SYNTHESIS AND PHYLOGENETIC COMPARATIVE ANALYSES OF THE CAUSES AND CONSEQUENCES OF KARYOTYPE EVOLUTION IN ARTHROPODS

by

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Abstract

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Cytogenetic data in the form of karyotypes are complex, highly-variable traits that offer opportunities to detect changes in genome organization, uncover phylogenetic history, and distinguish cryptic species. However, the synthesis of cytogenetic data across large taxonomic scales has been rare. Here I report the insights gained through a synthesis of all available karyotype data from Arthropoda.

The first chapter focuses on two databases that were built to make these data openly available, and broad insights into the evolution of sex determination and chromosome number in Arthropoda that the collected data have made possible. This is followed by four chapters that use these data to address fundamental questions in evolutionary biology. In chapter two I address the question, why do some clades frequently lose Y chromosomes while they are rarely lost in others? I propose the fragile Y hypothesis that suggests meiotic mechanisms are of central importance in explaining the phylogenetic distribution of Y chromosome loss. In chapter three I address the question, why do some clades exhibit near stasis in chromosome number while closely related clades show great variation? Using data from beetles in a comparative framework I show that when species evolve traits that reduce effective population size

rates of chromosome number evolution increase dramatically suggesting that observed differences in chromosome number are underdominant while segregating and are fixed through random drift in small populations. In chapter four I address the question, does low chromosome number increase the probability of evolving haplodiploidy? I develop a novel comparative method to test this long-standing hypothesis first proposed by Bull (1983). The results indicate that low chromosome number increases the probability of transitions to haplodiploidy. In chapter five I address the question, do eusocial Hymenoptera have higher chromosome number than solitary Hymenoptera? Using a larger dataset than previous studies, I show that there is no support for an absolute difference in chromosome number of solitary and eusocial Hymenoptera. Instead, I find that eusocial Hymenoptera have much higher rates of chromosome evolution when compared to their solitary relatives suggesting variable selection pressure or reduced effective population size in eusocial hymenoptera. As a body of work these analyses illustrate that chromosome number and meiotic mechanisms can impact the evolution of sex determination systems and that the evolution of chromosome number is often strongly influenced by the traits an organism exhibits.

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Chapter 1

Synthesis of cytogenetic data in Insecta.

Abstract

Perhaps the most basic description of a species nuclear genome is the number of discrete chromosomes it is divided among and any differences between the genomes of males and females. However, the difficulty of collecting this scattered data means that most karyotype data have never been analyzed using phylogenetically corrected statistical approaches. Karyotype records are often found in taxon specific journals or in studies with limited geographic focus; to remove this barrier to anlaysis we have constructed two databases. The Tree of Sex database brings together all available chromosome number and sex determination data available in plants, vertebrates, and invertebrates. The Coleoptera karyotype database contains all karyotype data available for Coleoptera including meiotic mechanisms. These two databases provide open access to records for over 20,000 species. In this chapter we focus our discussion on data available for Hexapoda and the insights it reveals. The distribution of sex determination data indicate that male heterogamety (XY, XO) is likely the ancestral sex determination method in insects. Female heterogamety appears to be a derived condition which has arrised 2 to 4 times in Insecta. Haplodiploidy has one ancient origin in the ancestor of all Hymenoptera and likely another in the ancestor of all Thysanoptera but many more recent origins in other orders. Pathenogenesis is present in almost all orders of insects but likely represent multiple recent origins. Finally, chromosome number varies across two orders of magnitude within insects but we find little evidence for traditional explanations for this variation.

Introduction

At the highest level genome architecture can be described by the number of chromosomes an organism has and the type of sex chromosome system present; this information is described by the α karyotype. This level of genome architecture is important to our understanding of basic processes in biology. For instance, changes in genome structure have been shown to play an important role in speciation (Presgraves 2008; Yoshida et al. 2014), gene movement (Betran et al. 2002; Meisel et al. 2009), adaptation (Nguyen et al. 2013; Guerrero and Kirkpatrick 2014), and sex chromosome evolution (Vicoso and Bachtrog 2013; Blackmon and Demuth 2014a). Particularly during the 1970's karyotype data was the focus of intense research and debate. White's stasipatric model of speciation invoked changes in the number of chromosomes fixed through drift in isolated populations that then acted as isolating barriers between incipient species (White 1978). Later though, theoretical work showed that the probability of fixing a change that could act as a strong isolating barrier upon secondary contact was unlikely with effective population sizes that at the time seemed reasonable (Lande 1985). The development of modern sequencing technology also led to a decline in the number of researchers actively analyzing karyotype data outside of cytotaxonomic settings.

The development of sequencing technologies and statistical phylogenetics now allow us to estimate large time calibrated phylogenies, and the development of comparative methods allows for statistical models of trait evolution. Together these developments provide a quantitative framework for the analysis of karyotype data and the ability to test many long standing theories in evolutionary biology. For instance: What forces control the number of chromosomes present in different clades, and why do some clades exhibit stasis while others are highly variable? How often do sex chromosomes experience turnover? Is the decay of sex-limited chromosomes (Y or W) inevitable? What governs the extinction of sex-limited chromosomes?

Insects are a tremendously successful group accounting for a great majority of animal species on Earth, and can be found in almost all terrestrial and freshwater habitats (Gullan and Cranston 2010; Mora et al. 2011). This diversity at the taxonomic level in insects is matched by variation in chromosome number and sex chromosome systems making insects vital in building our understanding of high-level genome evolution. Additionally there is a long history of cytogenetic research in entomology providing a rich source of data (Stevens 1906; Nichols 1910; Metz 1916; Goldsmith 1919; Hughes-Schrader 1924; Bridges 1935). The last broad synthesis of insect cytogenetics was completed by White approximately four decades ago (1977). At the ordinal level syntheses and compilations have been more common (Blattodea (White 1976), Coleoptera (Smith and Virkki 1978), Lepidoptera (Robinson 1971), Odonota (Kiauta 1972)). Cytogenetic studies in the intervening years have produced thousands of additional records that are scattered among hundreds of journal articles and dissertations often with narrow taxonomic or geographic focus. This has made it difficult to analyze large-scale patterns of karyotype evolution or even determine what data are available for a clade. To eliminate this barrier we created the Coleoptera karyotype database (www.uta.edu/karyodb) that contains 4,797 records, and worked with the Tree of Sex Consortium (www.treeofsex.org) to build the tree of sex database that contains 10,985 records for insects. We envision these resources as long-term repositories that will be regularly updated; and allow open access to data that were previously scattered and often available only through subscription-based publications. Here we systematically characterize and catalogue sex determination mechanisms and chromosome number in all orders of insects as well as describe insights from the broad-scale phylogenetic patterns of the distribution of sex chromosomes systems and chromosome numbers across insects.

Methods

To build our databases we began by incorporating records from important compilations (Makino 1951; Robinson 1971; Kiauta 1972; White 1976; Smith and Virkki 1978). Next we examined all articles citing these compilations and then performed an extensive literature search using Google Scholar and Web of Science using order and family names in conjunction with the terms: karyotype, cytotaxonomy, cytogenetic, parthenogenesis, haplodiploidy, polyploidy, sex chromosomes and chromosome number. Literature searches were performed in English, Spanish, Portuguese, French, and German. To the extent possible, we reconciled historical karyotype data with currently accepted taxonomy. The records in the database are drawn from approximately 453 published records including primary research papers, review papers and previous compilations in books.

The Tree of Sex database was developed in conjunction with the NESCent traitDB project (Vision and Cranston 2014). This database uses a standardized ontology (Table 1.1) for all animals. The web interface for this database requires users to select a taxonomic group of interest and then records can be selected based on any combination of the traits present in the focal taxonomic group.

Table 1.1 Tree of sex database ontology

Trait	States
Sexual system[1]	Gonochorous, hermaphrodite, parthenogenetic
Genotypic (sex determination)	Male heterogametic, female heterogametic, genetic sex determination, polygenic
Karyotype	ZO, ZW, XY, XO, WO, homomorphic, complex XY, complex ZW
Molecular basis	Dosage, Y dominant, W dominant
Chromosome number (female)[2]	integer number
Chromosome number (male)[2]	integer number
Predicted ploidy	1,2,3,4
Haplodiploidy (sex determination)	Arrhenotoky, paternal genome elimination, other
Environmental (sex determination)	TSD, TSD Ia, TSD Ib, TSD II, size, density, pH, ESD, other
Polyfactorial (sex determination)	Yes, no

[1] Gonochorous is used to indicate that sexes are separate akin to dioecy in plants.
[2] The diploid number is reported for chromosome number.

The Coleoptera Karyotype Database was developed locally and is hosted by the University of Texas at Arlington. We store the karyotype data in an SQL database that can be queried using a dynamically updated webpage. Users generate database queries by making selections at up to three taxonomic levels (suborder, family, or genus) and or selections of up to three karyotype characters (sex chromosome system, b-chromosomes, and reproductive mode). Once a user has defined a query, it is used to produce an html table. The website also allows users to export a comma separated text file of their results for offline analysis. The ontology used in this database (Table 1.2) maintains conventions that have a long history in Coleoptera cytogenetics where karyotypes are normally reported as the meioformula that describe not only the number of autosomes and the sex chromosome system but also the behavior of the sex chromosomes during meiosis.

Table 1.2 Coleoptera karyotype database ontology

Trait	States
Reproductive mode	Diplodiploid, Haplodiploid, Parthenogenetic
Autosomes	Integer number
Sex chromosome system	XY, XO, Xy_p, Xyr, Xy+, XXY, NeoXY
B chromosomes	Integer number
Predicted ploidy	Integer number

Testes squashes are the most common method employed in beetle karyotyping, and the karyotypes reported are meioformulas. For example, a commonly reported karyotype is "9+Xy_p" which indicates 9 autosomes, an XY sex determination system, and that a small Y chromosome remains at a distance from the X during meiosis. Most organisms, require homologous chromosomes to come together and form chiasmata during the first meiotic division to faithfully segregate the chromosomes into the gametes. However, many beetles particularly in the suborder Polyphaga exhibit various forms of non-chiasmatic segregation (Table 1.3).

Table 1.3 Meiotic mechanisms in Coleoptera

Type of meiosis	Sex chromosome systems	Description
Chiasmatic	XY, NeoXY, XXY	Canonical form of meiosis where homologous chromosomes pair and crossover occurs allowing for recombination between maternal and paternal copies of each chromosome.
Achiasmatic	XY, NeoXY, XXY	Meiosis in females is chiasmatic but in males all chromosomes tightly pair (synapse) but crossover and recombination are absent.
Asynaptic	Xy_p, Xy_r, Xy+	Meiosis of autosomes and sex chromosomes is chiasmatic in females. However in males autosomes have chiasmatic meiosis but the sex chromosomes though paired remain visibly separated with no opportunity for chiasmata or recombination.

Results

Order summaries

Below we briefly discuss the data available and the distribution of chromosome number and sex chromosome systems in each insect order. For completeness we also include the Entognatha (Collembola, Diplura and Protura) wingless arthropods, which, together with insects, make up the subphylum Hexapoda. All records included in the tree of sex database and the coleoptera karyotype database are included in Appendix A.

Collembola: There are 8000 described species of springtail (Cicconardi et al. 2013) across four separate suborders (considered as distinct orders by some authors). Reproduction is sexual in most species although parthenogenesis is described from 21 species. Species from three out of the four suborders of Collembola are male heterogametic with either XY or XO sex chromosome karyotypes. Members of the order Symphypleona, however, are characterized by paternal genome elimination: Both sexes develop from fertilized eggs with a X_1X_2/X_1X_2 sex chromosome karyotype, but during early development two X-chromosomes are eliminated in males rendering them X_1X_2OO, which is followed by the elimination of the rest of the paternal genome from the male germline later in development (Dallai et al. 1999; Dallai et al. 2000). Diploid chromosome numbers across the four suborders ranges from 8 to 22.

Diplura: Two-pronged bristletails contain approximately 1,000 described species, and ecological studies have revealed that many species reproduce sexually, and in some groups females even guard their eggs. Unfortunately, we have been unable to find any cytological investigations revealing the presence or absence of sex chromosomes or chromosome numbers in this lineage.

Protura: Approximately 700 species of these small primarily soil dwelling hexapods, known as coneheads, have been described. Chromosomal sex determination of the XY type has been identified in three Italian taxa from the families Acerentomidae and Eosentomidae (Fratello and Sabatini 1989). Records for the species *Eosentomon transitorium* indicate chromosome numbers ranging from 12-20 and both homomorphic and heteromorphic XY sex chromosomes, this variation is likely due to multiple cryptic species within *E. transitorium*.

Microcoryphia (Archaeognatha): Since their divergence ~250 million years ago Jumping bristletails are among the least morphologically changed insects, and approximately 500 species have been described. The method of sex determination has not been identified and cytological data are limited to the diploid chromosome number of 32 in *Machilis noctis* and 30 in *Dilta littoralis* (Bach and Petitpierre 1978). Reproduction by parthenogenesis has been identified in 5 taxa.

Zygentoma: The silverfish are the sister group of all other insects and have approximately 300 extant species. Cytogenetic data are available for four species and reveal an XO sex chromosome karyotype with diploid chromosome number of 34 in three taxa and 58 in one (Makino 1951). Two additional species have been reported to reproduce parthenogenetically which belong to two separate families (Ateluridae and Nicoletiidae) (Molero-Baltanás et al. 1998).

Ephemeroptera: Approximately 3,000 species of mayflies have been described, and cytogenetic data are available for 19 species. XY sex chromosome karyotypes have been found in six species from five genera, and two species have XO sex chromosome karyotypes (Kiauta and Mol 1977). Eleven species belonging to eight genera reproduce parthenogenetically (Gibbs 1977). Diploid chromosome number in this group ranges from 10 (which is found in three species of the family Baetidae) to 20 in *Ecdyonurus dispar*.

Odonata: The dragonflies and damselflies contain approximately 5,500 described species, and have a long history of cytogenetic studies. Data are available for over 400 species representing 149 genera. 400 taxa have XO sex chromosome karyotypes and this is widely accepted as the ancestral state for the order (Kiauta and Mol 1977). XY sex chromosome karyotypes have been observed in 20 species, which are thought to originate from fusions between autosomes and the ancestral X chromosome. Such fusions should result in a reduction in the number of autosomes of XY species in comparison to closely related XO species. Of the 7 genera having both XO and XY taxa, 4 genera show this expected pattern of lower chromosome number in XY species, while the other three genera have equal numbers of chromosomes in both XY and XO species. *Ishnura hastate*, a North American damselfly that has colonized the Azores is the only documented instance of parthenogenetic reproduction in the order (Rivera et al. 2005). Chromosome number ranges from 6 in the dragonfly *Macrothemis hemichlora* to 30 in an unidentified damselfly in the genus *Mecistogaster*.

Psocoptera: The Psocoptera or book lice are sister to the sucking lice (the Phthiraptera) and contain approximately 3,000 species. Sex determination karyotypes are known for species in 23 families, all of which display XO sex chromosome karyotype, with the exceptions of neo-Y systems in *Amphipsocus japonicas* and *Kolbia quisquiliarum* (Golub and Nokkala 2009). Parthenogenesis has been reported in about 30 species. Like Phthirapteran and Hemipteran insects, all Psocopteran have holocentric chromosomes. Diploid chromosome number ranges from 14 in genera *Elipsocus* and *Loensia* to 30 in the family Psyllipsocidae.

Phthiraptera: All approximately 5,000 species of lice are ectoparasites on bird and mammalian hosts. There are published karyotypes for 18 species, which show that both sexes are diploid, but that with the exception of a single species, no sex chromosomes can be distinguished (Tombesi and Papeschi 1993). This suggests that in most species sex chromosomes are either homomorphic or absent, and only *Bovicola limbata* was found to have differentiated X and Y chromosomes (Golub and Nokkala 2004). A recent molecular analysis in the human body louse suggested that this species may have paternal genome elimination (PGE) where males, although diploid, only transmit their maternal chromosomes to their offspring. Parthenogenesis has been described in four species. Diploid chromosome number in lice range from 10 in several species to 16 in the genera *Hoplopleura* and *Polyplax*.

Thysanoptera: There are approximately 5,000 described species of thrips. It is generally assumed that all thrips species are haplodiploid, which would make them the only other haplodiploid insect order besides Hymenoptera. However, only a small percentage of thrips (24 species) have been studied by cytogenetic methods and as a result, haplodiploidy has been confirmed only in 2 out of the 8 families (Brito et al. 2010). Like other groups of insects with haplodiploidy, some thrips display mating systems with high levels of sib-mating and females appear to have control over the sex ratios they produce (Choe and Crespi 1997). Parthenogenesis occurs frequently and is described in 59 species. Diploid chromosome number in thrips ranges from 20 (reported in two families) to 106 in *Aptinothrips rutua*.

Hemiptera: There are approximately 90,000 described species of hemipterans, divided into four suborders. In three of these the sex determining systems are relatively homogeneous, mostly of the XO type with occasional occurrence of complex male heterogametic karyotypes and origins of neo-Y chromosomes. The suborder Sternorrhyncha, which includes white flies, aphids and scale insects is much more diverse though. Each of these three clades displays a different and unique set of sex determining systems: White flies are haplodiploid, with males developing from unfertilized eggs. Most aphids reproduce through cyclic parthenogenesis, where a species goes through several rounds of parthenogenesis followed by a single generation of sexual reproduction. All parthenogenetic and sexually produced offspring have a XX sex chromosome karyotype, and males are produced by random elimination of one of the two X-chromosomes during early development, resulting in XO males (Wilson et al. 1997). Some aphid species have lost their sexual life cycle, and reproduce exclusively through parthenogenesis. Scale insects display one of the most diverse array of sex determination systems. Sex determination in a number of basal clades is of the XO type, but there have been at least two independent transitions to systems with haploid males within scale insects. Haplodiploidy evolved in the tribe Iceryiini, while paternal genome elimination (PGE) evolved in the neococcids and is the most common mode of reproduction among scale insects (found in approximately 6000 species; (Gavrilov 2007)). In some species the paternal genome is silenced (heterochromatinized) in somatic cells and eliminated from the germline, while in others the paternal genome is lost entirely from all cells during early development (Ross et al. 2010). Finally, a number of species in the tribe Iceryiini are unique among insects having evolved true hermaphroditism, where individuals produce both male and female gametes and reproduce through self fertilization (Ross et al. 2010). Diploid chromosome number ranges widely among hemipterans, ranging from 4 in some scale insect species of the family Monophlebidae, while the highest is 192 and was reported in the scale insect *Apiomorpha macqueeni*.

Blattodea: About 4,500 species of roaches have been described. Cytogenetic data for over 100 species are available, and all of the sexual species have XO sex chromosome karyotypes. The overwhelming majority of roaches possess a metacentric X chromosome which may make centric fusions with autosomes unlikely, and might explain the rarity of complex sex chromosomes in this order (White 1976). Two species that reproduce parthenogenetically are reported. Chromosome number ranges from 16 in *Lophoblatta fissa* to 80 in *Macropanesthia rhinoceros*.

Isoptera: Long considered an independent order, recent molecular studies indicate that the termites are actually a highly derived clade that nests within Blattodea as sister to the genus *Cryptocercus* (Ware et al. 2008). Approximately 2,600 species of termites have been described. Termites are eusocial with overlapping generations and multiple castes including soldiers and sterile workers that care for the young. Unlike the eusocial Hymenoptera, termites are diplodiploid. Cytogenetic data is available for 83 species representing 4 families and 41 genera. Sex chromosomes have been identified in 63 taxa, and the most frequently observed sex chromosome karyotype found in 51 species is $X_1X_2Y_1Y_2$ (Bergamaschi et al. 2007). One species (*Stolotermes victoriensis*) has XO sex chromosome karyotype (Luykx 1990). Chromosome number in Isoptera ranges from a high of 98 in *Mastotermes darwiniensis* to a low of 30 in *Cryptotermes domesticus*.

Mantodea: With about 2,300 described species the mantids are the sister group of Blattodea and Isoptera, and are the earliest branching order of dictyopterans. With the exception of one parthenogen all species exhibit male heterogamety. XO sex chromosome karyotypes are found in approximately 60 percent of the studied species, but complex sex chromosome complements are also common. Specifically, X_1X_2Y sex chromosome karyotype has been documented in approximately 40 species, and a single XY species has also been reported. The X_1X_2Y species were suggested to form a monophyletic group and their sex chromosome derived from a reciprocal translocation between a metacentric autosome and a metacentric X chromosome, resulting in two X chromosomes both of which have a single arm that chiasmatically pairs with one of the arms of the ancestral autosomes that became the Y chromosome. Achiasmatic male meiosis has evolved multiple times within mantids (White 1976).

Chromosome numbers in mantids range from a low of 16 found in several groups to a high of 40 in *Leptomantis parva* and an unidentified species in the genus *Humbertiella*.

Zoraptera: Approximately 30 species of zorapterans have been described. These primarily tropical insects live in small colonies of less than 200 individuals. The colonies exhibit a polygynous mating system with the dominant males responsible for the majority of successful mating attempts. *Zorotypus hubbardi* is the only species that has been studied cytogenetically and it exhibits XY sex chromosome karyotype with a diploid chromosome number of 38 (Kuznetsova et al. 2002).

Orthoptera: The order Orthoptera contains over 20,000 species. The large size of chromosomes and low diploid number have made Orthoptera an important group for our general understanding of chromosomes and cytogenetics. XO sex chromosome karyotypes are found in about 80% of the species, and is considered the ancestral mode of sex determination in this clade. However, many species within Saltatoria have XY and X_1X_2Y sex chromosome karyotypes (Castillo et al. 2010a). Parthenogenesis has been reported in 10 species (Lehmann et al. 2011). Extensive cytogenetic work on natural populations has revealed many examples of chromosomal variation within and between species, including inversions, translocations, fusions, fissions, sex chromosome rearrangements, and supernumerary B-chromosomes (Karamysheva et al. 2011). Diploid chromosome number in Orthoptera ranges from a low of 8 in *Dichroplus silveiraguidoi* to a high of 26 in *Conometopus sulcaticollis*.

Phasmatodea: There are approximately 3,000 species of stick insects. Data are available for 144 taxa, 37 of which reproduce parthenogenetically, and 83 of which have identified sex chromosomes. The majority of stick insects have XO sex chromosome karyotypes which likely is the ancestral system (68 species, present in 36 of 46 studied genera), and a minority exhibits XY sex chromosome karyotypes (13 species, 8 genera) (White 1976). One species, *Didymuria violescens*, has males with both XO and XY sex chromosome karyotypes. Chromosome number in this group is highly variable and polyploidy is well documented in parthenogenetic taxa. Mean chromosome number for all species that have identified sex chromosomes is 36.5, while parthenogenetic species have a mean chromosome number of 49.1. Diploid chromosome number in stick insects ranges from a low of 22 found in several species to 80 in *Sipyloidea sipylus.*

Embiidina (Embioptera): The order of webspinners contains approximately 300 described species. Data on sex determination are available for 4 taxa from the family Embiidae and 5 from the family Oligotomidae (White 1976). All studied sexually reproducing Embiidina have XO sex chromosome karyotypes, and female diploid chromosome numbers range from 20-24. Two parthenogenetic species have been identified, one of which, *Haploembia solieri*, occurs as both a diploid and triploid race.

Notoptera: The order Notoptera unites two small insect groups, Grylloblattodea and Mantophasmatodea, which have at times been considered independent orders, and together have approximately 40 extant species. Cytogenetic data are available only for two species of the family Gryllobattodea, *Grylloblatta campodeioformis* and *Galloisiana nipponensis* and both species have XY sex chromosome karyotypes (White 1976). The diploid chromosome number of *G. nipponensis* is 30.

Plecoptera: There are approximately 2,000 species of stoneflies. Cytogenetic data are available for 16 species from the families Perlidae and Perlodidae, both members of the suborder Systellognatha. The sex chromosome system has been identified in 11 taxa, and 7 species have X_1X_2O and 3 have XO sex chromosome karyotypes, while only one has XY. The available cytogenetic evidence indicates that the multiple sex chromosome systems in Plecoptera are the result of fission rather than fusion. For instance, in the genus Perla species with multiple sex chromosomes have more chromosomes than Perla species with either XY or XO sex chromosomes (2n=22 and 26 versus 10, 19 and 21) (Matthey and Aubert 1947). This along with the absence of Y chromosomes in these species suggests that the multiple sex chromosome systems originated from fissions of the ancestral X chromosome. Diploid number in this group ranges from 10 to 33.

Dermaptera. Approximately 2,000 species of earwigs have been described. Cytogenetic data from over 50 species are available (White 1976), and all are male heterogametic, with about half having XY sex chromosomes, and the other half having complex sex chromosomes (X_1X_2Y and $X_1X_2X_3Y$). Two earwig species are XO. The chromosomes of Dermaptera seem to be holocentric (White 1972). Sex chromosome polymorphism has been documented in *Forficula auricularia,* where XY and X_1X_2Y males coexist within populations, and X_1X_2Y males have an additional chromosome, whose origin is unclear (Henderson 1970). Chromosome number varies from a low of 4 in *Hemimerus bouvieri* to a high of 30 in *Arixenia esau*.

Hymenoptera: There are approximately 100,000 species of Hymenoptera and it is assumed that all of them have a haplodiploid sex determining system, which has been confirmed in all of the 1,300 species for which karyotype data are available (Consortium 2014). Chromosome number varies from 1 in *Myrmecia croslandi* to 57 in *Dinoponera lucida*.

Coleoptera: Beetles, with 350,000 described species, have been the focus of intense cytogenetic investigation, and karyotypes have often been used to identify cryptic species and to resolve phylogenetic relationships (Smith and Virkki 1978). Cytogenetic data for over 4,900 taxa exist, and all sexually reproducing beetles are male heterogametic with over 3,000 species possessing heteromorphic XY sex chromosome karyotypes. Of the remaining species, over 700 are XO and more than 100 are asexual (Blackmon and Demuth 2014a). There are at least two origins of haplodiploidy and one of PGE in beetles (Jordal et al. 2000). Coleoptera consists of 4 extant suborders. The suborder Archostemata has only 42 extant species, two species in this group have been studied. *Distocupes varians* has 9 autosomes and XO sex determination, while *Micromalthus debilis*, has a diploid chromosome number of 20 and cyclic parthenogenesis, paedogenesis (reproduction by sexually mature larvae), and haplodiploidy (Normark 2013). The suborder Myxophaga has approximately 65 species but only *Ytu zeus* has been investigated. Diploid number in this species was 20 and the sex chromosomes where distant pairing XY. Adephaga, the second largest order of beetles, contains approximately 40,000 described species, and data are available for 1,221 species from 7 families. Chromosome number in Adephaga is lowest in *Graphipterus serrator,* which has a diploid chromosome number of 8, and highest in *Dixus capito obscuroides*, which has 70 chromosomes. Polyphaga is the largest suborder of beetles and contains over 300,000 described species with XY sex chromosomes by far the most common (over 1884 species from 43 families). XO sex chromosomes have been recorded in 18 families, and complex sex chromosome systems have been found in 12 families. Diploid chromosome number ranges from 4 in *Chalcolepidius zonatus* to 66 in *Disonycha bicarinata*. Polyploidy is frequent in parthenogenetic species, and parthenogenesis has been identified in 16 families. True haplodiploidy has evolved at least once in the subfamily Scolytinae, and it is thought that all Xylobrini (> 1200 taxa) are haplodiploid but this has been investigated only in a handful of species. Another scolitine not closely related to the tribe Xylobrini, *Hypothenemus hamperi*, exhibits functional haplodiploidy in the form of paternal genome elimination (Brun et al. 1995).

Strepsiptera: Twisted-wing insects are a highly derived and enigmatic group of endoparasitic insects and contain over 500 species. Their phylogenetic placement was debated for some time, but most complete studies to date seem to indicate a close relationship with Coleoptera (Misof et al. 2014). Cytogenetic evidence for this group exists for just two species. The diploid number of *Xenos peckii* was identified as 16 and in an unidentified species of *Xenos* from Brazil, 3 autosomes and an XY sex chromosome karyotype was observed (Ferreira et al. 1984). There are scattered reports of parthenogenesis in this family based on collecting only females, but the only convincing case of parthenogenesis is in *Stichotrema dallatorreanum*, a species that is facultative parthenogenetic with isolated females reproducing for multiple generations (Kathirithamby et al. 2001).

Neuroptera: With over 5,000 described species, this group has cytogenetic information for 72 taxa belonging to five families. XY sex determination is dominant in the group and is found in 70 taxa and in all studied families. The Y chromosome has been lost at least twice, once in the Sisyrid *Climacia areolaris* and again in the Mantispid *Plega dactyloya* (Hughes-Schrader 1975b). The family Mantispidae also contains a species, *Entanoneura phithisica* that has a $X_1X_2X_3Y_1Y_2Y_3$

sex chromosome system (Hughes-Schrader 1969). *E. phithisica* has 7 autosomes, a reduction of 2 when compared to *E. limbata,* which indicates that it was likely a conversion of two of the dot like autosomes to produce this multiple sex chromosome system. Diploid chromosome number in the group ranges from 10 to 26.

Megaloptera: This group has approximately 300 described species, and along with Raphidioptera was formerly considered part of Neuroptera. Four of these species have been examined cytogenetically and all have XY sex chromosome karyotypes, and diploid chromosome numbers range from 9 to 11 (Takeuchi et al. 2002).

Raphidioptera: There are approximately 300 species of extant described snakeflies. Cytogenetic data are limited to 6 species from the genera *Agulla* and *Rhaphidia*, all with XY sex chromosomes (Hughes-Schrader 1975a). All studied species have had 12 autosomes.

Trichoptera: The caddisflies contain approximately 11,000 extant species, and are the sister group of Lepidoptera. Sex determination data are limited to 15 taxa, all of which have a ZO system (Lukhtanov 2000). An additional 6 taxa are likely parthenogenetic (Corbet 1966). Diploid chromosome number has been identified for 44 species in this group and varies from a low of 12 in *Limnephilus affinis* to a high of 100 in *Agrypnetes crassicornis*.

Lepidoptera: There are over 160,000 described butterfly species. Like Trichoptera all investigated Lepidoptera are female heterogametic suggesting that the ancestor of these two orders evolved female heterogamety. While there have been many cytogenetic studies in butterflies, testes squashes cannot reveal the karyotype of the heterogametic sex as commonly reported in XY groups and most cytogenetic studies have only reported the chromosome number. The sex chromosome system has been identified in only 40 of the 1,219 studied species, and Lepidoptera have both ZW and ZO systems. Based on the distribution of ZO within Lepidoptera as well as its sister group Trichoptera, it is believed that butterflies were ancestrally ZO (Lukhtanov 2000). ZO sex chromosomes have been identified in 6 families of Lepidoptera, three of which (Arctiidae, Gelechiidae, and Saturniidae) also have species with W chromosomes. These ZW sex chromosome systems are usually found with matching reductions in the number of autosomes, lending support to the idea that fusions between the autosomes and the ancestral Z chromosome are the source of new W chromosomes or even multiple ZW chromosome system. The genus *Samia* within Saturniidae offers a particularly striking example with species that have 13, 12, and 11 autosomes having ZO, ZW, and Z_1Z_2W sex chromosome systems respectively (Yoshido et al. 2005). Some of these transitions may have also coincided with a transition of the sex determining mechanism, from an ancestral Z counting state to a dominant feminizing allele on the W, as is found in *Bombyx mori* (Kiuchi et al. 2014). Chromosome number in Lepidoptera is also highly variable with diploid numbers ranging from 14 to 382. Parthenogenesis has been identified in 16 taxa, 10 of which belong to the family Psychidae.

Diptera: Approximately 125,000 species of Diptera have been described. The ease with which polytene chromosomes can be visualized has led to a cytogenetic data for over 1,400 taxa (White 1949). The majority of species (1188) have XY sex chromosome systems, but the family Tephritidae has evolved ZW sex chromosome systems and several lineages lack heteromorphic sex chromosomes all together. White (White 1949) proposed a classification of Diptera based on cytological grounds. Lower Diptera (Nematocera) were divided into four groups. The most primitive Diptera (superfamily Tipuloidea) are characterized by the presence of chiasmata in both sexes, and cytologically distinguishable XY sex chromosomes. A second assemblage of families (including Culicidae, Chironomidae, and Simuliidae) generally lack cytologically distinguishable XY sex chromosomes, but have retained chiasmata in males. The third group, which includes Bibionidae and Thaumaleidae, is characterized by heteromorphic XY sex chromosomes but a lack of chiasmata in males. A fourth cytological group of Nematocera is characterized by a highly specialized chromosome cycle, the loss of the Y chromosome, and sex is determined by elimination of the paternal X chromosome, and includes the families Sciaridae and Cecidomyidae. Most families of Diptera, including Drosophila, fall within the suborder Brachycera (higher Diptera). All Brachycera appear to lack chiasmata in males, and most species have heteromorphic XY chromosomes. At least 9 families have evolved parthenogenetic species, with the greatest concentration of parthenogens in the family Chironomidae (where 25 of the 52 studied taxa are parthenogenetic). In contrast to the lability of their sex determination systems, chromosome number varies less in this group. A number of families have genomes with just 3 autosomes, while Tabanidae has the highest with 12 autosomes. A recent study has demonstrated that while many Diptera species have male heterogamety, the chromosome that is sex-linked can differ among families. In particular, the sex chromosome of Drosophila was found to be autosomal in several outgroup species from different families (Vicoso and Bachtrog 2013; Blackmon and Demuth 2014b).

Mecoptera: Scorpion or hang flies, with approximately 550 extant species, are the sister group of Diptera, but have not been widely studied cytogenetically. 13 of the 14 taxa in which sex chromosomes have been identified exhibited XO sex determination, and one species, *Boreus brumalis,* has a X_1X_2Y sex chromosome complement (Xu et al. 2013). Achiasmatic male meiosis appears to have evolved independently in different species (Ullerich 1961). The number of autosomes in Mecoptera ranges from 11 to 28.

Siphonaptera: Fleas have an estimated 2,500 species, and recent molecular evidence indicates that fleas are actually highly derived Mecopterans most closely related to the family Borediae (Whiting 2002). Despite their abundance and medical importance, cytogenetic data are available for only 7 taxa (Thomas 1990). The sex chromosome system has been identified in six taxa, two of which have XY sex chromosomes and four that have multiple sex chromosomes, a characteristic that would lend support to the close association of Siphonaptera with Borediae that also exhibits multiple sex chromosomes. The number of autosomes in this group ranges from a low of 3 in *Xenopsylla prasadi* to a high of 10 in *Leptopsylla musculi*.

Chromosome number

Chromosome numbers differ dramatically among and within insect groups, with some groups having stable karyotypes, while others are highly variable. Figure 1.1 shows variation in diploid chromosome numbers across orders of insects, and both the mean as well as the variance in chromosomes numbers differ dramatically among insect orders. Lepidoptera, for example, have an average of 60 chromosomes, ranging from 14 to 380. Diptera, on the other hand, only have 22 chromosomes on average, and reported chromosome numbers vary from 12 to 52. Differences in chromosomal mutation rates could contribute to this diversity in chromosome numbers across taxa, for instance, genome rearrangement rates are an order of magnitude higher in Lepidoptera than in Diptera (d'Alencon et al., 2010). However, a popular explanation for this variance is the presence or absence of localized centromeres. While the majority of insects have monocentric (i.e. acrocentric or metacentric) chromosomes, a significant number of insects, including for example all Lepidoptera and Hemiptera have holocentric chromosomes. Here localized centromeres are absent and even highly fragmented chromosome can segregate successfully during meiosis and might enable more flexible karyotypes and a higher number of chromosomes (Melters et al., 2012). To evalaute this hypothesis we conducted a phylogenetic ANOVA. We used an existing phyogeny and the mean chromosome number for each order from the Tree of Sex database (appendix A) (Trautwein et al. 2012; Ashman et al. 2014). We found no significant difference with this approach (F=0.26, P-value=0.81).

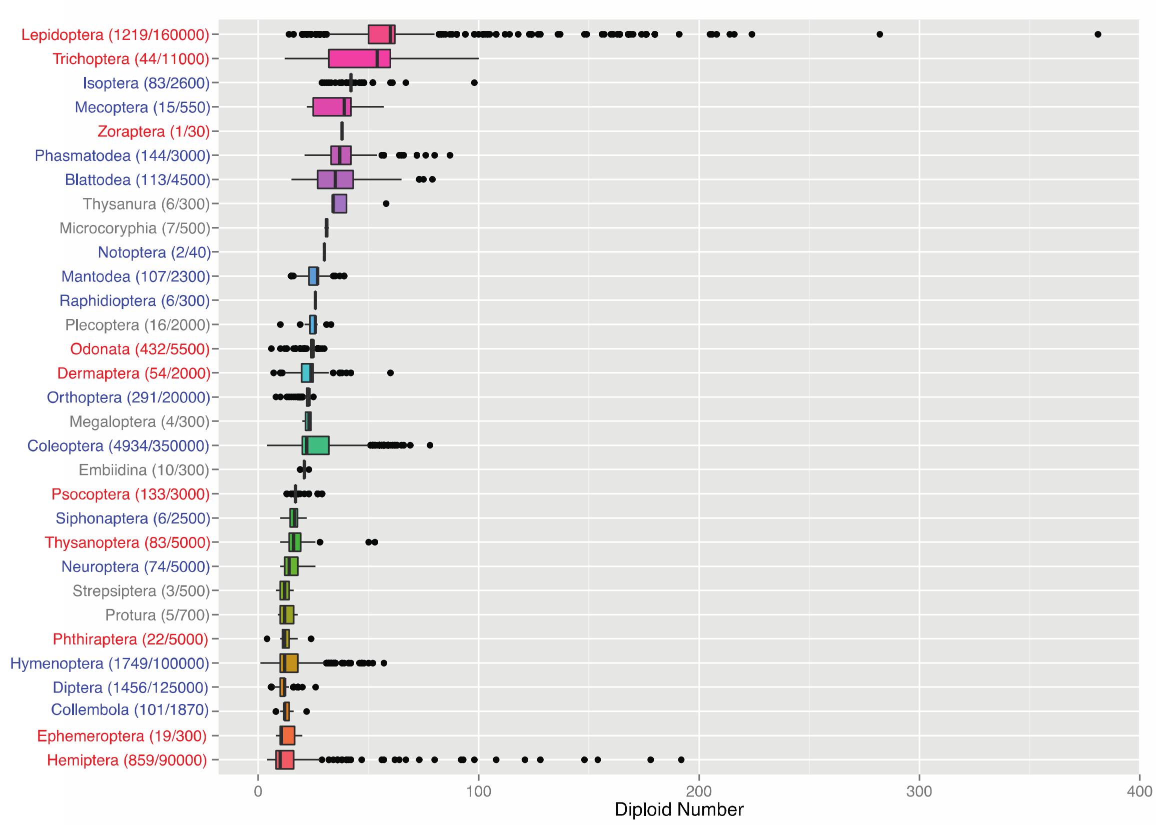

Figure 1.1 Distribution of chromosome number across hexapods.

Diploid chromosome numbers reported in hexapods. Boxes represent the range of 25th to 75th percentile. Outliers are plotted as individual points. The color of the order names indicates whether chromosomes are holocentric (red), monocentric (blue), or unknown (gray). The number of species for which data are available and the size of each order are indicated in parentheses.

Sex chromosome systems in insects

Most insects reproduce sexually (Normark 2003) and almost all insects are gonochoristic, i.e. individuals are either male or female throughout their life. Hermaphroditism is largely absent in insects (Jarne and Auld 2006). Throughout the tree of life, sex can be determined by many different mechanisms (Bachtrog et al. 2014), and insects capture much of this diversity (Figure 1.2), and because of the absence of hermaphroditism none of this diversity can be explained by independent origins of separate sexes, unlike many other groups with diverse sex determination systems (e.g. fish or Crustaceans).

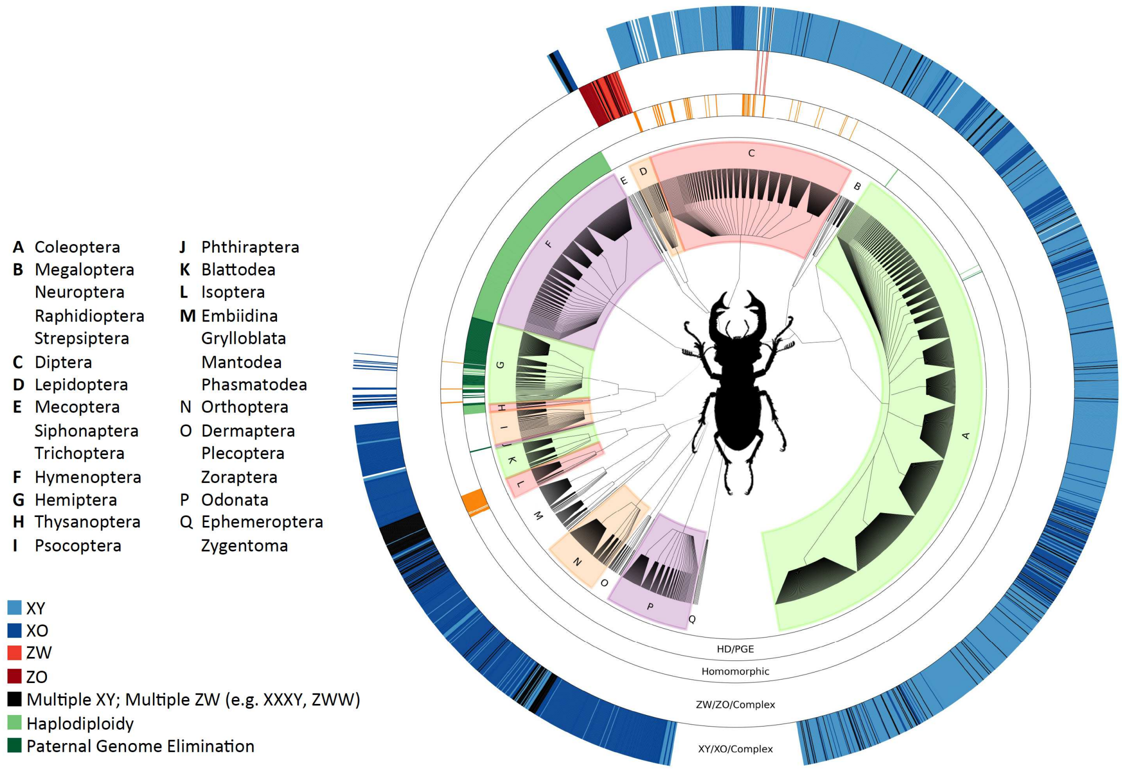

Figure 1.2 Genus level distribution of sex determination characteristics in insects. The exterior ring indicates male heterogametic systems followed by female heterogametic, homomorphic systems, and haplodiploid or paternal genome elimination. The branching structure is based on taxonomy and the figure incorporates data from 9,067 species representing 2725 genera. Data are available from treeofsex.org.

Male and female heterogamety

The phylogenetic distribution of sex determination systems indicates male heterogamety is likely the ancestral state of insects. Male heterogamety is found in 77% of investigated species, and within 223 of 359 families. Sex determination systems where females are the heterogametic sex are rare in insects, and we find only two transitions to female heterogamety:

one at the base leading to the superorder Amphiesmenoptera (Lepidoptera and Trichoptera), and a second transition in Diptera, within the family Tephriditae. Transitions to female heterogamety from an ancestral state of male heterogamety might be difficult to achieve, as they result in offspring that are homozygous for the Y (Bull 1983; Bachtrog et al. 2014). If the X contains important genes not present on the degenerate Y, such transitions become increasingly difficult and such constraints may underlie the rarity of female heterogamety in insects. However, in species groups with homomorphic sex chromosomes such transitions may be easier, and there might be several instances of undetected female heterogamety, as has been suggested for example in Chironomidae ((Thompson 1971); but see (Martin and Lee 1984)).

Sex-limited chromosome evolution

Gain and Loss of the sex-limited chromosome is common. Many genera and famillies have apparent recent Y or W losses, and XO or ZO appears to be the ancestral mode of sex determination in several insect orders. In particular, parsimony ancestral state reconstruction indicates that ZO was the ancestral state for the most recent common ancestor of Lepidoptera and Trichoptera (Lukhtanov 2000). Likewise several other orders were likely ancestrally XO, including Orthoptera, Odonata, Hemiptera and Blattodea. The frequency at which the sex-limited chromosome is lost is probably largely driven by its gene content; i.e. in groups where the Y contains genes necessary for survival or reproduction, it is unlikely to be lost unless these genes are relocated to another chromosome first. However meiotic mechanism also appear to be important within groups (see chapter 2 and (Blackmon and Demuth 2014a)). An indication of the variation in the rate of loss is seen in comparing Diptera and Coleoptera, the species groups for which we have the most data. Using the taxonomy in our database to control for phylogeny, we infer a minimum of 70 Y chromosome losses in Coleoptera but only 12 in Diptera. After controlling for the different number of karyotype records we have in both groups, we still have an excess of over 30 transitions in Coleoptera. This difference in number of events is matched by a difference in fraction of XO sex systems, with 4.2% of Diptera records and 23.3% of Coleoptera records indicating XO sex chromosome systems. This suggests that the fly Y chromosome may harbor more genes important for male function, relative to the beetle Y.

Sex-limited chromosomes can be lost, but also be regained, for example by fusions between Z or X chromosomes with an autosome or the capture of a former B chromosome. In fact, karyotype data from orders like Lepidoptera, Orthoptera, and Odonota indicate that sex-limited chromosomes are frequently regained after their loss in an ancestral lineage. Though the sex chromosomes have been identified in only 40 species of Lepidoptera, we identify at least four independent origins of W chromosomes, while in Orthoptera and Odonata we observe 12 and 10 independent origins of Y chromosomes, respectively. If fusions between autosomes and sex chromosomes are the primary source of new sex-limited chromosomes we would expect species with new sex-limited chromosomes to have fewer autosomes. The most recent common ancestor of both Lepidoptera and Orthoptera had no sex-limited chromosomes. So these orders provide an opportunity to test this expectation. The Lepidoptera genus *Samia* has both XO and XY species as do the Orthoptera genera *Dichroplus*, *Leiotettix* and *Scotussa* in each of these four cases the species with sex-limited chromosomes have fewer autosomes strongly suggesting that fussion are one of the primary sources of new sex-limited chromosomes.

Table 1.4 Mean number of autosomes in genera with variation in either the number of sex chromosomes. The mean number of autosome reported for species with XO/ZO, XY/ZW and multi XY/ZW systems is shown in their respective columns. Whether the pattern is consistent with fission or fusions and translocations is indicated in the final two columns.

Order	Genus	XO/ZO	XY/ZW	Multi XY/ZW	Fusion or Translocation	Fission
Coleoptera	Altica	-	10.9	10.5	X	-
Coleoptera	Amystax	-	8.5	10.0	-	X
Coleoptera	Anthonomus	9.0	15.5	20.0	-	X
Coleoptera	Asphaera	-	9.2	9.9	-	X
Coleoptera	Aulacophora	-	17.5	27.6	-	X
Coleoptera	Botanochara	15.0	-	18.8	-	X
Coleoptera	Calathus	18.1	17.3	10.0	X	-
Coleoptera	Callosobruchus	9.0	9.0	9.0	-	X
Coleoptera	Cassida	-	9.1	9.0	X	-
Coleoptera	Chilocorus	-	9.6	11.0	-	X
Coleoptera	Chondrocephalus	-	14.0	17.0	-	X
Coleoptera	Chrysomela	-	16.0	16.0	-	X
Coleoptera	Deporaus	-	11.3	13.0	-	X
Coleoptera	Dermatoxenus	-	9.7	8.5	X	-
Coleoptera	Dermestes	-	8.0	8.0	-	X
Coleoptera	Diapromorpha	-	10.3	10.0	X	-
Coleoptera	Disonycha	14.0	22.5	20.0	-	X
Coleoptera	Epicauta	-	9.2	9.0	X	-
Coleoptera	Euparius	-	10.0	23.0	-	X
Coleoptera	Heikertingerella	-	9.0	8.3	X	-
Coleoptera	Heilipodus	-	14.0	13.0	X	-
Coleoptera	Heilipus	-	12.7	13.0	-	X
Coleoptera	Hermaeophaga	-	7.0	7.0	-	X
Coleoptera	Homoschema	-	3.0	4.0	-	X
Coleoptera	Laccoptera	-	8.0	8.0	-	X
Coleoptera	Lepidospyris	-	10.0	10.0	-	X
Coleoptera	Monochamus	-	9.5	9.0	X	-
Coleoptera	Omophoita	-	10.1	10.0	X	-
Coleoptera	Opatroides	-	9.0	9.0	-	X
Coleoptera	Otiorhynchus	-	10.0	10.0	-	X
Coleoptera	Pityogenes	-	8.1	8.0	X	-
Coleoptera	Pseudotetracha	-	11.3	10.0	X	-
Coleoptera	Pyrophorus	6.5	-	7.0	-	X
Coleoptera	Scarites	21.4	25.0	18.0	X	-
Coleoptera	Scepticus	-	10.0	10.0	-	X
Coleoptera	Stolas	-	11.5	13.0	-	X
Coleoptera	Tanymecus	-	10.0	10.0	-	X
Coleoptera	Typophorus	-	9.0	9.0	-	X
Dermaptera	Forficula	-	11.0	10.3	X	-
Dermaptera	Nala	-	17.5	16.0	X	-
Dermaptera	Nesogaster	10.0	-	9.0	X	-
Diptera	Anastrepha	-	4.8	3.5	X	-
Diptera	Bacha	-	3.6	3.0	X	-
Diptera	Hemipyrellia	-	5.0	4.0	X	-
Diptera	Hylemya	-	10.0	10.0	-	X
Diptera	Sepedon	5.0	5.0	4.0	X	-
Diptera	Toxomerus	-	4.0	4.0	-	X
Isoptera	Cryptotermes	-	23.0	16.4	X	-
Lepidoptera	Orgyia	-	11.5	10.0	X	-
Lepidoptera	Samia	13.0	12.0	11.0	X	-
Neuroptera	Plega	-	10.0	8.0	X	-
Orthoptera	Dichroplus	10.75	9.6	9.0	X	-
Orthoptera	Leiotettix	11.0	8.5	5.5	X	-
Orthoptera	Scotussa	10.5	7.0	9.0	-	X
Plecoptera	Perla	9.5	4.0	11.2	-	X

Complex sex chromosomes

In some insect orders, such as Dermaptera, Plecoptera and Isoptera, a majority of the taxa were found to harbor multiple X or Y chromosomes, and complex sex chromosomes are also common in Mantodea, Coleoptera and Orthoptera. Multiple sex chromosomes can in principle occur through various chromosomal mutations, including fusions, fissions or translocations. Fusions are expected to reduce the number of autosomes between closely related species with complex vs. simple sex chromosomes while fissions and translocations should have no effect on the number of autosomes. To determine the source of complex sex chromosome systems, we compared the mean number of autosomes between species with simple vs. complex sex chromosomes within 56 genera that contain species with both types of sex chromosomes (Table 1.4). In 26 of 56 genera, species with complex sex chromosomes had fewer autosomes than species with simple sex chromosomes, consistent with fusions generating the complex sex chromosome system in these groups. However, in 30 of 56 genera, species with complex sex chromosome systems have equal or more autosomes, indicating that fissions (or translocations) are likely the source of additional X or Y chromosomes in these groups. This variation indicates that multiple processes are creating complex sex chromosomes in insects. However, we find that within orders, often one process dominates. For instance, within Coleoptera 26 genera show evidence for fission or translocations while only 13 suggest fusions. While holocentric chromosomes may be more prone to fissions than chromosomes with a defined centromere, we find no evidence for this effect among genera that we examined. Only two orders in this analysis have holocentric chromosomes (Dermaptera and Lepidoptera), but all 5 genera included show a pattern of decreased number of autosomes in species with complex sex chromosomes, consistent with fusions creating complex sex chromosomes.

Haplodiploidy

Haplodiploidy has evolved multiple times in insects, but losses are rare. Haplodiploidy, where females develop from fertilized eggs and males from unfertilized ones, has evolved at least 6 times within insects (Normark 2003). Two insect orders, Hymenoptera and Thysanoptera (thrips), are completely haplodiploid, and there are a number of smaller haplodiploid clades within Coleoptera and Hemiptera. Aside from true haplodiploidy there are several origins of paternal genome elimination (PGE). Species with PGE display the same transmission genetics as true haplodiploid species, where males only transmit their maternal genome to their offspring, but in contrast to haplodiploids, males develop from fertilized eggs and the paternal genome is lost in at least the germline cells or in some cases is heavily condensed and not passed on to the sperm. PGE has evolved at least 6 times within insects, once within Coleoptera, Hemiptera, Collembola (a sistergroup to the insects), Phthiraptera and twice within Diptera. The exact number of species with PGE is unclear as for most clades only a handful of species have been studied. However our data suggest that PGE might be present in up to 20,000 species (2%) of insect. Haplodiploidy and PGE are thought to have evolved as a maternal adaptation that increases the reproductive value of females: A female's haploid son will transmit her genes to future generations at twice the rate of a diploid son (Brown 1964; Bull 1979). However this advantage is countered by the fact that haploid males will probably be less viable, at least in the early stages of the evolution of haplodiploidy, which will limit the origination of haplodiploidy (see chapter 4).

Parthenogenesis

Parthenogenesis, where females develop from unfertilized eggs, has evolved many times across insects. Inclusion of a recently compiled list of parthenogenetic insect species to our database shows that parthenogenesis is found in 144 families, and 1169 species (Normark, 2014; Normark, 2003). Thus, while parthenogenesis is relatively rare when considering the total number of species, it has evolved hundreds or even thousands of times. Hemiptera and Coleoptera harbor many of the parthenogenetic species reported (325 and 467, respectively). Consistent with evolutionary predictions that asexual lineages are short-lived, there are few larger clades (genera, families etc.) that are entirely parthenogenetic, but instead parthenogenesis is found mostly at lower taxonomic units. A wealth of theory has been published on the relative advantage of sexual versus asexual reproduction, but much less on the factors that can explain the phylogenetic distribution parthenogenesis (Ross et al. 2012).

Conclusions

Our synthesis of karyotype data provides a first step in the understanding of the evolution of sex determination systems and chromosome number in one of the most abundant and economically important groups of organisms on the planet. The taxonomic breadth of our analysis allows us to make broader and more general inferences than earlier syntheses of insect sex determination, e.g. (Cook, 2002; Kaiser & Bachtrog, 2010; Verhulst, van de Zande & Beukeboom, 2010).

In general, we find that male heterogamety is likely ancestral for insects, while female heterogamety has evolved at least twice. Our data indicate that sex-limited chromosomes are lost and gained more readily in some clades than others, and that some groups (i.e. Dermaptera, Plecoptera, Mantodea, and Isoptera) exhibit a propensity for complex sex chromosomes not seen in closely related clades. The origin of complex sex chromosomes appears to differ among groups with both fussions and fissions playing an important role.

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Blackmon, Heath (2014) Coleopterist's Corner. *Entomological Society of Ontario Newsletter* 19(2) 18-21.

Chapter 2

Estimating tempo and mode of Y chromosome turnover: explaining Y chromosome loss with the fragile Y hypothesis

Abstract

Chromosomal sex determination is phylogenetically widespread, having arisen independently in many lineages. Decades of theoretical work provide predictions about sex chromosome differentiation that are well supported by observations in both XY and ZW systems. However, the phylogenetic scope of previous work gives us a limited understanding of the pace of sex chromosome gain and loss, and why Y or W chromosomes are more often lost in some lineages than others, creating XO or ZO systems. To gain phylogenetic breadth we therefore assembled a database of 4,724 beetle species' karyotypes and found substantial variation in sex chromosome systems. We used the data to estimate rates of Y chromosome gain and loss across a phylogeny of 1,126 taxa estimated from seven genes. Contrary to our initial expectations, we find that highly degenerated Y chromosomes of many members of the suborder Polyphaga are rarely lost, and that cases of Y chromosome loss are strongly associated with chiasmatic segregation during male meiosis. We propose the "fragile Y" hypothesis; that recurrent selection to reduce recombination between the X and Y chromosome leads to the evolution of a small pseudo-autosomal region (PAR), which, in taxa that require XY chiasmata for proper segregation during meiosis, increases the probability of aneuploid gamete production, with Y chromosome loss. This hypothesis predicts that taxa that evolve achiasmatic segregation during male meiosis will rarely lose the Y chromosome. We discuss data from mammals that is consistent with our prediction.

Introduction

Chromosomal sex determination is phylogenetically widespread, having arisen independently in many lineages. Decades of theoretical work provide predictions about sex chromosome differentiation that are well supported by observations in both XY and ZW systems. However, the phylogenetic scope of previous work gives us a limited understanding of the pace of sex chromosome gain and loss, and why Y or W chromosomes are more often lost in some lineages than others, creating XO or ZO systems. To gain phylogenetic breadth we assembled a database of 4,724 beetle species' karyotypes and found substantial variation in sex chromosome systems. We used the data to estimate rates of Y chromosome gain and loss across a phylogeny of 1,126 taxa estimated from seven genes. Contrary to initial expectations, We find that highly degenerated Y chromosomes of many members of the suborder Polyphaga are rarely lost, and that cases of Y chromosome loss are strongly associated with chiasmatic segregation during male meiosis. We propose the "fragile Y" hypothesis; that recurrent selection to reduce recombination between the X and Y chromosome leads to the evolution of a small pseudo-autosomal region (PAR), which, in taxa that require XY chiasmata for proper segregation during meiosis, increases the probability of aneuploid gamete production, with Y chromosome loss. This hypothesis predicts that taxa that evolve achiasmatic segregation during male meiosis will rarely lose the Y chromosome. We discuss data from mammals that is consistent with our prediction.

Chromosomal sex determination has evolved independently in many lineages (Bull 1983). In addition to their role in gender determination, sex chromosomes are fascinating because the homologs often differ in gene content and morphology (Vallender and Lahn 2004; Graves 2006; Arunkumar et al. 2009; Betrán et al. 2012). Their unequal distribution between sexes also means that sex-linked genes experience and respond to evolutionary forces in different ways compared with autosomes (Charlesworth et al. 1987; Rice 1987; Charlesworth 1991; Rice 1994). The sex chromosomes can encompass the extremes of evolutionary rate. For example, the average divergence between human and chimpanzee X and Y chromosomes are lower and higher respectively than average autosomal divergence (Mikkelsen et al. 2005). Sex chromosomes can also play a special role in the origin of species; where the hemizygous sex often suffers the consequences of hybridization disproportionately (Haldane's rule)(Haldane 1922; Watson and Demuth 2012) and X-linked introgressions have larger effects on hybrid fitness than autosomal introgressions (large X-effect)(Presgraves 2008; Phillips and Edmands 2012). Finally, sex chromosomes that are confined to the heterogametic sex (Y or W in male or female heterogametic species respectively) are also particularly interesting for their apparent dispensability in some taxa but not others.

The canonical view of sex chromosome evolution assumes that a sex determining region evolves that leads to a pair of ancestral autosomes evolving into proto sex chromosomes (Westergaard 1958). Most models suggest that the resulting proto Y (W) will degenerate as a consequence of reduced effective population size (as these chromosomes are only found in one sex) and lack of recombination near the sex-determining locus. The non-recombining region can expand to adjacent portions of the chromosome. The selective force for this is thought to be selection to maintain linkage between sexually antagonistic loci (those polymorphic for alleles that benefit one sex at the expense of the other) and the sex determination locus. Recombination suppression may involve chromosomal rearrangements (e.g. inversions) that include the sex determining locus (Charlesworth et al. 2005). Once recombination is suppressed, the Y(W) chromosome is subject to evolutionary forces that are expected to lead to loss of the chromosome's genes (Charlesworth and Charlesworth 2000). The phylogenetically widespread observation of XO (ZO) species (Makino 1951) indicates that degeneration of the Y(W) may ultimately result in its complete loss; yet despite considerable work on the molecular evolution of particular Y chromosomes (Lahn et al. 2001; Bachtrog et al. 2008; Hughes et al. 2012) we still have a relatively poor understanding of the factors that govern the rates of Y(W) chromosome gain and loss.

Forces promoting Y(W)-chromosome degeneration

In principle, the forces responsible for decay of these chromosomes include: Muller's Ratchet, background selection, Hill-Robertson effect, and genetic hitchhiking (Bachtrog 2013). The predicted inevitable decay of Y and W chromosomes has led to the idea that they are "born to be destroyed" (Steinemann and Steinemann 2005) and indeed these chromosomes are often dispensable (e.g. Lepidoptera, (Traut et al. 2008); Nematodes, (Bull 1983); Orthoptera, (Castillo et al. 2010b); and Odonata, (Kiauta 1969)). Some groups, such as Coleoptera and Diptera exhibit multiple independent losses of the Y chromosome (White 1977). In *Drosophila*, the tenuous persistence of the Y chromosome is evident in that the ancestral Y was likely lost long ago in an ancestor of *D. melanogaster* while the current Y is likely a secondarily captured B chromosome (Carvalho and Clark 2005). In fact, recent analysis indicates that the ancestral Y may have been lost as part of a sex chromosome reversal where a formerly autosomal pair of chromosomes became the determinants of sex allowing the ancestral X to be fixed in the *Drosophila* lineage as an autosome (the dot chromosome) (Vicoso and Bachtrog 2013). In *D. pseudoobscura* the existing Y is homologous with an ancestral autosome, suggesting that the sex chromosomes fused with an autosome and the ancestral Y region was subsequently lost (Carvalho and Clark 2005). Even among taxa with generally persistent XY chromosome systems such as those in mammals, there is precedent for Y dispensability; both mole voles (Just et al. 1995) and spiny rats (Arakawa et al. 2002) have lost the ancestral Y chromosome.

Forces promoting Y(W)-chromosome retention

Several lines of evidence , however, suggest that the evolution of Y(W) chromosomes is more complex than just inevitable decay. For instance, frequent turnover in the sex determining chromosome (i.e. changes in the linkage group responsible for sex determination, so that a chromosome is not involved long enough for gene loss to occur) and/or intermittent recombination between sex chromosomes may play a role in persistence of the homomorphic sex chromosomes observed among most amphibians and fish (Stein et al. 2002; Woram et al. 2003; Van Doorn and Kirkpatrick 2007; Perrin 2009; Blaser et al. 2012; Guerrero et al. 2012). Sex-specific gene regulation may ameliorate situations with sexually antagonistic polymorphisms (Prince et al. 2010) and may further contribute to retention of old homomorphic sex chromosomes, as recently suggested for the emu (Vicoso et al. 2013).

In systems that retain the Y(W) chromosome despite considerable degeneration, selection may prevent complete gene loss and/or promote recruitment of genes from elsewhere in the genome. For example, degeneration of the human Y-chromosome occurred in 5 waves over 200-300 million years of mammalian evolution (Hughes et al. 2012). Linear extrapolation, using the average rate of gene loss, predicts that the human Y would be lost within 10 million years (Aitken and Graves 2002), however as the number of sites decline so should the rate at which genes are lost (Bachtrog 2008). Recent analyses show that a few genes have been conserved due to purifying selection (Hughes et al. 2012), and that new genes that are important for male fertility have been transferred to the Y (Lahn et al. 2001). Retention of these “essential” male genes is aided by their frequent occurrence in palindromes where intra-chromosomal gene conversion decreases the chance of loss and may also foster fixation of new genes by adaptive evolution (Betrán et al. 2012).

The strength of selection to retain Y(W)-linked genes should also be affected by the evolution of dosage compensation. If X(Z)-linked genes are expressed at low levels in males, this may lower males’ fitness, and purifying selection will then act against loss of Y(W) homologs unless dosage compensation evolves (Ohno 1967). While chromosome-wide (global) dosage compensation is the norm in most mammals and *Drosophila*, considerable data now shows that it is incomplete in broad range of animals including trematodes (Vicoso and Bachtrog 2011), lepidopterans (Harrison et al. 2012), birds (Itoh et al. 2007), fish (Leder et al. 2010), and monotremes (Deakin et al. 2008). In these groups, the Y or W chromosome should decay more slowly since loss of function mutations will not be masked by increased expression of the X or Z copy.

Sex chromosome evolution in Coleoptera

The model systems for studying Y chromosome evolution, *Drosophila* and mammals, are ill suited to explore hypotheses about the tempo and mode of Y chromosome turnover because there are few transitions among sex chromosome states. Here we use comparative methods in the order Coleoptera to explore the evolution of Y chromosomes and generate hypotheses. Beetles are the most speciose order of eukaryotes and we have compiled karyotype data for thousands of species (available at www.uta.edu/karyodb).

To analyze sex chromosome changes in a comparative framework, we use DNA sequences for over 1,000 species in our karyotype database to estimate the phylogeny of Coleoptera. There have been few explicitly phylogenetic analyses of karyotype data (Flores et al. 2008; Leache and Sites 2009; Henning et al. 2011; Maddison and Leduc-Robert 2013), and to our knowledge, our analysis provides the first estimates of transition rates for sex chromosome turnover, Y chromosome decay, and Y chromosome loss, over such a large number of species. We find distinctly different patterns and rates of sex chromosome transitions between the two main suborders of beetles (Adephaga and Polyphaga). We propose that the much lower rate of Y chromosome loss in Polyphaga can be explained by the evolution of distance-pairing sex chromosomes that ensure proper meiotic segregation even when no recombination occurs between the sex chromosomes.

Methods

Data collection

Karyotypes: We performed a thorough literature search and compiled a comprehensive record of published Coleoptera karyotypes (appendix A). To the extent possible, we reconciled historical karyotype data with currently accepted Coleopteran taxonomy (North American species: (Arnett and Thomas 2000; Arnett et al. 2002); outside of North America: (Beutel and Leschen 2005; Leschen et al. 2010)).

Coleoptera are male heterogametic, and in most beetles the Y chromosome is smaller than the X (Smith and Virkki 1978). The most common sex chromosome systems in the literature are XY, XO, and Xy+ (see below). Here we denote sex chromosomes that undergo synapsis during meiosis as XY. In the vast majority of XY taxa, the synaptic chromosomes also form chiasmata (i.e. contain at least one region that can recombine) (Smith and Virkki 1978). However, achiasmatic male meiosis - where all chromosomes in males form synapses but do not recombine - has evolved four times in the suborder Adephaga. Two instances of achiasmatic male meiosis appear to involve only one or a few species and are probably of recent origin, (Serrano 1981; Yadav and Burra 1987), while the other two instances are probably old and appear to be synapomorphies for the clades Trechitae and Cicindelini + Colyrinae (Galian et al. 2002; Maddison and Ober 2011).

Sex chromosome systems that form distance-pairing sex bivalents are denoted as Xy+. Such X and Y chromosomes are entirely nonrecombining. In these species the autosomes undergo normal synapsis and crossing over in both sexes and the X chromosomes do so in females. However, in males the X and Y chromosome pair at a distance with no synapsis and no opportunity for crossing over. In Xy+ species the Y is usually very small often being described as "punctiform". We denote species that have completely lost the Y chromosome as XO.

Sequence data: Sequences for 2 mitochondrial genes (16s and COI) and 5 nuclear genes (18s, 28s, elongation factor 1, arginine kinase, and wingless) from 1,140 operational taxonomic units (OTUs) representing members of 47 of the 59 families with karyotype data were downloaded from GenBank (Appendix B). The karyotype database and the sequences available from GenBank contain overlapping, but non-identical sets of species, so the sequence data were treated as follows. When the karyotype database and GenBank had a match at a level higher than species, we created "chimeric OTUs" In these cases a composite branch was created by assigning all sequences and sex chromosome states found in that clade to the single higher level group. In this way we created 280 genus level OTUs and 14 family level OTUs. In order to increase overlap in the matrix of gene sequences, we also created 18 anchoring OTUs In these cases relationships among several members of a monophyletic group in the karyotype database had sequences of a single gene, but another member of the taxon (not present in the karyotype database) had sequences for additional target genes. In these cases, an arbitrarily chosen member of the monophyletic group that was sampled for the single gene and was present in the karyotype database was assigned sequences for all of the otherwise unrepresented target genes. This effectively “anchors” the monophyletic group within the larger Coleoptera tree without impacting resolution within the group. For example, in the genus Curculio we have karyotype data for three species, but those species only have sequence data available for COI. There is an additional species (*Curculio niveopictus*) with sequence data available for the 18S and 28S genes, but it does not have karyotype data. To increase overlap in our matrix, one of the species with COI sequence, *C. nucum*, was arbitrarily chosen to act as the anchor by having the 18s and 28s sequences from *C. niveopictus* assigned to it. This anchors the genus Curculio within the larger Coleopteran phylogeny, while preserving resolution within the genus. Both chimeric and anchoring OTUs are indicated as such in table A1.

All sequences were aligned in MAFFT (Katoh et al. 2009). RNA genes (16s, 18s, and 28s) were then filtered with the program Gblocks to remove ambiguously aligned sites (Talavera and Castresana 2007). This resulted in alignments for 16s, 18s, and 28s of 544, 1964, and 404 bp in length respectively. We used MEGA to manually adjust the alignments of protein coding genes (COI, wingless, elongation factor 1, and arginine kinase) to insure that the reading frame was maintained (Tamura et al. 2011); these alignments were 1567, 585, 1189, and 810 bp in length respectively. Finally all alignments were checked for poorly aligned taxa using GUIDANCE (Penn et al. 2010); fourteen taxa were found to have few unambiguously aligned sites and were removed from our dataset. The alignments for our seven target genes were concatenated into a sparse supermatrix that contained 1,126 OTUs and was 7,063bp in length. Most taxa do not have sequences for all genes, and the mean number of alignment sites with information was 1870.

Phylogenetic Inference: Inconsistency in the placement of a small subset of taxa among trees with equally probable topologies (rogue taxa) is a common problem in phylogenetic inference from sparse supermatrices (Thomson and Shaffer 2010). The problem is magnified by the computational burden of optimizing over the large number of OTUs in our dataset (e.g. 14,000 CPU hours on CIPRES (Miller et al. 2010) servers to complete the first phase below). Therefore, we divided our phylogenetic inference into two phases. The first phase used maximum likelihood inferences to build a collection of trees that we used to assess taxon instability. We computed 500 maximum likelihood trees using RAxML v 7.2.8 (Stamatakis 2009). Based on the resulting collection of trees, the instability index for all taxa was calculated (Aberer et al. 2013). High index values indicate that a taxon's placement is variable among trees. The distribution of instability indices shown in figure 2.1 indicates that 92 percent of taxa have indices below 2194 but that above this, indices increase quickly. The 84 taxa with scores above this cutoff were removed from subsequent analyses, resulting in a dataset containing 744 Polyphaga taxa, 296 Adephaga taxa, and 2 outgroup taxa.

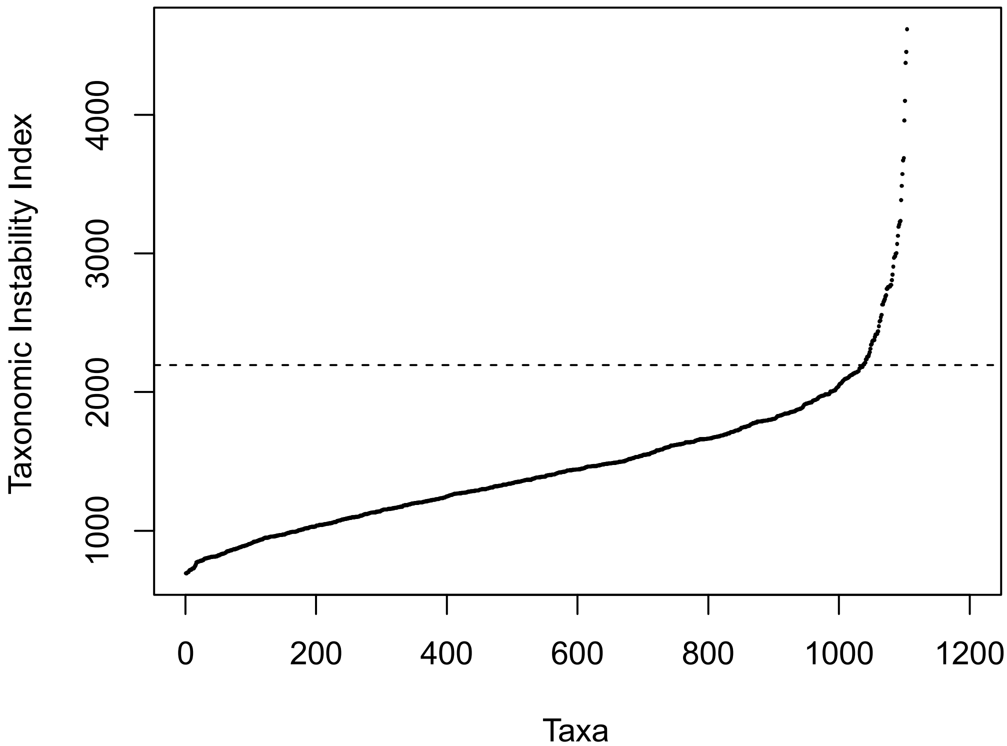


Figure 2.1 Taxonomic instability indices based on 500 maximum likelihood tree inferences. The dashed line shows the chosen cutoff, an index of 2194. Most taxa, 93 percent fall below this while above this value instability increases quickly.

The second phase of our phylogenetic inference employed Bayesian methods to produce a posterior sampling of ultrametric trees. The best maximum likelihood phylogram from the first phase was converted to an ultrametric tree using nonparametric rate smoothing in the R package APE (Paradis 2011). The resulting tree was subsequently used as input for two independent inferences in BEAST (v1.7.5; (Drummond and Rambaut 2007; Suchard and Rambaut 2009)). We assumed a lognormal relaxed clock and used normal distributions to place priors on the age of seven nodes. The seven nodes represent the age of the order (Coleoptera = 285 MYA), both major suborders (Adephaga = 237.2 MYA and Polyphaga = 270.5 MYA) and four arbitrarily chosen clades (Hydradephaga = 219.8 MYA, Elatridae = 139.9 MYA, Brentidae = 137.5 MYA, and Passalidae = 121.4 MYA). The standard deviations of the priors were set to reflect the 95% confidence interval of previous estimates (McKenna and Farrell 2009).

The two independent MCMC analyses required approximately 70 million generations to converge on a parameter space with equal likelihood to insure that they had reached stationarity they were allowed to run for an additional 40 million generations. The phylogeny inferred from our sparse supermatrix is largely consistent with the previously most comprehensive family level analysis for Coleoptera (Hunt et al. 2007). Because of the computational demands of analyzing evolutionary rates over such large trees, parameter estimates for the evolutionary models below were marginalized over 100 randomly selected trees from the stationary phase of our two chains (following referred to as "sampled trees"). The sampled trees had high resolution; a maximum clade credibility tree exhibited posterior probabilities greater than 90 percent at 76 percent of the nodes. The 100 sampled trees were subsequently used to model sex chromosome evolution in Polyphaga and Adephaga and are publicly available from Dryad Digital Repository: http://dx.doi:10.5061/dryad.g8010/1.

Comparative analysis

Sex chromosome systems are reported as discrete states (e.g. XY, Xy+, XO) despite representing a fundamentally continuous, though probably not linear, process of differentiation. In modeling their evolution across a phylogeny we must determine which states to include in the matrix of transition probabilities? For instance, if Xy+ is biologically equivalent to XY, then including the additional transition probabilities for that state will only add noise to the inferred rate of Y chromosome gain and loss. On the other hand, if Xy+ is a distinct state with different rates of transition to and from the XO state, then allowing for independent transition probabilities should provide a significantly better fit to the observed data. To assess how many states and rates best describe Y chromosome evolution in Coleoptera, we estimated transition probabilities under both 2-state (XY/XO) and 3-state (XY/Xy+/XO) models (Figure 2.2). For the 2-state models, all XY and Xy+ taxa were both coded as XY. Species where literature reports note "NeoXY" and other complex sex chromosome systems (i.e. those with multiple X and/or Y chromosomes) were also included in the analysis based on whether the sex chromosomes form a synapse during male meiosis (XY) or not (Xy+).

A – 2 State Coding

Model 2.1

	XO	XY
XO	-	*a*
XY	*a*	-

Model 2.2

	XO	XY
XO	-	*a*
XY	*b*	-

B – 3 State Coding

Model 3.1

	XO	XY	Xy+
XO	-	*a*	*a*
XY	*a*	-	*a*
Xy+	*a*	*a*	-

Model 3.4

	XO	XY	Xy+
XO	-	*a*	*a*
XY	*b*	-	*c*
Xy+	*b*	*d*	-

Model 3.3

	XO	XY	Xy+
XO	-	*a*	*b*
XY	*a*	-	*c*
Xy+	*b*	*c*	-

Model 3.6

	XO	XY	Xy+
XO	-	*a*	*b*
XY	*c*	-	*d*
Xy+	*e*	*f*	-

Figure 2.2 Models of sex chromosome system transitions.

(A) 2-State coding model with taxa partitioned between XO and XY. Using this coding we fit models with one rate (model 2.1) and two rates (model 2.2). (B) 3-State coding model with taxa partitioned between XO, XY, and Xy+. Using this coding we fit models with 1, 2, 4 and 6 rate parameters. Model 3.4 is a constrained model allowing for comparison between 2-state and 3-state coding in Polyphaga. If XY and Xy+ are equivalent states model 3.4 and 3.6 should perform equally well.

Of the 1042 OTUs in our tree 88 taxa do not possess sex chromosome data and were coded as missing data, and do not affect our estimated rates of Y chromosome changes. Included in these are 23 parthenogenetic taxa as well as 1 haplodiploid taxon. The remaining 64 taxa have only the chromosome number available, and while homomorphic chromosomes are not reported in Coleoptera some of these species may have sex chromosomes of this type. However, in most cases the investigators describe the chromosome squashes as inadequate to resolve the sex chromosomes, therefore it would appear that sex chromosomes in beetles are rarely in a homomorphic state, and this should not bias our results.

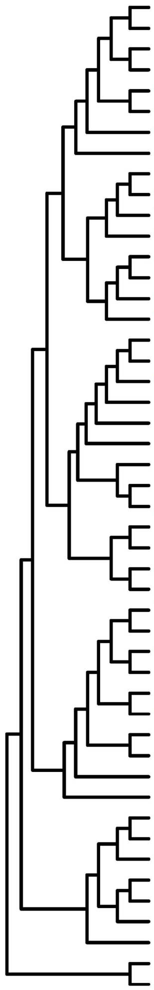
We estimated transition rates using BayesTraits, which allowed us to marginalize over uncertainty in phylogenetic inference and uncertainty in tip states (Pagel et al. 2004). For the 2-state coding we estimated rates assuming that all rates are equal (2.1) and also assuming that all rates differ (2.2). For the 3-state coding, we again estimated rates assuming that all rates are equal (3.1), plus a time reversible model (3.3), a 4-rate model (3.4), and a model with all six rates different (3.6). Finally model 3.4 is a nested version of model 3.6 in which we force both states XY and Xy+ to have a single rate of transition to XO and a single rate of transition back to XY from XO; this is equivalent to using 2-state coding for the data. Comparing models 3.4 and 3.6 tests whether XY and Xy+ have significantly different transition rates to and from XO.

To improve computational feasibility of the rate estimates, we first used BayesTraits to perform a preliminary maximum likelihood analysis of the sex chromosome transition rates across all sampled trees for the two major suborders, Polyphaga and Adephaga. Since estimated transition rates were always below 0.05, we conservatively set uniform priors between 0 and 0.1 on all transition rates for subsequent Bayesian analyses. None of our estimates were bounded by these priors. We adjusted the RateDev parameter for each run to insure that the acceptance rate of moves was between 20% and 40%. The marginal likelihood of each model was computed as the harmonic mean of the post burn-in likelihoods across all sampled trees. To compare models we used the marginal likelihoods (LS) to calculate the log Bayes Factor (LBF): LBF = 2(LS1-LS0) where LS1 is the more complex model and LS0 is the less complex model. We interpret LBF = 2 to 6 as positive support for the more complex model, 6-10 as strong support, and >10 as very strong support (Kass and Raftery 1995).

To further assess adequacy of our chosen models we performed posterior predictive simulations (PPS) (Rubin 1984). PPS datasets were created in the “R” environment (R Development Core Team 2013) using a custom function available in package evobiR. Briefly, we extracted rate matrices and associated trees from 1500 random points during the post burn-in phase of the BayesTraits MCMC runs for the best 2-state and 3-state models, each extraction was used to create a simulated dataset by evolving sex chromosomes over the extracted tree with the extracted rate estimates. The root state for each simulation was set so that the distribution of roots across each set of 1500 simulations matched the distribution of root states inferred during original parameterization of the model. We used these simulated datasets to compare the frequency of each tip state with the observed data. This same process was repeated on two subtrees within the suborder Adephaga to test whether specific subgroups had significantly different patterns and rates of transitions compared to what is expected based on rates estimated for the full suborder. Transition rates are reported as the mean probability of a transition per 100 million years ± the standard error.

Results

Coleopteran Karyotypes: Our comprehensive database of Coleoptera karyotypes includes 4,724 records based on 208 literature sources (Figure 2.3). The database is available online at www.uta.edu/karyodb and can be interrogated for any combination of: suborder, family, genus, sex chromosome system, presence of B chromosomes, and/or reproductive mode. Tables of selected data can be downloaded from the website. Karyotypes follow the format of Smith and Virkki (1978), the previously most comprehensive compilation of coleopteran karyotypes. In the Coleoptera cytogenetic literature, distance-pairing sex bivalents are usually denoted with a lower case letter that describes how they are oriented during meiosis (e.g. “p” stands for parachute and indicates a large X chromosome with a small Y chromosome that appears suspended from it; “r” stands for rod and indicates that the X and Y are oriented end to end.) This format is maintained in our database, but for clarity and consistency with the broader literature, all distance-pairing sex bivalents are denoted by Xy+ in the present study. Whenever possible the meioformula is given in the database. For example 9+Xy+ means a haploid autosome count of 9 and distance-pairing sex chromosomes. The meioformula is not available for 470 species in the database where only the diploid number is reported in the literature, nor for 9 haplodiploid records, and 116 parthenogenetic records. In total, data on sex chromosomes were available for 4,223 species. Since records were available for only three species in the relatively small coleopteran suborders Archostemata and Myxophaga, we analyzed only the major suborders Adephaga and Polyphaga.



	Taxa	Chrom.[a]	XO	XY	Xy+	Multi.[b]	Parth.[c]	Hapd.[d]
Laemophloeidae	6	6	-	1	5	-	-	-
Phalacridae	1	1	1	-	-	-	-	-
Erotylidae	1	1	-	1	-	-	-	-
Nitidulidae	2	2	-	-	2	-	-	-
Chrysomelidae	923	922	123	116	580	55	7	-
Cerambycidae	170	166	2	22	94	3	-	-
Curculionoidea	909	896	6	76	669	15	99	8
Silvanidae	3	3	-	-	3	-	-	-
Melyridae	5	5	2	-	2	-	-	-
Cleridae	11	11	-	-	11	-	-	-
Trogossitidae	2	2	-	-	2	-	-	-
Coccinellidae	196	196	4	81	95	2	-	-
Anthicidae	3	3	-	-	3	-	-	-
Meloidae	28	28	-	2	24	2	-	-
Ciidae	4	4	-	-	2	-	1	-
Tenebrionoidea	258	258	3	30	201	17	-	-
Lycidae	6	6	5	-	-	-	-	-
Lampyridae	26	26	24	1	-	-	-	-
Cantharidae	33	33	25	-	3	-	-	-
Elateridae	100	100	70	8	20	1	-	-
Byrrhidae	2	2	-	-	2	-	-	-
Buprestidae	101	100	1	20	70	6	-	-
Dermestidae	25	25	-	-	24	1	-	-
Bostrichidae	4	4	-	-	4	-	-	-
Anobiidae	9	9	1	1	5	-	2	-
Helophoridae	13	13	-	10	-	-	2	-
Hydrophilidae	18	18	-	1	13	-	2	-
Silphidae	8	8	2	2	4	-	-	-
Staphylinidae	19	16	2	5	9	-	1	-
Trogidae	11	11	-	-	11	-	-	-
Passalidae	60	60	22	37	-	1	-	-
Geotrupidae	24	24	-	13	7	-	-	-
Lucanidae	15	15	-	6	9	-	-	-
Scarabaeidae	449	448	12	182	201	-	-	-
Glaphyridae	1	1	-	-	1	-	-	-
Hybosoridae	1	1	-	-	1	-	-	-
Glaresidae	1	1	-	-	1	-	-	-
Leiodidae	18	18	-	-	17	-	1	-
Histeridae	2	2	-	-	2	-	-	-
Carabidae	1089	1088	345	378	-	112	-	-
Trachypachidae	2	2	2	-	-	-	-	-
Gyrinidae	7	7	1	-	-	-	-	-
Dytiscidae	133	131	98	19	-	-	-	-
Hygrobiidae	1	1	-	1	-	-	-	-
Haliplidae	15	15	2	12	-	-	-	-
Noteridae	6	6	-	2	-	4	-	-
Myxophaga	1	1	-	-	1	-	-	-
Archostemata	2	2	1	-	-	-	1	1
Polyphaga	**3468**	**3445**	**305**	**615**	**2097**	**103**	**115**	**8**
Adephaga	**1253**	**1250**	**448**	**412**	**0**	**116**	**-**	**-**
Myxophaga	**1**	**1**	**-**	**-**	**1**	**-**	**-**	**-**
Archostemata	**2**	**2**	**1**	**-**	**-**	**-**	**1**	**1**
Coleoptera	**4724**	**4698**	**754**	**1027**	**2098**	**219**	**116**	**9**

Figure 2.3 Cladogram illustrating the available cytogenetic data and distribution of sex chromosome systems in Coleoptera. Number of species in the karyotype database in each sex chromosome (or sex determination) state. Data and references are available at www.uta.edu/karyodb. a The number of species with chromosome number available

b Sex chromosome systems with multiple X and or Y chromosomes

c Species with parthenogenetic reproduction

d Species with haplodiploidy sex determination

There is a striking difference between Adephaga and Polyphaga in the number of taxa with distance-pairing sex bivalents (Xy+). None of the 1,253 Adephaga taxa in our dataset have Xy+ systems (Figure 3). Xy+ has been reported seven times in Adephaga, but subsequent investigations failed to replicate the observations (Serrano and Yadav 1984; Hughes and Angus 1999; Aradottir and Angus 2004). In contrast to Adephaga, 60 percent of Polyphaga species (2,097/3,468) exhibit Xy+.

Models of sex chromosome evolution: The difference in frequency of Xy+ systems between Adephaga and Polyphaga suggests that different biological mechanisms may act in each suborder. Therefore, we inferred parameters for models of sex chromosome evolution independently for each suborder. For Adephaga, we find that Y chromosomes are gained and lost at a rate of 0.573 ± 0.00052 gains and losses per 100 million years (Figure 2.4).

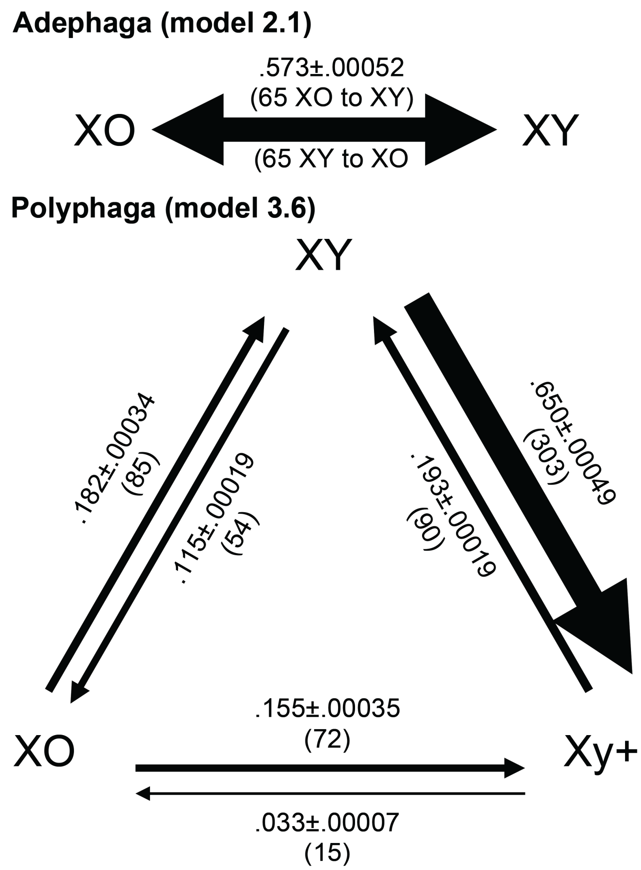


Figure 2.4 Sex chromosome system transition rate estimates. Rates are reported as the probability of transition per 100 million years ± the standard error. Parentheses indicate the mean number of transitions inferred. In Adephaga the mean number of transitions is the sum of transitions between both states.

Since only XY and XO states are observed in Adephaga, the model comparisons reduce to the difference between models with a single transition rate (model 2.1) and 2-rates (model 2.2; Figure 2.2). Comparison of marginal likelihoods (Table 2.1) reveals that both models fit the data equally well in Adephaga (LBF = 1.9, Table 2.1). Indeed, the 2-rate model estimates nearly identical rates for XY to XO and the reverse (0.574 and 0.572 respectively).

Table 2.1 Marginal likelihoods and model comparisons for models of sex chromosome evolution.

Suborder	Model	Marginal Likelihood	Comparison	Log Bayes Factor
Adephaga	2.1	-103.5	2.1 vs 2.2	1.9
	2.2	-102.6		
Polyphaga	2.1	-131.2	2.1 vs 2.2	11.8[a]
	2.2	-125.3	3.1 vs 3.3	30.5[a]
	3.1	-393.8	3.3 vs 3.6	21.5[a]
	3.3	-378.6	3.4 vs 3.6	10.7[a]
	3.4	-367.8		
	3.6	-362.4		

[a] Indicates very strong support for the more complex model.

To verify that the best model is able to recapitulate the distribution of empirical data in Adephaga we conducted PPS under model 2.1. The simulated data sets are centered on the observed distribution of sex chromosomes (Figure 2.5A), indicating that the estimated parameterization of model 2.1 can produce outcomes similar to the observed data.

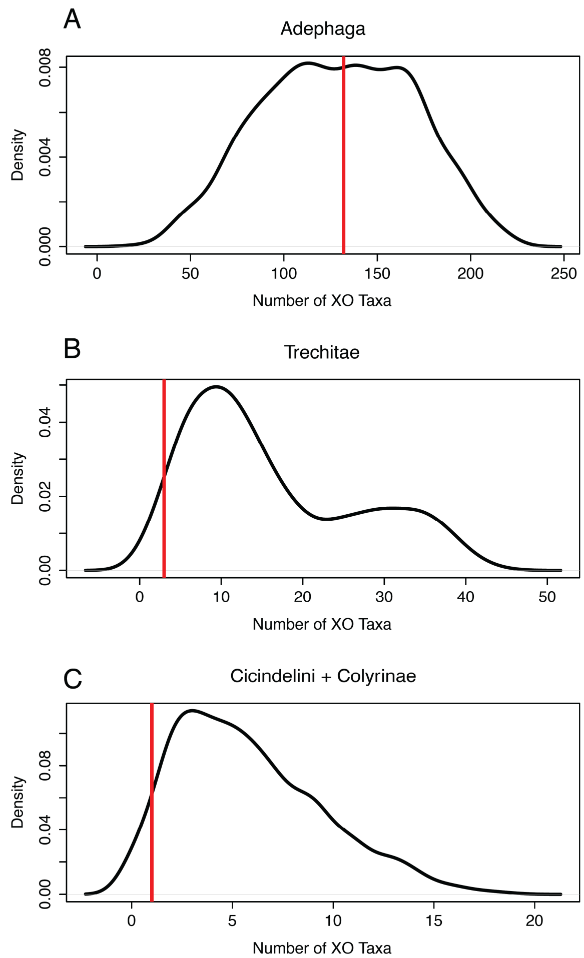


Figure 2.5 Distribution of PPS datasets in the suborder Adephaga.

The black lines indicate the density of simulated datasets; the vertical red lines indicate the number of taxa observed in the XY state. Adequate performance of model 2.1 in Adephaga is evident by the concentration of datasets similar to the observed data. The poor performance of model 2.1 in the subtrees composed of the clades Trechitae and Cicindelini + Colyrinae is evidence that these clades have higher retention rates of the Y chromosome than is expected for groups in the suborder Adephaga.

For the Polyphaga, the more complex of the 2-state models (2.2) is preferred in comparison with model 2.1 (LBF= 11.8; Table 2.1). Likewise, the most complex 3-state model (3.6; LBF = 10.7 – 30.5; Table 2.1) is preferred in comparison to all other 3-state models. Comparison of models 3.4 and 3.6 indicates that the 3-state coding is more appropriate than 2-state coding (LBF = 10.7; Table 2.1). Therefore, Xy+ and XY states differ biologically in terms of the rates of Y chromosome changes they undergo. Changes from XY to Xy+ have the highest estimated rate among all transitions in Coleoptera (0.65±0.00049), while the rates of transitions from Xy+ to any other state are the lowest (to XO = 0.033±0.00007; to XY = 0.19±0.00019; Figure 2.4), i.e., , Xy+ distance-pairing sex chromosomes in Polyphaga are the most evolutionarily stable sex chromosome state in Coleoptera in our analyses. PPS under model 3.6 show that our phylogenies and model parameterization can produce outcomes similar to the observed data (Figure 2.6).

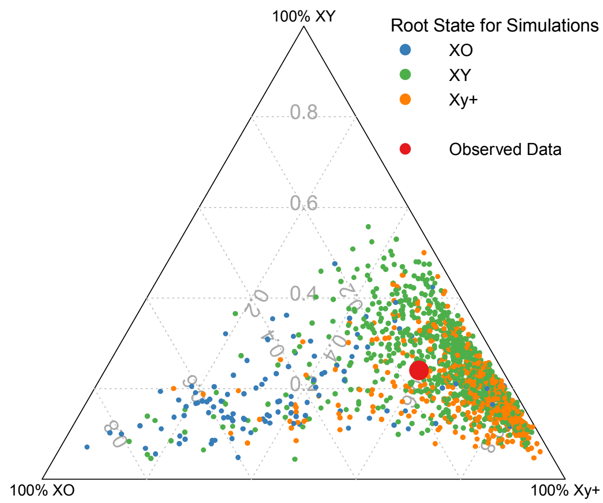


Figure 2.6 Distribution of PPS datasets in the suborder Polyphaga.

Each circle represents a simulation based on the parameter estimates from model 3.6, and are colored to reflect the root state chosen for the simulation. The larger red circle indicates the observed data. Axes represent the percent of terminal taxa in each of the three sex chromosome states. The empirical observation being near the densest part of the distribution of simulation results indicates that model 3.6 adequately predicts sex chromosome evolution in Polyphaga. The tail of simulations with a high proportion of XO taxa arises in large part from runs where XO was assigned as the root state, which is unlikely to be the true ancestral state in Polyphaga.

Discussion

The rates and patterns of Y chromosome turnover are distinctly different between the two largest Coleoptera suborders, Polyphaga and Adephaga. We suggest that important differences in the meiotic machinery, and particularly sex chromosome pairing, between these lineages indicates that previously unappreciated evolutionary forces may influence Y chromosome evolution.

In the suborder Adephaga, a Y chromosome has a 57 % chance of being lost or gained per 100 million years. The 65 Y chromosome losses (Figure 2.4) in Adephaga, are not difficult to explain. Presumably, these losses reflect the standard population genetic forces promoting Y decay noted earlier, and that gene losses ultimately reach the point where the Y chromosome becomes dispensable (Steinemann and Steinemann 2005). Our estimate of an equal number of Y chromosome gains in Adephaga is more interesting. While some sex chromosomes are famous for avoiding decay and remaining homomorphic (e.g. ratite birds (Adolfsson and Ellegren 2013; Vicoso et al. 2013) and anurans (Stock et al. 2011; Stock et al. 2013)), the situation in Adephaga is different. In this group, new Y chromosomes are evolving at the same rate they are lost.

There are two mechanisms for gaining a Y chromosome: 1) fusion of all or part of an autosome to the X (White 1977; Charlesworth and Charlesworth 1980; Watson et al. 1991; Veltsos et al. 2008); or 2) capture of a supernumerary (B) chromosome(Carvalho 2002). To determine whether transitions from XO to XY are the result of fusions between the X chromosome and a whole autosome we used stochastic character mapping (Huelsenbeck et al. 2003; Revell 2012) of chromosome number (downloaded from uta.edu/karyodb/) and sex chromosome system, to calculate the proportion of branches where a Y chromosome gain co-occurs with a reduction in the number of autosomes. This method suggests that at least 49% of the Y chromosome gains in Adephaga are the result of fusions between the X chromosome and a whole autosome. This is far more frequent co-occurrence than the 2.7% expected if gaining a new Y chromosome was independent of decreasing chromosome number (We infer that Y chromosomes are gained on 22.7 % of branches in the Adephaga tree, and we infer chromosome losses on 11.9% of branches; the probability of independent co-occurrence is then 0.227*0.119=0.027). This may indicate that sexually antagonistic loci are sufficiently common in Adephaga genomes that fusions of an autosome to the X are often favored. Without data for Y chromosome homology we cannot say whether the remaining 51% of branches are primarily due to translocations (i.e. fusion of partial chromosomes) or B-chromosome captures.

In contrast to Adephaga, we estimate that Y chromosomes in the suborder Polyphaga are more than twice as readily gained as lost (34% probability of gain per 100 my, 157 total gains; 15% probability of loss per 100 my, 69 total losses; Figure 4). To investigate the source of Y chromosome gains, we mapped transitions from the XO state and transitions in chromosome number as we did for Adephaga above. We find that only 27% of the Y gains in Polyphaga coincide with reductions in chromosome number, but that this is still far more frequent than the 0.5% expected if the events were independent (We infer Y chromosomes gains on 6.8 % of branches in the Polyphaga tree, and chromosome losses on 7.6% of branches; the probability of independent co-occurrence is then 0.068*0.076=0.005). While fusions clearly coincide with Y chromosome gains in both suborders, in comparison with Adephaga, a much larger proportion of Polyphaga Y chromosome gains appear on branches where no reduction in chromosome number is inferred. This suggests that relative to Adephaga a larger proportion of Y chromosome gains in Polyphaga result from either B-chromosome capture or the fusion of only a portion of an autosome to the X chromosome. The presence of an existing mechanism for segregation of unpaired sex chromosomes in Polyphaga may facilitate the capture of B-chromosomes, and contribute to the difference in Y chromosome origins between beetle suborders.

Rates of Y chromosome loss are also interesting in Polyphaga because they are so low. The non-recombining Xy+ sex chromosomes in Polyphaga species do not contain a pseudoautosomal region (PAR) and thus the entire Y chromosome is subject to the population genetic forces promoting Y decay. If decay followed by loss is the dominant source of XO species, as often suggested, it is surprising that Xy+ systems lose their Y 3.5-times less frequently than XY systems with a PAR (Figure 2.4). Consequently, we suggest that some evolutionary force(s) promoting retention must be acting in Polyphagan Xy+ systems. As noted in the introduction, frequent turnover in the sex determining chromosome and or intermittent recombination can promote retention of homomorphic sex chromosomes, but these mechanisms do not apply in species with highly degenerate Xy+ sex chromosomes. Other hypotheses for retention that could apply to the situation in Polyphaga involve purifying selection either due to “essential” male genes or haploinsufficiency (Li et al. 2013). Although little is known about the genes present on the Y chromosomes of Coleoptera, it seems unlikely that genes required for male viability are widespread on the Y chromosome, since XO species occur in 24 of 59 Coleoptera families studied, and our estimates indicate that the Y chromosome has been independently lost approximately 69 and 65 times in Polyphaga and Adephaga respectively (Figure 2.4).

The argument for retention of the Y chromosome due to haploinsufficiency of X-linked genes in males depends on whether dosage compensation occurs and to what extent. However, it seems unlikely to explain our results. Dosage compensation has been studied in only a single species of coleopteran, the red flour beetle Tribolium castaneum, a polyphagan beetle. In this species, chromosome wide dosage compensation of the X occurs in males, such that, on average expression from one X equals that from two autosomes (Prince et al. 2010). This type of chromosome wide up-regulation should provide haplosufficiency for all the genes on the X chromosome, reducing purifying selection to maintain Y homologs. We lack information for most beetle taxa, but the fact that the Y in Xy+ species is typically punctiform also indicates that most X chromosome genes must be haplosufficient so that haploinsufficiency is unlikely to be a general explanation for the exceedingly rare loss of Y chromosomes from Xy+ species.

What then can explain the relative stability of Y chromosomes in Polyphaga? We propose the “fragile Y” hypothesis: when proper segregation of the sex chromosomes depends on chiasmata, recurring selection to reduce recombination between loci in the PAR (e.g. loci with sexually antagonistic polymorphisms) and the sex determining locus (1) reduces the size of the PAR and consequently opportunities for chiasma formation, and (2) this leads to an increased probability of producing aneuploid gametes (Raudsepp et al. 2012) creating increased opportunities for Y loss (hence “fragile Y”).

Our hypothesis makes two predictions: 1) as the PAR shrinks, selection should favor segregation mechanisms that do not rely on chiasmata 2) taxa that evolve achiasmatic pairing should have lower rates of Y chromosome loss. We tested within the suborder Adephaga for evidence of this pattern. While no adephagans have distance-pairing sex chromosomes of the type found in Polyphaga, complete achiasmatic meiosis has arisen at least 4 times independently in Adephaga. Two of these origins involve only one or a handful of species in the genera *Egadroma* and *Calasoma*, suggesting that they arose relatively recently (Serrano 1981). However two of the origins involve the larger clades of Trechitae (Maddison and Ober 2011) and Cicindelini + Colyrinae (Galian et al. 2007), and must be older. Both these clades lose the Y more rarely than expected, consistent with our predictions. In our dataset a total of 45 Trechitae species are represented. Within these, at most 3 changes from XY to XO have occurred; for the clade including Cicindelini + Colyrinae we have 21 species and only a single such change. PPS analyses for these clades suggest that both groups have fewer XO species (i.e. fewer Y chromosome losses) than expected based on the overall transition rates for Adephaga. In Trechitae 95% of simulations predict more XO species than we observe (mean expected by simulation =16.5, versus 3 observed; Figure 2.5B). In Cicindelini + Colyrini 92% of the simulations predict more XO species than the empirical observation (mean expected by simulation = 5.8, versus 1 observed; Figure 2.5C).

Mammals: An additional opportunity to test the fragile Y hypothesis is available in mammals. The infraclasses Eutheria (placental mammals) and Metatheria (marsupials) offer a parallel example to Adephaga and Polyphaga in beetles. The sex chromosomes of metatherian mammals segregate in males without the presence of a PAR or chiasmata (Page et al. 2006) and no cases of Y loss are reported. In contrast, the Eutherians generally require a PAR region that forms chiasmata to faithfully segregate the sex chromosomes, and in taxa with small PARs the Y is occasionally lost (Fernández-Donoso et al. 2010). Among eutherian mammals, the rodents have the smallest documented PAR (Raudsepp and Chowdhary 2008), and it is within the rodents that we see multiple independent responses to the forces we ascribe to a fragile Y. First, within the family Cricetidae, the genus *Microtus* exhibits at least 3 origins of achiasmatic sex chromosomes, and as we expect there are no reported Y chromosome losses (Table 2.2) (Borodin et al. 2012).

Table 2.2 Summary of mammals with achiasmatic X-Y segregation or Y chromosome losses.

Clade		X-Y Segregation Mechanism in Males	Taxa	Independent Y losses	Citation
Cricetidae	*Microtus*	predominately achiasmatic[a]	29	0	(Borodin et al. 2012)
	Ellobius	chiasmatic	3	1-2	(Just et al. 1995)
Muridae	Gerbillinae	achiasmatic	9[b]	0	(Ratomponirina et al. 1986; Ratomponirina et al. 1989)
	Tokudaia	chiasmatic	3	1	(Arakawa et al. 2002)

[a] 17 species are achiasmatic, 12 chiasmatic with at least 3 independent origins of achiasmatic segregation

[b] 4 species of Gerbillinae have experienced autosome sex chromosome fusions, the autosomal portion of which undergo crossover.

In contrast, the closely related mole vole genus *Ellobius* has not evolved achiasmatic meiosis but shows at least one, and possibly two instances of Y chromosome loss (Just et al. 1995). Second, within the largest family of mammals, Muridae, we find additional origins of achiasmatic male meiosis and Y chromosome loss. The subfamily Gerbillinae has evolved achiasmatic sex chromosomes and Y losses are not reported, whereas in a related subfamily Murinae, which has not evolved achiasmatic meiosis, the spiny rat genus *Tokudaia* has three species two of which have lost the Y chromosome(Arakawa et al. 2002), and a third whose Y chromosome is fused with an autosome, rejuvenating the PAR and escaping potential difficulty in segregation during male meiosis (Murata et al. 2012). While this is a small sample, it is worth noting that in mammals the Y often carries genes essential for male viability and, all else being equal, is thus likely to be under stronger selection to be retained than in Coleoptera. The repeated evolution of either achiasmatic meiosis, or Y chromosome loss, in eutherians with the smallest PAR size is precisely what the fragile Y hypothesis predicts.

Conclusion

Our analysis suggests that meiotic mechanisms play an important, previously unappreciated role in the tempo of Y chromosome gain and loss. Additionally, given the relatively widespread loss of Y chromosomes among Coleopterans, sex determination seems likely to often involve an X counting system such as in *Drosophila melanogaster* (Bridges 1921) where the Y plays little role in sex determination (otherwise it would not be dispensable) (Bachtrog 2013). Finally, despite being the largest analysis of its kind, our analysis of sex chromosome evolution based on available karyotype data is relatively coarse. A more nuanced understanding of sex chromosome evolution, one that tests the predictions of this study, would benefit from genomic data that allows for assignment of chromosomal homologies. Given the large number of novel Y chromosomes arising in Coleoptera (225, figure 2.4), many of which are fusions or potential B-chromosome captures, it will be interesting to investigate whether some genes (or chromosomes) are recurrently recruited to Y chromosomes.

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Chapter 3

Assessing the impact of key ecological and phenotypic transitions on the rate of karyotype evolution: drift drives the evolution of chromosome number.

Abstract

Chromosomal mutations such as fusions and fissions are often thought to be deleterious, especially when heterozygous (i.e. underdominant), and consequently are unlikely to become fixed. Yet, models of chromosomal speciation ascribe an important role to chromosomal mutations. When effective population size (N_e) is small the efficacy of selection is weakened and the likelihood of fixing underdominant mutations by random genetic drift is greater. Thus it is possible that ecological and phenotypic transitions predicted to modulate N_e may facilitate fixation of chromosome changes, increasing the rate of karyotype evolution. We synthesize all available data on chromosome number in Coleoptera, and estimate the impact of traits expected to change N_e on the rate of chromosome number evolution in the family Carabidae and in 12 disparate genera from across the phylogeny of beetles. Our analysis indicates that in Carabidae, wingless clades have faster rates of karyotype evolution. Additionally, the genus level analysis shows that all groups with high rates of karyotype evolution exhibit multiple traits that are expected to reduce N_e, including sibmating, oligophagy, winglessness, and island endemism. The observed connection between reduced population size and accelerated karyotype evolution suggests that changes in chromosome number are likely fixed by random genetic drift despite an initial fitness cost, and that N_e is small enough for chromosomal speciation models to potentially be important drivers of speciation in many Coleopteran clades.

Introduction

Understanding the evolutionary forces that underlie strong karyotype conservation in some groups (Boyes and Shewell 1975; White 1978) while others are more labile (Kandul et al. 2007; Carbone et al. 2014) has remained elusive despite over 50 years of work. Historically, one of the key issues has been the relative importance of natural selection versus random genetic drift as the principal driver of change in chromosome number. However, recent analysis of the Gibbon genome suggests that mutation rate may also be an important factor determining the rate of karyotype evolution (Carbone et al. 2014).

Hypotheses that propose an important role for positive selection to change chromosome number are easily allied with arguments for the costs and benefits of recombination (Muller 1932; Fisher 1958; Muller 1964; Hill and Robertson 1966; Nei 1967; Lewontin 1971; Felsenstein 1974). Particularly when recombination is limited to a maximum of one crossover per chromosomal arm per meiosis, selection for increased or decreased recombination is expected to propel corresponding changes in chromosome number. Additionally, selection has been argued to favor increased chromosome number in social insects because having more chromosomes increases the average relatedness within a colony - limiting the opportunity for kin-recognition based cheating (Sherman 1979; Templeton 1979) - while simultaneously allowing for high genotypic diversity among sibs which has been shown to benefit colony growth, efficiency, and pathogen resistance (Tarpy 2003).

Countering the general applicability of positive selection's role as the agent of karyotype evolution, is the observation that most changes in karyotype are either neutral or deleterious, with many being underdominant (i.e. deleterious when heterozygous)(Max 1995). Underdominance of karyotype changes results from difficulties encountered in meiosis where mismatched chromosomal types do not segregate properly. Such underdominant mutations are only expected to fix when natural selection is overcome by random genetic drift in small populations (Wright 1941; Lande 1979, 1985). Despite the difficulties of fixing underdominant mutations, attempts to ascribe a causal role for karyotype evolution in the speciation process have been abundant (Lewis 1966; White 1978; Bickham and Baker 1979; Grant 1981; Templeton 1981; Baker and Bickham 1986; Rieseberg 2001). Some models assume that karyotype changes themselves are neutral but facilitate diverging local adaptation by sheltering some genome regions from the homogenizing effects of gene flow and recombination. Other models posit that underdominant karyotype changes that are differentially resolved between isolated populations by random genetic drift, may then act directly as isolating barriers upon secondary contact (see Rieseberg 2001 for more detailed review of chromosomal speciation models).

Given that effective population size (N_e) governs the efficacy of natural selection in relation to random genetic drift, one way to distinguish among these two evolutionary forces is to see whether factors associated with differences in N_e are also associated with differences in the rate of karyotype evolution and or the direction of change in chromosome number. More specifically, if karyotype changes are neutral, then their fixation rate should be unrelated to N_e. However, if karyotype changes are deleterious, then species with small N_e should have faster rates of chromosome evolution as more changes are fixed by drift. In contrast, if selection plays a broad role then we expect species with larger N_e to have faster rates. Furthermore, unlike random genetic drift, which is expected to affect the rate but not the direction of karyotype evolution, selection should be associated with a directional change (i.e. rate changes due to selection consistently cause all species within a lineage to go up or down).

Irrespective of whether selection or random genetic drift is responsible for fixation of new karyotypes, recent analysis of gibbon genomes suggests that an elevated rate of karyotype evolution may also be a signature of elevated chromosomal mutation rate. In the gibbon lineage, a transposable element that preferentially inserts into chromosome segregation genes may be responsible for increased rates of chromosomal rearrangements, thereby helping explain why the karyotypes of these small apes have diversified to a range of 2n=38 - 52 in the past 4 - 6 million years (Carbone et al. 2014) while the rest of the ape lineage varies by only a single autosomal fusion (2n=48 - 46) over more than twice that time (Stanyon et al. 2008; Locke et al. 2011). If increased mutational input is the primary cause of faster karyotype evolution, rather than selection or drift, then increases in the rate of change are not expected to be directional or associated with N_e.

Efforts to relate N_e to karyotype evolution typically use ecological and phenotypic traits as proxies for expected differences in N_e. For instance, all else being equal, winged species should have larger N_e than wingless species because flight increases dispersal distances ($N_e = 4\pi\sigma^2\delta$, where σ^2 is a measure of dispersal distance;(Wright 1946). Other traits that have been used as proxies for N_e include: mating system (inbreeding vs. outbreeding), geographic distribution (island vs. continental), and feeding type (restricted vs varied diet). The distribution of these traits has then been compared to the rate of karyotype change as estimated by scaling the variance in chromosome number to a fossil date for the taxonomic group of interest (Wilson et al. 1975; Bush et al. 1977; Bengtsson 1980; Imai et al. 1983; Larson et al. 1984; Petitpierre 1987; Olmo 2005). These earlier studies suggest that taxa inferred to have highly structured populations also have faster rates of karyotype evolution. In some cases there is also a negative correlation between the estimated rate of karyotype evolution and allozyme heterozygosity levels further supporting the hypothesis that random genetic drift in small populations drives increased rates of chromosome change (Coyne 1984). However, previous work has been limited by not incorporating phylogenies or evolutionary models for chromosome change and using comparisons between highly divergent clades where the underlying mutation rates may be different (i.e. across all vertebrates).

The present study expands previous efforts to understand N_e's effect on karyotype evolution in two ways. First, we incorporate ecological and phenotypic proxies for N_e into our comprehensive database of Coleoptera karyotypes (Blackmon and Demuth 2014a). Second, we employ a modern statistical phylogenetic framework to model the relationship between N_e and chromosome evolution. Coleoptera are an excellent group to study the effect of N_e on chromosome evolution because they exhibit variation in all four types of traits traditionally used as proxies for N_e (Crowson 1981), there is a good phylogenetic scaffold, and the database of karyotypes is extensive (4,797 species).

We show that lineages that have multiple traits associated with reduced N_e (loss of wings, inbreeding, island endemism, restricted feeding) also have significantly faster rates of karyotype evolution. Our findings suggest that random genetic drift is the predominant driver of fast karyotype evolution, as predicted if changes to chromosome number are typically underdominant or mildly deleterious.

Methods

Data collection

We compiled all available karyotypes from the Coleoptera Karyotype Database (www.uta.edu/karyodb). Coleoptera karyotypes rarely include banding data and are normally reported as the meioformula, consisting of the number of autosomes plus the sex chromosome complement of the male. For these reasons we use the male diploid number as a surrogate for the karyotype and for the remainder of the paper we refer to this as the chromosome number, we describe the rate of change in chromosome number as the rate of karyotype evolution. In 19 cases where multiple values were reported for a species, the mean value was used. Since some studies have shown that chromosome number is not normally distributed (Mank and Avise 2006), we conducted analyses with both the raw chromosome numbers as well as log transformed values, but we found that this does not change our conclusions and therefore we present results based on untransformed data.

Lack of overlap in the available data for karyotype, phylogeny, and N_e related traits resulted in our analysis being subdivided into a family level analysis of Carabidae using presence absence of wings, and a sparser but more phylogenetically diverse analysis of 12 genera using multiple N_e influencing traits. Data for the presence of wings in Carabidae was taken from a previous compilation of natural history data (Larochelle and Lariviere 2003) (appendix C). Species reported as being polymorphic for wings were scored as having equal probability of being either winged or wingless. If wing data was not present for a species in the karyotype and phylogenetic datasets, but other species in the genus were reported, the species was assigned a probability reflecting available data for the genus. For instance, in the genus *Calathus* 64% of species were reported as wingless, so any *Calathus* species not in the trait dataset were assigned a 64% probability of being wingless and 36% probability of being winged.

For each of the 12 genera included in our genus level rate estimates we performed literature searches to score them for the following traits: winged vs. wingless inbreeding vs. outbreeding, island vs. continental distributions, and oligophagy vs. polyphagy. We use the number of times high or low N_e traits occur in each group to classify them into high, medium, or low expected N_e classes (Table 3.1). To account for phylogenetic uncertainty in our comparative analysis we used 100 trees from the posterior distribution produced in an earlier study (Blackmon and Demuth 2014a). Briefly, these trees are based on an analysis of seven genes (16s, 18s, 28s, COI, elongation factor 1, arginine kinase, and wingless) across 1042 taxa in BEAST (v1.7.5; (Drummond and Rambaut 2007; Suchard and Rambaut 2009)). We assumed a lognormal relaxed clock and used normal distributions to place priors on the age of seven nodes; ages were based on previous estimates (McKenna and Farrell 2009).

Phylogenetic model based analyses

To test whether chromosome number is under selection to increase or decrease, we first tested whether the groups in our datasets had significantly different absolute number of chromosomes as would be expected for instance if small population size selected for more chromosomes. For the Carabidae data we calculated phylogenetically independent contrasts for both chromosome number and the probability that a clade was winged using the R package APE (Paradis 2011). We then computed Pearson's correlation coefficient to test for a correlation between chromosome number and probability of being winged. For the genus level data we used the R package GEIGER (Harmon et al. 2008) to compute a phylogenetically corrected ANOVA that tests whether our three N_e classes have significantly different chromosome numbers. We used 1000 simulations to assess significance of the F-statistic (Garland et al. 1993)

Next, for the family and genus level data we used censored rate tests based on Brownian motion models to determine whether the data indicate multiple rates of karyotype evolution as implemented in the R package Phytools (O'Meara et al. 2006; Revell 2012). We compare a model where the continuous trait (chromosome number) evolves at a single rate on all branches, to a model where each discrete state has an independent rate of chromosome number evolution.

In the analysis of Carabidae our discrete states were winged and wingless and in the analysis of genera our states were low, medium and high N_e. Conducting the censored rate test required reconstruction of the history of the discrete state across the phylogenies. In the analysis of Carabidae, since wing loss is widely accepted as a derived state within Coleoptera we fixed the root state of the tree as winged (Grimaldi and Engel 2005). For the genus level analyses we fixed the root of the tree as high N_e since the last common ancestor of the included genera is expected to have all high N_e traits. (Grimaldi and Engel 2005). We used an all rates differ Mk model (allows for rates to be different into and out of each state) to estimate the parameters of the transition rate matrix, and used stochastic mapping to assign a state along all branches in the tree. To account for uncertainty in phylogenetic inference and ancestral state reconstruction we performed five stochastic mappings on each of our 100 trees. Since previous work has shown that different rates of chromosome evolution may be occurring in the two major suborders of beetles we analyzed the genera in each suborder separately (Blackmon and Demuth 2014a). To explore whether the result of censored rate tests were being driven by exceptional rates in a single clade we also independently estimated the rate of karyotype evolution in each of the 12 genera. The R packages Geiger version 2.03 and Phytools version 0.4-21 were used to reconstruct ancestral states and fit models of chromosome number evolution (Harmon et al. 2008; Revell 2012).

Scaled variance estimates

Since the lack of overlap between species trait data and existing phylogenetic information causes a large reduction in the number of datapoints in our analysis, we also investigated whether estimating the rate of karyotype evolution without incorporating phylogenies is consistent with the phylogenetic model based approach above. We calculated time scaled coefficients of variation by first locating the oldest available fossil record for each genus of interest in the Paleobiology Database (http://paleodb.org). We then used the fossil ages to scale the coefficients of variation for chromosome number in each taxon (family or genus). To assess consistency between these "scaled variance" estimates and the phylogenetic model based rate estimates, we used a non-parametric correlation analysis (Kendall's τ). The test was one-tailed since we expect either no significant correlation or a positive one. All tests were considered significant at p-value < 0.05.

Results

Data collection

We downloaded 4,537 records from the Coleoptera Karyotype Database (uta.edu/karyodb) (Appendix A). This included data for all four extant suborders of Coleoptera. Two of these suborders are represented by only one and two karyotypes and thus we focused our analysis on the larger suborders of Adephaga and Polyphaga. These two suborders accounted for 1,224 and 3,310 karyotypes respectively. In Adephaga the number of autosomes ranged from 3 to 34 (mean =15.57±0.14), while in Polyphaga the range was from 1 to 32 (mean =10.63±0.06). Polyphaga exhibits a single mode of nine autosomes, accounting for 952 species or 29% of all Polyphaga records. Conversely, Adephaga is bimodal with concentrations at 11 and 18 autosomes accounting for 276 and 242 species or 23% and 20% respectively (Figure 3.1).

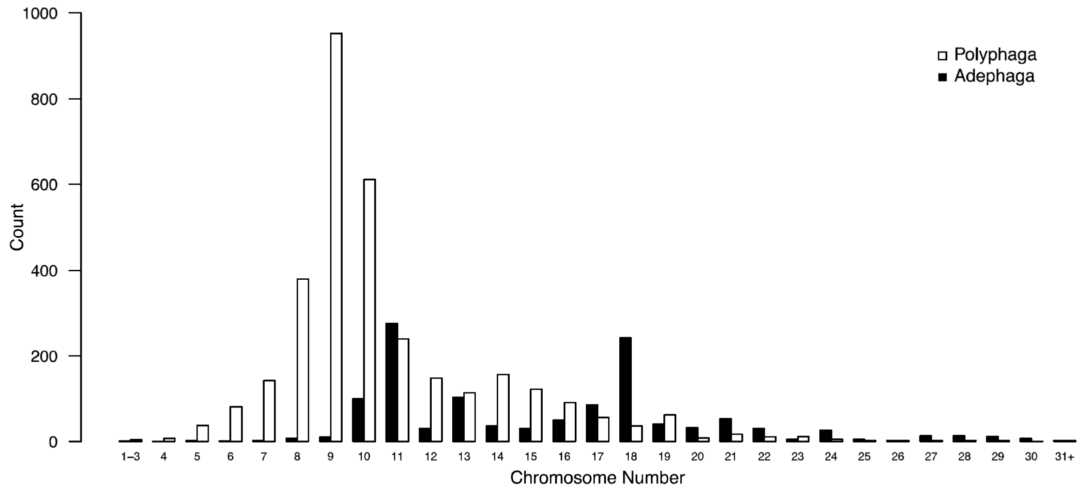

Figure 3.1 Haploid number of autosomes in the two major suborders of Coleoptera. The height of the bars reflects the number of records indicating a species with that haploid number and is based on 4,534 records available from www.uta.edu/karyodb.

Selection on chromosome number

If chromosome number comes under directional selection it could increase the rate of evolution in the lineage experiencing selection. However, unlike an increased rate due to random genetic drift, we expect change in response to be directional and result in a correlation between absolute chromosome number and traits we have associated with N_e. For instance, if wing loss consistently selects for increased chromosome number we expect wingless species to have more chromosomes on average. In Carabidae we find no evidence for a relationship between chromosome number and the probability that a species has wings (r= -0.039, t=-0.46, p-value = 0.65). Likewise, in the analysis of genera we found no relationship between N_e classes and chromosome number (F=4.06, p-value = 0.89). These results suggest that selection on chromosome number is not the primary influence on rates of karyotype evolution in these lineages.

Phylogenetic model based rate estimates

Karyotypes for 1065 Carabidae species were available, 136 of these were used in our comparative analysis because they were included in our phylogenetic tree and had data available on flight ability. The censored rate test supports the conclusion that chromosome number evolves at different rates in winged and wingless clades. The single rate model was rejected on all 500 stochastically mapped trees (max p-value < 0.01). Our analyses of Carabidae show that wingless lineages gain and lose chromosomes 6 times faster than their winged relatives. The mean estimate for the rate parameter σ^2 in wingless clades was 9.15±0.41 while the mean for winged clades was only 1.51±0.08 (Fig. 3.2a).

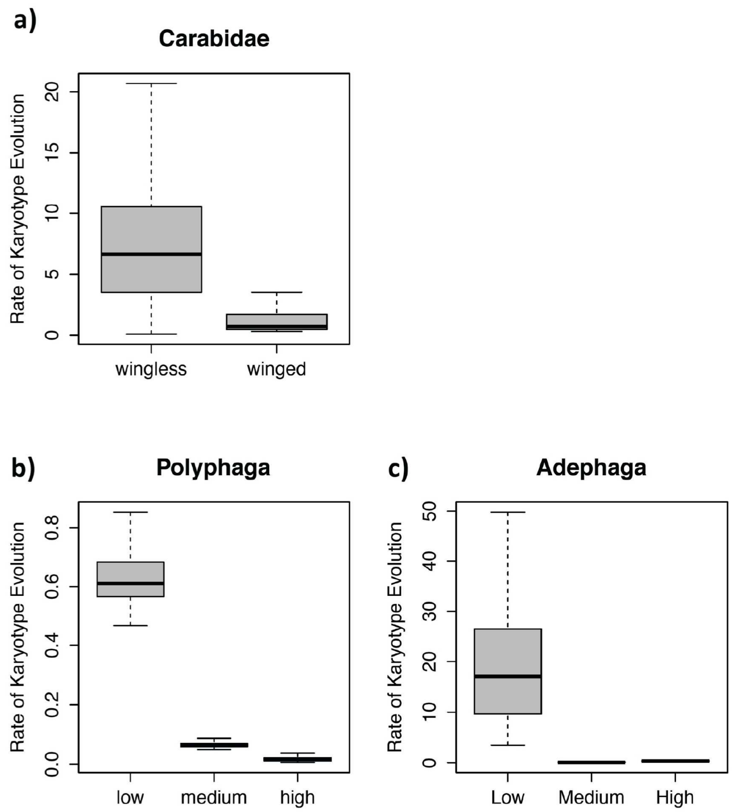

Figure 3.2 Phylogenetic based estimates of the rate of chromosome number evolution. Rates are the maximum likelihood estimates across 500 stochastically mapped trees. a) Estimates for the family Carabidae under a two-rate Brownian motion model. This dataset included 136 species scored as winged or wingless. b) Estimates under a three-rate Brownian motion model for the suborder Polyphaga with seven genera totaling 149 species. c) Estimates under a three-rate Brownian motion model for the suborder Adephaga with five genera totaling 112 species.

For the analysis of genera we scored each clade for the presence or absence of traits thought to reduce N_e. This allowed us to assign each genus to a class based on expected N_e. Four genera posses none of the N_e reducing traits and we classify these as the high N_e class. Three possess only one of these traits and form the medium N_e class, and five genera (*Calathus*, *Chrysolina*, *Cytronus*, *Dendroctonus*, and *Timarcha*) posses two of the N_e reducing traits, and these form the low N_e class (Table 3.1).

Table 3.1 Distribution of traits likely to effect population size.

Traits were scored based only on species included in the analysis and the majority state is reported below. Expected N_e is categorized by the number of traits expected to reduce N_e. High, medium, and low N_e categories were assigned if a clade had zero, one, or two N_e reducing traits respectively. A (+) indicates the high N_e version of a trait and a (-) indicates the low N_e version of a trait.

	Genus	Breeding	Feeding	Distribution	Wings	Expected N_e
Adephaga	*Bembidion*	+	+	+	+	high
	Calathus	+	+	-	-	low
	Cicindela	+	+	+	+	high
	Harpalus	+	+	+	+	high
	Pterostichus	+	+	+	-	medium
Polyphaga	*Chrysolina*	+	-	+	-	low
	Cyrtonus	+	-	+	-	low
	Dendroctonus	-	-	+	+	low
	Diabrotica	+	+	+	+	high
	Ips	+	-	+	+	medium
	Pimelia	+	+	+	-	medium
	Timarcha	+	-	+	-	low

The censored rate test supports the conclusion that chromosome number evolves at different rates in the different N_e classes. The single rate model was rejected for both datasets on all 500 stochastically mapped trees (max p-value < 0.01). The mean estimate for the rate parameter (σ^2) was highest for the low N_e class in both suborders. In Polyphaga the low N_e class had the highest rate of chromosome evolution (0.624±0.098); the medium N_e class exhibited an intermediate rate (0.065±0.013) and the high N_e class had the slowest rate of chromosome evolution (0.017±0.001) (Fig. 3.2b). In Adephaga rates of karyotype evolution are typically much higher than in Polyphaga, but the low N_e class again had the highest rate of chromosome evolution (24.401±8.627); unexpectedly the medium N_e class exhibited the lowest rate (0.091±0.034) and the high N_e class had an intermediate rate (0.369±0.057) of chromosome evolution (Fig. 3.2c).

Independent estimates for the rate parameter σ^2 for karyotype evolution within each of the 12 genera examined provide insights into the impact of each genus on the results described above. The rate estimates for individual genera ranged from near zero in the genera *Diabrotica* and *Pimelia* to as high as 24.33 (95% CI = 12.17 - 48.66) in *Calathus* (Table 3.2). In each suborder the low N_e class genera exhibited the highest rates of karyotype evolution. Those genera in the high and medium N_e groups showed similarly slow rates.

Estimates based on scaled variance

For each of the 12 genera included in our rate estimate inference, we searched PaleoDB for fossil records. Seven of our target genera had fossil data available; if multiple dates were available we recorded the age of the oldest available record. These ages ranged from a low of 7.24 million years for the genus *Chrysolina* to 150.8 million years for the genus *Cicindela* (Table 3.2). We calculated the scaled variance of chromosome number for each of the 7 genera by dividing the coefficient of variation for chromosome number by the fossil based age estimates (Table 3.2). These scaled variances ranged from 0.07 in *Cicindela* to 3.87 in the genus *Chrysolina.* Notably, we find that there is no correlation between the scaled variance based estimates of karyotype evolution and the phylogenetic model based rate estimates (σ^2 parameter above) for the 7 genera with overlapping analyses (τ =0.143, p-value=0.773).

Table 3.2 Genus level phylogenetic and scaled variance based estimates of rate of chromosome evolution. Dashes indicate those taxa for which reliable fossil dates where unavailable and where not included in comparison of approaches.

Clade	NMR_1	MR_2	95% CI_3	$NSCV_4$	CV_5	Age	SCV_6	Fossil Reference
Bembidion	40	0.243	0.157 - 0.376	230	0.06	48.6	0.12	(Arillo and Ortuno 1997)
Calathus	16	24.33	12.16 - 48.66	36	0.12	28.4	0.42	(Martynov 1929)
Cicindela	27	0.462	0.271 - 0.788	83	0.10	150.8	0.07	(Weyenbergh 1869)
Harpalus	14	0.515	0.246 - 1.082	31	0.05	65.5	0.08	(Birket-Smith 1977)
Pterostichus	15	0.088	0.043 - 0.180	58	0.09	37.2	0.24	(Wickham 1910)
Chrysolina	26	0.558	0.324 - 0.961	64	0.28	7.24	3.87	(Hopkins et al. 1971)
Dendroctonus	13	0.323	0.150 - 0.697	16	0.32	46.2	0.69	(Labandeira et al. 2001)
Cyrtonus	13	1.279	0.593 - 2.758	-	-	-	-	-
Diabrotica	12	0.008	0.004 - 0.018	-	-	-	-	-
Ips	26	0.117	0.068 - 0.201	-	-	-	-	-
Pimelia	29	0.002	0.001 - 0.004	-	-	-	-	-
Timarcha	30	0.438	0.264 - 0.726	-	-	-	-	-

1 number of taxa used in phylogenetic model based estimate of rates
2 mean rate of chromosome change (phylogenetic approach)
3 95% confidence interval (phylogenetic approach)
4 number of taxa used in calculation of scaled variance
5 coefficient of variation.
6 scaled CV = CV/Age/100MY

Discussion

Our analyses clearly show that ecological and phenotypic transitions that are expected to reduce N_e are associated with increased rates of karyotype evolution and that this pattern holds independently of potential differences in mutation rate between lineages. The most likely explanation for this pattern is that chromosome number changes are predominantly deleterious while segregating and become fixed by random genetic drift. We do not find support for a directional trend in gain or loss of chromosome number in response to trait evolution that might indicate a signature of selection.

The effect of reduced N_e on accelerated rates of karyotype evolution is dramatic. In Carabidae wingless clades show a 6-fold increase in the rate of karyotype evolution. In Polyphagan genera the difference between low and high N_e genera is >26-fold and in Adephagan genera it is greater than 30-fold. A few notable examples serve to highlight this overall pattern in beetles. First, within the Polyphaga family Curculionidae, our study includes the closely related scolytid genera *Ips* and *Dendroctonus*. Our estimate for the mean rate of karyotype evolution in *Dendroctonus* 0.323 (95% CI = 0.150-0.697) was 3-fold higher than the mean rate estimated in *Ips* 0.117 (95% CI = 0.068-0.201). This marked difference matches expectations based on breeding behavior. *Dendroctonus* is an inbreeding genus producing biased sex ratios and practicing predirspersal sibmating (Grégoire 1988). Meanwhile *Ips* is an outbreeding genus where both males and females disperse, and neither sib-mating nor biased sex ratios have been documented (Kirkendall 1993). These characteristics should lead to smaller N_e in *Dendroctonus* and should allow changes in karyotype to fix more easily even if they are underdominant as theory predicts.

Second, three of the four highest rates of karyotype evolution were observed in wingless, oligophagous genera within the family Chrysomelidae: *Timarcha*, *Cyrtonus*, and *Chrysolina* (0.438, 1.279, 0.558 respectively). In all three genera the mean maximum likelihood estimate (MLE) for the rates of karyotype evolution were higher than the MLE of *Diabrotica* 0.008 (95% CI = 0.004-0.018), a chrysomelid genus lacking any of the small N_e traits.

Finally, the genus *Calathus* provide perhaps the best example of compound effects of phenotype and ecological history on the tempo of karyotype evolution. First, many species in this genus are wingless and thus may be characterized by populations composed of small demes where fixation of karyotype changes should be more likely. However, the exceptionally high rate estimate for karyotype evolution in this genus 24.33 (95% CI = 12.17-48.66) is likely driven by two taxa; *Calathus abaxoides* and *C. ascendens* which have respectively the highest and lowest chromosome number in the genus. Interestingly, *C. abaxoides* and *C. ascendens* are 2 of 24 endemic, wingless, *Calathus* species on the Canary archipelago. Both species occur on the island of Tenerife which the genus has colonized in the last 12 million years (Emerson et al. 1999). These species likely experienced an initial population bottleneck during colonization, and the continued restriction to an island has led to a sustained lower N_e than species with continental distributions. While 17-19 autosomes is the norm for most species in this genus, *C. abaxoides* has increased to 27 autosomes while *C. ascendens* has decreased to 10 autosomes. The observation that both the lowest and highest chromosome number are the product of a single recently colonized island further suggests that drift in small populations is responsible for rapid karyotype evolution.

The role of mutation

Little is known about mutation rate variation in beetles, however we recently hypothesized that differences in the mechanisms of meiosis may provide a mutational basis for differences in the rate of sex chromosome turnover between the two main beetle suborders Polyphaga and Adephaga (Blackmon and Demuth 2014a). The present analysis demonstrates that two suborders also have very different overall rates of chromosome evolution (note the difference in scales between figures 3.2b and 3.2c) that are consistent with our findings on sex chromosome rates. It is noteworthy however, that despite a >10-fold difference in the "background" rate of karyotype evolution, the pattern where small N_e is associated with relatively rapid karyotype evolution holds within both suborders. Thus, while mutation rate may be a major factor driving the baseline rate of karyotype evolution, our analysis suggests that within a given mutational context, most changes are at least mildly deleterious and become fixed by random genetic drift.

Comparison with previous work

While our findings are in accord with earlier studies relating N_e to variation in chromosome number, our phylogenetic model based rate estimates are not correlated with time-scaled variance estimates derived similarly to previous work. This inconsistency is worth noting because the scarcity of reliable phylogenies is a limiting factor to conducting analyses in other groups. The lack of consistency between approaches highlights the risk inherent in ignoring the pattern of chromosome evolution over the phylogeny. Theoretically, a scaled variance method could work. However its accuracy will be limited by the extent to which the ages estimated for the groups are both accurate and correlated with the total phylogenetic branch lengths relating the focal taxa. These requirements are unlikely to be met particularly in groups that have relatively incomplete and highly heterogeneous fossil records such as insects. Methods not using a phylogeny will also be misled when the number of records is insufficient to capture the true variance of the groups being studied. The variance in chromosome number across families of Coleoptera can be partly explained by the number of records available (Pearson's correlation coefficient between family variance and number of records =0.41, p-value=0.008). This suggests that some families have not been sampled sufficiently to capture the true variance of extant species. Applying an evolutionary model for karyotype evolution using a time scaled phylogeny eliminates these issues.

Conclusion

There are almost certainly many individual cases where selection has driven a change in karyotype. For instance it has it has often been suggested that eusocial hymenoptera may through selection for increased recombination have evolved higher numbers of chromosomes. However, when chromosome numbers of solitary and eusocial hymenoptera were analyzed in a comparative framework the results suggested that selection for increased chromosome number is variable across eusocial hymenoptera (Ross et al. 2014). Our results in concert with previous work suggest that most chromosome changes are deleterious (at least while segregating) and that chromosome evolution is largely governed by random genetic drift in small populations. The association we find between factors influencing N_e and evolutionary rate also puts bounds on the selection coefficient of mutations, suggesting that many changes are likely to be only mildly deleterious; otherwise reduced N_e due to ecological and phenotypic transitions in Coleoptera would not be sufficient to drive significant increases in the number of chromosome changes that are fixed by random genetic drift. Our findings also indicate that the distribution of fitness effects of karyotype change is independent of the mutation rate.

More broadly, our work suggests that when species evolve traits, or inhabit locations that restrict population size, the rate of change in chromosome number increases often by orders of magnitude relative to closely related species. By increasing the fixation rate for karyotype changes, speciation mechanisms requiring genome rearrangements become more likely. This should be true for models that assume underdominance of karyotype mutations such as described by White (1978) and more recent models that assume karyotype changes to be neutral such as described by Riesberg (2001). Traditionally chromosomal rearrangements are thought to be more likely to contribute to speciation in plants than animals; possibly due to gene expression in pollen or lack of differentiated sex chromosomes in most plants (reviewed in Rieseberg 2001). Chromosomal speciation has also been suggested to be more likely in mammals than invertebrates due to differences in meiosis (Coyne and Orr 2004). However, given that our results suggest most karyotype changes in beetles are deleterious, models that invoke karyotypic changes acting directly as reproductive barriers seem more widely plausible than they have been considered recently. Unfortunately, the coarse nature of our karyotype data limits our analysis to mutations such as fusions and fissions that change the number of chromosomes. Future work incorporating genomic data would be useful to determine whether other types of mutations such as inversions, and translocations also reflect a similar pattern.

Chapter 4

Genome structure and the origin of haplodiploidy

Abstract

Haplodiploid reproduction, where males are haploid and females are diploid, is widespread among animals. Yet we understand very little about the forces responsible for the evolution of haplodiploidy. We use a phylogenetic ANOVA and develop a novel comparative method to test Bull's long-standing hypothesis that the proportion of the genome that is sex linked is important in the origin of haplodiploidy (1983). Briefly this approach tests whether haplodiploidy originates when chromosome number has extreme values. Using simulated data we show that our new approach has acceptable type one error rate but low power unless the relationship between the evolution of chromosome number and haplodiploidy are strong. We use the group Acari that has numerous independent origins of haplodiploidy to evaluate Bull's hypothesis, and find that the proportion of the genome that is sex linked is important in determining if transitions to haplodiploidy occur.

Introduction

Reproduction and sex determination are remarkably variable across life. In most species reproduction is highly symmetrical; each offspring has a father and a mother and receives an equal share of their nuclear genes (barring sex chromosome-linked loci). However this symmetry has frequently broken down. In a significant proportion of animals, the genetic roles of mother and father during reproduction are highly imbalanced. In about 15% of species, mothers monopolize the production of male offspring via haplodiploidy, either by the asexual production of sons (arrhenotoky) or by producing sons that eliminate their father's genome from their germline (Paternal genome elimination) (Ashman et al. 2014). The evolution of haplodiploidy remain poorly understood, though not for lack of interest. Many authors have considered different scenarios for its evolution, and a wealth of theory has been developed on this topic (Brown 1964; Bull 1979;

Borgia 1980; Bull 1983; Sabelis and Nagelkerke 1988; Haig 1993a, b; Goldstein 1994; Smith 2000; Normark 2004; Normark 2006; Immler and Otto 2014). Yet few of these ideas have been corroborated in an empirical or comparative framework. Here, we present the first formal comparative analysis to understanding the evolutionary dynamics of haplodiploidy.

Most theories assume that haplodiploidy arises from maternal–paternal genetic conflict. Hartl and Brown (Hartl and Brown 1970) and Bull (Bull 1979) presented the first formal models showing that when a mother is able to produce haploid sons (either by haplodiploidy or PGE), she benefits, as these sons always pass on her genes to their offspring (instead of only half of her genes in a diploid son). However selection for producing haploid sons is counterbalanced by an expected lower viability of haploid males. As a result haplodiploidy will only spread if haploid males are at least half as viable as diploid males. This poses a constraint on the evolution of haplodiploidy and PGE, as most diploid species have considerable numbers of recessive lethal mutations in their genome and therefore are unlikely to survive as a haploid. Subsequent models for the evolution of haplodiploidy also stress the importance of viability constraints, making the general prediction that transitions towards haplodiploidy should be difficult.

One factor that could affect the viability of haploid males is their genome structure: All transition from diploidy to haplodiploidy took place under male heterogamety (Gardner and Ross 2014), where males are either XO or XY. Under a XO-male sex determining system (or XY with a degenerate Y), the X chromosome shows haploid gene expression. Therefore, the frequency of X-linked recessive deleterious alleles is expected to be low, and species who's X-chromosome makes up a large proportion of their genome are expected to have a lower frequency of recessive deleterious alleles in the population. Assuming that on average autosomes and X chromosomes have a similar size, this leads to the testable prediction that species with very few chromosomes (e.g. one X and 2 autosomes) are more likely to evolve haplodiploidy because a larger proportion of the genome will already be haplosufficient than in species with many chromosomes (e.g. one X and 20 autosomes). In this manuscript we present the first formal comparative tests of this hypothesis using a phylogenetic ANOVA and by estimating the chromosome number of lineages that evolve haplodiploidy.

Our analyses focuses on the Acari (mites and ticks) which are uniquely suitable for such an approach: In most other groups haplodiploidy is fixed across large clades (e.g. Hymenoptera) and appears to have evolved only once in the common ancestor, but in Acari it has evolved repeatedly. We use reproductive data on 900 species of Acari combined with a phylogeny of 770 species.

Methods

Data collection

We collected all published data on the reproduction, ploidy and karyotypes of Acari, in particular from three important reviews of Acari reproduction (Oliver 1971; Oliver Jr 1977; Norton et al. 1993). We supplemented this dataset further with an extensive survey of the literature, by direct searches on Web of Science and Google scholar, as well as by forward and backward citation searches. We scored the reproductive mode (sexual vs. parthenogenetic), the reproductive systems (haplodiploidy vs. diplodiploidy), sex determination system (XY vs. XO) and the number of chromosomes (diploid chromosome count in females). In total we obtained reproductive data for 888 species, although the character matrix is not complete for every species. All data including the references are available on the NESCent "Tree of Sex" database (www.treeofsex.org) (Tree of Sex Consortium 2014) and Appendix D.

Phylogenetic reconstruction

We downloaded phylogenetically-informative DNA sequence clusters as FASTA files from PhyLoTA rel 1.5 (Sanderson et al. 2008). We started with data from three mitochondrial genes (COI, 12S, 16S) and 5 nuclear genes (EF1alpha, heat shock protein cognate 5 (Hsc70-5), signalrecognition particle protein 54k (Srp54k), 18S, 28S) that had been sampled from 822 mite species. We used MAFFT (Katoh et al. 2009) to align sequences from each gene. We used Gblocks (Talavera and Castresana 2007) to purge hyper-variable regions from each ribosomal alignment. In each Gblocks run, we set the allowed gap position to half, the minimum block length to 5, and the maximum number of contiguous non-conserved positions to 12. We then used Mesquite v2.73 (Maddison and Maddison 2001) to delimit codon positions and delete introns in protein-coding alignments, as well as build a supermatrix of concatenated alignments. The total length of the supermatrix was 12,132 sites. At this stage, we removed taxa from the phylogenetic dataset that were not represented in the genetic / sexual system trait dataset. This was necessary to make phylogeny and divergence time estimation feasible. The intersection of the phylogenetic and trait datasets included 560 taxa. We divided the pruned supermatrix into six data partitions: first and second nuclear codon positions, third nuclear codon positions, first and second mitochondrial codon positions, third mitochondrial codon positions, nuclear ribosomal sites, and mitochondrial ribosomal sites. We used BEAST v1.7.5 (Drummond and Rambaut 2007) to estimate phylogenetic relationships and time-proportional branch lengths. The BEAST analysis estimated the parameters of a HKY + G nucleotide substitution model independently for each of the six data partitions. It used a birth-death model of phylogenetic branching, and an uncorrelated lognormal relaxed clock model of among-branch substitution rate variation (Drummond et al. 2006). We calibrated divergence times with three fossil-based, exponential node priors: 1) a minimum age of 380 MY on the stem node of Acariformes (Hirst 1923; Norton et al. 1988); 2) a minimum age of 90 MY on the stem node of Argasidae (Klompen and Grimaldi 2001); and3) a minumum age of 35 MY on the stem node of Ixodes (Scudder 1885). We ran the BEAST analysis for 100 million generations and sampled trees once every 10,000 generations. We examined log files in Tracer (Drummond and Rambaut 2007) and determined that MCMC sampling from the stationary distribution commenced after 70 million generations. We randomly selected 100 trees from the stationary distribution. To account for phylogenetic uncertainty, we repeated our test over this set of 100 trees.

To maximize overlap between our trait database and phylogeny for comparative approaches we used an iterative tip matching approach. Briefly, we built our trait matrix by first finding exact species matches between the taxa in our tree and database. Each genus present on our tree that had no species level matches was then collapsed to a single tip and we searched for trait data for the genus. This process was repeated at the family level as well. At all taxonomic levels if there was more than one record in our trait database that matched a tip we used the mean chromosome number for the tip; in each of these cases the discrete traits such as reproductive mode were the same for all matching records in the database.

Phylogenetic ANOVA

The phylogenetic ANOVA was calculated using the implementation in the R package phytools (Revell 2012). Briefly, each taxon in our dataset was classified as haplodiploid or diplodiploid. If more than one chromosome number was reported for a taxon the mean chromosome number was used. Significance of the calculated F statistic was assessed using the simulation approach (Garland et al. 1993). This test was repeated for each of the sampled trees.

Originating condition test

Our test was conceptually inspired by Maddison's concentrated change test (Maddison 1990). Broadly, our approach determines whether there is evidence that nodes subtending the origins of the derived state (haplodiploidy) have extreme values for the continuous trait (chromosome number). We refer to this as the originating condition test and the four steps it involves are described below:

1) Reconstruct ancestral states for chromosome number pruning data from those species that exhibit haplodiploidy (fig 4.1a). By pruning chromosome number of haplodiploid taxa we create a more conservative test that will be applicable even if transitions to haplodiploidy causes selection for lower chromosome number.

2) Next we reconstruct the evolution of haplodiploidy with stochastic mapping to build a distribution of possible evolutionary histories (fig 4.1b) (Huelsenbeck et al. 2003). Since there is strong evidence that haplodiploidy is a derived state we fix the root of the tree as diplodiploid and we allow for different rates of transition between these states.

3) We then process the stochastic mappings to classify all nodes in the tree. Some nodes will be haplodiploid (Figure 4.1c, red nodes). The remainder will be diplodiploid and are subdivided by whether the immediate daughter branches remain in diplodiploidy (Figure 4.1c,

blue nodes) or as having an immediate daughter branch that shows a transition into haplodiploidy (Figure 4.1c, green nodes). Since these green nodes represent the origin of a haplodiploid lineage we call these nodes "producing nodes". Next we calculate the mean of chromosome number at the producing nodes identified across stochastic mappings and if available a distribution trees. This value is the estimate of the mean chromosome number of nodes that produce haplodiploidy we refer to this value as the "observed originating condition" for haplodiploidy.

4) To construct a null distribution we randomly sample from nodes that we have classified as being diplodiploid (step 3; Figure 4.1c blue and green nodes). The number of nodes sampled is the same as the number of producing nodes identified in step 3. This is repeated across multiple stochastic mappings and multiple trees if available. Finally, we use this null distribution to calculate an empirical p-value for the mean observed originating condition of haplodiploidy (Figure 4.1d).

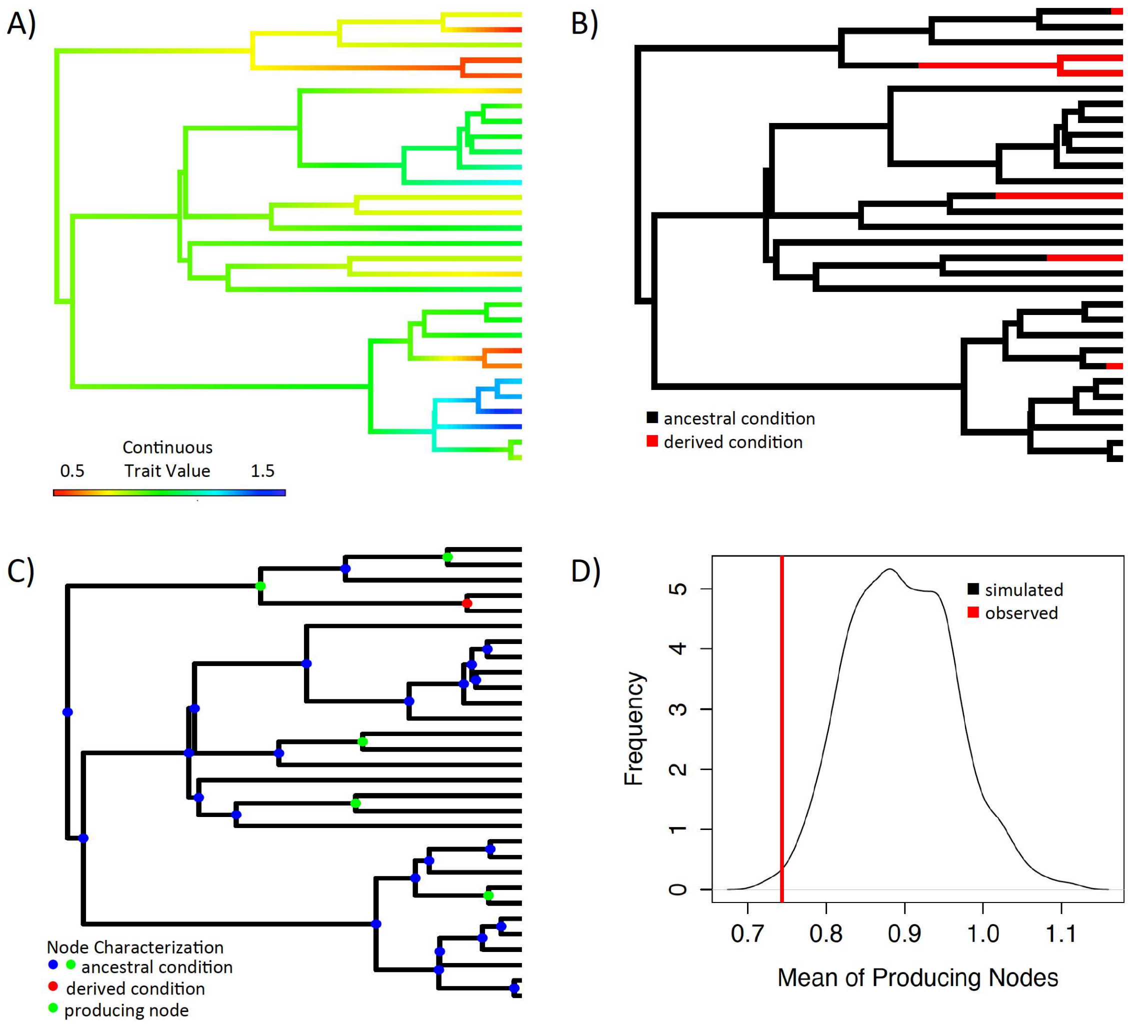

Figure 4.1 Four steps in the originating condition test.

A) Ancestral state reconstruction of chromosome number assuming a Brownian motion model of evolution. B) Identification of the transition points in ploidy through stochastic mapping C) Categorization of nodes as either diplodiploid (blue and green) or haplodiploid (red) as well as those that subtend an origin of haplodiploidy (green). D) Depiction of the null distribution and the observed mean chromosome number of producing nodes estimated from the data.

Validation testing

To test our approach we first simulated 200 trees using a birth death model with a birth rate of 1.0 and death rate of 0.5 allowing the trees to grow until 200 extant species were reached. Trees were simulated using the function sim.bdtree in the R package Geiger (Harmon et al. 2008). We then simulated chromosome number evolving by Brownian motion with a rate parameter of 0.2 and a starting mean of 10.0 on each tree using the function sim.char also in Geiger (Harmon et al. 2008). To create datasets where there is a correlation between chromosome number and the evolution of haplodiploidy we selectively scaled portions of the trees which had exceptionally low or high chromosome number. Briefly, we created ten versions of each tree with transformed branch lengths. We identified those branches that had a mean chromosome number in the upper or lower quartile. Branches in the upper quartile were scaled by a factor of 1/x while branches in the lower quartile where scaled by a factor of x, and we repeated this process for ten values of x ranging from 1 to 10. Since our trees begin in diplodiploidy increasing branch lengths in portions of the tree with low chromosome number effectively increases the rate of transition into haplodiploidy. While shortening branch lengths reduces the rate of transition into haplodiploidy. We evolved ploidy on these scaled trees using the sim.char function and setting the root state diplodiploid and allowing the trait to evolve under a model where transitions to haplodiploidy were allowed but no back transitions. We evaluated a number of rates for the transition from diplodiploid to haplodiploid; we discovered that a rate of 0.02 was sufficient to insure at least one transition occurred in all simulated datasets.

When the scaling factor (x) = 1 the trees were unchanged and there was no relationship between the evolution of chromosome number and ploidy, allowing us to test the type I error rate of our method. The remaining nine sets of 200 trees each allowed us to evaluate power under an increasingly strong relationship between chromosome number and ploidy, where branches that had low chromosome number were more likely to experience a transition into haplodiploidy while branches inferred to have high chromosome number were less likely to experience a transition.

Below we show the performance of this approach with the simulated data, reporting both type I error and power. Tests were considered significant at a p-value ≤ 0.05.

Results

Phylogenetic ANOVA

Raw data for chromosome number in diplodiploid and haplodiploid Acari suggests that haplodiploid lineages have lower chromosome number. The mean diploid number in diplodiploid taxa was 20 while haplodiploid taxa had a mean diploid number of 7. To test whether this difference could be explained by the correlation structure of the phylogeny we used a phylogenetic ANOVA. The mean F-statistic calculated across all sampled trees was 97.8. In all cases simulations indicate that the F-statistic calculated on each phylogeny had a p-value less than 0.01. This is indicates that the chromosome number in haplodiploid and diplodiploid clades is significantly different.

Validation testing for originating condition test

Analysis of the 200 simulated datasets with a scaling factor of 1 (no relationship between traits) showed a type one error rate of 5%. Analysis of the datasets with the scaling factor ranging from 2-10 assess the power of this approach. We found that under the simulation condition our approach had a power ranging from 15% to 76%.

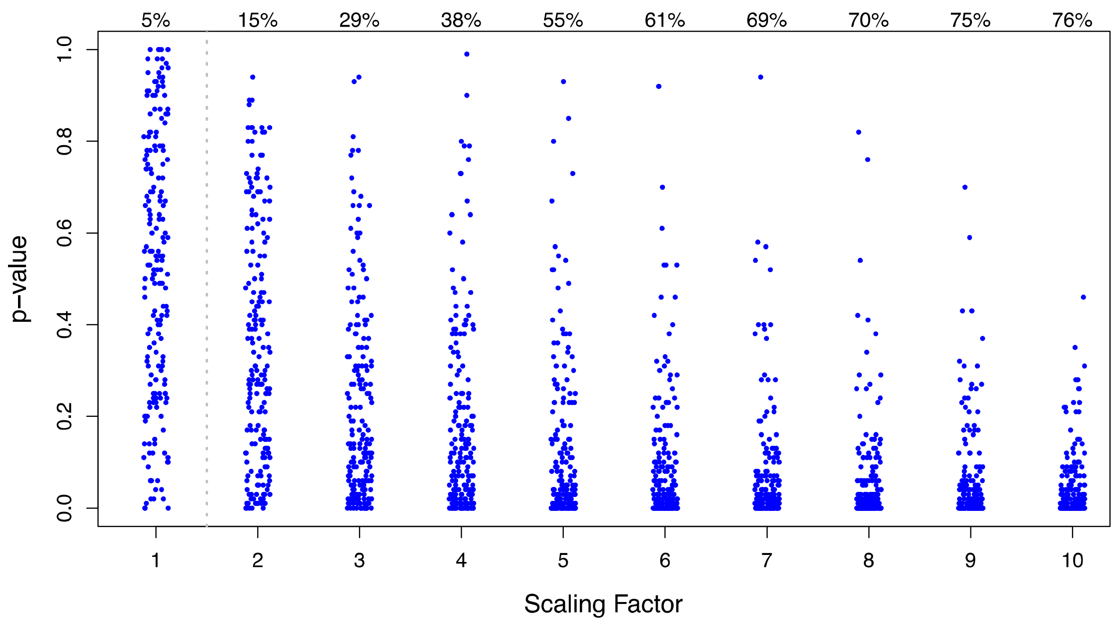

Figure 4.2 Empirical p-values calculated for simulated datasets.

The X-axis indicates the scaling factor used to stretch trees. The values at the top of the plot indicate the percentage of simulated datasets that resulted in significant results under our test. Each column contains 200 results.

Chromosome number and haplodiploidy

Mapping sex determination mode to the sampled Acari trees indicates that transitions to haplodiploidy occurred between 7 and 12 times (mean=11.2). Maximum likelihood reconstructions of chromosome number using only data from diplodiploid taxa indicated the mean of the diplodiploid nodes that led to transitions to haplodiploidy across all trees was 18.5. The null distribution generated by randomly sampling the same number of diplodiploid nodes on each tree as there were origins of haplodiploidy had a mean of 20.19 and a standard deviation of 0.78. Only 19 of the 1000 Monte Carlo simulations produced means equal to or lower than estimated from the observed data (Figure 4.3; empirical p-value = 0.019). This indicates that transitions to haplodiploidy occur from ancestors with significantly fewer chromosomes than we would expect by chance.

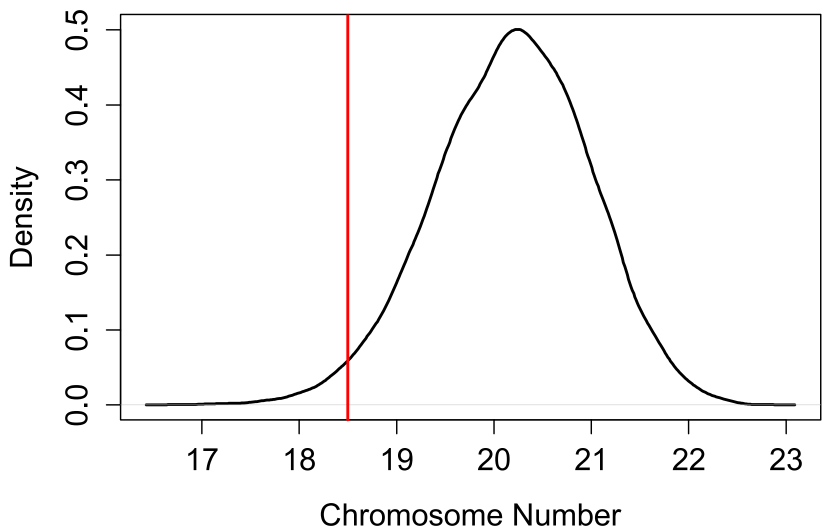

Figure 4.3 Originating condition test results.

The red line indicates the mean estimated chromosome number in nodes that subtend an origin of haplodiploidy. The black line indicates the distribution of simulated means produced to calculate the empirical p-value.

Discussion

In this study we present two comparative tests of the evolutionary dynamics of haplodiploidy. We first show that a phylogenetic ANOVA supports an absolute difference in the chromosome number of haplodiploid and diplodiploid taxa. However this difference in chromosome number may have evolved as a result of the transition to haplodiploidy rather than prior to the transition to haplodiploidy. The ancestral condition test that we develop avoids this possiblility by incorporating chromosome number data only from taxa in the ancestral condition (diplodiploidy). We show that this approach has acceptable type one error rates but has relatively weak power, requiring a strong relationship between the continuous trait (chromosome number) and discrete trait (ploidy) (figure 4.2). While we present this method with a trait that does not exhibit reversions, it should be straightforward to extend to traits that evolve more quickly and experience reversions. However, we anticipate that such an extension would likely be even less powerful since the uncertainty in the ancestral reconstruction of the discrete trait will increase. Increasing uncertainty in identifying the nodes that subtend a transition in the discrete trait will lead to broader sampling of nodes producing the originating value, and will lead to a lower probability of significant results. The validation testing shows that this approach is unlikely to produce false positives and is a conservative test.

Our analysis of the Acari data indicate that transitions to haplodiploidy are concentrated in lineages with low chromosome number. This provides the first emperical support for Bull's hypothesis that haplodiploidy does arise more frequently in clades with fewer chromosomes, and suggests that taxa with low chromosome number may have a lower viability cost when transitioning from diplodiploidy to haplodiploidy than taxa with many chromosomes.

In this chapter we have shown that genome architecture can affect the evolution of haplodiploidy. In doing so we were able to predict, at least in part, the phylogenetic distribution of ploidy within mites. However the combination of male heterogametic sex determination and low chromosome numbers occur across large clades of invertebrates that do not appear to have evolved haplodiploidy. This suggests that these factors alone are insufficient to explain broader phylogenetic patterns of haplodiploidy. Further theoretical and comparative work will be necessary to determine additional evolutionary correlates of haplodiploidy, to fully unravel its evolution.

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Blackmon, H., Adams, R.A. (2015) EvobiR an R package for comparative analysis and teaching in evolutionary biology.

Chapter 5

Recombination, chromosome number and eusociality in the Hymenoptera.

Abstract

Extraordinarily high rates of recombination have been observed in some eusocial species. The most popular explanation is that increased recombination increases genetic variation among workers, which in turn increases colony performance, for example by increasing parasite resistance. However, support for the generality of higher recombination rates among eusocial organisms remains weak, due to low sample size and a lack of phylogenetic independence of observations. Recombination rate though difficult to measure directly is correlated with chromosome number. As predicted, several authors have noted that chromosome numbers are higher among the eusocial species of Hymenoptera (ants, bees and wasps). Here, we present a formal comparative analysis of karyotype data from 1567 species of Hymenoptera. Contrary to earlier studies, we find no evidence for an absolute difference between chromosome number in eusocial and solitary species of Hymenoptera. However, we find support for an increased rate of chromosome number change in eusocial taxa. Our results support the view that a eusocial lifestyle has either led to variable selection pressure on chromosome number or that eusocial taxa typically have lower effective population size and fix more changes in chromosome number that are likely mildly deliterious at least while hetrozygous.

Introduction

Sexual reproduction is near ubiquitous among multicellular life (Maynard-Smith, 1978; Bell, 1982). Recombination -- the reshuffling of genomes during meiosis-- is thought to be the main benefit of sex, as it increases the efficiency of selection (Otto, 2009). However, in the short term it can also reduce organismal fitness by breaking up coadapted gene complexes (Agrawal, 2006; Otto, 2009). Theories for the evolution of recombination therefore aim to reconcile these two opposing evolutionary forces (Otto & Lenormand, 2002). In each generation genetic variation is produced by two separate mechanisms: independent assortment - random segregation of homologous chromosomes during meiosis and crossing over between homologous chromosomes. Interestingly, observed recombination rates can vary dramatically, even between closely related species (White, 1973; Wilfert *et al.*, 2007; Smukowski & Noor, 2011). Theory has often been successful in predicting under which circumstances selection would increase recombination rates, but statistical tests of these theories remain scarce (see however Lenormand & Dutheil, 2005).

One factor that might promote high rates of recombination is eusociality. In eusocial societies workers forego their own reproduction in order to help raise their siblings. The resulting colonies can range in size from a few individuals to millions, most of them sterile workers that are highly related, usually full- or half-siblings. High relatedness is thought to be crucial for the evolution of eusociality (Boomsma, 2009), but high relatedness can also be problematic for those societies. Living in a dense aggregate of close kin makes eusocial populations vulnerable to parasites (Schmid-Hempel, 1998; Kraus & Page, 1998; Schmid-Hempel & Crozier, 1999; Wilson-Rich *et al.*, 2009). Indeed, there is strong empirical evidence from ants, honeybees and bumblebees that colonies with higher genetic diversity, are better able to resist parasites (Shykoff & Schmid-Hempel, 1991; Baer & Schmid-Hempel, 1999; Tarpy, 2003; Hughes & Boomsma, 2004). Genetic diversity might also be important for division of labour (Oldroyd & Fewell, 2007; Wilfert *et al.*, 2007). Many eusocial colonies display extreme phenotypic and behavioural diversity among and within castes. Empirical studies have shown that caste, as well as task specialization within castes, are partly genetically determined (reviewed in Oldroyd & Fewell, 2007; Schwander *et al.*, 2010). Therefore, low genetic diversity might reduce colony fitness by disrupting proper division of labour. In addition to the challenges posed by high relatedness, eusocial species are also challenged by the decrease in effective population size due to extreme reproductive skew (Kent & Zayed, 2013). As a result, strong linkage disequilibrium and an increased frequency of deleterious mutations might lead to Hill-Robertson interference (Hill & Robertson, 1968), reducing the efficiency of natural selection. Several authors have suggested that eusocial species may be selected to increase recombination rates in responses to these challenges (Schmid-Hempel, 1998; Gadau *et al.*, 2000; Wilfert *et al.*, 2007; Sirviö *et al.*, 2011; Gadau *et al.*, 2012; Kent & Zayed, 2013). Increased recombination could increase genotypic diversity within colonies thereby helping eusocial societies to resist parasites and maintain proper division of labour (Wilfert *et al.*, 2007; Oldroyd & Fewell, 2007). Increased recombination rates also increase the efficiency of selection - counteracting the effects of small effective population sizes that are built into eusocial societies (Kent & Zayed, 2013).

Recent analyses comparing molecular estimates of recombination between eusocial and solitary Hymenoptera found that recombination rates of eusocial Hymenoptera are indeed higher than in solitary hymenopterans or any other metazoan that has been measured (Wilfert *et al.*, 2007; Sirviö *et al.*, 2011). Unfortunately, these analyses were based on just a small number of taxa (6 eusocial and 4 solitary Hymenoptera) and did not control for phylogenetic non-independence. Measuring recombination rates is challenging and labour intensive (Stumpf & McVean, 2003; Smukowski & Noor, 2011). Therefore, it is unlikely that, in the near future, sufficient data will be available for rigorous tests of the theoretical impacts of eusocial systems on recombination rates. On the other hand, currently it is possible to examine the relationship between eusociality and a factor that is known to be correlated with recombination rate: chromosome number. In fact, most earlier theory on recombination rate evolution in eusocial species was based on comparisons between chromosome numbers in eusocial and solitary Hymenoptera species (Sherman, 1979; Seger, 1983). As mentioned above, genetic variation is a function of the independent assortment of chromosomes, and the number of crossing over events between chromosomes. Increases in the number of chromosomes increase the possible genotypes due to independent assortment during meiosis. Because the number of crossing-over events is roughly constant (1-2 chiasmata) per chromosome (White 1973) increases in chromosome number also affects recombination rate by increasing the total number of crossover events.

Here we perform phylogenetically-controlled analyses to compare chromosomes numbers among eusocial and solitary species. Although the theory on recombination rates in

Hymenoptera was developed to explain absolute differences in chromosome number, it can also be used to predict differences in the variance in chromosome number between solitary and eusocial species. Eusocial species vary in terms of their size, mating systems, and social complexity. Each of these factors is expected to be important in shaping the evolution of recombination rates. Therefore, we predict that the variance in recombination rates -- as evidenced by chromosome number -- will be greater in eusocial species. As previously mentioned, the size of eusocial societies ranges from a few to millions of individuals. Kent and Zayed (2013) predicted that larger colonies are under stronger selection to increase recombination, due to an increase of reproductive skew. Larger colonies are also more likely to suffer from parasites (Schmid-Hempel 1998) and be faced with the maintenance of more elaborate caste structures than smaller ones (Oldroyd & Fewell, 2007). We therefore expect larger colonies to benefit more from increased genotypic diversity. Indeed Schmid-Hempel (1998) found a positive relationship between chromosome number and colonies size across 58 ant species. Recombination rates might also be affected by another factor that varies among eusocial societies: polyandry (multiple mating) and polygyny (multiple queens per nest). Both reduce reproductive skew, thereby increasing effective population size and decreasing selection on recombination. They also increase genotypic variation within colonies and might therefore lead to less stringent selection to increase recombination. Finally, eusocial taxa differ in their social complexity. Eusociality can be facultative, or obligate, and among eusocial species the number of distinct castes varies. It is currently unclear how the differences between facultative and obligate eusociality might affect selection on recombination rates. However, the theory on genetic caste determination predicts that species with more castes should benefit more from increased genotypic diversity (Oldroyd & Fewell, 2007). Furthermore, colonies with many distinct castes might be selected to increase recombination as they could benefit from breaking up linkage between genes that are selected in opposite directions in different castes (Kent & Zayed, 2013).

In summary, we expect eusocial species to have a higher variance in chromosome number than solitary species, because eusocial species are variable for a number of life history parameters that are expected to affect recombination rate evolution and that are not applicable to solitary species. Changes in chromosome number are often slightly deleterious and if effective population size is reduced in eusocial lineages chromosome number should change more quickly than in solitary species (Lande 1985; Max 1995).

Methods

Data collection

The data used for this analysis were collected from the literature between January 2012 and September 2013. We used a variety of sources, including the primary literature as well as a number of key review papers. References were identified via Web of Science and Google Scholar. We collected all karyotype data that has been published for species of Hymenoptera; these data are available from the Tree of Sex Database (Tree of Sex Consortium, 2014) (Appendix A and E). For each species with karyotype data, we recorded eusocial status according to the definition by (Crespi & Yanega, 1995)(solitary, cooperative breeder, facultatively eusocial, obligately eusocial, with the latter two being considered “eusocial”), and for each eusocial species we recorded colony size, queen number, and mating numbers for single queens. Genus-level caste number estimate for ants were based on data collected by Oster & Wilson (1978). Several ant species are social parasites -- they do not produce any workers themselves, but rely on those of other species. We obtained social parasite status from a recent review (Buschinger, 2009), restricting social parasites to those species with either dulosis (slave capturing) or inquilinism (living in a host species nest). In total we have data for 1567 species, although the character matrix is not complete for every species. We provide all data Table S1.

Phylogeny

We estimated time-scaled phylogenetic relationships among Hymenoptera lineages using a phyloinformatic approach. We used a Python script to download published DNA sequences from the NCBI nucleotide database (GenBank) that were sampled from species included in our trait dataset. We targeted nine phylogenetic markers that have been used extensively in Hymenoptera phylogenetics: CAD, abdominal A, arginine kinase, elongation factor 1-alpha, longwavelength rhodopsin, wingless, COI, cytB, and the mitochondrial large ribosomal subunit 16S. We aligned sequence clusters with MAFFT (Katoh & Toh, 2008), and filtered the 16S alignment using Gblocks (Talavera & Castresana, 2007) to remove ambiguously aligned regions. We used Mesquite v2.75 (W. P. Maddison & D. R. Maddison, 2013) to concatenate alignments, delete introns and delimit codon positions. The final data matrix dimensions were 602 taxa by 5600 aligned sites. We estimated phylogenetic relationships and divergence times simultaneously using BEAST v1.7.5 (Drummond & Rambaut, 2007). In the BEAST analysis, we estimated nucleotide substitution model parameters independently across five partitions: nuclear codon positions 1+2, nuclear codon position 3, mitochondrial codon positions 1+2, mitochondrial codon position 3, and the mitochondrial ribosomal positions. We assumed an HKY site model with among-site rate variation modeled with a gamma distribution, a birth-death model of phylogenetic branching, and a log-normal relaxed clock model of among-lineage substitution rate variation. We calibrated divergence time estimates with three exponential node priors: 1) 185 MY on the stem node of Ichneumonoidea (Zessin, 1981), 2) 180 MY on the crown node of Tenthredinoidea (Geinitz, 1887; Nel *et al.*, 2004), and 3) 197 MY on the crown node of Vespomorpha (Heer, 1865). We ran the BEAST analysis for 50 million generations, discarding the first 42 million generations before the stationary distribution of parameter values was reached.

Comparative analysis

For the analysis of chromosome number evolution we used haploid chromosome count. In cases where more than one record was available we used the mean of all records. As predictors we included eusociality (solitary vs. eusocial) as a binary trait, or degree of sociality (0=solitary, 1= cooperative breeder, 2= facultative eusocial, 3= obligate eusocial) We combined our data on polygyny and polyandry into one binary variable “relatedness”: species with one or the other (or both) were scored as “low relatedness” whereas singly mated monogynous colonies were scored as “high relatedness”. This decision was based on a previously observed negative correlation between the two (Hughes *et al.*, 2008). We conducted a phylogenetically corrected one-way ANOVA (sensu Garland *et al.*, 1993) comparing eusocial and solitary Hymenoptera. p-values were calculated based on a null distribution generated from 1000 simulations.

In addition to differences in mean chromosome number, eusociality might also affect the rate at which chromosome number evolves. We tested for a shift in the rate of chromosome number evolution using a censored rate test, based on a Brownian motion model. This allows us to compare models where the continuous trait (chromosome number) evolves at a single rate on all branches to a model where each state (e.g. solitary and eusocial) has an independent rate of evolution (O'Meara *et al.*, 2006). Conducting the censored rate test requires a reconstruction of the history of eusociality on our tree. Since eusociality is widely accepted as a derived state within Hymenoptera we fixed the root state of the tree as solitary (Wilson, 1975). We used an MK (a continuous-time Markov chain) model to estimate the parameters of the transition rate matrix, and allowed different transition rates between states. Stochastic mapping was used to assign the state of all branches in the tree. To account for uncertainty in ancestral states we performed our analysis across 100 stochastically mapped trees. This analysis was repeated coding social state into four categories (solitary, cooperative breeder, faculatively eusocial and obligately eusocial) and two categories (solitary and eusocial). The R package Phytools version 0.3-72 was used to both reconstruct ancestral states and fit models of chromosome number evolution. Tests were considered significant at $\alpha=0.05$.

Results

Eusociality-depended differences in chromosome number

Figure 5.1 shows a plot of the ancestral state reconstruction of chromosome number among the 367 Hymenoptera species represented on our phylogeny. We used a phylogenetically corrected one-way ANOVA to test for an absolute difference in chromosome number between eusocial and solitary Hymenoptera. The phylogenetically corrected one-way ANOVA comparing eusocial and solitary Hymenoptera also revealed no significant difference in chromosome number (F-statistic = 70.5, p-value = 0.23).

Rates of chromosome number evolution

Karyotypes vary dramatically within and among the eusocial clades, with chromosome number ranging from n=1 in the ant *Myrmecia croslandi* to n=53-60 in the ant *Dinoponera lucida* (figure 5.1a). Here we test if this variation could be due to an increased rate of evolution of karyotypes in eusocial compared to solitary clades. The censored rate test supports the conclusion that chromosome number evolves more quickly in eusocial than solitary Hymenoptera. We performed the censored rate test coding taxa into four eusocial states solitary, cooperative breeder, facultatively eusocial, and obligately eusocial. A four-rate model where each social state has its own rate was preferred across all stochastic mappings. The rate in the eusocial (facultative and obligate) clades was ~3x faster than the solitary clades (1.28 and 1.10 vs. 0.374 respectively). We estimated the highest rate (7.69) in the cooperative breeder clade, but this group is only represented by four species on the tree, and the 95% confidence interval (2.01-13.37) indicated insufficient data to reliably estimate this rate. We repeated this analysis coding taxa as eusocial or solitary. Using this coding we again found support for the more complex model where each social state has its own rate of evolution. This two-rate model was preferred across all 100 stochastic mappings with a p-value of less than 0.001. The rate of chromosome number evolution in eusocial clades was again ~ 3x faster (3.17-3.25x faster across stochastic character mappings) than in solitary clades (Figure 2b).

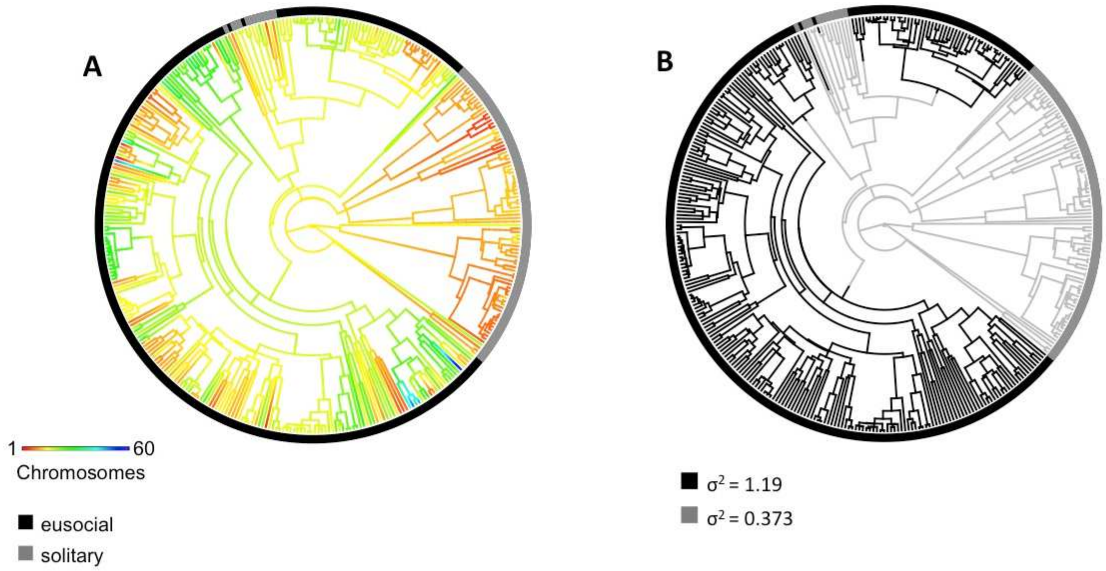

Figure 5.1 Analysis of the rate of chromosome number evolution.

In both trees the ring outside of the tree indicates the sociality state of the terminal taxa, black indicating eusocial and gray indicating solitary. **a)** The branches have been painted to illustrate a reconstruction of the evolution of chromosome number under Brownian motion according to the scale at lower left. **b)** A single stochastic mapping from our analysis shows how the branches were assigned to either eusocial or solitary states. Values for σ^2 are the mean across 100 stochastic mappings, and represent the rate of chromosome number evolution.

Discussion

The observation of extraordinarily high rates of recombination in a number of eusocial Hymenoptera has spurred the development of theories to explain the evolution of recombination rates. Broadly speaking, these theories fall into two classes: Either eusociality leads to selection for high recombination rates to increase genotypic diversity within a colony ("the genetic diversity theory" Wilfert et al., 2007), or alternatively to alleviate the negative effects of reproductive skew and small effective population size ("the reproductive skew theory", Kent & Zayed, 2013). Although the theoretical validity of these models is clear, the empirical support for a causal link between eusociality and high recombination remains weak. In this manuscript we test the hypothesis that eusocial behaviour has affected selection on recombination rates in the Hymenoptera, using chromosome number as a proxy for recombination. Using phylogenetic framework we show that, in contrast to earlier studies (Sherman, 1979; Seger, 1983; Wilfert *et al.*, 2007), there is no support for a higher number of chromosomes among eusocial species. We believe that this is unlikely to be an issue of statistical power, as our study is the most comprehensive to date and captures four out of the nine origins of eusociality. A more likely explanation is that the differences in chromosome number/recombination rate found by earlier analyses were due to the phylogenetic non-independence of observations; the principal difference observed was between the Aculeata (which consist of both solitary and eusocial species and has n=16 chromosomes on average), and the rest of the Hymenoptera (with an average of n=10 chromosomes).

Eusocial societies are diverse. Theory predicts that selection for increased recombination rates depends on many aspects a species' ecology (Wilfert *et al.*, 2007; Sirviö *et al.*, 2011; Kent & Zayed, 2013). We therefore decided not just to test the absolute difference between the chromosome number of solitary and eusocial species, but also to consider the rate at which chromosome number has evolved. Using a phylogenetic framework we found that chromosome number indeed changes at a higher rate in eusocial hymenopterans.

Much of the published theory for recombination rate and its effect on genetic variation were coopted from theories for the evolution of polyandry. There is a wealth of empirical support for the importance of polyandry on within-colony diversity. However, it is unclear if these theories make the same predictions about recombination. From the quantitative genetics literature we know that additive genetic variance *decrease* with recombination rate (Falconer & Mackay, 1996). Another issue is that for example parasite resistance could be due to a single locus, in which case recombination rate would have no effect on the distribution of resistance among colony members. The same would be true if the trait if polygenic, but the effects of each gene are completely additive (Falconer & Mackay, 1996). A recent simulation study investigated the role of chromosome number and recombination rate on polygenic traits (Rueppell *et al.*, 2012). They showed that both processes in general do not affect genetic variance, but that they can increase the number of unique genotypes and the genotypic range in a colony (Rueppell *et al.*, 2012). However the effects are small, and we currently know too little about the genetic architecture of traits determining colony fitness to access the impacts of these effects.

In this study we used chromosome number as a proxy for recombination rate. This means that although we were able to utilize data from a larger sample of eusocial species, we were working with only a coarse approximation of recombination rate. For example, it is possible that recombination rate varies by means other than chromosome number, e.g. an increase of the number of chiasmata per chromosome. Unfortunately most karyotypic studies of the Hymenoptera do not cite the number of chiasmata (Gokhman, 2009). However Hymenoptera have relatively small chromosomes and it is therefore unlikely that more than one chiasmata is present per arm.

In conclusion, a theoretical link has been made between high rates of recombination, high levels of genetic diversity, effective population size and colony performance in eusocial species. Higher genotypic diversity within colonies could improve their performance, by increasing resistance to parasites, and / or maintaining the genetic basis of the division of labour. While at the same time high recombination rates can reduce linkage and interference effects resulting from high reproductive skew. In this study, we tested these predictions using a large comparative analysis of Hymenoptera that assumed recombination rate is correlated with chromosome number. We found that eusociality is associated with an increased rate of chromosome number evolution but no absolute difference in chromosome number. While the higher rate of chromosome number evolution observed in eusocial clades may indicate varying strengths of selection on chromosome number it may also be due to drift. Changes in chromosome number are often slightly deleterious (Max, 1995). Therefore if effective population size is reduced in eusocial lineages chromosome number should change more quickly due to drift. However this is based on the assumption that eusociality always reduces effective population size, which fails to take into account the ecological success of many eusocial species. The current theory on recombination rate evolution in eusocial invertebrates fails to evaluate the relative importance of linkage disequilibrium and colony genotypic diversity and thereby provide clear quantitative predictions for both short-term and long-term effects of recombination rate. Such theoretical advances, in addition to recombination rate estimates for more Hymenoptera species, especially solitary members of the Aculeata, gamergate colonies and social parasites, will be crucial to fully understand the processes that have produced the pattern of variation that we have observed.

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Appendix A

Cytogenetic data for invertebrates

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Acariformes						
Acaridae						
Acarus siro			18		XO	211
Acotyledon formosani	parth					212
Caloglyphus berlesei			18		XO	211
Caloglyphus michaeli			16		XO	211
Caloglyphus mycophagus			16		XO	211
Rhizoglyphus echinopus			10		XY	213
Rhizoglyphus robini						214
Sancassania berlesei			18		XO	213
Sancassania michaeli			16		XO	213
Sancassania mycophaga			16		XO	213
Sapracarus sp.	parth					213
Sapracarus tuberculalUs	parth					213
Schwiebea elongata	parth					215
Troglocoptes sp.1	parth					213
Troglocoptes sp.2	parth					213
Troglocoptes sp.3	parth					213
Troglocoptes sp.4	parth					213
Tyrophagus casei			10		XY	213
Tyrophagus neiswanderi			12		XY	213
Tyrophagus palmarum			16		XO	213
Tyrophagus putrescentiae			16		XO	213
Achipteriidae						
Achipteria coleoptrata						216
Achipteria punctata			18			213
Achipteria species						217
Anachipteria species						217
Anystidae						
Anystis baccarum	parth					213
Anystis salicinus	parth					213
Arrenuridae						
Arrenurus bicuspidator			20			211
Arrenurus caudatus			26			211
Arrenurus maculata			20			211
Arrenurus pustulator			23			211
Arrenurus sp.1			20			213
Arrenurus sp.2			26			213
Arrenurus sp.3						213
Arrenurus sp.4						213
Arrenurus sp.5						213
Astegistidae						
Cultroribula bicultrata	parth					217
Cultroribula divergens	parth					217
Atopochthoniidae						
Atopochthonius artiodactylus	parth					217
Bdellidae						
Bdella capitosa	parth					213
Bdella tropica	parth					213
Brachychthoniidae						
Brachychthonius berlesei	parth					217
Brachychthonius pius	parth					217
Eobrachychthonius latior	parth					217
Liochthonius brevis	parth					217
Liochthonius sellnicki	parth					213
Liochthonius strenzkei	parth					217
Poecilochthonius spiciger	parth					217
Sellnickochthonius immaculatus	parth					217
Sellnickochthonius lydiae	parth					217
Sellnickochthonius suecia	parth					217
Sellnickochthonius zelawaiensis	parth					217
Synchthonius crenulatus	parth					217
Camerobiidae						
Neophyllobius aesculi			22			213

haplodiploid type unspecified

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Neophyllobius elegans haplodiploid type unspecified			22			213
Neophyllobius piniphilus haplodiploid type unspecified			20			218
Camisiidae						
Camisia aff. lapponica	parth					213
Camisia carrolli	parth					213
Camisia horrida	parth					213
Camisia invenusta	parth					213
Camisia segnis	parth					219
Camisia spinifer	parth					219
Heminothrus interlamellaris	parth					213
Heminothrus longisetosus	parth					213
Heminothrus ornatissimus	parth					219
Heminothrus paolianus	parth					216
Heminothrus targionii	parth					213
Plarynothrus altimontanus	parth					213
Plarynothrus banksi	parth					219
Plarynothrus biangulatus	parth					219
Plarynothrus bicarinatus	parth					219
Plarynothrus brevisetosus	parth					213
Plarynothrus carinatus	parth					213
Plarynothrus castaneus	parth					213
Plarynothrus major	parth					213
Plarynothrus microclava	parth					213
Plarynothrus peltifer			18			213
Platynothrus peltifer	parth					217
Platynothrus punctatus	parth					213
Platynothrus septentrionalis	parth					213
Platynothrus sibiricus	parth					213
Platynothrus skoettsbergi	parth					213
Platynothrus thori	parth					213
Platynothrus traversus	parth					213
Carabodidae						
Carabodes femoralis						216
Carabodes granulatus	parth					213
Ceratoppiidae						
Ceratoppia bipilis						217
Ceratoppia species						217
Ceratozetidae						
Ceratozetes cf.						217
Ceratozetes cuspidatus	parth					217
Ceratozetes gracilis						217
Ceratozetes parvulus	parth					213
Fuscozetes species						217
Chamobatidae						
Chamobates borealis						220
Chamobates voigtsi						220
Cheyletidae						
Acaropsellina docta haplodiploid type unspecified			10			213
Cheyletus malaccensis haplodiploid type unspecified			4			213
Cheletogenes ornatus haplodiploid type unspecified			4			213
Cheyletus eruditus	parth		4			211
Nodele simplex haplodiploid type unspecified			4			213
Cosmochthoniidae						
Gozmanyina majesta	parth					213
Nipponiella sp	parth					213
Crotoniidae						
Austronothrus clarki						221
Austronothrus curviseta						221
Austronothrus flagellatus						221

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Crotonia brachyrostrum						216
Crotonia caudalis						216
Holonothrus sp.						221
Cunaxidae						
Cunaxa capreolus			22			213
haplodiploid type unspecified						
Damaeidae						
Damaeobelba minutissima	parth					213
Damaeus angustipes						217
Damaeus verticillipes			18			213
Epidamaeus species						217
Damaeolidae						
Fosseremus laciniatus auct	parth					213
Elliptochthoniidae						
Elliptochthonius profundus	parth					213
Eniochthoniidae						
Eniochthonius minutissimus	parth					217
Epidermoptidae						
Myialges pari			16			213
haplodiploid type unspecified						
Epilohmanniidae						
Epilohmannia cylindrica	parth					213
Epilohmannia pallida	parth					213
Epilohmannia styriaca	parth					213
Epilohmannoides jacoti	parth					213
Epilohmannoides terrae	parth					213
Eremobelbidae						
Eremobelba gracilior						217
Ereynetidae						
Riccardoella limacum			10			213
haplodiploid type unspecified						
Eriophyidae						
Abacarus hystrix						222
haplodiploid type unspecified						
Aceria ficus						223
haplodiploid type unspecified						
Aceria guerreronis						224
haplodiploid type unspecified						
Aceria oleae						225
haplodiploid type unspecified						
Aceria sheldoni			4			213
haplodiploid type unspecified						
Aculops cornutus						213
haplodiploid type unspecified						
Aculops fockeui						213
haplodiploid type unspecified						
Aculops lycopersici			4			213
haplodiploid type unspecified						
Aculops pelekassi						213
haplodiploid type unspecified						
Aculops tetanothrix			4			213
haplodiploid type unspecified						
Aculus persicae			4			213
haplodiploid type unspecified						
Aculus schlechtendali			4			213
haplodiploid type unspecified						
Phyllocoptruta oleivora			4			213
haplodiploid type unspecified						
Eriophyidae						
Artacris macrorhynchus			4			213
haplodiploid type unspecified						
Epitrimerus pyri						213
haplodiploid type unspecified						
Eriophyes laevis						213
haplodiploid type unspecified						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Eriophyes tiliae			4			226
haplodiploid type unspecified						
Leipothrix dipsacivagus						227
haplodiploid type unspecified						
Rhyncaphytoptus ficifoliae						225
haplodiploid type unspecified						
Tegolophus hassani						223
haplodiploid type unspecified						
Vasates aceriscrumena						228
haplodiploid type unspecified						
Erythraeidae						
Balaustium sp.	parth					213
Erythraeus sp.			16			213
Eulohmanniidae						
Eulohmannia ribagai	parth					217
Eupalopsellidae						
Saniosulus nudus			6			213
haplodiploid type unspecified						
Euphthiracaridae						
Microtritia minima	parth					217
Euphthiracaroidea						
Rhysotritia ardua	parth					213
Rhysotritia duplicata	parth					216
Eupodidae						
Claveupodes delicatus	parth					213
Eupodes sigmoidensis	parth					213
Eupodes sp.			18			213
haplodiploid type unspecified						
Hawaiieupodes thermophilus	parth					213
Linopodes sp.			18			213
haplodiploid type unspecified						
Eutegaeidae						
Eutegaeus curviseta						216
Euzetidae						
Euzetes globulus			18			213
Galumnidae						
Galumna ithacensis						217
Galumna sp.			18			213
Orthogalumna terebrantis			18			213
haplodiploid type unspecified						
Pergalumna curva	parth					217
Pergalumna emarginata						217
Pergalumna formiria	*parth*					217
Gehypochthoniidae						
Gehypochthonius rhadamanthus	parth					213
Gehypochthonius urticinus	parth					213
Gehypochthonius xarifae	parth					213
Glycyphagidae						
Glycyphagus domesticus			18		XO	211
Gymnodamaeidae						
Gymnodamaeus bicostaus						217
Jacotella species						217
Haplochthonlidae						
Amnemochthonius taeniophorus	parth					213
Haplochthonius simplex	parth					213
Haplozetidae						
Peloribates cf.						217
Protoribates capucinus	parth					217
Protoribates lophotrichus	parth					217
Rostrozetes foveolatus	parth					213
Xylobates capucinus	parth					213
Xylobates oblongus	parth					213
Xylobates robuSlior	parth					213
Harpirhynchidae						
Harpyrhynchus brevis			4			213

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
haplodiploid type unspecified						
Harpyrhynchus novoplumaris			4			213
haplodiploid type unspecified						
Hemisarcoptidae						
Hemisarcoptes coccophagus			14			229
facultative sex ratio adjustment, homomorphic chromosomes						
Hermanniellidae						
Hermanniella species						217
Hermanniidae						
Hermannia gibba			16			213
Histiostomatidae						
Anoetus laboratorium			8			211
haplodiploid type unspecified						
Hormosianoetus laboratorium		8			213	
haplodiploid type unspecified						
Myianoetus sp.						213
haplodiploid type unspecified						
Histiostomatidae						
Hexanoetus conoidalis						213
haplodiploid type unspecified						
Histiostoma bakeri						213
Histiostoma feroniarum			14			213
haplodiploid type unspecified						
Histiostoma feroniarum.2	parth					230
Histiostoma formosana						213
haplodiploid type unspecified						
Histiostoma humiditatis	parth					213
Histiostoma julorum						213
haplodiploid type unspecified						
Histiostoma murchei						213
haplodiploid type unspecified						
Humerobatidae						
Humerobates rostrolamellatus		16			213	
haplodiploid type unspecified						
Hydrachnidae						
Hydrachna globosa			12			211
Hydrachna leegei			20			211
Hydrachna sp.1			12			213
Hydrachna sp.2			12			213
Hydrachna uniscutata			12			211
Hydrodromidae						
Hydrodroma despiciens			6			213
Hydrodroma despiciens.2			16			231
likely XO						
HydrozetIdae						
Hydrozetes dimorphus virginalis	parth					213
Hydrozetes lacustris	parth					213
Hydrozetes parisiensis	parth					213
Hydrozetes terrestris	parth					213
Hydrozetes tridactylus	parth					213
Hydryphantidae						
Hydryphantes bayeri			10			211
Hydryphantes clypeatus			6			211
Hydryphantes ruber			12			211
Hydryphantes sp.			10			211
Hydryphantes sp.1			10			213
Hydryphantes sp.2			10			213
Parathyas dirempta			18			213
Hygrobatidae						
Hygrobates calliger			14			211
Hypochthoniidae						
Eohypochthonius magnus	parth					213
Eohypochthonius travei	parth					213
Hypochthonius luteus	parth					213
Hypochthonius rufulus			18			213

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Hypochthonius rufulus.2	parth					217
Malacoangelia remigera	parth					213
Labidostommatidae						
Labidostomma luteum	parth					213
Lebertiidae						
Lebertia porosa			16			211
Lebertia sp.1			16			213
Lebertia sp.2			18			213
Lebertia stackelbergi			18			211
Liacaridae						
Liacarus coracinus						220
Liacarus subterraneus						220
Limnesiidae						
Limnesia maculata			18			211
Limnesia sp.1			18			213
Limnesia sp.2			18			213
Limnesia undulata			18			211
Limnocharidae						
Limnochares aquatica			6			213
LImnozetidae						
Limnozetes amnicus	parth					213
Limnozetes atmetos	parth					213
Limnozetes borealis	parth					213
Limnozetes guyi	parth					213
Limnozetes latilamellata	parth					213
Limnozetes lustrum	parth					213
Limnozetes onondaga	parth					213
Limnozetes palmerae	parth					213
Limnozetes sphagni	parth					213
Lohmanniidae						
Annectacarus mucronatus	parth					213
Cryptacarus promecus	parth					213
Lohmannia banksi	parth					216
Lohmannia lanceolata	parth					213
Meristacarus sp.	parth					213
Torpacarus omittens	parth					213
Malaconothridae						
Malaconothrus crassisetosa	parth					213
Malaconothrus gracilis	parth					216
Malaconothrus hauseri	parth					213
Malaconothrus robustus	parth					213
Malaconothrus robustus asiaticus	parth					213
Malaconothrus sp.1	parth					217
Malaconothrus sp.2	parth					217
Trimalaconothrus glaber	parth					213
Trimalaconothrus novus	parth					213
Trimalaconothrus saxosus	parth					213
Trimalaconothrus simplex	parth					213
Mesoplophoridae						
Archoplophora laevis	parth					217
Archoplophora villosa	parth					213
Mochlozetidae						
Podoribates pratensis						217
Mycobatidae						
Punctoribates insignis	parth					213
Punctoribates punctum						217
Nanhermanniidae						
Cyrthermalllzia guadeloupensis	parth					213
Cyrthermalllzia sp.1	parth					213
Masthermannia sp.1	parth					213
Nanhermannia comitalis	parth					213
Nanhermannia coronata	parth					216
Nanhermannia dorsalis	parth					217
Nanhermannia elegantula	parth					216
Nanhermannia nana	parth					216

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Nehypochthoniidae						
Nehypochthorum porosus	parth					216
Neoliodidae						
Poroliodes farinosus			18			213
Nothridae						
Nothrus anauniensis	parth					219
Nothrus borussicus	parth					213
Nothrus macedi	parth					213
Nothrus monticolus	parth					213
Nothrus palustris	parth					219
Nothrus pratensis	parth					217
Nothrus quadripilis	parth					213
Nothrus silvestris	parth					213
Nothrus silvicus	parth					217
Nothrus terminalis carolinae	parth					219
Nothrus truncatus	parth					216
Novonothrus flagellatus						216
Oppiidae						
Graptoppia (Stenoppia)	parth					217
Microppia minus	parth					217
Multioppia species						217
Oppia cf.						217
Oppia nitens	parth					213
Oppia nodosa	parth					213
Oppia sp.			18			213
haplodiploid type unspecified						
Oppiella nova	parth					217
Oppioid sp.						217
Quadroppia circumita						217
Quadroppia quadricarinata	parth					213
Quadroppia sp.1						217
Quadroppia sp.2	parth					217
Quadroppia sp.3						217
Oribatellidae						
Oribatella calcarata						220
Oribatella quadricornuta						220
Oribatella sakamorii	parth					213
Oribatella sp.1						217
Oribatella sp.2						217
Oribatulidae						
Oribatula sakamorii	parth					213
Oribatula tibialis						217
Palaeacaridae						
Palaeacarus hystricinus	parth					217
Palaeacarus kamenskii	parth					213
Parakalummidae						
Protokalumma salicis						217
Paratydeidae						
Neotydeus ardisannae	parth					213
Parhypochthoniidae						
Parhypochrhonius aphidinus	parth					213
Pedlculochelldae						
Paralycus lavoipierrei	parth					213
Paralycus parvulus	parth					213
Penthaleidae						
Halotydeus destructor						232
Halotydeus destructor.2	parth					213
Penthaleus major	parth					232
Phenopelopidae						
Eupelops hirtus						220
Eupelops plicatus						216
Eupelops torulosus						220
Phthiracaridae						
Atropacarus striculus	parth					217
Phthiracarus compressus						217

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Phthiracarus setosellus						217
Steganacarus magnus						233
Phyllochthoniidae						
Phyllochthonius aoutii	parth					213
Pionidae						
Piona camea			22			211
Piona coccinea coccinea			20			211
Piona nodata			8			211
Piona sp.1			8			213
Piona sp.2			20			213
Piona sp.3			22			213
Piona sp.4						213
Piona uncata uncata			20			211
Podapolipidae						
Chrysomelobia labidomerae						213
haplodiploid type unspecified						
Podopterotegaeidae						
Podopterotegaeus tectus	parth					217
Pomerantziidae						
Pomerantzia benhami	parth					213
Pomerantzia kethleyi	parth					213
Pomerantzia prolata	parth					213
Pterochthoniidae						
Pterochthonius angelus	parth					217
Pterygosomatidae						
Geckobiella texana						213
haplodiploid type unspecified						
Pyemotidae						
Pyemotes herfsi						213
haplodiploid type unspecified						
Pyemotes scolyti						213
haplodiploid type unspecified						
Pyemotes tritici			6			213
haplodiploid type unspecified						
Pyemotes ventricosus			6			211
haplodiploid type unspecified						
Pygmephoridae						
Pediculaster mesembrinae			6			213
haplodiploid type unspecified						
Scutacaridae flechtmanni			6			213
haplodiploid type unspecified						
Siteroptes graminum			6			213
haplodiploid type unspecified						
Siteroptes reniformis			6			213
haplodiploid type unspecified						
Pyroglyphidae						
Dermatophagoides farinae					XO	234
Raphignathidae						
Neognathus terrestris	parth					213
Rhagidiidae						
Evadorhagidia oblikensis	parth					213
Poecilophysis faeroensis	parth					213
Poecilophysis pratensis	parth					213
Rhagidia diversicolor	parth					213
Rhagidia gigas	parth					213
Robustocheles mucronata	parth					213
Shibaia longisensilla	parth					213
Sarcoptidae						
Sarcoptes scabiei			18		XO	235
Scheloribatidae						
Scheloribates laevigatus						217
Scheloribates lanceoliger						217
Scheloribates species						217
Scutacaridae						
Imparipes histricinus						213

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
haplodiploid type unspecified						
Stigmocheylidae						
Stigmocheylus sp.1	parth					213
Stigmocheylus sp.2	parth					213
Suctobelbidae						
Allosuctobelba obtusa	parth					217
Suctobelbella falcata	parth					217
Suctobelbella hamata	parth					217
Suctobelbella hurshi	parth					217
Suctobelbella laevis	parth					217
Suctobelbella palustris	parth					217
Suctobelbella similis	parth					217
Suctobelbella sp.1	parth					217
Suctobelbella sp.10	parth					217
Suctobelbella sp.11	parth					217
Suctobelbella sp.12	parth					217
Suctobelbella sp.13	parth					217
Suctobelbella sp.14	parth					217
Suctobelbella sp.15	parth					217
Suctobelbella sp.16	parth					217
Suctobelbella sp.17	parth					217
Suctobelbella sp.18	parth					217
Suctobelbella sp.19	parth					217
Suctobelbella sp.2	parth					217
Suctobelbella sp.20	parth					217
Suctobelbella sp.21	parth					217
Suctobelbella sp.3	parth					217
Suctobelbella sp.4	parth					217
Suctobelbella sp.5	parth					217
Suctobelbella sp.6	parth					217
Suctobelbella sp.7	parth					217
Suctobelbella sp.8	parth					217
Suctobelbella sp.9	parth					217
Suctobelbella subcornigera	parth					217
Suctobelbella tuberculata	parth					217
Suctobelbella vera	parth					217
Syringophilidae						
Syringophiloidus minor haplodiploid type unspecified			6			213
Tarsonemidae						
Iponemus confusus haplodiploid type unspecified						213
Iponemus radiatae haplodiploid type unspecified						213
Polyphagotarsonemus latus haplodiploid type unspecified			4			213
Tarsonemus confusus haplodiploid type unspecified						213
Tarsonemus confusus.2	parth					213
Tarsonemus lobosus haplodiploid type unspecified						213
Tarsonemus nodosus haplodiploid type unspecified						213
Tarsonemus randsi haplodiploid type unspecified						213
Tarsonemus schlechtendali haplodiploid type unspecified						213
Tarsonemus sp. haplodiploid type unspecified			4			213
Tarsonemus talpae haplodiploid type unspecified						213
Tarsonemus virgineus	parth					213
Tarsonemus waitei haplodiploid type unspecified						213
Tectocepheidae						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Tectocepheus cuspidatus	parth					213
Tectocepheus minor	parth					220
Tectocepheus sarekensis	parth					220
Tectocepheus velatus	parth					216
Tegoribatidae						
Lepidozetes singularis						217
Tenuipalpidae						
Brevipalpus califomicus	parth		2			211
haplodiploid type unspecified						
Brevipalpus obovatus	parth		2			211
haplodiploid type unspecified						
Brevipalpus phoenicus	parth		2			211
haplodiploid type unspecified						
Brevipalpus pulcher			4			213
haplodiploid type unspecified						
Brevipalpus russulus			4			213
haplodiploid type unspecified						
Brevipalpus spinosus			4			213
haplodiploid type unspecified						
Oligomerismus oregonensis	parth					213
Raoiella indica			4			213
haplodiploid type unspecified						
Tenuipalpus inophylli	parth					213
Tenuipalpidae						
Dolichotetranychus summers			4			213
haplodiploid type unspecified						
Tetranychidae						
Anatetranychus tephrosiae			6			211
haplodiploid type unspecified						
Bryobia graminum	parth					236
Bryobia kissophila	parth					236
Bryobia lagodechiana	parth					213
Bryobia latens	parth					213
Bryobia neopraetiosa	parth					236
Bryobia praetiosa	parth		8			211
haplodiploid type unspecified						
Bryobia rubrioculus	parth					236
Bryobia sarcothamni			8			211
haplodiploid type unspecified						
Eonychus curtisetosus			4			211
haplodiploid type unspecified						
Eonychus grewiae			4			211
haplodiploid type unspecified						
Eotetranychus befandrianae			4			211
haplodiploid type unspecified						
Eotetranychus carpini			8			211
haplodiploid type unspecified						
Eotetranychus friedmanni			6			211
haplodiploid type unspecified						
Eotetranychus grandis			6			211
haplodiploid type unspecified						
Eotetranychus imerinae			6			211
haplodiploid type unspecified						
Eotetranychus paracybelus			6			211
haplodiploid type unspecified						
Eotetranychus ranoma fanae			10			211
haplodiploid type unspecified						
Eotetranychus rinoreae			6			211
haplodiploid type unspecified						
Eotetranychus roedereri			6			211
haplodiploid type unspecified						
Eotetranychus sakalavensis			4			211
haplodiploid type unspecified						
Eotetranychus tiliarium			8			211
haplodiploid type unspecified						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Eotetranychus tulearensis haplodiploid type unspecified			4			211
Neotetranychus rubi haplodiploid type unspecified			14			211
Obuloides sp. haplodiploid type unspecified			6			213
Oligonychus andrei haplodiploid type unspecified			4			211
Oligonychus bessardi haplodiploid type unspecified			8			211
Oligonychus chazeaui haplodiploid type unspecified			8			211
Oligonychus coffeae haplodiploid type unspecified			6			211
Oligonychus gossypii haplodiploid type unspecified			4			211
Oligonychus monsarrati haplodiploid type unspecified			8			211
Oligonychus pratensis haplodiploid type unspecified			8			211
Oligonychus quercinus haplodiploid type unspecified			6			211
Oligonychus randriamasii haplodiploid type unspecified			4			211
Oligonychus sylvestris haplodiploid type unspecified			4			211
Oligonychus thelytokous	parth					213
Oligonychus ununguis haplodiploid type unspecified			6			211
Oligonychus virens haplodiploid type unspecified			8			211
Panonychus ulmi haplodiploid type unspecified			6			211
Petrobia harti haplodiploid type unspecified			4			211
Petrobia latens haplodiploid type unspecified			8			211
Porcupinychus insularis haplodiploid type unspecified			8			211
Schizonobia oudemansi haplodiploid type unspecified			8			237
Schizonobia sycophanta haplodiploid type unspecified			8			237
Schizotetranychus australis haplodiploid type unspecified			12			211
Schizotetranychus schizopus haplodiploid type unspecified			6			211
Tenuipalpoides acaciae haplodiploid type unspecified			6			213
Tetranychus atlanticus haplodiploid type unspecified			6			211
Tetranychus cinnabarinus haplodiploid type unspecified			6			211
Tetranychus hydrangeae haplodiploid type unspecified			6			211
Tetranychus kaliphorae haplodiploid type unspecified			6			211
Tetranychus ludeni haplodiploid type unspecified			6			211
Tetranychus neocalendonicus haplodiploid type unspecified			6			211
Tetranychus pacificus haplodiploid type unspecified			6			211
Tetranychus panici haplodiploid type unspecified			8			211

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Tetranychus roseus haplodiploid type unspecified			8			211
Tetranychus tumidus haplodiploid type unspecified			12			211
Tetranychus urticae haplodiploid type unspecified			6			211
Tetranychus viennensis haplodiploid type unspecified			6			211
Tetranycopsis horridus haplodiploid type unspecified	parth		4			211
Thyrisomiidae						
Banksinoma ovata						217
Trhypochthoniidae						
Afronothrus giganticus	parth					213
Afronothrus incisivus	parth					219
Afronothrus neotropicus	parth					213
Afronothrus russeolus	parth					213
Afronothrus schuilingi	parth					213
Allonothrus giganticus	parth					219
Allonothrus neotropicus	parth					213
Allonothrus russeolus	parth					213
Allonothrus schuilingi	parth					213
Archegozetes longisetosus	parth					219
Archegozets magnus	parth					213
Mainothrus badius	parth					216
Mucronothrus nasalis	parth					216
Pseudonothrus hirtus	parth					213
Trhypochthoniellus badius	parth					216
Trhypochthoniellus crussus	parth					216
Trhypochthoniellus excavatus	parth					216
Trhypochthoniellus setosus	parth					213
Trhypochthoniellus sp.1	parth					213
Trhypochthoniellus sp.2	parth					213
Trhypochthonius americanus	parth					216
Trhypochthonius nigricans	parth					213
Trhypochthonius silvestris	parth					213
Trhypochthonius tectorum	parth					213
Trichthoniidae						
Gozmanyina majestus	parth					217
Trombiculidae						
Leptotrombidium akamushi			12		XY	238
Leptotrombidium arenicola			28			213
Leptotrombidium deliense			14			213
Leptotrombidium fletcheri			14			213
Leptotrombidium scutellare			14		XY	238
Tydeidae						
Tydeus caudatus haplodiploid type unspecified			4			213
Unionicolidae						
Neumania vemalis			4			211
Neumania vernalis			4			213
Unionicola crassipes			18			211
Winterschmidtiidae						
Czenspinskia transversostriata	parth					213
Ensliniella kostylevi						239
Ensliniella parasitica haplodiploid type unspecified						240
Kennethiella trisetosa haplodiploid type unspecified						213
Kurosaia jiju						241
Xenillidae						
Xenillus tegeocranus			18			213
Acariformes						
Demodicidae						
Demodex caprae			4			211

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
haplodiploid type unspecified						
Eriophyidae						
Phytoptus tiliae			4			213
haplodiploid type unspecified						
Eupalopsellidae						
Eupalopsellus brevipilus			8			213
haplodiploid type unspecified						
Eupalopsellus olearius			6			213
haplodiploid type unspecified						
Eylaidae						
Eylais mutila			6			211
Eylais rimosa			4			211
Eylais setosa			4			211
Eylais sp.1			4			213
Eylais sp.2			6			213
Oxidae						
Frontipoda musculus			19			211
Stigmaeidae						
Agistemus camerounensis			4			213
haplodiploid type unspecified						
Agistemus exsertus			6			213
haplodiploid type unspecified						
Agistemus sanctiluciae			4			213
haplodiploid type unspecified						
Agistemus tranatalensis			6			213
haplodiploid type unspecified						
Tarsonemidae						
Phytonemus pallidus			4			213
haplodiploid type unspecified						
Tenuipalpidae						
Aegyptobia ephedrae			4			213
haplodiploid type unspecified						
Aegyptobia sp.			4			213
haplodiploid type unspecified						
Aegyptobia thujae	parth		4			242
Aegyptobia vannus	parth		4			242
Cenopalpus lanceolatisetae			4			213
haplodiploid type unspecified						
Tetranychidae						
Eurytetranychus buxi			10			211
haplodiploid type unspecified						
Eurytetranychus madagascariensis			6			211
haplodiploid type unspecified						
Eutetranychus banksi			6			211
haplodiploid type unspecified						
Eutetranychus eliei			8			211
haplodiploid type unspecified						
Eutetranychus grandidieri			4			211
haplodiploid type unspecified						
Eutetranychus orientalis			6			211
haplodiploid type unspecified						
Eutetranychus ranjatori			6			211
haplodiploid type unspecified						
Eutetranychus sambiranensis			4			211
haplodiploid type unspecified						
Trombidiidae						
Allothrombium fuliginosum			24			213
Sericothrombium schar/atinum		18			211	
Sericothrombium sp.1			26			211
Sericothrombium sp.2			22			211
Sericothrombium sp.3			18			213
Tydeidae						
Homeopronematus anconai						213
haplodiploid type unspecified						
Blattodea						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Blaberidae						
Archimandrita tessellata			46	45	XO	243
Blaberus atropos			74	73	XO	243
Blaberus cranifer			74	73	XO	243
Blaberus discoidalis			38	37	XO	243
Blaberus giganteus			74	73	XO	243
Blaberus parabolicus			40	39	XO	243
Byrsotria fumigata			48	47	XO	243
Capucina patula			38	37	XO	243
Diploptera punctata			48	47	XO	243
Epilampra abdomennigrum			42	41	XO	243
Epilampra grisea			50	49	XO	243
Epilampra maculicollis			38	37	XO	243
Epilampra maya			36	35	XO	243
Epilampra sagitta			44	43	XO	243
Epilampra sp.81B			40	39	XO	243
Eublaberus distanti			66	65	XO	243
Eublaberus posticus			44	43	XO	243
Galiblatta williamsi			28	27	XO	243
Gromphadorhina brunneri			64	63	XO	243
Gromphadorhina chopardi			76	75	XO	243
Gromphadorhina portentosa			64	63	XO	243
Hormetica scrobiculata			32	31	XO	243
Hormetica ventralis			32	31	XO	243
Hyporhicnoda litomorpha			44	43	XO	243
Lanxoblatta emarginata			66	65	XO	243
Leucophaea maderae			24	23	XO	243
Macropanesthia rhinoceros			80	79	XO	243
Nauphoeta cinerea			38	37	XO	243
Panchlora nivea			36	35	XO	243
Panchlora sp.			32	31	XO	243
Panchlora viridis			38	37	XO	243
Panesthia sp.			38	37	XO	243
Panesthia stellata			38	37	XO	243
Petasodes dominicana			54	53	XO	243
Phoetalia circumvagans			54	53	XO	243
Phortioica phoraspoides			66	65	XO	243
Pinaconota sicca			34	33	XO	243
Proscratea complanata			36	35	XO	243
Pycnoscelus indicus			36	35	XO	243
Pycnoscelus surinamensis			35			243
Pycnoscelus surinamensis			53			243
Rhabdoblatta annandalei			50	49	XO	243
Rhabdoblatta sp.39T			32	31	XO	243
Sp. sp41B			30	29	XO	243
Blattellidae						
Agmoblatta thaxteri			26	25	XO	243
Amazonina conspersa			24	23	XO	243
Amazonina n.sp.			26	25	XO	243
Amazonina n.sp.38B			26	25	XO	243
Attaphila fungicola			34	33	XO	243
Blattella bisignata			24	23	XO	243
Blattella germanica			24	23	XO	243
Blattella lituricollis lituricollis			26	25	XO	243
Blattella sauteri			24	23	XO	243
Blattella sp.C43T			28	27	XO	243
Blattella sp.D			30	29	XO	243
Blattella sp.E71A			50	49	XO	243
Blattella vaga			24	23	XO	243
Cariblatta lutea minima			26	25	XO	243
Dendroblatta cnephaia			32	31	XO	243
Dendroblatta sobrina			26	25	XO	243
Ectobius pallidus			22	21	XO	243
Gislenia australica			34	33	XO	243
Hemithyrsocera latera/is			26	25	XO	243

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Ischnoptera castanea			34	33	XO	243
Ischnoptera deropeltiformis			50	49	XO	243
Ischnoptera galibi			44	43	XO	243
Ischnoptera mura			34	33	XO	243
Ischnoptera panamae			40	39	XO	243
Ischnoptera rufa rufa			40	39	XO	243
Ischnoptera sp.93B			38	37	XO	243
Loboptera decipiens			34	33	XO	243
Lobopterella dimidiatipes			38	37	XO	243
Lophoblatta brevis			32	31	XO	243
Lophoblatta fissa			16	15	XO	243
Lupparia notulata			20	19	XO	243
Margattea punctulata			32	31	XO	243
Nahublattella n.sp.72B			20	19	XO	243
Parasymploce limbata			24	23	XO	243
Parasymploce sp.25T			32	31	XO	243
Parasymploce sp.30T			32	31	XO	243
Parcoblatta fulvescens			38	37	XO	243
Parcoblatta pennsylvanica			38	37	XO	243
Pseudomops septentrionalis			32	31	XO	243
Shawella couloniana			36	35	XO	243
Supella longipalpa			20	19	XO	243
Symploce capitata			28	27	XO	243
Symploce fusca			30	29	XO	243
Symplocodes marmorata			40	39	XO	243
Symplocodes n.sp.50			38	37	XO	243
Xestoblatta immaculata			38	37	XO	243
Blattidae						
Blatta orientalis			48	47	XO	243
Cryptocercus punctulatus			40	39	XO	243
Deropeltis erythrocephala			50	49	XO	243
Duchailluia n.sp.			42	41	XO	243
Eurycotis biolleyi			22	21	XO	243
Eurycotis decipiens			28	27	XO	243
Eurycotis floridana			28	27	XO	243
Lamproblatta albipalpus			18	17	XO	243
Pelmatosilpha coriacea			38	37	XO	243
Periplaneta americana			34	33	XO	243
Periplaneta australasiae			28	27	XO	243
Periplaneta brunnea			28	27	XO	243
Periplaneta fuliginosa			28	27	XO	243
Periplaneta japonica			34	33	XO	243
Polyphagidae						
Arenivaga investigata			46	45	XO	243
Cryptocercus primarius			20	19	XO	244
Cryptocercus punctulatus			48	47	XO	245
Cryptocercus punctulatus			38	37	XO	244
Cryptocercus relictus			18	17	XO	244
Latindia sp.3				22		243
Polyphaga aegyptiaca			64	63	XO	243
Collembola						
Bourletiellidae						
Bourletiella arvalis			12	10	XO	246
PGE						
Bourletiella hortensis			12	10	XO	246
PGE						
Cyphoderidae						
Cyphoderus albinus			12			247
Cyphoderus albinus			12			247
Dicyrtomidae						
Dicyrtomina ornata			12	10	XO	246
PGE						
Ptenothrix italica			14	12	XO	246
PGE						
Entomobryidae						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Entomobrya lanuginosa			12			247
Entomobrya marginata			12			247
Entomobrya marginata			12			247
Entomobrya muscorum			12			247
Entomobrya nivalis			12			247
Heteromurus nitidus			12			247
Heteromurus nitidus			12			247
Lepidocyrtus paradoxus			12			247
Lepidocyrtus paradoxus			12			247
Orchesella bifasciata			12			247
Orchesella cincta			12			247
Orchesella cincta			12			247
Orchesella flavescens			12			247
Orchesella flavescens			12			247
Orchesella villosa			12			248
Pseudosinella sp.			12			247
Pseudosinella sp.			12			247
Sinella coeca			12			247
Sinella coeca			12			247
Sinella curviseta			12	11	XO	249
chiasmatic male meiosis						
Willowsia buski			12			247
Willowsia buski			12			247
Hypogastruridae						
Ceratophysella bengtssoni			14			247
Ceratophysella denticulata			14			247
Ceratophysella bengtssoni			14	13	XO	247
Ceratophysella denticulata			14	13	XO	247
Hypogastrura adexilis			14	13	XO	249
chiasmatic male meiosis						
Hypogastrura manubrialis			14			247
Hypogastrura viatica			14			247
Mesogastrura ojcoviensis			14			247
Mesogastrura ojcoviensis			14			247
Xenylla grisea			14			247
Xenylla grisea			14			247
Xenylla planipila			14	13	XO	247
Xenylla planipila			14			247
Isotomidae						
Folsomia multiseta			14			247
Isotoma cinerea			14			247
Isotoma viridis			14	13	XO	247
Isotoma cinerea			14	13	XO	247
Isotoma notabilis			14			247
Isotomiella minor			12			247
Isotomiella minor			12	11	XO	247
Proisotoma crassicauda			14			247
Proisotoma minuta			14			247
Proisotoma minuta			14			247
Proisotoma subminuta			14			247
Katiannidae						
Stenognathellus denisi						246
PGE						
Neanuridae						
Anurida maritima			8			248
Bilobella aurantiaca			14			247
Bilobella grassei			12			247
Neanura monticola			14			247
Onychiuridae						
Onychiurus armatus			14	13	XO	247
Onychiurus fimatus			16			247
Onychiurus furcifer			14			247
Onychiurus pseudogranulosus		14			247	
Onychiurus scotarius			16			247
Onychiurus armatus			14			247

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Onychiurus fimatus			16			247
Onychiurus furcifer			14			247
Onychiurus paradoxus			14			247
Onychiurus pseudogranulosus			14			247
Onychiurus scotarius			16			247
Onychiurus sibiricus			14			247
Poduridae						
Podura aquatica						250
achiasmatic male meiosis						
Podura aquatica			22			247
Podura aquatica			8			248
Sminthuridae						
Allacma fusca			12	10	XO	246
PGE						
Caprainea marginata			12	10	XO	246
PGE						
Lipothrix lubbocki						246
PGE						
Sminthurus viridis			12	10	XO	246
PGE						
Sminthurididae						
Sminthurides aquaticus						246
PGE						
Tomoceridae						
Tomocerus flavescens			12			247
Tomocerus minor			12	11	XO	247
Tomocerus minutus			12			251
Coleoptera						
Anobiidae						
Ernobius mollis			22	22	Xyp	1
Gibbium psylloides			18	18	Xyp	1
Lasioderma serricorne			18	18	Xyp	1
Ptinus clavipes	parth	3	27			2
-automixis IIF premeiotic doubling	pseudogamous					
			18	18	Xyp	2
Ptinus hirtellus	parth	3	27			3
-pseudogamous						
			18	18	XY	3
Ptinus villiger			18	18	Xyp	1
Stegobium paniceum			18	17	XO	1
Anthicidae						
Notoxus calcaratus			18	18	Xyp	1
Notoxus constrictus			18	18	Xyp	1
Notoxus monodon			18	18	Xyp	1
Anthribidae						
Araecerus fasciculatus			22	22	Xyp	1
Euparius marmoreus			22	22	Xyp	1
Euparius oculatus				49	Xyyp	1
Habrissus longipes			22	22	Xyp	1
Platystomos sellatus			22	22	Xyp	1
Ptychoderes bivittatus			22	22	Xyp	1
Ptychoderes tricostifrons			22	22	Xyp	1
Tropideres germanus			22	22	Xyp	1
			24	24	Xyp	1
Tropideres japonicus			22	22	Xyp	1
Tropideres laxus			22	22	Xyp	1
Attelabidae						
Apoderus balteatus			22	22	Xyp	1
			26	26	Xyp	1
Apoderus coryli			28	28	Xyp	4
Apoderus erythrogaster nigriventris			28	28	Xyp	1
Apoderus erythrogaster rufiventris			26	26	Xyp	1
Apoderus jekeli			36	36	XY	1
			38	38	XY	1
Auletobius irkutensis japonicus		32	32	Xyp	1	

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Auletobius puberulus			32	32	Xyp	1
Byctiscus launipennis				22		5
Centrocorynus aemulus			28	28	Xyp	5
Deporaus affectatus			24	24	NeoXY	1
Deporaus harmanni			22	22	Xyp	1
Deporaus marginatus			22	22	Xyp	5
Deporaus minimus			26	26	Xyp	1
Deporaus sp. 1			22	22	Xyp	1
Deporaus sp. 2			22	22	Xyp	1
Deporaus unicolor			34	34	Xyp	1
				29	Xyyp	1
			24	24	NeoXY	1
Hypera viciae			22	22	Xyp	4
Larinus sturnus			38	38	Xyp	4
Liophloeus lentus			22	22	Xyp	4
Liparus glabrirostris			32	32	Xyp	4
Pissodes notatus			22	22	Xyp	4
Rhynchites heros			38	38	Xyp	1
Rhynchites pilosus			32	32	Xyp	1
Rhynchites placidus			38	38	Xyp	1
Rhynchites sp. 1			34	34	Xyp	1
Bostrichidae						
Apate monacha			22	22	Xyp	1
Bostrychopsis bengalensis			20	20	Xyp	1
Rhizopertha dominica			18	18	Xyp	1
Sinoxylon anale			20	20	Xyp	1
-B chromosomes						
Brentidae						
Apion abruptum			22	22	Xyp	1
Apion collare			22	22	Xyp	1
Apion sp. 1			22	22	Xyp	1
Apion sp. 2			22	22	Xyp	1
Aplemonus tuberculata			26	26	Xyp	5
Brentus anchorago			12	12	Xyp	1
Brentus mexicanus			12	12	Xyp	1
Ceratapion austriacum			22	22	Xyp	6
Ceratapion penetrans			22	22	Xyp	6
Cylas formicarius			22	22	Xyp	1
Cylas formicarius elegantulus		22	22	Xyp	1	
Eutrichapion melancholicum			22	22	Xyp	6
Nanophyes marmoratus			22	22	Xyp	6
Nemocephalus femoratus			12	12	Xyp	1
Oxystoma cerdo			22	22	Xyp	6
Proepisphales elegans			12	12	Xyp	1
Pseudorychoides insignis			12	12	Xyp	1
Rhopalapion longirostre			22	22	Xyp	6
Squamapion flavimanum			22	22	Xyp	6
Trachelizus sp. 1			12	12	Xyp	1
Buprestidae						
Spruce borer sp. I			20	20	XY	7
Spruce borer sp. II			22	22	XY	7
Acmaeodera boryi			18	18	Xyr	7
Acmaeodera flavofasciata			18	18	Xyr	7
Acmaeodera flavolineata			20	20	NeoXY	8
Acmaeodera gibbulosa			18	18	Xyr	7
Acmaeodera hepburni			18	18	NeoXY	7
Acmaeodera pilosellae persica		20	20	NeoXY	9	
Acmaeodera vetusta			18	18	Xyr	7
Agrilus angustulus			22	22	Xyp	10
Agrilus anxius			22	22	Xyp	7
Agrilus araxenus			20	20	XY	10
Agrilus liragus			20	20	NeoXY	7
Agrilus obscuricollis			20	20	Xyp	10
Agrilus politus pseudocoryli			20	20	XY	7
Agrilus sp.			20	20	NeoXY	7

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Agrilus sp. nr. Pensus					Xyp	7
Anthaxia amasina			16	16	Xyp	8
Anthaxia bicolor			16	16	Xyp	7
Anthaxia deaurata			16	16	Xyp	7
Anthaxia hungarica			16	16	Xyp	7
Anthaxia lgockii			16	16	Xyp	7
Anthaxia mirabilis			16	16	Xyp	7
Anthaxia olympica			16	16	Xyp	8
Anthaxia podolica			16	16	Xyp	7
Anthaxia sponsa			16	16	Xyp	7
Anthaxia viridifrons			16	16	Xyp	7
Buprestis fasciata				20		7
Capnodis miliaris			20	20	Xyp	7
Capnodis tenebrionis			14	14	NeoXY	7
Castiarina adelaidae			22	22	Xyp	7
Castiarina argillacea			22	22	Xyp	7
Castiarina cupreoflava			22	22	Xyp	7
Castiarina decemmaculata			22	22	Xyp	7
Castiarina flavopicta			22	22	Xyp	7
Castiarina grata			22	22	Xyp	7
Castiarina rufipennis			22	22	Xyp	7
Castiarina sexplagiata			22	22	Xyp	7
Castiarina simulata			22	22	Xyp	7
Castiarina subnotata			22	22	Xyp	7
Castiarina subtincta			22	22	Xyp	7
Castiarina triramosa			22	22	Xyp	7
Chalcophora lacustris			22	21	XO	7
Chrysobothris affinis tetragramma			16	16	Xyp	8
Chrysobothris dentipes			16	16	Xyp	7
Chrysobothris floricola			16	16	Xyp	7
Coraebus rubi			22	22	Xyp	10
Coraebus sinuatus			24	24	XY	10
Dicera divaricata			20	20	Xyp	7
Dicera prolongata			20	20	Xyp	7
Dicera tenebrosa			20	20	Xyp	7
Dicerca aenea validiuscula			20	20	Xyp	9
Euchroma gigantea				26	XXXYY	11
-B chromosomes						
				24	XXXYYY	11
-B chromosomes						
				24	XXXYYY	11
-B chromosomes						
				32	XXXYYY	12
-B chromosomes						
				34	XXXYYY	12
-B chromosomes						
				36	XXXYYY	12
-B chromosomes						
Julodella globithorax			26	26	Xyp	7
Julodis andreae			26	26	NeoXY	7
Julodis faldermanni			26	26	XY	7
Julodis whithilli			24	24	NeoXY	7
Melanophila acuminata			12	12	Xyp	7
Melanophila drummondi			16	16	Xyp	7
Melanophila intrusa			16	16	Xyp	7
Meliboeus caucasicus			22	22	Xyp	10
Ovalisia nadezhdae			20	20	Xyp	10
Perotis cuprata			20	20	Xyp	7
Perotis lugubris			20	20	Xyp	7
Sphaerobothris aghababiani			16	16	Xyp	9
Sphenoptera artemisiae			24	24	XY	10
Sphenoptera glabrata			40	40	XY	10
Sphenoptera mesopotamica				24		7
Sphenoptera scovitzi				24		7
Sphenoptera scpvitzii				42		9

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
-Male 2n = 38-46						
Sphenoptera tamarisci			30	30	NeoXY	8
Stenocera sp			26	26	NeoXY	13
Sternocera laevigata			26	26	NeoXY	7
Sternocera nitidicollis			26	26	NeoXY	7
Stigmodera cancellata			22	22	Xyp	7
Stigmodera goryi			22	22	Xyp	7
Stigmodera gratiosa			22	22	Xyp	7
Stigmodera macularia			22	22	Xyp	7
Stigmodera porosa			22	22	Xyp	7
Stigmodera roei			22	22	Xyp	7
Themognatha alternata			20	20	Xyp	7
Themognatha barbiventris			22	22	Xyp	7
Themognatha bonvouloiri			22	22	Xyp	7
Themognatha chalcodera			22	22	Xyp	7
Themognatha chevrolati			22	22	Xyp	7
Themognatha donovani			22	22	Xyp	7
Themognatha heros			22	22	Xyp	7
Themognatha mitchelli			22	22	Xyp	7
Themognatha mniszechi			22	22	Xyp	7
Themognatha nickerli			20	20	Xyp	7
Themognatha parvicollis			22	22	Xyp	7
Themognatha pubicollis			22	22	Xyp	7
Themognatha regia			22	22	Xyp	7
Themognatha tricolorata			22	22	Xyp	7
Themognatha variabilis			22	22	Xyp	7
Themognatha viridicincta			22	22	Xyp	7
Byrrhidae						
Byrrhus sp.			18	18	Xyp	1
Cytilus alternatus			18	18	Xyp	1
Cantharidae						
Cantharis cryptica			14	13	XO	14
Cantharis fusca			14			14
			20	20	Xyp	4
Cantharis lateralis			14	13	XO	14
Cantharis livida			14	13	XO	14
Cantharis nigra			14	13	XO	14
Cantharis nigricans			14			14
Cantharis pallida			14	13	XO	14
Cantharis pellucida			14	13	XO	14
Cantharis rufa			14	13	XO	14
Cantharis rustica			14	13	XO	14
Cantharis sp.			20	20	Xyp	1
Cantharis tenuicollis			20	20	Xyp	1
Cantharis thoracica			14	13	XO	14
Chauliognathus expansus			14	13	XO	15
Chauliognathus fallax			14	13	XO	15
Chauliognathus flavipes			14	13	XO	15
Chauliognathus lineatus			14	13	XO	15
Chauliognathus octomaculatus		14	13	XO	15	
Chauliognathus riograndensis		14	13	XO	15	
Chauliognathus sp. 1			14	13	XO	15
Chauliognathus tetrapunctatus		14	13	XO	15	
Malthinus seriepunctatus			12			14
Malthodes dispar			12	11	XO	14
Malthodes minimus			12			14
Rhagonycha fulva			14	13	XO	14
Rhagonycha lignosa			14			14
Rhagonycha limbata			14	13	XO	14
Rhagonycha lutea			14	13	XO	14
Rhagonycha testacea			14	13	XO	14
Silis ruficollis			14	13	XO	14
-B chromosomes						
Telephorus nobilitatus			14	13	XO	1
Tylocerus barberi			14	13	XO	1

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Carabidae						
Abacetus salzamanni			42	41	XO	16
Abax ater				35		16
Abax ovalis				35		16
Abax parallelepipedus			36	35	XO	16
Abax parallelus			36	35	XO	16
Acinopus giganteus				37		17
Acinopus gutturosus			38	37	XO	17
Acinopus picipes				37		18
Acupalpus brunnipes				45		17
Acupalpus elegans			22	22	XY	19
Acupalpus maculatus				39		17
Agonini sp. 1				30		18
Agonini sp. 2				36		18
Agonum bogemanni			36	36	NeoXY	18
Agonum corvus				39		17
Agonum cupripenne			36	36	NeoXY	18
Agonum dolens			40	39	XO	18
Agonum ericeti			34	34	XY	18
Agonum errans			38	37	XO	18
Agonum extensicolle			38	37	XO	17
Agonum fuliginosum			38	37	XO	18
Agonum gracile				36		17
-Male 2n = 35-36						
Agonum livens			44	43	XO	18
Agonum marginatum			38	37	XO	18
Agonum micans				35		17
Agonum moestum			34	34	XY	18
Agonum moestum longipenne		34	34	XY	18	
Agonum muelleri			38	37	XO	18
Agonum munsteri			36	36	XY	18
Agonum nigrum			34	34	XY	18
Agonum retractum			38	37	XO	18
Agonum sexpunctatum			38	37	XO	18
Agonum sp. 1				37		18
Agonum sp. 2			38	37	XO	18
Agonum thoreyi			36	35	XO	18
Agonum thoreyi melanocephalus			36	35	XO	18
Agonum viridicupreum			38	37	XO	17
Amara aenea			36	35	XO	18
Amara apricaria			34	33	XO	18
Amara arcuata				37		17
Amara aulica				33		18
Amara batesi			38	37	XO	17
Amara communis			38	37	XO	18
Amara equestris			30			17
Amara familiaris			34	33	XO	18
			34	34	NeoXY	18
Amara fervida			34	33	XO	17
Amara fulva			36	35	XO	17
Amara giganteus			42	41	XO	18
Amara impuncticollis				34		18
Amara ingenua			38	37	XO	17
Amara laevipennis			32	32	NeoXY	18
Amara metallescens				21		17
-B chromosomes						
Amara moerens			38	37	XO	17
Amara montivaga			38	37	XO	17
Amara nila			22	22	XY	17
Amara plebeja			34	34	XY	17
Amara rotundicollis			26			17
Amara rufescens			24			17
Amara similata			32	32	XY	17
Amara simplex			20			17
Amblycheila baroni			44	44	XY	20

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Amblystomus bivittatus			24	24	XY	18
Amblystomus quadriguttatus			28			21
Amblytelus curtus			30	30	XY	21
Amphasia interstitialis				36		18
-Male 2n = 35-37						
Amphasia sericea			30	29	XO	18
Anchomenidius astur				43		18
Anchomenus dorsalis			44	44	XY	17
Angoleus crenatus			38	37	XO	16
			40	39	XO	16
Angoleus nitidus			38	37	XO	16
Anisodactylus binotatus			38	37	XO	17
Anisodactylus hispanus			38	37	XO	18
Anisodactylus signatus			38	37	XO	18
Anisodactylus virens			38	37	XO	18
Anomoglossus emarginatus			38	37	XO	18
Anthia sexguttata			36	35	XO	18
Apenes marginalis				36		18
Aptinus displosor				32		18
Arthropterus sp. 1			46	46		21
Asaphidion caraboides			24	24	XY	18
-B chromosomes						
Asaphidion curtum			24	24	XY	18
Asaphidion cyanicorne			24	24	XY	18
Asaphidion rossii				24		17
Baudia anomala			46	45	XO	18
Bembidion aeneicolle			24	24	XY	22
Bembidion aenulum			24	24	XY	22
Bembidion alaskense			24	24	XY	22
Bembidion ambiguum			24	24		18
Bembidion americanum			24	24	XY	22
Bembidion anchonoderum			24	24	XY	22
Bembidion andreae andreae		24	24	XY	18	
Bembidion andreae bualei			24	24	XY	18
Bembidion antiquum			24	24	XY	22
Bembidion aratum			24	24	XY	22
Bembidion arcticum			26	26	XY	22
Bembidion arenobilis			24	24	XY	23
Bembidion arizonae			24	24	XY	22
Bembidion articulatum			24			18
Bembidion ascendens			24	24	XY	17
Bembidion assimile				24		18
Bembidion atrocoeruleum			24	24	XY	18
Bembidion balli			24	24	XY	22
Bembidion basicorne			24	24	XY	22
Bembidion bellorum			24	24	XY	23
Bembidion bifossulatum			24	24	XY	22
Bembidion biguttatum			24	24	XY	18
Bembidion bimaculatum			24	24	XY	22
Bembidion bipunctatum			24	24	XY	18
Bembidion bowditchi			24	24	XY	22
Bembidion brachythorax			24	23	XO	22
Bembidion brevistriatum			24	24	XY	22
Bembidion californicum			24	24	XY	22
Bembidion callosum			24	24	XY	18
Bembidion carinula			24	24	XY	22
Bembidion carolinense			24	24	XY	22
Bembidion carpetanum			24	24	XY	18
Bembidion castor			24	24	XY	22
Bembidion castum			24	24	XY	22
Bembidion cf anguliferum			24	24	XY	22
Bembidion cf. immaturum			24	24	XY	22
Bembidion chalceum			26	26	XY	22
Bembidion coeruleum			24	24	XY	18
Bembidion coloradense			24	24	XY	22

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Bembidion complanulum			24	24	XY	22
Bembidion compressum			24	24	XY	22
Bembidion concolor			24	24	XY	22
Bembidion concretum			24	24	XY	22
Bembidion confusum			24	24	XY	22
Bembidion connivens			24	24	XY	22
Bembidion consanguineum			24	24	XY	22
Bembidion constricticolle				22		22
Bembidion contraetum-group contractum		24	24	XY	22	
Bembidion contraetum-group viridicolle			24	24	XY	22
Bembidion convexulum			24	24	XY	22
Bembidion cordatum				22		22
Bembidion coxendix			24	23	XO	22
			24	24	XY	22
Bembidion cribum				25		18
Bembidion dahli				25		18
Bembidion dauricum			24	24	XY	22
Bembidion decorum			24	24	XY	18
Bembidion diligens				22		22
Bembidion doris			24	24	XY	18
Bembidion dorsale			24	24	XY	22
Bembidion dudichi			24	24	XY	18
Bembidion ephippium			24	24	XY	18
Bembidion fasciolatum egregium			24	24	XY	18
Bembidion flebile			24	24	XY	22
Bembidion fortestriatum			24	24	XY	22
Bembidion fortunatum			24	24	XY	18
Bembidion foveum				24		17
			24	24	XY	22
Bembidion frontale			24	24	XY	22
Bembidion fumigatum			24	24	XY	18
Bembidion gebleri turbatum			24	24	XY	22
Bembidion genei			24	24	XY	18
Bembidion geniculatum			24	24	XY	18
Bembidion gordoni			24	24	XY	22
Bembidion graciliforme			24	24	XY	22
Bembidion grapei			24	24	XY	22
Bembidion graphicum-Nr 1'			24	24	XY	22
Bembidion graphicum-Nr 2'			24	24	XY	22
Bembidion gratiosum			24	24	XY	22
Bembidion grisvardi			24	24	XY	18
Bembidion guadarramense			24	24	XY	18
Bembidion guttula			24	24	XY	18
Bembidion haruspex			24	24	XY	22
Bembidion hasti			24	24	XY	22
			24	24	XY	17
Bembidion hasurada			24	24	XY	17
Bembidion hesperium			22	22	XY	22
Bembidion hispanicum			24	24	XY	18
Bembidion honestum			24	24	XY	22
Bembidion humboldtense			24	24	XY	22
Bembidion hyperboraeorum			24	24	XY	22
Bembidion hypocrita			24	24	XY	18
Bembidion ibericum			24	24	XY	18
Bembidion impotens			24	24	XY	22
Bembidion inaequale inaequale		22	22	XY	22	
Bembidion inaequale opaciceps			22	22	XY	22
Bembidion incrematum			24	24	XY	22
Bembidion indistinctum			24	24	XY	22
Bembidion insulatum			24	24	XY	22
Bembidion integrum			24	24	XY	22
Bembidion intermedium			24	24	XY	22
Bembidion interventor			24	24	XY	22
Bembidion iricolor			24	24	XY	18
Bembidion iridescens			24	24	XY	22

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
			26	26	XY	22
Bembidion ksteri paulinoi			24	24	XY	18
Bembidion kuprianovi-Nr 1			24	24	XY	22
Bembidion kuprianovi-Nr 2			24	24	XY	22
Bembidion lacunarium			24	24	XY	22
Bembidion lampros			24	23	XO	18
Bembidion lapponicum			24	24	XY	22
Bembidion latiplaga			24	24	XY	18
Bembidion laxatum			24	24	XY	22
Bembidion lenae			24	24	XY	22
Bembidion levettei carrianum		22	22	XY	22	
Bembidion levettei levettei			22	22	XY	22
Bembidion levigatum			24	24	XY	22
Bembidion littorale				36		17
Bembidion lorquini			22	22	XY	22
Bembidion louisella			24	24	XY	23
Bembidion lunulatum			24	24	XY	18
Bembidion maculatum				24		18
Bembidion manningense			24	23	XO	22
Bembidion maorinum maorinum		24	24	XY	22	
Bembidion mckinleyi carneum		24	24	XY	22	
Bembidion mckinleyi mckinleyi		24	24	XY	22	
Bembidion mexicanum			24	24	XY	22
Bembidion millerianum			26	26	XY	18
Bembidion mimus			24	24	XY	22
Bembidion minimum			24	24	XY	19
Bembidion modestum			24	24	XY	17
Bembidion morulum			24	24	XY	22
Bembidion mundum			24	24	XY	22
Bembidion mutatum			24	24	XY	22
Bembidion nebraskense			22	22	XY	22
Bembidion nevadense			24	24	XY	22
Bembidion nigripes			24	24	XY	22
Bembidion nigrocoeruleum			24	24	XY	22
Bembidion nigrum			24	24	XY	22
Bembidion nitidulus ovalipennis			24		17	
Bembidion nitidum			24	24	XY	22
Bembidion nudipenne			24	24	XY	22
Bembidion oberthueri-group oberthueri			24	24	XY	22
Bembidion obliquulum			24	24	XY	22
Bembidion obscurellum			24	23	XO	22
Bembidion obtusangulum-group mormon			24	24	XY	22
Bembidion obtusangulum-group obtusangulum		24	24	XY	22	
Bembidion obtusum			24	24	XY	22
Bembidion occultator			24	23	XO	22
Bembidion octomaculatum			24	24	XY	18
Bembidion operosum			24	24	XY	22
Bembidion patruele			24	24	XY	22
Bembidion petrosum			24	23	XO	22
Bembidion planatum			24	24	XY	22
Bembidion planiusculum			24	24	XY	22
Bembidion planum			24	24	XY	22
Bembidion platynoides			24	24	XY	22
Bembidion poculare			24	24	XY	22
Bembidion praecinctum			24	24	XY	22
Bembidion praticola			24	24	XY	22
Bembidion properans			24	24	XY	18
Bembidion pseudocautum			24	24	XY	22
Bembidion punctatostriatum			24	24	XY	22
Bembidion punctulatum			24	24	XY	18
-B chromosomes						
			24	24	XY	18
Bembidion quadrifoveolatum			26	26	XY	22
Bembidion quadrimaculatum dubitans				22		22
Bembidion quadrimaculatum oppositum			24	24	XY	22

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Bembidion quadripustulatum			24	24	XY	18
Bembidion quadrulum			24	24	XY	22
Bembidion rapidum			24	24	XY	22
Bembidion recticolle			24	24	XY	22
Bembidion ripicola			24	23	XO	18
Bembidion rivulare			24	24	XY	18
Bembidion roosvelti			24	24	XY	22
Bembidion rothfelsi			34	34	XY	23
Bembidion ruficorne			26	26	XY	22
Bembidion rufinum			24	24	XY	22
Bembidion rufotinctum			24	24	XY	22
Bembidion rupicola			24	23	XO	22
Bembidion rusticum lenensoides		24	24	XY	22	
Bembidion salebratum			24	24	XY	22
Bembidion salinarium			24	24	XY	22
Bembidion satelles				22		22
Bembidion scopulinum			24	24	XY	22
Bembidion sejunctum sejunctum			24	24	XY	22
Bembidion sejunctum semiaureum			24	24	XY	22
Bembidion semicinctum			24	24	XY	22
Bembidion semistriatum			24	24	XY	22
Bembidion seudderi-group consimile			24	24	XY	22
Bembidion seudderi-group flohri		24	24	XY	22	
Bembidion seudderi-group obtusidens			24	24	XY	22
Bembidion seudderi-group scudderi			24	24	XY	22
Bembidion siculum			24	24	XY	17
Bembidion sierricola			24	24	XY	22
Bembidion simplex				22		22
Bembidion sordidum			24	24	XY	22
Bembidion sp nr ampliceps-Nr 1		24	24	XY	22	
Bembidion sp nr ampliceps-Nr 2		24	24	XY	22	
Bembidion sp nr aratum			24	24	XY	22
Bembidion sp nr impotens				22		22
Bembidion sp nr mundum			24	24	XY	22
Bembidion sp nr transversale-Nr 1			24	24	XY	22
Bembidion sp nr transversale-Nr 2			24	24	XY	22
Bembidion sp.			32	32	XY	18
Bembidion stephensi			24	24	XY	18
Bembidion striatum maurus		24	24	XY	18	
Bembidion sulcipenne hyperboroides			24	24	XY	22
Bembidion tairuense			24	24	XY	22
Bembidion tenellum			24	24	XY	18
-B chromosomes						
Bembidion tetracolum			24	23	XO	22
			24	24	XY	18
			26	26	XY	18
Bembidion texanum			24	24	XY	22
Bembidion thetys				24		17
Bembidion tibiale			24	24	XY	18
Bembidion timidum			24	24	XY	22
Bembidion transparens			24	24	XY	22
Bembidion transversale			24	24	XY	22
Bembidion tricolor				22		22
Bembidion umbratum			24	24	XY	22
Bembidion vandykei			24	24	XY	22
Bembidion varicolor			24	24	XY	17
Bembidion varium			24	24	XY	18
Bembidion versicolor			24	23	XO	22
			24	24	XY	22
Bembidion versutum			24	24	XY	22
Bembidion vicinus			24	24	XY	18
Bembidion wickhami			24	24	XY	22
Bembidion yukonoum			24	24	XY	22
Bembidion zephyrum			22	22	XY	22
Blemus sp				25		17

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Blethsia multipunctata				32		17
Brachinus andalusiacus				32		18
Brachinus beaticus				33		24
Brachinus bodemeyeri				25		24
Brachinus cordicollis			18	18	NeoXY	18
Brachinus crepitans			40	39	XO	18
Brachinus exhalans			22	21	XO	18
Brachinus explodens				36		24
Brachinus humeralis			28	28	XY	18
Brachinus janthinipennis			18	18	NeoXY	18
Brachinus longicornis				32		24
				34		24
Brachinus pateri			22	22		24
				20		24
Brachinus pecoudi				18		18
Brachinus plagiatus				32		18
Brachinus sclopeta				31		24
				32		24
Brachinus sexmaculatus			28	28	XY	18
Brachinus variventris				32		18
Bradybaenus festivus			38	37	XO	18
			36	36	XY	18
Broscus cephalotes				24		17
Broscus glaber				30		17
Broscus rutilans				30		18
Calachroa sexpunctata				23	XXY	18
Calathus abaxoides				55		18
Calathus ambiguus chevrolati		38	37	XO	18	
Calathus amplius				36		18
Calathus angularis			38	37	XO	17
Calathus angustulus			36	36	XY	17
Calathus ascendens				24		18
			22	23	XYY	18
Calathus asturiensis				39		18
Calathus auctus				37		18
Calathus baeticus mateui				37		17
Calathus brevis			38	37	XO	18
Calathus cf fuscipes				38		17
Calathus ciliatus				37		18
Calathus circumseptus				43		18
Calathus cognatus				37		17
Calathus dejeani hispanicus			38	37	XO	18
Calathus depressus			36	36		18
Calathus erratus			38	37	XO	18
Calathus freyi			36	36		18
Calathus fuscipes			38	37	XO	18
Calathus fuscipes fuscipes			38	37	XO	18
Calathus fuscipes graecus			38	37	XO	18
			40	39	XO	18
Calathus granatensis			38	37	XO	18
Calathus hispanicus			38	37	XO	17
Calathus luctosus			38			17
Calathus melanocephalus			38	37	XO	18
			38	38	XY	18
Calathus micropterus			38	37	XO	18
Calathus mollis				39		18
Calathus oreades				37		17
Calathus rectus			38	37		18
Calathus rotundatus				39		18
Calathus rubricus			36	36	XY	18
Calathus rufocastaneus			38	37	XO	18
Calathus spretus				37		17
Calathus vuillefroyi			38	37	XO	18
Calosoma beesoni			28	28	XY	18
Calosoma chinense				28		18

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Calosoma inquisitor			28	28	XY	18
Calosoma maderae indicum			28	28	XY	18
Calosoma maderae indigator			28	28	XY	17
Calosoma orientale			28	27	XO	18
Calosoma sycophanta			28	28	XY	18
Carabus abbreviatus			28	28	XY	18
Carabus alpestris alpestris				28		18
Carabus alpestris hoppei				28		18
Carabus arcensis arcensis				28		18
Carabus auronitens auronitens		28	28	XY	18	
Carabus auronitens festivus			30	29	XO	25
Carabus blaptoides			28	28	Xyr	1
Carabus blaptoides blaptoides		28	28	Xyr	18	
Carabus blaptoides lewisii			28	28	Xyr	18
Carabus blaptoides oxuroides			28	28	Xyr	18
Carabus blaptoides rugipennis		28	28	Xyr	18	
Carabus caelatus				28		18
Carabus caelatus schreiberi			28	28	XY	18
Carabus cancellatus			28	27	XO	18
Carabus cancellatus cancellatus		28	28	XY	18	
Carabus cancellatus celticus			28	28	XY	18
Carabus carinthiacus				28		18
Carabus clathratus clathratus			28		18	
Carabus coarctatus			28	28	XY	17
Carabus coriaceus			28	28	XY	18
Carabus coriaceus coriaceus			28	28	XY	18
Carabus creutzeri kircheri			28	28	XY	18
Carabus creutzeri rinaldoi			28	28	XY	18
Carabus croaticus croaticus			28	28	XY	18
Carabus depressus bonellii			28	28	XY	18
Carabus deyrollei			28	28	XY	18
Carabus dufouri			28	28	XY	17
Carabus errans			28	28	XY	18
Carabus faustus faustus			28	28	XY	18
Carabus fruhstorferi			28	28	Xyr	18
Carabus galicianus				28		18
Carabus ghiliani			28	28	XY	18
Carabus glabratus			26	25	XO	18
Carabus glabratus glabratus			28	28	XY	18
Carabus granulatus			18	17	XO	18
Carabus granulatus granulatus		28	28	XY	18	
Carabus guadarramus			28	28	XY	18
Carabus hispanus			28	28	XY	18
Carabus hortensis hortensis			28	28	XY	18
Carabus intricatus			28	28	XY	18
Carabus intricatus intricatus			28	28	XY	18
Carabus irregularis irregularis		28	28	XY	18	
Carabus lineatus basilicus			28	28	XY	18
Carabus lineatus lateralis			28	28	XY	18
Carabus lineatus lineatus			28	28	XY	18
Carabus lineatus troberti				28		18
Carabus lusitanicus brevis			28	28	XY	18
Carabus macrocephalus			28	28	XY	18
Carabus macrocephalus cantabricus				28		18
Carabus melancholicus costatus		28	28	XY	18	
Carabus monticola			28	28	XY	18
Carabus morbillosus			28	28	XY	17
Carabus nemoralis			28	27	XO	18
			30	29	XO	18
Carabus nemoralis meridionalis			28		18	
Carabus nemoralis nemoralis			28	28	XY	18
Carabus nitens			28	28	XY	18
Carabus olympia				28		17
Carabus problematicus			28	28	XY	18
Carabus problematicus gallicus		28	28	XY	18	

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Carabus punctatoauratus			30	29	XO	18
			28	28	XY	18
Carabus purpurascens			28	28	XY	18
Carabus purpurascens fulgens		28	28	XY	18	
Carabus purpurascens purpurascens				28		18
Carabus pyrenaeus			28	28	XY	18
Carabus pyrenaeus occidentalis			28		18	
Carabus pyrenaeus pyrenaeus		28	28	XY	18	
Carabus rugosus			28	28	XY	17
Carabus rutilans			30	29	XO	18
Carabus serratus			26	26	NeoXY	18
Carabus silvestris silvestris				28		18
Carabus solieri			28	27	XO	18
Carabus splendens			30	29	XO	18
			30	29	XO	18
Carabus splendens splendens			28	28	XY	18
Carabus violaceus germari				28		18
Carenum interruptum			24	24	XY	21
Carterus fulvipes			58	57	XO	18
Carterus interceptus				57		17
Carterus rotundicollis				57		18
Castelnaudi wilsoni			52	51	XO	21
Ceratoderus bifasciatus			28			17
Ceroglossus chilensis sp a			30	30	XY	26
Ceroglossus chilensis sp b			42	42	XY	26
Ceroglossus chilensis sp c				41		26
-B chromosomes						
Chlaenius aestivus			34	34	XY	18
Chlaenius darlingensis			38	37	XO	21
Chlaenius duvauceli			38	37	XO	18
Chlaenius fraterculus			40	39	XO	18
Chlaenius greyanus				37		21
Chlaenius hamifer			38	37	XO	21
Chlaenius impressicollis			40	39	XO	18
Chlaenius impunctifrons			38	37	XO	18
Chlaenius laetiusculus			38	37	XO	18
Chlaenius laticollis			38	37	XO	18
Chlaenius malachinus			38	37	XO	18
Chlaenius neelgheriensis			36	35	XO	18
Chlaenius nitidicollis			36	35	XO	18
Chlaenius olivieri				37		17
Chlaenius orbicollis			38	37	XO	18
Chlaenius pallipes			38	37	XO	18
Chlaenius panagaeoides			36	35	XO	18
Chlaenius pennsylvanicus			38	37	XO	18
			20	20	XY	18
Chlaenius pictus			38	37	XO	18
Chlaenius praefectus			38	37	XO	18
Chlaenius pretiosus			38	37	XO	18
Chlaenius pulcher			40	40	XY	18
Chlaenius scapularis			38	37	XO	18
Chlaenius sp.			40	39	XO	18
Chlaenius spoliatus			38	37	XO	18
Chlaenius tricolor			38	37	XO	18
Chlaenius tristis			38	37	XO	17
Chlaenius velutinus auricollis			38	37	XO	18
Chlaenius vestitus			38	37	XO	18
Chlaenius virens			38	37	XO	17
Chlaenius xanthospilus			38	37	XO	18
			36	36	Xyp	18
-Xyp Subsequent studies failed to replicate						
			37	37	Xyp	18
-Xyp Subsequent studies failed to replicate						
Cicindela agnata				23	XXY	17
Cicindela albina				23	XXY	17

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Cicindela ancocisconensis			24	22	Xx00	18
-Xx00 Subsequent studies failed to replicate						
Cicindela angulata				21	XXY	17
Cicindela argentata			22	21	XXY	27
Cicindela aterrima				22	XXXY	28
Cicindela aurulenta			24	22	XXXY	27
Cicindela bigemina				23	XXY	17
Cicindela brevis				23	XXY	17
Cicindela campestris			24	22	XXXY	18
Cicindela cardinalba				24	XXXY	29
Cicindela chloris				23	XXY	17
Cicindela chloropleura				23	XXY	17
Cicindela cognata				21	XXY	17
Cicindela cyclobregma				21	XXY	17
Cicindela deserticoloides				22	XXXY	30
Cicindela dorsalis				22	XXXY	28
Cicindela dromicoides				21	XXY	17
Cicindela duodecimguttata				22	XXXY	28
Cicindela duponti				23	XXY	17
Cicindela flohri				22	XXXY	28
Cicindela formosa generosa				22	XXXY	28
Cicindela fulgoris				22	XXXY	28
Cicindela funerea				23	XXY	17
Cicindela gillesensis			28	26	XXXY	29
Cicindela hemichrysea				22	XXXY	28
Cicindela hispanica			22	21	XXY	17
Cicindela holosericea				21	XXY	17
Cicindela hybrida			24	22	XXXY	18
Cicindela indica				21	XXY	17
Cicindela intermedia				21	XXY	17
Cicindela lemniscata				23	XXXXY	28
Cicindela litorea goudoti			24	22	XXXY	17
Cicindela littoralis			24	22	XXY	17
Cicindela littoralis			24	22	XXXY	31
Cicindela maroccana pseuomaroccana			26	23	XXXXY	18
Cicindela marutha				23	XXXXY	28
Cicindela maura			24	22	XXXY	17
Cicindela minuta				23	XXY	17
Cicindela multiguttata				23	XXY	17
Cicindela nebuligera				21	XXY	28
Cicindela nigrocoerulea				23	XXXXY	28
Cicindela obsoleta				22	XXXY	28
Cicindela ocellata				21	XXY	28
Cicindela oregona				22	XXXY	28
Cicindela pimeriana			20	20	Xyc	18
				22	XXXY	28
Cicindela punctulata				22	XXOO	18
				22	XXXY	28
Cicindela purpurea				22	XXOO	18
Cicindela repanda			22	21	XXY	18
				22	XXXY	28
				22	XXOO	18
-Subsequent studies failed to replicate						
Cicindela roseiventris mexicana			22	XXXY	28	
Cicindela rufiventris				22	XXXY	28
Cicindela rugatilis				21	XXY	28
Cicindela scutellaris				22	XXXY	28
Cicindela scutellaris lecontei			22	21	XXY	18
Cicindela sedecimpunctata				21	XXY	28
Cicindela severa				22	XXXY	28
Cicindela severini				21	XXY	17
Cicindela sexguttata				22	XXXY	28
				22	XXOO	32
-Subsequent studies failed to replicate						
Cicindela sexguttata sexguttata			21	XXY	18	

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Cicindela silvicola			24	22	XXY	18
Cicindela sp. (saetigera group)		28	26	XXXY	29	
Cicindela spinolai				21	XXY	17
Cicindela splendida				22	XXXY	28
Cicindela striatifrons				23	XXY	17
Cicindela striolata				23	XXY	17
Cicindela sumatrensis				23	XXY	17
Cicindela suturalis			26	23	XXXXY	27
Cicindela tranquebarica				22	XXOO	18
			22	21	XXY	18
			22	22	Xyc	18
				22	XXXY	28
Cicindela trifasciata			42	40	XXXY	33
-B chromosomes						
Cicindela triguttata				23	XXY	17
Cicindela trisignata				23	XXXXY	17
Cicindela viduata				23	XXY	17
Cicindela virgula				23	XXY	17
Cicindela viridilabris				21	XXY	17
Cicindela vittigera				23	XXY	17
Clivina australasiae			24	24	XY	21
Clivina dilutipes			24			21
Clivina fossor			44	44	XY	17
			46	46	XY	17
Clivina ypsilon				30		18
Colfax creagris			34	34	XY	18
Colfax sp.			34	34	XY	18
Colfax stevensi			34	34	XY	18
Colliuris pennsylvanica			18	18	NeoXY	18
Craspedophorus angulatus			12	12	XY	18
Cryptophonus fulvus				37		18
Cryptophonus litigiosus				37		17
Cryptophonus schaumii			38	37	XO	17
Cryptophonus tenebrosus			38	37	XO	18
Ctenostoma ornatum ornatum			17	XXY	34	
Ctenostoma rugosum			18			34
Curtonotus alpina				45		17
Curtonotus aulica				33		17
Curtonotus giganteus			42	41	XO	17
Cychrus caraboides			24	23	XO	18
Cylindera cognata				21	XXY	18
Cylindera paludosa			16			30
Cylindera trisignata			26	23	XXXXY	35
Cylindra germanica				18		18
			16	16	XY	20
Cymindis affinis			36	36	XY	17
-B chromosomes						
Cymindis bedeli			44	43	XO	18
Cymindis chevrolati			24	24	XY	17
Cymindis cincta				37		17
Cymindis coadunata			36	36	XY	17
Cymindis lineola				37		18
Cymindis scapularis			36	36	XY	17
Cymindis variolosa cyanoptera		34	34	XY	17	
Daptus vittatus			38	37	XO	17
Demetrias atricapillus			36	35	XO	18
Demetrias imperialis				44		17
-Male 2n = 43-44						
Dicheirotrichus obsoletus				37		17
Dicrochile brevicollis			56	55	XO	21
Dinodes baeticus				37		17
Dinodes fulgidicollis				37		18
Dinodes galaecianus			38	37	XO	17
Dinodes seoanei			46			17
Diplocheila latifrons			38	37	XO	18

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Diplocheila perscissa			40	39	XO	18
Diplocheila polita			42	42	XY	18
Diplocheila sp.			38	37	XO	18
Diplous californicus			38	37	XO	17
Ditomus calydonius			58	57	XO	17
Ditomus tricuspidatus				59		17
Dixus capito obscuroides			70	69	XO	18
Dixus clypeatus			46	45	XO	18
Dixus sphaerocephalus			56	55	XO	18
Dromius chobauti				25		17
Dromius meridionalis			26	25	XO	17
Dromius piceus			26	25	XO	18
Drypta argillacea			34	33	XO	18
Drypta australis			34	34	XY	21
-B chromosomes						
Drypta dentata			32	32	XY	18
Dyschirius attenuatus			22	22	XY	18
Dyschirius cylindricus			26	26	XY	18
Dyschirus globosus				30		17
Dyschirus importunus				26		17
Dyschirus tensicollis				28		17
Edaphopaussus favieri			50			17
Egadroma marginatum			40	39	XO	18
Egadroma piceus			38			17
Egadroma smaragdulus			40	39	XO	18
Egadroma smaragdulus quinquepustulatus		40	39	XO	18	
Elaphrus aureus			32	31	XO	6
Elaphrus cupreus				32		17
			34	33	XO	6
Elaphrus purpurans			32	32	XY	17
Elaphrus pyrenaeus				32		17
Elaphrus riparius				33		17
Elaphrus ullrichii			32	31	XO	6
Ellipsoptera marginata				23	XXXXY	28
Elliptica lugubris			24	22	XXXY	36
Eotachys bistriatus			24	24	XY	17
Epaphius secalis			28	28	XY	17
Eucryptotrichus pineticola			38	37	XO	18
Eudalia macleayi				33		21
Euleptus ooderus			38	37	XO	17
Eurylichnus blagravei			36	35	XO	21
Euthenarus promptus			26	26	XY	21
Eutrichopus canariensis				34		17
Galerita bicolor			30	30	XY	18
Gehringia olympica				19		17
-Male 2n = 18-20						
Graphipterus serrator			8	8	XY	18
Haptoderus cantabricus			38	37	XO	17
Haptoderus cf. nemoralis			38	37	XO	17
Haptoderus sp				37		17
Harpalus aesculans			38	37	XO	18
Harpalus affinis			38	37	XO	18
Harpalus albanicus				37		17
Harpalus anxius subcylindricus		38	37	XO	18	
Harpalus atratus			38	37	XO	18
Harpalus attenuatus			38	37	XO	18
Harpalus compar			38	37	XO	18
Harpalus contemptus			38	37	XO	18
Harpalus decipiens			38	37	XO	18
Harpalus dimidiatus			36	35	XO	18
Harpalus distinguendus			38	37	XO	18
Harpalus ebeninus			38	37	XO	18
Harpalus faunus			32	32	NeoXY	18
Harpalus honestus			38	37	XO	18
Harpalus indicola			38	37	XO	18

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Harpalus lethierryi aeculanus			38	37	XO	17
Harpalus microthorax			38	37	XO	17
Harpalus neglectus			38	37	XO	18
Harpalus oblitus patruelis			38	37	XO	18
Harpalus opacipennis			38	37	XO	18
Harpalus pennsylvanicus			38	37	XO	18
Harpalus pygmaeus				39		17
Harpalus rubripes			38	37	XO	18
Harpalus rufipes			38	37	XO	17
-B chromosomes						
Harpalus serripes			38	37	XO	18
			40	39	XO	18
Harpalus sp			38	38	XY	17
Harpalus sp.			38	38	XY	18
Harpalus sulphuripes			38	37	XO	18
Harpalus tridens			38	37	XO	18
Harpalus wagnerii			30	30	XY	18
Laemostenus complanatus			40	40	XY	17
Laemostenus oblongus			45			17
-Female 2n = 30-60						
Lebia atriventris			32	31	XO	18
Lebia cyanocephala			34	33	XO	17
Lecanomerus sp. 1			34			21
Lestichus chloronotus			38	37	XO	21
Licinus aequatus			38	38	XY	17
Licinus punctatulus granulatus		26	26	XY	18	
Licinus punctatulus punctatulus		26	26	XY	18	
Lionychus albonotatus			34	33	XO	17
Lionyehus albonotatus			34	33	XO	18
Lophyra catena				23	XXY	18
Lophyra flexuosa			24	22	XXXY	31
Lophyridia lunulata			24	22	XXXY	18
Loricera pilicornis				19		18
Loxandrus sp. 1			36	35	XO	21
Loxandrus sp. 2			36	35	XO	21
Loxandrus sp. 3				33		21
Loxoncus microgonus			38	38	Xyp	18
Macrocheilus trimaculatus			34	34	XY	18
Mantichora amigdaloides			38	38	XY	20
Masoreus wetterhallii			36	35	XO	17
Mecyclothorax lewisensis			24	23	XO	21
Mecyclothorax punctipennis			16	16	XY	21
Megacephala brasiliensis			12	12	XY	37
Megacephala cruciata			32	31	XO	38
Megacephala euphratica			32	31	XO	17
Megacephala rutilans			24	23	XO	38
			26	25	XO	38
Megacephala sobrina			30	29	XO	38
Melanius anthracinus			38	37	XO	16
Melanius gracilis			38	37	XO	16
Melanius minus			38	37	XO	16
Melanius nigrita				43		16
				51		16
			42	41	XO	16
			40	40	XY	16
			40	40	XY	16
			46	46	XY	16
Melanius rhaeticus				43		16
				46		16
Microlestes abeillei			32	31	XO	17
Microlestes gallicus			32	31	XO	18
Microlestes luctuosos			32	31	XO	18
Microlestes negrita			32	31	XO	18
Myriochile fastidiosa				23	XXY	18
Myriochile melancholica				22	XXXY	30

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Myriochile undulata				25	XXY	18
Mystropomus subcostatus				43		21
Nebria asturiensis				42		17
Nebria belloti				38		17
Nebria brevicollis				30		18
Nebria dilatata				52		18
Nebria expansus				46		17
Nebria fulvibarbis				40		17
Nebria gyllenhali				35		17
-Male 2n = 34-35						
Nebria livida				34		17
Nebria picicornis				46		17
Nebria rubicunda				46		17
Nebria salina				42		18
Neocollyris crassicornis				27	XXY	17
Neocollyris fuscitarsis				27	XXY	17
Neocollyris redtenbacheri				27	XXY	17
Neocollyris sp. 1				28	XXXY	20
Nesarpalus fortunatus				37		17
Nesarpalus sanctaecrucis			38	37	XO	18
Notagonum sp. 1			28	28	XY	21
Notagonum submetalicum						21
Notiobia germari			42	41	XO	21
Notiobia melanaria			38	37	XO	21
Notiobia schnusei				37		18
Notiophilus quadripunctatus				24		18
Notonomus bodeae			38	37	XO	21
-B chromosomes						
Notonomus flos			36	35	XO	21
Notonomus hopsoni				35		21
Notonomus macoyi			36	35	XO	21
Notonomus marginatus			36	35	XO	21
Notonomus masculinus			36	35	XO	21
Notonomus mediosulcatus			56			21
Notonomus muelleri			34	33	XO	21
-B chromosomes						
Notonomus obscurus			30	29	XO	21
Notonomus opulentus			36	35	XO	21
-B chromosomes						
Notonomus peronii			30	30	XY	21
Notonomus philippi			36	35	XO	21
Notonomus phillipsii			46	45	XO	21
-B chromosomes						
Notonomus pluripunctatus			36	35	XO	21
Notonomus rainbowi			36	35	XO	21
Notonomus satrapa			36	35	XO	21
Notonomus taylori				35		21
Notonomus triplogenioides			42			21
Notonomus variicollis			36	35	XO	21
Odacantha melanura				24		17
Odontocarus cephalotes				40		17
Odontocheila confusa			22	22	XY	39
-B chromosomes						
Odontocheila nodicornis			36	35	XO	39
Olisthopus glabratus				41		18
Omaseidius melanarius			38	37	XO	16
Omaseus atterrimus			38	37	XO	16
			42	41	XO	16
Omaseus elongatus				37		16
-B chromosomes						
			38	37	XO	16
Omaseus nigerimus			38	37	XO	16
Omophron limbatum			36	36	XY	17
Omophron ovale			36	36	XY	17
Omphra sp			20	19	XO	17

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Omus californicus			36	36	XY	20
Omus dejeani			36	36	XY	20
Oodes helopiodes				30		17
Oodes modestus			38			21
Oodes monticola			22	22	XY	17
Oodes parallelus			24	24	XY	17
Ophonus ardosiacus			38	37	XO	17
Ophonus azureus			38	37	XO	18
Ophonus cordatus			38	37	XO	18
Ophonus diffinis			38	37	XO	18
Ophonus incisus				37		17
Ophonus longicollis				37		18
Ophonus parallelus			38	37	XO	18
Ophonus rufibarbis				37		17
Ophonus rufipes			38	37	XO	18
-B chromosomes						
Ophonus sabulicola hispanus				37		17
Ophonus similis			38	37	XO	18
Ophonus stictus			38	37	XO	18
Ophonus subquadratus			38	37	XO	18
Ophonus subsinuatus				37		18
Orthomus barbarus			34	34	XY	16
Orthomus expansus			34	34	XY	16
Orthomus sp			34	34	XY	17
Orthomus velocissimus pardoi		34	34	XY	16	
Orthotrichus indicus			38	37	XO	17
Oxycheila tristis			32	29	XXXXY	38
Oxypselaphus obscurus			38	37	XO	17
Pamborus alternans			22	22	XY	21
Pamborus opacus			22	22	XY	21
Pamborus tropicus			22			21
Paranchus albipes			38	37	XO	17
Parophonus acutangulus			38	37	XO	18
Parophonus hirsutulus			42	41	XO	18
Penetretus andalusiacus				33		17
Penetretus rufipennis				33		17
Penetretus semipunctatus				33		18
Penetretus temporalis				32		17
Pentacomia sp. 1			22	21	XO	20
Percosoma substriatum			34	34	XY	21
Percus politus				63		16
Percus quiraoi			58	57	XO	16
Pericompsus laetulus			22	22	XY	17
Perileptus areolatus			28	27	XO	18
Phaenaulax sp. 1			38	37	XO	21
Pheropsophus africanus				32		17
Pheropsophus bimaculatus			36	35	XO	18
Pheropsophus catoirei				36		18
			28	27	XO	18
			36	35	XO	18
Pheropsophus chaudoiri			36	35	XO	18
Pheropsophus hilaris var. sobrinus			20	19	XO	18
Pheropsophus lissoderus			18	17	XO	18
Pheropsophus occipitalis			36	35	XO	18
			36	36	XY	18
Pheropsophus verticallis			30	29	XO	21
Philophloeus sp. 1			30	29	XO	21
Platyderus alcaracinus				23		17
Platyderus lusitanicus				23		18
Platyderus muricianus				23		17
Platyderus testaceus				40		17
Platyderus varians			38	37	XO	18
Platymetopus flavilabris			40	40	XY	18
Platynini sp 1				30		17
Platynini sp 2				36		17

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Platynus assimile			28	27	XO	18
			38	37	XO	18
Platynus chloreus			38	37	XO	17
Platynus decentis			26	26	NeoXY	18
Platynus dorsale			44	44	XY	18
Platynus extensicolle			38	37	XO	18
Platynus longiventre				28		17
Platynus nugax				37		17
Platynus obscurus			38	37	XO	18
Platynus ruficornis			38	37	XO	18
Platynus sp (japan)				37		17
Platynus sp (mexico 1)				37		17
Platynus sp (mexico 2)				43		17
Platynus sp (mexico 3)				37		17
Platynus variablis			44	43	XO	17
Platytarus bufo				30		17
Poecilus chalcites			38	37	XO	16
Poecilus coerulescens			38	37	XO	16
Poecilus crenatus				37		17
				39		17
Poecilus cupreus			44	43	XO	16
			44	44	XY	16
Poecilus cursorius				37		16
				40		16
Poecilus decipens			38	37	XO	16
Poecilus koyi ?			38	37	XO	18
			30	29	XO	16
Poecilus kugelanni			46	45	XO	16
Poecilus lepidus				38		18
				38		16
			32	31	XO	16
Poecilus lucublandus			28	27	XO	16
Poecilus nitidus			38	37	XO	18
Poecilus purpurascens			38	37	XO	17
Poecilus quadricollis			44	43	XO	16
Poecilus sericeus			32	32	XY	16
Poecilus versicolor			38	37	XO	16
Poecilus vicinus			42	41	XO	16
Pogonus chalceus				22		18
Pogonus gilvipes			22	22	XY	17
Pogonus meridionalis			22	22	XY	17
Pogonus persicus			22	22	XY	17
Pogonus testaceus			22	22	XY	17
Pristonychus terricola				30		18
Promecoderus mastersii			48	47	XO	21
Promecoderus sp. 1			46	45	XO	21
Prosopogmus chalybeipennis			36	35	XO	21
Prosopogmus impressifrons			36	35	XO	21
Prosopogmus oodiformis			38			21
Prothyma concinna				25	XXXXY	36
Prothymia sp. 1				24	XXXY	20
Pseudochaetoera virgintiguttata			23	XXY	18	
Pseudotetracha australis			24	24	XY	40
Pseudotetracha blackburni-1			24	23	XXY	40
Pseudotetracha blackburni-2			24	24	XY	40
Pseudotetracha whelani			26	26	XY	29
Pterophilus brevipennis			38	37	XO	16
Pterostichus aereipennis			38	37	XO	16
-B chromosomes						
Pterostichus aethiops			38	37	XO	16
Pterostichus alacer			38	37	XO	16
Pterostichus angustatus			38	37	XO	18
			38	37	XO	16
Pterostichus anthracinus			38	37	XO	18
Pterostichus argutor diligens			30	30	XY	16

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Pterostichus argutor strenuus			30		16	
Pterostichus aterrimus nigerrimus		38	37	XO	18	
Pterostichus bicolor			38	37	XO	16
Pterostichus brevipennis			38	37	XO	18
Pterostichus cantaber			38	37	XO	16
-B chromosomes						
Pterostichus cantabricus			38	37	XO	16
Pterostichus cf dufouri				37		17
Pterostichus chyddaeus			38	37	XO	16
Pterostichus coracina			38	37	XO	16
Pterostichus coracinus			38	37	XO	17
Pterostichus cristatus			38	37	XO	16
Pterostichus cristatus cantabricus		38	37	XO	16	
Pterostichus diligens			30	30	XY	18
Pterostichus dufouri			38	37	XO	16
Pterostichus elongatus			38	37	XO	18
Pterostichus flavofemoratus			38	37	XO	16
Pterostichus ghiliani			38	37	XO	16
Pterostichus globosus ebenus				37		16
Pterostichus gracile			38	37	XO	18
Pterostichus herculaneus			38	37	XO	16
Pterostichus impressus				37		16
Pterostichus insidiator			38	37	XO	16
Pterostichus interruptus			38	37	XO	16
Pterostichus madidus			38	37	XO	16
Pterostichus melanarius			38	37	XO	18
Pterostichus melas			38	37	XO	16
Pterostichus metallicus			38	37	XO	18
Pterostichus minor			38	37	XO	18
Pterostichus morio				32		16
Pterostichus muehlfeldi				34		16
Pterostichus multipunctatus			38	38	XY	16
-B chromosomes						
Pterostichus nemoralis			38	37	XO	16
Pterostichus niger			38	37	XO	18
-B chromosomes						
Pterostichus nigrita			38	37	XO	41
-B chromosomes						
Pterostichus nigrum			38	37	XO	16
Pterostichus oblongopunctatus		28	28	XY	18	
			28	28	XY	16
Pterostichus patruelis			28	28	NeoXY	18
Pterostichus patruellis			28	28	NeoXY	16
Pterostichus pidanensis mikae		38	37	XO	16	
-B chromosomes						
Pterostichus pidanensis pidanensis			38	37	XO	16
-B chromosomes						
			38	37	XO	18
Pterostichus pumicatus			38	37	XO	16
Pterostichus rhaeticus			38	37	XO	41
Pterostichus sp.			38	37	XO	16
Pterostichus sp. Caucasucus			38	37	XO	16
Pterostichus spinolae				37		16
Pterostichus strenuus				30		17
Pterostichus tuberculiger			38	37	XO	16
Pterostichus vernalis			46	46	XY	16
Pterostichus ziegleri				34		16
Risophilus himalayicus			40	39	XO	17
Ropaloteres cinctus				27	XXXXY	36
Sarothrocrepis corticalis			34	33	XO	21
Sarticus habitans			36	35	XO	21
Sarticus monarensis			46	45	XO	21
Scarites buparius				37	XXY	42
-B chromosomes						
				37	XXY	18

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
				39	XXY	18
Scarites eurytus			46	45	XO	42
Scarites hespericus			54	53	XO	42
Scarites inconspicuus			52	52	XY	18
Scarites indus			16	15	XO	18
			52	52	XY	18
Scarites laevigatus			62	61	XO	42
Scarites occidentalis				41	XXY	18
-B chromosomes						
				41	XXY	42
Scarites planus			40	39	XO	18
Scarites subterraneus			38	37	XO	18
Scarites terricola			58	57	XO	42
Scybalicus oblongiusculus				37		17
Sericoda bogemannii				36		17
Setalis rubripes				37		21
Siagona dejeani			46	45	XO	17
Siagona europaea			46	46	XY	17
Siagona fabricii			46	46	XY	18
Siagona flessus			44	44	XY	18
Siagona jenissoni			46	45	XO	17
Siagona pumila			46	46	XY	18
Siagonyx blackburni			48	48		21
Simodontus australis			34	33	XO	21
Sphallomorpha albopicta			38	37	XO	21
Sphodrus leucophthalmus				36		17
Spiralia maura				22	XXXY	30
Stenolophus lecontei			26	25	XO	18
Stenolophus mixtus			36	36	XY	18
Stenolophus piceus			38			21
Stenolophus proximus				24		18
Stenolophus skrimshireanus				26		17
Stenolophus teutonus			24	24	XY	18
Stomis pumicatus			38	37	XO	16
Styracoderus atramentarius				45		17
Synchus vivalis				25		17
Syntomus foveatus			42	41	XO	18
Syntomus fuscomaculatus				46		18
Syntomus obscuroguttatus			34	33	XO	18
Syrdenus grayi			40	40	XY	17
-B chromosomes						
Tachys parvula			30	30	XY	18
Taenidia circumdata				22	XXXY	30
Teraphis sp. 1			30	30	XY	21
Thalassotrechus barabarae			22	22	XY	17
Therates sp. 1				23	XXY	20
Trechus flavolimbatus				23		17
Trechus latus			24	23	XO	17
Trechus obtusus			24	23	XO	18
Trechus pilisensis			24	23	XO	18
Trechus pulchellus			24	23	XO	18
Trechus pulpani			24	23	XO	18
Trechus quadristriatus			24	23	XO	18
Trichocellus godarti				39		17
Trichosternus relictus			56	55	XO	21
Trichosternus vigorsi				45		21
Trichotichnus luparis			38	37	XO	17
Trichus maculata			36			17
Triplectrus haplomus			38	37	XO	18
Triplectrus rusticus			24	24	NeoXY	18
Trymosternus cordatus				62		17
Zabrus ambiguus			60	59	XO	17
Zabrus angustatus				59		17
Zabrus castroi			60	59	XO	17
-B chromosomes						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Zabrus coiffaiti			60	59	XO	17
Zabrus consanguineus			58	57	XO	17
Zabrus constrictus			50	49	XO	17
Zabrus crassus				48		18
Zabrus curtus arragonensis				59		17
Zabrus curtus neglectus			58	57	XO	17
Zabrus graecus				48		17
Zabrus gravis			58	57	XO	17
Zabrus ignavus				47		17
Zabrus laevigatus				46		18
				50		18
Zabrus marginicollis				57		43
Zabrus mateui				59		17
Zabrus obesus				59		43
Zabrus pecoudi				49		17
Zabrus seidlitzi			58	57	XO	18
Zabrus seidlitzi gredosanus			58	57	XO	17
Zabrus silphoides asturiensis			60	59	XO	17
Zabrus spinipes				62		17
Zabrus theveneti				59		17
Zabrus urbionensis				60		17
Zabrus vasconicus			64	63	XO	17
-B chromosomes						
Zuphium olens			30	30	XY	17
Cerambycidae						
Acalolepta fraudatrix				22		1
Acalolepta luxuriosa			24	24	XY	1
Acalolepta sejuncta				22		1
Acanthocinus aedilis			22	22	Xyp	1
Acanthocinus circumflexus			26	26	Xyp	1
Acanthocinus griseus				22		1
Acmaeops proteus			22	22	Xyp	1
Aegosoma scabricorne				20		1
Aeloesthes holosericea			18	18	Xyp	1
Agapanthia dahli			20	20	Xyp	1
Agapanthia daurica				20		1
Agapanthia villosoviridescens		20	20	XY	1	
			20	20	Xyp	44
			20	20	Xyp	4
Anaesthetis testacea			22	22	Xyp	1
Anaflus protensus			20	20	Xyp	1
Anisarthron barbipes			20	20	Xyp	1
Anoplophora chinensis macularia		30	30	XY	1	
Anoplophora malasiaca			30	30	Xyp	1
Apomecyna neglecta			22	22	Xyp	1
Apriona japonica				36		1
Asemum striatum			20	20	Xyp	1
Batocera rubus			20	20	Xyp	1
Callidium violaceum			22	22	XY	1
Callipogon armillatus			26	26	Xyp	45
Cerambyx scopolii			20	20	Xyp	1
Chloridolum thaliodes				24		1
Chlorophorus annularis			20	20	Xyp	1
Chlorophorus figuratus			20	20	Xyp	1
Clytus arietis			20	20	Xyp	1
Clytus lama			20	20	Xyp	1
Clytus melaenus			20	20	XY	1
Compsa textilis			20	20	Xyp	1
Compsocerus equestris			32	32	Xyp	45
Criocephalus rusticus			20	20	Xyp	1
Cyllene robiniae			20	20	XY	1
Cyrtoclytus caproides			20	20	XY	1
Derancistrus thomae			28	28	Xyp	1
Dihammus fraudator				22		1
Dihammus luxuriosus				24		1

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Dilus fugax				18		1
Distenia gracilis				20		1
Dorcadion anatolicum				20		46
			24	24	Xyp	46
Dorcadion scabricolle				20		46
Eburia 8-maculata			20	20	Xyp	1
Elaphidion prob. Parallelus			18	18	Xyp	1
-B chromosomes						
Elaphidion villosum			18	18	Xyp	1
Epiglenea comes			20	20	Xyp	1
Ergates faber				22		1
Eutrapha 16-punctata			20	20	Xyp	1
Eutrapha ocelota			20	20	XY	1
Exocentrus adspersus			26	26	Xyp	1
Exocentrus fasciolatus						1
Exocentrus galloisis						1
Exocentrus lineatus						1
Exocentrus lusitanus			22	22	Xyp	1
Exocentrus punctipennis			22	22	Xyp	1
Gaurotes doris				22		1
Gaurotes suvorovi			22	22	XY	1
Glenea spilota			20	20	Xyp	1
Gonocallus collaris			14	14	Xyp	1
Graphisurus obsoletus			20	20	Xyp	1
Lagochirus aranaeiformis			24	24	Xyp	1
Leiopus stillatus				24		1
Leontium viride				26		1
Leptostylus sp.			20	20	Xyp	1
Leptura dubia				20		1
Leptura ochracea			20	20		1
Leptura sanguinolenta				20		1
Liopus nebulosus			22	22	Xyp	1
Macrotoma scutellaris			28	28	XY	1
Mecynippus pubicornis				22		1
Mesechthistatus binodosus				22		1
Mesosa hirsuta			20	20	XY	1
Mesosa longipennis				22		1
Mesosa myops japonica			20	20	XY	1
Mesosa nebulosa			20	20	Xyp	1
Mesosa senilis			20	20	Xyp	1
Molorchus umbellatarum			20	20	Xyp	1
Monochamus beloni			22	22	XY	1
Monochamus galloprovinciallis galloprovinciallis			22	22	Xyp	47
Monochamus latus				21	Xyyp	1
-B chromosomes						
Monochamus marmorator			20	20	Xyp	1
Monochamus notatus			20	20	Xyp	1
Monochamus oregonensis			22	22	Xyp	1
-B chromosomes						
				21	Xyyp	1
-B chromosomes						
Monochamus saltuarius			20	20	Xyp	47
Monochamus sartor			24	24	Xyp	47
Monochamus scutellatus			20	20	Xyp	1
-B chromosomes						
			20	20	Xyp	1
Monochamus scutellatus-oregonensis comp			18		1	
Monochamus sutor			20	20	Xyp	1
Monochamus urussovi				24		1
Morimus orientalis			24	24	Xyp	48
Nusphera madurensis			22	22	Xyp	1
Oberea affinis			20	20	Xyp	1
Oberea mandarina			20	20	Xyp	1
Oberea oculata			20	20	Xyp	4
Oberea sp. 1			20	20	Xyp	1

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Oberea tripunctata					XY	1
			20	20	Xyp	1
Obrium brunneum			22	22		1
Olenocamptus bilobus			18	18	Xyp	1
Olenocamptus sp. 1			18	18	Xyp	1
Oncideres amputator			20	19	XO	49
Palimna liturata			32	32	XY	1
Phaea sp. 1			20	20	Xyp	1
Phymatodes maaki			20	20	Xyp	1
Phytoecia coerulescens			20	20	Xyp	1
Phytoecia nigricornis			20	20	Xyp	4
Plagionotus arcuatus			20	20	Xyp	1
Plagionotus pulcher				20		1
Plectura metallica				26		1
Plocaederus obesus				10		1
Pogonocherus decoratus				20		1
Pogonocherus dimidiatus			20	20	XY	1
Pogonocherus fasciculatus				22		1
Pogonocherus hispidulus			20	20	Xyp	1
Pogonocherus hispidus			20	20	Xyp	1
Pogonocherus penicellatus			20	20	Xyp	1
Prionus coriarius				24		1
Psenocerus supernotatus			20	20	Xyp	1
Pterolophia caudata			20	20	XY	1
			20	20	Xyp	1
Pterolophia jugosa				20		1
Pterolophia leiopoda				20		1
Pterolophia rigida				22		1
Pterolophia zonata				20		1
Purpuricenus indus			28	28	Xyp	1
Purpuricenus spectabilis				28		1
Pyrestes haematicus			20	20	XY	1
Rhagium bifasciatum			20	20	Xyp	1
Rhagium inquisitor			20	20	Xyp	1
Rhagium mordax			20			1
Rhopalopus signaticollis				22		1
Rosalia btesi				20		1
Saperda calcarata adspersa			20	20	Xyp	1
Saperda moesta			20	20	Xyp	1
Saperda perforata			20	20	Xyp	1
Saperda populnea			20	20	Xyp	1
Saperda scalaris			20	20	Xyp	1
Saphanus piceus			20	20	Xyp	1
Spondylis buprestoides			30	30	Xyp	1
Steirastoma brevis			28	28	Xyp	50
Stenodontes spinibaris			26	26	Xyp	1
Stenostola ferrea			20	20	Xyp	1
Stenygra histrio			20	20	Xyp	1
Stenygrinum 4-notatum			20	20	XY	1
Strangalia 4-fasciata			20			1
Strangalia maculata			20			1
Stromatium barbatum			20	19	XO	1
Tetraopes femoratus			20	20	XY	1
Tetraopes tetropthamus			20	20	XY	1
			20	20	XY	1
			20	20	Xyp	1
Tetropium castaneum			20	20	Xyp	1
			24	24	Xyp	1
Tetropium fuscum			22	22	Xyp	1
Tetropium gabrieli			24	24	Xyp	1
Tetrops praeusta			20	20	Xyp	1
Trachyderes striatus			22	22	Xyp	51
Trachyderes thoracicus			32	32	Xyp	51
Trichophorus interrogationes			20	20	Xyp	45
Uraecha bimaculata				32		1

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Vadonia unipunctata				20		46
Vesperus xatari			54	53	Xyy	52
-2 y chrom are homologous to a pair autosomes in the female						
Xenolea nubila				32		1
Xylosteus spinolai			20			1
Xylotrechus smei			20	20	Xyp	1
Chrysomelidae						
Acalymma blandulum			20	19	XO	53
-B chromosomes						
Acalymma fairmairei			28	27	XO	53
Acalymma gouldi			20	19	XO	53
Acalymma innuba			20	19	XO	53
-B chromosomes						
Acalymma pallipe			22	21	XO	53
Acalymma quadrivittatum			22	21	XO	53
Acalymma s. sp. near trivittatum			39	XXY	53	
-B chromosomes						
Acalymma sp. 1			24	23	XO	53
Acalymma thiemei			22	21	XO	53
Acalymma trivittatum			22	21	XO	53
-B chromosomes						
Acalymma vittatum			22	21	XO	53
Acanthoscelides obtectus			20	20	XY	1
Aedmon eugeniae			40	39	XO	53
-B chromosomes						
Agathomerus sellatus			20	20	Xyp	53
Agathomerus subfasciatus			20	20	Xyp	53
Agathomerus testaceus			20	20	Xyp	53
Agelastica coerulea			24	24	Xyr	53
Agroiconota inedita			42	42	Xyp	54
Agroiconota propinqua			38	38	Xyp	55
Alagoasa acutangula			22	22	Xy+	53
Alagoasa apicata			22	22	Xy+	53
Alagoasa arcifera			16	16	Xy+	53
-B chromosomes						
Alagoasa bicolor			22	22	Xy+	53
Alagoasa bipunctata			22	22	Xy+	53
Alagoasa burmeisteri			22	22	Xy+	53
Alagoasa burmeisteri gounellei		22	22	Xy+	53	
Alagoasa burmeisteri maculatissima			22	22	Xy+	53
Alagoasa ceracollis			22	22	Xy+	53
Alagoasa cruxnigra				22		53
Alagoasa decemguttata			22	22	Xy+	53
Alagoasa dipus			22	22	Xy+	53
Alagoasa dissepta cyaneofasciata			22	22	Xy+	53
Alagoasa equestris			12	12	Xy+	56
Alagoasa extrema			22	22	Xy+	53
Alagoasa fasciaticollis			22	22	Xy+	53
-B chromosomes						
			22	22	Xy+	53
Alagoasa illustris			22	22	Xy+	53
Alagoasa januaria			22	22	Xy+	53
Alagoasa jufina			22	22	Xy+	53
Alagoasa libentina			22	22	Xy+	53
Alagoasa libentina tetraspilota		22	22	Xy+	53	
Alagoasa mella commutata			22	22	Xy+	53
Alagoasa posticalis			22	22	Xy+	53
Alagoasa rotundicollis			22	22	Xy+	53
Alagoasa sp. 1			22	22	Xy+	53
Alagoasa sp. 2			22	22	Xy+	53
Alagoasa trifasciata			22	22	Xy+	53
Alagoasa trifasciata vulgatissima		22	22	Xy+	53	
Altica aenea brasiliensis			24	24	Xy+	53
Altica ambiens			24	24	Xy+	53
Altica ambiens alni			24	24	Xy+	53

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Altica amethystina			24	24	Xy+	53
Altica ampelophaga			24	24	Xy+	53
Altica brevicollis			24	24	Xy+	53
Altica carduorum			24	24	Xy+	53
Altica carinata			24	24	Xy+	53
Altica chalybea			22	22	Xy+	53
Altica coerulea			24	24	Xy+	53
				23	Xyy+	53
Altica coerulescens			24	24	Xy+	53
Altica corni			24	24	Xy+	53
Altica lazulina	parth	3	34			53
-apomixis						
Altica lythri			24	24	Xy+	53
Altica oleeracea			24	24	Xy+	53
Altica populi			24	24	Xy+	53
Altica rosae			24	24	Xy+	53
Altica sp. 1			22	22	Xyp	53
Altica sp. 2			24	24	Xy+	53
Altica sp. 3			24	24	Xy+	53
				26	XXyy+	53
Altica subplicata			24	24	Xy+	53
Altica tamaricis			24	24	Xy+	53
Altica tincta?			24	24	Xy+	53
Altica ulmi			24	24	Xy+	53
Ambrostoma superbum			40	40	Xyp	57
Amphelsasma cavum			18	17	XO	53
-B chromosomes						
Amphelsasma cavum n. sp.			20	19	XO	53
Amphelsasma cavum vicinum		18	17	XO	53	
Anisodera excavata			18	18	NeoXY	54
Aphthona cyparissiae			32	32	XY	53
Aphthona depressa			28	28	XY	53
-B chromosomes						
			28	28	XY	53
Aphthona flaviceps			26	26	XY	53
Aphthona herbigrada			28	28	XY	53
			30	30	XY	53
Aphthona illigeri			28	28	XY	53
Aphthona lamprocyanea			24	24	Xy+	53
Aphthona lutescens			24	24	XY	53
Aphthona nigriceps			32	32	XY	53
Aphthona venustula			28	28	XY	53
-B chromosomes						
			28	28	XY	53
Apophylia sericea			30	30	Xyp	53
Apraea portoricensis			10	10	XY	53
			12	12	XY	53
Araucanomela wellingtonensis		28	28	Xyp	58	
Argopus punctipennis			50	50	XY	53
Arrhenocoela lineata			26	26	XY	53
Asiorestia impressa			38	38	XY	53
Asphaera abdominalis			22	22	Xy+	53
Asphaera abendrothi				25	XXXXY	56
Asphaera daniella				27	XXXXXXY	56
Asphaera limitata				23	XXY	56
Asphaera meticulosa			22	22	Xy+	53
Asphaera nr. Weyrauchi sp. 1				27	XXXXXXY	56
Asphaera octopunctata			18	18	Xy+	53
Asphaera pauperata			18	18	Xy+	53
				23	XXY	56
Asphaera quadrifasciata				22		53
Asphaera reflexicollis				25	XXXXY	56
Asphaera scutata			32	27	XXXXXXY	56
Asphaera semifulva			34	28	XXXXXXXY	56
Asphaera sp. 2				24	XXXY	56

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Asphaera sp. 3				26	XXXXXXXY	56
Asphaera t-album				27	XXXXXXY	56
Asphaera unicolor			22	22	Xy+	53
Aspidimorpha difformis			18	18	Xyp	53
Aspidimorpha dorsata			16	16	Xyp	53
Aspidimorpha furcata			18	18	Xyp	53
Aspidimorpha indica			18	18	Xyp	53
Aspidimorpha miliaris			18	18	Xyp	53
Aulacophora cincta			30	30	XY	53
Aulacophora femoralis			58	58	XY	53
				59	XXY	53
Aulacophora fovecollis				30		53
			30	30	Xyp	53
				59	XXY	53
Aulacophora intermedia			30	30	XY	53
				57	XXY	53
				57	XXY	53
Aulacophora semifusca				59	XXY	53
Aulacoscelis melanocera			24	23	XO	53
Baliosus californicus			18	18	Xyp	53
Basilepta balyi			28	28	Xyp	53
Basilepta fuvipes			28	28	Xyp	53
Basilepta obliteratum			24	24	Xyp	53
Basiprionota decemmaculata			18	18	Xyp	53
Blaptea elguetai			28	28	Xyp	59
Blepharida rhois			32	32	Xyp	53
Botanochara angulata				51	XXY	54
Botanochara bonariensis				47	XXY	54
				27	Xyy	54
				41	Xyy	54
				44	XXXY	54
Botanochara duodecimverrucata		32	31	XO	54	
				44	XXXY	54
Botanochara sp				30	XXXY	54
-B chromosomes						
				44	XXXY	54
Bromius obscurus	parth		24			53
-apomixis syn. Adoxus obscurus						
			16	16	Xyp	53
Bruchidius albizziae			22	22	Xyp	1
Bruchidius angustifrons						60
Bruchidius aureus			20	20	Xyp	1
Bruchidius dimorphous			20	20	Xyp	1
Bruchidius mimosae			22	22	Xyp	1
Bruchidius multilineolatus			20	20	Xyp	1
Bruchidius saundersi			20	20	Xyp	1
Bruchidius sp. 1			22	22	Xyp	1
Bruchidius urbanus			20	20	Xyp	1
Bruchus pisorum			22	22	XY	1
			20	20	Xyp	1
			22	22	Xyp	1
Bruchus rufimanus			38	37	XO	1
Calligrapha alni			24	23	XO	53
-B chromosomes						
Calligrapha alnicola	parth		48			53
Calligrapha amator			24	23	XO	53
Calligrapha apicalis	parth		48			53
Calligrapha bidenticola			24	23	XO	53
-B chromosomes						
Calligrapha californica corepsivora			24	23	XO	53
Calligrapha confluens			24	23	XO	53
Calligrapha fulvipes			24	23	XO	53
Calligrapha multipunctata bigsbyana				23		53
-B chromosomes						
			24	24	Xyp	53

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Calligrapha ostryae	parth		48			53
Calligrapha philadelphica			24	23	XO	53
-B chromosomes						
			24	23	XO	53
Calligrapha pnirsa			24	23	XO	53
Calligrapha polyspila			24	24	Xyp	53
Calligrapha pruni			24	23	XO	53
Calligrapha rowena			24	23	XO	53
-B chromosomes						
Calligrapha scalaris	parth		44			53
			24	23	XO	53
Calligrapha verrucosa			24	23	XO	53
Calligrapha vicina	parth		48			53
Calligrapha virginea			48			53
Callosobruchus analis			20	20	XY	61
			20	20	Xyp	1
Callosobruchus chinensis			20	20	XY	61
			20	19	XO	1
			20	20	Xyp	62
				21	Xyyp	62
Callosobruchus maculatus			20	20	XY	61
			20	19	XO	1
			20	20	XY	1
			20	20	Xyp	1
Callosobruchus subinnotatus			20	20	XY	61
Capraita egleri			22	22	Xy+	53
Capraita sp. 1			22	22	Xy+	53
Capraita strichocephala			22	22	Xy+	53
Capraita trinidadensis			22	22	Xy+	53
Capraita virkkii			22			53
Caryedon acaciae			18	18	Xyp	1
Caryedon gonagra			18	18	Xyp	1
Caryedon lineatonota			20	20	Xyp	1
Caryedon longus			18	18	Xyp	1
Caryedon opacus			18	18	Xyp	1
Caryedon prosopius			18	18	Xyp	1
Caryedon serratus			18	18	Xyp	1
Caryedon sp. 1			20	20	Xyp	1
Caryedon sp. 2			23	23	Xyp	1
-Male 2n = 20-26						
Cassida algirica				18		63
Cassida azurea			18	18	Xyp	63
Cassida bergeali			18	18	Xyp	63
Cassida circumdata			18	18	Xyp	53
Cassida deflorata			18	18	Xyp	63
Cassida enervis			18	18	Xyp	53
Cassida flaveola			18	18	Xyp	53
Cassida fuscorufa			18	18	Xyp	53
Cassida hemisphaerica			20	20	Xyp	63
Cassida hexastigma			18	18	Xyp	63
Cassida inquinata			18	18	Xyp	53
Cassida leucanthemi			18	18	Xyp	63
Cassida margaritacea			30	30	Xyp	53
Cassida nebulosa			18	18	Xyp	4
Cassida pannonica			20	20	Xyp	63
Cassida panzeri			18	18	Xyp	63
Cassida prasina			18	18	Xyp	53
Cassida pusilla			18	18	Xyp	53
Cassida rubiginosa			18	18	Xyp	63
Cassida rufovirens			18	18	Xyp	63
Cassida sanguinolenta			18	18	Xyp	63
Cassida sanguinosa			18	18	Xyp	63
Cassida sp. 1			20	20	Xyp	53
				21	Xyyp	53
Cassida subreticulata			30	30	Xyp	63

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Cassida varians			18	18	Xyp	64
-B chromosomes						
Cassida vibex			20	20	Xyp	53
			18	18	Xyp	4
Cassida virdis			24	24	Xyp	63
			30	30	Xyp	63
Cassida virdis 1			16	16	XY	4
Cassida Virdis 2			24	24	Xyp	4
Cassida Virdis 3			30	30	Xyp	4
Cassida vittata			20	20	Xyp	53
Cassidinae sp			22	22	XY	54
Cerotoma atrofasciata			34	33	XO	53
-B chromosomes						
Cerotoma ruficornis			34	33	XO	53
Cerotoma sp. 1 in variegata complex			22	21	XO	53
Chaetocnema chlorophana			20	20	Xyp	53
Chaetocnema concinna			22	22	XY	53
Chaetocnema conducta			22	22	Xyp	53
Chaetocnema depressa			26	26	Xyr	53
Chaetocnema major			22	22	Xyp	53
Chaetocnema tibialis			22	22	Xyr	53
Chalcophana cincta			26	26	Xyp	53
Chalcophana sp.			26	26	NeoXY	45
Chalcophana sp. 1			26	26	NeoXY	53
Chalcophana verecunda			26	26	Xyp	53
			26	26	NeoXY	45
Chalepus dorsalis			16	16	Xyp	54
Chalepus inequalis			18	18	Xyp	53
Chalepus sanguinicollis			18	18	Xyp	55
Chalepus sp. 1			18	18	Xyp	53
Charidotella immaculata			22	22	Xyp	54
Charidotella quadrisignata			24	24	Xyp	55
Charidotella sexpunctata			22	22	Xyp	53
Charidotella sexpunctata			22	22	Xyp	55
Chelymorpha cassidea			22	22	Xyp	53
Chelymorpha cribraria			22	22	Xyp	55
Chelymorpha indigesta			22	22	Xyp	53
Chelymorpha nigricollis			22	22	Xyp	53
Chelymorpha varians			22	22	Xyp	53
Chirida sp. 1			36	36	Xyp	53
Chiridopsis bupunctata			18	18	Xyp	53
Chlamisus straminea				21	XXY	53
Chlamydocassis metallica			32	32	Xyp	53
Chrysochus asclepiadeus			24	24	Xyp	53
Chrysochus auratus			26	26	Xyc	53
Chrysochus cobaltinus			30	29	XO	53
Chrysodina sp.			12	12	Xyp	45
Chrysolina affinis			24	24	Xyp	53
Chrysolina americana			24	24	Xyp	53
Chrysolina analis			40	40	Xyp	65
			40	40	Xyp	53
Chrysolina aurichalcea			32	31		53
			42	41		53
				32		53
			46	45	XO	53
			40	40	Xyp	53
			46	46	Xyp	53
Chrysolina banksi			24	23	XO	53
Chrysolina bicolor			24	24	Xyp	53
Chrysolina bigorrensis			26	26	Xyp	65
Chrysolina carnifex			40	40	Xyp	65
			40	40	Xyp	53
Chrysolina cerealis			24	24	Xyp	53
Chrysolina cf. Subcostata			26	26	Xyp	65
Chrysolina coerulans			24	24	Xyp	4

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Chrysolina colasi			24	24	Xyp	57
Chrysolina colasi			24	24	Xyp	53
Chrysolina curvilinea			40	40	Xyp	65
Chrysolina diluta			36	36	Xyp	53
Chrysolina exanthematica			24	23	XO	53
Chrysolina fastuosa			24	24	Xyp	4
Chrysolina femoralis			24	24	Xyp	53
Chrysolina fragariae			24	24	Xyp	53
Chrysolina gebleri			26	26	Xyp	57
Chrysolina gemina			24	24	Xyp	53
Chrysolina geminata				38		53
Chrysolina globosa			26	26	Xyp	65
Chrysolina graminis			24	24	Xyp	4
Chrysolina grossa			24	24	Xyp	53
Chrysolina gypsophilae grossepunctata			30	30	Xyp	53
Chrysolina haemoptera			40	40	Xyp	53
Chrysolina helopioides			48	47	XO	65
Chrysolina herbacea			24	24	Xyp	53
Chrysolina interstincta			40	40	Xyp	65
Chrysolina janbechynei			40	40	Xyp	53
Chrysolina kuesteri			22	22	Xyp	53
Chrysolina lucida			24	24	Xyp	53
Chrysolina marcasitica			42	42	Xyp	53
Chrysolina marginata			40	40	Xyp	57
Chrysolina marginata			40	40	Xyp	65
			40	40	Xyp	53
Chrysolina obscurella			48	47	XO	65
Chrysolina obsoleta			24	23	XO	53
Chrysolina oricalcia			40	40	Xyp	53
Chrysolina peregrina			46	46	Xyp	53
Chrysolina polita			24	24	Xyp	4
Chrysolina purpurascens			24	23	XO	65
			24	24	Xyp	53
Chrysolina purpurascens crassimargo			24	24	Xyp	65
Chrysolina purpurascens purpurascens			24	24	Xyp	65
Chrysolina pyrenaica			40	40	Xyp	53
Chrysolina rufa				23		65
			24	23	XO	53
Chrysolina rutilans				23		53
Chrysolina staphylea			24	23	XO	53
			22	22	Xyp	53
Chrysolina timarchoides			48	47	XO	65
			48	47	XO	53
Chrysolina umbratilis			30	30	Xyp	65
Chrysolina varians			32	32	Xyp	53
Chrysolina veridana			24	24	Xyp	53
Chrysomela interrupta			34	34	Xyp	53
Chrysomela lapponica			34	34	Xyp	53
Chrysomela mainensis interna		34	34	Xyp	53	
Chrysomela populi			34	34	Xyp	53
Chrysomela schaefferi			34	34	Xyp	53
				35	Xyyp	53
Chrysomela sp. 1			34	34	Xyp	53
Chrysomela sp. 2			34	34	Xyp	53
Chrysomela tremulae			34	34	Xyp	53
Chrysophtharta aurea			24	24	Xyp	53
Chrysophtharta decolorata			24	24	Xyp	53
Chrysophtharta nobilitata			24	24	Xyp	53
Chrysophtharta variicollis			24	24	Xyp	53
Clytra laeviscula				24		53
Clytra laeviuscula			24	24	Xyp	4
Clytra quadripunctata			24	24	XY	53
Clytra succinata			40	40	XY	53
Colaphus sophiae			28	27	XO	44
Colaspidema barbarum			28	28	Xyp	57

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Colaspis greyi			22	22	Xyp	53
Colaspis tricolor			30	30	NeoXY	53
Colasposoma auripenne			16	16	Xyp	53
Colasposoma lividipes			16	16	Xyp	53
Colasposoma metallicum			16	16	Xyp	53
Colasposoma ornatum			16	16	Xyp	53
Colasposoma rufipes			16	16	Xyp	53
Colasposoma semicostatum			16	16	Xyp	53
Colasposoma sp. 1			16	16	Xyp	53
Conchyloctenia nigrovittata			16	16	XY	54
			18	18	Xyp	54
Conicobruchus indicus			20	20	Xyp	1
Coptocephala floralis				24		66
Coptocephala unifasciata			24	24	Xyp	4
Coptocycla adamantina			18	18	Xyp	53
Coraia clarki			36	36	Xyp	53
Coraia maculicollis			36	36	Xyp	53
Cosmogramma decora			20	20	Xyp	45
Craspedonta leayana			18	18	Xyp	53
Crepidedera aurea			18	18	Xyp	53
Crepidedera plutus			26	26	Xyp	53
Crioceris asparagi			16	16	Xyp	53
Crioceris duodecimpunctata			16	16	Xyp	53
Crioceris macilenta			16	16	Xyp	53
Crioceris paracenthesis			16	16	Xyp	53
Crosita altaica			30	30	Xyp	57
Crosita rugulosa			30	30	Xyp	57
Crosita salviae			24	24	Xyp	53
Cryptocephalus alboscutellatus			30		66	
Cryptocephalus analis			30	30	Xyp	53
Cryptocephalus aureolus			30	30	Xyr	53
Cryptocephalus bipunctatus			30	30	Xyr	53
Cryptocephalus capucinus			30	30	Xyr	53
Cryptocephalus crassus			32	32	Xyr	53
Cryptocephalus espanoli			30	30	Xyr	53
Cryptocephalus fulvus				32		53
Cryptocephalus globicollis			30	30	Xyr	53
Cryptocephalus hypochoeridis			30	30	Xyr	53
Cryptocephalus lusitanicus				30		66
Cryptocephalus moraei			30	30	Xyr	53
Cryptocephalus ocellatus			30	30	Xyp	53
Cryptocephalus ochroleucus			30	30	Xyp	53
Cryptocephalus octopilosus			32	32	Xyp	53
Cryptocephalus oppositus			30	30	Xyp	53
Cryptocephalus pominorum				30		66
Cryptocephalus primarius			40	40	Xyp	53
Cryptocephalus quadruplex			24	24	Xyp	53
Cryptocephalus rugicollis			30	30	Xyr	53
Cryptocephalus sexmaculatus			28	28	Xyp	53
Cryptocephalus sexpunctatus			16	16	Xyp	53
Cryptocephalus sexpustulatus			30	30	Xyr	53
Cryptocephalus sexsignatus			30	30	XY	53
Cryptocephalus sp. 1			30	30	Xyp	53
Cryptocephalus sp. 2			30	30	Xyp	53
Cryptocephalus sp. 3			30	30	Xyp	53
Cryptocephalus sulphureus			32	32	Xyp	53
Cryptocephalus triangularis			32	32	Xyp	53
Cryptocephalus violaceus			30	30	Xyr	53
Cryptocephalus vittula			28	28	Xyp	53
Cteisella confusa			18	18	Xyp	54
Cyrsylus volkameriae				30	Xxyy	53
Cyrtonus arcasi			40	40	Xyp	67
Cyrtonus contractus			28	28	Xyp	67
Cyrtonus cupreovirens			28	28	Xyp	67
Cyrtonus cylindricus			28	28	Xyp	67

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Cyrtonus dufouri			28	28	Xyp	53
Cyrtonus elegans			28	28	Xyp	67
Cyrtonus fairmarei			40	40	Xyp	67
Cyrtonus majoricensis			28	28	Xyp	67
			28	28	Xyp	53
Cyrtonus pardoi			46	46	Xyp	67
Cyrtonus plumbeus			28	28	Xyp	67
Cyrtonus puncticeps			40	40	Xyp	67
Cyrtonus punctipennis			28	28	Xyp	53
Cyrtonus rotundatus			28	28	Xyp	67
Cyrtonus ruficornis			28	28	Xyp	67
Cyrtonus sp. 1			28	28	Xyp	67
Dactylispa atkinsoni			16	16	Xyp	53
Dactylispa brevispinosa			16	16	Xyp	53
Dactylispa humeralis			16	16	Xyp	53
Deloyala cruciata			18	18	Xyp	54
Deloyala guttata			18	18	Xyp	54
			20	20	Xyp	55
Desmogramma nigripes			24	24	Xyp	53
Deuteronoda suturalis			16	16	NeoXY	53
Diabrotica adelpha			20	19	XO	53
Diabrotica balteata			20	19	XO	53
Diabrotica bioculata			20	19	XO	53
Diabrotica capitata			20	19	XO	53
Diabrotica circulata			20	19	XO	53
Diabrotica cortezi			20	19	XO	53
Diabrotica cristata			20	19	XO	53
Diabrotica dissimilis			20	19	XO	53
Diabrotica flaviventris			20	19	XO	53
Diabrotica graminea			20	19	XO	53
Diabrotica lemniscata			20	19	XO	53
-B chromosomes						
Diabrotica limitata 15-punctata		20	19	XO	53	
Diabrotica longicornis			20	19	XO	53
-B chromosomes						
Diabrotica longicornis barberi		20	19	XO	53	
-B chromosomes						
Diabrotica longicornis nigricornis (undesc.)			20	XXOO	53	
-XX B chromosomes						
Diabrotica marginata			20	19	XO	53
Diabrotica nummularis			20	19	XO	53
Diabrotica ochreata			20	19	XO	53
Diabrotica octoplagiata			20	19	XO	53
Diabrotica porracea			20	19	XO	53
Diabrotica rufolimabata			20	19	XO	53
Diabrotica scutella			20	19	XO	53
-B chromosomes						
Diabrotica sexmaculata			20	19	XO	53
Diabrotica speciosa			22	21	XO	53
Diabrotica tibialis			20	19	XO	53
-B chromosomes						
Diabrotica trifasciata			20	19	XO	53
Diabrotica undecimpunctata			20	19	XO	53
-B chromosomes						
Diabrotica undecimpunctata duodecimnotata		20	19	XO	53	
Diabrotica undecimpunctata howardi			20	19	XO	53
-B chromosomes						
			20	19	XO	53
-B chromosomes						
Diabrotica undecimpunctata tenella			20	19	XO	53
-B chromosomes						
Diabrotica variablis?'			20	19	XO	53
Diabrotica virgifera			20	19	XO	53
Diabrotica virgifera zeae			20	19	XO	53
Diabrotica viridula			20	19	XO	53

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Diabrotica viridula rufobasis		20	19	XO	53	
Diapromorpha melanopus			22	22	XY	53
Diapromorpha pallens			24	24	XY	53
Diapromorpha quadripunctata		22	22	Xy+	53	
				23	Xyy+	53
Diapromorpha turcica			22	22	Xy+	53
				23	Xyy+	53
Dibolia penstemonis			32	32	NeoXY	53
Dibolia timida			40	40	Xyp	53
Dicladispa occator			16	16	Xyp	53
Dicladispa testacea			16	16	Xyp	53
Diorhabda lusca				40		53
Diphaulaca arguta			30	30	Xyp	53
Diphaulaca sp. 1			30	30	Xyp	53
Diphaulaca sp. 2			30	30	Xyp	53
Disonycha alternata			50	50	NeoXY	53
Disonycha bicarinata				63	XXY	53
				65	XXY	45
Disonycha brevilineata				34	XXOO	53
Disonycha glabrata				35	XXXXXXY	53
Disonycha laevigata			46	46	Xyp	53
			44	44	NeoXY	53
Disonycha nigrita				34	XXOO	53
Disonycha sp. 1			48	48	XY	53
Disonycha sp. 2			30	29	XO	53
Disonycha spilotrachela				29	XXY	53
Donacia andalusica			30	30	Xyp	53
Donacia bicolor			30	30	Xyp	53
Donacia biimpressa			30	30	Xyp	53
Donacia clavipes			30	30	Xyp	53
Donacia hirticollis			28	28	Xyp	53
Donacia subtilis			28	28	Xyp	53
Donacia vulgaris			30	30	Xyp	53
Doryphora quadrisignata			12	12	NeoXY	53
Entomoscelis adonidis			26	26	Xyp	53
Entomoscelis sacra			26	26	Xyp	53
Epimela indet. sp.				22		53
Epistictina viridimaculata			18	18	XY	54
Epitrix cucumeris			26	26	Xyp	53
Epitrix fasciata			26	26	Xyp	53
Erganoides sp. 1			26	26	Xyp	53
Estignema chinensis			18	18	Xyp	53
Eumolpus sp.			22	22	Xyp	45
Eumolpus sp. 1			22	22	Xyp	53
Eumolpus sp. 2			22	22	Xyp	53
Eumolpus surinamensis			22	22	Xyp	45
Eurypedus thoni			20	20	Xyp	45
Eurypepla jamaicensis			18	18	Xyp	55
Exema canadensis			18	18	NeoXY	53
Exora encaustica narensis			32	31	XO	53
Forsterita sp. 1			24	24	Xyp	53
Galeruca angusta			44	44	Xyp	53
Galeruca artemisiae			44	44	Xyp	53
Galeruca canigouensis				39		53
-Male 2n = 38-40						
Galeruca indica			46	46	Xyp	53
Galeruca miegi			38	38	Xyp	53
Galeruca monticola			38	38	Xyp	53
Galeruca tanaceti			40	40	Xyp	53
Galerucella bicolor			44	44	Xyp	53
Galerucella bimarnica			34	34	Xyp	53
Galerucella calmariensis			34	34	Xyp	53
Galerucella cavicollis			34	34	Xyp	53
Galerucella lineola			34	34	Xyp	53
Galerucella nymphae			34	34	Xyp	53

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Galerucella placida			38	38	Xyp	53
Galerucella pusilla			16	16	NeoXY	53
Galerucella sp. 1			34	34	Xyp	53
Galerucella tenella			26	26	Xyp	53
Galerucella vaccinii			34	34	Xyp	53
Gastrophysa cyanea			30	30	Xyp	53
Gastrophysa poligoni			24	24	Xyp	53
Gastrophysa viridula			28	28	Xyp	53
Genus nr. Stenophyma sp. 1			32	32	Xy+	53
Glyphocassis trilineata			16	16	Xyp	54
			18	18	Xyp	53
Glyptina sp. 1			28	28	XY	53
Glyptoscelis chontalensis			20	20	Xyp	53
Glyptoscelis sp. 1			16	16	Xyp	53
Gonioctena americana			24	24	Xyp	53
Gonioctena linnaeana			24	24	Xyp	53
Gonioctena nivosa			24	24	Xyp	53
Gonioctena quinquepunctata			24	24	Xyp	53
Gonioctena sibirica			24	24	Xyp	53
Gonioctena springlovae			40	40	Xyp	53
Gonioctena variabilis			24	24	Xyp	53
Gonioctena viminalis			24	24	Xyp	53
Gratiana lutescens			18	18	Xyp	53
Gratiana pallidula			18	18	Xyp	53
Gratiana spadicea			20	20	Xyp	54
Gynandrobrotica lepida			18	17	XO	53
Gynandrobrotica nigrofasciata		18	17	XO	53	
-B chromosomes						
Gynandrobrotica sp. 1			14	13	XO	53
-B chromosomes						
Gynandrobrotica variabilis			18	17	XO	53
Heikertingerella brevitarsis				24	XXYY	53
Heikertingerella sp. 1			20	20	NeoXY	53
Heikertingerella sp. 2				18	XXYY	53
Heikertingerella sp. 3				18	XXYY	53
Helocassis clavata			18	18	XY	53
			18	18	Xyp	53
Hemipyxis sp. 1			24	24	XY	53
Henicotherus porteri			28	28	Xyp	59
Hermaeophaga cicatrix				17	XXY	53
Hermaeophaga ruficollis			16	16	XY	68
Hilarocassis exclamationis			34	34	Xyp	53
			34	34	Xyc	55
Hispa armigera			12	12	XY	53
			18	18	XY	53
Hispa atra			16	16	Xyp	53
Homoschema nigriventre			8	8	XY	53
Homoschema obesum				11	XXY	53
Hydrothassa glabra			34	34	Xyp	53
Hyphasoma sp. 1			22	22	NeoXY	53
Hypocassida subferruginea			38	38	NeoXY	53
Hypolampsis bryanti			20	20	XY	53
Hypolampsis sp. 1			22	22	Xyp	53
Isotes multipunctata			24	23	XO	53
Isotes quadrispilota			38	37	XO	53
Jolivetia obscura			28	28	Xyp	69
Kanarella sp. 1			26	26	Xyp	53
Labidomera clivicollis			33	33	XY	53
-Subsequent studies failed to replicate						
			34	33	XO	70
Labidomera suturella			32	31	XO	70
Laccoptera quadrimaculata			18	18	XY	54
			18	18	Xyr	54
-B chromosomes						
			18	18	Xyp	53

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
				19	Xyyp	53
Lachnaia pubescens			24	24	Xy+	53
Lasiochila excavata			18	18	NeoXY	53
Lema cerea			14	14	Xyp	53
Lema cirsicola				18		53
Lema coromandeliana			16	16	Xyp	53
Lema cyanea			24	24	Xyp	53
Lema cyanella			16	16	Xyp	53
Lema dorsalis			18	18	Xyp	53
Lema n.sp.			16	16	Xyp	53
Lema nigripes			18	18	Xyp	53
Lema nigrrofrontalis			16	16	Xyp	53
Lema praeusta			16	16	Xyp	53
Lema rufotestacea			14	14	Xyp	53
Lema semifulva			16	16	Xyp	53
Lema terminata			16	16	Xyp	53
Lema trilineata			32	32	Xyp	53
Leptinotarsa behrensi			36	35	XO	53
Leptinotarsa belti			24	23	XO	53
Leptinotarsa decimlineata			34	33	XO	53
			36	35	XO	53
			36	36	Xyp	53
Leptinotarsa defecta			36	35	XO	53
Leptinotarsa flavitarsis			36	35	XO	53
Leptinotarsa haldemani			36	35	XO	53
Leptinotarsa heydeni			36	35	XO	53
Leptinotarsa juncta			36	35	XO	53
Leptinotarsa lineolata			36	35	XO	53
Leptinotarsa peninsularis			36	35	XO	53
Leptinotarsa rubiginosa			36	35	XO	53
Leptinotarsa signaticollis			34	33	XO	53
Leptinotarsa texana			36	35	XO	53
Leptinotarsa tumamoca			36	35	XO	53
Leptinotarsa typographica			36	35	XO	53
Leptinotarsa undecimlineata			34	33	XO	53
Leptispa filiformis			32	32	XY	71
Leucocera laevicollis			24	24	Xyp	53
Lilioceris impressa			20	20	Xyr	53
Lilioceris lilii				20		53
			22	22	Xyp	53
Linaeidea aenea			34	34	Xyp	53
Lochmaea capreae				34		53
Longitarsus australis			28	28	XY	68
Longitarsus ballotae			32	32	XY	53
Longitarsus candidulus			30	30	XY	53
Longitarsus codinai			30	30	XY	53
Longitarsus exsoletus			32	32	XY	53
Longitarsus holsaticus			32	32	XY	53
Longitarsus kleiniiperda			30	30	XY	53
Longitarsus luridus			30	30	XY	53
Longitarsus lycopi			28	28	XY	53
Longitarsus melanocephalus			32	32	XY	53
Longitarsus nanus			28	28	XY	53
Longitarsus nervosus			30	30	XY	53
Longitarsus niger			26	26	XY	53
Longitarsus nigrofasciatus			26	26	XY	53
			28	28	XY	53
Longitarsus oakleyi			28	28	XY	53
Longitarsus obliteratoides			30	30	XY	53
Longitarsus ochroleucus			30	30	XY	53
Longitarsus ordinatus			28	28	XY	53
Longitarsus pellucides			30	30	XY	53
Longitarsus pratensis			26	26	XY	53
Longitarsus reichei			28	28	XY	53
Longitarsus rubiginosus			30	30	XY	53

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Longitarsus succineus			30	30	XY	53
Longitarsus tabidus			28	28	XY	53
Longitarus aeruginosus			24	24	XY	68
Luperodes praeustus			32	32	NeoXY	53
Luperus discrepans				33	XNeoXY	53
Lysathia ludoviciana			24	24	Xy+	53
Lysathia occidentalis			24	24	Xy+	53
Lysathia sp. 1			24	24	Xy+	53
Macrocoma rufotibialis			16	16	Xyp	53
Macrohaltica jamaicensis			24	24	Xy+	53
Macrohaltica mexicana salvadorensis			26	26	Xy+	53
Macrohaltica transversa			24	24	Xy+	68
Macrolenes dentipes				22		66
Mantura rustica				30		53
Merilia sublunata			22	22	Xy+	53
Mesoplatys cincta			24	24	Xyp	53
Metallactus patagonicus			16	15	XO	45
Metriona elatior			18	18	Xyp	54
Microrhopala vittata			32	32	Xyp	53
Microtheca ochroloma			28	28	Xyp	53
Monolepta erythrocephala			26	26	Xyp	53
Monolepta sexsignata			18	18	Xyp	53
			18	18	Xyr	53
Monolepta signata			18	18	Xyp	53
Monomacra caprai			30	30	NeoXY	53
Monomacra sp. 1			34	33	XO	53
Monoxia batisia			36	36	XY	53
Monoxia sp. 1			18	18	NeoXY	53
Neocrepidodera transversa			38	38	Xyp	4
Nodonota aridicola			12	12	Xyp	53
Nodonota lateralis			12	12	Xyp	53
Nodonota puncticollis			12	12	Xyp	53
Nodonota virdis			16	16	Xyp	53
Notosacantha maculipennis			16	16	Xyp	53
Octotoma scabripennis			20	20	Xyp	53
Odontota dorsalis			16	16	Xyp	53
Oedionychus cinctus			16	16	Xy+	68
Oedionychus limbatus			16	16	Xy+	68
Oedionychus sp.			22	22	XY	45
Oedionychus sp. 1			22	22	Xy+	53
Oedionychus umbratica			22	22	Xy+	53
Oides bipunctata			18	17	XO	53
Oides sp.			50	49	XO	53
Omophoita aequatorialis			22	22	Xy+	53
Omophoita aequinoctialis			22	22	Xy+	53
Omophoita albicollis			22	22	Xy+	53
Omophoita angustolineata ?		22	22	Xy+	53	
Omophoita annularis			22	22	Xy+	53
Omophoita clerica				23	Xyy+	53
Omophoita cyanipennis			22	22	Xy+	53
Omophoita cyanipennis octomaculata			22	22	Xy+	53
Omophoita latitarsis			22	22	Xy+	53
Omophoita lunata			24	24	Xy+	53
Omophoita magniguttis			22	22	Xy+	72
Omophoita octoguttata			22	22	Xy+	53
Omophoita personata			22	22	Xy+	53
Omophoita quadrinotata			22	22	Xy+	53
Omophoita sexnotata			22	22	Xy+	72
Omophoita sp.				22		72
Omophoita superba			22	22	Xy+	53
Oocassida pudibunda			39	39	Xyp	53
-Male 2n = 38-40						
Ophraella communa				34		66
Ophraella conferta			24	24	NeoXY	53
Ophraella cribata			24	24	NeoXY	53

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Ophraella notata			36	36	XY	53
Ophraella notulata			36	36	XY	53
Ophraella pilosa			34	34	XY	53
Ophraella sexvittata			24	24	NeoXY	53
Ophrida marmorea			32	32	Xyp	53
Oreina alpestris			24	24	Xyp	53
Oreina cacaliae			24	24	Xyp	53
Oreina elongata			24	24	Xyp	53
Oreina fairmairiana			24	24	Xyp	57
Oreina ganglbaueri			24	24	Xyp	53
Oreina intricata			24	24	Xyp	53
Oreina variabilis			24	24	Xyp	53
Oreina virgulata			24	24	Xyp	53
Oulema astrosuturalis			20	20	XY	53
Oulema downesi			22	22	Xyp	53
Oulema gallaeciana			16	16	Xyp	53
Oulema hoffmannseggi			16	16	Xyp	53
Oulema melanopus			16	16	Xyp	4
Oulema tristis			16	16	Xyp	4
Oxylepus deflexicollis			18	18	Xyp	63
Pachybrachis anoguttatus				16		66
Pachybrachus azuereus			16	16	Xyr	53
Pachybrachus bivittatus			16	16	Xyr	53
Pachybrachus catalonicus			16	16	Xyr	53
Pachybrachus melanostrictus			16	16	Xyr	53
Pachybrachus peccans			16	16	Xyr	53
Pachybrachus petitpierrei			16	16	Xyr	53
Pachymerus chinensis			20	20	Xyp	1
Paranaita bilimbata			22	22	Xy+	53
Paranaita opima			22	22	Xy+	73
Paranaita sanguinipes			22	22	Xy+	53
Paranapiaca connexa			20	19	XO	53
Paranapiaca significata			20	19	XO	53
Paranapiaca tricincta			24	23	XO	53
Parasyphraea sp. 1			20	20	Xyp	53
Paratriarius curtisii			24	23	XO	53
Paratriarius dorsata			20	19	XO	53
Paria sp. 1			16	16	Xyp	53
Paria sp. 2			16	16	Xyp	53
Paridea sp. 1			40	40	XY	53
Paropsis aegrota			24	24	Xyp	53
Paropsis atomaria			24	24	Xyp	53
Paropsis porosa			24	24	Xyp	53
Paropsis rubidipes			24	24	Xyp	53
Paropsisterna beata			24	24	Xyp	53
Paropsisterna nucea			24	24	Xyp	53
Paropsisterna octosignata			24	24	Xyp	53
Pataya nitida			38	38		69
Phaedon affine			34	34	Xyp	53
Phaedon cochleariae			34	34	Xyp	53
Phaedon consimile			34	34	Xyp	53
Phaedon cyanopterum			34	34	Xyp	58
Phaedon tumidulus			34	34	Xyp	53
Phanaeta aida			20	20	Xyp	53
Phenrica aequinoctialiformis				41	Xyy	53
Phenrica austriaca				48	Xyyy	53
Philhydronopa sp. 1			24	24	Xyp	53
Phratora laticollis			34	34	Xyp	53
Phratora polaris			34	34	Xyp	57
Phratora tibialis			34	34	Xyp	53
Phratora vitellinae			34	34	Xyp	57
Phratora vulgatissima			34	34	Xyp	57
Phyllotreta diademata			30	30	Xyp	53
Phyllotreta fallax			32	32	Xyp	53
Phyllotreta nemorum			32	32	Xyp	53

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Plagiodera atritarsis			30	30	Xyp	53
Plagiodera erythroptera			30	30	Xyp	53
Plagiodera rufescens			30	30	Xyp	53
Plagiodera versicolora			28	28	Xyp	53
Platycorinus modestus			28	28	Xyp	53
			30	30	Xyp	53
Platycorinus peregrinus			28	28	XY	53
			28	28	Xyp	53
			30	30	Xyp	53
Platycorinus sp. 1			26	26	Xyp	53
Platyphora aulica			24	24	Xyp	53
Platyphora spectablis			24	24	Xyp	57
Platypria hystrix			16	16	Xyp	53
Platyprosopus rubidus			22	22	Xyp	53
Podagrica fuscicornis			40	40	Xyp	53
Podagrica fuscipes			40	40	Xyp	53
Podagrica malvae			40	40	Xyp	53
Podagrica menestriesi			40	40	Xyp	53
Podontia quatordecimpunctata			36		53	
Polyconia caroli			16	16	Xyp	53
Prasocuris junci				34		66
Psylliodes affinis			20	20	NeoXY	53
Psylliodes algirica			30	30	Xyp	53
Psylliodes chrysocephalus			36	36	Xyp	53
Psylliodes circumdata			32	32	Xyp	53
Psylliodes cupreus			34	34	Xyp	53
Psylliodes dulcamarae			28	28	NeoXY	74
-B chromosomes						
Psylliodes marcidus			34	34	Xyp	74
Psylliodes napi			34	34	Xyp	53
Psylliodes obscuroaeneus			32	32	Xyp	68
Psylliodes thlaspis			34	34	Xyp	53
Pyrrhalta viburni			36	36	Xyp	53
Rhytidocassis indicola			18	18	Xyp	53
Sagra femorata			16	16	NeoXY	53
Sceloenopla mantecada			18	18	Xyp	55
Sermylassa halensis			44	44	Xyp	53
Smaragdina longicornis			24	24	Xyp	53
Smaragdina mungphuensis			24	24	XY	53
Specularius maindroni			22	22	Xyp	1
Spermophagus latescenta			32	32	XY	1
			32	32	Xyp	1
Sphaeroderma rubidum			52	52	XY	53
Sphaeroderma testaceum			52	52	XY	53
Spintherophyta sp. 1			12	12	Xyp	53
Sterromela interlita			24	24	Xyp	53
Sterromela lineata			24	24	Xyp	53
Stolas chalybeus			24	24	Xyp	54
Stolas festiva			24	24	Xyp	53
			22	22	Xyp	45
Stolas lacordairei			30	30	Xyp	53
Stolas sp. 1				30	XXNeoXYp	53
Strabala ambulans puertoricensis				31	XXY	53
				33	XXY	53
Strichosa eburata			24	24	Xyp	58
Syphraea cubana			24	24	Xy+	53
Syphraea cylindrica			24	24	Xy+	53
Syphraea quintanillai			20	19	XO	53
Systena basalis			32	32	NeoXY	53
Talurus rugosus			16	16	XY	53
Timarcha affinis			20	20	Xyp	53
Timarcha aurichalcea				18		75
Timarcha balearica			22	22	Xyp	53
Timarcha calceata			30	30	Xyp	53
Timarcha catalaunensis			20	20	Xyp	53

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Timarcha cornuta				18		75
Timarcha cyanescens			20	20	Xyp	53
Timarcha erosa vermiculata		20	20	Xyp	53	
Timarcha espanoli			26	26	Xyp	53
Timarcha fallax			20	20	Xyp	53
Timarcha geniculata			20	20	Xyp	53
Timarcha goettingensis			20	20	Xyp	53
Timarcha goettingensis normanna			20	20	Xyp	53
Timarcha gougeleti				20		75
Timarcha gr. Perezi				20		75
Timarcha granadensis				22		75
Timarcha hispanica				20		75
Timarcha insparsa			20	20	Xyp	53
Timarcha intermedia			20	20	Xyp	53
Timarcha interstitialis			20	20	Xyp	53
Timarcha intricata			44	44	Xyp	53
Timarcha laevigata			28	28	Xyp	53
Timarcha lugens			20	20	Xyp	53
Timarcha marginicollis			20	20	Xyp	53
Timarcha maritima			20	20	Xyp	53
Timarcha metallica			20	20	Xyp	53
Timarcha monserratensis			20	20	Xyp	53
Timarcha perezi			20	20	Xyp	53
Timarcha pimelioides			28	28	Xyp	53
Timarcha pratensis			26	26	Xyp	53
Timarcha recticollis			20	20	Xyp	53
Timarcha rugosa			26	26	Xyp	53
Timarcha scabripennis				28		75
			24	24	Xyp	53
Timarcha sicelidis			20	20	Xyp	53
Timarcha sinuatocollis			20	20	Xyp	53
Timarcha strangulata			28	28	Xyp	53
Timarcha tangeriana			26	26	Xyp	53
Timarcha tenebricosa			22	22	Xyp	53
Timarcha ventricosa			26	26	Xyp	53
Trirhabda canadensis			30	29	XO	53
			30	30	XY	53
			30	30	Xyp	53
			32	32	Xyp	53
Trirhabda virgata			28	28		53
Typophorus nigritus			20	20	Xyp	53
				21	Xyyp	53
Uroplata girardi			20	20	Xyp	53
Uroplata nigritarsis			20	20	Xyp	71
Walterianella eugenia			22	22	Xy+	53
Walterianella humilis			22	22	Xy+	53
Walterianella nr. humilis sp. 1		22	22	Xy+	53	
Walterianella nr. Opthalmica sp. 1			22	22	Xy+	53
Walterianella opthalmica			22	22	Xy+	53
Walterianella sp. 1			22	22	Xy+	53
Walterianella sp. 2			22	22	Xy+	53
Walterianella venusta			46	46	Xy+	53
Xanthogaleruca luteola			30	30	XY	76
Yingaresca obliterata			40	40	NeoXY	53
Yingaresca variicornis			26	26	Xyp	53
Zabrotes subfasciatus			26	26	Xyp	77
Zygogramma bigenera			24	23	XO	53
Zygogramma tetragramma			28	27	XO	53
Ciidae						
Cis fuscipes				14		1
Cis impressa	parth		14			1
Octotemnus aevis			22	22	Xyp	1
Sulcasis lengi			22	22	Xyp	1
Cleridae						
Enoclerus moestus			18	18	Xyp	1

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Enoclerus nigripes rufiventris		18	18	Xyp	1	
Enoclerus sp. 1			18	18	Xyp	1
Enoclerus sp. 2			18	18	Xyp	1
Priocera spinosa			18	18	Xyp	1
Thanasimus dubius			18	18	Xyp	1
Thanasimus formicarius			18	18	Xyp	1
Thanasimus undulatus			18	18	Xyp	1
Trichodes apiarius			18	18	Xyp	1
Trichodes nutalli			18	18	Xyp	1
Trichodes ornatus			18	18	Xyp	1
Coccinellidae						
Adalia bipunctata			20	20	XY	1
			20	20	Xyp	1
Adalia frigida melanopleura		20	20	Xyp	1	
Adonia variegata				20		78
Afissa parvula			18	18	Xyp	1
Aiolocaria mirablis			20			1
			18	17	XO	1
Anatis 15-punctata			18	18	NeoXY	1
Anatis mali			18	18	NeoXY	1
Anatis rathvoni			18	18	NeoXY	1
Anisocalvia duodecimmaculata		20	20	XY	1	
			20	20	Xyp	1
Anisocalvia quatuordecimguttata		20	20	Xyp	1	
			20	20	Xyr	1
Anisocalvia quatuordecimguttata similis		20	20	Xyp	1	
Aphidecta axyridis			16	16	Xyp	1
			16	16	Xyr	1
Aphidecta axyridis spectablis		16	16	Xyp	1	
Aphidecta bruchii			20	20	XY	1
			18	18	Xyr	1
Aphidecta californica			20	20	Xyp	1
Aphidecta crotchi			20	20	Xyr	1
Aphidecta novemnotata			20	20	Xyp	1
Aphidecta obliterata			20	19	XO	1
Aphidecta repanda			20	20	Xyp	1
Aphidecta septempunctata			20	20	Xyp	1
Aphidecta septempunctata bruckii			20	20	Xyp	1
Aphidecta transversalis			20	20	Xyp	1
Aphidecta transversoguttata			20	20	Xyp	1
Aphidecta transversoguttata quinquenotata		20	20	Xyp	1	
Aphidecta trifasciata			20	20	Xyp	1
Aphidecta trifasciata juliana		20	20	Xyp	1	
Aphidecta trifasciata perplexa		20	20	Xyp	1	
Axion pilatei			18	18	NeoXY	1
Axion plagiatum			18	18	NeoXY	1
Azya luteipes			24	24	NeoXY	1
Azya pontbrianti				24		45
Azya trinitatis			22	22	NeoXY	1
Brachyacantha 2-3-pustulata			18	18	NeoXY	1
-B chromosomes						
Brachyacantha felina			16	16	NeoXY	1
Brachyacantha ursina ursina		16	16	NeoXY	1	
Brachyacantha ursina uteella		20	20	NeoXY	1	
Brumus parvicollis				16		1
Brumus septentrionis			18	18	NeoXY	1
Brumus suturalis			18	18	NeoXY	1
Calvia decemguttata				20		78
Calvia quatruordecimguttata				20		78
Chilocorus angolensis			18	18	NeoXY	1
-B chromosomes						
Chilocorus bilineatus			24	24	NeoXY	1
Chilocorus bipustulatus			22	22	NeoXY	1
Chilocorus cacti cacti			22	22	NeoXY	1
Chilocorus cacti confusor			22	22	NeoXY	1

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Chilocorus circumdata			22	22	NeoXY	1
Chilocorus discoideus			24	24	NeoXY	1
Chilocorus distigma			24	24	NeoXY	1
-B chromosomes						
Chilocorus erythrocephalus			24	24	NeoXY	1
Chilocorus fraternus			22	22	NeoXY	1
Chilocorus hauseri			22	22	NeoXY	1
Chilocorus hexacyclus			14	14	NeoXY	1
Chilocorus kuwanae			20	20	NeoXY	1
Chilocorus n. sp.			18	18	NeoXY	1
Chilocorus nigritus			22	22	NeoXY	1
Chilocorus orbus			22	22	NeoXY	1
Chilocorus renipustulatus			20	20	NeoXY	1
Chilocorus rubidus			18	18	NeoXY	1
-B chromosomes						
Chilocorus schioedtei			24	24	NeoXY	1
Chilocorus similis			20	20	NeoXY	1
Chilocorus stigma			26	25	XXY	1
-B chromosomes						
			26	25	XXY	1
Chilocorus tricyclus			20	20	NeoXY	1
Chnoodes sp.			18	18	Xyp	1
Cladis nitidula			16	16	NeoXY	1
Coccidula rufa			20	20	Xyp	79
Coccidula scutelata			20	20	Xyp	79
Coccinella septempunctata				20		78
Coccinella transversalis			20	20	Xyp	13
Coelophora inaequalis			20	20	Xyr	1
Coleomegilla innotata			20	20	Xyp	1
Coleomegilla maculata lengi		20	20	Xyp	1	
Cryptognatha nodiceps			14	14	NeoXY	1
Cryptognatha simillima			14	14	NeoXY	1
Cryptolaemus montrouzieri			22	22	Xyp	1
Curinus coeruleus			16	16	NeoXY	1
Cycloneda polita			20	20	Xyp	1
Cycloneda sanguinea			20	20	Xyp	80
Egius platycephalus			20	20	NeoXY	1
Epilachna 12-stigma			20	20	Xyp	1
			14	14	Xyr	1
Epilachna borealis			18	18	XY	1
Epilachna cacica			10	10	Xyp	45
Epilachna chrysomelina x E. capensis				18		1
Epilachna nipponica			20	20	Xyr	1
Epilachna obscurella			18	18	Xyp	1
Epilachna orientalis			18	18	XY	1
Epilachna paenulata			18	18	Xyp	81
Epilachna pustulosa			20	20	XY	1
			20	20	Xyp	1
Epilachna septima			20	20	Xyp	1
Epilachna sp.			18	18	Xyp	1
Epilachna varivestis			20	20	Xyp	1
Epilachna vigintioctomaculata		18	18	XY	1	
			20	20	XY	1
			20	20	Xyp	1
Epilachna vigintioctomaculata nipponica		20	20	Xyp	1	
Epilachna vigintioctomaculata x pustulosa		20	20	Xyp	1	
Epilachna vigintioctopunctata			18	18	XY	1
			18	18	Xyp	82
-B chromosomes						
			18	18	Xyp	1
Eriopis connexa			20	20	Xyp	83
-B chromosomes						
Exochomus bisbinotatus			14	14	NeoXY	1
Exochomus flavipes			14	14	NeoXY	1
Exochomus jamaicensis			18	18	NeoXY	1

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Exochomus marginipennis californicus			16	16	NeoXY	1
Exochomus marginipennis childreni			18	18	NeoXY	1
Exochomus marginipennis fasciatus				18		1
Exochomus metallicus			18	18	NeoXY	1
Exochomus Oliturατus sp. 1			18	18	NeoXY	1
-B chromosomes						
			18	18	NeoXY	1
Exochomus orbiculus			18	18	NeoXY	1
Exochomus Ouropygialis sp. 1		16	16	NeoXY	1	
Exochomus Ouropygialis sp. 2		16	16	NeoXY	1	
-B chromosomes						
Exochomus OuropygialisO sp. 3		18	18	NeoXY	1	
Exochomus quadrapustulatus			14	14	NeoXY	1
-B chromosomes						
			14	14	NeoXY	1
Exochomus quadrapustulatus floralis			14	14	NeoXY	1
Exochomus quadripustulatus			14	14	NeoXY	84
-B chromosomes						
Harmonia arcuata			16	16	Xyp	13
Hippodamia convergens			20	20	Xyp	1
Hippodamia parenthesis			20	20	Xyp	1
Hippodamia quinquesignata ambigua			20	20	Xyp	1
Hippodamia quinquesignata punctulata			20	20	Xyp	1
Hippodamia sinuata			20	20	Xyp	1
Hippodamia sp.			20	20	Xyp	1
Hippodamia tibialis tibialis			20	20	Xyp	1
Hippodamia tridecimpunctata		20	20	Xyp	1	
Hyperaspis 4-oculata			14	14	Xy+	1
Hyperaspis annexa				14		1
Hyperaspis bigeminata			14	14	Xy+	1
Hyperaspis billoti			16	16	Xy+	1
Hyperaspis binotata			14	14	Xy+	1
Hyperaspis cincta			14	14	Xy+	1
Hyperaspis congressis			14	14	Xy+	1
Hyperaspis dissoluta dissoluta		14	14	Xy+	1	
Hyperaspis donzeli			14	14	Xy+	1
Hyperaspis jucunda			16	16	Xy+	1
Hyperaspis lateralis lateralis		14	14	Xy+	1	
Hyperaspis lateralis montanica			14		1	
Hyperaspis notatula			14	14	Xy+	1
Hyperaspis paspalis			14	14	Xy+	1
Hyperaspis sp.			14	14	Xy+	1
Hyperaspis trilineata			14	14	Xy+	1
Illeis cincta			20	20	Xyp	1
Illeis indica			20	20	Xyp	1
Menochilus 6-maculatus			20	20	Xyp	1
Micraspis cardoni			20	20	Xyp	1
Microweisea marginata			20	20	XY	1
Microweisea sp.			20	20	XY	1
Mulsantina hudsonica			12	12	NeoXY	1
-B chromosomes						
			12	12	NeoXY	1
Mulsantina n. sp.			18	18	NeoXY	1
Mulsantina picta minor			20	20	Xyp	1
Mulsantina picta picta			20	20	Xyp	1
Neda aequatoriana			20	20	Xyp	1
Neomysia caseyi			20	20	Xyp	1
Neomysia oregona			20	20	Xyp	1
Neomysia pullata pullata			20	20	Xyp	1
Neomysia pullata randalli			20	20	Xyp	1
Olla abdominalis			20	20	Xyp	1
Orcus chalybeus			18	18	NeoXY	1
Pharoscymnus sp.			20	20	Xyp	1
Phyllobora vigintiduopunctata			20		78	
Prodilis indagator			24	24	NeoXY	1

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Propylaea japonica			20	20	XY	1
Propylea quatuordecimpunctata			20		78	
Psyllobora taedata			18	18	NeoXY	1
Rhyzobius chrysomeloides			18	18	Xyp	79
Rhyzobius litura			16	16	NeoXY	79
Rhyzobius ventralis			18	17	XO	1
Rodolia cardinalis			18	17	XO	1
Scymnus binaevatus			16	16	NeoXY	1
Scymnus marginicollis			16	16	NeoXY	1
Scymnus nubilis			16	16	NeoXY	1
Scymnus sp. 1			16	16	NeoXY	1
Scymnus sp. 2			18	18	Xyp	1
Scymnus sp. 3			20	20	Xyp	1
Scymnus sp. 4			20	20	Xyp	1
Scymnus sp. 5			16	16	NeoXY	1
Solanophila paenulata			18	18	Xyp	45
Sumnius cardoni			18	18	Xyp	1
Synonycha grandis			20	20	Xyr	1
Thea bisoctonotata			20	20	Xyp	1
Tythaspis sedecimpunctata				24		78
Various undet. Spp.			20	20	XY	1
Verania allardi			20	20	XY	1
			20	20	Xyp	1
Verania discolor			20	20	Xyp	1
Cupedidae						
Distocupes varians			20	19	XO	85
Curculionidae						
Acalles camelus			30	30	Xyp	6
Acalles commutatus			28	28	Xyp	6
Acalles echinatus			30	30	Xyp	6
			30	30	Xyp	86
Acalles fallax			30	30	Xyp	86
Acalles petryszaki			30	30	Xyp	86
Acallopistus sp. 1			24	24	Xyp	5
Acicnemis alni			24	24	Xyp	1
Acicnemis nigra			22	22	Xyp	87
			24	24	Xyp	1
Adexius scrobipennis			36	36	Xyp	87
Adosomus melanogrammus			46	46	Xyp	1
Alcides collaris			28	28	XY	13
Alcides sp. 1			40	40	XY	1
			34	34	Xyp	87
Alcidodes affaber			32	32	Xyp	87
Alcidodes sp. 1			32	32	Xyp	87
Amblyrrhinus poricollis			22	22	Xyp	87
Amblyrrhinus sp. 1			22	22	Xyp	87
Amblyrrhinus subrecticollis			22	22	Xyp	87
Amystax fasciatus			16	16	Xyp	87
			22	22	Xyp	87
				23	Xyyp	87
Anobleptus sp. 1			22	22	Xyp	87
			24	24	Xyp	1
Anthonomus bisignifer			20	19	XO	1
			30	30	Xyp	1
			32	32	Xyp	1
			34	34	Xyp	1
			36	36	Xyp	1
Anthonomus corvulus			26	26	Xyp	1
Anthonomus grandis			44	44	XY	88
			42	42	Xyp	87
-B chromosomes						
				43	XXY	87
Anthonomus haematopus			32	32	XY	1
Anthonomus scutellatus			28	28	Xyp	1
Anthonomus signatus			34	34	Xyp	1

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Anthonomus sp. 1			34	34	XY	1
Anthonomus sp. 2			26	26	Xyp	1
Anthonomus sp. 3			32	32	Xyp	1
Apiophorus pictus			30	30	Xyp	1
Aplotes roelofsi			22	22	Xyp	1
Apodrusus wolcotti				20		1
Apotomorhinus cribatus			26	26	Xyp	5
Arrhines languides			22	22	Xyp	87
Astycus lateralis			22	22	Xyp	1
Astycus sp.			22	22	Xyp	87
-B chromosomes						
Atactogaster sp. 1			48	48	Xyp	5
Athesapeuta sp. 1				32		5
Athesapeuta sp. 2				32		5
Barioscaphus cordiae			22	22	Xyp	5
Baris arthemisiae			38	38	Xyp	87
Baris ezoana			32	32	Xyp	89
			34	34	Xyp	89
Baris sp.			32	32	XY	1
			18	18	Xyp	87
			22	22	Xyp	87
			32	32	Xyp	1
			54	54	Xyp	1
					Xyp	1
Baris striata				38		1
Barynotus moerens	parth	3	33			1
	parth	5	55			1
Barynotus obscurus	parth	4	44			1
Barynotus squamosus	parth	3	33			1
Barypeithes albinae			22	22	Xyp	90
Barypeithes chevrolati			22	22	Xyp	90
Barypeithes formaneki			22	22	Xyp	90
Barypeithes interpositus			22	22	Xyp	90
Barypeithes liptoviensis			26	26	Xyp	90
			28	28	Xyp	87
Barypeithes mollicomis			22	22	Xyp	90
Barypeithes pellucidus			22	22	Xyp	90
-B chromosomes						
			22	22	Xyp	1
Barypeithes purkynei			22	22	Xyp	90
Blosyrus asellus			24	24	Xyp	87
Blosyrus falcatus			22	22	Xyp	1
Blosyrus japonicus	parth	3	33			91
	parth	4	44			91
	parth	5	55			91
	parth	6	66			91
			22	22		91
Bothrometopus fasciatus			22	22	Xyp	87
Brachyderes incanus			22	22	Xyp	90
Brachysomus dispar			22	22	Xyp	90
Brachysomus echinatus	parth	3	33			90
Brachysomus hirtus	parth	3	33			90
Brachysomus setiger			22	22	Xyp	90
Byctiscus congener regalis			22	22	Xyp	1
Byctiscus venustus			18	18	Xyp	1
Byrsopages kiso			22	22	Xyp	1
Byrsopages sp(Mt. Asahidake)			22	22	Xyp	1
Byrsopages sp(Mt. Niseko)			22	22	Xyp	1
Byrsopages sp(Mt. Proshiri)			22	22	XY	1
Caenocryptorrhynchus frontalis			34	34	Xyp	87
Calendra australis australis			26	26	Xyp	1
Calendra bruchi			26	26	Xyp	45
Calendra costipennis			30	30	Xyp	1
Calendra linearis			24	24	Xyp	1
Calendra parvula			26	26	Xyp	1

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Calendra zeae			26	26	Xyp	1
Callirhopalus bifasciatus	parth	3	33			87
	parth	4	44			87
	parth	5	55			87
Callirhopalus minimus	parth	3	33			1
	parth	4	44			1
Callirhopalus obesus	parth		44			1
	parth		65			1
Callirhopalus setosus	parth	4	43			1
-Female 2n = 41-44						
Calosirus albosuturalis			34	34	XY	1
Canonopsis sericea			22	22	Xyp	87
Carcilia strigicollis			22	22	Xyp	1
Catagmatus japonicus			32	32	Xyp	1
Catapionus gracilicornis	parth	2	22			87
	parth	3	33			87
	parth	4	44			87
	parth	5	55			87
	parth	6	66			87
	parth		44			92
Catapionus modestus			22	22	Xyp	87
Catapionus obscurus			22	22	Xyp	93
Catapionus viridimetallicus			20	20	NeoXY	1
Cathormiocerus aristatus	parth	3	33			94
Centricnemus leucogrammus			22	22	Xyp	6
Ceutorrhynchus ancola			34	34	Xyp	1
Ceutorrhynchus costatus			20	20	Xyp	1
Ceutorrhynchus diffusus			24	24	XY	1
Ceutorrhynchus erysimi			28	28	XY	1
Ceutorrhynchus lewisi			28	28	Xyc	1
Ceutorrhynchus punctiger			24	24	XY	1
Ceutorrhynchus sp. 1			24	24	Xyp	1
Chlorophanus grandis			24	24	Xyp	1
Chlorophanus viridis			22	22	Xyp	87
Chokkirius truncatus			22	22	Xyp	1
Christensenia antarctica			22	22	Xyp	87
Cidnorrhinus 4-maculatus			28	28	Xyp	1
Cionus championi			40	40	Xyp	5
Cionus ganglbaueri			38	38	Xyp	87
Cionus hortulans			38	38	Xyp	87
Cionus longicollis-montanus			40	40	Xyp	87
Cionus nigritarsis			38	38	Xyp	87
Cionus olivieri			42	42	Xyp	87
Cionus tamazo			40	40	Xyp	1
Cionus tuberculosus			44	44	Xyp	87
Cirrorhynchus kelecsenyi			30	30	Xyp	95
Cleonus japonicus			28	28	NeoXY	1
Colobodes konoi			48	48	Xyp	1
Colobodes matasumurau			48	48	XY	1
Colobodes matsumurai					Xyp	87
Colobodes sp. 1 Ov-alum n.sp.O		48	48	Xyp	1	
Colobodes sp. 2			36	36	Xyp	1
Corigetus chandigarhensis			22	22	Xyp	87
Corigetus sp. 1			22	22	Xyp	1
Cosmopolites sordidus			30	30	Xyp	96
Cryptorhynchus sp. 1				38		87
-Male 2n = 22-53						
Cryptorrhynchus erectus			32	32	Xyp	1
Cryptorrhynchus lapathi			34	34	Xyp	1
-Male 2n = 33-34						
			34	34	Xyp	1
			36	36	Xyp	1
Cryptorrhynchus sp. 1			32	32	Xyp	1
			38	38	Xyp	1
Curculio aino			28	28	Xyp	1

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Curculio arakawai			26	26	Xyp	1
Curculio convexus			26	26	Xyp	1
Curculio dentipes			26	26	Xyp	1
Curculio distinguendus			26	26	Xyp	1
Curculio elaeagni			26	26	Xyp	1
Curculio ficusi				26		5
Curculio flavescens			26	26	Xyp	1
			28	28	Xyp	1
Curculio funebris			26	26	Xyp	1
Curculio koreanus			32	32	Xyp	1
Curculio longirostris			26	26	Xyp	5
Curculio minutissimus			34	34	Xyp	1
Curculio murakamii			26	26	Xyp	1
Curculio nucum			26	26	Xyp	87
Curculio obtusus			26	26	Xyp	1
Curculio pictus			22	22	Xyp	1
			26	26	Xyp	1
Curculio quercivorus			32	32	XY	1
Curculio roelofsi			26	26	Xyp	87
Curculio sp. 1			24	24	Xyp	87
			26	26	Xyp	87
			28	28	Xyp	87
			26	26	Xyp	1
Curculio sp. Nov.				32		5
Cycnotrachelus roelofsi			28	28	XY	1
Cylindrocopturus sp. 1			32	32	Xyp	1
Cyphicerinus tectonae			22	22	Xyp	5
Cyphicerus aceri			22	22	Xyp	1
Cyrtepistomus bardus			22	22	Xyp	5
Cyrtepistomus castaneus	parth	3	31			1
-Female 2n = 30-32						
Cyrtepistomus gucindus			22	22	Xyp	87
Cyrtepistomus jucundus			22	22	Xyp	87
Cyrtepistomus sp. 1			22	22	Xyp	87
Deiradolcus pubescens			22	22	Xyp	5
Deiradolcus sp. 1			22	22	Xyp	5
Demimaea mori			24	24	Xyp	1
Dermatoxenus caesicollis			20	20	Xyp	1
				20	Xyyp	1
Dermatoxenus clathratus			22	22	Xyp	1
Dermatoxenus sp. 1			22	22	Xyp	87
Desmidophorus hebes			20	20	XY	1
Desmidophorus sp. 1			22	22	Xyp	5
Diaprepes abbreviatus			22	22	Xyp	96
Diaprepes marginicollis			22	22	Xyp	96
Diaprepres abbreviata			22	22	Xyp	1
Diatropus marshalli			22	22	Xyp	87
Dicranthus elegans			22	22	XY	87
Dicranthus majzlani			22	22	XY	87
Didothis melancholica			28	28	Xyp	87
Didothis sp. 1			34	34	Xyp	87
Diocalandra sp. 1			26	26	Xyp	1
Diplogrammus quadrivittatus			30	30	Xyp	45
Disker tenuicornis			22	22	Xyp	87
Dodecastichus atripes			22	22	Xyp	95
Dodecastichus aurosignatus vlasuljensis			22	22	Xyp	95
Dodecastichus dolomitae dryadis			22	22	Xyp	95
Dodecastichus geniculatus			22	22	Xyp	95
Dodecastichus inflatus			22	22	Xyp	95
Dodecastichus obsoletus as D. Speiseri			22	22	Xyp	95
Donus comatus carpathicus			22	22	Xyp	1
Donus oxalidis			22	22	Xyp	1
Dorytomus mongolicus			28	28	Xyp	1
Dorytomus shikotanus			24	24	XY	1
Dusmoecetes marioni			22	22	Xyp	87

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Dusmoecetes richtersi			22	22	Xyp	87
Dyslobus verrucifer			22	22	Xyp	1
Dystropicus dorsalis			56	56	Xyp	5
Echinocnemus marmoreus			18	18	Xyp	1
Echinocnemus sp. 1			16	16	Xyp	87
Echinocnemus squameus			22	22	Xyp	87
Ectatorhinus adamsi			38	38	Xyp	1
Ectemnorrhinus angusticollis			22	22	Xyp	87
Ectemnorrhinus drygalski			22	22	Xyp	87
Ectemnorrhinus viridis			22	22	Xyp	87
Episomus lacerta			26	26	XY	13
Episomus turritus			32	32	Xyp	1
Esamus albomarginatus			22	22	Xyp	5
Esamus circumdatus			22	22	Xyp	5
Esamus plurisetosus			22	22	Xyp	5
Esamus sciurus			22	22	Xyp	5
Eudiagogus episcopalis			34	34	Xyp	45
Eugnathus distinctus			22	22	XY	1
Eugnathus distincyus			22	22	Xyp	87
Euops punctatostriata			26	26	Xyp	1
Euops splendida			22	22	XY	1
Eupagoderes sp. 1			22	22	Xyp	1
Eusomus ovulum	parth		30			97
-Female 2n = 28-32						
	parth		33			90
Euthyrhinus yakushimanus			16	16	NeoXY	87
Exophthalmus famelicus			22	22	Xyp	96
Exopthalmus quadritaenia			22	22	Xyp	96
Foucartia liturata			22	22	XY	90
			22	22	Xyp	1
Foucartia squamulata	parth		32			98
-Female 2n = 31-33						
Gasteroclisus aethiops			36	36	Xyp	87
Gasteroclisus binodulus			36	36	Xyp	87
			38	38	Xyp	87
Gelus calafornicus			25	26	XO	99
-B chromosomes						
Gymnetron antirrhini			32	32	Xyp	1
Gymnetron smreczynski			32	32	Xyp	87
Gymnetron tetrum			32	32	Xyp	87
Heilipodus erythropus			30	30	Xyp	87
Heilipodus scaber				30	XXYyp	87
-XpneoXneoYyp						
Heilipodus scabripennis				30	XXYyp	87
-neoXpneoXneoYyp						
Heilipodus sp.			28	28	Xyp	100
Heilipus tremolerasi			30	30	Xyp	87
				29	Xyyp	87
-neoXpneoYyp						
Heilipus wiedemanni			22	22	Xyp	87
			30	30	Xyp	45
Hemerus sp. 1			22	22	Xyp	87
Hilaus sp. 1			18	18	Xyp	87
			20	20	Xyp	87
			22	22	Xyp	87
			24	24	Xyp	87
Hydrophilus olivaceus			30	29	XO	13
Hylobius abietis			22	22	Xyp	1
Hylobius abietis haroldi			22	22	Xyp	1
Hylobius albosparsus			40	40	Xyp	1
Hylobius aliradicis			22	22	Xyp	1
Hylobius congener			22	22	Xyp	1
Hylobius cribripennis			36	36	Xyp	1
Hylobius desbrochersi			36	36	Xyp	1
Hylobius elongatus			48	48	Xyp	1

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Hylobius exculptus			28	28	Xyp	1
Hylobius freyi (=exculptus)			28	28	Xyp	1
Hylobius galloisi			36	36	Xyp	1
Hylobius gebleri			22	22	Xyp	1
Hylobius gigas			36	36	Xyp	1
Hylobius insularis			50	50	Xyp	1
Hylobius montanus			20			1
Hylobius pales			22	22	Xyp	1
Hylobius perforatus			36	36	Xyp	1
Hylobius piceus			40	40	Xyp	1
Hylobius pinastri			22	22	Xyp	1
Hylobius pinastri karafutoensis		22	22	Xyp	1	
Hylobius pinicola			40	40	Xyp	1
Hylobius radicis			22	22	Xyp	1
Hylobius sp. 1			24			1
Hylobius warreni			32	32	Xyp	1
Hypera elongata			22	22	Xyp	87
Hypera medicaginis			22	22	Xyp	87
Hypera mongolicus			22	22	XY	1
Hypera nigrirostris			22	22	Xyp	1
Hypera postica			22	22	Xyp	87
Hypera punctata					XY	1
			20	20	NeoXY	87
Hypera rumicus			22	22	Xyp	1
Hypera viciae			22	22	Xyp	1
Hypermias sp. 1			22	22	Xyp	87
Hypolixus truncatulus			22	22	Xyp	87
			44	44	Xyp	1
Hypomeces squamosus			22	22	Xyp	5
Indocurculio minutus			24	24	Xyp	5
Indomecus lectus			22	22	Xyp	5
Indomias acutipennis			22	22	Xyp	87
Ixalma dentipes			22	22	Xyp	1
Larinodontes obtusus			40	40	Xyp	87
Larinus griseopilosus			40	40	Xyp	1
Larinus latissimus			40	40	Xyp	1
Larinus meleagris			40	40	Xyp	1
Larinus saussureae			36	36	Xyp	5
Lepidospyris demissus			22	22	Xyp	87
				23	Xyyp	87
Lepropus chrysochlorus			22	22	Xyp	5
			22	22	Xyp	87
Lepropus flavovittatus			22	22	Xyp	87
Lepropus lateralis			22	22	Xyp	87
Leptomias angustatus			22	22	Xyp	5
Leptomias waltersi			22	22	Xyp	5
Lepyrus alternans			30	30	Xyp	1
Lepyrus japonicus			30	30	XY	1
Lepyrus konoi			30	30	Xyp	1
Lepyrus palustris			30	30	Xyp	1
Limnobaris jucunda			24	24	Xyp	1
			30	30	Xyp	1
Liophloeus gibbus			22	22	Xyp	87
Liophloeus lentus			22	22	Xyp	87
Liophloeus tessulatus	parth	3	30			1
-Female 2n = 29-31						
			22	22	Xyp	1
Liparus glabrirostris				32		87
Listroderes costirostris	parth	3	28			1
-Female 2n = 25-30						
	parth	3	35			1
-Female 2n = 28-41						
	parth	3	30			1
-Female 2n = 29-30						
	parth	3	30			1

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
	parth	3	33			1
Lixus acutipennis			46	46	Xyp	1
Lixus cardui			44	44	Xyp	87
Lixus divaricatus			46	46	Xyp	1
Lixus impressiventris			40	40	Xyp	1
Lixus maculatus			46	46	Xyp	1
Lixus subtilis			40	40	Xyp	1
Lobotrachelus sp. 1			28	28	Xyp	87
Macrocorynus griseoides	parth	3	33			87
Magdalis alutacea			32	32	Xyp	1
Magdalis gentilis			30	30	Xyp	1
Magdalis leconti				16		1
			30	30	Xyp	1
			32	32	Xyp	1
Magdalis perforata			32	32	Xyp	1
Magdalis piceae			30	30	NeoXY	1
Magdalis sp. 1			34	34	Xyp	1
Mechistocerus fumosus			36	36	Xyp	87
Mechistocerus nipponicus			28	28	Xyp	1
Mechistocerus sp. 1			22	22	Xyp	87
			32	32	Xyp	87
			40	40	Xyp	87
			20	20	NeoXY	1
Mechistocerus sp. 2			32	32	Xyp	1
Mechistocerus sp. 3			40	40	Xyp	1
Mechistocerus sp. Nov.			22	22	Xyp	87
			32	32	Xyp	87
			40	40	Xyp	87
Mecopomorphus griseus			24	24	Xyp	87
Mecyslobus flavosignatus			34	34	Xyp	87
Mecyslobus westermanni			32	32	Xyp	5
Mecysmoderes sp. 1			38	38	XY	1
Mecysolobus erro			34	34	Xyp	1
Mecysolobus flavosignatus			34	34	Xyp	1
Mecysolobus trifidus			30	30	Xyp	1
Meotiorrhynchus querendus			22	22	Xyp	1
Metamasius hemipterus			26	26	Xyp	96
Metapocyrtus yonagunianus			22	22	Xyp	87
			42	42	Xyp	87
Metialma scenica			32	32	Xyp	87
Metialma sp			32	32	Xyp	87
			34	34	Xyp	87
			30	30	Xyp	1
Miccotrogus picirostris			34	34	Xyp	1
Myllocerus 11-pustulatus maculosus			22	22	Xyp	1
Myllocerus angulatipes			22	22	Xyp	87
Myllocerus blandus			22	22	Xyp	87
Myllocerus conspersus			22	22	Xyp	87
Myllocerus dentifer			22	22	Xyp	87
Myllocerus discolor			22	22	Xyp	87
Myllocerus discolor canescans		22	22	Xyp	5	
Myllocerus dorsatus			22	22	Xyp	87
Myllocerus fumosus	parth	3	33			87
Myllocerus griseus			22	22	Xyp	1
Myllocerus kashmiriensis			22	22	Xyp	87
Myllocerus leativirens			22	22	Xyp	87
Myllocerus lefroi			22	22	Xyp	87
Myllocerus nipponicus	parth	3	33			1
Myllocerus paetus			22	22	Xyp	87
Myllocerus pauper			22	22	Xyp	87
Myllocerus sabulosus			22	22	Xyp	87
Myllocerus sp. 1			22	22	Xyp	1
			30	30	Xyp	1
Myllocerus sp. 2			22	22	Xyp	87
Myllocerus subfasciatus			22	22	Xyp	1

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Myllocerus transmarinus			22	22	Xyp	87
Myllocerus tusicollis			22	22	Xyp	87
Myllocerus viridanus			22	22	Xyp	87
Myllocerus viridens			22	22	Xyp	1
Myosides seriehispidus	parth	3	32			1
-Female 2n = 30-33						
Naupactus bruchi			22	22	Xyp	87
			22	22	Xyp	45
Naupactus peregrinus						101
Naupactus xantographus			22	22	Xyp	87
			22	22	Xyp	45
Nedyus quadrimaculatus			28	28	Xyp	87
Neocanonopsis dreuxi			22	22	Xyp	87
Neomecopus sp. 1			30	30	Xyp	1
Niphades sp. 1			32	32	Xyp	87
Niphades variegatus			34	34	Xyp	1
Notaris acridulus			30	30	Xyp	1
Odoiporous longicollis	parth	4	52			102
	parth	6	78			102
			26			102
Oedophyrus hilleri			26	26	Xyp	1
Okikuruminus oblongus			36	36	Xyp	1
Okikuruminus roelofsi			36	36	Xyp	103
Orobitis apicalis			26	26	Xyp	1
Orochlesis takaosanus			40	40	Xyp	87
Otiorhynchus alpicola			22	22	Xyp	95
Otiorhynchus alpicola atterimus		22	22	Xyp	87	
Otiorhynchus anthracinus	parth	5	55			1
-Female 2n = 54-55						
Otiorhynchus apenninus			22	22	Xyp	95
Otiorhynchus arcticus			22	22	XY	1
			22	22	Xyp	95
Otiorhynchus armadillo			22	22	Xyp	95
Otiorhynchus atripes			22	22	Xyp	87
Otiorhynchus atroapterus			22	22	Xyp	104
Otiorhynchus aurosignatus vlasuljensis			22	22	Xyp	87
Otiorhynchus austriacus			22	22	Xyp	95
				22	XXOO	1
Otiorhynchus bisulcatus			22	22	Xyp	104
			22	22	Xyp	95
Otiorhynchus carmagnolae			22	22	XY	95
Otiorhynchus chrysocomus	parth	3	33			1
-Female 2n = 32-33						
	parth	4	44			1
Otiorhynchus chrysops				20	XXOO	1
-XX00						
Otiorhynchus coecus as O. niger		22	22	Xyp	95	
Otiorhynchus cornicinus			22	22	Xyp	95
Otiorhynchus corvus			22	22	XY	95
			22	22	Xyp	87
Otiorhynchus croaticus	parth		28			87
-Female 2n = 22-33						
			22	22	Xyp	95
Otiorhynchus dryadis			22	22	Xyp	87
Otiorhynchus dubius	parth	4	44			1
Otiorhynchus equestris			22	22	Xyp	95
Otiorhynchus fuscipes			22	22	XY	1
			22	22	XY	1
Otiorhynchus gemmatus	parth	3	33			1
			22	22	Xyp	95
Otiorhynchus geniculatus			22	22	Xyp	1
Otiorhynchus inflatus			22	22	Xyp	1
Otiorhynchus inflatus salebrosus			22	22	XY	1
Otiorhynchus kollari			22	22	XY	95
Otiorhynchus koritnicensis			22	22	Xyp	95

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Otiorhynchus ligustici	parth		34			105
-Female 2n = 33-35						
Otiorhynchus mendax	parth		44			87
Otiorhynchus meridionalis			22	22	XY	1
			22	22	Xyp	95
Otiorhynchus minutesquamosus		22	22	XY	95	
			22	22	Xyp	87
Otiorhynchus morio			22	22	XY	1
			22	22	Xyp	95
Otiorhynchus multipunctatus			22	22	XY	1
			22	22	Xyp	95
-B chromosomes						
Otiorhynchus niger	parth		33			1
			22	22	XY	1
			22	22	Xyp	1
Otiorhynchus obsidianus			22	22	XY	95
Otiorhynchus obtusus			22	22	XY	95
Otiorhynchus opulentus			22	22	Xyp	87
Otiorhynchus ovatus	parth	3	32			1
-Female 2n = 30-34						
			33			1
Otiorhynchus pauxillus	parth		34			1
-Female 2n = 29-38						
	parth		33			1
Otiorhynchus praecellens bosnarum			22	22	Xyp	95
Otiorhynchus proximus	parth		33			1
Otiorhynchus raucus	parth		33			106
Otiorhynchus repletus			22	22	XY	95
Otiorhynchus retifer			22	22	Xyp	87
Otiorhynchus rotifer			22	22	Xyp	95
Otiorhynchus rugifrons	parth		33			1
			22	22	Xyp	1
Otiorhynchus salicicola psudonotus			22	22	XY	1
Otiorhynchus salicis	parth	3	32			1
-Female 2n = 28-35						
	parth	3	32			1
-Female 2n = 29-34						
	parth	3	33			1
-Female 2n = 32-33						
	parth	3	32			1
			22	22	Xyp	1
Otiorhynchus scaber	parth	3	32			1
-Female 2n = 30-34						
	parth	3	33			1
-Female 2n = 32-33						
	parth	4	43			1
-Female 2n = 40-45						
	parth	4	44			1
-Female 2n = 43-44						
	parth	3	33			1
Otiorhynchus sensitivus			22	22	Xyp	95
Otiorhynchus singularis	parth	3	33			1
Otiorhynchus speiseri			22	22	Xyp	87
Otiorhynchus strumosus			22	22	Xyp	95
Otiorhynchus subdentatus	parth	4	44			1
-Female 2n = 43-44						
	parth	3	33			1
Otiorhynchus sulcatus	parth	3	33			1
-Female 2n = 32-33						
	parth	3	33			1
	parth	3	34			1
Otiorhynchus tenebricosus			22	22	XY	95
Otiorhynchus vehemens			22	22	XY	1
Oxydema sp. 1			30	30	Xyp	87
Pachylobius picivorus				36		1

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Pachyrhynchus infernalis			22	22	Xyp	87
Pachytychius sp. 1			32	32	Xyp	87
Pagiophloeus sp. 1			28	28	Xyp	87
Paophilus afflatus			22	22	Xyp	90
Parafoucartia squamulata	parth	3	33			90
Paramecopus farinosus			32	32	Xyp	87
Paraplapoderus ulmi			30	30	XY	1
Parascaphus sp. 1			22	22	Xyp	5
			20	20	Xyp	87
Paratrachelophorus longicornis		30	30	Xyp	1	
Peritelus hitricornis	parth		33			1
	parth		44			1
Phloeophagosoma takenouchii		32	32	Xyp	1	
Phyllobius annectans			22	22	XY	1
Phyllobius arborator			22	22	Xyp	87
Phyllobius argentatus			22	22	Xyp	87
Phyllobius armatus			22	22	Xyp	1
Phyllobius brevis			22	22	Xyp	1
Phyllobius brevitarsis			22	22	Xyp	87
Phyllobius caucasicus			22	22	Xyp	107
Phyllobius galloisi			22	22	Xyp	1
Phyllobius incomptus			22	22	Xyp	1
Phyllobius intrusus			22	22	Xyp	87
Phyllobius longicornis			22	22	Xyp	87
			24	24	Xyp	1
Phyllobius maculicornis			22	22	Xyp	87
Phyllobius mundus			22	22	Xyp	1
Phyllobius nigritus			22	22	Xyp	1
Phyllobius oblongus			22	22	Xyp	1
Phyllobius prolongatus			22	22	Xyp	1
Phyllobius pyri			22	22	Xyp	87
Phyllobius rotundicollis			22	22	Xyp	1
Phyllobius sp. 1			22	22	Xyp	1
Phyllobius urticae			22	22	Xyp	87
Phyllobius viridicollis			22	22	Xyp	1
Phymatapoderus latipennis			32	32	Xyp	1
Phymatapoderus pavens			24	24	Xyp	1
Phytobius sp. 1			24	24	Xyp	1
Phytoscaphus inductus			22	22	Xyp	87
-B chromosomes						
Phytoscaphus sp. 1			20	20	Xyp	87
Pissodes affinis			30	30	Xyp	1
Pissodes affinis curriei			30	30	Xyp	1
Pissodes approximatus				32		1
-Male 2n = 30-34						
Pissodes approximatus canadensis				32		1
-Male 2n = 30-34						
Pissodes dubius			30	30	Xyp	1
Pissodes dubius fraseri			30	30	Xyp	1
Pissodes dubius piperi			30	30	Xyp	1
Pissodes fasciatus			30	30	Xyp	1
Pissodes fiskei			24	25	Xyp	1
-XYp III+10 haploid						
Pissodes gyllenhali			32	32	Xyp	1
Pissodes memorensis			30	30	Xyp	1
Pissodes nitidus			30	30	Xyp	1
Pissodes notatus			30	30	Xyp	1
Pissodes obscurus			28	28	Xyp	1
Pissodes OP27O			30	30	Xyp	1
Pissodes OYT3O			34	34	Xyp	1
Pissodes radiatae			30	30	Xyp	1
Pissodes rotundatus			30	30	Xyp	1
Pissodes rotundatus alascensis		30	30	Xyp	1	
Pissodes rotundatus nigrae			30	30	Xyp	1
Pissodes schwarzi			28	28	Xyp	1

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Pissodes schwarzi yosemite			28	28	Xyp	1
Pissodes similis			30	30	Xyp	1
Pissodes similis utahensis			30	30	Xyp	108
Pissodes strobi			34	34	Xyp	1
Pissodes strobi engelmanni			34	34	Xyp	1
Pissodes strobi sitchensis			34	34	Xyp	1
Pissodes terminalis			28	29	Xyp	1
-XYp III+12 haploid						
Pissodes validirostris			30	30	Xyp	1
Pissodes webbi			34	34	Xyp	1
Platymycterus himalayanus			22	22	Xyp	87
Platymycterus moestus			22	22	Xyp	87
Platymycterus sjostedti			22	22	Xyp	5
Platymycterus sp.			22	22	Xyp	87
Plintini sp. 1			22	22	Xyp	1
Podapion gallicola			22	22	Xyp	1
Podeschrus abietis			22	22	Xyp	1
Polydrusus amoenus				22		1
Polydrusus atomarius			22	22	Xyp	87
Polydrusus calabricus			20	20	Xyp	87
Polydrusus impressifrons				20		1
Polydrusus inustus	parth		33			106
Polydrusus marginatus			22	22	Xyp	87
Polydrusus mollis	parth	3	31			1
-Female 2n = 30-31						
	parth	3	33			106
						109
	parth	2	22			1
Polydrusus pilosus			22	22	XY	1
Polydrusus ruficornis			22	22	Xyp	87
Polydrusus sericeus			22	22	Xyp	87
Polydrusus sicanus			22	22	Xyp	87
Polydrusus undatus			22			1
Polydrusus viridicintus			22	22	Xyp	87
Procas biguttatus			22	22	Xyp	1
			24	24	Xyp	1
Proctorus decipiens				22		1
Protacallinus sp. 1			30	30	Xyp	1
Pseudoanthonomus hamamelidis		32	32	XY	1	
			38	38	Xyp	1
Pseudphytoscaphus sp. 1			22	22	Xyp	5
Ptochus oyulum			22	22	Xyp	5
Pycnodactylus hypocritia				38		5
Rhadinomerus annulipes			34	34	Xyp	87
			36	36	Xyp	87
Rhadinomerus maebarai			44	44	Xyp	1
Rhinocerus sp. 1			20	20	Xyp	87
Rhinomias forticornis			22	22	Xyp	87
Rhinoncus pagnus			20	20	Xyp	5
Rhinoncus sibiricus			28	28	Xyp	1
Rhynchaenus mutabilis			24	24	XY	1
Rhynchaenus niger			28	28	XY	1
Rhynchaenus pallicornis				26		1
			28	28	XY	1
Rhynchaenus populi			26	26	Xyp	1
Rhynchaenus sp. 1			26	25	XO	1
Rhynchaenus stigma			28	28	Xyp	87
Rhynchophorus ferrugineus			22	22	Xyp	1
Rhyssomatus marginatus			22	22	Xyp	87
			22	22	Xyp	45
Ruteria hypocrita			30	30	Xyp	6
Rynchophorus palmarum			22	22	Xyp	96
Ryssematus lineaticollis			24	24	Xyp	1
Scepticus griseus			22	22	Xyp	1
Scepticus insularis	parth	2	22			1

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
	parth	3	33			1
	parth	5	55			1
			22	22	Xyp	1
				23	Xyyp	1
Scepticus tigrinus			22	22	Xyp	1
Sciaphilus asperatus						98
-bisexual						
	parth	3	33			90
Sciopithes obscurus	parth	4	44			1
Scythropus japonicus			22	22	Xyp	1
Scythropus ornatus			22	22	Xyp	1
Scythropus sp. 1			20	20	Xyp	1
Shirahoshizo insidiosus			38	38	Xyp	1
Simo variegates	parth	3	33			94
Simulatacalles simulator			24	24	Xyp	87
Sipalus hypocrita			22	22	Xyp	1
Sitona crinitus			22	22	Xyp	5
Sitona cylindricollis			22	22	Xyp	1
Sitona flavescens			22	22	Xyp	1
Sitona hispidulus			22	22	Xyp	1
Sitona humeralis			22	22	Xyp	6
Sitona lepidus			22	22	Xyp	1
Sitona lineata			22	22	Xyp	1
Sitona lineatus			22	22	Xyp	6
Sitona macularis			22	22	Xyp	6
Sitona scissifrons			22	22	Xyp	1
Sitona sp. 1			22	22	Xyp	1
			24	24	Xyp	1
			26	26	Xyp	1
Sitona suturalis			22	22	Xyp	6
Sitophilus granarius			12			1
			24	24	Xyp	110
Sitophilus oryzae			12	11	XO	111
			22	22	XY	1
			22	22	NeoXY	1
Sitophilus sasakii			22	22	XY	1
Sitophilus zeamais			22	22	Xyp	1
			22	22	NeoXY	1
-B chromosomes						
Sphenophorus parvula			30	30	Xyp	1
Strophosoma capitatum			22	22	XY	90
Strophosoma faber			22	22	Xyp	90
Strophosoma melanogrammum	parth		33			90
Strophosoma melanogrammus	parth		33			1
-Female 2n = 31-35						
	parth		34			1
-Female 2n = 33-34						
	parth		34			1
Sympiezomias cribicollis			22	22	Xyp	1
Sympiezomias cribricollis			22	22	Xyp	87
Sympiezomias lewisii			22	22	Xyp	1
Sympiezomias sp. 1			22	22	XY	1
Syrotelus septentrionalis				16		87
Syrotelus umbrosus			16	16	Xyp	87
Tachypterellus 4-gibbus			34	34	Xyp	1
Tanymecus cephalotes			22	22	Xyp	87
Tanymecus feae				22		87
Tanymecus hispidus			22	22	Xyp	5
Tanymecus indicus			22	22	Xyp	87
Tanymecus longulus			22	22	Xyp	87
Tanymecus palliatus			22	22	Xyp	87
Tanymecus sciurus			22	22	Xyp	87
				23	Xyyp	87
Tanymecus sp. 1			22	22	Xyp	1
Tanysphyrus lemnae			16	16	Xyp	1

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
			18	18	Xyp	1
Tanysphyrus major			16	16	Xyp	1
Telephae konoi			22	22	Xyp	1
			26	26	Xyp	1
Thlipsomerus glebosus			22	22	Xyp	87
Trachyphloeus aristatus	parth	3	33			1
Trachyphloeus bifoveolatus	parth	3	33			1
-Female 2n = 32-33						
	parth	3	33			1
Trachyphloeus parallelus	parth	4	44			94
Trachyrinus sp. 1	parth		33			1
Transptochus sp.			22	22	Xyp	5
Trichalophus albonotatus			28	28	NeoXY	1
Tropiphorus carinatus	parth	3	33			1
-Female 2n = 32-33						
Tropiphorus cucullatus	parth	4	41			1
-Female 2n = 40-41						
Tropiphorus elevatus	parth	3	33			94
Tropiphorus terricola	parth	4	44			1
Tychius aureolus femoralis			40	40	Xyp	1
Tychius ginsuji			34	34	Xyp	1
Tychius sp. 1			34	34	Xyp	1
Tychius stephensi			40	40	Xyp	1
Tylotus chrysops as O. chrysops			22		95	
Xanium vanhoeffenianum			22	22	Xyp	87
Xanthochelus sp.			22	22	Xyp	87
Zacladus geranii			28	28	Xyp	87
Dermestidae						
Anthrenus fasciatus			18	18	Xyp	1
Anthrenus flavipes			18	18	Xyp	1
Anthrenus sp.			18	18	Xyp	1
Anthrenus verbasci			18	18	Xyp	1
Attagenus elongatulus			18	18	Xyp	1
Attagenus megatoma			18	18	Xyp	1
Dermestes ater			18	18	Xyp	1
Dermestes caninus			18	18	Xyp	1
Dermestes frischii			18	18	Xyp	1
				19	Xyyp	1
Dermestes haemorrhoidalis			18	18	Xyp	1
Dermestes lardarius			18	18	Xyp	1
Dermestes maculatus			18	18	Xyp	1
-1-4 y chromosomes						
			18	18	Xyp	1
Dermestes peruvianus			18	18	Xyp	1
Dermestes talpinus			18	18	Xyp	1
Dermestes vulpinus			18	18	Xyp	1
Dermests signatus			18	18	Xyp	1
Orphilus subnitidus			20	20	Xyp	1
Trogoderma glabrum			18	18	Xyp	1
			20	20	Xyp	1
Trogoderma inclusum			18	18	Xyp	1
Trogoderma parabile			18	18	Xyp	1
			20	20	Xyp	1
Trogoderma variabile			18	18	Xyp	1
Dytiscidae						
Agabus biguttatus			44	43	XO	112
Agabus bipustulatus			44	43	XO	113
			42	42	Xyp	18
-Xyp Subsequent studies failed to replicate						
Agabus confinis			44	43	XO	113
			42	42	XY	18
Agabus conspersus			40	40	XY	18
-material studied was from India and likely is a different species						
			44	43	XO	113
Agabus ramblae			44	43	XO	113

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Agabus sturmi			44	43	XO	113
			42	42	Xyp	18
-Xyp Subsequent studies failed to replicate						
Boreonectes alpestris			56	55	XO	114
Boreonectes griseostriatus			62	61	XO	114
Boreonectes ibericus			54	53	XO	114
Boreonectes macedonicus			54	53	XO	114
Boreonectes multilineatus			58	57	XO	114
Boreonectes riberae			56	55	XO	114
Colymbetes adpressus			44	44	XY	115
Colymbetes affinis			44	43	XO	115
Colymbetes biguttatus			44	43	XO	115
-reported as 22 in text likely a misprint						
Colymbetes binotatus			44	43	XO	115
Colymbetes bipustulatus			44	43	XO	115
Colymbetes bipustulatus var. solieri			44	43	XO	115
Colymbetes confinis			44			115
-only females examined						
Colymbetes congener			44	43	XO	115
Colymbetes conspersus			44	43	XO	115
Colymbetes fuscus			42	41	XO	115
Colymbetes fuscus				36		18
-Male 2n = 35-37						
Colymbetes infuscatus			44	44	NeoXY	115
Colymbetes labiatus			44	43	XO	115
Colymbetes lapponicus			44	43	XO	115
Colymbetes melanarius			44	43	XO	115
Colymbetes nebulosus			44	43	XO	115
Colymbetes nevadensis			44	43	XO	115
Colymbetes paykulli			42	41	XO	115
Colymbetes paykulli			38	37	XO	18
			36	36	Xyp	18
-Xyp Subsequent studies failed to replicate						
Colymbetes piceus			42	41	XO	112
Colymbetes ramblae			44	43	XO	115
Colymbetes serricornis			44	43	XO	115
Colymbetes striatus			42	41	XO	115
Colymbetes striatus			40	40	XY	18
			42	42	XY	18
			44	44	XY	18
Colymbetes sturmii			44	43	XO	115
Colymbetes thomsoni			44	43	XO	115
Colymbetes unguicularis			44	43	XO	115
Colymbetes wollastoni			44	43	XO	115
Cybister japonicus				43		116
Cybister lateromarginalis				22		18
Cybister limbatus			44	43	XO	18
Cybister sugillatus			44	43	XO	18
Cybister tripunctatus			44	43	XO	18
Deronectes angusi			50	50	XY	117
Deronectes costipennis costipennis			28	28	NeoXY	117
Deronectes costipennis gignouxi		28	28	NeoXY	117	
Deronectes ferrugineus			62	62	XY	117
Deronectes latus			50	50	XY	117
Deronectes platynotus			28	28	NeoXY	117
Deronectes wewalai			62	62	XY	117
Dytiscus circumcinctus			38	38	XY	18
Dytiscus dauricus				37		116
Dytiscus marginalis				39		18
-Male 2n = 36-41						
			40			18
			38	38	XY	18
Dytiscus marginalis czerskii				37		116
Dytiscus sp.				39		18
-Male 2n = 38-40						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
				34		18
				40		18
Eretes sp.			44	43	XO	18
Eretes strictus			44	43	XO	112
Hydaticus decorus			42	41	XO	112
Hydaticus fabricii			42	41	XO	18
Hydaticus leander			46	45	XO	18
Hydaticus luczonicus			42	41	XO	18
Hydaticus vittatus			42	41	XO	18
			46	45	XO	18
Hydroporus humilis			36	35	XO	112
Hydrovatus cuspidatus			34	33	XO	112
Ilybius aenescens			36	35	XO	18
Ilybius albarracinensis			36	35	XO	113
Ilybius ater			36	35	XO	18
Ilybius chalconatus			36	35	XO	113
Ilybius erichsoni			36	35	XO	113
Ilybius fenestratus			36	35	XO	18
Ilybius fuliginosus			36	35	XO	18
Ilybius guttiger			36	35	XO	18
Ilybius montanus			34	33	XO	113
-Male 2n = 30-35						
Ilybius neglectus			36	35	XO	113
Ilybius quadriguttatus			36	35	XO	113
Ilybius subaeneus			36	35	XO	18
Ilybius vittiger			36	35	XO	113
Ilybius wasastjernae			38	37	XO	113
Nebrioporus amicorum			50	49	XO	117
Nebrioporus assimilis			50	49	XO	117
Nebrioporus baeticus			50	49	XO	117
Nebrioporus bucheti			50	49	XO	117
Nebrioporus canaliculatus			50	49	XO	117
Nebrioporus canariensis			50	49	XO	117
Nebrioporus carinatus			50	49	XO	117
Nebrioporus ceresyi			50	49	XO	117
Nebrioporus croceus			50	49	XO	117
Nebrioporus crotchi			50	49	XO	117
Nebrioporus depressus			50	49	XO	117
Nebrioporus depressus elegans int.			50	49	XO	117
Nebrioporus elegans			50	49	XO	117
Nebrioporus fabressei			50	49	XO	117
Nebrioporus insignis			50	49	XO	112
Nebrioporus lanceolatus			50	49	XO	117
Nebrioporus lanceolatus			50	49	XO	112
Nebrioporus martinii			50	49	XO	117
Nebrioporus sardus			50	49	XO	117
Nebrioporus walkeri			50	49	XO	112
Platambus maculatus			20	19	XO	18
Rhantus exsoletus			42	41	XO	115
Rhantus exsoletus					XO	118
			42	42	Xyp	18
-Xyp Subsequent studies failed to replicate						
Rhantus frontalis			46	45	XO	115
Rhantus grapii			46	45	XO	115
Rhantus notatus					XO	118
			44	44	Xyp	18
-Xyp Subsequent studies failed to replicate						
Rhantus suturalis			46	45	XO	115
Rhantus suturellus			42	41	XO	115
Scarodytes fuscitarsis			56	55	XO	117
Scarodytes halensis			56	55	XO	117
Scarodytes malickyi			56	55	XO	117
Scarodytes nigriventris			56	55	XO	117
Stictotarsus bertandi			56	56	NeoXY	117
Stictotarsus duodecimpustulatus		56	56	NeoXY	117	

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Stictotarsus enexpectatus			60	59	XO	119
Stictotarsus griseostriatus strandi		62	61	XO	120	
Stictotarsus procerus			56	56	NeoXY	120
Trichonectes otini			50	49	XO	117
Unidentified dytiscid			38	37	XO	18
Elateridae						
Adelocera colonicus			18	17	XO	121
Adelocera modesta			18	17	XO	121
Adelocera murina			22	22	Xyp	4
			22	22	Xyp	121
Adelocera rectangularis			18	17	XO	121
Adelocera sp.			18	17	XO	121
Agriotella bigeminata			20	19	XO	121
Agriotes lineatus			20	19	XO	121
Agriotes mancus			20	19	XO	121
Agriotes obscurus			20	19	XO	121
Agriotes sputator			20	20	Xyp	121
Agrypnus fuscipes			18	17	XO	121
Agrypnus sp.			12	11	XO	121
Ampedus apicatus			20	19	XO	121
Ampedus deletus			20	19	XO	121
Ampedus fusculus			20	19	XO	121
Ampedus luctuosus			20	19	XO	121
Ampedus melsheimeri			20	19	XO	121
Ampedus pullus			20	19	XO	121
Ampedus sp., nr. deletus			20	19	XO	121
Ampedus sp., nr. Deletus			22	21	XO	121
Ampedus sp., nr. miniipennis		20	19	XO	121	
Athous rufiventris			20	19	XO	121
Cardiophorus cardisce			22	22	Xyp	121
Cardiophorus convexulus			22	22	Xyp	121
Cardiophorus convexus			20	20	Xyp	121
Cardiophorus fenestratus			22	22	Xyp	121
Cardiophorus gagates			22	22	Xyp	121
Cardiophorus haridwarensis			22	21	XO	121
Cardiophorus limbatus			22	21	XO	121
Cardiophorus togatus			22	22	Xyp	121
Cardiorhinus rufilateris			20	19	XO	121
Chalcolepidius silbermanni			12	12	XY	121
Chalcolepidius zonatus			4	4	XY	122
Colaulon lezeleuci			18	17	XO	121
Conoderus dimidiatus			18	17	XO	123
Conoderus fuscofasciatus			18	17	XO	121
Conoderus malleatus			18	17	XO	121
Conoderus pilatei			18	17	XO	121
Conoderus rodriguezi			18	17	XO	121
Conoderus rufidens			18	17	XO	121
Conoderus scalaris			18	17	XO	123
Conoderus sp.			18	17	XO	121
Conoderus stigmosus			16	16	NeoXY	123
			14	14	NeoXY	121
Conoderus ternarius			18	17	XO	123
Ctenicera aenea			20	19	XO	121
Ctenicera aeripennis aeripennis		20	19	XO	121	
Ctenicera aeripennis destructor		20	19	XO	121	
Ctenicera appressa			22	22	Xyp	121
Ctenicera appropinquans			20	19	XO	121
Ctenicera arata			18	17	XO	121
Ctenicera bombycina			22	22	Xyp	121
Ctenicera hieroglyphica			22	21	XO	121
Ctenicera inflata			20	20	Xyp	121
Ctenicera mediana			22	22	Xyp	121
Ctenicera nitidula			18	17	XO	121
Ctenicera ochreipennis			22	22	Xyp	121
Ctenicera propola columbiana		22	21	XO	121	

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Ctenicera propola propola			22	21	XO	121
Ctenicera rufopleuralis			18	17	XO	121
Ctenicera semimetallica			20	19	XO	121
Ctenicera splendens			20	19	XO	121
Ctenicera tarsalis			20	20	Xyp	121
Ctenicera tessellata			22	22	Xyp	121
Dicrepidius politus			24	23	XO	121
Dicrepidius ramicornis			24	23	XO	121
Eanus estriatus			20	20	Xyp	121
Eanus maculipennis			20	20	Xyp	121
Elater sp.1			20	19	XO	121
Elater sp.2			20	19	XO	121
Hemirrhipus lineatus			10	10	NeoXY	121
Heterocrepidius mendex				22		124
Heteroderes lenis			18	17	XO	121
Heteroderes macroderes			18	17	XO	121
			20	19	XO	121
Heteroderes modestus			18	17	XO	121
Heteroderes sericeus			18	17	XO	121
Lacon profusa			14	14	NeoXY	121
Limonius aeger			20	20	Xyp	121
Limonius griseus			18	17	XO	121
Melanotus fissilis			20	19	XO	121
Melanotus kamaunensis			12	12	XY	121
Melanotus leonardi			20	19	XO	121
Melanotus longicornis			20	19	XO	121
Melanotus oregonensis			20	19	XO	121
Melanotus sp.			20	19	XO	121
Melanotus sp., nr. Communis		20	19	XO	121	
Melanotus tenebrosus			20	19	XO	121
Melanotus trapezoideus			20	19	XO	121
Monocrepidius sp.			18	17	XO	121
Monocrepidus sp.			18	17	XO	45
Pomachilius sp.2			20	20	Xyp	121
Prosternon tesselatum			22	22	XY	121
Pyrearinus candelarius			16	15	XO	121
Pyrophorus divergens			16	15	XO	121
Pyrophorus luminosus				17	XXY	121
Pyrophorus phosporescens			16	15	XO	121
Pyrophorus punctatissimus			16	15	XO	121
Pyrophorus radians			12	11	XO	121
Erotylidae						
Triplax thoracica			18	18	NeoXY	1
Geotrupidae						
Anoplotrupes balyi			22	22	XY	125
Anoplotrupes stercorosus			22	22	XY	126
			20	20	Xyp	127
Bolboceras quadridens			20	20	Xyp	125
Bolboceras sp.			20	20	Xyp	128
Bolboceratops indicum			20	20	Xyp	125
Ceratophyus hoffmannseggi			16	16	XY	129
Cnemotrupes splendidus miarophagus				22		125
Geotrupes hypocrita			22	22	XY	125
Geotrupes mutator				22		125
			20	20	XY	127
Geotrupes spiniger				22		125
			22	22	XY	129
			20	20	Xyp	127
Geotrupes stercocarius				22		125
Geotrupes stercorarius			20	20	XY	127
Sericotrupes niger			22	22	XY	129
Thorectes geminatus			22	22	XY	129
Thorectes intermedius			22	22	XY	129
Thorectes lusitanicus			22	22	XY	129
Thorectes punctatissimus			20	20	XY	127

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Trypocopris pyrenaeus			20	20	Xyp	127
Trypocopris vernalis			22	22	XY	129
Typhaeus typhoeus			20	20	Xyp	127
Glaphyridae						
Lichnanthe rathvoni			20	20	Xyp	125
Glaresidae						
Glaresis sp.			20	20	Xyp	125
Gyrinidae						
Dineutes americanus				44		18
Dineutes horni				40		18
Gyrinus caspius				27		18
Gyrinus distinctus				27		18
Gyrinus paykulli				27		18
Gyrinus substriatus			28	27	XO	18
Gyrinus suffriani			28	27		18
Haliplidae						
Brychius elevatus			40	39	XO	130
Haliplus confinis			22			130
Haliplus flavicollis			30	30	XY	130
Haliplus fluviatilis			24	24	XY	130
Haliplus fulvus			36	36	XY	130
Haliplus immaculatus			24	24	XY	130
Haliplus laminatus			24	24	XY	130
Haliplus lineatocollis			24	24	XY	130
Haliplus lineatus			24	24	XY	130
Haliplus mucronatus			20	20	XY	130
Haliplus obliquus			24	24	XY	130
Haliplus ruficollis			24	24	XY	130
Haliplus sibricus			24	24	XY	130
Haliplus variegatus			32	32	XY	130
Peltodytes caesus			34	33	XO	130
Helophoridae						
Helophorus aequalis			18	18	XY	131
Helophorus aquaticus			18	18	XY	131
-B chromosomes						
Helophorus atlantis			22	22	XY	132
Helophorus brevipalpis	parth	3	30			133
			22	22	XY	133
Helophorus calpensis			22	22	XY	132
Helophorus grandis			18	18	XY	134
-B chromosomes						
Helophorus maritimus			18	18	XY	134
Helophorus minutus			22	22	XY	132
Helophorus oblongus				18		1
Helophorus occidentalis			18	18	XY	134
Helophorus orientalis	parth	3	33			133
Helophorus paraminutus			22	22	XY	132
Histeridae						
Hister sp.			26	26	Xyp	1
Saprinus sp.			26	26	Xyp	1
Hybosoridae						
Hybosorus orientalis			20	20	Xyp	125
Hydrophilidae						
Anacaena bipustulata			18	18	Xyp	135
Anacaena globulus			16	16	Xyp	135
Anacaena limbata			18	18	Xyp	135
Anacaena lutescens	parth	2	18			135
	parth	3	27			135
			18	18	Xyp	135
Anacaena rufipes			12	12	NeoXY	135
Berosus indicus			18	18	Xyp	1
Helocombus bifidus			18	18	Xyp	1
Hydrobius fuscipes				18		1
Hydrophilus indicus			30	30	Xyp	1
Hydrous acuminatus			30	30	Xyr	1

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Hydrous indicus			30	30	Xyp	1
Hydrous piceus				30		1
Hydrous triangularis			30	30	Xyp	1
Sternolophus rufipes			18	18	Xyp	1
Tropisternus lateralis			18	18	Xyp	1
Tropisternus nimbatus			18	18	Xyp	1
Hygrobiidae						
Hygrobia hermanni			36	36	XY	118
Laemophloeidae						
Cryptolestes ferrugineus			18	18	Xyp	1
Cryptolestes pusilloides			18	18	Xyp	1
Cryptolestes pusillus			18	18	Xyp	1
Cryptolestes spartii			18	18	Xyp	1
Cryptolestes turcicus			18	18	Xyp	1
Cryptolestes ugandae			20	20	NeoXY	1
Lampyridae						
Aspisoma aegrotum			20	19	XO	136
Aspisoma hesperum			20	19	XO	136
Aspisoma ignium			20	19	XO	136
Aspisoma laterale			20	19	XO	136
Aspisoma maculatum			20	19	XO	136
Aspisoma sticticum			20	19	XO	136
Bicellonycha lividipennis			18	18	NeoXY	136
Cratomorphus dorsalis			20	19	XO	136
Diphotus vittatus			20	19	XO	136
Ellychnia californica			20	19	XO	136
Ellychnia corrusca			20	19	XO	136
Lucidota diaphanura			20	19	XO	136
Luciola cruciata			18	17	XO	136
Luciola lateralis			18	17	XO	136
Photinus australis			20	19	XO	137
Photinus consanguineus			20	19	XO	137
Photinus macdermotti			20	19	XO	138
Photinus pyralis			20	19	XO	137
Photinus sp. 1 (aff. pyralis)			20	19	XO	136
Photinus sp. 2			20	19	XO	136
Photuris congener				18		138
Photuris pennsylvanica			20	19	XO	136
Pyractomena angulata			20	19	XO	136
Pyractomena borealis			20	19	XO	136
Pyractomena galeata			20	19	XO	136
Pyractomena heterodoxa			20	19	XO	136
Leiodidae						
Cantabrogeus luquei			22	22	Xyp	139
Cantabrogeus sp	parth	3	33			139
Catops coracinus			22	22	Xyp	139
Drimeotus kovacsi viehmanii			24	24	Xyp	140
Espanoliella luquei			22	22	Xyp	139
Fresnedaella lucius			22	22	Xyp	139
Leiodes calcarata			22	22	Xyp	139
Notidocharis whagoni			22	22	Xyp	139
Pholeuon knirschi			24	24	Xyp	140
Quaestus pasensis			22	22	Xyp	139
Speonomus delarouzeei			24	24	Xyp	141
Speonomus hydrophilus			24	24	Xyp	142
Speonomus pyrenaeus			24	24	Xyp	142
Troglocharinus ferreri pallaresi		24	24	Xyp	141	
Troglocharinus jacasi			24	24	Xyp	141
Troglocharinus kiesenwetteri			24	24	Xyp	141
Troglocharinus schibii			24	24	Xyp	141
Troglocharinus variabilis			24	24	Xyp	141
Lucanidae						
Cerchus lignarius			20	20	Xyp	1
Dorcus parallelipipedus			18	18	NeoXY	1
Figulus binodulus			20	20	XY	143

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Figulus boninensis			20	20	XY	143
Figulus punctatus			26	26	Xyp	143
Lamprima adolphinae			18	18	XY	144
Lucanus cervus			22	22	XY	144
Lucanus maculifermoratus			26	26	Xyr	1
Macrodorcas binervis			14	14	Xyp	145
Macrodorcas rectus			18	18	Xyr	145
Nipponodorcus rubrofemoratus		10	10	Xyr	1	
			10	10	NeoXY	1
Prosopocoilus inclinatus hachijoensis			20	20	Xyp	145
Prosopocoilus inclinatus inclinatus		20	20	Xyp	145	
Sinodendron rugosum			18	18	Xyp	1
Lycidae						
Calopteron bifasciatum			32	31	XO	1
Calopteron corrugatum			32	31	XO	1
-B chromosomes						
Calopteron scapulare			32	31	XO	1
-B chromosomes						
Linoptes imbrex				33		1
Metriorrhynchus rhipidius			32	31	XO	1
Thonalmus chevrolati			34	33	XO	146
Melandryidae						
Dircaea 4-maculata			20	20	Xyp	1
Prothalpia undata			18	18	NeoXY	1
Serropalpus barbatus			18	18	Xyp	1
Serropalpus substriatus			20	20	Xyp	1
Meloidae						
Cyaneolytta n. sp.			20	20	Xyp	1
Epicauta atomaria			20	20	Xyp	45
				21	Xyyp	45
				22	Xyyyp	45
Epicauta cinerea			20	20	XY	1
Epicauta grammica			24	24	Xyp	1
Epicauta isthmica			20	20	Xyp	1
Epicauta murina			20	20	Xyp	1
Epicauta n. sp.			20	20	Xyp	1
Epicauta pennsylvanica			20	20	XY	1
Epicauta pluvialis			20	20	Xyp	45
Epicauta rosilloi			20	20	Xyp	45
Epicauta rufipedes			20	20	Xyp	1
Lytta picta			20	20	Xyp	13
Meloe sp.			20	20	Xyp	1
Mylabris balteata			20	20	Xyr	13
Mylabris macilenta			22	22	Xyp	1
Mylabris phalerata			22	22	Xyp	1
Mylabris pustulata			22	22	Xyp	1
Mylabris thunbergi			22	22	Xyp	1
Paniculolytta sanguineoguttata		20	20	Xyp	1	
Pryrota decorata			20	20	Xyp	1
Psalydolytta sp. nr. Rouxi			20	20	Xyp	1
Sybaris paraeustus			20	20	Xyp	1
Sybaris tastaceus			20	20	Xyp	13
Tetraonyx frontalis			20	20	Xyp	1
Tetraonyx quadrimaculata			20	20	Xyp	1
Zonitis tarasca			20	20	Xyp	1
Melyridae						
Astylus antis			18	18	Xyp	147
Astylus variegatus				18		148
-B chromosomes						
Collops sp.			18	17	XO	1
Endeodes collaris			20	19	XO	1
Hoppingiana hudsonica			14	14	Xyp	1
Micromalthidae						
Micromalthus deblis	parth		20	10		1
-type of HD not specified						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Nitidulidae						
Nitidula bipunctata			20	20	Xyp	1
Nitidula rufipes			20	20	Xyp	1
Noteridae						
Canthydrus diopthalmus			20	20	XY	149
Neohydrocoptus jaechi			14	14	NeoXY	150
Noterus clavicornis			22	21	XXY	149
Noterus crassicornis			22	21	XXY	149
Noterus laevis			22	21	XXY	149
Synchortus imbricatus			28	27	XXY	151
Oedemeridae						
Oedemera podagrariae			22	22	Xyp	4
Oedemera virescens			22	22	Xyp	4
Passalidae						
Aulacocyclus edentulus			30	30	XY	152
Chondrocephalus debilis			38	38	XY	152
Chondrocephalus gemmae			28	28	XY	152
Chondrocephalus granulum			24	24	XY	152
Chondrocephalus purulensis			44	39	XXXXXO	152
Coniger ridiculus			36	36	XY	152
Heliscus tropicus			34	34	XY	152
Odontotaenius disjunctus			26	26	XY	152
Odontotaenius striatopunctatus		24	24	XY	152	
			26	26	XY	152
Odontotaenius zodiacus			30	30	XY	152
Ogyges politus			26	26	XY	152
Oileus bifidus			18	18	XY	152
-B chromosomes						
Oileus rimator			18	18	XY	152
Oileus sargi			18	18	XY	152
Passalus aculeatus			30	29	XO	152
Passalus alius			26	25	XO	152
Passalus binomiatus			26	25	XO	152
Passalus coniferus			26	25	XO	153
Passalus glaberrinus			26	25	XO	152
Passalus interruptus			26	25	XO	152
Passalus interstitialis			26	25	XO	152
Passalus mancus			32	31	XO	152
Passalus mirabilis			26	25	XO	152
Passalus morio			32	31	XO	153
Passalus occipitalis			26	25	XO	152
Passalus perplexus			26	25	XO	152
Passalus plicatus			26	25	XO	152
Passalus punctatostriatus			26	25	XO	152
Passalus punctiger			26	25	XO	153
Passalus quadricollis			26	25	XO	152
Passalus sp. 1			30	29	XO	152
Passalus suturalis			26	25	XO	152
Passalus unicornis			26	25	XO	154
Paxillus leachi			26	25	XO	152
Petrejoides mazatecus			38	38	XY	152
Petrejoides nebulosum			38	38	XY	152
-B chromosomes						
Petrejoides orizabae			28	28	XY	152
Popilius eclipticus			34	34	XY	152
Proculejus brevis			28	28	XY	152
Proculejus c. brevis 1			32	32	XY	152
-B chromosomes						
Proculejus c. brevis 2			20	20	XY	152
-B chromosomes						
Proculus beckeri			38	38	XY	152
Pseudacanthus aztecus			34	34	XY	152
Pseudacanthus mexicanus			40	40	XY	152
Pseudacanthus violetae			38	38	XY	152
Ptichopus angulatus			26	25	XO	152

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Publius agassizi			28	28	XY	152
Spasalus robustus			26	25	XO	152
Spurius bicornis			30	30	XY	152
			32	32	XY	152
Spurius halffteri			38	38	XY	152
Undulifer acapulcae			44	44	XY	152
Verres corticicola			28	28	XY	152
Verres hageni			28	28	XY	152
-B chromosomes						
Veturius assimilis			28	28	XY	152
Veturius transversus			28	28	XY	152
Vindex agnoscendens			28	28	XY	152
Vindex c. sculptilis			18	18	XY	152
Vindex sp. nov.			18	18	XY	152
Phalacridae						
Phalacrid sp.			16	15	XO	1
Pleocomidae						
Pleocoma crinita			20	20	Xyp	125
Pleocoma dubitalis			20	20	Xyp	125
Pleocoma minor			20	20	Xyp	125
Pleocoma simi			20	20	Xyp	125
Ptiliidae						
Ptinella aptera						155
Ptinella errabunda	parth					155
Ptinella taylorae						155
Scarabaeidae						
Adoretus bombinator			22	22	Xyp	156
Adoretus decanus			22	22	Xyp	125
Adoretus duvauceli			22	22	Xyp	125
Adoretus epipleuralis			22	22	Xyp	156
Adoretus incurvatus			22	22	Xyp	125
Adoretus lasiopygus			22	22	Xyp	125
Adoretus limbatus			22	22	Xyp	125
Adoretus sp.			22	22	Xyp	125
Adoretus sp. (M-42)			22	22	Xyp	125
Adoretus versutus			22	22	Xyp	125
			24	24	Xyp	125
Adorrhinyptia dorsalis			22	22	Xyp	125
Adorrhinyptia sp.			16	16	Xyr	125
			18	18	Xyr	125
			20	20	Xyr	125
Aegiala arenaria				20		1
Aegiala blanchardi			20	20	Xyp	1
Aegialia arenaria			20	20	XY	127
Aeqialia arenaria				20		125
Aeqialia blanchardi			20	20	Xyp	125
Allomyrina dichotoma			20	20	Xyp	125
Amaurodes passerini			20	20	XY	144
Amphimallon majale			20	20	XY	144
Amphimallon solstitialis				20		125
Anomala bengalensis			18	18	XY	125
Anomala corpulenta			18	18	XY	125
Anomala cuprea				20		125
Anomala dorsalis			20	20	Xyp	125
Anomala dubia			20	20	XY	144
Anomala lucens			20	20	Xyr	125
Anomala luciae			20	20	XY	144
Anomala polita			20	20	Xyp	125
Anomala ruficapilla			20	20	Xyp	125
Anomala rufocuprea				20		125
			18	18	XY	125
Anomala sp.			20	20	Xyp	125
Anomala superflua			20	20	Xyp	125
Anomala varicolor			20	20	Xyp	125
Anomala vestigator			20	20	Xyp	125

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Anomiopsides heteroclyta				18		45
Aphodius abdominalis			20	19	XO	157
Aphodius ater			20	20	XY	158
Aphodius bonvouloiri			20	20	XY	157
Aphodius borealis			20	20	Xyp	158
Aphodius coniugatus			20	20	XY	159
Aphodius conspurcatus			20	20	XY	160
Aphodius consputus			20	20	XY	161
Aphodius constans			20	20	XY	158
Aphodius contaminatus			20	20	XY	160
Aphodius depressus			20	20	XY	160
Aphodius distinctus			20	20	XY	125
Aphodius distintus			20	20	XY	160
Aphodius elevatus				20		125
Aphodius erraticus			20	20	XY	162
Aphodius fasciatus			20	20	XY	158
Aphodius fimetarius			20	20	XY	163
Aphodius foetens				20		159
Aphodius foetidus				20		159
-B chromosomes						
Aphodius fossor			20	20	XY	162
Aphodius haemorrhoidalis			20	20	XY	162
Aphodius lapponum			20	20	XY	158
Aphodius lineolatus			20	20	XY	160
Aphodius lividus			20	20	XY	164
-B chromosomes						
Aphodius luridus			20	20	XY	160
Aphodius moestus			22	22	XY	125
-B chromosomes						
Aphodius nemoralis			20			158
Aphodius niger			20	20	XY	165
-B chromosomes						
Aphodius obliteratus			20	20	XY	160
Aphodius paganettii			20	20	XY	165
Aphodius paykulli			20	20	XY	160
Aphodius pedellus			20	20	XY	163
-B chromosomes						
Aphodius plagiatus			20	20	XY	165
Aphodius prodromus			20	20	XY	161
Aphodius pseudolividus			20	20	XY	164
Aphodius pusillus				20		124
Aphodius rufipes			20	20	XY	160
Aphodius rufus			20	20	Xyp	158
Aphodius scrutator			20	20	XY	162
Aphodius sphacelatus			20	20	XY	161
Aphodius sticticus			20	20	XY	160
Aphodius subterraneus				20		125
Aphodius vittatus mundus			20	20	XY	158
Aphodius wilsonae			20	20	XY	165
-B chromosomes						
Apogonia carinata			20	20	Xyp	124
Apogonia ferruginea			20	19	XO	125
Apogonia nigricans			20	19	XO	125
			20	20	Xyp	125
Apogonia proxima			20	20	Xyp	124
Apogonia sp, nr. nigricans			20	19	XO	125
Apogonia sp.			22	21	XO	125
			20	20	Xyp	125
Apogonia unistraita			20	20	XY	125
Archophileurus vervex			16	16	NeoXY	45
Aserica pilula			20	20	Xyp	125
Aserica sp.			20	19	XO	125
Ataenius fossor			20	20	XY	125
Ataenius haemorrhoidalis			20	20	XY	125
Ataenius merdarius			20	20	XY	125

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Ataenius rufipus			20	20	XY	125
Ataenius rufus				20		125
Ataenius scrutator			20	20	XY	125
Ataenius spretulus				20		125
Atheuchus sp			16	16	XY	166
Athyreus excavatus			20	20	Xyp	125
Autoserica assamensis			30	30	XY	125
Autoserica sp.			18	18	Xyp	125
			20	20	Xyp	125
Bolbites onitoides			20	20	Xyp	45
Bothynus striatellus			20	20	Xyp	45
Bubas bison			20	20	XY	167
Bubas bubaloides			20	20	XY	167
Bubas bubalus			20	20	XY	167
-B chromosomes						
Caccobius schreberi			20	20	XY	168
			20	20	Xyp	125
Canthidium breve			18	18	Xyp	45
Canthochilum andyi			18	18	Xyp	1
Canthochilum hispidum			18	18	Xyp	1
Canthochilum histeroides			18	18	Xyp	1
Canthochilum oakleyi			18	18	Xyp	125
Canthon aff carbonarius			20	20	Xyp	169
Canthon chalybaeus			20	20	Xyp	169
Canthon indigaceus			18	18	Xyp	1
Canthon muticus			20	20	Xyp	45
Canthon septemmaculatus			20	20	Xyp	45
Canthon staigi			18	18	Xyp	166
Catharsius aff. Sagax			20	20	Xyp	1
Catharsius molossus			20	20	XY	1
			20	20	XY	125
			20	20	Xyp	125
Catharsius pithecius			20	20	Xyp	125
Catharsius sagax			20	20	Xyp	125
Catharsius sp1			18	18	Xyp	1
Catharsius sp2			20	20	Xyr	1
Catharsius sp3			20	20	Xyp	1
Cetonia aurata			20	20	XY	125
Cetonia aurataeformis				20		170
Cetonia roelofsi				20		125
Chalcosoma atlas			20	20	NeoXY	144
Cheironitis furcifer			20	20	XY	1
Chiron digitatus			20	20	XY	125
			20	20	Xyp	1
Chlorocala africana			14	14	XY	144
Clinteria spilota				20		125
Coenochilus trabecula			20	20	Xyp	125
Copris fricator			22	21	XO	125
Copris frictator			22	21	XO	1
Copris hispanus cavolinii				19		1
			18	18	XY	171
Copris hispanus hispanus			18	18	XY	171
			18	18	XY	167
Copris incertus			14	14	Xyp	125
Copris lugubris			14	14	Xyp	1
Copris lunaris			20	20	XY	167
Copris sinicus			14	14	Xyp	167
Copris sp.			14	14	Xyp	125
Copris tullius				20		125
Coprophanaeus cyanescens			20	20	Xyp	172
Coprophanaeus dardanus			20	20	XY	169
Coprophanaeus ensifer			20	20	XY	172
Cotalpa lanigera			20	20	XY	125
			20	20	Xyp	125
Cremastocheilus armatus			20	20	Xyp	125

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Cyclocephala insulicola			20	20	Xyp	173
Cyclocephala lutea			20	20	Xyp	45
Cyclocephala maffafa grandis		20	20	Xyp	173	
Cyclocephala melanocephala rubiginosa			20	20	XY	144
			20	20	Xyp	174
Cyclocephala putrida			20	20	Xyp	45
Cyclocephala tridentata dominicensis			20	20	XY	144
Cyclocephala tridentata tridentata			20	20	Xyp	173
Cyprolais hornimani			20	20	XY	144
Deltochilum aff amazonicum		14	14	NeoXY	169	
Deltochilum aff morbillosum			14		175	
Deltochilum calcaratum				14		175
			14	14	NeoXY	166
Deltochilum elevatum			20	20	Xyp	166
Deltochilum morbillosum			14	14	NeoXY	166
Deltochilum valgum			14	14	NeoXY	45
Deltochilum verruciferum			20	20	Xyp	176
Diabroctis mimas			20	20	XY	169
			20	20	Xyp	177
Dichotomius aff mundus			18	18	Xyp	178
Dichotomius aff sericeus			18	18	Xyp	178
Dichotomius affinis			18	18	Xyp	178
Dichotomius bos			18	18	Xyp	45
Dichotomius bosqui				20		45
Dichotomius carolinus			20	20	Xyp	1
Dichotomius crinicollis			18	18	Xyp	178
Dichotomius depresicollis			18	18	Xyp	178
Dichotomius geminatus			18	18	Xyp	179
-B chromosomes						
			18	18	Xyp	178
Dichotomius laevicollis			18	18	Xyp	178
Dichotomius mormon			18	18	Xyp	178
Dichotomius nisus			18	18	Xyp	180
Dichotomius semianeus			18	18	Xyp	178
Dichotomius semisquamosus			18	18	Xyp	180
Dichotomius sericeus			18	18	Xyp	178
			18	18	Xyr	180
Dichotomius sp			18	18	Xyp	178
Dichranocephalus wallichii			20	20	XY	144
Dicronorhina derbyana			20	20	XY	144
Dicronorhina derbyana oberthuri		20	20	XY	144	
Dicronorhina micans			20	20	XY	144
Digitonthophagus bonasus			20	20	Xyr	1
Digitonthophagus gazella			20	20	XY	168
-B chromosomes						
			20	20	Xyp	169
			20	20	Xy/Xyp/Xyr	166
Diloboderus abderus			20	20	Xyp	45
Diplotaxis obscura			20	20	Xyp	125
Diplotaxis sierrae			20	20	Xyp	125
Diplotaxis sp.			20	20	Xyp	125
Dynamopus athleta			22	22	Xyp	125
Dynastes hercules hercules			18	18	NeoXY	181
Dynastes tityus			18	18	NeoXY	144
Dyscinetus bidentatus			20	20	Xyp	45
Dyscinetus gagates			20	20	Xyp	45
Dyscinetus rugifrons			20	20	Xyp	45
Ectinohoplia rufipes			20	20	Xyr	125
Enema pan			18	18	Xyp	45
Eophileurus chinensis				20		125
Eophileurus platypterus			20	20	Xyp	125
Epicometis hirta			20	20	XY	125
			20	20	Xyp	125
-B chromosomes						
Epicometis squalida			20	20	Xyp	125

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Eucranium arachnoides			18	18	Xyp	45
Eudicella aethiopica			20	20	XY	144
Eudicella gralli			20	20	XY	144
Eudicella smithi			20	20	XY	144
Euetheola humilis			20	20	Xyp	45
Euonticellus fulvus			20	20		168
Euonticellus pallipes			20	20	XY	168
Euothonphagus amyntas			20	20	XY	168
-B chromosomes						
Euothonphagus atramentarius		20	20	XY	168	
Euphoria inda			20	20	Xyp	125
Euphoria lurida			20	20	Xyp	45
Eurysternus caribaeus			8	8	NeoXY	182
Exomala hirtella			20	20	XY	144
Geniates borelli			20	20	Xyp	183
Glycyphana fulvistemma			20	20	XY	125
Glyphoderus sterquilinus			18	18	Xyp	45
Gnorimus nobilis			20	20	XY	144
Gnorimus variabilis					NeoXY	49
Goliathus goliathus			20	20	XY	144
Gromphas lacordairei			20	20	Xyp	45
Gymnetis pantherina			20	20	XY	144
Gymnopleurus cyaneus			20	20	Xyp	1
Gymnopleurus geoffroyi			20	20	Xyp	167
Gymnopleurus koenigi			20	20	Xyp	125
Gymnopleurus sturmi			20	20	XY	184
Haplidia etrusca			18	18	NeoXY	125
Haplidia transversa			20	20	XY	144
Heliocopris bucephalus			20	20	XY	1
Heliocopris gigas			20	20	Xyp	167
Holotrichia longipennis			18	18	Xyp	125
Holotrichia problematica			20	20	Xyp	156
Holotrichia serrata			20	20	Xyp	125
Hoplia communis				20		125
Hoplia uniformis			20	20	XY	144
Isocopris inhiatus			18	18	Xyp	177
Jumnos ruckieri			14	14	NeoXY	185
Lachnosterna longipennis			20	20	Xyp	156
Leucothyreus guadulpiensis			20	20	XY	144
Leucothyreus nolleti			20	20	XY	144
Ligyrodes relictus			20	20	Xyp	125
Ligyrus cuniculus			20	20	Xyp	173
Ligyrus gibbosus burmeisteri		20	20	Xyp	45	
Lygirus ebenus			20	20	Xyp	183
Lyogenys fuscus				20		186
Macraspis dichroa cribata			18	18	Xyp	45
Macraspis festiva			18	18	Xyp	177
Macraspis moreo				20		187
Macraspis tristis			18	18	Xyp	188
Maladera alcocki			20	20	Xyp	156
Malagoniella aff astianax			20	20	Xyp	169
Mecynorrhina polyphemus confluens			20	20	XY	144
Mecynorrhina torquata			20	20	XY	144
Megalorrhina harrisi			20	20	XY	144
Megasoma actaeon			20	20	Xyp	173
Melolontha hippocastani			20	20	XY	125
Melolontha melolontha			20	20	XY	189
Melolontha pectoralis			20	20	XY	189
Microcopris doriae			20	20	Xyp	167
Microcopris hidakai			20	20	Xyp	167
Mimela glabra			20	20	Xyp	156
Mimela sp.			20	20	Xyp	125
Oniticellus fulvus				20		125
Oniticellus pallipes			20	20	Xyp	125
Onitis belial			20	20	XY	167

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Onitis crassus			20	20	Xyp	1
Onitis ion			20	20	XY	167
Onitis philemon			20	20	Xyp	125
Ontherus appendiculatus			20	20	Xyp	166
Ontherus sulcator			20	20	Xyp	45
Onthophagus albicornis			20	20	XY	168
Onthophagus amyntas				20		125
Onthophagus andalusicus italicus				20		125
Onthophagus bifasciatus			20	20	Xyp	156
Onthophagus catta			20	20	Xyp	125
			20	20	Xyr	1
Onthophagus coenobita			20	20	XY	168
Onthophagus crassus			20	20	Xyp	125
Onthophagus dama			20	20	Xyr	125
Onthophagus fracticornis			20	20	XY	190
Onthophagus furcatus			20	20	XY	168
Onthophagus hecate			20	20	Xyp	125
Onthophagus hirculus			20	20	Xyp	45
Onthophagus hirtus			20	20	XY	168
Onthophagus illyricus			20	20	XY	168
Onthophagus joannae			20	20	XY	168
Onthophagus lemur				20		125
Onthophagus lucidus			20	20	XY	168
Onthophagus maki			20			168
Onthophagus marginicollis			20	20	Xyp	1
Onthophagus massai			20	20	XY	171
Onthophagus mopsus			20	20	Xyp	125
Onthophagus mopsus gracillicornis			20	20	Xyp	1
Onthophagus nuchicornis				20		1
Onthophagus opacicollis			20	20	XY	190
Onthophagus ovatus			20	20	XY	168
Onthophagus pacificus			20	20	Xyp	156
Onthophagus pennsylvanicus			20	20	Xyp	125
Onthophagus punctatus				20		125
Onthophagus quaestus			20	20	Xyp	125
Onthophagus ramosellus			20	20	Xyp	125
Onthophagus rufescens			20	20	Xyp	1
Onthophagus ruficapillus			20	20	XY	168
Onthophagus similis			20	20	XY	190
-B chromosomes						
Onthophagus sp. 1			20	20	Xyp	1
Onthophagus sp. 2			20	20	Xyp	1
Onthophagus sp. 3			18	18	Xyp	1
Onthophagus sp. 4			18	18	Xyp	1
Onthophagus stylocerus			20	20	XY	168
Onthophagus taurus			20	20	XY	168
			20	20	Xyp	125
Onthophagus vacca			20	20	XY	168
-B chromosomes						
Onthophagus verticicornis				20		125
Onthophagus verticornis				20		1
Ophthalmo serica karafutoensis			18		125	
Orizabus cultripes			18	18	Xyp	125
Orphnus impressus			20	20	Xyp	125
Orphnus mysoriensis			20	20	Xyp	125
Oruscatus davus				20		45
Oryctes nasicornis			18	18	Xyp	125
			18	18	NeoXY	144
Oryctes rhinoceros			20	20	Xyp	125
Osmoderma eremita			18	18	NeoXY	144
-B chromosomes						
Osmoderma lassallei			18	18	NeoXY	144
Osmoderma scabra			18	18	NeoXY	49
-B chromosomes						
Oxysternon silenus			20	19	XO	169

Taxa	**Sexual System**	**Ploidy**	**Female 2n**	**Male 2n**	**Sex Chrom. Karyotype**	**Source**
Oxythyrea funesta			20	19	XO	44
			20	20	XY	125
Paracopris ramosiceps			18	18	Xyp	167
Paragymnopleurus sinuatus			18	18	Xy+	1
Pelidnota pallidipennis			20	20	Xyp	183
Pelidnota punctata			20	20	XY	125
Pelidnota sumptuosa			20	20	Xyr	187
Pentodon bidens punctatus			20	19	XO	191
Pentodon bispinifrons			20	20	Xyp	125
Pentodon idiota			20	20	XY	144
Pentodon sp.			20	19	XO	125
Phalops divisus			20	20	Xyp	128
Phalops olivaceous			20	20	Xyp	128
Phanaeus aff yucatanus			14	14	Xyp	1
Phanaeus chalcomelas			12	12	XY	169
Phanaeus daphnis			12	12	NeoXY	1
Phanaeus ensifer				20		187
Phanaeus igneus			12	12	XY	125
Phanaeus mexicanus			12	12	NeoXY	1
Phanaeus splendidulus			20	20	Xyp	166
Phanaeus vindex			12	12	XY	125
			12	12	NeoXY	125
Phileurus didymus			16	16	NeoXY	144
Phileurus sp.				14		187
Phileurus valgus guadulpiensis		20	20	XY	144	
Phyllognathus dionysius			20	20	Xyp	125
Phyllognathus silensis			18	18	NeoXY	125
Phyllopertha campestris			20	20	XY	125
Phyllophaga aff capillata				20		186
Phyllophaga anxia				20		125
Phyllophaga delata			20	20	XY	125
Phyllophaga drakii				20		125
Phyllophaga fusca			20	20	XY	125
Phyllophaga gracilis			20	20	XY	125
Phyllophaga pleei			20	20	XY	189
Phyllophaga sandersoniella			20	20	XY	144
Phyllophaga sp. crenulata group		20			125	
Phyllophaga tristis			20	20	XY	125
Phyllophaga vestita				20		186
Plaesiorrhinella watkinsiana			20	20	XY	144
Pocalta ursina			20	20	XY	125
Popillia japonica			18	18	XY	125
Propomacrus bimucronatus			20	20	XY	144
Protaetia aeruginosa				20		170
Protaetia angustata			20	20	XY	144
Protaetia aurichalcea			20	20	XY	144
Protaetia cuprea bancoi				20		170
Protaetia cuprea cuprea				20		170
Protaetia cuprea metallica			20	20	XY	170
Protaetia cuprea obscura			20	20	XY	170
Protaetia fieberi			20	20	XY	170
Protaetia lugubris			20	20	XY	170
Protaetia mirifica			20	20	XY	170
Protaetia morio			20	20	XY	170
Protaetia oblonga				20		170
Protaetia opaca			20	20	XY	170
Protaetia speciosa			20	20	XY	170
Psammodius oregonesis			20	20	Xyp	125
Psammoporus sabuleti			20	20	XY	127
Rhamphorrhina bertolonii			20	20	XY	144
Rhinyptia indica			20	20	Xyp	156
Rhomborrhina polita				20		125
Rhomborrhina unicolor				20		125
Rutela striata			20	20	XY	144
Scarabaeidae nr. Autoserica and Neoserica		20	20	Xyp	125	

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Scarabaeus cristatus			20	20	Xyp	167
Scarabaeus laticollis			20	20	XY	125
			20	20	Xyp	167
Scarabaeus sacer			20	20	Xyp	125
Scarabaeus semipunctatus			20	20	Xyp	125
Schizonycha fuscescens			20	20	Xyp	125
Schizonycha ruficollis			20	20	Xyp	125
			22	22	Xyp	125
Serica assamensis			20	20	Xyp	156
Serica falli			20	20	Xyp	125
Serica sericea			20	20	Xyp	125
Serica tristis			20	20	Xyp	125
Serica umbrinella			20	20	Xyp	156
Sisyphus schaefferi			20	20	XY	1
Stephanorrhina guttata			20	20	XY	144
Stephanorrhina princeps			20	20	XY	144
Strategus surinamensis hirtus		20	20	Xyp	183	
Strategus syphax			20	20	XY	144
			20	20	Xyp	173
Strategus validus				20		187
Sulcophanaeus imperator			20	20	NeoXY	45
Sulcophanaeus menelas			20	20	NeoXY	45
Tiniocellus spinipes			24	24	Xyp	125
Trichiotinus assimilis			20	20	Xyp	125
Trichius fasciatus			20	20	XY	125
Trichius rosaceus zonatus			20	20	XY	144
Trichius sexualis			20	20	XY	144
Trichius succinctus				20		125
Trichius zonatus			20	20	XY	125
Tropinota hirta				20		170
-B chromosomes						
Xylotrupes gideon			20	20	XY	144
Scolytidae						
Blastophagus minor			26	26	Xyp	1
			30	30	Xyp	1
Blastophagus pinierda			26	26	Xyp	1
			30	30	Xyp	1
Cactopinus desertus			24	23	XO	1
Coccotrypes dactyliperda						192
-type of HD not specified						
Coccotrypes declivis	haplodiploid				193	
-based on one brood						
Coccotrypes graniceps	haplodiploid				194	
-type of HD not specified						
Conopthorus coniperda			20	20	NeoXY	1
Conopthorus resinosae			18	18	XY	1
Conopthorus sp. 1				18		1
Cryphalus abietis			26	26	Xyp	1
Cryphalus piceae			26	26	Xyp	1
Crypturgus pusillus			26	26	Xyp	1
Dendroctonus adjunctus			14	14	NeoXY	1
Dendroctonus approximatus			12	12	NeoXY	1
Dendroctonus brevicomis			12	12	NeoXY	1
Dendroctonus frontalis			16	16	Xyp	1
Dendroctonus jeffreyi			24	24	NeoXY	195
-B chromosomes						
Dendroctonus mexicanus			12	12	Xyp	196
Dendroctonus murrayanae			30	30	Xyp	1
Dendroctonus parallelocollis			28	28	Xyp	196
Dendroctonus ponderosae			24	24	NeoXY	195
Dendroctonus pseudotsugae			30	30	Xyp	1
Dendroctonus punctatus			32	32	Xyp	1
Dendroctonus rhizophagus			28	28	Xyp	196
Dendroctonus rufipennis			30	30	Xyp	1
Dendroctonus simplex			30	30	Xyp	1

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Dendroctonus terebrans			26	26	Xyp	1
Dendroctonus valens			28	28	Xyp	1
Dryocoetes affaber			28	28	Xyp	1
Dryocoetes autographus			26	26	Xyp	1
			28	28	Xyp	1
Hylastes angustatus			26	26	Xyp	1
Hylastes ater			26	26	Xyp	1
Hylastes cunicularius			26	26	Xyp	1
Hylastes varius			26	26	Xyp	1
Hylurgops glabratus			26	26	Xyp	1
Hylurgops palliatus			26	26	Xyp	1
Hylurgops pinifex			30	30	Xyp	1
Hypothenemus hamperi	PGE		14	14		197
-in males one set of chromosomes is always highly condensed						
			14	15	XXY	1
-Subsequent studies failed to replicate						
Ips acuminatus			16	16	Xyp	1
Ips avulsus			34	32	Xyp	1
-B chromosomes						
Ips bonanseai			32	32	Xyp	1
Ips borealis			32	32	Xyp	1
Ips calligraphus calligraphus		32	32	Xyp	1	
Ips calligraphus ponderosae		32	32	Xyp	1	
Ips concinnus			16	16	Xyp	1
Ips confusus			32	32	Xyp	1
Ips cribricollis			32	32	Xyp	1
Ips emarginatus			32	32	Xyp	1
Ips hoppingi			32	32	Xyp	1
Ips hunteri			32	32	Xyp	1
Ips integer			32	32	Xyp	1
Ips interstitialis			32	32	Xyp	1
Ips knausi			32	32	Xyp	1
Ips latidens			20	20	Xyp	1
Ips lecontei			32	32	Xyp	1
Ips mexicanus			16	16	Xyp	1
Ips montanus			32	32	Xyp	1
Ips Ochagnoni Sw.O			32	32	Xyp	1
Ips paraconfusus			32	32	Xyp	1
Ips perroti			32	32	Xyp	1
Ips pertubatus	parth		48			1
			32	32	Xyp	1
Ips pilifrons			32	32	Xyp	1
Ips pini			30	30	Xyp	1
			32	32	Xyp	1
Ips pini (=oregonis Eichh.)			32	32	Xyp	1
Ips plastographus maritimus		32	32	Xyp	1	
Ips plastographus plastographus			32	32	Xyp	1
Ips sexdentatus			26	26	Xyp	1
Ips spinifer			20	20	Xyp	1
Ips tridens	parth		48			1
			32	32	Xyp	1
Ips typographus			26	26	Xyp	1
			30	30	Xyp	1
Ips woodi			32	32	Xyp	1
Leperisinus pruinosis			26	26	Xyp	1
Orthotomicus caelatus			22	22	Xyp	1
Orthotomicus erosus			16	16	Xyp	1
Orthotomicus laricis			16	16	Xyp	1
Orthotomicus proximus			14	14	Xyp	1
Orthotomicus sabinianae					Xyp	1
Orthotomicus suturalis			16	16	Xyp	1
Phloeotribus scarabaeoides			26	26	XY	1
Pityogenes bidentatus			16	16	Xyp	1
Pityogenes chalcographus			16	16	Xyp	1
			20	20	Xyp	1

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Pityogenes crannulatus			18	18	Xyp	1
Pityogenes fossifrons			20	19	XXY	1
- XpneoXneoYp						
Pityogenes hopkinsi			20	20	Xyp	1
Pityogenes knechteli			20	20	Xyp	1
Pityogenes quadridens			16	16	Xyp	1
			20	20	Xyp	1
Pityokteines ornatus			18	18	Xyp	1
Pityphthorus lichtensteini			26	26	Xyp	1
Pityphthorus sp. 1				28		1
Polygraphus grandiclava			16	16	Xyp	1
Polygraphus jezoensis				24		1
Polygraphus poligraphus			16	16	Xyp	1
Polygraphus rugipennis			12	12	Xyp	1
Polygraphus subopacus			16	16	Xyp	1
Scolytus dahuricus			22	22	Xyp	1
Scolytus mali			12	12	Xyp	1
			16	16	Xyp	1
Scolytus multistriatus			12	12	Xyp	1
Scolytus ratzeburgi			16	16	Xyp	1
Scolytus rugulosus			16	16	Xyp	1
Trypodendron lineatum			26	26	Xyp	1
Xyleborus dispar				40		1
Xylosandrus affinis	haplodiploid				193	
-evidence: sex ratio and/or all male broods						
Xylosandrus compactus	haplodiploid	20	10		1	
-type of HD not specified						
Xylosandrus dispar	haplodiploid				193	
-evidence: sex ratio and/or all male broods						
Xylosandrus ferrugineus	haplodiploid				193	
-evidence: sex ratio and/or all male broods						
Xylosandrus germanus	haplodiploid	16	8		1	
-type of HD not specified						
Silphidae						
Nicrophorus sayi			14	13	XO	198
Nicrophorus vespilloides			14	13	XO	198
Phosphuga atrata			34	34	Xyp	198
Silpha americana			40	40	XY	198
Silpha noveboracensis			26	26	Xyp	198
Silpha perforata			40	40	XY	198
Silpha surinamensis			26	26	Xyp	1
Thanatophilus sinuatus			26	26	Xyp	198
Silvanidae						
Ahasverus advena			18	18	Xyp	1
Oryzaephilus mercator			18	18	Xyp	1
Oryzaephilus surinamensis			18	18	Xyp	1
Staphylinidae						
Aleochara sp.			18	18	NeoXY	198
Batrisodes globosus			28	28	Xyp	1
Creophilus maxillosis villosus		36	36	XY	198	
Creophilus maxillosus			40	40	Xyp	45
Nudobius cephalus			28	28	Xyp	198
Ontholestes cingulatus			26	26	Xyp	198
Philonthus fuscipennis			24	24	Xyp	198
Philonthus intermedius			56	56	Xyp	198
Philonthus politus			40	40	Xyp	198
Philonthus varius			32	31	XO	198
Platyprosophus tamulus			20	20	XY	198
Pselaphus fustifer			30	30	Xyp	1
Quedius fuliginosus			34	33	XO	198
Staphylinus sp.			40	40	Xyp	45
Staphylinus violaceus			44	44	XY	198
Tachinus lignorum			26	26	XY	198
Stenotrachelidae						
Cephaloon lepturides			18	18	Xyp	1

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Tenebrionidae						
Adesmia biskrensis			18	18	Xyp	199
Adesmia cancellata			20	20	Xyp	199
Adesmia metallica			18	18	Xyp	199
Adesmia montana			20	20	XY	200
Aemymone cariosa			18	18	Xyp	45
Agapanthia korostelevi			20	20	Xyp	107
Agapanthia walteri			20	20	Xyp	107
Akis acuminata			16	16	NeoXY	199
Akis bacarozzo			16	16	NeoXY	199
Akis bremeri			16	16	NeoXY	199
Akis discoidea			16	16	NeoXY	199
Alobates pennsylvanica			20	20	Xyp	199
Alphasida depressa			20	20	Xyp	199
Alphasida ibicensis				20		199
Alphasida sp.			18	18	Xyp	199
Alphitobius diaperinus			20	19	XO	199
Alphitobius pliceus			20	20	Xyp	199
Alphitobius sp.			20	20	Xyp	199
Ammobius rufus			20	20	Xyp	199
Arthrodeis curtus			20	20	Xyp	199
Arthrodeis inflatus			20	20	Xyp	199
Arthrodeis punctulatus			20	20	Xyp	199
Arthromacra aenea			14	14	NeoXY	1
Asida cardonae			20	20	Xyp	201
Asida glacialis			20	20	Xyp	201
Asida glacialis rustica			20	20	Xyp	201
Asida jurinei			20	20	Xyp	199
Asida maraguesi			20	20	Xyp	201
Asida planipennis			20	20	Xyp	199
Belopus elongatus				20		199
Blaps bedeli torres-salai				34	XXXY	201
Blaps cribrosa				36		199
Blaps gibba			44	38	XXXXXXXY	202
Blaps gigas			38	35	XXXXY	202
Blaps judaeorum				19	XXY	199
				21	XXY	199
Blaps lethifera				37	XXY	199
Blaps lusitanica				19	XXY	199
				35	XXXXY	199
Blaps mortisaga				36	XXXY	199
Blaps mucronata				36	XXXY	199
Blaps sulcata				34	XXXY	199
Blaps tenuicollis				36	XXXXYY	199
Blaps waltli				34	XXXY	199
Blaps wiedemanni				25	XXXXY	199
Blapstinus sp.			20	20	Xyp	199
Bolitopherus cornutus			20	19	XO	199
Caenoblaps nitida				35	XXY	199
Clitobius ovatus opacus			20	20	Xyp	199
Coelometopus clypeatus				20		201
Cossyphus depressus			18	18	Xyp	199
Cossyphus hoffmannseggi				18		199
Cryptycus gibbulus			20	20	Xyp	199
Cynaeus angustus			20	20	Xyp	199
Dailognatha pumila			20	20	Xyp	107
Derosphaerus cribum			20	20	Xyp	199
Diaperis boleti			14	14	NeoXY	199
Diastolinus fortipes			26	26	Xyp	45
Elenophorus collaris			26	26	Xyp	199
Eleodes armata			20	20	NeoXY	199
Eleodes cordata			20	20	NeoXY	199
Eleodes dentipes			20	20	NeoXY	199
Erodius emondi			20	20	Xyr	199
Erodius emondi laevis			20	20	Xyp	199

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Erodius exilipes			20	20	Xyp	199
Erodius lefranci			20	20	Xyp	199
Erodius nitidicollis			20	20	Xyr	199
Erodius orientalis			20	20	Xyp	199
Eulabris sp.			20	20	Xyp	199
Glabrasida goudoti			20	20	Xyp	201
Glabrasida melillense			18	18	Xyp	199
Glabrasida zapateri			20	20	Xyp	201
Gnaptor spinimanus			38	36	XXXY	49
Gnathocerus cornutus			20	20	Xyp	199
Gnathocerus maxillosus			20	20	Xyp	199
Gonocephalum bilineatum			20	20	Xyp	199
Gonocephalum depressum			20	20	Xyp	199
Gonocephalum dorsogranosum		20	20	Xyp	199	
Gonocephalum elongatum			20	20	Xyr	199
Gonocephalum hoffmannseggi		20	20	Xyp	199	
Gonocephalum oblongum			20	20	Xyp	199
Gonocephalum parallelum			20	20	XY	199
Gonocephalum patruele			20	20	Xyp	199
Gonocephalum rusticum			20	20	Xyp	199
Gonocephalum sp.			20	20	Xyp	199
Gonocephalum vagum			20	20	Xyp	199
Hegeter amaroides			20	20	Xyp	199
Hegeter brevicollis			20	20	Xyp	199
Hegeter costipennis			20	20	Xyp	199
Hegeter fernandezi			20	20	Xyp	199
Hegeter grancanariensis			20	20	Xyp	199
Hegeter lateralis			20	20	Xyp	199
Hegeter politus			20	20	Xyp	199
Hegeter tenuipunctatus			20	20	Xyp	199
Hegeter transversus			20	20	Xyp	199
Hegeter tristis			20	20	Xyp	199
Himatismus fasciculatus			20	20	Xyp	199
Hoplobrachium asperipenne			22	22	Xyp	199
Hoplobrachium dentipes			22	22	Xyp	199
Hylocrinua sp.			20	20	Xyp	199
Isocerus balearicus			20	20	Xyp	199
Isomira quadrastriata			20	20	Xyp	1
Isomira sp. 1			20	20	Xyp	1
Isomira variabilis			14	14	Xyp	1
Laena reitteri			18	18	Xyp	203
-B chromosomes						
Latheticus oryzae			20	20	Xyp	199
Leptonychus curvicornis			20	20	Xyp	199
Melanochrus blairi			20	20	Xyp	199
Melanochrus lacordairei			20	20	Xyp	199
Mesomorphus villiger			20	19	XO	199
Mesostema angustata praesahariana			20	20	Xyr	199
Mesostema lineatopunctata			20	20	Xyp	199
Misolampus goudoti erichsoni		20	20	Xyp	199	
Misolampus subglaber			20	20	Xyp	201
Morica hybrida			16	16	NeoXY	199
Morica planata			16	16	NeoXY	199
Navicularis latihumeralis			20	20	Xyp	199
Nesotes conformis grancanariensis			20	20	Xyp	199
Nesotes gomerensis			20	20	Xyp	199
Nesotes picescens			20	20	Xyp	199
Nesotes porrectus			20	20	Xyp	199
Nesotes viridicollis			20	20	Xyp	199
Nyctelia rugosa			18	18	Xyp	45
Nyctelia sp.			18	18	Xyp	45
Nyctobates gigas			18	18	NeoXY	204
Opatrinus aciculatus			20	20	Xyp	199
Opatrinus validus			20	20	Xyp	199
Opatroides vicinus			20	20	XY	199

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
			20	20	Xyp	199
				21	Xyy	205
Oxycara mellyi			20	20	Xyp	199
Oxycarops fuscipes			22	22	Xyp	199
Pachycera buprestroides			20	20	Xyp	199
Pachychila dejeani			20	20	Xyp	199
Pachychila frioli			20	20	Xyp	199
Pachychila germari haroldi			20	20	Xyp	199
Pachychila sublunata			20	20	Xyp	199
Pachyscelis musiva			18	18	Xyp	107
Paivaea hispida			20	20	Xyp	199
Palembus dermestoides			20	20	Xyp	206
Palorus subdepressus			20	20	Xyp	199
Phaleria acuminata			20	20	Xyp	199
Phaleria variabilis			20	20	Xyp	199
Phylan abbreviatus			20	20	Xyp	199
Phylan gibbulus			20	20	Xyp	199
Phylan mediterraneus			20	20	Xyp	199
Phylan nitidicollis			26	26	Xyp	199
Phylan obesus			20	20	Xyp	199
Phylan semicostatus			26	26	Xyp	199
Pimelia angulata latesti			18	18	Xyr	199
Pimelia aranacea			18	18	Xyr	199
Pimelia ascendens			18	18	Xyp	207
Pimelia atlantis atlantis			18	18	Xyp	207
Pimelia atlantis frigioides			18	18	Xyp	207
Pimelia baetica			18	18	Xyp	207
Pimelia bipunctata			18	18	Xyr	199
Pimelia boyeri			18	18	Xyp	207
Pimelia canariensis			18	18	Xyp	207
Pimelia capito			18	18	Xyp	107
Pimelia cephalenica			18	18	Xyp	199
Pimelia costata			18	18	Xyp	207
Pimelia cribra			20	20	Xyp	207
Pimelia echidna			18	18	Xyp	207
Pimelia elevata			20	20	Xyp	207
Pimelia estevezi			18	18	Xyp	207
Pimelia fernandez-lopezi			18	18	Xyp	207
Pimelia fornicata			18	18	Xyp	207
Pimelia grandis echidniformis		20	20	Xyp	199	
Pimelia grandis latesti			18	18	Xyr	199
Pimelia granulicollis			18	18	Xyp	207
Pimelia grossa			18	18	Xyp	199
Pimelia inexpectata			18	18	Xyp	199
Pimelia integra			18	18	Xyp	207
Pimelia interjecta			20	20	Xyp	207
Pimelia interstitialis			18	18	Xyr	199
Pimelia laevigata costipennis		18	18	Xyp	207	
Pimelia laevigata laevigata			18	18	Xyp	207
Pimelia laevigata validipes			18	18	Xyp	207
Pimelia lutaria			18	18	Xyp	207
Pimelia maura			18	18	Xyp	207
Pimelia mauritanica			18	18	Xyp	199
Pimelia modesta			18	18	Xyp	199
Pimelia monticola			18	18	Xyp	207
Pimelia radula ascendens			18	18	Xyp	199
Pimelia radula oromii			18	18	Xyp	207
Pimelia radula radula			18	18	Xyp	207
Pimelia rugosa			18	18	Xyp	207
Pimelia scabricollis			18	18	Xyp	199
Pimelia scabrosa			18	18	Xyp	207
Pimelia sericella			18	18	Xyp	199
Pimelia servilei			18	18	Xyr	199
Pimelia sparsa albohumeralis		18	18	Xyp	207	
Pimelia sparsa serrimargo			18	18	Xyp	207

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Pimelia sparsa sparsa			18	18	Xyp	207
Pimelia subquadrata valdani		18	18	Xyr	199	
Pimelia variolosa			18	18	Xyp	207
Platydema impressifrons			20	20	Xyp	199
Platynotus excavatus			20	20	Xyp	199
Platynotus punctatipennis			20	20	Xyp	199
Praocis compacta			20	20	Xyp	199
Probaticus ebeninus			20	20	Xyp	201
Pseudoblaps meteeyi			20	20	Xyp	199
Pseudolamus seriatoporus			20	20	Xyp	199
Rhytinota sp.			20	20	Xyp	199
Scaurus punctatus			20	20	NeoXY	199
Scaurus striatus			24	24	NeoXY	199
Scaurus vicinus			24	24	NeoXY	199
Scleron asperulum			20	20	NeoXY	199
Scleron ganutipenne			22	22	Xyp	199
Scleron reitteri			22	22	Xyp	199
Scleron sp.			20	20	XY	199
			22	22	Xyr	199
Scotobates calcaratus			18	18	NeoXY	199
Scotobius miliaris			14	14	Xyp	199
Scotobius muricatus			18	18	Xyp	45
Scotobius tristis			18	18	NeoXY	199
Sitophagus holoeptoides			20	20	Xyp	199
Sphaenariopsis impolita			20	20	Xyp	199
Sphaenariopsis tristis			20	20	Xyp	199
Spyrathus sp.			20	20	Xyp	199
Stenosis intricata			20	20	Xyp	199
Tenebrio molitor			20	20	XY	199
			20	20	Xyp	199
			20	20	Xyr	199
Tenebrio obscurus			20	20	Xyr	199
Tenebrio picipes			20	20	Xyp	199
Tentyria grossa			20	20	Xyp	199
Tentyria laevis			20	20	Xyp	199
Tentyria latreillei			20	20	Xyp	199
Tentyria mucronata			20	20	Xyp	199
Tentyria ophiusae			20	20	Xyp	199
Tentyria rotunda			20	20	Xyp	199
Tentyria schaumi			20	20	Xyp	199
Tentyria subcosta			20	20	Xyp	199
Trachycelis aphodiodes			22	22	Xyp	199
Tribolium anaphe				18		208
Tribolium audax			20	20	Xyp	199
-B chromosomes						
Tribolium brevicornis				18		208
Tribolium castaneum			20	20	Xyp	199
Tribolium confusum			18	18	NeoXY	199
Tribolium destructor			18	18	NeoXY	199
Tribolium freemani			20	20	Xyp	199
Tribolium madens			20	20	XY	199
-B chromosomes						
Uloma impressicollis			20	20	Xyp	45
Upis ceramboides			20	20	Xyp	199
Uyttenboogaartia punctipennis		20	20	Xyp	199	
Zophobas aff. confusus			20	20	Xyp	204
Zophosis bicarinata			20	20	Xyp	199
Tetratomidae						
Penthe obliquata			16	16	XY	1
			16	16	NeoXY	1
Torridincolidae						
Ytu zeus			20	20	Xyp	209
-B chromosomes						
Trachypachidae						
Trachypachus holmbergi			38	37	XO	210

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Trachypachus slevini			38	37	XO	210
Trogidae						
Trox borrei			20	20	Xyp	45
Trox costatus			20	20	Xyp	156
Trox foveicollis			20	20	Xyp	125
Trox granulatus			20	20	Xyp	125
Trox monachus			20	20	Xyp	125
Trox omacanthus			20	20	Xyp	125
Trox oricensis			20	20	Xyp	125
Trox punctatus			20	20	Xyp	125
Trox scaber			20	20	Xyp	125
Trox scutellaris			20	20	Xyp	125
Trox spinulosus dentibius			20	20	Xyp	125
Trogossitidae						
Lophoceters pusillus			18	18	Xyp	1
Tenebroides mauritanicus			24	24	Xyp	1
Zopheridae						
Zopherus haldemani			16	16	XY	199
Dermaptera						
Arixenidae						
Arixenia esau			60	60	XY	252
Forficulidae						
Anechura bipunctata			24	24	XY	252
Apterygida albipennis			24	24	XXXY	252
Forficula auricularia			24	24	XXY	253
Forficula auricularia			24			253
Forficula auricularia			24	24	XY	253
Forficula auricularia			25		XXY	253
Forficula auricularia				25	XXY	253
Forficula auricularia			26	25	XXY	253
Forficula auricularia			26		XXY	253
Forficula scudderi			24	24	XY	254
Forficula smyrnensis			29	21	XXY	254
Forficula sp			28	27	XXY	255
Forficula auricularia			24	24	XXY	252
Forficula auricularia			24	24	XXY	252
Forficula auricularia			24	25	XXY	252
Forficula scudderi			24	24	Xyy	252
Forficula smyrnensis			22	21	XXY	252
Pseudochelidura sinuata			26	25	XXY	252
Hemimeridae						
Hemimerus bouvieri			8	7	XXY	252
Labiduridae						
Anisolabis annuipes			26	25	complex XY	253
Anisolabis marginalis			26	25	XXY	252
Anisolabis maritima			26	25	XXY	252
Anisolabis sp			44	42	XXXY	252
Euborellia annulipes			26	25	XXY	252
Euborellia moesta			26	25	XXY	252
Euborellia stali			26	25	XXY	252
Gonolabis brunneri			24	24	XXY	252
Labidura bengalensis			14	14	XY	253
Labidura riparia			12	12	XY	256
Labidura riparia			12	12	XXY	257
Labidura truncata			10	10	XXY	258
Labidura bidens			12	12	XY	252
Labidura riparia			14	14	XY	252
Labidura truncata			10	10	XY	252
Nala lividipes			34	34	XY	252
Nala lividipes			40	40	XXY	252
Nala lividipes			38	37	XXY	252
Notolabis occidentalis			24	24	XY	252
Parisopsalis spryi			34	32	XXXY	252
Labiidae						
Chaetospania brunner			34	31	XXXXY	252

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Chaetospania sp.1			22	21	XXY	252
Chaetospania sp.2			22	21	XXY	252
Labia minor			14	14	XXY	252
Labia sp.			18	18	XY	252
Nesogaster erichsoni			22	21	XXY	252
Nesogaster halli			22	19	XXY	252
Prolabia arachidis			40	38	XXXY	252
unknown Sp.			38	37	XXY	252
Pygicranidae						
Dacnodes shortridgei			12	11	XXY	252
Diplatys gladiator			18	18	XY	255
unknown sp.			20	20	XXY	252
Diptera						
Agromyzidae						
Amauromyza flavifrons			6	6	XY	259
Amauromyza verbasci			6	6	XY	259
Cerodontha angulata			6	6	XY	259
Cerodontha eucaricis			12	12	XY	259
Cerodontha ireos			12	12	XY	259
Cerodontha pseuderrans			12	12	XY	259
Cerodontha scirpi			12	12	XY	259
Cerodontha spinata			12	12	XY	259
Cerodontha vignae			12	12	XY	259
Phytomyza abdominalis			10	10		259
Phytomyza crassiseta			12	12	XY	259
Phytomyza crassiseta	parth	3	18			259
Phytomyza ilicis			12	12	XY	259
Phytomyza plantaginis	parth					260
Phytomyza primulae			12	12	XY	259
Anisopodidae						
Mycetobia pallipes			6	6	XY	261
Anthomyiidae						
Achaetella varipes			12	12	XY	262
Cordilura ciliata			12	12	XY	262
Cordilura ontario			12	12	XY	262
Fucellia marina			12	12	XY	263
Fucellia merina			12	12	XY	262
Homalomya sp			12	12	XY	263
Hydrophoria conica			12	12	XY	262
Hylemya antiqua			12	12	XY	264
Hylemya antiqua			12	12	XY	262
Hylemya brassicae			12	12	XY	264
Hylemya brassicae			12	12	XY	262
Hylemya cana			12	12	XY	264
Hylemya cana			12	12	XY	262
Hylemya cilicrura			12	12	XY	264
Hylemya cilicrura			12	12	XY	262
Hylemya crucifera			12	12	XY	264
Hylemya crucifera			12	12	XY	262
Hylemya echinata			12	12	XY	262
Hylemya floralis			12	12	XY	264
Hylemya floralis			12	12	XY	262
Hylemya florilegea			12	12	XY	262
Hylemya fugax			14	13	XXY	265
Hylemya fugax			14	13	XXY	264
Hylemya planipalpus			12	12	XY	264
Hylemya planipalpus			12	12	XY	262
Hylemya trichodactula			12	12	XY	262
Hylemya trichodactyla			12	12	XY	264
Ophyra leucostoma			12	12	XY	263
Orthochaeta hirtipes			12	12	XY	262
Pegomya betae			12	12	XY	262
Pegomya bicolor			12	12	XY	262
Pegomya geniculata			12	12	XY	262
Pegomyia geniculata			12	12	XY	264

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Phorbia brassica			12	12	XY	262
Phorbia brassica			12	12	XY	266
Scatophaga pallida			12	12	XY	262
Scatophaga stercoraria			12	12	XY	262
Asilidae						
Asilus lecythus			14	14	XY	263
Asilus notatus			14	14	XY	263
Asilus sericeus			10	10	XY	263
homomorphic						
Dasyllis grossa			10	9	XO	263
Dasyllis thoracica			10	10	XY	263
Deromyia winthemi			12	12	XY	263
Erax rufibarbis			10	10	XY	263
Leptogaster badius			10	10	XY	263
Septogaster badius			10	10	XY	266
Bibionidae						
Bibio bortulanus			10	10		266
Bibio hortulanus			10	10		261
homomorphic						
Penthetria holosericea			10	10	XY	261
Bombyliidae						
Acrophthalrnyda paulseni			12	12		267
homomorphic						
Anthrax anthrax			16	16		267
Anthrax cordillerensis			12	12	XY	267
Anthrax lateralis			12	12		263
homomorphic						
Anthrax mystaceus			14	14		267
Anthrax oedipus			18	18	XY	267
Anthrax sinuosa			18	18	XY	263
Anthrax tigrinus			12	12		267
Anthrax yamashiroensis			10	10	XY	267
Bombylius fulvescens			12	12		267
Bombylius pygmaeus			12	12	XY	267
Exoprosopa atrinasis			18	18	XY	267
Exoprosopa sp.			14	14	XY	267
Ligyra cerberus			18	18	XY	267
Ligyra proserpina			18	18	XY	267
Neodiplocampta roederi			18	18	XY	267
Spogostylum simson			12	12		263
Systoechus vulgaris			14	14	XY	267
Thyridanthrax abrupta			16	16		267
Thyridanthrax niveifrons			18	18	XY	267
Thyridanthrax sp.			18	18	XY	267
Thyridanthrax sp.			18	18	XY	267
Toxophora javana			8	8	XY	267
Usia florea			10	10	XY	267
Villa cingulum			16	16		267
Villa gayi			18	18	XY	267
Villa gorgon			14	14	XY	267
Villa lateralis			12	12	XY	267
Villa morio			18	18	XY	267
Villa scylla			10	10	XY	267
Villa sinuosa			18	18	XY	267
Villa sp			18	18	XY	267
Villa sp			18	18	XY	267
Villa sp.1			14	14	XY	267
Villa sp.1			14	14	XY	267
Villa sp.2			14	14		267
Villa sp.2			14	14		267
Villa sp.3			18	18		267
Villa sp.3			18	18		267
Villa sp.lateralis grp.			14	14	XY	267
Villa sp.nr.blanchardiana			12	12	XY	267
Villa spB			12	12	XY	267

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Villa spC			14	14	XY	267
Villa velutina			18	18	XY	267
Villa velutina			18	18	XY	267
Villa velutina I			18	18	XY	267
Villa velutina II			18	18	XY	267
Calliphoridae						
Albuquerquea latifrons			12	12	XY	268
Amenia chrysame			12	12	XY	268
Anthracomyza atratula			12	12	XY	268
Bengalia inermis			12	12	XY	268
Bengalia lyneborgi			12	12	XY	268
Blepharicnema splendens			12	12	XY	268
Boreellus atriceps			12	12	XY	268
Bufolucilia silvarum			12	12	XY	268
Calliphora viridescens			12	12	XY	262
Calliphora vomitoria			12	12	XY	262
Calliphora accepta			12	12	XY	268
Calliphora bomitoria			12	12	XY	266
Calliphora croceipalpis I			12	12	XY	268
Calliphora croceipalpis II			12	12	XY	268
Calliphora erythrocephala			12	12	XY	269
Calliphora erythrocephala			12	12	XY	262
Calliphora fallax			12	12	XY	268
Calliphora fulviceps			12	12	XY	268
Calliphora fulvicoxa			12	12	XY	268
Calliphora hilli			12	12	XY	268
Calliphora lilaea			12	12	XY	268
Calliphora peruviana			12	12	XY	268
Calliphora plebeia			12	12	XY	268
Calliphora sternalis			12	12	XY	268
Calliphora stygia			12	12	XY	268
Calliphora tibialis			12	12	XY	268
Calliphora varifrons			12	12	XY	268
Calliphora vicina			12	12	XY	269
Calliphora vicina			12	12	XY	262
Calliphora vicina I			12	12	XY	268
Calliphora vicina II			12	12	XY	268
Calliphora viridenscens			12	12	XY	270
Calliphora viridescens			12	12	XY	262
Calliphora vomitoria			12	12	XY	269
Calliphora vomitoria			12	12	XY	262
Calliphora vomitoria I			12	12	XY	268
Calliphora vomitoria II			12	12	XY	268
Calliphora vomitoria III			12	12	XY	268
Callitroga hominivorax			12	12	XY	269
Callitroga hominivorax			12	12	XY	262
Callitroga macellaria			12	12	XY	269
Callitroga mocellaria			12	12	XY	262
Chrysomia albiceps			12	12	XY	262
Chrysomia cholorpyga			12	12	XY	262
Chrysomia putoria			12	12	XY	262
Chrysomya albiceps			12	12		271
homomoprhic; monogeny						
Chrysomya marginalis			12	12	XY	271
Chrysomya megacephala			12	12	XY	271
Chrysomya phaonis			12	12	XY	271
Chrysomya pinguis			12	12	XY	271
Chrysomya putoria			12	12	XY	271
Chrysomya rufifacies			12	12		271
homomoprhic; monogeny						
Chrysomya saffraneta			12	12	XY	271
Chrysomya varipes			12	12	XY	271
Chrysomyia albiceps			12	12	XY	268
Chrysomyia chloropyga I			12	12	XY	268
Chrysomyia chloropyga II			12	12	XY	268

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Chrysomyia megacephala			12	12	XY	268
Chrysomyia megacephala			12	12	XY	262
Chrysomyia pachymera			12	12	XY	268
Chrysomyia putoria I			12	12	XY	268
Chrysomyia putoria II			12	12	XY	268
Chrysomyia rufifacies			12	12	XY	268
Chrysomyia rufifacies			12	12	XY	262
Cochliomyia hominivorax			12	12	XY	268
Cochliomyia macellaria I			12	12	XY	268
Cochliomyia macellaria II			12	12	XY	268
Cosmina testaceipes			12	12	XY	268
Cynomya cadaverina			12	12	XY	268
Cynomya mortuorum I			12	12	XY	268
Cynomya mortuorum II			12	12	XY	268
Cynomya mortuorum III			12	12	XY	268
Cynomyia mortyorum			12	12	XY	262
Cynomyopsis cadaverina			12	12	XY	269
Cynomyopsis cadaverina			12	12		262
Discritomyia fasciata			12	12	XY	268
Discritomyia fulgens			12	12	XY	268
Discritomyia new species			12	12	XY	268
Discritomyia terryi			12	12	XY	268
Eucalliphora lilaea			12	12	XY	270
Eucalliphora lilaea			12	12	XY	262
Euphumosia setigera			12	12	XY	268
Eurhyncomyia anterotes			12	12	XY	268
Hemilucilia sp homomorphic			12	12	XY	268
Hemilucilia sp homomorphic			12	12	XY	268
Hemilucilia sp homomorphic			12	12	XY	268
Hemipyrellia brunneipes			12	12	XY	268
Hemipyrellia fernandica			12	12	XXYY	268
Hemipyrellia ligurriens			12	12	XY	268
Hemipyrellia taeniops			12	12	XY	268
Hemipyrellia tagaliana			12	12	XY	268
Huascaromusca nigrifrons			12	12	XY	268
Isomyia connivens			12	12	XY	268
Isomyia prasina			12	12	XY	268
Lucilia caesar			12	12	XY	269
Lucilia caesar			12	12	XY	262
Lucilia cuprina			12	12	XY	262
Lucilia illustria			12	12	XY	262
Lucilia sericata			12	12	XY	262
Lucilia ampullacea			12	12	XY	268
Lucilia caesar			12	12	XY	268
Lucilia cuprina			12	12	XY	271
Lucilia illustris			12	12	XY	269
Lucilia porphyrina			12	12	XY	268
Lucilia sericata			12	12	XY	271
Melinda biseta			12	12	XY	268
Melinda sp			12	12	XY	268
Mesembrinella peregrina I			12	12	XY	268
Mesembrinella peregrina II			12	12	XY	268
Metallea cuprea			12	12	XY	268
Metallea puncticeps			12	12	XY	268
Microcalliphora varipes			12	12	XY	268
Paralucilia fulvicrura			12	12	XY	268
Paralucilia wheeleri			12	12	XY	268
Paratricyclea surcoufi			12	12	XY	268
Phaenicia caeruleiviridis			12	12	XY	262
Phaenicia eximia			12	12	XY	262
Phaenicia sericata			12	12	XY	262
Phaenicia caeruleiviridis			12	12	XY	268

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Phaenicia coernleiviridis			12	12	XY	270
Phaenicia cuprina			12	12	XY	268
Phaenicia eximia			12	12	XY	269
Phaenicia eximia			12	12	XY	268
Phaenicia sericata			12	12	XY	269
Phormia regina			12	12	XY	262
Phormia terrae-novae			12	12	XY	262
Phormia regina			12	12	XY	269
Phormia regina			12	12	XY	268
Phormia terraenovae			12	12	XY	269
Phumosia promittens			12	12	XY	268
Pollenia rudis			12	12		262
Pollenia nigripes			12	12	XY	268
Pollenia rudis			12	12	XY	269
Pollenia rudis I			12	12	XY	268
Pollenia rudis II			12	12	XY	268
Pollenia rudis III			12	12	XY	268
Polleniopsis hokurikuensis			12	12	XY	268
Protocalliphora hirundo			12	12	XY	268
Protocalliphora sialia			12	12	XY	268
Protocalliphora sp			12	12	XY	268
Protocalliphora aenea			12	12	XY	269
Protocalliphora aenea			12	12	XY	262
Protocalliphora avium			12	12	XY	269
Protocalliphora avium			12	12	XY	262
Protocalliphora hirundo			12	12	XY	270
Protocalliphora hirundo			12	12	XY	262
Protocalliphora metallica			12	12	XY	269
Protocalliphora metallica			12	12	XY	262
Protocalliphora sialia			12	12	XY	270
Protocalliphora sialia			12	12	XY	262
Protophormia terraenovae			12	12	XY	269
Protophormia terraenovae			12	12	XY	262
Protophormia terraenovae			12	12	XY	271
Protophormia terraenovae I			12	12	XY	268
Protophormia terraenovae II			12	12	XY	268
Rhinia apicalis			12	12	XY	268
Rhinia discolor			12	12	XY	268
Rhinia subapicalis			12	12	XY	268
Rhyncomyia italica			12	12	XY	268
Rhyncomyia stannocuprea			12	12	XY	268
Sarconesiopsis chilensis			12	12	XY	268
Sphenometrops tergata			12	12	XY	262
Stomorhina armatipes			12	12	XY	268
Stomorhina lunata			12	12	XY	268
Stomorhina obsoleta			12	12	XY	268
Cecidomyiidae						
Asphondylia monacha			8	7	XO	266
Asteromyia rubra			8	7	XO	266
Caryomyia sp			8	7	XO	266
Cecidomyia serotinae			8	7	XO	266
Cecidomyia sp.			8	7	XO	266
Cecidomyia vicola			8	7	XO	266
Dasyneura affinis			8	7	XO	266
Lasioptera asterspinosae			8	7	XO	266
Lestodiplosis sp			8	7	XO	266
Miastor americana			12	11	XO	266
octoploid in germ line, paedogenetic						
Miastor metraloas					XO	266
Miastor sp					XO	266
Monarthropalpus buxi			8	7	XO	266
Oligarces paradoxus					XO	266
Oligotrphus pattersoni			8	7	XO	266
Ontarinia canadensis			8	7	XO	266
Phytophaga celtiphyllia			12		XO	266

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Phytophaga destructor			9	8	XO	266
Rhopalomyia sabinae			8	7	XO	266
Taxomyia taxi			8	7	XO	266
Trishormomyia helianthi			8	7	XO	266
Walshomyia texana			8	7	XO	266
Chamaemyiidae						
Cremifania nigrocellulata			6	6	XY	272
homomorphic						
Cremifania nigrocellulata			6	6	XY	262
Leucopis obscura			10	10		272
Leucopmyia obscura			10	10		262
Chironomidae						
Chironimus plumosus			8	8		261
homomorphic						
Chironomus alluaudi			8	8		273
homomorphic						
Chironomus alpestris			8	8		266
Chironomus bathophilus			8	8		266
Chironomus confinis			8	8		266
Chironomus dorsalis			8	8		266
Chironomus formosipennis			8	8		273
homomorphic						
Chironomus plumosus			8	8		266
Chironomus pulcher			8	8		273
homomorphic						
Chironomus riparius			8	8		273
homomorphic						
Chironomus riperiua			8	8		266
Chironomus sp			8	8		273
homomorphic						
Chironomus sp.			8	8		266
Chironomus sp.			6	6		273
homomorphic						
Chironomus sp.			8	8		273
homomorphic						
Chironomus thummi			8	8		266
Chironomus transvaalensis			8	8		273
homomorphic						
Corynoneura sp nr scutellata	parth					274
Cryptochironomus defectus			6	6		266
Endochironomus sp			8	8		266
Glyptotendipes barbipes			8	8		261
homomorphic						
Glyptotendipes polytomus			8	8		266
Glyptotendipes sp			6	6		266
Glyptotendipes sp			8	8		266
Limnophyes vestitus	parth					274
Lundstroemia parthenogenetica	parth					274
Micropsectra praecox			8	8		266
Microtendipes pedellus			8	8		266
Sergentia profundorum			6	6		266
Stictochironomus histrio			8	8		266
Culicidae						
Aedes albopictus			6	6		266
homomorphic						
Aedes canadensis			6	6		266
homomorphic						
Aedes japonicus			6	6		266
homomorphic						
Aedes koreicus			6	6		266
homomorphic						
Aedes togoi			6	6		266
homomorphic						
Aedes triseriatus			6	6		266
homomorphic						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Anopheles agrgyritarsus			6	6	XY	275
Anopheles albimanus			6	6	XY	275
Anopheles aquasalis			6	6	XY	275
Anopheles aztecus			6	6	XY	275
Anopheles claviger			6	6	XY	275
Anopheles darlingi			6	6	XY	275
Anopheles freeborni			6	6	XY	275
Anopheles gambiae			6	6	XY	275
Anopheles maculipennis			6	6	XY	275
Anopheles noroestensis			6	6	XY	275
Anopheles occidentalis			6	6	XY	275
Anopheles pseudopunctipennis		6	6	XY	275	
Anopheles punctipennis			6	6	XY	275
Anopheles punctipennis			6	6	XY	266
Anopheles quadrimaculatus			6	6	XY	275
Anopheles sp			6	6	XY	266
Anopheles stephensi			6	6	XY	275
Anopheles strodei			6	6	XY	275
Anopheles strodei			6	6	XY	275
Armigeres obturbans			6	6		266
Chaoborus plumicornis			8	8		266
Corethra plumicornis			6	6		266
Culex hayashii			6	6		266
homomorphic						
Culex pipiens			6	6		266
homomorphic						
Culex pipiens			12	12		263
Culex spicalis			6	6		266
homomorphic						
Culex tarsalis			6	6		266
homomorphic						
Culex territans			6	6		266
homomorphic						
Culex tritaeniorhynchus			6	6		266
homomorphic						
Lutzia fuscana			6	6		266
homomorphic						
Mochlonyx sp			8	8	XY	266
Theobaldia incidens			6	6		266
homomorphic						
Cuterebridae						
Cuterebra emasculator			12	12	XY	262
Cuterebra emasculator			12	12	XY	276
Cylindrotomidae						
Phalacrocera replicata			10	10	XY	261
Diopsidae						
Sphyracephala brevicornis			10	10	XY	262
Dryomyzidae						
Dryomyza anilis			12	12	XY	262
Neuroctena analis			12	12	XY	262
Helemyzidae						
Suillia nemorum			12	12	XY	262
Suillia nemorum			12	12	XY	262
Suillia sp			12	12	XY	262
Hippoboscidae						
Melophagus ovinus			18	18	XY	266
Olfersia bisulcata			8	8	XY	266
Hypodermatidae						
Hypoderma bovis			12	12	XY	276
Hypoderma lineatum			12	12	XY	276
Lauxaniidae						
Calliopum aeneum			12	12	XY	272
Depressa striatipennis			12	12	XY	272
Homoneura armata			12	12	XY	272
Homoneura biroi			12	12	XY	272

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Homoneura horvathi			12	12	XY	272
Homoneura laticosta			12	12	XY	272
Homoneura sp1			12	12	XY	272
Homoneura sp2			12	12	XY	272
Homoneura spA			12	12		272
Homoneura spB			12	12		272
Lauxania cylindricornis			12	12	XY	272
Lyciella bicoloripes			12	12	XY	272
Lyciella hirtiventris			12	12	XY	272
Lyciella illota			10	10	XY	272
Lyciella rorida			10	10	XY	272
Lyciella sp1			12	12		272
Lyciella sp2			12	12	XY	272
Lyciella spinigera			12	12	XY	272
Minettia flaveola			10	10	XY	272
Minettia flaveola			10	10	XY	262
Minettia lupulina			12	12	XY	272
Minettia lupulina			12	12	XY	272
Paralauxania elevata			12	12	XY	272
Paranomina sp			12	12	XY	272
Physegenua vittata			12	12	XY	272
Physegenua vittata			12	12		272
Physegenua vittata			12	12	XY	262
Sapromyza avicola			12	12	XY	272
homomorphic						
Sapromyza sp			8	8	XY	272
Sapromyza stigmatica			12	12	XY	272
Sp sp			12	12	XY	272
Sp sp			12	12	XY	272
Sp sp			12	12	XY	272
Sp sp			12	12	XY	272
Sp. sp.			12	12	XY	262
Leptoceratidae						
Leptocera fontinalis			7			266
Limoniidae						
Dicranomyia trinotata			6	6		261
homomorphic						
Thaumastoptera calceata			6	6		261
homomorphic						
Itonididae						
Phytophaga destructor			8	8		261
homomorphic						
Muscidae						
Calliphora erythrocephala			12	12	XY	263
Fannia canicularis			12	12	XY	270
Fannia canicularis			12	12	XY	262
Fannia glaucescens			12		XY	270
Fannia glaucescens			12	12	XY	262
Fannia sp			12	12	XY	270
Fannia sp.			12	12	XY	270
Fucellia marina			12	12	XY	270
Haematobia irritans			10	10	XY	262
Haematobia irritans			10	10	XY	270
homomorphic						
Homalomyia sp			12	12	XY	262
Hydrophoria conica			12	12	XY	270
homomorphic						
Hydrotaea houghi					XY	270
Hydrotaea scambus			10	10	XY	270
homomorphic						
Hydrotaea scambus			10	10		262
Macrorchus ausoba			12	12		270
Musca autymnalis			12	12	XY	262
Musca domestica			12	12	XY	262
Musca sorbens			12	12	XY	262

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Musca vestustissima			12	12	XY	262
Musca autumnalis			12	12	XY	270
Musca autumnalis			12	12	XY	277
Musca domestica			12	12		270
Musca domestica			12	12		270
Musca domestica			12	12	XY	270
Musca domestica			12	12	XY	270
Musca domestica			12	12	XY	270
Musca domestica			12	12	XY	270
Musca domestica			12	12	XY	270
Musca domestica			12	12	XY	277
Musca domestica			12	12	XY	277
Musca domestica			12	12	XY	277
Musca domestica			12	12	XY	266
Musca domestica			12	12	XY	263
Musca domestica curviforceps		12	12		270	
Musca domestica curviforceps		11	11	XY	270	
Musca domestica domestica			12	12	XY	270
Musca domestica domestica			12	12	XY	270
Musca domestica domestica			12	12	XY	270
Musca domestica domestica			12	12	XY	270
Musca domesticacalleva			12	12	XY	270
Musca domesticacalleva			12	12	XY	277
Musca domesticacurviforceps			12	12	XY	277
Musca sorbens			12	12	XY	270
Musca sorbens			12	12	XY	277
Musca veltustissima			12	12	XY	277
heteromorphic						
Musca velustissima			12	12	XY	270
Muscina stabulans			10	10	XY	262
Muscina stabulans			10	10	XY	270
homomorphic						
Muscina stabulans			12	12	XY	270
Muscina stabulans			10	10		277
homomorphic						
Mydaea neglecta			12	12	XY	270
Ophyra leucostoma			12		XY	270
homomorphic						
Ophyra leucostoma			12	12	XY	270
Ophyra leucostoma			12	12	XY	277
Ophyra leucostoma			12	12	XY	262
Orthellia nudissima			10	10	XY	262
Orthellia nudissima			10	10	XY	270
homomorphic						
Orthellia nudissima			10	10		277
homomorphic						
Pegomya betae			12	12	XY	270
Pegomya bicolor			12	12	XY	270
homomorphic						
Pegomya geniculata			12	12	XY	270
Peregle radicum			12	12	XY	270
homomorphic						
Phaonia basalis			12	12	XY	262
Phaonia variegata			10	10	XY	262
Phaonia basalis			12	12	XY	270
Phaonia basalis			12	12	XY	277
Phaonia variegala			10	10	XY	270
homomorphic						
Phaonia variegata			10	10		277
homomorphic						
Phormia regina			12	12	XY	263
Pseudopyrellia cornicina			12	12		270
Stomoxya calicitrans			10	10	XY	262
Stomoxys calcitrans			10	10	XY	270
homomorphic						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Mycetophilidae						
Brachypeza radiata			12	12	XY	266
Exechia indecisa			14	14	XY	266
Exechia indecisa			14	14	XY	261
Exechia speciosa			12	12	XY	266
Fungivora blanda			8	8	XY	266
Fungivora blanda			8	8	XY	261
Fungivora funorum			14	14	XY	266
Fungivora guttata			8	8	XY	266
Fungivora guttata			8	8	XY	261
Fungivora lineola			14	14	XY	266
Fungivora unipunctata			14	14	XY	266
Mycetophila punctata			14	14	XY	266
Mycetophila punctata			14	14	XY	261
Rhymosia domestica			14	14	XY	266
Rhymosia fenestralis			8	8	XY	266
Oestridae						
Cephenemyia phobifer			12	12	XY	262
Cephenomyia phobifer			12	12	XY	276
Hypoderma bovis			12	12	XY	262
Hypoderma lineatum			12	12	XY	262
Oestrus ovis			12	12	XY	262
Oestrus ovis			12	12	XY	276
Ortalidae						
Camptoneura picta			12	12		263
Camtpneura picta			12	12		266
Chaetopsis fulvifrons			8	8		263
Otitidae						
Camptonoura picta			12	12		262
Ceroxys latiusculus			12	12	XY	262
Ceroxys latiusculus			12	12	XY	278
Ceroxys urticae			12	12	XY	278
Chaetopsis fulvifrons			8	8	XY	278
Chaetopsis fulvifrons			8	8		262
Chaetopsis ulvi			8	8		263
Chaetopsis ulvi			8	8		263
Delphinia picta			12	12	XY	278
Delphinia picta			12	12	XY	263
Delphinia picta			12	12		263
Euxesta notata			12	12	XY	262
Euxesta notata			12	12	XY	278
Euxesta notata sp.1			12	12	XY	278
Euxesta notata sp.2			12	12	XY	278
Melieria crassipennis			8	8	XY	262
Melieria crassipennis I			8	8	XY	278
Melieria crassipennis II			8	8	XY	278
Myrmecothea myrmecoides			10	10	XY	262
Myrmecotheca myrmecoides			12	12	XY	278
Physiphora aenea			10	10	XY	278
Pterocalla sp.			10	10	XY	278
Seioptera vibrans			6	6	XY	262
Seioptera vibrans			6	6	XY	278
Phoridae						
Aphiocaeta sp			6	6		266
Phora sp.			8	8		266
Phryneidae						
Phryne fenestralis			8	8	XY	261
Piophilidae						
Piophila casei			12	12		266
Platystomatidae						
Amphicnephes sp.			6	6	XY	278
Laglasia sp.			12	12	XY	278
Lenophila caerulea			12	12	XY	278
Plagiostenopterina sp. 1			6	6	XY	278
Plagiostenopterina sp. 2			6	6	XY	278

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Platystoma lugubre			12	12	XY	278
Pogonortalis doclea			10	10	XY	278
Rivellia viridulans			6	6	XY	262
Rivellia sp.			6	6	XY	278
Rivellia sp. Probably viridulans		6	6	XY	278	
Psilidae						
Chamaepsila rosae			8	8		262
Psychodidae						
Lutzomyia carmelinoi			8	8		279
homomorphic						
Lutzomyia columbiana			8	8		279
homomorphic						
Lutzomyia erwindonaldoi			8	8		279
homomorphic						
Lutzomyia gomezi			8	8		279
homomorphic						
Lutzomyia trapidoi			6	6		279
homomorphic						
Lutzomyia walkeri			8	8		279
homomorphic						
Ptychopteridae						
Liriope cinerasceus			10	10	XY	266
Liriope sp			10	10	XY	266
Rhagionidae						
Chrysophilus sp			10	10	XY	280
Leptis sp			10	10	XY	266
Leptis sp.			10	10	XY	280
Richardiidae						
Setellia pernix			10	10	XY	278
possibly XO						
Sapromyzidae						
Physegenua vittata			12	12		266
Physegenua vlittata			12	12	XY	263
Sarcophagidae						
Acridiophaga aculeata			12	12	XY	281
heteromorphic						
Acridiophaga aculeata			12	12	XY	262
Arachnidiomya aldrichi			12	12	XY	270
Blaesoxipha hunteri			12	12	XY	270
Blaesoxipha hunteri			12	12	XY	270
Blaesoxipha hunteri			12	12	XY	262
Blaesoxipha opifera			12	12	XY	270
Blaesoxipha opifera			12	12	XY	262
Boettcheria cimbicis			12	12	XY	282
Boettcheria cimbicis			12		XY	270
Boettcheria cimbicis			12	12	XY	262
Euboettcheria sp			12		XY	270
Euboettcheria sp			12	12	XY	262
Euboettcheria sp.			12	12	XY	282
Helicobia rapax			12	12	XY	282
Helicobia rapax			12	12	XY	270
Helicobia rapax			12	12	XY	262
Helicobia sp			12	12	XY	270
Helicobia sp			12	12	XY	262
Helicobia sp.			12	12	XY	282
Hystricocnema plinthopyga			12	12	XY	282
Hystricocnema plinthopyga			12	12	XY	270
Hystricocnoma plinthopyga			12	12	XY	262
Kellymyia kellyi			12	12	XY	281
heteromorphic						
Kellymyia kellyi			12	12	XY	270
Kellymyia kellyi			12	12	XY	262
Neobellaria bullata			12	12	XY	262
Neobellieria bullata			12	12	XY	282
Neobellieria cooleyi			12	12	XY	270

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Paraphrissopoda chrysostoma		12	12	XY	282	
Paraphrissopoda chrysostoma		12	12	XY	262	
Paraphrisspdda chrysostoma			12	12	XY	270
Parasarcophaga argyrostoma			12	12	XY	282
Protodexia australis			12	12	XY	281
Protodexia hunteri			12	12	XY	281
Protodexis australis			12	12	XY	262
Protodexis hunteri			12	12	XY	262
Pseudosarcophaga affinis			18	18		262
Pseudosarcophaga affinis			20	20		281
Pseudosarcophaga affinis			18	18	XY	270
homomorphic						
Ravinia communis			12	12	XY	262
Ravinia peniculata			12	12	XY	262
Ravinia duplicata			12	12	XY	270
Ravinia l'herminieri			12	12	XY	270
Ravinia peniculata			12	12	XY	266
Ravinia pusiola			12	12	XY	270
Ravinia querula			12	12	XY	270
Ravinia querula			12	12	XY	262
Rawinia peniculata			12	12	XY	263
Sacrophaga carnria			12	12	XY	266
Sacrophaga sgrracinae			12	12	XY	266
Sacrophaga sp			12	12	XY	266
Sacrophaga tuberosa			12	12	XY	266
Sarcophaga carnaria			12	12	XY	262
Sarcophaga sp			12	12	XY	263
Sarcophaga tuberosa			12	12	XY	262
Sarcophaga aldrichi			12	12	XY	281
Sarcophaga aldrichi			12	12	XY	262
Sarcophaga argyrostoma			12	12	XY	282
Sarcophaga argyrostoma			12	12	XY	270
Sarcophaga argyrostoma			12	12	XY	270
Sarcophaga argyrostoma			12	12	XY	262
Sarcophaga bullata			12	12	XY	270
Sarcophaga carnaria			12	12	XY	270
Sarcophaga cooley			12	12	XY	262
Sarcophaga cooleyi			12	12	XY	281
Sarcophaga crassipalpus			12	12	XY	270
Sarcophaga crassipalpus			12	12	XY	262
Sarcophaga dalmatina			12	12	XY	270
Sarcophaga exuberans			12	12	XY	282
Sarcophaga exuberans			12	12	XY	270
Sarcophaga exuberans			12	12	XY	262
Sarcophaga falculata			12	12	XY	282
Sarcophaga falculata			12	12	XY	270
Sarcophaga falculata			12	12	XY	262
Sarcophaga H			12	12	XY	281
Sarcophaga H			12	12	XY	270
Sarcophaga lalisterna			12	12	XY	270
Sarcophaga latisterna			12	12	XY	262
Sarcophaga occipitalis			12	12	XY	282
Sarcophaga occipitalis			12		XY	270
Sarcophaga occipitalis			12	12	XY	262
Sarcophaga raversa			12	12	XY	262
Sarcophaga reversa			12	12	XY	281
Sarcophaga reversa			12	12	XY	262
Sarcophaga securifera			12	12	XY	282
Sarcophaga securifera			12	12	XY	262
Sarcophaga serracaniae			12	12	XY	262
Sarcophaga serraceniae			12	12	XY	270
Sarcophaga serraceniae			12	12	XY	270
Sarcophaga sp			12	12	XY	262
Sarcophaga sp.			12	12	XY	270
Sarcophage latisterna			12	12	XY	262

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Servasia aculeata			12	12	XY	270
Servasia australis			12	12	XY	270
Servasia reversa			12	12	XY	270
Sphenometopa tergata			12	12	XY	270
Sphenometopa tergata			12	12	XY	262
Wohlfahrlia meigeni			12	12	XY	282
Wohlfahrlia opaca			12	12	XY	282
Wohlfarhtia meigeni			12	12	XY	270
Wohlfarhtia opaca			12	12	XY	270
Wolfahrtia meigeni			12	12	XY	262
Wolfahrtia opaca			12	12	XY	262
Scathophagidae						
Cordilura ontario			12	12	XY	270
Cordilura praensia			12	12	XY	270
Cordilura varipes			12	12	XY	270
Neochirosia nuda			12	12	XY	270
Orthochaeta hirtipes			12	12	XY	270
Scaptophaga furcala			12	12	XY	270
Scaptophaga nigrolimbata			12	12	XY	270
Scaptophaga pallida			12	12	XY	270
Scaptophaga stercoraria			12	12	XY	270
Scathophaga pallida			12	12	XY	266
Scathophaga stercoraria			12	12	XY	266
Scatopsidae						
Scatopse notata			12	12	XY	261
Scatopse sp			12	12	XY	261
Sciaridae						
Sciara agarica			8		XO	266
Sciara coprphila			8	7	XO	266
Sciara fenestralis			8		XO	266
Sciara nacta			8		XO	266
Sciara ocellaris			8		XO	266
Sciara pauciseta			8	7	XO	266
Sciara prolifica			8	7	XO	266
Sciara reynoldsi			8		XO	266
Sciara similans			8		XO	266
Sciara sp			8		XO	266
Sciomyzidae						
Antichaeta melanosoma			12	12	XY	262
Antichaeta melanosoma			12	12	XY	283
Atrichomelina pubera			12	12	XY	262
Atrichomelina pubera			12	12	XY	283
Colobaea americana			12	12	XY	283
Dichetophora boyesi			12	12	XY	284
Dichrochirosa dissimilis			12			283
Dichrochirosa sp			12	12	XY	283
Dictya sabroski			12	12	XY	262
Dictya texensis			12	12	XY	262
Dictya txensis			12	12	XY	262
Dictya atlantica			12	12	XY	283
Dictya atlantica			12	12	XY	262
Dictya brimleyi			12	12	XY	283
Dictya brimleyiE			12	12	XY	262
Dictya floridensis			12	12	XY	283
Dictya sabroskyi			12	12	XY	283
Dictya stricta			12	12	XY	283
Dictya texensis			12	12	XY	283
Dictya umbrarum			12	12	XY	284
Dictya umbrarum series II			12	12	XY	284
Dictyodes dictyodes			12	12	XY	283
Elgiva cucularia			12	12	XY	284
Elgiva divisa			12	12	XY	284
Elgiva rufa			12	12	XY	284
Elgiva rufa			12			283
Euthycera chaerophylli			12	12	XY	283

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Helosciomyza ferruginea			12	12	XY	284
Hoplodictya spinicornis			12	11	XO	283
Hydromya dorsalis			12	12	XY	284
Hydromya dorsalis series II			12	12	XY	284
Knutsonia lineata			12	12	XY	284
Limnia boscii			12	12	XY	283
Limnia paludicola			12	12	XY	284
Limnia unguicornis			12		XY	283
Neuroctena analis			12	12		266
Neuroctena analis			12	12		263
Perilimnia albifacies			12	12	XY	283
Pherbellia dubia			12	12	XY	284
Pherbellia grisescens			12	11	XO	262
Pherbellia nana			12	12	XY	262
Pherbellia sp.			12	12	XY	262
Pherbellia albocostata			12	12	XY	284
Pherbellia brunnipes			12	12	XY	284
Pherbellia chiloensis			12	12	XY	283
Pherbellia grisescens			12	12	XY	283
Pherbellia humilis			12	11	XO	283
Pherbellia javana			12	12	XY	284
Pherbellia lapponica			12	12	XY	284
Pherbellia nana			12	12	XY	283
Pherbellia obscura			12	12	XY	284
Pherbellia obtusa			12	12	XY	283
Pherbellia patagonensis			12	11	XO	283
Pherbellia scutellaris			12	12	XY	284
Pherbellia sp. 1 (n.sp.near patagonensis)			12	12	XY	283
Pherbellia sp.4 (n.sp.near chiloensis)			12	12	XY	283
Pherbellia trabeculata			12	12	XY	283
Pherbina corlleti			12	12	XY	283
Pherbina coryleti			12	12	XY	284
Protodictya chilensis			12	12	XY	283
Protodictya guttularis			12	12	XY	283
Psacadina zerni			12	12	XY	262
Psacadina zernyi			12	12	XY	283
Pteromicra glabricula			10	10	XY	284
Pteromicra pectorosa			10	9	XO	283
Pteromicra similis			10			283
Renocera fuscinervis			12	12	XY	284
Salticella fasciata			12	12	XY	284
Sepedon fuscipennis			12	12	XY	262
Sepedon armipes			12	11	XO	262
homomorphic						
Sepedon armipes			12	11	XO	283
Sepedon fuscipennis			12	12	XY	283
Sepedon macropus			12	12	XY	283
Sepedon plumbella			12	12	XY	284
Sepedon saegeri			12	12	XY	284
Sepedon sphegea			12	12	XY	283
Sepedon spinipes americana			12	11	XXY	283
Tetanocera loewiE			12	12	XY	262
Tetanocera sp.			12	12	XY	262
Tetanocera sparsa			12	12	XY	262
Tetanocera arrogans			10	10	XY	284
Tetanocera elata			12	12	XY	283
Tetanocera ferruginea			12	12	XY	284
Tetanocera ferruginea			12	12	XY	283
Tetanocera hyalipennis			12	12	XY	284
Tetanocera loewi			12	12	XY	283
Tetanocera montana			12	12	XY	283
Tetanocera plebeia			12	12	XY	283
Tetanocera plumosa			12	12	XY	283
Tetanocera silvatica			12			283
Tetanocera unicolor			12	12	XY	284

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Tetanocera vicina			12	12	XY	283
Tetanoceroides mesopleuralis			12	12	XY	283
Tetanoceroides occidentalis			12			283
Trypetoptera punctulata			12	12	XY	284
Sepsidae						
Piophila casei			12	12	XY	263
Simuliidae						
Eusimulium vernum			6	6	XY	285
Simulium sp			6	6		266
Stratiomyidae						
Actina incisurali			10	10	XY	280
Adoxomyia rustica			8	8	XY	280
Beris chalybeata			10	10	XY	280
Chloromyia formosa			14		XY	280
Hermetia illucens			14	14	XY	280
Himantoloba flavopilosa			16	16	XY	280
Lasionemopoda hirsuta			16	16	XY	280
Merosargus melanothorax			16	16	XY	280
Neoexaireta spinigera			12	12	XY	280
Odontomyia regisgeorgei			12	12	XY	280
Ptecticus australis			16	16	XY	280
Ptecticus longipennis			16	16	XY	280
Ptecticus matsumurae			16	16	XY	280
Ptecticus n. sp 5			16	16	XY	280
Ptecticus n.sp 1			16	16	XY	280
Ptecticus n.sp 2				16		280
Ptecticus n.sp 3			16	16	XY	280
Ptecticus n.sp 4			16	16	XY	280
Ptecticus sackenii			16	16		263
Ptecticus tenebrifer			16	16	XY	280
Ptecticus trivittatus			16	16	XY	280
Ptecticus trivittatus			16	16	XY	266
Ptecticus trivittatus			16	16	XY	263
Ptecticus trivittatus			16	16		263
Ptecticus wulpii			16	16	XY	280
Sargus cuprarius			16	16		280
Sargus fasciatus			8	8	XY	280
Straliomys barbata			14	14	XY	280
Stratiomys sp			12	12	XY	280
Syrphidae						
Blera badia			12	12	XY	286
Blera fallax			12	12	XY	286
Blera scitula			12	12	XY	286
Allograpta exotica			10	10	XY	287
Allograpta hortensis			8	8	XY	287
Allograpta neotropica			10	10	XY	287
Allograpta obliqua			10	10	XY	288
Allograpta pfeifferi			12	12	XY	288
Allograpta piurana			10	10	XY	287
Allograpta piurana			10	10	XY	287
Allograpta pulchra (hybrid?)			8	8	XY	287
Allograpta pulchra (I)			10	10	XY	287
Asarcina rostrata			12	12	XY	288
Baccha alicia			10	10	XY	287
Baccha asthenia			10	10	XY	287
Baccha clavata (I)			10	10	XY	287
Baccha clavata (II)			10	10	XY	287
Baccha debasa			10	10	XY	287
Baccha flavipennis			10	10	XY	287
Baccha funebris			10	10	XY	287
Baccha gastrostacta			10	10	XY	287
Baccha livida			8	8	XY	287
Baccha melanorrhina			10	10	XY	287
Baccha norina			8	8	XY	287
Baccha nymphaea			10	10	XY	287

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Baccha polista			10	10	XY	287
Baccha scutellata			10	9	XXY	287
Baccha virginio			10	10	XY	287
Baccha vittiger			10	10	XY	287
Baccha zilla			10	10	XY	287
Baccha fascipennis			6	6	XY	288
Baccha obscuripennis			6	6	XY	288
Blera analis			12	12	XY	286
Blera badia			12	12	XY	288
Blera confusa			12	12	XY	288
Blera confusa			12	12	XY	286
Blera nigra			12	12	XY	288
Blera nigra			12	12	XY	286
Caliprobola crawfordi			10	10	XY	288
Calliprobola crawfordi			10	10	XY	286
Calliprobola crawfordi			10	10	XY	286
Carposcalis obscura			8	8	XY	288
Carposcalis sp.			8	8	XY	287
Carposcalis sp.(3)			8	8	XY	287
Carposcalis sp.(4)			8	8	XY	287
Carposcalis sp.(5)			8	8	XY	287
Carposcalis sp.(6)			8	8	XY	287
Carposcalis sp.(8)			8	8	XY	287
Cheilosia pagana			12	12	XY	288
Cheilosia plutonia			12	12	XY	288
Cheilosia tristis			10	10	XY	288
Cheilosia vernalis			10	10	XY	288
Chrysogaster metallina			12	12	XY	288
Chrysogaster nitida			12	12	XY	288
Chrysogaster solstitialis			12	12	XY	288
Chrysogaster splendita			12	12	XY	288
Chrysogaster viduata			12	12	XY	288
Chrysotoxum arcuatum			10	10	XY	288
Chrysotoxum arcuatum			10	10	XY	289
Chrysotoxum bicinctum			10	10	XY	288
Chrysotoxum bicinctum			10	10	XY	289
Chrysotoxum cautum			10	10	XY	289
Chrysotoxum derivatum			10	10	XY	288
Chrysotoxum derivatum			10	10	XY	289
Chrysotoxum elegans			10	10	XY	289
Chrysotoxum fasciolatum			10	10	XY	289
Chrysotoxum festivum			10	10	XY	288
Chrysotoxum festivum			10	10	XY	289
Chrysotoxum intermedium			10	10	XY	289
Chrysotoxum latifasciatum			10	10	XY	289
Chrysotoxum lessonae			10	10	XY	289
Chrysotoxum octomaculatum			10	10	XY	289
Chrysotoxum parmense			10	10	XY	289
Chrysotoxum ventricosum			10	10	XY	289
Chrysotoxum verralli			10	10	XY	289
Cnemodon latitarsis			8	8	XY	290
Criorhina berberina			8	8	XY	286
Criorhina berberina			8	8	XY	286
Criorhina berberina			8	8	XY	286
Criorhina caudata			12	12	XY	286
Criorhina coquilletti			12	12	XY	286
Criorhina luna			12	12	XY	286
Criorhina pachymera			8	8	XY	286
Criorhina tricolor			12	12	XY	286
Criorhina tricolor			12	12	XY	286
Didea laxa			10	10	XY	288
Doros conopseus			8	8	XY	288
Epistrophe bifasciata			10	10	XY	290
Epistrophe bifasciata			10	10	XY	288
Episyrphus balteatus			10	10	XY	288

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Eristalinus sepulcralis			12	12	XY	288
Eristalis abusivus			12	12	XY	288
Eristalis aeneus			12	12	XY	288
Eristalis anthophorinus			12	12	XY	288
Eristalis arbustorum			12	12	XY	288
Eristalis bastardi			12	12	XY	290
Eristalis bastardi			12	12	XY	288
Eristalis bastardi			12	12		263
Eristalis dimidiatus			12	12	XY	288
Eristalis horticola			12	12	XY	288
Eristalis intricarius			12	12	XY	288
Eristalis lenax			12	12	XY	290
Eristalis meigeni			12	12	XY	288
Eristalis nemorum			12	12	XY	288
Eristalis obscurus			12	12	XY	288
Eristalis pertinax			12	12	XY	288
Eristalis pratorum			12	12	XY	288
Eristalis tenax			12	12	XY	288
Eristalis tenax			12	12	XY	263
Eumerus obliquus			12	12	XY	288
Eumerus strigatus			12	12	XY	288
Eumerus tuberculatus			12	12	XY	288
Hadromyia grandis			10	10	XY	286
Helophilus fasciatus			12	12	XY	288
Helophilus hybridus			12	12	XY	288
Helophilus pendulus			12	12	XY	288
Helophilus trivittatus			12	12	XY	288
Ischiodon aegyptium			8	8	XY	288
Ischiodon aegyptium			10	10	XY	288
Ischyrosyrphus velutinus			8	8		288
Lejops lineatus			12	12	XY	288
Lejops lunulatus			10	10	XY	288
Lejops obsoletus			14	14	XY	288
Lejops relictus			10	10	XY	288
Lejops rex			12	12	XY	288
Lejops stipatus			12	12	XY	288
Lejops transfugus			12	12	XY	288
Lejops versicolor			12	12	XY	288
Lejota cyanea			12	12	XY	288
Lejota cyanea			12	12	XY	286
Leucozona lucorum			10	10	XY	288
Mallota posticata			12	12	XY	288
Melangyna cincta			10	10	XY	288
Melangyna lasiophthalma			10	10	XY	288
Melangyna pullulus			10	10	XY	288
Melanostoma mellinum			8	8	XY	288
Melanostoma pictipes			8	8	XY	288
Melanostoma scalare			8	8	XY	288
Meliscaeva cinctella			10	10	XY	288
Meliscaeva sp			10	10	XY	288
Merodon equestris			12	12	XY	288
Mesogramma marginata			12	12	XY	290
Mesogramma marginata			12	12		263
Mesograpta marginata			12	12	XY	288
Metasyrphus americanus			8	8	XY	288
Metasyrphus astutus			8	8	XY	288
Metasyrphus canadensis			8	8	XY	288
Metasyrphus corollae			8	8	XY	288
Metasyrphus luniger			8	8	XY	288
Metasyrphus perplexus			8	8	XY	288
Metasyrphus snowi			8	8	XY	288
Microdon piperi			12	12	XY	288
Mitesia virginiensis			12	12	XY	286
Myathropa florea			10	10	XY	288
Myolepta luteola			10	10	XY	288

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Myolepta luteola			10	10	XY	286
Myolepta luteola			10	10	XY	286
Myolepta pretiosa			10	10	XY	286
Myolepta strigilata			10	10	XY	286
Neoascia globosa			8	8	XY	288
Neoascia podagrica			8	8	XY	288
Neocnemodon latitarsus			8	8	XY	288
Neocnemodon vitripennis			8	8	XY	288
Ornidia obesa			12	12	XY	288
Orphnabaccha sp.			10	10	XY	287
Paragopsis strigalus			12	12	XY	290
Paragus bicolor			8	8	XY	288
Paragus borbonicus			8	8	XY	288
Paragus longiventris			8	8	XY	288
Paragus minutus			8	8	XY	288
Paragus tibialis			8	8	XY	288
Phalacrodira rectoides			8	8	XY	288
Phalacrodira vittiger			8	8	XY	288
Pipiza femoralis			8	8	XY	288
Pipiza nigripilosa			8	8	XY	288
Pipiza sp.			8	8	XY	288
Pipizella varipes			8	8	XY	288
Pipizella virens			8	8	XY	288
Platycheirus albimanus			8	8	XY	288
Platycheirus angustatus			8	8	XY	288
Platycheirus clypeatus			8	8	XY	288
Platycheirus fulviventris			8	8	XY	288
Platycheirus peltatus			8	8	XY	288
Platycheirus quadratus			8	8	XY	288
Platycheirus scambus			8	8	XY	288
Platycheirus scutatus			8	8	XY	288
Pseudoscaeva sericea			10	10	XY	287
Rhingia campestris			10	10	XY	288
Rhingia nasica			10	10	XY	288
Rhysops currani			10	10	XY	287
Rhysops neotropica			14	14	XY	287
Rhysops nigrans			8	8	XY	287
Rhysops sp. (13)			8	8	XY	287
Salpingogaster nigra			8	8	XY	287
Scaeva melanostoma			10	10	XY	287
Scaeva occidentalis			10	10	XY	287
Scaeva pyrastri			8	8	XY	288
Scaeva selenitica			8	8	XY	288
Sericomyia chalcopyga			12	12	XY	291
Sericomyia chrysotoxoides			10	10	XY	291
Sericomyia lata			12	12	XY	291
Sericomyia militaris			12	12	XY	291
Sericomyia species 1			10	10	XY	291
Somula decora			12	12	XY	288
Somula decora			10	10	XY	286
Sphaerophoia scripta			8	8	XY	290
Sphaerophoria menthastri			8	8	XY	288
Sphaerophoria robusta			8	8	XY	288
Sphaerophoria rueppellii			8	8	XY	288
Sphaerophoria scripta			8	8	XY	288
Sphaerophoria Species 6			8	8	XY	288
Sphaerophoria Species 7			8	8	XY	288
Sphaerophoria sylindrica			8	8	XY	288
Sphecomyia brevicornis			14	14	XY	286
Sphecomyia occidentalis			10	10	XY	286
Sphecomyia pattonii			12	12	XY	286
Sphegina armatipes			12	12	XY	288
Sphegina californiaca			12	12	XY	288
Sphegina flavimana			12	12	XY	288
Sphegina infuscata			12	12	XY	288

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Spilomyia digitata			10	10	XY	286
Spilomyia longicornis			10	10	XY	286
Syritta pipiens			10	10	XY	288
Syritta pipiens			10	10	XY	286
Syrphus octomaculatus			8	8	XY	287
Syrphus balteatus			10	10	XY	290
Syrphus corollae			8	8	XY	290
Syrphus lasiophthalmus			10	10	XY	290
Syrphus luniger			8	8	XY	290
Syrphus melanostomoides			10	10	XY	290
Syrphus melanostomoides			10	10	XY	288
Syrphus phaeostigma			8	8	XY	287
Syrphus rectus			8	8	XY	288
Syrphus reedi			8	8	XY	287
Syrphus ribesii			8	8	XY	288
Syrphus ribesii			10	10	XY	288
Syrphus sp.			8	8	XY	288
Syrphus torvus			8	8	XY	288
Syrphus vitripennis			8	8	XY	288
Syrphus vittafrons			8	8	XY	288
Tcmnostoma alternans			8	8	XY	286
homomorphic						
Temnostoma acra			12	12	XY	286
homomorphic						
Temnostoma acra			12	12	XY	286
homomorphic						
Temnostoma alternans			8	8	XY	286
homomorphic						
Temnostoma balyras			8	8		288
Temnostoma balyras			8	8	XY	286
homomorphic						
Temnostoma vespiforme			8	8	XY	286
Toxomerus anthrax			10	10	XY	287
Toxomerus calceolatus			10	10	XY	287
Toxomerus croesus			10	10	XY	287
Toxomerus geminatus			10	10	XY	288
Toxomerus lachrymosus			12	12	XY	287
Toxomerus laciniosus			10	10	XY	287
Toxomerus laenas			10	10	XY	287
Toxomerus occidentalis			10	10	XY	288
Toxomerus philippii			10	10	XY	287
Toxomerus politus			10	10	XY	287
Toxomerus portius			10	11	XYY	287
Toxomerus sp. (10)			10	10	XY	287
Toxomerus sp. (11)			10	10	XY	287
Toxomerus sp. (12)			10	10	XY	287
Toxomerus sp. (15)			10	10	XY	287
Toxomerus sp. (16)			8	8	XY	287
Toxomerus sp. (19)			10	10	XY	287
Toxomerus sp. (4)			10	10	XY	287
Toxomerus sp. (6)			12	12	XY	287
Toxomerus sp.(3)			10	10	XY	287
Toxomerus steatogaster			10	10	XY	287
Toxomerus vitreus			10	10	XY	287
Tropidia quadrata			10	10	XY	288
Tropidia quadrata			10	10	XY	286
Tropidia scita			10	10	XY	288
Tropidia scita			10	10	XY	286
Tubifera sp			14	14	XY	290
Tubifera sp.			14	14	XY	288
Volucella bombylans			12	12	XY	288
Volucella obesa			12	12	XY	290
Volucella obesa			12	12	XY	263
Volucella pellucens			12	12	XY	288
Xanthogramma ornatum			10	10	XY	288

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Xylota _subfasciata			10	10	XY	286
Xylota angustiventris			10	10	XY	286
Xylota annulifera			10	10	XY	286
Xylota atlantica			10	10	XY	288
Xylota atlantica			10	10	XY	286
Xylota barbara			10	10	XY	286
Xylota barbata			10	10	XY	288
*Xylota barbata_*			10	10	XY	286
Xylota bigelowi			8	8		288
Xylota bigelowi			8	8	XY	286
Xylota chalybea			10	10	XY	288
Xylota chalybea			10	10	XY	286
Xylota chalybea			10	10	XY	286
Xylota coeruleiventris			10	10	XY	286
Xylota coeruleiventris			10	10	XY	286
Xylota curvaria			10	10	XY	286
Xylota curvaria			10	10	XY	286
Xylota ejuncida			10	10	XY	286
Xylota flavitibia			10	10	XY	288
Xylota flavitibia			10	10	XY	286
Xylota flexa			10	10	XY	286
Xylota florum			10	10	XY	286
Xylota hinei			10	10	XY	286
Xylota ignava			10	10	XY	286
Xylota inarmata			10	10	XY	286
Xylota lenta			10	10	XY	286
Xylota libo			10	10	XY	286
homomorphic						
Xylota nemorum			10	10	XY	288
Xylota nemorum			10	10	XY	286
Xylota nemorum			10	10	XY	286
Xylota pigra			10	10	XY	288
Xylota pigra			10	10	XY	286
Xylota pigra			10	10	XY	286
Xylota quadrimaculata			10	10	XY	288
Xylota quadrimaculata			10	10	XY	286
Xylota segnis			10	10	XY	288
Xylota segnis			10	10	XY	286
Xylota segnis			10	10	XY	286
Xylota sp2			10	10	XY	286
Xylota subfasciata			10	10	XY	288
Xylota sylvarum			10	10	XY	288
Xylota sylvarum			10	10	XY	286
Xylota sylvarum			10	10	XY	286
Xylota tuberculata			10	10	XY	288
Xylota tuberculata			10	10	XY	286
Xylota tuberculata			10	10	XY	286
Xylota vecors			10	10	XY	286
Tabanidae						
Atylotus bicolor			18	18	XY	292
Atylotus bicolor			18	18	XY	293
Atylotus fulvus			18	18	XY	292
Atylotus fulvus			18	18	XY	293
Atylotus horvathi			12	12	XY	292
Atylotus loewianus			18	18	XY	292
Atylotus obioensis			18	18	XY	292
Atylotus ohioensis			18	18	XY	293
Atylotus pulchellus karybenthinus		18	18	XY	292	
Chrysops aberrans			12	12	XY	292
Chrysops aberrans			12	12	XY	293
Chrysops aestuans			10	10	XY	293
Chrysops caecutiens			10	10	XY	292
Chrysops flavipes			10	10	XY	292
Chrysops frigidus			10	10	XY	293
Chrysops frigidus			10	10	XY	292

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Chrysops indus			10	10	XY	293
Chrysops Indus			10	10	XY	292
Chrysops ludens			10	10	XY	292
Chrysops mlokosiewiczi			10	10	XY	292
Chrysops pictus			10	10	XY	292
Chrysops relictus			10	10	XY	292
Chrysops shermani			12	12	XY	293
Chrysops shermani			8	8	XY	292
Chrysops suavis			10	10	XY	292
Chrysops vanderwulpi			10	10	XY	292
Chrysops vittatus			12	12	XY	292
Chrysops vittatus homomorphic			8	8		293
Chrysops vittatus			12	12	XY	293
Dasyrhamphis umbrinus			12	12	XY	292
Haematopota crassicornis			18	18	XY	292
Haematopota italica			14	14	XY	292
Haematopota pallens			18	18	XY	292
Haematopota pellucens			14	14	XY	292
Haematopota pluvialis			18	18	XY	292
Haematopota pluvialis			18	18	XY	293
Haematopota scutellata rossica		18	18	XY	292	
Haematopota subcylindrica			26	26	XY	292
Haematopota tamerlani			18	18	XY	292
Hybomitra arpadi			12	12	XY	292
Hybomitra bimaculata			14	14	XY	292
Hybomitra brevis			18	18	XY	292
Hybomitra ciureai			12	12	XY	292
Hybomitra distinguenda distinguenda			16	16	XY	292
Hybomitra erberi			10	10	XY	292
Hybomitra lasiophthalma			14	14	XY	293
Hybomitra lasiophthalma			14	14	XY	292
Hybomitra lundbecki			18	18	XY	292
Hybomitra m. acrocentrica			16	16	XY	292
Hybomitra montana montana			16	16	XY	292
Hybomitra muhlfeldi			10	10	XY	292
Hybomitra nigella			18	18	XY	292
Hybomitra peculiaris			14	14	XY	292
Hybomitra stenopselapha			18	18	XY	292
Hybomitra tarandina			18	18	XY	292
Hybomitra tarandinoides			10	10	XY	292
Hybomitra ussuriensis			18	18	XY	292
Tabanus autumnalis			14	14	XY	292
Tabanus bifarius			16	16	XY	292
Tabanus bifarius			16	16	XY	293
Tabanus bovines			14	14	XY	292
Tabanus bromius			10	10	XY	292
Tabanus buddha			12	12	XY	292
Tabanus colchidicus			16	16	XY	292
Tabanus cordiger			12	12	XY	292
Tabanus cordiger			12	12	XY	293
Tabanus dolini			12	12	XY	292
Tabanus flavofemoratus			10	10	XY	292
Tabanus geminus			14	14	XY	292
Tabanus hauseri			14	14	XY	292
Tabanus indrae			10	10	XY	292
Tabanus infestus			10	10	XY	292
Tabanus maculicornis			10	10	XY	292
Tabanus marginalis			10	10	XY	292
Tabanus marginalis			10	10	XY	293
Tabanus miki			10	10		292
Tabanus pleskei			12	12	XY	292
Tabanus quatuornotatus			16	16	XY	292
Tabanus sabuletorum			12	12	XY	292
Tabanus shelkovnikovi			12	12	XY	292

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Tabanus spectabilis			10	10	XY	292
Tabanus sudeticus			14	14	XY	292
Tabanus unifasciatus			12	12	XY	292
Tabanus zimini			12	12	XY	292
Tachinidae						
Aplomya caesar			12	12	XY	294
Aplomya caesar			12	12	XY	270
Aplomya caesar			12	12	XY	262
Aplomya mitis			12	12	XY	270
Aplomya mitis			12	12	XY	262
AplomyaE mitis			12	12	XY	294
Archylas apicifer			12	12	XY	270
Archytas apicifera			12	12	XY	262
Bessa selecta			12	12		262
Bessa selecta			12	12	XY	262
Bessa selecta			12	12	XY	270
Bessa selecta			12		XY	270
Ceracia dentata			12	12	XY	294
Ceracia dentata			12		XY	270
Ceromasia auricaudata			12	12	XY	294
Ceromasia auricaudata			12	12	XY	270
Ceromasia auridaudata			12	12	XY	262
Drino behemica			12	12	XY	262
Drino bohemica			12	12	XY	294
Drino bohemica			12	12	XY	270
Eumea westermanni			12	12	XY	294
Eumea westermanni			12		XY	270
Eumea westermanni			12	12	XY	262
Lydella grisescens			12	12	XY	294
Lydella grisescens			12	12	XY	270
Lydella grisescens			12	12	XY	262
Madremyia saundersii			12	12	XY	294
Madremyia saundersii			12	12	XY	270
Madremyia saundersii			12	12	XY	262
Mericia ampelus			12	12	XY	294
Mericia ampelus			12	12	XY	270
Namorilla pyste			12	12	XY	262
Nemorella pyste			12		XY	270
Nemorilla pyste			12	12	XY	294
Neopharocera hamata			12	12		270
Neopharocera hamata			12	12	XY	270
Neophorocera hamata			12	12	XY	294
Neophorocera hemata			12	12	XY	262
Omoloma fumiferanae			12	12	XY	270
Omotoma fumiferanae			12	12	XY	294
Omotoma fumiferonae			12	12	XY	262
Peleteria iterans			12	12	XY	262
Peletieria iterans			12	12	XY	270
Phorocera hamata			12	12		262
Phorocera hamata			12	12	XY	266
Phorocera hemata			12	12	XY	262
Phryxe pecosensis			12	12	XY	294
Phryxe pecosensis			12	12	XY	262
Phyrxe pecosensis			12	12	XY	270
Spathimeigenia sp			12	12	XY	270
Spathimeigenia sp.			12	12	XY	294
Winthemia dantanae			12	12	XY	262
Winthemia datanae			12	12	XY	294
Winthemia datanae			12		XY	270
Winthemia occidentis			12	12	XY	294
Winthemia occidentis			12	12	XY	270
Winthemia occidentis			12	12	XY	262
Winthemia rufopicla			12	12	XY	270
Winthemia rufopicta			12	12	XY	262
Tephritidae						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Acinia fucata			12	12	ZW	295
Acinia mallochi			12	12	ZW	295
Afrodacus jarvisi			14	14	XY	262
Anastepha ludens			10	10		266
Anastrepha amita			12	12	XY	296
Anastrepha aphelocentema			12	12	XY	295
Anastrepha aphelocentema			12	12	XY	296
Anastrepha aphelocentoma			12	12	XY	262
Anastrepha barnesi			12	12	XY	295
Anastrepha barnesi			12	12	XY	296
Anastrepha bistrigata			11	12	XXY	295
Anastrepha bistrigata			12	11	XXY	296
Anastrepha distincta			12	12		295
homomorphic						
Anastrepha distincta			12	12	XY	262
Anastrepha distincta			12	12	XY	296
Anastrepha fraterculus			12	12		295
homomorphic						
Anastrepha fraterculus			12	12	XY	295
Anastrepha fraterculus			12	12	XY	262
Anastrepha fraterculus			12	12	XY	296
Anastrepha grandis			12	12	XY	296
Anastrepha leptozona			10	10	XY	296
Anastrepha ludens			10	10		295
Anastrepha ludens			10	10	XY	262
Anastrepha ludens			12	12	XY	296
homomorphic						
Anastrepha mombinpraeoptans		12	12	XY	262	
Anastrepha montei			8	8	XY	296
Anastrepha oblicua			12	12	XY	295
Anastrepha obliqua			12	12	XY	296
Anastrepha pickeli			8	8	XY	295
Anastrepha pickeli			8	8	XY	296
Anastrepha pseudoparalella			12	12	XY	296
Anastrepha pseudoparallela			12	12	XY	295
Anastrepha serpentina			11	12	XXY	295
Anastrepha serpentina			10	10	XY	262
Anastrepha serpentina			12	11	XXY	296
Anastrepha sororcula			12	12	XY	296
Anastrepha spatula			12	12	XY	295
Anastrepha spatulata			12	12	XY	262
Anastrepha spatulata			12	12	XY	296
Anastrepha striata			12	12	XY	295
Anastrepha striata			12	12	XY	262
Anastrepha striata			12	12	XY	296
Anastrepha turpiniae			12	12	XY	296
Anastrepha zenildae			12	12	XY	296
homomorphic						
Anastrepha zuelaniae			12	12	XY	295
Anastrepha zuelaniae			12	12	XY	262
Anastrepha zuelaniae			12	12	XY	296
homomorphic						
Austrodacus cucumis			12	12	XY	262
Bactrocera cucurbitae			12	12	XY	295
Bactrocera diversus			12	12	XY	295
Bactrocera oleae			12	12	XY	295
Bactrocera zonatus			12	12	XY	295
Cecidocharella borrichia			12	12	ZW	295
Ceratitis capitata			12	12	XY	295
Ceratitis capitata			12	12	XY	262
Chrysotrypanea sp			12	12	ZW	295
Chrysotrypanea trifasciata			12	12	ZW	295
Dacus olea			12	12	XY	262
Dioxina chilensis			12	12		295
Diplodacus sienatiles			12	12	XY	262

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Dyseuaresta impluvita			12	12		295
homomorphic						
Dyseuaresta mexicana			12	12		295
Epochra canadensis			10	10	XY	262
Euaresta melanogaster			12	12		263
Euaresta melanogsaster			12	12		266
Procecidochares utilis			12	12	XY	295
Rhachiptera limbata			12	12	ZW	295
Rhagoletis basiola			10	10	XY	295
Rhagoletis berberedis			12	12	XY	295
Rhagoletis berberis			14	14	XY	295
Rhagoletis boycei			12	12		295
homomorphic						
Rhagoletis cerasi			12	12	XY	295
Rhagoletis cingulata			12	12		295
homomorphic						
Rhagoletis completa			12	12		295
homomorphic						
Rhagoletis conivora			12	12	XY	295
Rhagoletis conversa			12	12	XY	295
Rhagoletis fausta			12	12		295
homomorphic						
Rhagoletis indifferens			12	12		295
homomorphic						
Rhagoletis jungladis			12	12		295
homomorphic						
Rhagoletis juniperina			12	12		295
homomorphic						
Rhagoletis meigeni			10	10	XO	295
Rhagoletis mendax			12	12		295
homomorphic						
Rhagoletis nova			12	12	XY	295
Rhagoletis pomella			12	12		295
homomorphic						
Rhagoletis ribicola			12	12		295
homomorphic						
Rhagoletis striatelia			11	12	XXY	295
Rhagoletis suavis			12	12		295
homomorphic						
Rhagoletis tabelaria			12	12		295
homomorphic						
Rhagoletis tomatis			12	12	XY	295
Rhagoletis zephyria			12	12		295
homomorphic						
Rhagoletis zoqui			12	12		295
homomorphic						
Strumata bryoniae			12	12	XY	262
Strumata cacuminata			12	12	XY	262
Strumata humeralis			12	12	XY	262
Strumata tryoni			12	12	XY	262
Tehpritis arnicae			12	12	XY	262
Tephritis arnicae			12	11	XO	266
Tephritis arnicae			11	12	XO	295
Tephritis sp.			12	12	ZW	295
Trupanea chrysanthemifolii			12	12		295
homomorphic						
Trupanea foliosi			12	12		295
homomorphic						
Trupanea footei			12	12		295
homomorphic						
Trupanea thuriferae			12	12		295
homomorphic						
Trypanaresta marisolae			12	12		295
homomorphic						
Zonosemata electa			12	12	XY	295

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Zonosemata vittigera			12	12	XY	295
Tetanoceratidae						
Tetanocera sparea			12	12	XY	266
Thaumaleidae						
Thaumalea testacea			6	6	XY	261
Tipulidae						
Dictenidia bimaculala			8	8	XY	261
Tipula paludosa			8	8		266
Tipula paludosa			8	8	XY	261
Tipula sp			8	8		266
Tipula sp.			8	8	XY	261
Trichoceridae						
Melusine sp.			6	6		261
homomorphic						
Ulididae						
Chaetopsis fulvifrons			8	8		266
Xylomyidae						
Solva pallipes			10	10	XY	280
Embiidina						
Embiidae						
Cleomia guareschii			22	21	XO	297
Embia tyrrhenica			22	21	XO	297
Embia nuragica			24	23	XO	297
Embia ramburi			22	21	XO	297
Oligotomidae						
Haploembia solieri			20	19	XO	297
Haploembia palaui			22	21	XO	297
Oligotoma japonica			20	19	XO	297
Oligotoma saundersi			22	21	XO	297
Ephemeroptera						
Baetidae						
Baetis rhodani			10	10	XY	298
Baetis vernus			10	10	XY	298
Cloeon dipterum			10	10	XY	298
Cloeon triangulifer	parth					299
Caenidae						
Caenis horaria			9	8	XO	300
Ephemerellidae						
Ephemerella ignita			16	16	XY	300
Ephemeridae						
Ephemera danica			12	11	XO	300
Heptageniidae						
Ecdyonurus dispar			20	20	XY	300
Siphlonuridae						
Ameletus costalis			18	18	XY	298
Grylloblata						
Grylloblatidae						
Galloisiana nipponensis			30	30	XY	243
heteromorphic						
Grylloblatta campodeioformis					XY	243
Hemiptera						
Aclerdidae						
Aclerda berlesii						301
Aclerda sp.			18			302
Aleyrodidae						
Aleurotulus nephrolepidis			26	13		303
holocentric HD arrhenotoky						
Aleyrodes proletella			28	14		303
holocentric HD arrhenotoky						
Bemisia tabaci			22	11		303
holocentric HD arrhenotoky						
Trialeurodes vaporarium			22	11		303
holocentric HD arrhenotoky						
Asterolecaniidae						
Asterodiaspis quercicola	parth		24			302

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Russellaspis pustulans	parth					304
Astrolecaniidae						
Abditicoccus acaciae	parth					305
Amorphococcus mesuae	parth					305
Anomalococcus indicus			14			302
Endernia sp.						305
Mycetococcus ehrhorni			6			302
PGE						
Callipappidae						
Callipappus rubiginosus			14		XO	302
Platycoelostoma tasmanicum						305
Cerococcidae						
Cerococcus indicus			14			302
Cerococcus quercus			18			302
PGE						
Coccidae						
Acanthopulvinaria orientalis			18			302
PGE						
Ceroplastes _oridensis			36			302
Ceroplastes actiniformes			32			302
Ceroplastes ceriferus	parth		36			302
Ceroplastes cirripediformis						306
Ceroplastes cirripediformis	parth					306
Ceroplastes japonicus			36			302
PGE						
Ceroplastes pseudoceriferus			36			302
Ceroplastes rubens			36			307
Cissococcus fulleri						308
Coccus capparidis	parth					309
Coccus hesperidum	parth		14			302
Coccus longulus			14			302
Coccus pseudomagnoliarum	parth					309
Coccus viridis	parth					309
Drepanococcus cajani			18			302
Ericerus pela						310
Eriopeltis lichtensteini			14			302
PGE						
Eriopeltis stammeri			14			302
PGE						
Eucalymnatus euterones			16			302
Eucalymnatus tessellatus	parth		16			311
Eulecanium ciliatum			18			302
Eulecanium douglasi			18			302
Eulecanium tiliae			18			302
Lichtensia viburni			18			302
PGE						
Luzulaspis dactylis			18			302
PGE						
Neolecanium cornuparvum			34			302
PGE						
Neopulvinaria innumerabilis	parth					302
Parthenolecanium cerasifex			16			302
arrhenotoky						
Parthenolecanium cerasifex	parth		16			302
Parthenolecanium corni			16			302
PGE						
Parthenolecanium pomeranicum	parth					312
Parthenolecanium putmani	parth		16			302
Physokermes hemicryphus	parth	2 or 3	23			302
Protopulvinaria pyriformis	parth		16			302
Pulvinaria _occifera			16			302
Pulvinaria aurantii			26			302
PGE						
Pulvinaria hydrangeae	parth		16			302
Pulvinaria peregrina	parth		16			302

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Pulvinaria polygonata			18			302
Pulvinaria psidii			14			302
Pulvinaria ribesiae			18			302
PGE						
Pulvinaria vitis			16			302
Pulvinariella mesembryanthemi	parth					302
Rhizopulvinaria variabilis	parth		28			302
Saissetia coffeae	parth		16			302
Sphaerolecanium prunastri			18			302
PGE						
Vinsonia stellifera			10			302
Conchaspididae						
Conchaspis lepagei			12			302
PGE						
Dactylopiidae						
Dactylopius ceylonicus			10			302
PGE						
Dactylopius coccus			16			302
PGE						
Dactylopius confusus			10			302
PGE						
Dactylopius opuntiae	parth					313
Dactylopius opuntiae			10			302
PGE						
Diaspididae						
Abgrallaspis cyanophylli			8			302
PGE						
Abgrallaspis flavida			8			302
PGE						
Acutaspis paulista			8			302
PGE						
Acutaspis perseae			8			302
PGE						
Africaspis chionaspiformis			8			302
PGE						
Africaspis fici			12			302
PGE						
Ancepaspis edentata			8			302
PGE						
Ancepaspis tridentata			6			302
PGE						
Aonidia lauri			8			302
PGE						
Aonidia shastae			8			302
PGE						
Aonidiella aurantii			8			302
PGE						
Aonidiella citrina			8			302
PGE						
Aonidiella orientalis			8			302
PGE						
Aonidiella simplex			8			302
PGE						
Aonidomytilus concolor			12			302
PGE						
Aonidomytilus variabilis			10			302
PGE						
Aspidaspis arctostaphyli			8			302
PGE						
Aspidaspis densiflorae			8			302
PGE						
Aspidiella hartii			8			302
PGE						
Aspidiella sacchari			8			302
PGE						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Aspidiotus cryptomeriae PGE			8			302
Aspidiotus destructor PGE			8			302
Aspidiotus hedericola PGE			8			302
Aspidiotus nerii PGE			8			302
Aspidiotus nerii	parth	2	8			302
Aspidiotus simulans PGE			8			302
Aulacaspis rosae PGE			8			302
Aulacaspis spinosa PGE			8			302
Aulacaspis tubercularis PGE			8			302
Berlesaspis spinifera						305
Carulaspis minima PGE			8			302
Chionaspis ortholobis PGE			8			302
Chionaspis pinifoliae PGE			8			302
Chionaspis pinifoliae	parth	2	8			302
Chionaspis platani PGE			8			302
Chionaspis salicis PGE			8			302
Chrysomphalus aonidum PGE			8			302
Chrysomphalus bifasciculatus PGE			8			302
Chrysomphalus dictyospermi	parth	2	8			302
Chrysomphalus pinnulifer	parth		8			302
Clavaspis coursetiae PGE			8			302
Clavaspis texana PGE			8			302
Comstockiella sabalis PGE			10			302
Cooleyaspis praelonga PGE			18			302
Costalimaspis eugeniae PGE			12			302
Crassaspis multipora PGE			8			302
Diaspidiotus aesculi PGE			8			302
Diaspidiotus ancylus PGE			8			302
Diaspidiotus gigas PGE			8			302
Diaspidiotus lenticularis PGE			8			302
Diaspidiotus ostreaeformis PGE			8			302
Diaspidiotus perniciosus PGE			8			302
Diaspidiotus zonatus PGE			8			302
Diaspis boisduvalii PGE			8			302
Diaspis bromeliae PGE			8			302

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Diaspis echinocacti	PGE		16			302
Duplachionaspis sicula	PGE		8			302
Dynaspidiotus apacheca	PGE		8			302
Dynaspidiotus californicus	PGE					314
Dynaspidiotus pseudomeyeri	PGE		8			315
Epidiaspis leperii			8			302
Epidiaspis persimilis	PGE		8			302
Fiorinia fioriniae	parth	2	8			302
Fiorinia japonica	PGE		8			302
Froggattiella penicillata	PGE		8			302
Furcaspis capensis	PGE		8			316
Furcaspis biformis	PGE		8			302
Greenaspis decurvata	PGE		8			302
Gymnaspis aechmeae	PGE		10			302
Helaspis mexicana	PGE		12			302
Hemiberlesia cupressi	parth	2	8			302
Hemiberlesia lataniae	PGE		8			302
Hemiberlesia lataniae	parth	2	8			302
Hemiberlesia palmae	parth	2	8			302
Hemiberlesia quercicola	PGE		8			302
Hemiberlesia rapax	parth	2	8			302
Howardia biclavis	parth	2	10			302
Ischnaspis longirostris	parth	2	8			302
Kuwanaspis bambusicola	parth	2	10			302
Kuwanaspis pseudoleucaspis	parth	2	8			302
Ledaspis reticulata	PGE		8			302
Ledaspis tenuiloba	PGE		18			302
Lepidosaphes beckii	PGE		8			315
Lepidosaphes conchiformis	PGE		8			302
Lepidosaphes tokionis	PGE		12			302
Lepidosaphes ulmi	PGE		16			302
Leucaspis lowi/loewi	parth	2	11			302
Leucaspis pusilla	PGE		8			302
Lindingaspis ferrisi	PGE		8			302
Lindingaspis opima	PGE		8			302
Lindingaspis rossi	PGE		8			302
Melanaspis glomerata	PGE		8			302
Melanaspis inopinata			8			302
Melanaspis lilacina			8			302

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
PGE						
Morganella longispina			8			302
PGE						
Mycetaspis juventinae			8			302
PGE						
Mycetaspis personata			8			302
PGE						
Neomorgania eucalypti			8			302
PGE						
Neoselenaspidus kenyae	parth	2	8			302
Neoselenaspidus silvaticus	parth	2	8			302
Nicholiella bumeliae			8			302
PGE						
Nikkoaspis shiranensis			8			302
PGE						
Odonaspis ruthae	parth	2	8			302
Odonaspis saccharicaulis			8			302
PGE						
Opuntiaspis philococcus			8			302
PGE						
Parlatoria crotonis			8			302
PGE						
Parlatoria oleae			8			302
PGE						
Parlatoria proteus			8			302
PGE						
Parlatoria proteus	parth	2	8			302
Parlatoria ziziphi			8			302
PGE						
Pinnaspis aspidistrae			8			302
PGE						
Pinnaspis buxi	parth	2	8			302
Pinnaspis strachani			8			302
PGE						
Poliaspoides formosana	parth	2	8			302
Protodiaspis agrifoliae			8			302
PGE						
Protodiaspis chichi			8			302
PGE						
Protodiaspis didymus			8			302
PGE						
Protodiaspis infidelis			6			302
PGE						
Protodiaspis signata			8			302
PGE						
Pseudaonidia baikeae			8			302
PGE						
Pseudaonidia trilobitiformis			8			302
PGE						
Pseudaulacaspis pentagona			16			302
PGE						
Pseudischnaspis bowreyi			8			302
PGE						
Pseudoparlatoria browni			8			302
PGE						
Pseudoparlatoria ostreata			10			302
PGE						
Pseudoparlatoria parlatorioides		10			302	
PGE						
Radionaspis indica			8			302
PGE						
Rhizaspidiotus dearnessi			8			302
PGE						
Rolaspis anacantha			18			302
PGE						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Selenaspidus articulatus			8			302
PGE						
Selenaspidus incisus	parth		8			302
Situlaspis yuccae			10			302
PGE						
Spinaspidiotus fissidens			8			302
PGE						
Targionia bigeloviae	parth	2	8			302
Targionia nigra			8			302
PGE						
Targionia vitis			8			302
PGE						
Targionia yuccarum			8			302
PGE						
Trischnaspis bipindensis	parth	2	8			302
Unachionaspis bambusae			8			302
PGE						
Unaspis citri			8			302
PGE						
Unaspis euonymi			8			302
PGE						
Xanthophthalma concinnum	parth	2	16			302
Xerophilaspis prosopidis			8			302
PGE						
Eriococcidae						
Acanthococcus agropyri			16			302
PGE						
Acanthococcus insignis			16			302
PGE						
Aculeococcus morrisoni	parth					305
Aculeococcus yongpingensis	parth					305
Apiomorpha attenuata			56			317
PGE						
Apiomorpha baeuerleni			5			317
PGE						
Apiomorpha calycina			92			317
PGE						
Apiomorpha conica			19			317
PGE						
Apiomorpha densispinosa			4			317
PGE						
Apiomorpha dipsaciformis			18			317
PGE						
Apiomorpha duplex			26			317
PGE						
Apiomorpha excupula			18			317
PGE						
Apiomorpha frenchi			17			317
PGE						
Apiomorpha gullanae	parth		73			318
Apiomorpha helmsii			98			302
PGE						
Apiomorpha hilli			42			302
PGE						
Apiomorpha intermedia			12			302
PGE						
Apiomorpha karschi			93			302
PGE						
Apiomorpha longiloba			178			302
PGE						
Apiomorpha macqueeni			192			302
PGE						
Apiomorpha maliformis			18			302
PGE						
Apiomorpha malleeacola			32			302

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
PGE						
Apiomorpha minor			47			302
PGE						
Apiomorpha munita			154			302
PGE						
Apiomorpha munita			15			302
PGE						
Apiomorpha ovicola			62			302
PGE						
Apiomorpha ovicoloides			57			302
PGE						
Apiomorpha pedunculata			38			302
PGE						
Apiomorpha pharetrata			29			302
PGE						
Apiomorpha pileata			19			302
PGE						
Apiomorpha regularis			108			302
PGE						
Apiomorpha rosaeforma			14			302
PGE						
Apiomorpha sessilis			4			302
PGE						
Apiomorpha sloanei			128			302
PGE						
Apiomorpha spinifer			148			302
PGE						
Apiomorpha strombylosa			41			302
PGE						
Apiomorpha subconica			67			302
PGE						
Apiomorpha tepperi			64			302
PGE						
Apiomorpha urnalis			121			302
PGE						
Apiomorpha variabilis			80			302
PGE						
Apiomorpha withersi			40			302
PGE						
Ascelis praemollis			16			302
Ascelis schraderi			18			302
PGE						
Calycicoccus merwei						319
PGE						
Capulinia crateraformis	parth					305
Capulinia jaboticabae			18			302
PGE						
Capulinia orbiculata			18			302
PGE						
Carpochloroides mexicanus	parth					319
Carpochloroides viridis	parth					319
Casuarinaloma leaii			12			302
PGE						
Cryptococcus fagisuga	parth					305
Cylindrococcus casuarinae			6			302
Cylindrococcus spiniferus			18			302
PGE						
Cystococcus echiniformis						305
Cystococcus pomiformis						305
Eremococcus pirogallis						305
Eremococcus rugosus						305
Eremococcus rugosus	parth					305
Eremococcus turbinata	parth					305
Eriococcus abditus			16			302
PGE						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Eriococcus acutispinatus	parth					305
Eriococcus araucariae			18			302
PGE						
Eriococcus arcanus	parth					305
Eriococcus cavellii			18			302
PGE						
Eriococcus coriaceus			18			302
PGE						
Eriococcus detectus			18			302
PGE						
Eriococcus elytranthae	parth					305
Eriococcus ericae			14			302
PGE						
Eriococcus fossor	parth					305
Eriococcus hakeae			18			302
Eriococcus lecanioides			18			302
PGE						
Eriococcus leptospermi			18			302
PGE						
Eriococcus minus			16			302
PGE						
Eriococcus montanus	parth					305
Eriococcus rata			14			302
PGE						
Eriococcus rhodomyrti			16			302
PGE						
Eriococcus williamsi			14			302
PGE						
Floracoccus elevans	parth					305
Gossyparia spuria			28			302
PGE						
Kuwanina obscurata						305
Lachnodius eucalypti			18		XO	302
homomorphic						
Lachnodius hirsutus	parth					305
Lachnodius lectularius			18			302
Madarococcus totarae			14			302
PGE						
Madarococcus viridulus			18			302
PGE						
Opisthoscelis convexa			18			302
Opisthoscelis fibularis						305
Opisthoscelis maculata			18			302
Opisthoscelis mammularis						305
Opisthoscelis maskelli						305
Opisthoscelis subrotunda			18			302
Ourococcus cobbi			14			302
PGE						
Phacelococcus subcorticalis			18			302
Phloeococcus loriceus			18			302
PGE						
Scutare lanuginosa			24			302
PGE						
Sisyrococcus intermedius			18			302
PGE						
Sphaerococcus morrisoni						305
Sphaerococcus pustulans	parth					305
Sphaerococcus socialis			18			302
Stegococcus oleariae	parth					305
Tectococcus ovatus	parth					305
Halimococcidae						
Colobopyga browni			10			302
PGE						
Colobopyga pritchardiae			10			315
PGE						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Halimococcus borassi			10			302
PGE						
Platycoccus tylocephalus			10			302
PGE						
Thysanococcus calami	parth	2	10			302
Thysanococcus pandani			10			302
PGE						
Kermesidae						
Kermes quercus			26			302
PGE						
Olliffiella cristicola	parth					305
Reynvaania gallicola	parth					305
Kerriidae						
Kerria lacca			18			302
PGE						
Tachardiella sp.			20			302
PGE						
Kuwaniidae						
Kuwania oligostigma			16		XO	302
Lecanodiaspididae						
Lecanodiaspis africana						302
PGE						
Marchalinidae						
Marchalina hellenica	parth		18			302
Margarodidae						
Margarodes vitis	parth					302
Porphyrophora hamelii			14		XO	302
Porphyrophora polonica			14		XO	302
Matsucoccidae						
Matsucoccus gallicolus			40		XXXXXXO	302
Matsucoccus pini	parth					320
Monophlebidae						
Aspidoproctus maximus			6		XO	302
Auloicerya acaciae			4			321
haplodiploid type unspecified						
Conifericoccus agathidis						305
Crypticerya rosae			4			302
haplodiploid type unspecified						
Crypticerya sp.			4			302
haplodiploid type unspecified						
Drosicha sp.			8			302
Echinicerya anomala			4			302
haplodiploid type unspecified						
Gigantococcus maximus			4			302
haplodiploid type unspecified						
Gueriniella serratulae	parth	2	6			302
Icerya aegyptiaca			4			302
haplodiploid type unspecified						
Icerya aegyptiaca	parth		4			302
Icerya bimaculata	hermaphrodite		4			302
Icerya brasiliensis			4			302
haplodiploid type unspecified						
Icerya littoralis			4			302
haplodiploid type unspecified						
Icerya montserratensis			4			302
haplodiploid type unspecified						
Icerya purchasi	hermaphrodite		4			302
Icerya similis			4			302
haplodiploid type unspecified						
Icerya tremae			4			302
haplodiploid type unspecified						
Llaveia axin			6		XO	302
Llaveia oaxacoensis			6		XO	302
Llaveiella taenechina			6		XO	302
Nautococcus schraderae			6		XO	302

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Protortonia navesi	parth					322
Protortonia primitiva			6		XO	302
Steatococcus tuberculatus			4			302
haplodiploid type unspecified						
Ortheziidae						
Insignorthezia insignis	parth					323
Newstedia sp.			14		XO	324
Orthezia urticae			18			325
Praelongorthezia praelonga			16		XO	326
homomorphic						
Phenacoleachiidae						
Phenacoleachia zealandica			8		XO	327
Phoenicococcidae						
Colobopyga browni			10			315
PGE						
Colobopyga pritchardiae			10			315
PGE						
Halimococcus borassi			10			315
PGE						
Phoenicococcus marlatti			18			315
PGE						
Platycoccus tylocephalus			10			315
PGE						
Thysanococcus calami	parth		10			315
Thysanococcus pandani			10			302
PGE						
Pseudococcidae						
Antonina crawi			12			302
Antonina evelynae			12			302
PGE						
Antonina graminis	parth		16			302
Antonina pretiosa			24			302
Atrococcus paludinus			10			302
PGE						
Balanococcus singularis			10			302
PGE						
Cataenococcus olivaceus	parth		38			302
Chaetococcus bambusae	parth		10			302
Chlorococcus straussiae			38			302
Chorizococcus pusillus			10			302
Chorizococcus rostellum			10			302
Clavicoccus tribulus			14			302
Coccidohystrix insolita			12			302
PGE						
Coccura suwakoensis			10			302
Dysmicoccus boninsis			12			302
Dysmicoccus brevipes			10			302
PGE						
Dysmicoccus brevipes	parth		10			302
Dysmicoccus multivorus			10			302
PGE						
Dysmicoccus neobrevipes			10			302
Dysmicoccus wistariae			10			302
Erium pygmaeum			10			302
Ferrisia virgata			10			302
PGE						
Ferrisia virgata	parth		10			302
Fonscolombia butorinae			10			302
PGE						
Fonscolombia tomlinii			10			302
PGE						
Formicococcus ireneus			10			302
Formicococcus robustus			10			302
PGE						
Heterococcus nudus			10			302

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
PGE						
Laminicoccus pandani			10			302
Laminicoccus vitiensis			16			302
Maconellicoccus hirsutus			10			302
PGE						
Maconellicoccus ugandae			10			302
Melanococcus viridis			16			302
Mirococcopsis subterranea	parth		10			302
Mirococcus inermis			10			302
PGE						
Nairobia bifrons			14			302
Neochavesia caldasiae			14			328
Nesococcus pipturi			12			302
Nesopedronia acanthocauda			18			302
Nesopedronia cibotii			14			302
Nesopedronia dura			10			302
Nesopedronia hawaiiensis			10			302
Nipaecoccus aurilanatus			10			302
Nipaecoccus graminis			10			302
Nipaecoccus nipae			10			302
PGE						
Nipaecoccus viridis			10			302
PGE						
Palmicultor browni			8			302
Palmicultor palmarum			10			302
Paracoccus bruguierae			10			302
Paracoccus burnerae			10			302
Paracoccus diversus			10			302
Paraputo leveri			10			302
Pedronia strobilanthis			8			302
Phenacoccus acericola			12			302
PGE						
Phenacoccus aceris			10			302
PGE						
Phenacoccus defectus			10			302
Phenacoccus dicoriae			10			302
Phenacoccus gossypii			12			302
PGE						
Phenacoccus graminicola			10			302
Phenacoccus helianthi			10			302
PGE						
Phenacoccus infernalis			10			302
Phenacoccus manihoti	parth					329
Phenacoccus phenacoccoides			10			302
PGE						
Phenacoccus pumilus			10			302
PGE						
Phenacoccus solani	parth		10			302
Phenacoccus solenopsis			10			302
Planococcoides crassus			10			302
Planococcus citri			10			302
PGE						
Planococcus lilacinus			10			302
Planococcus minor			16			302
Planococcus vovae			10			302
PGE						
Porococcus tinctorius			18			302
Pseudococcus swezeyi			10			302
Pseudococcus _origer			10			302
Pseudococcus antricolens			10			302
Pseudococcus calceolariae			10			302
PGE						
Pseudococcus comstocki			10			302
Pseudococcus kikuyuensis			10			302
Pseudococcus longispinus			8			302

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Pseudococcus lycopodii			10			302
Pseudococcus maritimus			10			302
Pseudococcus montanus			18			302
Pseudococcus nudus			10			302
Pseudococcus occidius			10			302
Pseudococcus pipturicolus			10			302
Pseudococcus viburni			10			302
PGE						
Pseudotrionymus multiductus	parth		18			302
Rastrococcus iceryoides			10			302
PGE						
Rhizoecus dianthi			12			302
Rhizoecus falcifer			12			302
Rhizoecus mayanus			10			302
Rhizoecus mexicanus			8			302
PGE						
Saccharicoccus sacchari			10			302
Spilococcus mamillariae			20			302
PGE						
Spilococcus mamillariae	parth		20			302
Spilococcus sequoiae			24			302
Trionymus aberrans			16			302
PGE						
Trionymus caricis			8			302
Trionymus insularis	parth		10			302
Trionymus longipilosus			10			302
Trionymus perrisii			16			302
PGE						
Vryburgia amaryllidis			10			302
Vryburgia transvaalensis	parth		10			302
Xenococcus annandalei						305
Putoidae						
Puto albicans			20		XO	302
Puto antennatus						305
Puto arctostaphyli			20		XO	302
Puto paci_cus			16		XO	302
Puto sp.					XO	302
Puto superbus						305
Puto yuccae			20		XO	302
Steingeliidae						
Araucaricoccus queenslandicus	parth				319	
Steingelia gorodetskia			10		XO	302
Steingelia gorodetskia			10		XO	302
Stictococcidae						
Stictococcus sp.						330
homomorphic						
Hymenoptera						
Andrenidae						
Andrena (Hesperandrena) duboisi			6	3		331
arrhenotoky						
Andrena (Hesperandrena) sp.			20	10		331
arrhenotoky						
Andrena togashii			6	3		332
arrhenotoky						
Aphelinidae						
Aphelinus mali			10	5		333
arrhenotoky						
Aphytis mytilaspidus			10	5		333
arrhenotoky						
Archenomus orientalis			22	11		333
arrhenotoky						
Encarsia berlesei			10	5		333
arrhenotoky						
Encarsia pergandiella			12	6		333
arrhenotoky						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Apidae						
Camargoia nordestina	arrhenotoky		34	17		334
Cephalotrigona capitata	arrhenotoky		34	17		334
Frieseomelitta doederleini	arrhenotoky		30	15		334
Frieseomelitta languida	arrhenotoky		30	15		334
Frieseomelitta varia	arrhenotoky		30	15		334
Geotrigona mombuca	arrhenotoky		30	15		334
Lestrimelitta limao	arrhenotoky		28	14		334
Mourella caerulea	arrhenotoky		34	17		334
Nannotrigona sp.1	arrhenotoky		34	17		334
Nannotrigona testaceicornis	arrhenotoky		34	17		334
Paratrigona subnuda	arrhenotoky		34	17		334
Ptilotrigona lurida	arrhenotoky		22	11		334
Scaptotrigona acantha	arrhenotoky		34	17		331
Scaptotrigona angustula	arrhenotoky		34	17		332
Scaptotrigona angustula	arrhenotoky		34	17		334
Scaptotrigona appendiculata	arrhenotoky		32	16		332
Scaptotrigona babai	arrhenotoky		32	16		332
Scaptotrigona barrocoloralensis	arrhenotoky	34	17		332	
Scaptotrigona chanchamayoensis	arrhenotoky		34	17		335
Scaptotrigona clavipes	arrhenotoky		34	17		334
Scaptotrigona dentipes	arrhenotoky		34	17		332
Scaptotrigona depilis	arrhenotoky		34	17		334
Scaptotrigona esakii	arrhenotoky		32	16		332
Scaptotrigona fenestrata	arrhenotoky		32	16		336
Scaptotrigona fenestrata	arrhenotoky		32	16		331
Scaptotrigona fiebrigi	arrhenotoky		34	17		337
Scaptotrigona flavipes	arrhenotoky		34	17		332
Scaptotrigona fulgidus longiplumosis	arrhenotoky		26	13		331
Scaptotrigona fulviventris	arrhenotoky		32	16		338
Scaptotrigona fuscipennis	arrhenotoky		34	17		334
Scaptotrigona japonica	arrhenotoky		34	17		332
Scaptotrigona latitarsis	arrhenotoky		34	17		334

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Scaptotrigona megastigmata	arrhenotoky		34	17		332
Scaptotrigona minangkabou	arrhenotoky		40	20		332
Scaptotrigona muelleri	arrhenotoky		16	8		339
Scaptotrigona okinawana	arrhenotoky		34	17		332
Scaptotrigona pectoralis barrocoloradensis	arrhenotoky	34	17		331	
Scaptotrigona postica	arrhenotoky		34	17		334
Scaptotrigona quadripunctata	arrhenotoky	34	17		334	
Scaptotrigona recursa	arrhenotoky		34	17		334
Scaptotrigona smaragdula	arrhenotoky		28	14		332
Scaptotrigona sp.1	arrhenotoky		34	17		334
Scaptotrigona spinipes	arrhenotoky		34	17		331
Scaptotrigona spinipes	arrhenotoky		34	17		334
Scaptotrigona subterranea	arrhenotoky		34	17		331
Scaptotrigona violacea	arrhenotoky		32	16		331
Scaptotrigona violacea	arrhenotoky		32	16		340
Scaptotrigona xanthotricha	arrhenotoky		34	17		334
Anthophora acervorum villosula	arrhenotoky	18	9		332	
Anthophora bomboides	arrhenotoky		36	18		331
Anthophora californica	arrhenotoky		38	19		331
Anthophora plumipes	arrhenotoky		18	9		331
Apis cerana	arrhenotoky		32	16		341
Apis cerana indica	arrhenotoky		32	16		342
Apis cerana japonica	arrhenotoky		32	16		332
Apis dorsata	arrhenotoky		32	16		343
Apis florea	arrhenotoky		32	16		344
Apis mellifera	arrhenotoky		32	16		331
Apis mellifera adansonii	arrhenotoky		32	16		345
Apis mellifera ligustica	arrhenotoky		32	16		332
Apis mellifera mellifera	arrhenotoky		32	16		346
Axestotrigona ferruginea	arrhenotoky		36	18		347
Bombus (Bombias) nevadensis	arrhenotoky	36	18		348	
Bombus (megabombus) consobrinus wittenburghi	arrhenotoky		38	19		332
Bombus affinis			36	18		348

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
arrhenotoky						
Bombus atratus			40	20		339
arrhenotoky						
Bombus deuteronymus maruhanabachi			46	23		332
arrhenotoky						
Bombus diversus			36	18		332
arrhenotoky						
Bombus honshuensis			34	17		332
arrhenotoky						
Bombus hypocrita			36	18		332
arrhenotoky						
Bombus ignitus			36	18		332
arrhenotoky						
Bombus lucorum lucorum			36	18		331
arrhenotoky						
Bombus moderatus			36	18		348
arrhenotoky						
Bombus morio			40	20		339
arrhenotoky						
Bombus pennsylvanicus			36	18		331
arrhenotoky						
Bombus pseudobaicalensis			34	17		332
arrhenotoky						
Bombus schrencki			34	17		331
arrhenotoky						
Bombus terrestris			36	18		349
arrhenotoky						
Bombus terricola			36	18		348
arrhenotoky						
Bombus terricola occidentalis			36	18		348
arrhenotoky						
Bombus ussurensis			36	18		332
arrhenotoky						
Celetrigona longicornis			30	15		350
arrhenotoky						
Cleptotrigona cubiceps			36	18		347
arrhenotoky						
Cullumanobombus rufocincus			38	19		348
arrhenotoky						
Dactylurina staudingeri			34	17		331
arrhenotoky						
Diadasia enavata			30	15		331
arrhenotoky						
Eufriesia violacea			30	15		331
arrhenotoky						
Euglossa cyanaspis			42	21		331
arrhenotoky						
Euglossa hyacinthina			40	20		331
arrhenotoky						
Euglossa sp.			42	21		331
arrhenotoky						
Exomalopsis aureopilosa			18	9		331
arrhenotoky						
Exomalopsis sp.			16	8		331
arrhenotoky						
Fervidobombus atratus			40	20		348
arrhenotoky						
Fervidobombus californicus			38	19		348
arrhenotoky						
Fervidobombus fervidus			36	18		348
arrhenotoky						
Fervidobombus morio			40	20		348
arrhenotoky						
Fervidobombus pennsylvanicus		36	18		348	
arrhenotoky						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Frieseomelitta (Duckeola) ghiliani		30	15		351	
arrhenotoky						
Frieseomelitta doederleini			30	15		340
arrhenotoky						
Frieseomelitta languida			30	15		352
arrhenotoky						
Frieseomelitta varia			30	15		340
arrhenotoky						
Hypotrigona braunsi			28	14		351
arrhenotoky						
Hypotrigona gribodoi			28	14		351
arrhenotoky						
Isepeolus viperinus			32	16		351
arrhenotoky						
Leurotrigona muelleri			16	8		331
arrhenotoky						
Leurotrigona pusilla			30	15		331
arrhenotoky						
Meliplebeia beccari			34	17		331
arrhenotoky						
Melipona asilvae			18	9		353
arrhenotoky						
Melipona bicolor bicolor			18	9		353
arrhenotoky						
Melipona capixaba			18	9		353
arrhenotoky						
Melipona compressipes			18	9		353
arrhenotoky						
Melipona compressipes manaosensis			18	9		351
arrhenotoky						
Melipona crinita			18	9		353
arrhenotoky						
Melipona favosa			18	9		332
arrhenotoky						
Melipona interrupta fasciculata		18	9		354	
arrhenotoky						
Melipona mandacaia			18	9		353
arrhenotoky						
Melipona marginata			18	9		331
arrhenotoky						
Melipona marginata marginata		18	9		355	
arrhenotoky						
Melipona mondury			18	9		356
arrhenotoky						
Melipona nigra			18	9		354
arrhenotoky						
Melipona quadrifasciata			18	9		355
arrhenotoky						
Melipona quinquefasciata			28	14		351
arrhenotoky						
Melipona rufiventris			18	9		354
arrhenotoky						
Melipona scutellaris			18	9		353
arrhenotoky						
Melipona subnitida			18	9		340
arrhenotoky						
Meliponula (Meliplebeia) becarii		34	17		351	
arrhenotoky						
Meliponula bocandei			36	18		347
arrhenotoky						
Mourella caerulea			34	17		352
arrhenotoky						
Nannotrigona sp.			34	17		352
arrhenotoky						
Nannotrigona testaceicornis			34	17		340

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
arrhenotoky						
Oxytrigona sp. cf. flaveola	arrhenotoky		34	17		357
Oxytrigona tataira	arrhenotoky		34	17		351
Partamona ailyae	arrhenotoky		34	17		331
Partamona cupira	arrhenotoky		34	17		340
Partamona helleri	arrhenotoky		34	17		331
Partamona mulata	arrhenotoky		34	17		331
Partamona pearsoni	arrhenotoky		34	17		331
Partamona peckolti	arrhenotoky		34	17		358
Partamona peckolti musarum	arrhenotoky		34	17		331
Partamona seridoensis	arrhenotoky		34	17		359
Partamona sp.n.	arrhenotoky		34	17		331
Partamona vicina	arrhenotoky		34	17		331
Plebeia (Friesella) schrottkyi	arrhenotoky		36	18		340
Plebeia denoiti	arrhenotoky		36	18		354
Plebeia droryana	arrhenotoky		36	18		360
Plebeia emerina	arrhenotoky		36	18		351
Plebeia remota	arrhenotoky		36	18		351
Plebeia sp.1	arrhenotoky		34	17		331
Plebeia subnuda	arrhenotoky		36	18		351
Plebeina denoiti	arrhenotoky		36	18		331
Psithyrus ashtoni	arrhenotoky		50	25		348
Psithyrus citrinus	arrhenotoky		52	26		348
Ptilothrix bombiformis	arrhenotoky		12	6		331
Pyrobombus ardens	arrhenotoky		36	18		332
Pyrobombus bimaculatus	arrhenotoky		36	18		348
Pyrobombus edwardsii	arrhenotoky		36	18		331
Pyrobombus ephippiatus	arrhenotoky		36	18		348
Pyrobombus huntii	arrhenotoky		36	18		348
Pyrobombus impatiens	arrhenotoky		36	18		348
Pyrobombus melanopygus	arrhenotoky		36	18		348
Pyrobombus mixtus	arrhenotoky		36	18		348
Pyrobombus perplexus	arrhenotoky		24	12		348

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Pyrobombus sitkensis	arrhenotoky		36	18		348
Pyrobombus ternarius	arrhenotoky		36	18		348
Pyrobombus vagans	arrhenotoky		36	18		348
Pyrobombus vosnesenskii	arrhenotoky		36	18		348
Scaptotrigona depilis	arrhenotoky		34	17		340
Scaptotrigona postica	arrhenotoky		34	17		340
Separatobombus griseocollis	arrhenotoky		38	19		348
Subterraneobombus appositus	arrhenotoky	32	16		348	
Subterraneobombus borealis	arrhenotoky		32	16		348
Svastra obliqua expurgata	arrhenotoky		42	21		331
Tetragona angustula	arrhenotoky		34	17		340
Tetragona clavipes	arrhenotoky		34	17		340
Trigona fuscipennis	arrhenotoky		34	17		340
Trigona spinipes	arrhenotoky		34	17		340
Trigona staudingeri	arrhenotoky		34	17		351
Trigona subterranea	arrhenotoky		34	17		340
Argidae						
Arge cyanocrocea	arrhenotoky		22	11		331
Arge gracilicornis	arrhenotoky		16	8		331
Arge melanochroa	arrhenotoky		20	10		331
Arge nigripes	arrhenotoky		26	13		331
Arge pagana	arrhenotoky		16	8		331
Arge pectoralis	arrhenotoky		16	8		331
Arge ustulata	arrhenotoky		16	8		331
Bethylidae						
Epyris nigir	arrhenotoky		28	14		333
Laelius utilis	arrhenotoky		20	10		333
Braconidae						
Apanteles sp.1	arrhenotoky		22	11		332
Aphidius rhopalosiphi	arrhenotoky		14	7		333
Biosteres carbonarius	arrhenotoky		28	14		333
Charmon cruentatus	arrhenotoky		10	5		333
Cotesia glomeratus	arrhenotoky		24	12		333
Dacnusa sp.1	arrhenotoky		34	17		333

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Diaeretiella rapae	arrhenotoky		12	6		333
Ephedrus sp.1	arrhenotoky		34	17		333
Habrobracon hebetor	arrhenotoky		20	10		333
Habrobracon juglandis	arrhenotoky		20	10		333
Habrobracon pectinophorae	arrhenotoky		20	10		333
Habrobracon serinopae	arrhenotoky		20	10		333
Heterospilus prosopidis	arrhenotoky		34	17		333
Macrocentrus thoracicus	arrhenotoky		26	13		333
Meteorus gyrator	arrhenotoky		20	10		333
Meteorus pallipes	arrhenotoky		20	10		333
Meteorus versicolor	arrhenotoky		16	8		333
Mirax sp.1	arrhenotoky		20	10		333
Phaenocarpa persimilis	arrhenotoky		34	17		333
Praon abjectum	arrhenotoky		8	4		333
Rhysipolis decorator	arrhenotoky		12	6		333
Cephidae						
Calameuta filiformis	arrhenotoky		40	20		331
Cephus cinctus	arrhenotoky		18	9		331
Janus integer	arrhenotoky		48	24		331
Chalcididae						
Brachymeria intermedia	arrhenotoky		6	3		333
Brachymeria lasus	arrhenotoky		10	5		333
Brachymeria ovata	arrhenotoky		10	5		333
Dirhinus himalayanus	arrhenotoky		10	5		333
Chrysididae						
Omalus djozanus hondonis	arrhenotoky		38	19		332
Cimbicidae						
Abia candens	arrhenotoky		32	16		331
Cimbex femorata	arrhenotoky		16	8		331
Trichiosoma lucorum	arrhenotoky		16	8		331
Colletidae						
Hylaeus ellipticus	arrhenotoky		22	11		331
Hylaeus nippon	arrhenotoky		16	8		332
Hylaeus sp.1	arrhenotoky		36	18		332
Hylaeus sp.2	arrhenotoky		56	28		332

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Hylaeus stevensi	arrhenotoky		28	14		331
Hylaeus transversali	arrhenotoky		16	8		331
Cynipidae						
Andricus curvator	arrhenotoky		20	10		333
Andricus fecundator	arrhenotoky		20	10		333
Andricus kollari	arrhenotoky		20	10		333
Andricus quercuscalicis	arrhenotoky		20	10		333
Aulacidea hieracii	arrhenotoky		20	10		333
Biorrhiza pallida	arrhenotoky		20	10		333
Cynips divisa	arrhenotoky		20	10		333
Cynips erinacea	arrhenotoky		24	12		333
Diastrophus nebulosus	arrhenotoky		20	10		333
Diplolepis elganteria	arrhenotoky		18	9		333
Diplolepis nervosum	arrhenotoky		18	9		333
Diplolepis rosae	arrhenotoky		22	11		333
Diplolepis spinosissimae	arrhenotoky		18	9		333
Dryocosmus kuriphilus	arrhenotoky		20	10		333
Neuroterus laeviusculus	arrhenotoky		20	10		333
Neuroterus numismalis	arrhenotoky		20	10		333
Neuroterus quescusbaccarum	arrhenotoky		20	10		333
Trigonaspis megaptera	arrhenotoky		20	10		333
Xestophanes potentillae	arrhenotoky		20	10		333
Diapriidae						
Belyta depressa	arrhenotoky		16	8		333
Cinetus lanceolatus	arrhenotoky		20	10		333
Diprionidae						
Diprion nipponicus	arrhenotoky		28	14		331
Diprion pini	arrhenotoky		22	11		331
Diprion similis	arrhenotoky		22	11		331
Gilpinia abieticola	arrhenotoky		14	7		331
Gilpinia frutetorum	arrhenotoky		14	7		331
Gilpinia hercyniae	arrhenotoky		14	7		331
Gilpinia pallida	arrhenotoky		14	7		331
Gilpinia polytoma	arrhenotoky		12	6		331

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Macrodiprion nemoralis	arrhenotoky		14	7		331
Monoctenus nipponicus	arrhenotoky		30	15		331
Monoctenus suffusus	arrhenotoky		14	7		331
Neodiprion nanulus	arrhenotoky		14	7		331
Neodiprion sertifer	arrhenotoky		14	7		331
Neodiprion abietis	arrhenotoky		16	8		331
Neodiprion compar	arrhenotoky		14	7		331
Neodiprion dubiosus	arrhenotoky		14	7		331
Neodiprion lecontei	arrhenotoky		14	7		331
Neodiprion maurus	arrhenotoky		14	7		331
Neodiprion nigroscutum	arrhenotoky		14	7		331
Neodiprion pinetum	arrhenotoky		14	7		331
Neodiprion pratti banksianae	arrhenotoky		14	7		331
Neodiprion sp.1	arrhenotoky		14	7		331
Neodiprion sp.2	arrhenotoky		16	8		331
Neodiprion swainei	arrhenotoky		16	8		331
Neodiprion taedae taedae	arrhenotoky		14	7		331
Neodiprion tsugae	arrhenotoky		14	7		331
Neodiprion virginiana	arrhenotoky		14	7		331
Encryrtidae						
Ageniaspis fuscicollis	arrhenotoky		20	10		333
Apoanagyrus lopezi	arrhenotoky		20	10		333
Copidosoma buyssoni	arrhenotoky		24	12		333
Copidosoma floridanum	arrhenotoky		20	10		333
Copidosoma gelechiae	arrhenotoky		22	11		333
Copidosoma truncatellum	arrhenotoky		20	10		333
Eucoilidae						
Pseudeucoila bochei	arrhenotoky		20	10		333
Eulophidae						
Cirrospillls dialllus	arrhenotoky		12	6		333
Colpodypells florus	arrhenotoky		12	6		333
Melittobia chalybii	arrhenotoky		10	5		333
Tetrastichus gigas	arrhenotoky		12	6		333
Tetrastichus megachilidis	arrhenotoky		12	6		333

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Eumenidae						
Ancistrocerus adiabatus cytainus		12	6		331	
arrhenotoky						
Ancistrocerus densepilloserus			12	6		332
arrhenotoky						
Ancistrocerus simulator			14	7		331
arrhenotoky						
Ancistrocerus spilogaster			12	6		331
arrhenotoky						
Ancistrocerus tuberculiceps sutterianus			20	10		331
arrhenotoky						
Discoelius japonicus			24	12		332
arrhenotoky						
Euodynerus foraminatus scutellaris			16	8		331
arrhenotoky						
Euodynerus quadrifasciatus			10	5		332
arrhenotoky						
Stenodynerus frauenfeldi			20	10		332
arrhenotoky						
Eupelmidae						
Anastatus catalonicus			10	5		333
arrhenotoky						
Macroneura vesicularis			10	5		333
arrhenotoky						
Eurytomidae						
Eudecatoma biguttata			18	9		333
arrhenotoky						
Eurytoma californica			20	10		333
arrhenotoky						
Formicidae						
Acanthomyrmex sp.1			24	12		361
arrhenotoky						
Acanthomyrmex sp.2			22	11		361
arrhenotoky						
Acanthomyrmex sp.3			22	11		361
arrhenotoky						
Acanthomyrmex sp.4			22	11		361
arrhenotoky						
Acromyrmex ambiguus			38	19		361
arrhenotoky						
Acromyrmex crassipinus			38	19		361
arrhenotoky						
Acromyrmex echinatior			36	18		362
arrhenotoky						
Acromyrmex heyeri			38	19		361
arrhenotoky						
Acromyrmex hispidus			38	19		361
arrhenotoky						
Acromyrmex subterraneus			38	19		361
arrhenotoky						
Acropyga acutiventris			30	15		361
arrhenotoky						
Acropyga sp.1			32	16		361
arrhenotoky						
Acropyga sp.2			30	15		361
arrhenotoky						
Aenictus brevicornis			24	12		361
arrhenotoky						
Aenictus laeviceps			22	11		361
arrhenotoky						
Aenictus sp.1			30	15		361
arrhenotoky						
Amblyopone australis			48	24		361
arrhenotoky						
Amblyopone fortis			44	22		361

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
arrhenotoky						
Amblyopone reclinata			38	19		361
arrhenotoky						
Anochetus altisquamis			30	15		361
arrhenotoky						
Anochetus graeffei			30	15		361
arrhenotoky						
Anochetus graeffei.2			38	19		361
arrhenotoky						
Anochetus horridus			46	23		361
arrhenotoky						
Anochetus madaraszi			28	14		361
arrhenotoky						
Anochetus modicus			30	15		361
arrhenotoky						
Anochetus sp.1			24	12		361
arrhenotoky						
Anochetus sp.2			38	19		361
arrhenotoky						
Anochetus sp.3			30	15		361
arrhenotoky						
Anochetus sp.4			30	15		361
arrhenotoky						
Anochetus sp.5			34	17		361
arrhenotoky						
Anochetus sp.6			34	17		361
arrhenotoky						
Anochetus yerburyi			30	15		361
arrhenotoky						
Anonychomyrma itinerans			16	8		361
arrhenotoky						
Anonychomyrma sp.1			16	8		361
arrhenotoky						
Anoplolepis gracilipes			34	17		361
arrhenotoky						
Aphaenogaster beccarii			30	15		361
arrhenotoky						
Aphaenogaster beccarii.2			46	23		361
arrhenotoky						
Aphaenogaster depilis			34	17		361
arrhenotoky						
Aphaenogaster famelica			34	17		361
arrhenotoky						
Aphaenogaster fulva			36	18		361
arrhenotoky						
Aphaenogaster gibbosa			32	16		361
arrhenotoky						
Aphaenogaster iberica			34	17		361
arrhenotoky						
Aphaenogaster lamellidens			38	19		361
arrhenotoky						
Aphaenogaster longiceps			46	23		361
arrhenotoky						
Aphaenogaster miamiana			36	18		361
arrhenotoky						
Aphaenogaster osimensis			32	16		361
arrhenotoky						
Aphaenogaster rudis			40	20		361
arrhenotoky						
Aphaenogaster sardoa			34	17		361
arrhenotoky						
Aphaenogaster senilis			32	16		361
arrhenotoky						
Aphaenogaster smythiesi			28	14		361
arrhenotoky						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Aphaenogaster sp.1			30	15		361
arrhenotoky						
Aphaenogaster subterranea			22	11		361
arrhenotoky						
Aphaenogaster testaceopilosa		34	17		361	
arrhenotoky						
Aphaenogaster tipuna			34	17		361
arrhenotoky						
Aphaenogaster treatae			42	21		361
arrhenotoky						
Apterostigma mayri			24	12		361
arrhenotoky						
Apterostigma sp.1			20	10		361
arrhenotoky						
Apterostigma sp.2			24	12		361
arrhenotoky						
Apterostigma sp.3			32	16		361
arrhenotoky						
Atta bisphaerica			22	11		361
arrhenotoky						
Atta cephalotes			44	22		362
arrhenotoky						
Atta columbica			22	11		361
arrhenotoky						
Atta laevigata			22	11		361
arrhenotoky						
Atta sexdens			22	11		361
arrhenotoky						
Bothriomyrmex gibbus			22	11		361
arrhenotoky						
Bothriomyrmex pusillus			22	11		361
arrhenotoky						
Bothriomyrmex sp.1			22	11		361
arrhenotoky						
Brachymyrmex sp.1			18	9		361
arrhenotoky						
Calomyrmex sp, ANIC-1			28	14		361
arrhenotoky						
Camponotus (Myrmanblys) sp1		18	9		361	
arrhenotoky						
Camponotus aethiops			42	21		361
arrhenotoky						
Camponotus alii			42	21		361
arrhenotoky						
Camponotus atriceps			40	20		361
arrhenotoky						
Camponotus balzani			40	20		361
arrhenotoky						
Camponotus bonariensis			40	20		361
arrhenotoky						
Camponotus caryae			40	20		361
arrhenotoky						
Camponotus cingulatus			40	20		361
arrhenotoky						
Camponotus compressus			30	15		361
arrhenotoky						
Camponotus consobrinus			46	23		361
arrhenotoky						
Camponotus crassisquamis			40	20		361
arrhenotoky						
Camponotus crassus			20	10		361
arrhenotoky						
Camponotus cruentatus			38	19		361
arrhenotoky						
Camponotus dolendus			20	10		361

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
arrhenotoky						
Camponotus femoratus			44	22		361
arrhenotoky						
Camponotus festinus			38	19		361
arrhenotoky						
Camponotus foreli			34	17		361
arrhenotoky						
Camponotus japonicus			26	13		361
arrhenotoky						
Camponotus kiusiuensis			28	14		361
arrhenotoky						
Camponotus lateralis			28	14		361
arrhenotoky						
Camponotus ligniperdus			28	14		361
arrhenotoky						
Camponotus mitis			20	10		361
arrhenotoky						
Camponotus mus			26	13		361
arrhenotoky						
Camponotus obscuripes			28	14		361
arrhenotoky						
Camponotus parius			40	20		361
arrhenotoky						
Camponotus pilicornis			50	25		361
arrhenotoky						
Camponotus punctulatus			40	20		361
arrhenotoky						
Camponotus rufipes			40	20		361
arrhenotoky						
Camponotus rufoglaucus			36	18		361
arrhenotoky						
Camponotus sericeiventris			40	20		361
arrhenotoky						
Camponotus sericeus			44	22		361
arrhenotoky						
Camponotus sp, ANIC-1			46	23		361
arrhenotoky						
Camponotus sp, ANIC-10			46	23		361
arrhenotoky						
Camponotus sp, ANIC-11			32	16		361
arrhenotoky						
Camponotus sp, ANIC-12			38	19		361
arrhenotoky						
Camponotus sp, ANIC-13			20	10		361
arrhenotoky						
Camponotus sp, ANIC-14			38	19		361
arrhenotoky						
Camponotus sp, ANIC-2			46	23		361
arrhenotoky						
Camponotus sp, ANIC-3			48	24		361
arrhenotoky						
Camponotus sp, ANIC-5			32	16		361
arrhenotoky						
Camponotus sp, ANIC-8			32	16		361
arrhenotoky						
Camponotus sp, ANIC-9			36	18		361
arrhenotoky						
Camponotus sp. (impressus group)			52	26		361
arrhenotoky						
Camponotus sp. variegatus complex			20	10		361
arrhenotoky						
Camponotus sp.1			18	9		361
arrhenotoky						
Camponotus sp.2			38	19		361
arrhenotoky						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Camponotus sp.3	arrhenotoky		40	20		361
Camponotus sp.4	arrhenotoky		38	19		361
Camponotus sp.5	arrhenotoky		36	18		361
Camponotus sp.6	arrhenotoky		40	20		361
Camponotus sylvaticus	arrhenotoky		40	20		361
Camponotus Taylori	arrhenotoky		24	12		361
Camponotus thraso	arrhenotoky		40	20		361
Camponotus vagus	arrhenotoky		28	14		361
Camponotus variegatus	arrhenotoky		26	13		361
Camponotus vitiosus	arrhenotoky		18	9		361
Cardiocondyla nuda	arrhenotoky		28	14		361
Cardiocondyla sp. (Myrmobrachys)	arrhenotoky		40	20		361
Cardiocondyla sp.1	arrhenotoky		40	20		361
Cardiocondyla sp.10	arrhenotoky		40	20		361
Cardiocondyla sp.11	arrhenotoky		26	13		361
Cardiocondyla sp.12	arrhenotoky		52	26		361
Cardiocondyla sp.13	arrhenotoky		18	9		361
Cardiocondyla sp.14	arrhenotoky		18	9		361
Cardiocondyla sp.15	arrhenotoky		32	16		361
Cardiocondyla sp.16	arrhenotoky		34	17		361
Cardiocondyla sp.17	arrhenotoky		20	10		361
Cardiocondyla sp.18	arrhenotoky		34	17		361
Cardiocondyla sp.19	arrhenotoky		38	19		361
Cardiocondyla sp.20	arrhenotoky		40	20		361
Cardiocondyla sp.21	arrhenotoky		20	10		361
Cardiocondyla sp.22	arrhenotoky		38	19		361
Cardiocondyla sp.7	arrhenotoky		44	22		361
Cardiocondyla sp.8	arrhenotoky		40	20		361
Cardiocondyla sp.9	arrhenotoky		38	19		361
Carebara asina	arrhenotoky		44	22		361
Carebara sauteri	arrhenotoky		36	18		361
Carebara sp, ANIC-6	arrhenotoky		38	19		361
Carebara sp.1			36	18		361

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
arrhenotoky						
Carebara sp.2			44	22		361
arrhenotoky						
Carebara sp.3			32	16		361
arrhenotoky						
Carebara sp.4			26	13		361
arrhenotoky						
Carebara sp.5			34	17		361
arrhenotoky						
Carebara sp.6			42	21		361
arrhenotoky						
Carebara sp.7			36	18		361
arrhenotoky						
Carebara sp.8			44	22		361
arrhenotoky						
Cataglyphis bicolor			52	26		361
arrhenotoky						
Cataglyphis iberica			52	26		361
arrhenotoky						
Cataglyphis setipes			54	27		361
arrhenotoky						
Centromyrmex feae			44	22		361
arrhenotoky						
Cerapachys biroi			28	14		361
arrhenotoky						
Cerapachys brevis			46	23		361
arrhenotoky						
Cerapachys sp.1			50	25		361
arrhenotoky						
Cerapachys sp.2			50	25		361
arrhenotoky						
Chalepoxenus kutteri			24	12		361
arrhenotoky						
Chalepoxenus muellerianus			24	12		361
arrhenotoky						
Colobostruma alinodis			22	11		361
arrhenotoky						
Colobostruma sp, ANIC-1			22	11		361
arrhenotoky						
Colobostruma sp.1			20	10		361
arrhenotoky						
Crematogaster biroi			24	12		361
arrhenotoky						
Crematogaster brunnea			36	18		361
arrhenotoky						
Crematogaster laboriosa			26	13		361
arrhenotoky						
Crematogaster rothneyi			50	25		361
arrhenotoky						
Crematogaster sp, ANIC-1			24	12		361
arrhenotoky						
Crematogaster sp, ANIC-2			28	14		361
arrhenotoky						
Crematogaster sp.1			40	20		361
arrhenotoky						
Crematogaster sp.10			26	13		361
arrhenotoky						
Crematogaster sp.11			24	12		361
arrhenotoky						
Crematogaster sp.12			58	29		361
arrhenotoky						
Crematogaster sp.13			26	13		361
arrhenotoky						
Crematogaster sp.4			26	13		361
arrhenotoky						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Crematogaster sp.5	arrhenotoky		26	13		361
Crematogaster sp.6	arrhenotoky		36	18		361
Crematogaster sp.7	arrhenotoky		36	18		361
Crematogaster sp.8	arrhenotoky		24	12		361
Crematogaster sp.9	arrhenotoky		26	13		361
Crematogaster subnuda	arrhenotoky		36	18		361
Cryptopone rotundiceps	arrhenotoky		12	6		361
Cryptopone sauteri	arrhenotoky		28	14		361
Cryptopone testacea	arrhenotoky		18	9		361
Cylindromyrmex brasiliensis	arrhenotoky		34	17		361
Cyphomyrmex cornutus	arrhenotoky		22	11		361
Cyphomyrmex costatus	arrhenotoky		20	10		361
Cyphomyrmex rimosus	arrhenotoky		32	16		361
Dacetinops concinnus	arrhenotoky		16	8		361
Diacamma rugosum	arrhenotoky		14	7		361
Diacamma sp.1	arrhenotoky		36	18		361
Diacamma sp.2	arrhenotoky		44	22		361
Diacamma sp.3	arrhenotoky		30	15		361
Diacamma sp.4	arrhenotoky		66	33		361
Diacamma sp.5	arrhenotoky		58	29		361
Dinoponera gigantea	arrhenotoky		82	41		363
Dinoponera lucida	arrhenotoky		114	57		361
Dinoponera quadriceps	arrhenotoky		92	46		363
Discothyrea sp.1	arrhenotoky		30	15		361
Doleromyrma sp.1	arrhenotoky		14	7		361
Doleromyrma sp.2	arrhenotoky		12	6		361
Dolichoderus quadripunctatus	arrhenotoky	28	14		361	
Dolichoderus scabridus	arrhenotoky		28	14		361
Dolichoderus sp.1	arrhenotoky		18	9		361
Dolichoderus thoracicus	arrhenotoky		30	15		361
Dorymyrmex bicolor	arrhenotoky		26	13		361
Dorymyrmex flavus	arrhenotoky		26	13		361
Dorymyrmex pulchellus			18	9		361

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
arrhenotoky						
Dorymyrmex pyramicus			18	9		361
arrhenotoky						
Dorymyrmex thoracicus			18	9		361
arrhenotoky						
Echinopla sp.1			24	12		361
arrhenotoky						
Ectatomma brunneum			44	22		361
arrhenotoky						
Ectatomma edentatum			46	23		361
arrhenotoky						
Ectatomma muticum			40	20		361
arrhenotoky						
Ectatomma permagnum			46	23		361
arrhenotoky						
Ectatomma tuberculatum			36	18		361
arrhenotoky						
Eurhopalothrix sp.1			18	9		361
arrhenotoky						
Forelius foetida			32	16		361
arrhenotoky						
Forelius mccooki			32	16		361
arrhenotoky						
Formica 3 spp (fusca gr.)			54	27		361
arrhenotoky						
Formica 4 spp			52	26		361
arrhenotoky						
Formica aquilonia			52	26		361
arrhenotoky						
Formica candida			52	26		361
arrhenotoky						
Formica cinerea			54	27		361
arrhenotoky						
Formica cunicularia			54	27		361
arrhenotoky						
Formica dakotensis			52	26		361
arrhenotoky						
Formica exsecta			52	26		361
arrhenotoky						
Formica frontalis			52	26		361
arrhenotoky						
Formica fusca			54	27		361
arrhenotoky						
Formica gagates			54	27		361
arrhenotoky						
Formica gerardi			54	27		361
arrhenotoky						
Formica japonica			54	27		361
arrhenotoky						
Formica lemani			54	27		361
arrhenotoky						
Formica lugubris			52	26		361
arrhenotoky						
Formica montana			54	27		361
arrhenotoky						
Formica obscuripes			52	26		361
arrhenotoky						
Formica pergandei			52	26		361
arrhenotoky						
Formica polyctena			52	26		361
arrhenotoky						
Formica pratensis			52	26		361
arrhenotoky						
Formica pressilabris			52	26		361
arrhenotoky						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Formica reflexa	arrhenotoky		52	26		361
Formica rufa	arrhenotoky		52	26		361
Formica rufibarbis	arrhenotoky		54	27		361
Formica sanguinea	arrhenotoky		52	26		361
Formica subintegra	arrhenotoky		52	26		361
Formica subrufa	arrhenotoky		52	26		361
Formica truncorum	arrhenotoky		54	27		361
Formica ulkei	arrhenotoky		52	26		361
Formica uralensis	arrhenotoky		52	26		361
Formica yessensis	arrhenotoky		52	26		361
Formicoxenus chamberlini	arrhenotoky		28	14		361
Formicoxenus hirticolis	arrhenotoky		32	16		361
Formicoxenus nitidulus	arrhenotoky		30	15		361
Formicoxenus provancheri	arrhenotoky		22	11		361
Formicoxenus quebecensis	arrhenotoky		28	14		361
Gigantiops destructor	arrhenotoky		78	39		361
Gnamptogenys annulata	arrhenotoky		68	34		361
Gnamptogenys binghamii	arrhenotoky		22	11		361
Gnamptogenys menadensis	arrhenotoky		42	21		361
Gnamptogenys sp.1	arrhenotoky		36	18		361
Gnamptogenys sp.2	arrhenotoky		46	23		361
Gnamptogenys striatula	arrhenotoky		34	17		361
Harpagoxenus canadensis	arrhenotoky		36	18		361
Harpagoxenus sublaevis	arrhenotoky		40	20		361
Heteroponera dolo	arrhenotoky		24	12		361
Heteroponera relicta	arrhenotoky		22	11		361
Hypoponera confinis	arrhenotoky		38	19		361
Hypoponera pruinosa	arrhenotoky		24	12		361
Hypoponera sp, ANIC-1	arrhenotoky		38	19		361
Hypoponera sp, ANIC-2	arrhenotoky		38	19		361
Hypoponera sp.1	arrhenotoky		38	19		361
Hypoponera sp.2	arrhenotoky		38	19		361
Hypoponera sp.3			36	18		361

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
arrhenotoky						
Iridomyrmex anceps			36	18		361
arrhenotoky						
Iridomyrmex anceps.2			48	24		361
arrhenotoky						
Iridomyrmex gracilis			18	9		361
arrhenotoky						
Iridomyrmex mattiroloi			18	9		361
arrhenotoky						
Iridomyrmex purpureus			18	9		361
arrhenotoky						
Iridomyrmex sp, ANIC-11			18	9		361
arrhenotoky						
Iridomyrmex sp, ANIC-12			18	9		361
arrhenotoky						
Iridomyrmex sp, ANIC-13			18	9		361
arrhenotoky						
Iridomyrmex sp, ANIC-14			18	9		361
arrhenotoky						
Iridomyrmex sp, ANIC-15			18	9		361
arrhenotoky						
Iridomyrmex sp, ANIC-16			18	9		361
arrhenotoky						
Iridomyrmex sp, ANIC-17			18	9		361
arrhenotoky						
Iridomyrmex sp, ANIC-5			14	7		361
arrhenotoky						
Iridomyrmex sp, ANIC-6			18	9		361
arrhenotoky						
Iridomyrmex sp.4			18	9		361
arrhenotoky						
Lasius alienus			28	14		361
arrhenotoky						
Lasius brunneus			30	15		361
arrhenotoky						
Lasius emarginatus			30	15		361
arrhenotoky						
Lasius flavus			30	15		361
arrhenotoky						
Lasius fuliginosus			28	14		361
arrhenotoky						
Lasius nearcticus			30	15		361
arrhenotoky						
Lasius niger			30	15		361
arrhenotoky						
Lasius pallitarsus			28	14		361
arrhenotoky						
Lasius sakagamii			30	15		361
arrhenotoky						
Lasius talpa			30	15		361
arrhenotoky						
Lasius umbratus			30	15		361
arrhenotoky						
Lepisiota capensis			18	9		361
arrhenotoky						
Lepisiota sp.1			18	9		361
arrhenotoky						
Lepisiota sp.2			18	9		361
arrhenotoky						
Leptogenys borneensis			46	23		361
arrhenotoky						
Leptogenys diminuta			36	18		361
arrhenotoky						
Leptogenys hysterica			26	13		361
arrhenotoky						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Leptogenys iridescens	arrhenotoky		46	23		361
Leptogenys kraepelini	arrhenotoky		26	13		361
Leptogenys minchinii	arrhenotoky		52	26		361
Leptogenys myops	arrhenotoky		48	24		361
Leptogenys peugueti	arrhenotoky		54	27		361
Leptogenys processionalis	arrhenotoky		46	23		361
Leptogenys sp.1	arrhenotoky		48	24		361
Leptogenys sp.2	arrhenotoky		30	15		361
Leptogenys sp.3	arrhenotoky		54	27		361
Leptomyrmex erytrocephalus	arrhenotoky		24	12		361
Leptothorax acervorum	arrhenotoky		26	13		361
Leptothorax albipennis	arrhenotoky		16	8		361
Leptothorax crassipilis	arrhenotoky		36	18		361
Leptothorax faberi	arrhenotoky		32	16		361
Leptothorax goesswaldi	arrhenotoky		56	28		361
Leptothorax gredleri	arrhenotoky		22	11		361
Leptothorax kutteri	arrhenotoky		48	24		361
Leptothorax muscorum	arrhenotoky		36	18		361
Leptothorax pacis	arrhenotoky		52	26		361
Leptothorax pocahontas	arrhenotoky		36	18		361
Leptothorax retractus	arrhenotoky		36	18		361
Leptothorax sp.1	arrhenotoky		32	16		361
Leptothorax sp.10	arrhenotoky		34	17		361
Leptothorax sp.2	arrhenotoky		42	21		361
Leptothorax sp.3	arrhenotoky		34	17		361
Leptothorax sp.4	arrhenotoky		24	12		361
Leptothorax sp.5	arrhenotoky		24	12		361
Leptothorax sp.6	arrhenotoky		26	13		361
Leptothorax sp.7	arrhenotoky		28	14		361
Leptothorax sp.8	arrhenotoky		44	22		361
Leptothorax sp.9	arrhenotoky		32	16		361
Leptothorax sphagnicola	arrhenotoky		26	13		361
Linepithema humile			16	8		361

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
arrhenotoky						
Linepithema pilifer			18	9		361
arrhenotoky						
Linepithema sp.1			18	9		361
arrhenotoky						
Lophomyrmex bedoti			38	19		361
arrhenotoky						
Lophomyrmex sp.1			38	19		361
arrhenotoky						
Lordomyrma sp.1			22	11		361
arrhenotoky						
Manica rubida			44	22		361
arrhenotoky						
Mayriella abstinens			18	9		361
arrhenotoky						
Meranoplus bicolor			16	8		361
arrhenotoky						
Meranoplus minor			22	11		361
arrhenotoky						
Meranoplus sp.1			20	10		361
arrhenotoky						
Meranoplus sp.2			22	11		361
arrhenotoky						
Meranoplus sp.3			22	11		361
arrhenotoky						
Meranoplus sp.4			22	11		361
arrhenotoky						
Messor aciculatus			44	22		361
arrhenotoky						
Messor andrei			40	20		361
arrhenotoky						
Messor barbarus			42	21		361
arrhenotoky						
Messor sp.1			40	20		361
arrhenotoky						
Monomorium dichroum			16	8		361
arrhenotoky						
Monomorium glabrum			38	19		361
arrhenotoky						
Monomorium indicum			22	11		361
arrhenotoky						
Monomorium latinode			70	35		361
arrhenotoky						
Monomorium minimum			22	11		361
arrhenotoky						
Monomorium orientale			20	10		361
arrhenotoky						
Monomorium pharaonis			22	11		361
arrhenotoky						
Monomorium rothsteini			22	11		361
arrhenotoky						
Monomorium scabriceps			38	19		361
arrhenotoky						
Monomorium sp.1			22	11		361
arrhenotoky						
Monomorium sp.10			38	19		361
arrhenotoky						
Monomorium sp.11			22	11		361
arrhenotoky						
Monomorium sp.12			22	11		361
arrhenotoky						
Monomorium sp.2			42	21		361
arrhenotoky						
Monomorium sp.3			32	16		361
arrhenotoky						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Monomorium sp.4	arrhenotoky		22	11		361
Monomorium sp.5	arrhenotoky		22	11		361
Monomorium sp.6	arrhenotoky		22	11		361
Monomorium sp.7	arrhenotoky		22	11		361
Monomorium sp.8	arrhenotoky		22	11		361
Monomorium sp.9	arrhenotoky		34	17		361
Monomorium subopacum	arrhenotoky		34	17		361
Monomorium viride	arrhenotoky		22	11		361
Monomorium whitei	arrhenotoky		24	12		361
Mycocepurus goeldii	arrhenotoky		16	8		361
Mycocepurus sp.1	arrhenotoky		16	8		361
Myrmecia banksi	arrhenotoky		40	20		361
Myrmecia brevinoda	arrhenotoky		84	42		361
Myrmecia cephalotes	arrhenotoky		66	33		361
Myrmecia chasei	arrhenotoky		46	23		361
Myrmecia croslandi	arrhenotoky		2	1		361
Myrmecia forficata	arrhenotoky		52	26		361
Myrmecia fulvipes	arrhenotoky		42	21		361
Myrmecia gulosa	arrhenotoky		38	19		361
Myrmecia haskinsorum	arrhenotoky		18	9		361
Myrmecia imaii	arrhenotoky		8	4		361
Myrmecia mandibularis	arrhenotoky		58	29		361
Myrmecia michaelseni	arrhenotoky		54	27		361
Myrmecia nigrocincta	arrhenotoky		22	11		361
Myrmecia occidentalis	arrhenotoky		64	32		361
Myrmecia pavida	arrhenotoky		44	22		361
Myrmecia piliventris	arrhenotoky		34	17		361
Myrmecia pilosula	arrhenotoky		20	10		361
Myrmecia pyriformis	arrhenotoky		82	41		361
Myrmecia simillima	arrhenotoky		70	35		361
Myrmecia sp. cf. arnoldi	arrhenotoky		58	29		361
Myrmecia sp. cf. fulvipes	arrhenotoky		12	6		361
Myrmecia tepperi			70	35		361

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
arrhenotoky						
Myrmecia vindex			76	38		361
arrhenotoky						
Myrmecina americana			28	14		361
arrhenotoky						
Myrmecina graminicola			28	14		361
arrhenotoky						
Myrmecina sp.1			66	33		361
arrhenotoky						
Myrmecina sp.2			68	34		361
arrhenotoky						
Myrmica lobicornis			24	12		361
arrhenotoky						
Myrmica rubra			48	24		361
arrhenotoky						
Myrmica ruginodis			48	24		361
arrhenotoky						
Myrmica sabuleti			46	23		361
arrhenotoky						
Myrmica scabrinodis			44	22		361
arrhenotoky						
Myrmica schencki			46	23		361
arrhenotoky						
Myrmica sulcinodis			52	26		361
arrhenotoky						
Myrmicaria brunnea			44	22		361
arrhenotoky						
Myrmicaria sp.1			44	22		361
arrhenotoky						
Myrmicaria sp.2			44	22		361
arrhenotoky						
Myrmicaria sp.3			44	22		361
arrhenotoky						
Myrmicaria sp.4			44	22		361
arrhenotoky						
Myrmicaria sp.5			46	23		361
arrhenotoky						
Myrmicocrypta sp.1			30	15		361
arrhenotoky						
Myrmoxenus adlerzi			20	10		361
arrhenotoky						
Myrmoxenus algeriana			20	10		361
arrhenotoky						
Myrmoxenus bernardi			20	10		361
arrhenotoky						
Myrmoxenus corsica			20	10		361
arrhenotoky						
Myrmoxenus gordiagini			20	10		361
arrhenotoky						
Myrmoxenus kraussei			20	10		361
arrhenotoky						
Myrmoxenus ravouxi			20	10		361
arrhenotoky						
Myrmoxenus stumperi			20	10		361
arrhenotoky						
Mystrium camillae			32	16		361
arrhenotoky						
Neivamyrmex texanus			36	18		361
arrhenotoky						
Nothomyrmecia macrops			94	47		361
arrhenotoky						
Notoncus ectatommoides			44	22		361
arrhenotoky						
Ochetellus glaber			28	14		361
arrhenotoky						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Odontomachus chelifer	arrhenotoky		44	22		361
Odontomachus hastatus	arrhenotoky		44	22		361
Odontomachus latidens	arrhenotoky		32	16		361
Odontomachus meinerti	arrhenotoky		44	22		361
Odontomachus rixosus	arrhenotoky		30	15		361
Odontomachus scalptus	arrhenotoky		44	22		361
Odontomachus simillimus	arrhenotoky		44	22		361
Odontomachus sp, ANIC-1	arrhenotoky		44	22		361
Odontomachus sp.1	arrhenotoky		44	22		361
Odontoponera transversa	arrhenotoky		44	22		361
Oecophylla longinoda	arrhenotoky		24	12		361
Oecophylla smaragdina	arrhenotoky		16	8		361
Opisthopsis rufithorax	arrhenotoky		50	25		361
Orectognathus clarki	arrhenotoky		30	15		361
Orectognathus darlingtoni	arrhenotoky		22	11		361
Orectognathus versicolor	arrhenotoky		22	11		361
Pachycondyla apicalis	arrhenotoky		40	20		361
Pachycondyla arhuaca	arrhenotoky		24	12		361
Pachycondyla astuta	arrhenotoky		40	20		361
Pachycondyla carinulata	arrhenotoky		24	12		361
Pachycondyla chinensis	arrhenotoky		22	11		361
Pachycondyla concava	arrhenotoky		54	27		361
Pachycondyla constricta	arrhenotoky		30	15		361
Pachycondyla crassinoda	arrhenotoky		62	31		361
Pachycondyla crenata	arrhenotoky		26	13		361
Pachycondyla curvinodis	arrhenotoky		26	13		361
Pachycondyla gilberti	arrhenotoky		30	15		361
Pachycondyla goeldii	arrhenotoky		24	12		361
Pachycondyla harpax	arrhenotoky		96	48		361
Pachycondyla impressa	arrhenotoky		94	47		361
Pachycondyla inversa	arrhenotoky		30	15		361
Pachycondyla leeuwenhoeki	arrhenotoky		16	8		361
Pachycondyla lutea			16	8		361

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
arrhenotoky						
Pachycondyla luteipes			22	11		361
arrhenotoky						
Pachycondyla marginata			46	23		361
arrhenotoky						
Pachycondyla mesonotalis			26	13		361
arrhenotoky						
Pachycondyla metanotalis			70	35		361
arrhenotoky						
Pachycondyla moesta			26	13		361
arrhenotoky						
Pachycondyla rubiginosa			76	38		361
arrhenotoky						
Pachycondyla rubra			36	18		361
arrhenotoky						
Pachycondyla rufipes			48	24		361
arrhenotoky						
Pachycondyla sp.1			22	11		361
arrhenotoky						
Pachycondyla sp.10			48	24		361
arrhenotoky						
Pachycondyla sp.11			52	26		361
arrhenotoky						
Pachycondyla sp.2			38	19		361
arrhenotoky						
Pachycondyla sp.3			44	22		361
arrhenotoky						
Pachycondyla sp.4			60	30		361
arrhenotoky						
Pachycondyla sp.5			22	11		361
arrhenotoky						
Pachycondyla sp.6			28	14		361
arrhenotoky						
Pachycondyla sp.7			22	11		361
arrhenotoky						
Pachycondyla sp.8			36	18		361
arrhenotoky						
Pachycondyla sp.9			36	18		361
arrhenotoky						
Pachycondyla stigma			12	6		361
arrhenotoky						
Pachycondyla striata			104	52		361
arrhenotoky						
Pachycondyla subversa			28	14		361
arrhenotoky						
Pachycondyla succedanea			14	7		361
arrhenotoky						
Pachycondyla tridentata			28	14		361
arrhenotoky						
Pachycondyla unidentata			12	6		361
arrhenotoky						
Pachycondyla venusta			48	24		361
arrhenotoky						
Pachycondyla verenae			60	30		361
arrhenotoky						
Pachycondyla villosa			34	17		361
arrhenotoky						
Papyrius nitidus			16	8		361
arrhenotoky						
Paratrechina indica			30	15		361
arrhenotoky						
Paratrechina longicornis			16	8		361
arrhenotoky						
Paratrechina parvula			14	7		361
arrhenotoky						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Paratrechina sp, ANIC-1	arrhenotoky		30	15		361
Paratrechina sp.1	arrhenotoky		16	8		361
Paratrechina sp.10	arrhenotoky		30	15		361
Paratrechina sp.2	arrhenotoky		26	13		361
Paratrechina sp.3	arrhenotoky		28	14		361
Paratrechina sp.4	arrhenotoky		16	8		361
Paratrechina sp.5	arrhenotoky		28	14		361
Paratrechina sp.6	arrhenotoky		30	15		361
Paratrechina sp.7	arrhenotoky		16	8		361
Paratrechina sp.8	arrhenotoky		30	15		361
Paratrechina sp.9	arrhenotoky		30	15		361
Pheidole binghamii	arrhenotoky		20	10		361
Pheidole capellinii	arrhenotoky		20	10		361
Pheidole dentata	arrhenotoky		20	10		361
Pheidole dentigula	arrhenotoky		20	10		361
Pheidole desertorum	arrhenotoky		20	10		361
Pheidole fallax	arrhenotoky		20	10		361
Pheidole fervida	arrhenotoky		20	10		361
Pheidole hortensis	arrhenotoky		20	10		361
Pheidole hyatti	arrhenotoky		20	10		361
Pheidole indica	arrhenotoky		20	10		361
Pheidole latinoda	arrhenotoky		42	21		361
Pheidole megacephala	arrhenotoky		20	10		361
Pheidole mus	arrhenotoky		12	6		361
Pheidole nitidula	arrhenotoky		20	10		361
Pheidole noda	arrhenotoky		38	19		361
Pheidole pallidula	arrhenotoky		20	10		361
Pheidole plagiaria	arrhenotoky		20	10		361
Pheidole porcula	arrhenotoky		20	10		361
Pheidole soritis	arrhenotoky		18	9		361
Pheidole sp.1	arrhenotoky		18	9		361
Pheidole sp.10	arrhenotoky		20	10		361
Pheidole sp.11			20	10		361

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
arrhenotoky						
Pheidole sp.12			20	10		361
arrhenotoky						
Pheidole sp.13			20	10		361
arrhenotoky						
Pheidole sp.14			20	10		361
arrhenotoky						
Pheidole sp.15			20	10		361
arrhenotoky						
Pheidole sp.16			20	10		361
arrhenotoky						
Pheidole sp.17			20	10		361
arrhenotoky						
Pheidole sp.18			20	10		361
arrhenotoky						
Pheidole sp.19			20	10		361
arrhenotoky						
Pheidole sp.2			20	10		361
arrhenotoky						
Pheidole sp.20			34	17		361
arrhenotoky						
Pheidole sp.21			20	10		361
arrhenotoky						
Pheidole sp.22			16	8		361
arrhenotoky						
Pheidole sp.23			38	19		361
arrhenotoky						
Pheidole sp.24			18	9		361
arrhenotoky						
Pheidole sp.25			20	10		361
arrhenotoky						
Pheidole sp.26			22	11		361
arrhenotoky						
Pheidole sp.27			20	10		361
arrhenotoky						
Pheidole sp.28			38	19		361
arrhenotoky						
Pheidole sp.29			20	10		361
arrhenotoky						
Pheidole sp.3			20	10		361
arrhenotoky						
Pheidole sp.30			20	10		361
arrhenotoky						
Pheidole sp.31			18	9		361
arrhenotoky						
Pheidole sp.32			20	10		361
arrhenotoky						
Pheidole sp.33			20	10		361
arrhenotoky						
Pheidole sp.34			20	10		361
arrhenotoky						
Pheidole sp.35			36	18		361
arrhenotoky						
Pheidole sp.36			42	21		361
arrhenotoky						
Pheidole sp.37			20	10		361
arrhenotoky						
Pheidole sp.38			20	10		361
arrhenotoky						
Pheidole sp.39			30	15		361
arrhenotoky						
Pheidole sp.4			20	10		361
arrhenotoky						
Pheidole sp.40			20	10		361
arrhenotoky						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Pheidole sp.41	arrhenotoky		20	10		361
Pheidole sp.42	arrhenotoky		20	10		361
Pheidole sp.43	arrhenotoky		28	14		361
Pheidole sp.44	arrhenotoky		18	9		361
Pheidole sp.45	arrhenotoky		18	9		361
Pheidole sp.46	arrhenotoky		18	9		361
Pheidole sp.47	arrhenotoky		32	16		361
Pheidole sp.48	arrhenotoky		20	10		361
Pheidole sp.49	arrhenotoky		18	9		361
Pheidole sp.5	arrhenotoky		20	10		361
Pheidole sp.50	arrhenotoky		18	9		361
Pheidole sp.51	arrhenotoky		18	9		361
Pheidole sp.6	arrhenotoky		20	10		361
Pheidole sp.7	arrhenotoky		18	9		361
Pheidole sp.8	arrhenotoky		20	10		361
Pheidole sp.9	arrhenotoky		20	10		361
Pheidole spininodis	arrhenotoky		20	10		361
Pheidole subarmata	arrhenotoky		20	10		361
Pheidole tepicana	arrhenotoky		18	9		361
Pheidole woodmasoni	arrhenotoky		18	9		361
Pheidologeton diversus	arrhenotoky		42	21		361
Pheidologeton sp.1	arrhenotoky		42	21		361
Philidris cordata	arrhenotoky		16	8		361
Plagiolepis pygmaea	arrhenotoky		18	9		361
Plagiolepis schmitzii	arrhenotoky		18	9		361
Plagiolepis sp.1	arrhenotoky		18	9		361
Plagiolepis sp.2	arrhenotoky		18	9		361
Platythyrea quadridenta	arrhenotoky		18	9		361
Platythyrea tricuspidata	arrhenotoky		94	47		361
Podomyrma adelaidae	arrhenotoky		52	26		361
Pogonomyrmex apache	arrhenotoky		32	16		361
Pogonomyrmex badius	arrhenotoky		32	16		361
Pogonomyrmex barbatus			32	16		361

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
arrhenotoky						
Pogonomyrmex brevispinosus			32	16		361
arrhenotoky						
Pogonomyrmex californicus			32	16		361
arrhenotoky						
Pogonomyrmex comanche			32	16		361
arrhenotoky						
Pogonomyrmex desertorum			32	16		361
arrhenotoky						
Pogonomyrmex huachucanus			36	18		361
arrhenotoky						
Pogonomyrmex imberbiculus			30	15		361
arrhenotoky						
Pogonomyrmex magnacanthus		32	16		361	
arrhenotoky						
Pogonomyrmex maricopa			32	16		361
arrhenotoky						
Pogonomyrmex montanus			32	16		361
arrhenotoky						
Pogonomyrmex occidentalis			32	16		361
arrhenotoky						
Pogonomyrmex rugosus			32	16		361
arrhenotoky						
Pogonomyrmex subnitidus			32	16		361
arrhenotoky						
Polyergus samurai			54	27		361
arrhenotoky						
Polyrhachis ammon			42	21		361
arrhenotoky						
Polyrhachis dives			42	21		361
arrhenotoky						
Polyrhachis gribodoi			48	24		361
arrhenotoky						
Polyrhachis hector			42	21		361
arrhenotoky						
Polyrhachis hippomanes			40	20		361
arrhenotoky						
Polyrhachis illaudata			32	16		361
arrhenotoky						
Polyrhachis lacteipennis			42	21		361
arrhenotoky						
Polyrhachis lamellidens			42	21		361
arrhenotoky						
Polyrhachis rastellata			42	21		361
arrhenotoky						
Polyrhachis sp, ANIC-1			42	21		361
arrhenotoky						
Polyrhachis sp.1			42	21		361
arrhenotoky						
Polyrhachis sp.2			42	21		361
arrhenotoky						
Polyrhachis sp.3			40	20		361
arrhenotoky						
Ponera japonica			12	6		361
arrhenotoky						
Ponera pennsylvanica			12	6		361
arrhenotoky						
Ponera scabra			8	4		361
arrhenotoky						
Ponera sp.1			12	6		361
arrhenotoky						
Ponera sp.2			12	6		361
arrhenotoky						
Prenolepis imparis			16	8		361
arrhenotoky						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Prenolepis jerdoni	arrhenotoky		36	18		361
Pristomyrmex punctatus	arrhenotoky		24	12		361
Pristomyrmex sp.1	arrhenotoky		22	11		361
Pristomyrmex sp.2	arrhenotoky		28	14		361
Proatta sp.1	arrhenotoky		32	16		361
Probolomyrmex sp.1	arrhenotoky		28	14		361
Proceratium silaceum	arrhenotoky		36	18		361
Proceratium sp.1	arrhenotoky		48	24		361
Prolasius sp, ANIC-1	arrhenotoky		18	9		361
Prolasius sp, ANIC-2	arrhenotoky		18	9		361
Protomognathus americanus	arrhenotoky		22	11		361
Pseudolasius sp.1	arrhenotoky		28	14		361
Pseudolasius sp.2	arrhenotoky		30	15		361
Pseudolasius sp.3	arrhenotoky		30	15		361
Pseudolasius sp.4	arrhenotoky		16	8		361
Pseudolasius sp.5	arrhenotoky		34	17		361
Pseudomyrmex gracilis	arrhenotoky		70	35		361
Pseudomyrmex holmgreni	arrhenotoky		50	25		361
Pseudomyrmex penetrator	arrhenotoky		24	12		361
Pseudomyrmex schuppi	arrhenotoky		24	12		361
Pseudomyrmex sp.1	arrhenotoky		42	21		361
Pseudomyrmex sp.2	arrhenotoky		50	25		361
Pseudomyrmex sp.3	arrhenotoky		44	22		361
Pyramica dohertyi	arrhenotoky		24	12		361
Pyramica mutica	arrhenotoky		36	18		361
Pyramica sp.1	arrhenotoky		38	19		361
Pyramica sp.2	arrhenotoky		26	13		361
Pyramica sp.3	arrhenotoky		16	8		361
Recurvidris sp.1	arrhenotoky		24	12		361
Rhytidoponera aciculata	arrhenotoky		52	26		361
Rhytidoponera chalybaea	arrhenotoky		42	21		361
Rhytidoponera impressa	arrhenotoky		42	21		361
Rhytidoponera lamellinodis			52	26		361

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
arrhenotoky						
Rhytidoponera maniae			44	22		361
arrhenotoky						
Rhytidoponera mayri			50	25		361
arrhenotoky						
Rhytidoponera mayri			50	25		361
arrhenotoky						
Rhytidoponera metallica			38	19		361
arrhenotoky						
Rhytidoponera punctata			100	50		361
arrhenotoky						
Rhytidoponera purpurea			38	19		361
arrhenotoky						
Rhytidoponera sp ANIC-10			48	24		361
arrhenotoky						
Rhytidoponera sp ANIC-11			50	25		361
arrhenotoky						
Rhytidoponera sp ANIC-13			52	26		361
arrhenotoky						
Rhytidoponera sp ANIC-14			22	11		361
arrhenotoky						
Rhytidoponera sp ANIC-15			50	25		361
arrhenotoky						
Rhytidoponera sp ANIC-16			52	26		361
arrhenotoky						
Rhytidoponera sp ANIC-9			48	24		361
arrhenotoky						
Rhytidoponera tasmaniensis-1		30	15		361	
arrhenotoky						
Rhytidoponera tasmaniensis-2		46	23		361	
arrhenotoky						
Rhytidoponera victoriae			42	21		361
arrhenotoky						
Sericomyrmex amabilis			50	25		361
arrhenotoky						
Solenopsis aurea			32	16		361
arrhenotoky						
Solenopsis fugax			22	11		361
arrhenotoky						
Solenopsis geminata			32	16		361
arrhenotoky						
Solenopsis invicta			32	16		361
arrhenotoky						
Solenopsis molesta			22	11		361
arrhenotoky						
Solenopsis richteri			32	16		361
arrhenotoky						
Solenopsis saevissima			32	16		361
arrhenotoky						
Solenopsis sp.1			38	19		361
arrhenotoky						
Solenopsis sp.2			22	11		361
arrhenotoky						
Solenopsis xyloni			32	16		361
arrhenotoky						
Sphinctomyrmex steinheili			46	23		361
arrhenotoky						
Stenamma brevicorne			8	4		361
arrhenotoky						
Stenamma westwoodii			40	20		361
arrhenotoky						
Stigmacros sp, ANIC-1			38	19		361
arrhenotoky						
Stigmacros sp, ANIC-3			20	10		361
arrhenotoky						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Strongylognathus huberi	arrhenotoky		28	14		361
Strumigenys doriae	arrhenotoky		22	11		361
Strumigenys friedae	arrhenotoky		24	12		361
Strumigenys godeffroyi	arrhenotoky		42	21		361
Tapinoma erraticum	arrhenotoky		16	8		361
Tapinoma indicum	arrhenotoky		12	6		361
Tapinoma melanocephalum	arrhenotoky		10	5		361
Tapinoma nigerrimum	arrhenotoky		18	9		361
Tapinoma sessile	arrhenotoky		16	8		361
Tapinoma simrothi	arrhenotoky		18	9		361
Tapinoma sp.1	arrhenotoky		10	5		361
Technomyrmex albipes	arrhenotoky		18	9		361
Technomyrmex sp.1	arrhenotoky		30	15		361
Technomyrmex sp.2	arrhenotoky		28	14		361
Technomyrmex sp.3	arrhenotoky		30	15		361
Technomyrmex sp2 bicolor	arrhenotoky		28	14		361
Temnothorax affinis	arrhenotoky		18	9		361
Temnothorax ambiguus	arrhenotoky		22	11		361
Temnothorax andrei	arrhenotoky		20	10		361
Temnothorax angustulus	arrhenotoky		46	23		361
Temnothorax c.f. interrupus	arrhenotoky		24	12		361
Temnothorax c.f. lichtensteini	arrhenotoky	28	14		361	
Temnothorax congruus	arrhenotoky		18	9		361
Temnothorax corticalis	arrhenotoky		22	11		361
Temnothorax curvispinosus	arrhenotoky		46	23		361
Temnothorax duloticus	arrhenotoky		48	24		361
Temnothorax exilis	arrhenotoky		22	11		361
Temnothorax flavicornis	arrhenotoky		22	11		361
Temnothorax gredosi	arrhenotoky		34	17		361
Temnothorax interruptus	arrhenotoky		24	12		361
Temnothorax kraussei	arrhenotoky		28	14		361
Temnothorax lichtensteini	arrhenotoky		28	14		361
Temnothorax longispinosus			24	12		361

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
arrhenotoky						
Temnothorax melas			26	13		361
arrhenotoky						
Temnothorax niger			36	18		361
arrhenotoky						
Temnothorax nigriceps			18	9		361
arrhenotoky						
Temnothorax nylanderi			22	11		361
arrhenotoky						
Temnothorax parvulus			28	14		361
arrhenotoky						
Temnothorax rabaudi			18	9		361
arrhenotoky						
Temnothorax racovitzai			42	21		361
arrhenotoky						
Temnothorax recedens			24	12		361
arrhenotoky						
Temnothorax rottenbergii			22	11		361
arrhenotoky						
Temnothorax rugatulus			28	14		361
arrhenotoky						
Temnothorax schaumii			18	9		361
arrhenotoky						
Temnothorax sordidulus			22	11		361
arrhenotoky						
Temnothorax specularis			34	17		361
arrhenotoky						
Temnothorax spinosior			24	12		361
arrhenotoky						
Temnothorax spinosius			32	16		361
arrhenotoky						
Temnothorax ssp tuberum group		24	12		361	
arrhenotoky						
Temnothorax tristis			42	21		361
arrhenotoky						
Temnothorax tuberum			18	9		361
arrhenotoky						
Temnothorax unifasciatus			18	9		361
arrhenotoky						
Tetramorium adelphon			22	11		361
arrhenotoky						
Tetramorium brevidentatum			20	10		361
arrhenotoky						
Tetramorium caespitum			28	14		361
arrhenotoky						
Tetramorium eleates			28	14		361
arrhenotoky						
Tetramorium forte			28	14		361
arrhenotoky						
Tetramorium guineense			22	11		361
arrhenotoky						
Tetramorium kheperra			14	7		361
arrhenotoky						
Tetramorium lanuginosum			14	7		361
arrhenotoky						
Tetramorium pacificum			22	11		361
arrhenotoky						
Tetramorium pnyxis			20	10		361
arrhenotoky						
Tetramorium semilaeve			14	7		361
arrhenotoky						
Tetramorium seneb			20	10		361
arrhenotoky						
Tetramorium simillimum			14	7		361
arrhenotoky						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Tetramorium smithi arrhenotoky			26	13		361
Tetramorium sp.1 arrhenotoky			20	10		361
Tetramorium sp.10 arrhenotoky			36	18		361
Tetramorium sp.11 arrhenotoky			20	10		361
Tetramorium sp.12 arrhenotoky			24	12		361
Tetramorium sp.2 arrhenotoky			18	9		361
Tetramorium sp.3 arrhenotoky			20	10		361
Tetramorium sp.4 arrhenotoky			18	9		361
Tetramorium sp.5 arrhenotoky			20	10		361
Tetramorium sp.6 arrhenotoky			22	11		361
Tetramorium sp.7 arrhenotoky			18	9		361
Tetramorium sp.8 arrhenotoky			26	13		361
Tetramorium sp.9 arrhenotoky			14	7		361
Tetramorium spinosum arrhenotoky			26	13		361
Tetramorium walshi arrhenotoky			14	7		361
Tetraponera allaborans arrhenotoky			32	16		361
Tetraponera sp.1 arrhenotoky			44	22		361
Tetraponera sp.2 arrhenotoky			42	21		361
Trachymyrmex septentrionales arrhenotoky		20	10		361	
Trachymyrmex sp.1 arrhenotoky			12	6		361
Trachymyrmex sp.2 arrhenotoky			18	9		361
Typhlomyrmex meire arrhenotoky			20	10		361
Typhlomyrmex rogenhoferi arrhenotoky			36	18		361
Vollenhovia emeryii arrhenotoky			36	18		361
Vollenhovia sp, ANIC-3 arrhenotoky			40	20		361
Vollenhovia sp.1 arrhenotoky			22	11		361
Vollenhovia sp.2 arrhenotoky			50	25		361
Vollenhovia sp.3 arrhenotoky			34	17		361
Vollenhovia sp.4 arrhenotoky			36	18		361
Halictidae						
Agapostemon virescens arrhenotoky			34	17		331
Augochlora pura arrhenotoky			22	11		331
Augochlorella michaelis arrhenotoky			32	16		351

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Augochloropsis sparsilis	arrhenotoky		16	8		331
Halictus aerarius	arrhenotoky		28	14		332
Lasioglossum allodalum	arrhenotoky		40	20		332
Lasioglossum cooleyi	arrhenotoky		36	18		364
Lasioglossum duplex	arrhenotoky		18	9		332
Lasioglossum lineatulus	arrhenotoky		24	12		331
Lasioglossum rhythidophorum	arrhenotoky	12	6		351	
Lasioglossum rhytidophorum	arrhenotoky		12	6		331
Lasioglossum taeniolellum	arrhenotoky		32	16		332
Lasioglossum zephyrus	arrhenotoky		26	13		331
Nomia nevadensis angelesia	arrhenotoky		42	21		331
Pseudaugochloropsis graminea	arrhenotoky	16	8		331	
Pseudoaugochloropsis graminea	arrhenotoky	16	8		351	
Ichneumonidae						
Aethercerus discolor	arrhenotoky		22	11		333
Aethercerus dispar	arrhenotoky		24	12		333
Aethercerus nitidus	arrhenotoky		22	11		333
Aethercerus ranini	arrhenotoky		22	11		333
Agrothereutes extrematus	arrhenotoky		20	10		333
Aoplus pulchricornis	arrhenotoky		26	13		333
Aptesis puncticollis	arrhenotoky		16	8		333
Baeosemus dentifer	arrhenotoky		22	11		333
Baranisobas ridibundus	arrhenotoky		22	11		333
Chasmias motatorius	arrhenotoky		34	17		333
Coelichneumon cyaniventris	arrhenotoky		26	13		333
Coelichneumon sugillatorius	arrhenotoky		26	13		333
Colpognathus celerator	arrhenotoky		22	11		333
Cratichneumon viator	arrhenotoky		28	14		333
Diadromus prosopius	arrhenotoky		22	11		333
Diadromus pulchellus	arrhenotoky		22	11		333
Diadromus subtilicornis	arrhenotoky		22	11		333
Diadromus troglodytes	arrhenotoky		22	11		333
Diadromus varicolor	arrhenotoky		22	11		333

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Dicaelotus pumilis	arrhenotoky		22	11		333
Dicaelotus sp. nr. Parvulus	arrhenotoky		22	11		333
Diphyus latebricola	arrhenotoky		24	12		333
Diphyus raptorius	arrhenotoky		24	12		333
Dirophanes callopus	arrhenotoky		18	9		333
Dirophanes fulvitarsis	arrhenotoky		20	10		333
Dirophanes invisor	arrhenotoky		20	10		333
Dyspetes arrogator	arrhenotoky		20	10		333
Ephialtes manifestator	arrhenotoky		30	15		333
Eurylabus torvus	arrhenotoky		20	10		333
Gelis sp.1	arrhenotoky		26	13		333
Gen. sp.1	arrhenotoky		30	15		332
Glypta lapponica	arrhenotoky		18	9		333
Heterischnus nigricollis	arrhenotoky		22	11		333
Heterischnus truncator	arrhenotoky		22	11		333
Homotherus locutor	arrhenotoky		22	11		333
Ichneumon albiger	arrhenotoky		24	12		333
Ichneumon amphibolus	arrhenotoky		24	12		333
Ichneumon bucculentus	arrhenotoky		24	12		333
Ichneumon confusor	arrhenotoky		24	12		333
Ichneumon crassifemur	arrhenotoky		24	12		333
Ichneumon croceipes	arrhenotoky		24	12		333
Ichneumon extensorius	arrhenotoky		24	12		333
Ichneumon formosus	arrhenotoky		22	11		333
Ichneumon gracilentus	arrhenotoky		24	12		333
Ichneumon gracilicornis	arrhenotoky		22	11		333
Ichneumon ingratus	arrhenotoky		24	12		333
Ichneumon inquinatus	arrhenotoky		26	13		333
Ichneumon insidiosus	arrhenotoky		24	12		333
Ichneumon lugens	arrhenotoky		24	12		333
Ichneumon melanotis	arrhenotoky		24	12		333
Ichneumon minutorius	arrhenotoky		24	12		333
Ichneumon molitorius			24	12		333

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
arrhenotoky						
Ichneumon nereni			22	11		333
arrhenotoky						
Ichneumon sarcitorius			24	12		333
arrhenotoky						
Ichneumon stramentarius			20	10		333
arrhenotoky						
Ichneumon submarginatus			24	12		333
arrhenotoky						
Ichneumon suspiciosus			24	12		333
arrhenotoky						
Ichneumon validicornis			24	12		333
arrhenotoky						
Lissonota sp.			22	11		333
arrhenotoky						
Mastrus smithii			26	13		333
arrhenotoky						
Oronotus binotatus			22	11		333
arrhenotoky						
Orthocentrus sp.1			28	14		333
arrhenotoky						
Orthopelma mediator			22	11		333
arrhenotoky						
Patrocloides chalybeatus			16	8		333
arrhenotoky						
Phaeogenes melanogonos			22	11		333
arrhenotoky						
Phaeogenes nigridens			22	11		333
arrhenotoky						
Phaeogenes semivulpinus			18	9		333
arrhenotoky						
Phaeogenes spiniger			22	11		333
arrhenotoky						
Polysphincta tuberosa			18	9		333
arrhenotoky						
Pseudoamblyteles homocerus			18	9		333
arrhenotoky						
Stenichneumon culpator			28	14		333
arrhenotoky						
Sycaonia sicaria			22	11		333
arrhenotoky						
Syspasis alboguttata			22	11		333
arrhenotoky						
Syspasis scutellator			22	11		333
arrhenotoky						
Tycherus australogeminus			22	11		333
arrhenotoky						
Tycherus bellicornis			20	10		333
arrhenotoky						
Tycherus dilleri			22	11		333
arrhenotoky						
Tycherus fuscicornis			22	11		333
arrhenotoky						
Tycherus ischiontelinus			18	9		333
arrhenotoky						
Tycherus ophthalmicus			22	11		333
arrhenotoky						
Tycherus osculator			22	11		333
arrhenotoky						
Tycherus suspicax			22	11		333
arrhenotoky						
Venturia canescens			22	11		333
arrhenotoky						
Virgichneumon digrammus			34	17		333
arrhenotoky						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Virgichneumon faunus	arrhenotoky		22	11		333
Vulgichneumon saturatorius	arrhenotoky		18	9		333
Leucospidae						
Leucospis affinis	arrhenotoky		12	6		333
Megachilidae						
Anthidium mormonum	arrhenotoky		32	16		331
Ashmeadiella sp.	arrhenotoky		32	16		331
Chalicodoma sculpturalis	arrhenotoky		32	16		332
Chalicodoma spissula	arrhenotoky		32	16		332
Coelioxys sp.	arrhenotoky		32	16		331
Dianthidium heterulkei heterulkei	arrhenotoky	30	15		331	
Hoplitis robusta	arrhenotoky		32	16		331
Megachile ainu	arrhenotoky		32	16		332
Megachile pseudomonticola	arrhenotoky		32	16		332
Megachile relativa	arrhenotoky		32	16		331
Megachile rotundata	arrhenotoky		32	16		331
Osmia cornifrons	arrhenotoky		32	16		332
Osmia cornuta	arrhenotoky		32	16		365
Osmia cornuta	arrhenotoky		32	16		331
Osmia glauca	arrhenotoky		32	16		331
Osmia lignaria propinque	arrhenotoky		32	16		332
Osmia nigrifrons	arrhenotoky		32	16		331
Osmia pentstemonis	arrhenotoky		32	16		331
Osmia taurus	arrhenotoky		32	16		332
Stelis chlorocyanea	arrhenotoky		34	17		331
Trachusa gummifera	arrhenotoky		32	16		331
Ormyridae						
Ormyrus sp.1	arrhenotoky		12	6		333
Pergidae						
Perga sp.	arrhenotoky		16	8		331
Philomastix sp.	arrhenotoky		16	8		331
Pterygophorus sp.	arrhenotoky		16	8		331
Pompilidae						
Anoplius concinnus	arrhenotoky		28	14		366
Anoplius viaticus	arrhenotoky		28	14		366

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Gen. sp.1	arrhenotoky		30	15		331
Gen. sp.1	arrhenotoky		30	15		332
Gen. sp.2	arrhenotoky		30	15		331
Gen. sp.2	arrhenotoky		30	15		332
Pteromalidae						
Anisopteromalus calandrae	arrhenotoky		14	7		333
Coelopisthia extenta	arrhenotoky		10	5		333
Dibrachys sp.1	arrhenotoky		10	5		333
Lariophagus distinguesdus	arrhenotoky		10	5		333
Muscidifurax zaraptor	arrhenotoky		10	5		333
Nasonia vitripennis	arrhenotoky		12	6		333
Pteromalus puparum	arrhenotoky		10	5		333
Pteromalus venustus	arrhenotoky		10	5		333
Sapygidae						
Sapyga pumila	arrhenotoky		52	26		367
Scelionidae						
Telenomus fariai	arrhenotoky		20	10		333
Siricidae						
Sirex cyaneus	arrhenotoky		16	8		331
Sirex juvencus	arrhenotoky		16	8		331
Sirex noctilio	arrhenotoky		16	8		331
Urocerus augur	arrhenotoky		36	18		331
Urocerus gigas	arrhenotoky		26	13		331
Sphecidae						
Carinostigmus filippovi	arrhenotoky		28	14		332
Chalybion japonicum	arrhenotoky		48	24		332
Ectemnius rubicola nipponis	arrhenotoky		28	14		332
Microstigmus arlei	arrhenotoky		6	3		368
Microstigmus brasiliensis	arrhenotoky		10	5		368
Microstigmus cooperi	arrhenotoky		6	3		369
Microstigmus crucifex	arrhenotoky		8	4		369
Microstigmus luederwaldti	arrhenotoky		6	3		368
Pemphredon diervillae	arrhenotoky		8	4		332
Pemphredon krombeini	arrhenotoky		16	8		332
Pemphredon lethifer	arrhenotoky		16	8		332

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Psenulus carnifrons iwatai arrhenotoky			16	8		332
Psenulus maculipes arrhenotoky			42	21		332
Rhopalum pygidiale arrhenotoky			26	13		332
Rhopalum watanabei arrhenotoky			26	13		332
Trychofoenus sp.1 arrhenotoky			28	14		332
Trypoxylon albitarse arrhenotoky			32	16		331
Trypoxylon asuncicola arrhenotoky			32	16		370
Trypoxylon fabricator arrhenotoky			32	16		370
Trypoxylon nitidum arrhenotoky			28	14		371
Trypoxylon obsonator arrhenotoky			28	14		332
Trypoxylon petiolatum arrhenotoky			28	14		332
Trypoxylon sp.1 arrhenotoky			32	16		370
Trypoxylon sp.1 arrhenotoky			18	9		332
Trypoxylon sp.2 arrhenotoky			26	13		332
Tenthredinidae						
Aglaostigma albicincta arrhenotoky			30	15		331
Aglaostigma amoorensis arrhenotoky			32	16		331
Aglaostigma aucupariae arrhenotoky			24	12		331
Aglaostigma nebulosa arrhenotoky			20	10		331
Aglaostigma occipitosa arrhenotoky			34	17		331
Aglaostigma sapporonis arrhenotoky			18	9		331
Aglaostigma sp. arrhenotoky			44	22		331
Allantus luctifer arrhenotoky			16	8		331
Allantus meridionalis arrhenotoky			18	9		331
Allantus nakabusensis arrhenotoky			20	10		331
Allantus sp. arrhenotoky			16	8		331
Alphostromboceros konowi arrhenotoky			14	7		331
Ametastegia geranii arrhenotoky			18	9		331
Ametastegia pallipes arrhenotoky			12	6		331
Aneugmenus japonicus arrhenotoky			14	7		331
Aneugmenus kiotonis arrhenotoky			14	7		331
Aneugmenus stramineipes arrhenotoky			16	8		331
Anoplonyx sp. arrhenotoky			16	8		331

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Asiemphytus albilabris	arrhenotoky		30	15		331
Athalia bicolor	arrhenotoky		12	6		331
Athalia cordata	arrhenotoky		12	6		331
Athalia japonica	arrhenotoky		16	8		331
Athalia kashmirensis	arrhenotoky		12	6		331
Athalia lugens infumata	arrhenotoky		16	8		331
Athalia rosae rosae	arrhenotoky		16	8		331
Athalia rosae ruficornis	arrhenotoky		16	8		331
Birka carinifrons	arrhenotoky		14	7		331
Cladius morio	arrhenotoky		12	6		331
Cladius pectinicornis	arrhenotoky		12	6		331
Corymbus fujisana	arrhenotoky		20	10		331
Corymbus nipponica	arrhenotoky		20	10		331
Croesus japonicus	arrhenotoky		16	8		331
Croesus septentrionalis	arrhenotoky		16	8		331
Croesus varus	arrhenotoky		16	8		331
Dolerus aeneus	arrhenotoky		16	8		331
Dolerus ephippiatus	arrhenotoky		16	8		331
Dolerus gessneri	arrhenotoky		16	8		331
Dolerus hematodes	arrhenotoky		16	8		331
Dolerus lewisii	arrhenotoky		28	14		331
Dolerus niger	arrhenotoky		16	8		331
Dolerus nigratus	arrhenotoky		16	8		331
Dolerus similis japonicus	arrhenotoky		18	9		331
Dolerus subfasciatus	arrhenotoky		18	9		331
Dolerus varispinus	arrhenotoky		16	8		331
Dolerus yokohamensis	arrhenotoky		16	8		331
Elinora koehleri	arrhenotoky		20	10		331
Empria sp.	arrhenotoky		30	15		331
Empronus obsoletus	arrhenotoky		20	10		331
Eriocampa mitsukurii	arrhenotoky		18	9		331
Eutomostethus juncivorus	arrhenotoky		12	6		331
Hemibeleses nigriceps			32	16		331

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
arrhenotoky						
Hemichroa alni			18	9		331
arrhenotoky						
Heptamelus (Heptamelus) ochroleucus			20	10		331
arrhenotoky						
Heptamelus (Pseudoheptamelus) runari			14	7		331
arrhenotoky						
Lagidina irritans			36	18		331
arrhenotoky						
Lagidina platycerus			36	18		331
arrhenotoky						
Loderus eversmanni obscurus			28	14		331
arrhenotoky						
Loderus genucinctus insulicola		22	11		331	
arrhenotoky						
Macrophya albipuncta			16	8		331
arrhenotoky						
Macrophya annulitibia			20	10		331
arrhenotoky						
Macrophya apicalis			16	8		331
arrhenotoky						
Macrophya carbonaria			20	10		331
arrhenotoky						
Macrophya coxalis			20	10		331
arrhenotoky						
Macrophya esakii exilis			16	8		331
arrhenotoky						
Macrophya falsifica			20	10		331
arrhenotoky						
Macrophya fascipennis			24	12		331
arrhenotoky						
Macrophya imitator			16	8		331
arrhenotoky						
Macrophya infumata			18	9		331
arrhenotoky						
Macrophya malaisei			20	10		331
arrhenotoky						
Macrophya montana			16	8		331
arrhenotoky						
Macrophya punctumalbum			20	10		331
arrhenotoky						
Macrophya ribis			24	12		331
arrhenotoky						
Macrophya rohweri			20	10		331
arrhenotoky						
Macrophya rufipes			20	10		331
arrhenotoky						
Macrophya sp.			20	10		331
arrhenotoky						
Macrophya timida			20	10		331
arrhenotoky						
Monosoma pulveratum			16	8		331
arrhenotoky						
Nematinus fuscipennis			16	8		331
arrhenotoky						
Nematinus luteus			16	8		331
arrhenotoky						
Nematinus willigkiae			16	8		331
arrhenotoky						
Nematus (Lygaeonematus) erichsonii			14	7		331
arrhenotoky						
Nematus (Nematus) lucidus			16	8		331
arrhenotoky						
Nematus (Pachynematus) obductus			16	8		331
arrhenotoky						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Nematus (Pikonema) alaskaensis arrhenotoky		16	8		331	
Nematus (Pikonema) dimmockii arrhenotoky		16	8		331	
Nematus (Pontania) sp. arrhenotoky			18	9		331
Nematus (Pontania) viminalis arrhenotoky		16	8		331	
Nematus (Pristiphora) geniculatus arrhenotoky			16	8		331
Nematus (Pristiphora) pallipes arrhenotoky		16	8		331	
Nematus (Pristiphora) ruficornis arrhenotoky		16	8		331	
Nematus (Pristiphora) rufipes arrhenotoky		16	8		331	
Nematus (Pristiphora) sp.1 arrhenotoky			14	7		331
Nematus (Pristiphora) sp.2 arrhenotoky			16	8		331
Nematus (Pristiphora) sp.3 arrhenotoky			16	8		331
Nematus (Pteronidea) leucotrochus arrhenotoky			18	9		331
Nematus (Pteronidea) melanaspis arrhenotoky			16	8		331
Nematus (Pteronidea) nigricornis arrhenotoky		16	8		331	
Nematus (Pteronidea) olfaciens arrhenotoky		18	9		331	
Nematus (Pteronidea) pavidus arrhenotoky		16	8		331	
Nematus (Pteronidea) ribesii arrhenotoky			18	9		331
Nematus (Pteronidea) viridescens arrhenotoky			16	8		331
Nematus (s.l.) sp. arrhenotoky			18	9		331
Neostromboceros itoi arrhenotoky			12	6		331
Neostromboceros nipponicus arrhenotoky			14	7		331
Neostromboceros okinawaensis arrhenotoky		14	7		331	
Neostromboceros sinanensis arrhenotoky			14	7		331
Nesoselandria morio arrhenotoky			12	6		331
Pachyprotasis asteris arrhenotoky			20	10		331
Pachyprotasis caerulescens kashmirica arrhenotoky			18	9		331
Pachyprotasis erratica arrhenotoky			20	10		331
Pachyprotasis fukii arrhenotoky			20	10		331
Pachyprotasis hayasuensis arrhenotoky			20	10		331
Pachyprotasis hiensis arrhenotoky			20	10		331
Pachyprotasis hiyodorii arrhenotoky			20	10		331
Pachyprotasis iwatai arrhenotoky			20	10		331
Pachyprotasis longicornis			20	10		331

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
arrhenotoky						
Pachyprotasis Malaise arrhenotoky			22	11		331
Pachyprotasis malaisei arrhenotoky			22	11		331
Pachyprotasis nigrinotata arrhenotoky			20	10		331
Pachyprotasis nogusai arrhenotoky			20	10		331
Pachyprotasis okutanii arrhenotoky			20	10		331
Pachyprotasis pallidiventris arrhenotoky			20	10		331
Pachyprotasis rapae arrhenotoky			20	10		331
Pachyprotasis sasabensis arrhenotoky			20	10		331
Pachyprotasis sawadai arrhenotoky			20	10		331
Pachyprotasis sengaminensis arrhenotoky			20	10		331
Pachyprotasis serii arrhenotoky			20	10		331
Pachyprotasis sp.1 arrhenotoky			20	10		331
Pachyprotasis sp.10 arrhenotoky			22	11		331
Pachyprotasis sp.2 arrhenotoky			20	10		331
Pachyprotasis sp.3 arrhenotoky			20	10		331
Pachyprotasis sp.4 arrhenotoky			20	10		331
Pachyprotasis sp.5 arrhenotoky			20	10		331
Pachyprotasis sp.6 arrhenotoky			20	10		331
Pachyprotasis sp.7 arrhenotoky			20	10		331
Pachyprotasis sp.8 arrhenotoky			20	10		331
Pachyprotasis sp.9 arrhenotoky			20	10		331
Pachyprotasis tanakai arrhenotoky			20	10		331
Pachyprotasis volatilis arrhenotoky			20	10		331
Pachyprotasis yamahakkai arrhenotoky			20	10		331
Pachyprotasis zukaensis arrhenotoky			20	10		331
Parachractus leucopodus arrhenotoky			20	10		331
Perineura esakii arrhenotoky			34	17		331
Perineura japonica arrhenotoky			34	17		331
Perineura okutanii arrhenotoky			34	17		331
Perineura pictipennis arrhenotoky			34	17		331
Perineura sp. arrhenotoky			34	17		331
Phyllocolpa sp. arrhenotoky			18	9		331

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Priophorus varipes			12	6		331
arrhenotoky						
Propodea fentoni			20	10		331
arrhenotoky						
Pseudohemitaxonus dryopteridis		10	5		331	
arrhenotoky						
Rocalia japonica			22	11		331
arrhenotoky						
Rocalia longipennis			18	9		331
arrhenotoky						
Rocalia sp.			16	8		331
arrhenotoky						
Siobla ferox			18	9		331
arrhenotoky						
Siobla metallica			18	9		331
arrhenotoky						
Siobla ruficornis			18	9		331
arrhenotoky						
Siobla sturmi			18	9		331
arrhenotoky						
Siobla venusta apicalis			18	9		331
arrhenotoky						
Stromboceros koebelei			14	7		331
arrhenotoky						
Strongylogaster blechni			18	9		331
arrhenotoky						
Strongylogaster filicis			16	8		331
arrhenotoky						
Strongylogaster lineata			16	8		331
arrhenotoky						
Strongylogaster macula			14	7		331
arrhenotoky						
Strongylogaster mixta			18	9		331
arrhenotoky						
Strongylogaster moiwana			18	9		331
arrhenotoky						
Strongylogaster onocleae			16	8		331
arrhenotoky						
Strongylogaster osmundae			14	7		331
arrhenotoky						
Strongylogaster ruber			18	9		331
arrhenotoky						
Strongylogaster secunda			18	9		331
arrhenotoky						
Strongylogaster tambensis			14	7		331
arrhenotoky						
Taxonus alboscutellatus			18	9		331
arrhenotoky						
Tenthredo (Eurogaster) mesomelas			20	10		331
arrhenotoky						
Tenthredo (Eurogaster) obsoleta		20	10		331	
arrhenotoky						
Tenthredo (Eurogaster) opaciceps			20	10		331
arrhenotoky						
Tenthredo (Olivacedo) olivacea		20	10		331	
arrhenotoky						
Tenthredo (Olivacedo) pseudolivacea			20	10		331
arrhenotoky						
Tenthredo (Olivacedo) viridatrix		20	10		331	
arrhenotoky						
Tenthredo (Rhogogaster) sp.1			20	10		331
arrhenotoky						
Tenthredo (Rhogogaster) sp.2			20	10		331
arrhenotoky						
Tenthredo (Rhogogaster) sp.3			20	10		331

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
arrhenotoky						
Tenthredo (Rhogogaster) viridis		24	12		331	
arrhenotoky						
Tenthredo (s.l.) abdominalis			20	10		331
arrhenotoky						
Tenthredo (s.l.) angustiannulata		16	8		331	
arrhenotoky						
Tenthredo (s.l.) basizonata			18	9		331
arrhenotoky						
Tenthredo (s.l.) contusa			20	10		331
arrhenotoky						
Tenthredo (s.l.) convergenata			20	10		331
arrhenotoky						
Tenthredo (s.l.) crassa			20	10		331
arrhenotoky						
Tenthredo (s.l.) cylindrica			20	10		331
arrhenotoky						
Tenthredo (s.l.) dentina			20	10		331
arrhenotoky						
Tenthredo (s.l.) finschi seguro		20	10		331	
arrhenotoky						
Tenthredo (s.l.) flavomandibulata		20	10		331	
arrhenotoky						
Tenthredo (s.l.) fortunei			24	12		331
arrhenotoky						
Tenthredo (s.l.) fukaii			20	10		331
arrhenotoky						
Tenthredo (s.l.) gifui			24	12		331
arrhenotoky						
Tenthredo (s.l.) hokkaidonis			20	10		331
arrhenotoky						
Tenthredo (s.l.) japonica			20	10		331
arrhenotoky						
Tenthredo (s.l.) jozana			18	9		331
arrhenotoky						
Tenthredo (s.l.) latifasciata			20	10		331
arrhenotoky						
Tenthredo (s.l.) matsumurai			38	19		331
arrhenotoky						
Tenthredo (s.l.) melanogastra		20	10		331	
arrhenotoky						
Tenthredo (s.l.) mortivaga			20	10		331
arrhenotoky						
Tenthredo (s.l.) nigropicta			20	10		331
arrhenotoky						
Tenthredo (s.l.) nitidiceps			20	10		331
arrhenotoky						
Tenthredo (s.l.) opposita			18	9		331
arrhenotoky						
Tenthredo (s.l.) ornatula			20	10		331
arrhenotoky						
Tenthredo (s.l.) picticornis			20	10		331
arrhenotoky						
Tenthredo (s.l.) platycera			20	10		331
arrhenotoky						
Tenthredo (s.l.) procincta			20	10		331
arrhenotoky						
Tenthredo (s.l.) providens			20	10		331
arrhenotoky						
Tenthredo (s.l.) rubrocaudata		20	10		331	
arrhenotoky						
Tenthredo (s.l.) sp.			18	9		331
arrhenotoky						
Tenthredo (s.l.) sp.1			20	10		331
arrhenotoky						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Tenthredo (s.l.) sp.2			20	10		331
arrhenotoky						
Tenthredo (s.l.) sp.3			20	10		331
arrhenotoky						
Tenthredo (s.l.) sp.4			20	10		331
arrhenotoky						
Tenthredo (s.l.) sp.5			20	10		331
arrhenotoky						
Tenthredo (s.l.) sp.6			20	10		331
arrhenotoky						
Tenthredo (s.l.) subolivacea			20	10		331
arrhenotoky						
Tenthredo (s.l.) takeuchii			20	10		331
arrhenotoky						
Tenthredo (s.l.) ussuriensis			20	10		331
arrhenotoky						
Tenthredo (Temuledo) temula			20	10		331
arrhenotoky						
Tenthredo (Tenthredella) atra			20	10		331
arrhenotoky						
Tenthredo (Tenthredella) bipunctula			20	10		331
arrhenotoky						
Tenthredo (Tenthredella) colon		20	10		331	
arrhenotoky						
Tenthredo (Tenthredella) decens		20	10		331	
arrhenotoky						
Tenthredo (Tenthredella) fagi			26	13		331
arrhenotoky						
Tenthredo (Tenthredella) ferruginea			22	11		331
arrhenotoky						
Tenthredo (Tenthredella) fulva adusta			20	10		331
arrhenotoky						
Tenthredo (Tenthredella) fuscoterminata			22	11		331
arrhenotoky						
Tenthredo (Tenthredella) hilaris		18	9		331	
arrhenotoky						
Tenthredo (Tenthredella) limbata		20	10		331	
arrhenotoky						
Tenthredo (Tenthredella) livida		20	10		331	
arrhenotoky						
Tenthredo (Tenthredella) mandibularis			20	10		331
arrhenotoky						
Tenthredo (Tenthredella) solitaria		20	10		331	
arrhenotoky						
Tenthredo (Tenthredella) velox		20	10		331	
arrhenotoky						
Tenthredo (Tenthredo) arcuata		24	12		331	
arrhenotoky						
Tenthredo (Tenthredo) brevicornis		40	20		331	
arrhenotoky						
Tenthredo (Tenthredo) marginella			22	11		331
arrhenotoky						
Tenthredo (Tenthredo) notha			38	19		331
arrhenotoky						
Tenthredo (Tenthredo) omissa		20	10		331	
arrhenotoky						
Tenthredo (Zonuledo) amoena		36	18		331	
arrhenotoky						
Tenthredopsis carinata			16	8		331
arrhenotoky						
Tenthredopsis litterata			18	9		331
arrhenotoky						
Tenthredopsis nassata			18	9		331
arrhenotoky						
Tenthredopsis sp.1			16	8		331

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
arrhenotoky						
Tenthredopsis sp.2			16	8		331
arrhenotoky						
Tenthredopsis sp.3			16	8		331
arrhenotoky						
Thrinax athyrii			12	6		331
arrhenotoky						
Thrinax japonicus			18	9		331
arrhenotoky						
Thrinax melanogyne			12	6		331
arrhenotoky						
Thrinax minomensis			16	8		331
arrhenotoky						
Thrinax paucipunctatus			12	6		331
arrhenotoky						
Thrinax sasayamensis			12	6		331
arrhenotoky						
Thrinax struthiopteridis			12	6		331
arrhenotoky						
Thrinax tokunagai			14	7		331
arrhenotoky						
Torymidae						
Monorionlolllems clemellti			12	6		333
arrhenotoky						
Monorionlolllems montivagus			12	6		333
arrhenotoky						
Monorionlolllems obscurus			10	5		333
arrhenotoky						
Monorionlolllems saltuosus			10	5		333
arrhenotoky						
Torymus baccharidis			12	6		333
arrhenotoky						
Torymus californicus			12	6		333
arrhenotoky						
Torymus capillaceus			12	6		333
arrhenotoky						
Torymus koebelei			10	5		333
arrhenotoky						
Torymus occidentalis			12	6		333
arrhenotoky						
Torymus tubicola			12	6		333
arrhenotoky						
Torymus umbilicatus			10	5		333
arrhenotoky						
Torymus vesiculi			12	6		333
arrhenotoky						
Torymus warreni			12	6		333
arrhenotoky						
Trichogrammatidae						
Trichogramma chilonis			10	5		333
arrhenotoky						
Trichogramma deion			10	5		333
arrhenotoky						
Trichogramma dendrolimi			10	5		333
arrhenotoky						
Trichogramma evanescens			10	5		333
arrhenotoky						
Trichogramma nubialale			10	5		333
arrhenotoky						
Trichogramma pretiosum			10	5		333
arrhenotoky						
Trichogramma sp.1			10	5		333
arrhenotoky						
Vespidae						
Brachygastra lecheguana			56	28		331

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
	arrhenotoky					
Liostenogaster sp.1	arrhenotoky		14	7		332
Metapolybia sp.	arrhenotoky		38	19		331
Mischocyttarus cassununga	arrhenotoky		64	32		331
Mischocyttarus sp.	arrhenotoky		68	34		331
Parachartergus smithii	arrhenotoky		54	27		331
Polistes apachus	arrhenotoky		46	23		331
Polistes canadensis	arrhenotoky		32	16		331
Polistes carolinus	arrhenotoky		38	19		331
Polistes chinensis	arrhenotoky		46	23		331
Polistes chinensis antennalis	arrhenotoky		46	23		372
Polistes cinerascens	arrhenotoky		54	27		331
Polistes exclamans	arrhenotoky		66	33		331
Polistes fuscatus	arrhenotoky		52	26		331
Polistes gallicus	arrhenotoky		42	21		331
Polistes hebraeus	arrhenotoky		18	9		331
Polistes jadwigae	arrhenotoky		62	31		332
Polistes mandarinus	arrhenotoky		52	26		332
Polistes metricus	arrhenotoky		52	26		331
Polistes nimpha	arrhenotoky		44	22		331
Polistes omissus	arrhenotoky		28	14		331
Polistes simillimus	arrhenotoky		56	28		331
Polistes snelleni	arrhenotoky		60	30		331
Polistes versicolor versicolor	arrhenotoky		62	31		331
Polybia occidentalis	arrhenotoky		34	17		331
Polybia paulista	arrhenotoky		34	17		331
Polybia scutellaris	arrhenotoky		34	17		331
Polybia sericea	arrhenotoky		54	27		331
Polybia sp.1	arrhenotoky		32	16		331
Polybia sp.2	arrhenotoky		34	17		331
Protonectarina sylveirae	arrhenotoky		58	29		331
Protopolybia exigua exigua	arrhenotoky		62	31		331
Protopolybia pumila	arrhenotoky		42	21		331

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Pseudopolybia vespiceps arrhenotoky			16	8		331
Stelopolybia multipicta multipicta arrhenotoky		64	32		331	
Stelopolybia pallipes pallipes arrhenotoky			64	32		331
Vespa crabro arrhenotoky			50	25		332
Vespa mandarinia arrhenotoky			50	25		331
Vespa simillima xanthoptera arrhenotoky			50	25		331
Vespula flaviceps arrhenotoky			50	25		331
Vespula vulgaris arrhenotoky			50	25		373
Isoptera						
Kalotermitidae						
Bifiditermes improbus			36	35	XXY	374
Cryptotermes austrinus				40		374
Cryptotermes brevis			36	37	XYY	374
Cryptotermes cristatus				46		374
Cryptotermes cynocephalus			44	43	XXY	374
Cryptotermes domesticus			30	29	XXY	244
Cryptotermes domesticus			30	29	XXY	374
Cryptotermes dudleyi			40	40		374
Cryptotermes gearyi homomorphic				48	XY	374
Cryptotermes papulosus			42			374
Cryptotermes primus			30			374
Cryptotermes queenslandis			42	41	XXY	374
Cryptotermes riverinae			42	42		374
Cryptotermes secundus			40			244
Cryptotermes secundus			40	40		374
Cryptotermes sp.				47		374
Glyptotermes brevicornis			42			374
Glyptotermes iridipennis				42		374
Incisitermes barretti				42		374
Incisitermes sp.			42			374
Kalotermes convexus				46		374
Kalotermes flavicollis			68	67	XXY	244
Neotermes insularis			52	52	XXXY	374
Neotermes insularis				60		374
Procryptotermes australiensis			48	47	XXY	374
Rhinotermitidae						
Coptotermes acinaciformis			42	42	XXYY	244
Reticulitermes lucifugus grassei		42	42	XXYY	244	
Reticulitermes urbis homomorphic			42	42		244
Stolotermitidae						
Porotermes adamsoni			40	40		374
Stolotermes victoriensis			32	31	XO	374
Termitidae						
Acidnotermes praus			42		XXYY	375
Afrosubulitermes congoensis			42		XXYY	375
Amitermes darwini			42	42	XXYY	244
Amitermes eucalipti			42			244
Amitermes germanus			42			244
Amitermes parvus			42	42	XXYY	244
Crenetermes albotarsalis			42		XXYY	375
Cubitermes exiguus			42		XXYY	375
Cubitermes sankurensis			42		XXYY	375
Cubitermes sp. 1.			42		XXYY	375
Cubitermes weissi			42		XXYY	375
Drepanotermes septentrionalis			42	42	XXYY	244

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Ephelotermes melachoma			42	42	XXYY	244
Ephelotermes taylori			42	42	XXYY	244
Kalotermes approximatus			34	33	XXY	376
Kalotermes approximatus			32		XXYY	375
Kalotermes Flavicollis			61		XXYY	375
Lophotermes septentrionalis			42	42	XXYY	244
Macrognathotermes sunteri			42	42	XXYY	244
Macrotermes bellicosus			42		XXYY	375
Mastotermes darwiniensis homomorphic			98		XY	245
Microcerotermes boreus			42	42	XXYY	244
Microcerotermes fuscotibiatis			42		XXYY	375
Microcerotermes nervosus			42	42	XXYY	244
Microcerotermes parvulus			42		XXYY	375
Microcerotermes sp.1			44		XXYY	375
Microcerotermes sp.2			42		XXYY	375
Microtermes sp.1			42		XXYY	375
Nasutitermes arboreus			42		XXYY	375
Nasutitermes graveolus			42	42	XXYY	244
Nasutitermes longipennis			42	42	XXYY	244
Nasutitermes triodiae			42	42	XXYY	244
Noditermes lamanianus			38		XXYY	375
Odontotermes redemanni			48		XXYY	375
Odontotermes snyderi			42		XXYY	375
Odontotermes sp.1			42		XXYY	375
Ophiotermes mandibularis			42		XXYY	375
Pericapritermes sp.1			42		XXYY	375
Procubitermes sp. 1			38		XXYY	375
Protermes minimus			42		XXYY	375
Pseudacanthotermes militaris			42		XXYY	375
Reticulitermes flavipes			42		XXYY	375
Reticulitermes lucifugus			42		XXYY	375
Reticutitermes santonensis			42		XXYY	375
Schedorhinotermes lamanianus			38		XXYY	375
Tenuirostritermes tenuirostris					XXYY	375
Thoracotermes macrothorax			42		XXYY	375
Tuberculitermes bycanistes			42		XXYY	375
Tumulitermes pastinator			42	42	XXYY	244
Unguitermes bouilloni			42		XXYY	375
Zootermopsis angusticollis			52		XXYY	375
Zootermopsis angusticollis			52		XXYY	375
Zootermopsis nevadensis			52		XXYY	375
Lepidoptera						
Agaristidae						
Seudyra subflava				62		377
Arctiidae						
Abraxas grossulariata				56		377
Abraxas grossulariata dohrnii				56		377
Arctia caja				56		377
Arctia caja				62		377
Arctia caja				62		377
Arctia caja phaesoma				62		377
Arctia hebe				63		377
Cycnial mendica				52		377
Cycnial mendica				62		377
Earias fabia				62		377
Earias insulana				62		377
Hippocrita jacobaea				62		377
Lophocampa maculata			33	34	ZO	378
Miltochrista miniata				62		377
Pericallia ricini				62		377
Phragmatobia fuliginosa			57	56	ZWW	377
Phragmatobia fuliginosa amurensis				58		377
Spilarctis imparilis				62		377
Spilaritia infernalis				62		377

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Spilosoma lubricipeda				62		377
Spilosoma lubricipeda				62		377
Spilosoma menthastri				60		377
Spilosoma menthastri				60		377
Utetheisa ornatrix				62		377
Utetheisa ornatrix bella				62		377
Utetheisa ornatrix stretchii				62		377
Utetheisa pulchella				62		377
Bombycidae						
Bombyx mandarina				54		377
Bombyx mandarina				54		377
Bombyx mandarina				56		377
Bombyx mandarina				56		377
Bombyx mori			56	56	ZW	377
Bombyx mori				56		377
Bombyx mori				56		377
Theophila religiosae				62		377
Carposinidae						
Carposina niponensis				62		377
Crambidae						
Ostrinia scapulalis			62	62	ZW	378
Cymatophoridae						
Thyatira batis				62		377
Danaidae						
Euploes mulciber barsine				58		377
Eupterotidae						
Apha tychoona				44		377
Gelechiidae						
Exoteleia dodecella			23	24	ZO	378
Exoteleia pinifoliella			21	22	ZO	378
Phthorimaea operculella			58	58	ZW	378
Tachyptilia populella				58		377
Geometridae						
Agathia carissima				62		377
Aperia syringaria				58		377
Ascotis selenaria cretacea				68		377
Boarmia consonaria				62		377
Calospiloa sylvata fulvobasalis			58		377	
Campaea margatitata				62		377
Camptogramma bilineata				60		377
Chlorochysta miata				60		377
Coenotephria sagittata				24		377
Colostygia aptata				60		377
Colostygia didymata				54		377
Colostygia olivata				62		377
Colostygia parallelolineata				60		377
Colostygia pectinataria				62		377
Cusiala stipitaria karuizawensis			60		377	
Dysstroma citrata				58		377
Dysstroma latefasciata				58		377
Dysstroma truncata				58		377
Epirrho alternata				62		377
Epirrho galiata				62		377
Eptrrho trista				60		377
Eulype hastata				62		377
Eulype subhastata				62		377
Euphyia corylata				60		377
Euphyia cucullata				62		377
Euphyia luctuata				60		377
Euphyia unangulata				56		377
Hydrelia flammeolaria				60		377
Hydrelia testaceata				26		377
Hydriomena coerulata				60		377
Hydriomena furcata				56		377
Hydriornena ruberata				60		377

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Lampropteryx minna				34		377
Lampropteryx suffumata				64		377
Larentia autumnalis				60		377
Lycia hirtaria				28		377
Lycia hirtaria				28		377
Lyncometra ocellata				62		377
Mesolenca albicillata				62		377
Nyssia zonaria				112		377
Opisthograptis luteolata				62		377
Oporinia autumnata				76		377
Oporinia christyi				62		377
Oporinia filigrammaria				74		377
Ourapteryx sambucaria				62		377
Pelurga comitata				64		377
Perizoma affinitata				50		377
Perizoma alchemillata				60		377
Perizoma blandiata				60		377
Perizoma flavofasciata				60		377
Perizoma hydrata				50		377
Perizoma taeniata				64		377
Phigalia pilosaria				224		377
Plemyria bicolorata				60		377
Poecilopsis pomonaria				102		377
Pseudoboarmia punctinalis				64		377
Psychophora caesiata				62		377
Psychophora sabini frigidaria				58		377
Qporinia dilutata				60		377
Selenia bilunaria				60		377
Selenia lunaria				62		377
Selenia tetralunaria				58		377
Thera cognata				40		377
Thera firmata				38		377
Thera juniperata				60		377
Thera obeliscata				26		377
Thera variata				26		377
Xanthorho fluctuata				62		377
Xanthorho montanata				59		377
Xanthorho quadrifasciata				62		377
Xantlwrho spadicearia				58		377
Zonosoma pendularia				62		377
Gracilariidae						
Gracilaria elongella				58		377
Hesperidae						
Achalarus lycidas				62		377
Achalarus toxeus				32		377
Augiades venata				26		377
Bibasis aquilina				58		377
Carcharadus alceae				62		377
Cegenes pumilio				48		377
Chioides catillus				62		377
Choaspes benjaminii				62		377
Cotia otho				62		377
Daimio tethys				60		377
Erynnis baptisiae				62		377
Erynnis horatius				62		377
Erynnis icelus				60		377
Erynnis juvenalis				60		377
Erynnis lucilus				62		377
Erynnis marloyi				62		377
Erynnis montanus				62		377
Erynnis persius				62		377
Erynnis tages				62		377
Erynnis tages				62		377
Grais stigmaticus				62		377
Hesperia alveus				48		377

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Hesperia alveus				48		377
Hesperia malvae				62		377
Hesperia onopordi				60		377
Hesperia orbifer				60		377
Hesperia sao				62		377
Hesperia serratulae				60		377
Lavatheria lavatherae				60		377
Muschampsia proto				60		377
Nastra l'herminieri				60		377
Ochlodes ochracea				48		377
Ochlodes sylvanoides				58		377
Ochlodes venata				58		377
Ochlodes venata				58		377
Parnara guttata				32		377
Pholisora catullus				58		377
Poanes hobomok				58		377
Polytremis mathiades				32		377
Polytremis pellucida				32		377
Pyrgus bellieri				54		377
Pyrgus cacaliae				60		377
Pyrgus carlinae				60		377
Pyrgus carlinae cirsii				60		377
Pyrgus carthami				58		377
Pyrgus malvae				66		377
Reverdinus boeticus				90		377
Reverdinus floccifera				90		377
Reverdinus floccifera orientalis			67		377	
Reverdinus floccijera dravira				85		377
Reverdinus stauderi ambigua				60		377
Sarangesa phidyle				58		377
Spialia orbifer				62		377
Spialia phlomidis				62		377
Thanaos tages				62		377
Thoressa varia				62		377
Thorybes pylades				62		377
Thymelicus lineola				54		377
Thymelicus lineola				58		377
Thymelicus sylvestris				54		377
Tuttia tessellum				60		377
Lasiocampidae						
Dendrolinus jezoensis				60		377
Dendrolinus pini				60		377
Dendrolinus spectabilis				60		377
Epicnaptera ilicifolia				62		377
Epicnaptera tremulifolia				62		377
Malacosoma castrense				62		377
Malacosoma neustria				62		377
Malacosoma neustria				62		377
Philudoria potatoria				62		377
Philudoria potatoria				62		377
Poecilocompa populi				72		377
Trabala vishnu			51	52	ZZW	378
Trichiura crataegi				56		377
Lycaenidae						
Acrodiaetus menalcas				170		377
Agriades glandon				48		377
Agriades glandon rusticus				48		377
Agrodiaetus actis firdussi				65		377
Agrodiaetus actis pseudactis				55		377
Agrodiaetus admetus				160		377
Agrodiaetus admetus anatoliensis				157		377
Agrodiaetus alcestis				41		377
Agrodiaetus allivaganus pseudoxerces (?)				32		377
Agrodiaetus altivagans				41		377
Agrodiaetus antidolus				123		377

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Agrodiaetus ardschira				127		377
Agrodiaetus baytopi				54		377
Agrodiaetus carmon				163		377
Agrodiaetus cyanea				37		377
Agrodiaetus cyanea brandti				37		377
Agrodiaetus cyanea kermansis			44		377	
Agrodiaetus cyanea paracyanea			39		377	
Agrodiaetus dama				83		377
Agrodiaetus dama hamadanensis .				43		377
Agrodiaetus damone				90		377
Agrodiaetus damone maraschi (?)			32		377	
Agrodiaetus damone wagneri			32		377	
Agrodiaetus demavendi				137		377
Agrodiaetus dolus				148		377
Agrodiaetus dolus ainsae				118		377
Agrodiaetus dolus pseudovirgilia			216		377	
Agrodiaetus dolus vittata				149		377
Agrodiaetus erschoffi tekkeana			28		377	
Agrodiaetus fabressei				180		377
Agrodiaetus hopfferi				31		377
Agrodiaetus hopfferi hadjina				30		377
Agrodiaetus hopfferi sennanensis			58		377	
Agrodiaetus interjectus				60		377
Agrodiaetus iphigenia				27		377
Agrodiaetus iphigenia iphidamon			28		377	
Agrodiaetus mithridates saetosus			43		377	
Agrodiaetus mofidii				69		377
Agrodiaetus morgani				84		377
Agrodiaetus pfeifferi				214		377
Agrodiaetus phyllides askhabadica				124		377
Agrodiaetus phyllis				161		377
Agrodiaetus phyllis vanensis				156		377
Agrodiaetus poseidon				41		377
Agrodiaetus poseidon mesopotamica				40		377
Agrodiaetus posthumus				21		377
Agrodiaetus ripartii				180		377
Agrodiaetus ripartii paralcestis			180		377	
Agrodiaetus tankeri				42		377
Agrodiaetus transcaspica				105		377
Agrodiaetus transcaspica elbursica				33		377
Agrodiaetus transcaspica ninae			70		377	
Albulina orbitulus				46		377
Antigius attilia				50		377
Aricia agestis				46		377
Aricia agestis				46		377
Aricia agestis				48		377
Aricia agestis				48		377
Aricia allous				46		377
Aricia anteros				46		377
Aricia isaurica				48		377
Aricia nicias				46		377
Asrodiaetus mithridates				53		377
Calastrina argiolus				48		377
Calastrina argiolus				50		377
Calastrina argiolus				50		377
Calastrina argiolus				50		377
Callophrys rubi				46		377
Callophrys rubi				46		377
Calycopis cecrops				48		377
Chrysophanus hippotho				48		377
Chrysophanus virgaureae				48		377
Chrysozephyrus aurorimus				48		377
Curetis acuta paracuta				58		377
Cyaniris semiargus				46		377
Cyaniris semiargus				48		377

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Cyaniris semiargus antiochena			48		377	
Cyaniris semiargus persica				48		377
Eumaeus debora				48		377
Everes alcetas				51		377
Everes alcetas				52		377
Everes amyntula				48		377
Everes argiades				48		377
Everes argiades				48		377
Everes comyntas				48		377
Everes comyntas				48		377
Everes decolorata				50		377
Everes minimus				48		377
Everes minimus				48		377
Everes sebras				48		377
Favonius cognatus				48		377
Freyeria trochilus				46		377
Glaucopsyche alexis				46		377
Glaucopsyche arion				46		377
Glaucopsyche cyllarus				46		377
Glaucopsyche melanops				46		377
Heliophorus epicles matsumurae			50		377	
Icaricia icarioides				48		377
Iolana iolas				44		377
Japonica saepestriata				50		377
Lycaeides idas				47		377
Lycaeides idas				48		377
Lycaeides melissa				48		377
Lycaena agyrognomon				48		377
Lycaena alciphron				48		377
Lycaena amandus				46		377
Lycaena argus				46		377
Lycaena arion				46		377
Lycaena asabinus				48		377
Lycaena dorilis				48		377
Lycaena eumedon				48		377
Lycaena helloides				48		377
Lycaena heteronea				136		377
Lycaena hippotho				48		377
Lycaena hypophleas				48		377
Lycaena icarus				46		377
Lycaena lampon				48		377
Lycaena nivalis				48		377
Lycaena ochimus				48		377
Lycaena optilete				48		377
Lycaena phlaeas				48		377
Lycaena phlaeas				48		377
Lycaena phlaeas				48		377
Lycaena phlaeas				48		377
Lycaena phoenicurus				48		377
Lycaena rubidus				76		377
Lycaena snowi				48		377
Lycaena thersamon				48		377
Lycaena thetis				48		377
Lycaena tityrus				48		377
Lysandra albicalis esteparina				164		377
Lysandra albicans				164		377
Lysandra albicans pennaelensis			164		377	
Lysandra argester				191		377
Lysandra argester				282		377
Lysandra bellargus				90		377
Lysandra bellargus				90		377
Lysandra candalus				52		377
Lysandra candalus isauricoides			76		377	
Lysandra candalus zuleikae				63		377
Lysandra coelestissima				169		377

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Lysandra coeruleossmar				168		377
Lysandra coridon				176		377
Lysandra coridon				180		377
Lysandra coridon				180		377
Lysandra coridon hispanagallica			176		377	
Lysandra coridon jurae				176		377
Lysandra coridon manleyi				176		377
Lysandra coridon maritimarum			176		377	
Lysandra corldon gallica				176		377
Lysandra escheri				46		377
Lysandra hispana				168		377
Lysandra hispana constanti				168		377
Lysandra hispana galliaealbicans			168		377	
Lysandra hispana pseudoalbicans				168		377
Lysandra hispana rezniceki				168		377
Lysandra myrrha				52		377
Lysandra nausithous				48		377
Lysandra nivescens				381		377
Lysandra ossmar				168		377
Lysandra punctifera				48		377
Lysandra syriaca				48		377
Lysandra thersites				48		377
Lysandra thersites				48		377
Maculinea alcon				46		377
Maculinea alcon tarannis				46		377
Meleagerta meleager				46		377
Narathura japonica				48		377
Neozephyrus taxila				48		377
Philotes baton				48		377
Philotes bavius				48		377
Philotes vicrama				48		377
Plebeius eurypilus				40		377
Plebeius loewii				48		377
Plebeius pylaon				38		377
Plebeius pylaon nicholi				42		377
Plebeius pylaon solimana				42		377
Polyommatus amandus				48		377
Polyommatus argus				46		377
Polyommatus argyrognomon energetes				48		377
Polyommatus eroides				46		377
Polyommatus eros				46		377
Polyommatus eumedon				48		377
Polyommatus hylas				48		377
Polyommatus icarus				46		377
Polyommatus icarus				46		377
Polyommatus icarus persica				46		377
Polyommatus idas armoricana			48		377	
Polyommatus idas croatica				48		377
Polyommatus meleager				48		377
Satyrium sylvinus				82		377
Scolitantides orion				46		377
Strymon melinus				48		377
Strymon pruni				46		377
Strymon pruni				46		377
Syntarucus telicanus				48		377
Taraka hamada				30		377
Tarucus balcanicus				48		377
Thecla quercus				48		377
Turanana panagaea				48		377
Ussuriana stygiana				94		377
Vacciniina alcedo				46		377
Vacciniina hyrcana				44		377
Vacciniina sieversi				44		377
Zephyrus betulae				32		377
Zizeeria maha argia				48		377

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Lymantriidae						
Dasychira pseudabietis				104		377
Dasychira pudibunda				174		377
Dasychira selenitica				44		377
Euproctis flava				44		377
Euproctis pseudoconspersa				44		377
Euproctis similis				44		377
Euproctis similiso				46		377
Leucoma salicis				60		377
Lymantria dispar				62		377
Lymantria dispar				62		377
Lymantria dispar				62		377
Lymantria dispar			62	62	ZW	378
Lymantria dispar japonica				62		377
Lymantria fumida				60		377
Lymantria mathura aurora				62		377
Lymantrla monacha				62		377
Orgyia antiqua				28		377
Orgyia antiqua				28		377
Orgyia antiqua			28	28	ZW	378
Orgyia ericae				60		377
Orgyia ericae				60		377
Orgyia leucostigma				56		377
Orgyia recens				60		377
Orgyia thyellina			23	22	ZWW	378
Orgyia thyellina			22	22	ZW	378
Megathymidae						
Agathymus mariae				42		377
Megathymus violae				54		377
Stallingsia maculosa				100		377
Micropterigidae						
Micropterix calthella			57	58	ZO	378
Noctuidae						
Adris tyrannus amurensis				62		377
Agrotis fimbria				58		377
Agrotis triangulum				58		377
Amathes c-nigrum				58		377
Amathes xanthographa				68		377
Amphipoea burrowsi				62		377
Anomis commoda				62		377
Apamea monoglypha				58		377
Apatele incretata				62		377
Apatele psi				62		377
Apatele psi				62		377
Arcte coerulea				62		377
Autographa nigrisigma				62		377
Calpe aureola				62		377
Cosmia camplostigma				62		377
Dichromia trigonalis				62		377
Euplexia lucipara				62		377
Gortyna flavago				62		377
Hoplotarache lunana				64		377
Hypena proboscidalis				62		377
Leucania conigera				62		377
Leucania favicolor				62		377
Leucania impura				58		377
Leucania impura				62		377
Leucania pallens				62		377
Luperina testacea				58		377
Mamestra brassicae				62		377
Mamestra persicariae				62		377
Ophiusa melicerte				62		377
Orthosia circellaris				60		377
Orthosia gracilis			27	28	ZO	378
Plusia intermixta				62		377

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Plusia peponis				62		377
Plusiodonta casta				62		377
Polytela gloriosae				62		377
Proderia littora				62		377
Pseudoips prasinana				64		377
Xylina ingrica				62		377
Notodontidae						
Cerura erminea				56		377
Cerura vinula				42		377
Cerura vinula albanica				40		377
Cerura vinula delavoiei				62		377
Cerura vinula fennica				42		377
Cerura vinula germanica				42		377
Clostera anachoreta				60		377
Clostera anachoreta				60		377
Clostera anastomosis				50		377
Clostera anastomosis tristis				50		377
Clostera apicalis				60		377
Clostera curtula				58		377
Clostera pigra				46		377
Clostera timon				20		377
Drepana curvatula				62		377
Drepana falcataria				62		377
Harpyia bicuspis				60		377
Harpyia bifida				98		377
Harpyia furcula				58		377
Harpyia lanigera				58		377
Lophopteryx camelina				62		377
Notodonta phoebe				62		377
Notodonta trltophus				62		377
Notodonta ziczac				62		377
Odontosia camelina				62		377
Phalera bucephala				60		377
Phalera bucephala				60		377
Nymphalidae						
Acraea bonasia				64		377
Acraea natalica pseudegina				62		377
Aglais urticae				58		377
Aglais urticae				62		377
Aglais urticae				62		377
Aglais urticae				62		377
Aglais urticae connexa				62		377
Agraulis juno				62		377
Amauris egialea hyalites				58		377
Amauris hecate				58		377
Amauris tartarea				77		377
Anaea aidea				60		377
Anartia fatima				62		377
Anartia jatrophae				62		377
Apatura ilia				62		377
Apatura ilia substituta				62		377
Araschnia burejana				62		377
Araschnia burejana strigosa				62		377
Araschnia Ievana				62		377
Araschnia Ievana obscura				62		377
Araschnia levana				62		377
Argynnis aglaia				58		377
Argynnis aglaia				58		377
Argynnis anadyomene				72		377
Argynnis anadyomene midas				74		377
Argynnis aphirape ossianus				56		377
Argynnis euphrosyne				62		377
Argynnis euphrosyne				62		377
Argynnis freija				62		377
Argynnis frigga				62		377

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Argynnis ino				26		377
Argynnis lathonia				60		377
Argynnis pales arsilache				60		377
Argynnis paphia				58		377
Argynnis paphia				58		377
Argynnis paphia				58		377
Argynnis paphia				58		377
Argynnis paphia geisha				58		377
Argynnis selene				60		377
Argynnis thore scandinavica				60		377
Argyreus hyperbius				62		377
Argyronome loadice				62		377
Argyronome loadice japonica				62		377
Argyronome ruslana				52		377
Argyronome ruslana lysippe				52		377
Asterocampa celtis				62		377
Asterocampa Ieilia				62		377
Aterica galene				45		377
Biblis hyperia				56		377
Boloria aquilonaris				60		377
Boloria eunomia caelestis				56		377
Boloria graeca				62		377
Boloria napaea				62		377
Boloria pales				60		377
Boloria selene tollandensis				60		377
Boloria titania helena				60		377
Brenthis daphne				26		377
Brenthis daphne rabdia				28		377
Brenthis heate				68		377
Brenthis ino mashurnsis				28		377
Brenthis ino tigroides				28		377
Caduga sita				94		377
Charaxes fulvescens				114		377
Charaxes zingha				52		377
Charaxes zingha				54		377
Chlosyne damoetas				62		377
Chlosyne harrish				62		377
Chlosyne palla				62		377
Clossiana thore jezoensis				62		377
Clossiana titania				62		377
Cyrestis thyodamas				62		377
Cyrestis thyodamas formosana			62		377	
Damora sagana liane				62		377
Danaus chrysippus				60		377
Danaus chrysippus				62		377
Danaus eresimus				60		377
Danaus gilippus				58		377
Danaus limniace petiverana				87		377
Dryas julia				62		377
Euphaedra edwardsii				60		377
Euphydryas anicia eurytion				62		377
Euphydryas aurinia				60		377
Euptoieta hegesia				62		377
Euryphene mardania senegalensis				66		377
Euryphura chalcis				60		377
Euryphura plautilla				60		377
Euthalia thibetana insulae				28		377
Fabriciana adippe				58		377
Fabriciana nerippe				58		377
Fabriciana niobe				58		377
Fabriciana niobe				58		377
Fahriciana adippe				58		377
Fahriciana adippe pallescens				58		377
Hamadryas glauconome				62		377
Hestina japonica				60		377

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Hypolimnas bolina kezia				62		377
Hypolimnas misippus				62		377
Inachus io geisha				62		377
Junonia chorimene				62		377
Junonia coenia				62		377
Junonia evarete zonalis				62		377
Junonia hierta				62		377
Junonia oenone				62		377
Junonia stygia				66		377
Junonia westermanni				62		377
Kalkasia philyra				60		377
Kaniska canace				62		377
Ladoga camilla				60		377
Ladoga glorifica				60		377
Lampides boeticus				48		377
Limenitis anonyma				60		377
Limenitis archippus				60		377
Limenitis astyanax				60		377
Limenitis camilla				60		377
Limenitis camilla				60		377
Limenitis glorifica				60		377
Limenitis populi				60		377
Limenitis populi				60		377
Limenitis weidemeyerii				60		377
Melanargia galathea				48		377
Melitaea athalia				62		377
Melitaea aurelia				64		377
Melitaea cinxia				62		377
Melitaea diamina				62		377
Melitaea didyma				56		377
Melitaea iduna				62		377
Melitaea maturna				62		377
Melitaea maturna				62		377
Melitaea montium				54		377
Melitaea persea				55		377
Melitaea phoebe				62		377
Melitaea transcaucasica				58		377
Melitaea trivia				62		377
Mellicta athalia				62		377
Mellicta varia				62		377
Mesoacidalia charlotta				58		377
Mesoacidalia charlotta				58		377
Mesoacidalia chartotta .basalis			58		377	
Metamorpha stelenes				62		377
Morpho peleides				56		377
Neptis aceris				60		377
Neptis aceris				60		377
Neptis hylas luculenta				60		377
Neptis morosa				56		377
Neptis nysiades				88		377
Nymphalis antiopa				60		377
Nymphalis antiopa				62		377
Nymphalis antiopa				62		377
Nymphalis canace				62		377
Nymphalis io				62		377
Nymphalis xanthomelas				62		377
Nymphalis xanthomelas japonica			62		377	
Palla violinitens				34		377
Pandoriana maja				58		377
Paraneptis pryeri				60		377
Paraneptis rivularis				60		377
Phyciodes phaon				62		377
Phyciodes tharos				62		377
Polygnnia c-aureum				62		377
Polygonia c-album				62		377

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Polygonia c-album				62		377
Polygonia c-album				62		377
Polygonia c-album hamigera				62		377
Polygonia egea				62		377
Polygonia vau-album samurai			62		377	
Polygonia zephyrus				62		377
Polygonla c-album				62		377
Precis almana				62		377
Precis almana				62		377
Precis iphita				62		377
Precis orithya				62		377
Precis pelarga				62		377
Precis pelarga leodice				62		377
Pseudacraea boisduvalii				60		377
Pseudacraea gottbergi				60		377
Pyrameis atalanta				62		377
Pyrameis cardui				62		377
Salamis cacta				42		377
Salamis parhassus				65		377
Sasakia charonda				58		377
Sephisa daimio				62		377
Speyeria aphrodite				54		377
Speyeria aphrodite ethne				58		377
Speyeria atlantis nikias				58		377
Speyeria callippe meadii				60		377
Speyeria coronia halcyone				60		377
Speyeria cybele				58		377
Speyeria hydaspe sakuntala				58		377
Speyeria marmonia eurynome			58		377	
Speyeria zerene sinope				58		377
Thaleropis jonia				62		377
Vanessa cardui				62		377
Vanessa cardui				62		377
Vanessa indica				30		377
Vanessa indica				62		377
Vanessa kashmirensis				62		377
Vanessa polychloros				62		377
Vanessa virginiensis				62		377
Vanessa xanthomelas				62		377
Oecophoridae						
Depressaria nervosa				60		377
Papilionidae						
Battus philenor				60		377
Byasa alcinous				60		377
Byasa latreillei				60		377
Byasa polyeuctes letincius				60		377
Byasa polyeuctes termessus				60		377
Chilasa clytia				60		377
Graphium doson				60		377
Graphium feisthameli				60		377
Graphium phaon				60		377
Graphium podalirius				56		377
Graphium podalirius				60		377
Graphium podalirius				60		377
Graphium sarpedon				40		377
Luedorfia japonica				62		377
Luedorfia puziloi				60		377
Papilio alexanor				60		377
Papilio bianor				60		377
Papilio brucei (?)				60		377
Papilio cresphontes				60		377
Papilio dardanus				60		377
Papilio demoleus				60		377
Papilio helenus				60		377
Papilio helenus				60		377

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Papilio Inachaon hippocrates				62		377
Papilio maackii				60		377
Papilio machaon				62		377
Papilio machaon				60		377
Papilio machaon				60		377
Papilio machaon				64		377
Papilio machaon emihippocrates			60		377	
Papilio memnon				60		377
Papilio memnon heronus				60		377
Papilio nepheles chaon				60		377
Papilio ornythion				60		377
Papilio palamedes				60		377
Papilio paris decorosa				60		377
Papilio polyctor				60		377
Papilio polytes pasikrates				60		377
Papilio polytes romulus				60		377
Papilio polyxenes				60		377
Papilio protenor demetrius				60		377
Papilio protenor euprotenor				60		377
Papilio rutulus				64		377
Papilio thoas				54		377
Papilio troilus				60		377
Papilio xuthus				60		377
Papllio pilumnus				60		377
Parnassius apollo				60		377
Parnassius apollo				60		377
Parnassius mnemosyne				58		377
Parnassius smintheus				60		377
Pornassius eversmanni				124		377
Princeps demoleus				60		377
Troides aeacus				60		377
Zerynthia hypermnestra				62		377
Phycitidae						
Anagasta khniella				58		377
Anagasta khniella				60		377
Anagasta khniella				60		377
Anagasta khniella				60		377
Anagasta khniella				60		377
Eurrhypara hortulata				56		377
Syllepte derogata				62		377
Pieridae						
Anteos clorinde				62		377
Anthocharis cardamines				62		377
Anthocharis scolymus				62		377
Aporia crataegi				50		377
Aporia crataegi				50		377
Aporia crataegi				52		377
Aporia crataegi				52		377
Aporia crataegi adherbal				50		377
Aporia hippia japonica				50		377
Appias drusilla				64		377
Appias lyncida formosana				64		377
Appias sabina				64		377
Ascia monuste				54		377
Belenois aurota				50		377
Belenois calypso				50		377
Belenois creona				50		377
Belenois gidica				52		377
Belenois mesentina				50		377
Belenois theora concolor				50		377
Catopsilia crocale				62		377
Catopsilia crocale				62		377
Catopsilia florella				62		377
Catopsilia pyranthe				62		377
Catopsilia pyranthe				62		377

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Catopsllia pomona				62		377
Cepora coronis phryne				46		377
Cepora nadina eunama				50		377
Colias alexandra				62		377
Colias aurorina				64		377
Colias australis				62		377
Colias chlorocoma				62		377
Colias croceus				62		377
Colias croceus				62		377
Colias electo fieldii				62		377
Colias erate nilagiriensis				62		377
Colias erate poliographus				62		377
Colias eurytheme				62		377
Colias hecta sulitelma				62		377
Colias hyale				63		377
Colias hyale				62		377
Colias hyale				62		377
Colias meadii				62		377
Colias myrmidone				61		377
Colias noster werdandi				62		377
Colias palaeno				63		377
Colias palaeno sugitanii				62		377
Colias phicimone				60		377
Colias philodice				62		377
Colias philodice				62		377
Colias sagartia				64		377
Colias scudderii				62		377
Colias stoliczkana miranda				62		377
Colias thisoa				65		377
Colotis aurora evarne				30		377
Colotis liagore				56		377
Delias aglaia				50		377
Delias aglaia curasena				50		377
Delias descombesi				59		377
Delias eucharis				50		377
Dixeia orbona				48		377
Euchloe ausonia				62		377
Euchloe ausonides				62		377
Euchloe cardamines				60		377
Euchloe cardamines				62		377
Euchloe cardamines				62		377
Euchloe charlonia				62		377
Euchloe crameri occidentalis				62		377
Euchloe crameri romana				62		377
Euchloe gruneri				48		377
Euchloe lessei				55		377
Eurema brigitta				24		377
Eurema hecabe contubernalis			62		377	
Eurema hecabe mandarina				48		377
Eurema laeta bethesba				58		377
Eurema lisa				62		377
Eurema nicippe				62		377
Eurema proterpia				62		377
Eurema senegalensis				62		377
Gonepteryx farinosa				64		377
Gonepteryx mahaguru niponica			62		377	
Gonepteryx rhamni				63		377
Gonepteryx rhamni				62		377
Gonepteryx rhamni				62		377
Gonepteryx rhamni maxima				62		377
Hebomoia glaucippe				34		377
Hebomoia glaucippe formosana			34		377	
Hebomoia glaucippe shorizui				34		377
Kricogonia lyside				62		377
Leptidea amurensis				128		377

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Leptidea duponcheli				205		377
Leptidea duponcheli				206		377
Leptidea duponcheli				208		377
Leptidea morsei				108		377
Leptidea morsei				108		377
Leptidea sinapis				59		377
Leptidea sinapis				69		377
Leptosia alcesta				24		377
Ixias pyrene familiaris				56		377
Ixias pyrene insignis				56		377
Mylothris hilara				44		377
Mylothris ochracea				51		377
Mylothris rhodope				49		377
Phoebis philea				62		377
Pieris beckerii				52		377
Pieris brassicae				30		377
Pieris brassicae				30		377
Pieris brassicae				30		377
Pieris brassicae				30		377
Pieris brassicae				30		377
Pieris brassicae			30	30	ZW	378
Pieris brassicae azoriensis				30		377
Pieris brassicae nepalensis				30		377
Pieris calyce				52		377
Pieris conidia				50		377
Pieris conidia indica				50		377
Pieris ergane				52		377
Pieris krueperi				48		377
Pieris manni				50		377
Pieris manni				50		377
Pieris melete pseudonapi				54		377
Pieris napi				50		377
Pieris napi				50		377
Pieris napi				50		377
Pieris napi bryoniae				53		377
Pieris napi bryoniae				50		377
Pieris napi meridionalis				50		377
Pieris napi nesis				52		377
Pieris napi sulphurea				50		377
Pieris occidentalis				52		377
Pieris rapae				50		377
Pieris rapae				50		377
Pieris rapae				50		377
Pieris rapae				50		377
Pieris rapae				52		377
Pieris rapae crucivora				50		377
Pinacopteryx eriphia				26		377
Pleris daplidicae				52		377
Pleris napi				50		377
Pleris napi macdunnoughli				50		377
Pontia daplidice moorei				52		377
Synchlo callidice				52		377
Synchlo callidice				52		377
Synchlo protodice				52		377
Zerene cesonia				62		377
Plutellidae						
Cerostoma nemorellum				68		377
Psychidae						
Apterolia helix				62		377
Fumea casta				61		377
Luffia ferchaultella				63		377
Luffia ferchaultella				62		377
Luffia lapidella			61	62	ZO	378
Solenobia alpicolella				61		377
Solenobia atlanca				62		377

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Solenobia clathrella				62		377
Solenobia fumosella				62		377
Solenobia generosensis				62		377
Solenobia goppensteinensis				62		377
Solenobia lichenella				62		377
Solenobia manni				62		377
Solenobia pineti				62		377
Solenobia rupicolella				62		377
Solenobia seileri				62		377
Solenobia siederi				62		377
Solenobia thomanni				62		377
Solenobia triquetrella	parth	2		62		377
Solenobia triquetrella	parth	4		124		377
Solenobia triquetrella			61	62	ZO	378
Solenobla lichenella	parth	4		124		377
Talaeporia tubulosa			59	60	ZO	378
Pyralidae						
Cadra cautella			60	60	ZW	378
Chino simplex				58		377
Diatraea saccharalis				34		377
Ectomyelois ceratoniae			62	62	ZW	378
Ephestia kuehniella			60	60	ZW	378
Galleria mellonella				60		377
Galleria mellonella				60		377
Galleria mellonella			60	60	ZW	378
Haritala ruralis				82		377
Perinephala coronata				20		377
Plodia interpunctella			60	60	ZW	378
Sylepta ruralis				62		377
Witlesia murana			59	58	ZWW	378
Riodinidae						
Calephelis virginiensis				90		377
Hamearis lucina				58		377
Libythea bachmanii				62		377
Libythea celtis				62		377
Saturniidae						
Antherea pernyi				66		377
Antherea pernyi				98		377
Antherea yamamai			62	62	ZW	378
Automeris io				62		377
Caligula japonica			61	62	ZO	378
Callosamia promethea				38		377
Dictyoploca japonica				62		377
Platysamia cecropia				60		377
Platysamia cecropia				62		377
Platysamia columbia				62		377
Platysamia euryalis				62		377
Platysamia gloveri				62		377
Samia cynthia			25	26	ZZW	378
Samia cynthia			27	28	ZO	378
Samia cynthia			26	26	ZW	378
Samia cynthia pryeri				28		377
Samia cynthia pryeri				28		377
Samia cynthia pryeri				28		377
Samia cynthia ricini				28		377
Samia cynthia ricini				28		377
Samia cynthia ricini				28		377
Samia cynthia ricini				28		377
Samia cynthia ricini				28		377
Samia cynthia ricini				28		377
Samia cynthia walkeri				26		377
Samia cynthia walkeri				26		377
Samia cynthia walkeri				26		377
Saturnia pavonia				58		377
Saturnia pavonia				58		377

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Saturnia pavonia				58		377
Saturnia pyri			60	60	ZW	378
Telea polyphemus				60		377
Satyridae						
Agapetes galathea				48		377
Agapetes russiae				50		377
Aphantopus hyperantus				46		377
Aphantopus hyperantus				58		377
Bicylus funebris				58		377
Bicylus sandace				56		377
Bicylus vulgaris				56		377
Bicylus zinebi				52		377
Brentesia circe				58		377
Cercyonis oetus				54		377
Cercyonis pegala				54		377
Cercyonis pegala				54		377
Chazara anthe				56		377
Chazara bischoffi				56		377
Chazara briseis				56		377
Coenonympha arcania				64		377
Coenonympha arcania clorinda			66		377	
Coenonympha arcania parvinsubrica				68		377
Coenonympha arcanla cephalus			64		377	
Coenonympha dorus				58		377
Coenonympha gardetta darwiniana				83		377
Coenonympha gardetta lecerfi			59		377	
Coenonympha gardetta philedarwiniana				60		377
Coenonympha gardetta satyrion			62		377	
Coenonympha iphis				58		377
Coenonympha oedippus				58		377
Coenonympha pamphilus				58		377
Coenonympha pamphilus				58		377
Coenonympha saadi				58		377
Coenonympha tullia				58		377
Coenonympha tullia occupata			58		377	
Elymnias hypermnestra hainana			52		377	
Elymniopsis bammakoo				52		377
Erebia aethiopellus				14		377
Erebia aethiops				42		377
Erebia alberganus				35		377
Erebia calcarius				16		377
Erebia calcarius				16		377
Erebia callias				30		377
Erebia callias				30		377
Erebia cassfoides pseudomurina			20		377	
Erebia cassioides				20		377
Erebia cassioides				20		377
Erebia cassioides aquitania				20		377
Erebia cassioides arvernensis				20		377
Erebia cassioides carmenta				20		377
Erebia cassioides carmenta				20		377
Erebia cassioides dolomitensis			20		377	
Erebia cassioides illyrica				20		377
Erebia cassioides illyrica				20		377
Erebia cassioides illyromacedonica				20		377
Erebia cassioides illyromacedonica				20		377
Erebia cassioides majellana				20		377
Erebia cassioides murina				20		377
Erebia cassioides pseudocarmenta				20		377
Erebia casstoides murina				20		377
Erebia claudina				36		377
Erebia disa				58		377
Erebia discoidalis				56		377
Erebia epiphron cassiope				34		377
Erebia epipsodea				22		377

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Erebia epistygne				56		377
Erebia eriphyle				58		377
Erebia glacialis				38		377
Erebia gorge				42		377
Erebia gorgone				24		377
Erebia hewitsonii				23		377
Erebia hispania				50		377
Erebia hispania				50		377
Erebia hispania rondoui				44		377
Erebia hispania rondoui				48		377
Erebia iranica				103		377
Erebia iranica				102		377
Erebia iranica savalanica				102		377
Erebia iranica transcaucasia				104		377
Erebia lappona				56		377
Erebia lefebyrei				44		377
Erebia ligea				58		377
Erebia magdalena				58		377
Erebia manto constans				58		377
Erebia medusa				22		377
Erebia medusa polaris				22		377
Erebia melampus				38		377
Erebia melas				42		377
Erebia meolans				28		377
Erebia mnestra				24		377
Erebia montanus				48		377
Erebia neoridas				46		377
Erebia nerine				44		377
Erebia niphonica				38		377
Erebia nivalis				22		377
Erebia nivalis				22		377
Erebia ome				28		377
Erebia ottomana				80		377
Erebia pandrose				56		377
Erebia pandrose sthennyo				56		377
Erebia pharte				38		377
Erebia prono				38		377
Erebia scipio				44		377
Erebia serotina				31		377
Erebia serotina				36		377
Erebia stirius				44		377
Erebia styx				46		377
Erebia triarius				32		377
Erebia tyndarus				20		377
Erebia tyndarus				20		377
Erebia tyndarus semimurina				20		377
Erebia warreniana				22		377
Hipparchia aelia				59		377
Hipparchia allionii				58		377
Hipparchia aristaeus				58		377
Hipparchia fatua				58		377
Hipparchia mersina				58		377
Hipparchia pisidice				58		377
Hipparchia statilinus burgeffi				58		377
Hipparchia syriaca				58		377
Hyponephele dysdora				58		377
Hyponephele lupinus				58		377
Hyponephele lycaon				58		377
Hyponephele narica				58		377
Kirina climene				50		377
Kirina roxelana				50		377
Lasiommata menava				58		377
Lethe diana				58		377
Lethe rohria daemoniaca				58		377
Lethe sicelis				58		377

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Maniola jurtina				58		377
Maniola jurtina				58		377
Maniola jurtina				58		377
Maniola tithonus				58		377
Melanargia lachesis				48		377
Melanitis leda				56		377
Melanitis phedima				59		377
Minois dryas				56		377
Mycalesis francisca perdiccas				58		377
Mycalesis gotama				56		377
Neope goschkevitschii				56		377
Neope muirheadi nagasawae				56		377
Oeneis asamana				58		377
Oeneis daisetsuzana				58		377
Oeneis jutta				64		377
Oeneis lucilla				58		377
Pararge aegeria				54		377
Pararge aegeria aegerides				56		377
Pararge deidamia				58		377
Pararge hiera				58		377
Pararge maera				56		377
Pararge maera adrasta				56		377
Pararge maera pannonica				56		377
Pararge megera				54		377
Pararge megera				58		377
Pararge megera lyssia				58		377
Penthema formosanum				56		377
Pseudochazara anthelea				56		377
Pseudochazara berae				54		377
Pseudochazara caucasia				54		377
Pseudochazara geyeri				54		377
Pseudochazara hippolyte				56		377
Pseudochazara mamurra				56		377
Pseudochazara mniszechii				56		377
Pseudochazara telephassa				56		377
Pseudotergumia fidia				60		377
Pyronia cecilia				56		377
Pyronia pasiphae				66		377
Pyronia tithonus				58		377
Satyrus actaea				54		377
Satyrus bryce				54		377
Satyrus hermione				58		377
Satyrus semete				58		377
Yphthima argus				58		377
Yphthima doleta				48		377
Yphthima motschulskyi				54		377
Sphingidae						
Celerio euphorbiae				57		377
Celerio euphorbiae				56		377
Celerio euphorbiae				56		377
Celerio euphorbiae				58		377
Celerio galii				56		377
Celerio galii				58		377
Celerio hippophaes				58		377
Celerio lineata				58		377
Celerio livornica				58		377
Ceterio vespertilio				58		377
Deilephila elpenor				58		377
Deilephila elpenor				58		377
Deilephila elpenor lewisii				58		377
Deilephila porcellus				58		377
Laothoe populi				56		377
Laothoe populi austauti				56		377
Laothof! populi				56		377
Marumba gaschkewitschii echephron				56		377

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Mimas tiliae				58		377
Mimas tiliae			58	58	ZW	378
Psilogramma menephron increta			48		377	
Smerinthus ocellata				54		377
Smerinthus ocellata				54		377
Smerinthus ocellata				56		377
Smerinthus ocellata planus				54		377
Sphinx ligustri				56		377
Sphinx ligustri				56		377
Theretra japonica				58		377
Theretra oldenlandiae				62		377
Talaeporiidae						
Talaeporia lubulosa				60		377
Tischeriidae						
Tischeria angusticolella				42		377
Tischeria ekebladella			46	46	ZW	378
Tortricidae						
Adoxophyes orana				60		377
Archips breviplicanus				60		377
Archips fuscocupreana				60		377
Bactra lacteana			59	58	ZWW	378
Choristoneura cerasiorana				60		377
Choristoneura cerasiorana				60		377
Choristoneura fumiferana				60		377
Choristoneura pinus				60		377
Cydia pomonella			56	56	ZW	378
Homona magnanima				60		377
Homona menciana				60		377
Pandemis heparana				60		377
Yponomeutidae						
Yponomeuta cagnagellus			61	62	ZZW	378
Yponomeuta evonymella				62		377
Yponomeuta evonymella			61	62	ZZW	378
Yponomeuta gigas			61	62	ZZW	378
Yponomeuta kitabatakei				60		377
Yponomeuta malinellus			61	62	ZZW	378
Yponomeuta padellus			61	62	ZZW	378
Yponomeuta polistictus				60		377
Yponomeuta rorellus			61	62	ZZW	378
Yponomeuta vigintipunctatus			62		377	
Zygaenidae						
Elcysma westwoodii				64		377
Illiberis nigra				50		377
Illiberis psychina				50		377
Zygaena achilleae				60		377
Zygaena ephialtes				60		377
Zygaena ephialtes coronillae				60		377
Zygaena ephialtes peucedani				60		377
Zygaena lonicerae				60		377
Zygaena purpuralis				60		377
Zygaena trifolii				60		377
Mantodea						
Amorphoscelidae						
Amorphoscelis indica			34	33	XO	243
Cliomantis cornuta			26	25	XO	243
Glabromantis nebulosa			26	25	XO	243
Empusidae						
Empusa egena			28	27	XO	243
Empusa pauperata			28	27	XO	243
Empusa spinosa			28	27	XO	243
Gongylus gongyloides			28	27	XO	243
Eremiaphilidae						
Didymocorypha lanceolata			16	15	XO	243
Didymocorypha lanceolata			18	17	XO	243
Humbertiella indica			24	23	XO	243

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Humbertiella n.sp.			40	39	XO	243
Humbertiella similis			32	31	XO	243
Humbertiella sp.			22	21	XO	243
Hymenopodidae						
Acanthops falcata			20	19	XO	243
Acanthops godmani			20	19	XO	243
Acontiothespis cordillerae vitrea		16	15	XO	243	
Acontiothespis multicolor			16			243
Acontiothespis sp.			16	15	XO	243
Antemna rapax			28	27	XXY	243
Creobroter gemmatus			28	27	XO	243
Creobroter laevicollis			28	27	XO	243
Creobroter urbanus			28	27	XO	243
Euantissa ornata			34	33	XO	243
Harpagomantis tricolor			26	25	XO	243
Hestiasula brunneriana			28	27	XO	243
Pseudacanthops medusa			20			243
Tithrone roseipennis			16	15	XO	243
Mantidae						
Aethalochroa ashmoliana			30	29	XO	243
Ameles abjecta			30	29	XO	243
Ameles heldreichi			29	28	XO	243
Ameles sp.			21	20	XO	243
Angela guianensis				19		243
Antistia sp.			28	27	XO	243
Transvaal						
Apterornantis bolivari			30	29	XO	243
Archimantis quinquelobata			28	27	complex XY	243
Archimantis sobrina			28	27	complex XY	243
Arneles cypria			27	26	XO	243
Bisanthe pulchripennis			22	21	XO	243
Bolbe nigra			30	25	XO	243
Bolbe pallida			30	25	XO	243
Brunneria borealis			28			243
Callimantis antillarum			18	17	XO	243
Cheddikulama straminea			28	27	XXY	243
Choeradodis rhombicollis			32	31	XXY	243
Compsothespis anomala			30	23	XXY	243
Compsothespis natalica			30	23	XXY	243
Deiphobe brunneri			20	19	XO	243
Deiphobe indica			28	27	XXY	243
Dystacta alticeps			26	25	XO	243
Haldwania liliputana			16	15	XO	243
Hierodula coarctata			28	27	complex XY	243
Hierodula patellifera			28	27	XXY	243
Hierodula sp.			28	27	XXY	243
Hierodula tenuidentata			28	27	complex XY	243
Hierodula venosa			28	27	XXY	243
Hierodula ventralis			28	27	complex XY	243
Holaptilon pusillulurn			30	29	XO	243
Hoplocorypha macra			36	35	XO	243
Hoplocorypha sp.			28	27	XO	243
Ima fusca			34	34	XY	243
Iris aratoria			26	25	XO	243
Kongobatha diadernata			30	25	XO	243
Leptomantis parva			40	39	XO	243
Ligaria quadripunctata			24	23	XO	243
Liturgusa actuosa			24	23	XO	243
Liturgusa cursor			34	33	XO	243
Liturgusa maya			18	17	XO	243
Liturgusa sp.			22	21	XO	243
Mantis octospilota			28	27	XXY	243
Mantis religiosa			28	27	XXY	243
Melliera brevipes			28	27	XXY	243
Miomantis sp.			16	15	XO	243

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Nullabora flavoguttata			28	27	complex XY	243
Oligonyx dohrnianus			30	19	XO	243
Orthodera gunnii			26	25	XXY	243
Orthodera ministralis			26	25	XXY	243
Orthoderina straminea			26	25	XXY	243
Oxyopsis rubicunda			28	27	XXY	243
Paratenodera sinensis			28	27	XXY	243
Parathespis humbertiana			32	31	XO	243
Phyllovates tripunctata			28	27	XXY	243
Polyspilota aeruginosa			28	27	XXY	243
Polyspilota sp.			28	27	XXY	243
Promiopteryx granadensis			20	19	XO	243
Pseudomiopteryx infuscata			18	17	XO	243
Rhodamantis pulchella			28	27	complex XY	243
Rhodamantis sp3'			28	27	XXY	243
Schizocephala bicornis			30	27	XO	243
Sp. Sp			30	25	XO	243
Sphodromantis gastrica			28	27	XXY	243
Sphodropoda sp4			28	27	XXY	243
Sphodropoda tristis			28	27	complex XY	243
Sphodrornantis viridis			24	23	XXY	243
Stagomantis heterogamia			28	27	complex XY	243
Stagornantis carolina			28	27	complex XY	243
Stagrnatoptera septentrionalis		28	27	complex XY	243	
Statilia maculata			28	27	XXY	243
Tenodera aridifolia			28	27	XXY	243
Tenodera australasiae			28	27	XXY	243
Tenodera superstitiosa			28	27	XXY	243
Thesprotia filum			30	23	XO	243
Thesprotia graminis			30	23	XO	243
Toxomantis sinensis			28	27	XO	243
Vates pectinicornis			28	27	XXY	243
Mantoididae						
Mantoida schraderi			38	37	XO	243
Mecoptera						
Bittacidae						
Bittacus italicus			26	25	XO	379
Bittacus pilocornis			30	29	XO	380
Bittacus stigmaterus			32	31	XO	380
Boreidae						
Boreus brumalis			26	25	XXY	381
Choristidae						
Chorista australis			58	57	XO	382
Nannochoristidae						
Nannochorista dipteroides			22			382
Panorpidae						
Neopanorpa lui			42	41	XO	383
males are achiasmatic						
Panorpa acuta			24	23	XO	380
Panorpa anomala			24	23	XO	380
Panorpa cognata			44	43	XO	384
Panorpa communis			46	45	XO	384
Panorpa dubia			40	39	XO	383
males are achiasmatic						
Panorpa emarginata			40	39	XO	383
males are achiasmatic						
Panorpa germanica			42	41	XO	384
Panorpa sp.			48	47	XO	383
males are achiasmatic						
Megaloptera						
Corydalidae						
Chauliodes japonicus			20	20	Xy+	385
Corydalus cornutus			24	24	Xy+	386
Neohermes filicornis			22	22	Xxyyp	386
Protohermes grandis			24	24	Xy+	387

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Microcoryphia						
Machilidae						
Dilta littoralis				32		388
Machilis noctis				30		388
Neuroptera						
Chrysopidae						
Chrysopa alba			12	12	XY	389
heteromorphic						
Chrysopa aspersa			12	12	XY	389
heteromorphic						
Chrysopa carnea			14	14	XY	389
heteromorphic						
Chrysopa cognatella			12	12	XY	389
heteromorphic						
Chrysopa flava			14	14	XY	389
heteromorphic						
Chrysopa flavifrons			12	12	XY	389
heteromorphic						
Chrysopa formosa			12	12	XY	389
heteromorphic						
Chrysopa intima			12	12	XY	389
heteromorphic						
Chrysopa japana			12	12	XY	389
heteromorphic						
Chrysopa japonica			12	12	XY	389
heteromorphic						
Chrysopa kurisakiana			12	12	XY	389
heteromorphic						
Chrysopa matsumurae			12	12	XY	389
heteromorphic						
Chrysopa parabola			12	12	XY	389
heteromorphic						
Chrysopa perla			12	12	XY	389
heteromorphic						
Chrysopa sapporensis			12	12	XY	389
heteromorphic						
Chrysopa septempunctata			10	10	XY	389
heteromorphic						
Chrysopa septempunctata cognata			10	10	XY	389
heteromorphic						
Chrysopa sp.			10	10	XY	389
heteromorphic						
Chrysopa venosa			12	12	XY	389
heteromorphic						
Chrysopa ventralis			12	12	XY	389
heteromorphic						
Chrysopa vittata			14	14	XY	389
heteromorphic						
Chrysopa vividana			12	12	XY	389
heteromorphic						
Chrysopa vulgaris			12	12	XY	389
heteromorphic						
Chrysopa yamamuvae			12	12	XY	389
heteromorphic						
Hemerobiidae						
Hemerobius marginatus			12	12	XY	390
heteromorphic						
Mantispidae						
Climaciella semihyalina			20	20	XY	391
heteromorphic						
Climaciella sp.			20	20	XY	392
heteromorphic						
Entanoneura limbata			20	20	XY	391
heteromorphic						
Entanoneura phithisica				20	XXXY	391

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Eumantispa harmandi			18	18	XY	391
heteromorphic						
Leptomantispa pulchella			22	22	XY	391
heteromorphic						
Mantispa fuscicornis			22	22	XY	391
heteromorphic						
Mantispa interrupta			22	22	XY	391
heteromorphic						
Mantispa japonica			20	20	XY	391
heteromorphic						
Mantispa sayi			22	22	XY	391
heteromorphic						
Mantispa styriaca			18	18	XY	391
heteromorphic						
Mantispa uhleri			22	22	XY	391
heteromorphic						
Nolima pinal			18	18	XY	391
heteromorphic						
Plega dactyloya			22	21	XO	391
Plega signata			18	18	XY	391
heteromorphic						
Tuberonotha stenua			20	20	XY	391
heteromorphic						
Zeugomantispa minuta			20	20	XY	391
heteromorphic						
Myrmeleontidae						
Acanthaclisis japonica			14	14	XY	393
heteromorphic						
Brachynemurus coquilletti			14	14	XY	394
heteromorphic						
Brachynemurus dissimilis			16	16	XY	394
heteromorphic						
Brachynemurus hubbardi			14	14	XY	394
heteromorphic						
Brachynemurus mexicanus			14	14	XY	394
heteromorphic						
Brachynemurus niger			16	16	XY	394
heteromorphic						
Brachynemurus nigrilabris			16	16	XY	394
heteromorphic						
Brachynemurus schwarzi			14	14	XY	394
heteromorphic						
Centroclisis brachygaster			14	14	XY	393
heteromorphic						
Creoleon plumbea			18	18	XY	393
heteromorphic						
Macronemurus appendiculatus		16	16	XY	393	
heteromorphic						
Macronemurus sp.			16	16	XY	393
heteromorphic						
Morter hyalinus			14	14	XY	393
heteromorphic						
Myrmeleon alcestris			14	14	XY	393
heteromorphic						
Myrmeleon californicus			14	14	XY	394
heteromorphic						
Myrmeleon europaeus			14	14	XY	393
heteromorphic						
Myrmeleon exitalis			14	14	XY	394
heteromorphic						
Myrmeleon formicarius			14	14	XY	393
heteromorphic						
Myrmeleon immaculatus			14	14	XY	394
heteromorphic						
Myrmeleon mexicanum			14	14	XY	394

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
heteromorphic						
Myrmeleon obscurus			14	14	XY	393
heteromorphic						
Myrmeleon sagax			14	14	XY	393
heteromorphic						
Neuroleon sp.			16	16	XY	393
heteromorphic						
Palpares libelluloides			26	26	XY	393
heteromorphic						
Palpares sobrinus			22	22	XY	393
heteromorphic						
Palpares sp.			24	24	XY	393
heteromorphic						
Palparidius concinnus			18	18	XY	393
heteromorphic						
Psammoleon arizonensis			16	16	XY	394
heteromorphic						
Vella texana			14	14	XY	394
heteromorphic						
Osmylidae						
Osmylus decoratus			16	15	XXY	395
Sisyridae						
Climacia areolaris			14	13	XO	396
Sisyra vicaria			14	14	XY	396
heteromorphic						
Odonata						
Aeshnidae						
Acanthaeschna anacantha			28	27	XO	397
micro chromosomes present						
Acanthaeschna multipunctata		28	27	XO	397	
micro chromosomes present						
Aeshna bonariensis			26	26	NeoXY	398
Aeshna canadensis			28	27	XO	399
Aeshna cf. unicolor			28	27	XO	397
micro chromosomes present						
Aeshna clepsydra			28	27	XO	397
micro chromosomes present						
Aeshna coerulea			24	24	NeoXY	398
Aeshna confusa			28	27	XO	398
Aeshna cornigera planaltica			16	16	XY	398
Aeshna crenata			28	27	XO	397
micro chromosomes present						
Aeshna cyanea			28	27	XO	397
micro chromosomes present						
Aeshna diffinis diffinis			22	21	XO	397
micro chromosomes present						
Aeshna grandis			26	26	NeoXY	398
Aeshna grandis			26	25	XO	400
Aeshna intricata			20	19	XO	397
micro chromosomes present						
Aeshna juncea			27	27	XO	397
also XY						
Aeshna juncea			26	26	NeoXY	398
Aeshna mixta			28	27	XO	401
Aeshna palmate			28	27	XO	397
micro chromosomes present						
Aeshna peralta			28	27	XO	397
micro chromosomes present						
Aeshna serrata fennica			26	26	NeoXY	397
micro chromosomes present						
Aeshna squamata			24	24	NeoXY	398
Aeshna subartica elisabethae			28	27	XO	397
micro chromosomes present						
Aeshna umbrosa occidentalis			28	27	XO	399
Aeshna umbrosa umbrosa			28	27	XO	399

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Aeshna verticalis			28	27	XO	397
micro chromosomes present						
Aeshna virdis			26	26	NeoXY	397
micro chromosomes present						
Aeshna walkeri			28	27	XO	399
micro chromosomes present						
Anax imperator			28	27	XO	399
micro chromosomes present						
Anax junius			28	27	XO	399
micro chromosomes present						
Anax longipes			28	27	XO	399
micro chromosomes present						
Anax parthenope			28	27	XO	397
micro chromosomes present						
Basiashna janata			26	25	XO	399
Boyeria maclachlani			28	27	XO	397
micro chromosomes present						
Boyeria vionsa			28	27	XO	399
Castoraeschna castor			28	27	XO	397
micro chromosomes present						
Coryphaeschna adnexa			28	27	XO	397
Gynacantha japonica			28	27	XO	397
micro chromosomes present						
Hemianax papuensis			28	27	XO	401
micro chromosomes present						
Hemianax ephippiger			14	13	XO	397
micro chromosomes present						
Oplonaeshna armata			28	27	XO	397
micro chromosomes present						
Planaeschna milnei			28	27	XO	401
micro chromosomes present						
Agrionidae						
Agrion aequabile			26	25	XO	399
Agrion maculatum			26	25	XO	399
Hetaerina americana			26	25	XO	399
Calopterygidae						
Anaciagrion cornelia			26	25	XO	397
micro chromosomes present						
Calopteryx aequabile			26	25	XO	397
micro chromosomes present						
Calopteryx atrata			26	25	XO	397
micro chromosomes present						
Calopteryx maculata			26	25	XO	397
micro chromosomes present						
Calopteryx splendens caprai			26	25	XO	397
micro chromosomes present						
Calopteryx splendens splendens		26	25	XO	397	
Calopteryx virgo japonica			26	25	XO	397
micro chromosomes present						
Calopteryx virgo meridionalis			27	26	XO	397
Calopteryx virgo padana			26	25	XO	397
micro chromosomes present						
Calopteryx virgo virgo			26	25	XO	397
micro chromosomes present						
Matrona basalaris			26	25	XO	397
Mnais costalis			26	25	XO	397
micro chromosomes present						
Mnais strigata			26	25	XO	397
micro chromosomes present						
Coenagrionidae						
Acanthagrion ascendens			28	27	XO	397
micro chromosomes present						
Acanthagrion chacoense			28	27	XO	397
micro chromosomes present						
Aeolagrion foliaceum			28	27	XO	397

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Agrion funebris			28	27	XO	397
Agrion sedula			28	27	XO	397
Agrion violacea			28	27	XO	397
Agrion vivida			28	27	XO	397
Amphiagrion abbreviatum			28	27	XO	399
Argia violacea			28	27	XO	399
Argia vivida			28	27	XO	399
Ceratura capreola			28	27	XO	397
Cercion lindeni			28	27	XO	397
micro chromosomes present						
Ceriagrion cerinorubellum			28	27	XO	397
micro chromosomes present						
Ceriagrion coromandeliamum			28	27	XO	399
micro chromosomes present						
Ceriagrion fallax			28	27	XO	397
micro chromosomes present						
Ceriagrion rubiae			28	27	XO	397
micro chromosomes present						
Ceriagrion tenellum tenellum			28	27	XO	397
micro chromosomes present						
Chromagrion conditum			28	27	XO	399
Coenagrion armatum			28	27	XO	397
Coenagrion hastulatum			28	27	XO	397
Coenagrion hieroglyphicum			28	27	XO	397
micro chromosomes present						
Coenagrion pulchellum			28	27	XO	397
Coenagrion resolutum			28	27	XO	399
Coenagrion sp.			28	27	XO	397
micro chromosomes present						
Diceratobasis macrogaster			28	27	XO	397
micro chromosomes present						
Enallagma aspersum			28	27	XO	399
Enallagma boreale			28	27	XO	399
Enallagma carunculatum			28	27	XO	399
Enallagma civile			28	27	XO	399
Enallagma cyathigerum			28	27	XO	399
Enallagma cyathigerum			28	27	XO	399
Enallagma cyathigerum				28		402
single specimen with fission						
Enallagma ebrium			28	27	XO	399
Enallagma praevarum			28	27	XO	399
Erythromma najas			28	27	XO	397
Ischnura cervula			28	27	XO	399
Ischnura cf. ultima			28	27	XO	397
Ischnura denticollis			28	27	XO	399
Ischnura elegans			28	27	XO	397
Ischnura fluviatilis			28	27	XO	397
Ischnura perparva			28	27	XO	399
Ischnura senegalensis			28	27	XO	397
micro chromosomes present						
Ischnura verticalis			28	27	XO	399
Leptagrion macrurum			30	30	NeoXY	403
Magalagrion oahuense			28	27	XO	397
micro chromosomes present						
Mortonagrion selenion			28	27	XO	397
micro chromosomes present						
Nehalennia irene			28	27	XO	399
Nehalennia speciosa			28	27	XO	397
Pseudagrion australasiae			28	27	XO	397
micro chromosomes present						
Pseudagrion decorum			28	27	XO	397
micro chromosomes present						
Pseudagrion microcephalum			28	27	XO	397
micro chromosomes present						
Pseudagrion rubriceps			28	27	XO	397

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
micro chromosomes present						
Pseudagrion spencei			28	27	XO	397
micro chromosomes present						
Pyrrhosoma nymphula			28	27	XO	397
Tigriagrion aurantinigrum			28	27	XO	397
Zoniagrion exclamationis			28	27	XO	399
Cordulegasteridae						
Antogaster sieboldii			26	25	XO	397
micro chromosomes present						
Cordulegaster boltoni			26	25	XO	397
micro chromosomes present						
Cordulegaster deserticola			26	25	XO	397
micro chromosomes present						
Cordulegaster diastatops			26	25	XO	397
micro chromosomes present						
Cordulegaster diastatops			26	25	XO	399
Cordulegaster dorsalis			26	25	XO	399
micro chromosomes present						
Cordulegaster maculatus			26	25	XO	399
micro chromosomes present						
Cordulidae						
Cordulia shurtleffi			26	25	XO	399
Didymops transversa			26	25	XO	399
micro chromosomes present						
Dorocordulia libera			14	13	XO	399
Dorocordulia libera				14		402
single specimen with fusion						
Ephitheca canis			26	25	XO	399
Ephitheca cynosura			22	21	XO	399
Ephitheca cynosura				22		402
single specimen with fusion						
Ephitheca semiaquea			26	25	XO	399
Ephitheca spinigera			26	25	XO	399
Macromia magnifica			26	25	XO	399
micro chromosomes present						
Somatochlora metallica			26	25	XO	400
Somatochlora semicircularis			26	25	XO	399
Corduliidae						
Cordulia aenea			26	25	XO	397
Epicodulia princeps			26	25	XO	397
micro chromosomes present						
Epitheca canis			26	25	XO	397
micro chromosomes present						
Epitheca cynosura			21	20	XO	397
Epitheca semiaqua			26	25	XO	397
Epitheca spinigera			26	25	XO	397
micro chromosomes present						
Epopthalmia frontalis frontalis		26	25	XO	397	
micro chromosomes present						
Somatochlora flavomaculata			26	25	XO	397
Somatochlora metallica			26	25	XO	397
Somatochlora uchidai			26	25	XO	397
micro chromosomes present						
Somatochlora viridiaenea			26	25	XO	397
Tetragoneuria petechialis			22	21	XO	397
Tetragoneuria spinigera			28	27	XO	397
Epallagidae						
Epallage fatime			26	25	XO	404
Epiophlebiidae						
Epiophlebia superstes			26	25	XO	397
Gomphidae						
Anisogomphus bivittatus			24	23	XO	401
micro chromosomes present						
Aphylla edentata			24	23	XO	401
Aphylla producta			24	23	XO	401

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Dromogomphus spinosus			24	23	XO	399
micro chromosomes present						
Dromogomphus spoliatus			24	23	XO	399
micro chromosomes present						
Epigomphus llama			20	19	XO	401
Erpetogomphus ophibolus			24	23	XO	397
micro chromosomes present						
Gomphoides sp.			24	23	XO	401
Gomphus graslini			24	23	XO	401
micro chromosomes present						
Gomphus confraternus			24	23	XO	399
micro chromosomes present						
Gomphus exilis			24	23	XO	399
micro chromosomes present						
Gomphus exilis						402
Gomphus lentulus			24	23	XO	399
Gomphus lividus			24	23	XO	399
micro chromosomes present						
Gomphus melaenops				24		402
single specimen with fusion						
Gomphus melampus bifasciatus			24		402	
single specimen with fusion						
Gomphus militaris			24	23	XO	399
Gomphus plagiatus			24	23	XO	399
micro chromosomes present						
Gomphus scudderi			24	23	XO	399
Gomphus spicatus			24	23	XO	399
micro chromosomes present						
Gomphus submedianus			24	23	XO	399
Ictinogomphus rapax			24	23	XO	401
Octogomphus specularis			24	23	XO	399
Onychogomphus forcipatus			24	24	XO	401
Onychogomphus forcipatus					XO	397
Ophiogomphus bison			24	23	XO	399
Ophiogomphus bison			25	24	XO	397
Ophiogomphus bison				24		402
single specimen with fission						
Ophiogomphus colubrinus			24	23	XO	399
Ophiogomphus rupinsulensis			24	23	XO	399
Ophiogomphus serpentinus			24	23	XO	397
Phyllocycla sp.			24	23	XO	401
Progomphus borealis			24	23	XO	399
Progomphus borealis			24	23	XO	401
Progomphus intricatus			24	23	XO	401
Progomphus obscurus			24	23	XO	399
Progomphus obscurus			24	23	XO	401
Progomphus phyllochromus			24	23	XO	401
micro chromosomes present						
Sieboldius albardae			24	23	XO	401
micro chromosomes present						
Trigolnphus melampus bifasciatus		20	19	XO	401	
Trigomphus citimus tabei			22	21	XO	397
micro chromosomes present						
Trigomphus interruptus			20	19	XO	397
micro chromosomes present						
Trigomphus melampus			20	19	XO	401
Trigomphus unifasciatus			22	21	XO	397
Gomphidae						
Davidius nanus			24	23	XO	401
Dromogomphus spinosus			24	23	XO	401
Dromogomphus spoliatus			24	23	XO	401
Erpetogomphus designatus			24	23	XO	401
micro chromosomes present						
Erpetogomphus diadophis			24	23	XO	401
Gomphus confraternus			24	23	XO	401

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Gomphus exilis			24	23	NeoXY	401
Gomphus graslini			24	23	XO	401
Gomphus lentulus			24	23	XO	401
Gomphus lividus			24	23	XO	401
Gomphus melaenops			24	23	XO	401
Gomphus militaris			24	23	XO	401
Gomphus pallidus			24	23	XO	401
Gomphus plagiatus			24	23	XO	401
Gomphus postocularis			24	23	XO	401
micro chromosomes present						
Gomphus scudderi			24	23	XO	401
Gomphus spicatus			24	23	XO	401
Gomphus submedianus			24	23	XO	401
Nihonogomphus viridis			24	23	XO	401
micro chromosomes present						
Octogomphus specularis			24	23	XO	401
Onychogomphus forcipatus			24	25	NeoXY	401
Ophiogolnphus serpentinus			24	23	XO	401
Ophiogomphus colubrinus			24	23	XO	401
Ophiogomphus occidentalis			24	23	XO	401
Ophiogomphus rupinsulensis			24	23	XO	401
Ophiogonlphus bison			24	25	NeoXY	401
Stylogomphus suzukii			24	23	XO	401
micro chromosomes present						
Trigomphus citimus tabei			22	21	XO	401
Hetaerinidae						
Hetaerina americana			26	25	XO	397
micro chromosomes present						
Hetaerina charca			26	25	XO	397
micro chromosomes present						
Hetaerina rosea			28	27	XO	397
micro chromosomes present						
Hetaerina sanguinea			26	25	XO	397
Hetaerina titia			26	25	XO	397
micro chromosomes present						
Hetaerina tricolor			26	25	XO	397
micro chromosomes present						
Hetaerina vulnerata			26	25	XO	397
micro chromosomes present						
Lestidae						
Chalcolestes viridis			26	25	XO	397
micro chromosomes present						
Lestes virens			26	25	XO	401
Lestes viridis			26	25	XO	401
Lestes congener			26	25	XO	399
micro chromosomes present						
Lestes disjunctus			26	25	XO	399
Lestes dryas			26	25	XO	399
micro chromosomes present						
Lestes forcipatus			22	21	XO	399
Lestes forficula			26	25	XO	397
micro chromosomes present						
Lestes rectangularis			26	25	XO	399
micro chromosomes present						
Lestes simulatrix			26	25	XO	397
micro chromosomes present						
Lestes sponsa			26	25	XO	397
micro chromosomes present						
Lestes stultus			26	25	XO	399
micro chromosomes present						
Lestes vidua			26	25	XO	397
micro chromosomes present						
Lestes virens vestallis			26	25	XO	397
micro chromosomes present						
Sympecma fusca			26	25	XO	397

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
micro chromosomes present						
Libellulidae						
Acisoma panorpoides panorpoides			26	25	XO	397
micro chromosomes present						
Brachydiplax chalybea			26	25	XO	397
micro chromosomes present						
Brachydiplax farinosa			26	26	NeoXY	397
micro chromosomes present						
Brachydiplax sobrina			26	25	XO	397
micro chromosomes present						
Brachythemis contaminata			26	25	XO	397
micro chromosomes present						
Bradinopyga geminata			26	25	XO	397
micro chromosomes present						
Brechmorhoga mendax			26	25	XO	399
Brechmorrhoga nubecula			26	25	XO	397
micro chromosomes present						
Brechmorrhoga pertinax peruviana			26	25	XO	397
Canaphila vibex			26	25	XO	397
micro chromosomes present						
Cannacria elisa			26	25	XO	397
micro chromosomes present						
Cannacria fasciata			26	25	XO	397
micro chromosomes present						
Cannacria gravida			26	25	XO	399
micro chromosomes present						
Cannacria herbida			26	25	XO	397
micro chromosomes present						
Celithemis elisa			26	25	XO	399
Celithemis fasciata			26	25	XO	399
Crocothemis erythraea			26	25	XO	397
micro chromosomes present						
Crocothemis servilia			25	25	XO	397
also XY						
Dasythemis esmeralda			26	25	XO	397
micro chromosomes present						
Dasythemis venosa			26	25	XO	397
micro chromosomes present						
Diastatops intensa			26	25	XO	397
micro chromosomes present						
Diastatops obscura			26	25	XO	397
micro chromosomes present						
Diplacodes bipunctata			28	27	XO	397
Diplacodes haematodes			25	24	XO	397
Diplacodes leferbvrei			26	25	XO	397
micro chromosomes present						
Diplacodes nebulosa			26	25	XO	397
micro chromosomes present						
Diplacodes trivialis			26	25	XO	397
micro chromosomes present						
Dythemis cannacroides			24	23	XO	397
micro chromosomes present						
Dythemis fugax			26	25	XO	399
micro chromosomes present						
Dythemis rufinervis			26	25	XO	397
micro chromosomes present						
Dythemis velox			26	25	XO	397
micro chromosomes present						
Erythemis attala			26	25	XO	397
Erythemis collocata			26	25	XO	399
micro chromosomes present						
Erythemis plebeja			26	25	XO	397
Erythemis simplicicollis			26	25	XO	399
micro chromosomes present						
Erythrodiplax basalis basalis			26	25	XO	397

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Erythrodiplax berenice			26	25	XO	399
micro chromosomes present						
Erythrodiplax castanea			25	24	XO	397
Erythrodiplax connata connata		26	25	XO	397	
micro chromosomes present						
Erythrodiplax connata fusca			26	25	XO	399
Erythrodiplax fervida			26	25	XO	397
micro chromosomes present						
Erythrodiplax justiniana			26	25	XO	397
micro chromosomes present						
Erythrodiplax media			22	21	XO	397
micro chromosomes present						
Erythrodiplax melanorubra			26	25	XO	397
micro chromosomes present						
Erythrodiplax paraguayensis			24	23	XO	397
micro chromosomes present						
Erythrodiplax umbrata			26	25	XO	399
micro chromosomes present						
Erythrodiplax unimaculata			26	25	XO	397
micro chromosomes present						
Ladona julia			26	25	XO	399
micro chromosomes present						
Lathrecista asiatica			26	25	XO	397
micro chromosomes present						
Lepthemis vesiculosa			26	25	XO	397
Leucorrhinia albifrons			26	25	XO	397
micro chromosomes present						
Leucorrhinia dubia			26	25	XO	397
Leucorrhinia frigida			24	23	XO	399
Leucorrhinia frigida			23	22	XO	397
Leucorrhinia frigida				24		402
single specimen with fusion						
Leucorrhinia glacialis			26	25	XO	399
micro chromosomes present						
Leucorrhinia hudsonica			26	25	XO	399
micro chromosomes present						
Leucorrhinia intacta			26	25	XO	399
micro chromosomes present						
Leucorrhinia pectoralis			26	25	XO	397
micro chromosomes present						
Leucorrhinia proxima			26	25	XO	399
micro chromosomes present						
Leucorrhinia rubicunda			26	25	XO	397
Libellula angelina			26	25	XO	397
micro chromosomes present						
Libellula axilena			24	23	XO	397
Libellula composita			26	25	XO	399
micro chromosomes present						
Libellula croceipennis			26	25	XO	399
micro chromosomes present						
Libellula cyanea			26	25	XO	399
Libellula depressa			25	24	XO	397
Libellula flavida			26	25	XO	399
micro chromosomes present						
Libellula florensis			26	25	XO	399
micro chromosomes present						
Libellula incesta			26	25	XO	399
Libellula luctuosa			26	25	XO	397
Libellula pulchella			26	25	XO	399
micro chromosomes present						
Libellula quadrimaculata			26	25	XO	399
Libellula quadrimaculata quadrimaculata			26	25	XO	397
micro chromosomes present						
Libellula saturata			26	25	XO	399
micro chromosomes present						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Libellula semifasciata			26	25	XO	399
micro chromosomes present						
Libellula vibrans			26	25	XO	399
micro chromosomes present						
Lyriothemis pachygastra			26	25	XO	397
micro chromosomes present						
Macrothemis hemichlora			6	6	NeoXY	398
Macrothemis mortoni			26	25	XO	398
micro chromosomes present						
Macrothemis musiva			26	25	XO	398
micro chromosomes present						
Macrothemis declivata			24	23	XO	397
micro chromosomes present						
Macrothemis imitans imitans			26	25	XO	397
micro chromosomes present						
Miathyria marcella			26	25	XO	397
micro chromosomes present						
Micrathyria atra			26	25	XO	397
micro chromosomes present						
Micrathyria cf. eximia			22	21	XO	397
Micrathyria didyma			26	25	XO	397
micro chromosomes present						
Micrathyria hageni			26	25	XO	397
micro chromosomes present						
Micrathyria iheringi			24	23	XO	397
micro chromosomes present						
Micrathyria laevigata			26	25	XO	397
micro chromosomes present						
Micrathyria ocellata dentiens			26	25	XO	397
micro chromosomes present						
Micrathyria sp.			24	23	XO	397
Micrathyria spuria			26	25	XO	397
micro chromosomes present						
Nannothemis bella			26	25	XO	399
micro chromosomes present						
Nesciothemis farinosum			26	25	XO	397
micro chromosomes present						
Nesogonia blackburni			26	25	XO	397
micro chromosomes present						
Neurothemis tullia tullia			28	28	NeoXY	397
micro chromosomes present						
Orthemis levis				6		402
single specimen with fission						
Orthemis biolleyi			24	23	XO	397
Orthemis cultiformis			24	23	XO	397
micro chromosomes present						
Orthemis ferruginea			24	23	XO	399
Orthemis ferruginea			24	23	XO	397
micro chromosomes present						
Orthemis ferruginea			10	10	NeoXY	397
micro chromosomes present						
Orthemis levis				6		402
NeoXY probable						
Orthetrum albistylum albistylum		26	25	XO	397	
micro chromosomes present						
Orthetrum albistylum speciosum		26	25	XO	397	
micro chromosomes present						
Orthetrum azureum			26	25	XO	397
micro chromosomes present						
Orthetrum brachiale			22	21	XO	397
Orthetrum brunneum			26	25	XO	397
micro chromosomes present						
Orthetrum cancellatum			26	25	XO	397
micro chromosomes present						
Orthetrum coerulescens			26	25	XO	397

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Orthetrum glaucum			26	25	XO	397
micro chromosomes present						
Orthetrum japonicum			26	25	XO	397
micro chromosomes present						
Orthetrum pruinosum neglectum		26	25	XO	397	
micro chromosomes present						
Orthetrum sabina			26	25	XO	397
micro chromosomes present						
Orthetrum taeniolatum			26	25	XO	397
micro chromosomes present						
Orthetrum triangulare melania		26	25	XO	397	
micro chromosomes present						
Orthetrum triangulare triangulare		26	25	XO	397	
micro chromosomes present						
Pachydiplax longipennis			26	25	XO	399
micro chromosomes present						
Pantala flavescens			26	25	XO	397
micro chromosomes present						
Pantala hymenea			26	25	XO	399
micro chromosomes present						
Perithemis cornelia			26	25	XO	397
Perithemis domitia			26	25	XO	397
micro chromosomes present						
Perithemis electra			26	25	XO	397
Perithemis lais			18	17	XO	397
Perithemis mooma			26	25	XO	397
micro chromosomes present						
Perithemis seminole			26	25	XO	397
micro chromosomes present						
Perithemis sp.			26	25	XO	397
Planiplax sanguineventris			26	25	XO	399
micro chromosomes present						
Plathemis lydia			26	25	XO	399
micro chromosomes present						
Potamarcha obscura			26	25	XO	397
micro chromosomes present						
Pseudothemis zonata			24	23	XO	397
Rhodopygia cardinalis			26	25	XO	397
micro chromosomes present						
Rhyothemis fuliginosa				26		402
Rhyothemis variegata			26	25	XO	397
micro chromosomes present						
Scapanea frontalis			26	25	XO	397
micro chromosomes present						
Sympetrum costiferum			26	25	XO	399
micro chromosomes present						
Sympetrum danae			26	25	XO	399
micro chromosomes present						
Sympetrum eroticum eroticum		22	21	XO	397	
Sympetrum flaveolum			26	25	XO	397
micro chromosomes present						
Sympetrum frequens frequens		24	23	XO	397	
Sympetrum madidum			26	25	XO	399
micro chromosomes present						
Sympetrum meridionale			26	25	XO	397
micro chromosomes present						
Sympetrum obtrusum			26	25	XO	399
micro chromosomes present						
Sympetrum parvulum			26	25	XO	397
micro chromosomes present						
Sympetrum pedemontanum elatum			26	25	XO	397
micro chromosomes present						
Sympetrum robicundulum			26	25	XO	399
micro chromosomes present						
Sympetrum sanguineum			26	25	XO	397

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
micro chromosomes present						
Sympetrum semicinctum			26	25	XO	399
micro chromosomes present						
Sympetrum striolatum			26	25	XO	397
Sympetrum vicinum			26	25	XO	399
micro chromosomes present						
Sympetrum vulgatum			26	25	XO	397
micro chromosomes present						
Tarnetrum corruptum			26	25	XO	399
micro chromosomes present						
Tarnetrum illotum			26	25	XO	399
micro chromosomes present						
Tauriphila australis			26	25	XO	397
micro chromosomes present						
Tauriphila azteca			26	25	XO	399
micro chromosomes present						
Tramea abdominalis			26	25	XO	397
Tramea basilaris			26	25	XO	399
Tramea burmeisteri			26	25	XO	397
micro chromosomes present						
Tramea carolina			26	25	XO	399
micro chromosomes present						
Tramea cophysa			26	25	XO	397
micro chromosomes present						
Tramea lacerata			26	25	XO	399
Tramea limbata			26	25	XO	397
micro chromosomes present						
Tramea virginia			26	25	XO	397
micro chromosomes present						
Trithemis aurora			26	25	XO	397
micro chromosomes present						
Trithemis pallidinervis			26	25	XO	397
micro chromosomes present						
Urothemis signata signata			26	25	XO	399
micro chromosomes present						
Zenithoptera viola			26	25	XO	397
micro chromosomes present						
Macrodiplactidae						
Aethriamanta brevipennis			26	25	XO	397
micro chromosomes present						
Megapodagrionidae						
Heteragrion flavidorsum			26	25	XO	397
Heteragrion inca			26	25	XO	397
micro chromosomes present						
Megapodagrion contortum			27	26	XO	397
Megapodagrion macropus			26	25	XO	397
Megapodagrion setigerum			26	25	XO	397
Philogenia carrilica			26	25	XO	397
micro chromosomes present						
Petaluridae						
Tachopteryx thoreyi			20	19	XO	397
micro chromosomes present						
Tanypteryx hageni			18	17	XO	399
micro chromosomes present						
Tanypteryx pryeri			18	17	XO	397
micro chromosomes present						
Uropetala carovei			18	17	XO	397
micro chromosomes present						
Platycnemididae						
Copera annulata			26	25	XO	397
micro chromosomes present						
Platycnemis pennipes			26	25	XO	397
Platystictidae						
Palaemnema paulina			26	25	XO	397
micro chromosomes present						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Polythoridae						
Cora irene			24	23	XO	397
micro chromosomes present						
Polythore boliviana			24	23	XO	397
micro chromosomes present						
Protoneuridae						
Epipleoneura sp.			28	27	XO	397
Neoneura rubiventris			28	27	XO	397
micro chromosomes present						
Pseudolestidae						
Hypolestes clara			18	17	XO	397
Pseudostigmatidae						
Mecistogaster sp. 1			30	29	XO	397
micro chromosomes present						
Mecistogaster sp. 2			12	12	NeoXY	397
Orthoptera						
Acrididae						
Abracris dilecta			24	23	XO	405
Abracris sp. B			22	21	XO	405
Adimantus cubiceps			24	23	XO	405
Adimantus ornatissimus			24	23	XO	405
Albretchia palpata			24	23	XO	405
Aleuas gracilis			20	20	XY	405
Aleuas lineatus			20	20	XY	405
Aleuas sp. 1			20	20	XY	405
Aleuas sp. 2			22	22	XY	405
Aleuas sp. 3			20	20	XY	405
Aleuas vitticollis			20	19	XO	405
Allotruxalis sp.			24	23	XO	405
Allotruxalis strigata			24	23	XO	405
Amblytropidia australis			24	23	XO	405
Apacris rubrithorax			24	23	XO	405
Apacris sp. 1			24	23	XO	405
Apolobamba prope pulchra			24	23	XO	405
Atrachelacris olivaceus			22	22	XY	405
Atrachelacris unicolor			22	22	XY	405
Belosacris coccineipes			24	23	XO	405
Bucephalacris bohlsii			22	21	XO	405
Carbonellacris grossa			24	23	XO	405
Chlorus bolivianus			20	19	XO	405
Chlorus borrelli			22	21	XO	405
Chlorus sp. 1			20	19	XO	405
Chlorus vittatus			24	23	XO	405
Cocytolettix argentina			24	23	XO	405
Cocytolettix intermedia			24	23	XO	405
Cocytolettix pulchripennis			24	23	XO	405
Cocytolettix sp. 1			24	23	XO	405
Cornops aquaticum			24	23	XO	405
Cornops frenatum			24	23	XO	405
Covasacris sp.			24	23	XO	405
Dichromatos corupa					XXY	406
Dichromatos lilloanus					XXY	406
Dichromatos montanus					XXY	406
Dichromatos schrottkyi					XXY	406
Dichromorpha australis			24	23	XO	405
Dichroplus alejomesai			24	23	XO	405
Dichroplus auriventris			24	23	XO	405
Dichroplus bergi			22	22	XY	405
Dichroplus conspersus			24	23	XO	405
Dichroplus democraticus			24	23	XO	405
Dichroplus dubius			22	21	XXY	405
Dichroplus elongatus			24	23	XO	405
Dichroplus exilis			24	23	XO	405
Dichroplus fuscus			24	23	XO	405
Dichroplus fuscus.2			20	19	XO	405

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Dichroplus maculipennis			24	23	XO	405
Dichroplus mantiqueirae			24	23	XO	405
Dichroplus misionensis			24	23	XO	405
Dichroplus obsurus			18	18	XY	405
Dichroplus paraelongatus			24	23	XO	405
Dichroplus paraguayensis			20	20	XY	405
Dichroplus patruelis			22	21	XO	405
Dichroplus piceomaculatus			22	22	XY	405
Dichroplus porteri			22	22	XY	405
Dichroplus pratensis			20	19	XO	405
Dichroplus pseudopunctulatus		24	23	XO	405	
Dichroplus punctulatus			24	23	XO	405
Dichroplus robustulus			24	23	XO	405
Dichroplus robustus			22	21	XXY	405
Dichroplus schulzi			24	23	XO	405
Dichroplus silveiraguidoi			8	8	XY	405
Dichroplus sp. 11			24	23	XO	405
Dichroplus sp. 12			20	20	XY	405
Dichroplus sp. 13			20	20	XY	405
Dichroplus sp. 14			22	22	XY	405
Dichroplus sp. 15			20	20	XY	405
Dichroplus sp. 16			22	22	XY	405
Dichroplus vittatus			20	20	XY	405
Dichroplus vittatus.2			18	18	XY	405
Dichroplus vittigerum			18	18	XY	405
Eucephalacris borellii			24	23	XO	405
Eujivarus fusiformis			22	21	XO	405
Eujivarus sp. A			22	21	XO	405
Eujivarus sp. B			22	21	XO	405
Eujivarus sp. C			22	21	XO	405
Eujivarus vittatus			24	23	XO	405
Eulampiacris leucoptera			24	23	XO	405
Euplectrotettix sp. 1			24	23	XO	405
Euplectrotettix sp. 2			24	23	XO	405
Euplectrotettix sp. 3			24	23	XO	405
Eurotettix lilloanus			22	21	XXY	405
Eurotettix minor			22	22	XY	405
Eurotettix schrottkyi			22	21	XXY	405
Eurotettix sp. 1			22	21	XXY	405
Eurotettix sp. 2			22	21	XXY	405
Eusitalces sp. A			24	23	XO	405
Eusitalces vulneratus			24	23	XO	405
Eutryxalis sp.			24	23	XO	405
Fenestra bohlsii			24	23	XO	405
Haroldgrantia lignosa			24	23	XO	405
Hyalopteryx rufipennis			24	23	XO	405
Isonyx paragauyensis			24	23	XO	405
Isonyx sp. 1			24	23	XO	405
Jodacris chapadensis			20	19	XO	405
Jodacris ferrugineus			20	19	XO	405
Jodacris furcillata			20	19	XO	405
Lamiacris migroguttata			24	23	XO	405
Laplatacris dispar			24	23	XO	405
Laplatacris sp. 1			24	23	XO	405
Leiotettix flavipes			22	22	XY	405
Leiotettix politus					XXY	406
Leiotettix politus			14	14	XY	405
Leiotettix politus.2			14	13	XXY	405
Leiotettix pulcher			22	22	XY	405
Leiotettix sanguineus			24	23	XO	405
Leiotettix sp. 1			16	15	XXY	405
Leiotettix sp. 2			18	18	XY	405
Leiotettix sp. 3			24	23	XO	405
Leiotettix viridis			24	23	XO	405
Leptysma dorsalis			24	23	XO	405

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Leptysmina pallida			24	23	XO	405
Leptysmina sp. 1			24	23	XO	405
Machaeropeles rostratum			24	23	XO	405
Mastusia quadricarinata			24	23	XO	405
Meloscirtus montanus			24	23	XO	405
Meloscirtus sp. 1			24	23	XO	405
Metaleptea brevicornis adspersa		24	23	XO	405	
Nahuelia rubriventris			24	23	XO	405
Neopedies brunneri			24	23	XO	405
Neopedies sp. 1			24	23	XO	405
Neopedies sp. 2			24	23	XO	405
Neopedies sp. 3			24	23	XO	405
Neopedies sp. 4			24	23	XO	405
Notopomala glaucipes			24	23	XO	405
Omalotettix obliquum			22	21	XO	405
Ommatolampis perspicillata			24	23	XO	405
Orphula sp.			24	23	XO	405
Orphulella concinnula			24	23	XO	405
Orphulella punctata			24	23	XO	405
Orphulella sp.			24	23	XO	405
Orphulina pulchella			24	23	XO	405
Osmilia flavolineata			24	23	XO	405
Oxyblepta sp.			24	23	XO	405
Oxybleptella sagitta			24	23	XO	405
Paraorphula graminea			24	23	XO	405
Parapellopedon instabilis			24	23	XO	405
Parapellopedon sp.			24	23	XO	405
Parascopas exertus			22	21	XO	405
Parascopas obesus			24	23	XO	405
Parascopas sanguineus			24	23	XO	405
Parascopas similis			24	23	XO	405
Paratylotropidia morsei					XXY	406
Paropaon laevifrons			24	23	XO	405
Paropaon pilosus tingomariae			24	23	XO	405
Pedies andeanus			22	21	XO	405
Pedies sp. 1			22	21	XO	405
Pedies sp. 2			22	21	XO	405
Pedies sp. 3			22	21	XO	405
Pedies sp. 4			24	23	XO	405
Propedies bilobus			24	23	XO	405
Propedies bipunctatus			24	23	XO	405
Propedies fusiformis			24	23	XO	405
Propedies olivaceus			24	23	XO	405
Propedies sanguineus			24	23	XO	405
Propedies sp. 1			24	23	XO	405
Pseudoscopas nigrigena			24	23	XO	405
Pseudoscopas sp. 1			24	23	XO	405
Pseudoscopas sp. 2			24	23	XO	405
Pseudoscopas sp. 3			24	23	XO	405
Pseudoscopas sp. 4			24	23	XO	405
Pseudoscopas sp. 5			24	23	XO	405
Pseudoscopas sp. 6			24	23	XO	405
Pseudoscopas sp. 7			24	23	XO	405
Pseudoscopas sp. 8			24	23	XO	405
Psiloscirtus bolivianus			24	23	XO	405
Psiloscirtus olivaceus			24	23	XO	405
Psiloscirtus sp. A			24	23	XO	405
Pycnosarcus atavus			18	17	XO	405
Ronderosia dubius					XXY	406
Ronderosia robustus					XXY	406
Schistocerca cancellata			24	23	XO	405
Schistocerca flavofasciata			24	23	XO	405
Schistocerca pallens			24	23	XO	405
Schistocerca paraensis			24	23	XO	405
Schistocerca sp.			24	23	XO	405

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Scotussa cliens			22	21	XO	405
Scotussa daguerrei					XXY	406
Scotussa daguerrei			22	21	XXY	405
Scotussa delicatula			16	16	XY	405
Scotussa impudica			24	23	XO	405
Scotussa lemniscata			24	23	XO	405
Scotussa liebermanni			22	21	XO	405
Scotussa sp. 1			24	23	XO	405
Scyllina humilis			24	23	XO	405
Scyllina signatipennis			22	22	XY	405
Scyllina sp.			24	23	XO	405
Scyllinops brunneri			24	23	XO	405
Scyllinops pallida			24	23	XO	405
Scyllinops sp. 1			24	23	XO	405
Scyllinops sp. 2			24	23	XO	405
Silvitettix concolor			24	23	XO	405
Sinipta acuta			24	23	XO	405
Sinipta dalmani			24	23	XO	405
Sinipta maldonadoi			24	23	XO	405
Sitalces dorsalis			24	23	XO	405
Sitalces infuscatus			24	23	XO	405
Sitalces volxemi			20	19	XO	405
Staurorhectus longicornis			24	23	XO	405
Stenopola bohlsii			24	23	XO	405
Stenopola boliviana			24	23	XO	405
Stenopola dorsalis			24	23	XO	405
Stenopola pallida			22	21	XO	405
Stenopola rubrifons			24	23	XO	405
Stereotettix sp. 1			24	23	XO	405
Tetrataenia surinama			20	19	XO	405
Trimerotropis ochraceipennis			24	23	XO	405
Trimerotropis pallidipennis			24	23	XO	405
Xiphiola borellii			24	23	XO	405
Zygoclistron falconinum			20	20	XY	405
Zygoclistron nasicum			20	20	XY	405
Zygoclistron trachystictum			20	20	XY	405
Lentulidae						
Karruacris browni					XXY	406
Ommexechidae						
Aucacris bullocki			24	23	XO	405
Calcitrena maculosa			24	23	XO	405
Clarazella bimaculata			24	23	XO	405
Clarazella patagona			24	23	XO	405
Conometopus sulcaticollis			26	25	XO	405
Cumainocloidus cordillerae			24	23	XO	405
Descampsacris serrulata			24	23	XO	405
Graea horrida			24	23	XO	405
Neuquina fictor			22	22	XY	405
Ommexecha sp.			24	23	XO	405
Ommexecha virens			24	23	XO	405
Ommexechia germari			22	21	XO	405
Pachyosa signata			22	22	XY	405
Spathalium audouini			22	22	XY	405
Tetrixocephalus chilensis			24	23	XO	405
Tetrixocephalus micropterus			24	23	XO	405
Tetrixocephalus sergioi			24	23	XO	405
Tetrixocephalus sp.			24	23	XO	405
Tetrixocephalus willemsei			22	22	XY	405
Pauliniidae						
Marellia remipes			24	23	XO	405
Paulinia acuminata			24	23	XO	405
Pyrgomorphidae						
Omura congrua			20	19	XO	405
Romaleidae						
Alcamenes clarazianus			24	23	XO	405

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Antandrus viridus			24	23	XO	405
Chariacris miniacea			24	23	XO	405
Chromacris miles			24	23	XO	405
Chromacris peruviana			24	23	XO	405
Chromacris speciosa			24	23	XO	405
Coryacris angustipennis			24	23	XO	405
Diponthus clarazianus			24	23	XO	405
Diponthus communis			22	22	XY	405
Diponthus dispar			22	21	XO	405
Diponthus electus			22	21	XO	405
Diponthus maculiferus			22	21	XO	405
Diponthus prope communis			24	23	XO	405
Diponthus sp.			24	23	XO	405
Elaeochlora basalis			24	23	XO	405
Elaeochlora brachyptera			24	23	XO	405
Elaeochlora sp.			24	23	XO	405
Elaeochlora trilineata			24	23	XO	405
Elaeochlora viridicata			24	23	XO	405
Eutropidacris collares			24	23	XO	405
Prionolopha serrata			24	23	XO	405
Procolpia minor			24	23	XO	405
Securigera acutangula			24	23	XO	405
Xestotrachelus robustus			24	23	XO	405
Xyleus attenuatus			24	23	XO	405
Xyleus discoideus			24	23	XO	405
Xyleus gracilis			24	23	XO	405
Xyleus insignis			24	23	XO	405
Xyleus laevipes			22	22	XY	405
Xyleus modestus			24	23	XO	405
Xyleus sp. 1			24	23	XO	405
Xyleus sp. 2			24	23	XO	405
Xyleus sp. 3			24	23	XO	405
Zoniopoda hempeli			24	23	XO	405
Zoniopoda iheringi			22	22	XY	405
Zoniopoda juncorum			24	23	XO	405
Zoniopoda omnicolor			24	23	XO	405
Zoniopoda similis			24	23	XO	405
Zoniopoda tarsata			24	23	XO	405
Tristiridae						
Atacamacris diminuta			10	10	XY	405
Elysiacris angusticollis			22	21	XO	405
Illapelia penai			24	23	XO	405
Peplacris recutita			22	21	XO	405
Tropidostethus bicarinatus			22	21	XO	405
Parasitiformes						
Polyaspidoidea						
Iphidinychus geieri	parth					407
Iphiduropoda penicillata						407
Antennophoridae						
Antennophorus grandis			24			213
haplodiploid type unspecified						
Argasidae						
Argas brumpti			24			213
Argas cooleyi			26		XY	213
Argas hermanni			26		XY	213
Argas japonicus			26		XY	213
Argas persicus			26		XY	213
Argas radiatus			26		XY	213
Argas reflexus			26		XY	213
Argas sanchezi			26		XY	213
Argas tridentatus			26		XY	213
Argas vespertilionis			26			213
Argas zumpti			26		XY	213
Ornithodoros alactogalis			33			213
Ornithodoros asperus			16		XY	213

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Ornithodoros capensis			20		XY	213
Ornithodoros gurneyi			12		XY	213
Ornithodoros lahorensis			26			213
Ornithodoros macmillani			16			213
Ornithodoros moubata			20		XY	213
Ornithodoros nereensis			25		XY	213
Ornithodoros savignyi			20		XY	213
Ornithodoros tartakovskyi			21		XY	213
Ornithodoros tholozani			16			213
Otobius lagophilus			20			213
Otobius megnini			20			213
Ascidae						
Asca aelhiopica	parth					213
Asca afroaphidioides	parth					213
Asca aphidioides	parth					213
Asca cranela	parth					213
Asca evansi	parth					213
Asca garmani	parth					213
Asca muma	parth					213
Asca piloja	parth					213
Asca quinqueselosa	parth					213
Cheiroseius sp.	parth					213
Gamasellodes bicolor	parth					408
Gamasellodes rectiventris haplodiploid type unspecified						213
Gamasellodes sp. haplodiploid type unspecified						213
Gamasellodes vermivorax haplodiploid type unspecified						213
Protogamasellus brevicornis	parth					213
Protogamasellus hibernicus	parth					213
Protogamasellus massula	parth					213
Protogamasellus mica	parth					213
Protogamasellus sp.	parth					213
Rhinoseius colwelli haplodiploid type unspecified						213
Blattisociidae						
Blattisocius patagiorum haplodiploid type unspecified			6			213
Lasioseius berlesi	parth					213
Lasioseius denlalus	parth					213
Lasioseius subterraneus haplodiploid type unspecified						213
Lasioseius youcefi	parth					213
Cercomegistidae						
Cercoleipus coelonotus			26			213
Dermanyssidae						
Dermanyssus gallinae haplodiploid type unspecified			6			213
Dermanyssus prognephilus haplodiploid type unspecified			10			211
Dermanyssus prognephilus.2 haplodiploid type unspecified			6			213
Dinychidae						
Urodiaspis pannonica	parth					407
Urodiaspis stammeri						407
Urodiaspis tecta	parth					407
Discourellidae						
Discourella baloghi						407
Discourella modesta	parth					407
Eviphididae						
Pelelhiphis berlesei	parth					213
Pelelhiphis insignis	parth					213
Pelelhiphis rufeseens	parth					213
Halolaelapidae						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Leitneria granulata	parth					213
Ixodidae						
Amblyomma americanum			22		XO	213
Amblyomma cajennense			22		XO	213
Amblyomma darwini			20		XY	213
Amblyomma dissimile			22		XO	213
Amblyomma helvolum			22		XO	213
Amblyomma inornotum			22		XO	213
Amblyomma limbatum			22		XXY	213
Amblyomma maculalum			22		XO	213
Amblyomma moreliae			22		XXY	213
Amblyomma sp.			22		XO	213
Amblyomma testudinarium			22		XO	213
Amblyomma triguttatum			20		XO	213
Amblyomma tubereulalum			22		XO	213
Aponomma concolor			20		XO	213
Aponomma fimbriatum			22		XO	213
Aponomma hydrosauri			18		XO	213
Aponomma undatum			20		XO	213
Boophilus annulatus			22		XO	213
Boophilus micropius			22		XO	213
Dermacentor albipictus			22		XO	213
Dermacentor anderson			22		XO	213
Dermacentor hunteri			22		XO	213
Dermacentor nitens			22		XO	213
Dermacentor occidentalis			22		XO	213
Dermacentor parumapertus			22		XO	213
Dermacentor silvarum			22		XO	213
Dermacentor sp.			20		XO	213
Dermacentor sp.2			22		XO	213
Dermacentor variabilis			22		XO	213
Haemaphysalis bancrofti			22			213
Haemaphysalis bispinosa					XO	213
Haemaphysalis bremneri			22		XO	213
Haemaphysalis campanulata			22		XO	213
Haemaphysalis flava			22		XO	213
Haemaphysalis formosensis			22		XO	213
Haemaphysalis hystricis			20		XO	213
Haemaphysalis japonica			22			213
Haemaphysalis kitaokai			20		XO	213
Haemaphysalis lagrangei			22		XO	213
Haemaphysalis leachii			16			213
Haemaphysalis leporispalustris			22		XO	213
Haemaphysalis longicornis			27		XO	213
Haemaphysalis megaspinosa			22		XO	213
Haemaphysalis pentalagi			22		XO	213
Hyalomma aegyptium			22		XO	213
Hyalomma anatolicum			22		XO	213
Hyalomma anatolicum excavatum		22		XO	213	
Hyalomma asiaticum			22		XO	213
Hyalomma asiaticum excavatum			22			213
Hyalomma detritum			22		XO	213
Hyalomma dromedarii			22		XO	213
Hyalomma franchinii			22		XO	213
Hyalomma impeltarum			22		XO	213
Hyalomma marginatum			22		XO	213
Hyalomma rhipicephaloides			22		XO	213
Hyalomma rufipes			22		XO	213
Ixodes cornuatus			24			213
Ixodes hexagonus			26		XO	213
Ixodes holocyclus			24		XO	213
Ixodes kingi			26		XY	213
Ixodes laysanensis			28		XY	213
Ixodes nipponensis			28			213
Ixodes ricinus			28		XY	213

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Ixodes tasmani			24			213
Rhipicephalus bursa			24			213
Rhipicephalus evertsi			22		XO	213
Rhipicephalus sanguineus			22		XO	213
Rhipicephalus secundus			22		XO	213
Laelapidae						
Androlaelaps casalis			14			213
haplodiploid type unspecified						
Cosmolaelaps vacua	parth					213
Dicrocheles phalaenodectes			6			213
PGE						
Euandrolaelaps sp.						213
haplodiploid type unspecified						
Eulaelaps shanghaiensis			16			213
haplodiploid type unspecified						
Geolaelaps aculeifer			18			213
haplodiploid type unspecified						
Geolaelaps oreithyiae	parth					213
Geolaelaps sp.1						213
haplodiploid type unspecified						
Geolaelaps sp.2						213
haplodiploid type unspecified						
Haemogamasus centrocarpus						213
haplodiploid type unspecified						
Haemogamasus longipes						213
haplodiploid type unspecified						
Hypoaspis lubrica			14			213
haplodiploid type unspecified						
Laelaspis sp.						213
haplodiploid type unspecified						
Stratiolaelaps miles			14			213
haplodiploid type unspecified						
Varroa destructor						409
PGE						
Varroa jacobsoni			14			409
PGE						
Laelapidae						
Cosmolaelaps gurabensis			12			213
haplodiploid type unspecified						
Cosmolaelaps sp.1						213
haplodiploid type unspecified						
Cosmolaelaps sp.2						213
haplodiploid type unspecified						
Cosmolaelaps vacua	parth					213
Pseudoparasitus sp.						213
haplodiploid type unspecified						
Macrochelidae						
Areolaspis bifoliatus			10			211
haplodiploid type unspecified						
Areolaspis sp.						213
haplodiploid type unspecified						
Geholaspis alpinus	parth					213
Geholaspis berlesei	parth					213
Geholaspis longispinosus	parth					213
Geholaspis longulus	parth					213
Geholaspis mandibularis	parth					213
Geholaspis pauperior	parth					213
Glyptholaspis americana						213
haplodiploid type unspecified						
Glyptholaspis confusa						213
haplodiploid type unspecified						
Glyptholaspis fimicola						213
haplodiploid type unspecified						
Glyptholaspis pontina						213
haplodiploid type unspecified						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Holostaspella sp.						213
haplodiploid type unspecified						
Macrocheles lerreus	parth					213
Macrocheles penicilliger	parth					213
Macrocheles peniculalus	parth					213
Macrocheles similis	parth					213
Macrochelidae						
Macrocheles boudreauxi			10			213
haplodiploid type unspecified						
Macrocheles glaber						213
haplodiploid type unspecified						
Macrocheles insignitus						213
haplodiploid type unspecified						
Macrocheles mammifer						213
haplodiploid type unspecified						
Macrocheles matrius						213
haplodiploid type unspecified						
Macrocheles merdarius						213
haplodiploid type unspecified						
Macrocheles muscadomesticae			10			213
haplodiploid type unspecified						
Macrocheles parapisentii						213
haplodiploid type unspecified						
Macrocheles peregrinus						213
haplodiploid type unspecified						
Macrocheles perglaber						213
haplodiploid type unspecified						
Macrocheles pisentii			10			213
haplodiploid type unspecified						
Macrocheles robustulus						213
haplodiploid type unspecified						
Macrocheles rodriguezi						213
haplodiploid type unspecified						
Macrocheles schaeferi						213
haplodiploid type unspecified						
Macrocheles scutatus						213
haplodiploid type unspecified						
Macrocheles sp.						213
haplodiploid type unspecified						
Macrocheles subbadius						213
haplodiploid type unspecified						
Macrocheles vernalis			10			213
haplodiploid type unspecified						
Macronyssidae						
Ophionyssus bacoti			16			211
haplodiploid type unspecified						
Ophionyssus natricis			18			211
haplodiploid type unspecified						
Ophionyssus sylviarum			18			211
haplodiploid type unspecified						
Ornithonyssus bacoti			16			213
haplodiploid type unspecified						
Ornithonyssus natrids			18			213
haplodiploid type unspecified						
Ornithonyssus silviarum			18			213
haplodiploid type unspecified						
Melicharidae						
Proctolaelaps krimsei						213
haplodiploid type unspecified						
Proctolaelaps longipilis						213
haplodiploid type unspecified						
Nenteriidae						
Nenteria breviunguiculata						407
Nenteria stylifera	parth					407
Ologamasidae						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Gamasellus vibrissae	parth					213
Oplitidae						
Oplitis alophora						407
Oplitis franzi						407
Oplitis wasmanni						407
Uroplitella conspicua	parth					407
Uroplitella paradoxa						407
Parasitidae						
Amblygamasus septentrionalis			12			213
Pergamasus brevicornis			12			213
Parasitidae						
Eugamasus kraepelini			12			213
Eugamasus magnus			10			213
Phorytocarpais hyalinus	parth					213
Phytoseiidae						
Amblyseius aberrans			8			213
haplodiploid type unspecified						
Amblyseius agrestris	parth					213
Amblyseius barkeri			8			213
haplodiploid type unspecified						
Amblyseius bibens			8			213
PGE						
Amblyseius brevipes			8			213
haplodiploid type unspecified						
Amblyseius chiapensis			8			213
haplodiploid type unspecified						
Amblyseius chilensis			8			213
haplodiploid type unspecified						
Amblyseius cucumeris			8			213
haplodiploid type unspecified						
Amblyseius deleoni			8			213
haplodiploid type unspecified						
Amblyseius deleoni.2	parth					213
Amblyseius herbarius	parth					213
Amblyseius hibisci			8			213
haplodiploid type unspecified						
Amblyseius judaicus			8			213
haplodiploid type unspecified						
Amblyseius largoensis			8			213
haplodiploid type unspecified						
Amblyseius masiaka			8			213
haplodiploid type unspecified						
Amblyseius messor			8			213
haplodiploid type unspecified						
Amblyseius parasundi	parth					213
Amblyseius rotundus			8			213
haplodiploid type unspecified						
Amblyseius rubini			8			213
haplodiploid type unspecified						
Amblyseius salish	parth					213
Amblyseius sp.			8			213
haplodiploid type unspecified						
Amblyseius swirskii			8			213
haplodiploid type unspecified						
Amblyseius vazimba			8			213
haplodiploid type unspecified						
Clavidromus jackmickleyi			8			213
haplodiploid type unspecified						
Euseius hibisci						410
PGE						
Euseius quetzali						410
PGE						
Iphiseius degenerans			8			213
haplodiploid type unspecified						
Metaseiulus occidentalis			6			411

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
PGE						
Neoseiulus californicus						412
PGE						
Neoseiulus setulus	parth					213
Paragignathus tamaricis			8			213
haplodiploid type unspecified						
Phytoseiulus persimilis			8			213
PGE						
Phytoseius amba			8			213
haplodiploid type unspecified						
Phytoseius finitimus			8			213
haplodiploid type unspecified						
Phytoseius sp.1			8			213
haplodiploid type unspecified						
Phytoseius sp.2			8			213
haplodiploid type unspecified						
Seiulus isolrichus			8			213
haplodiploid type unspecified						
Typhlodromus athiasae			8			213
haplodiploid type unspecified						
Typhlodromus caudiglans			8			213
haplodiploid type unspecified						
Typhlodromus chazeaui			8			213
haplodiploid type unspecified						
Typhlodromus contiguus			8			211
haplodiploid type unspecified						
Typhlodromus drori			8			211
haplodiploid type unspecified						
Typhlodromus fallacis			8			211
haplodiploid type unspecified						
Typhlodromus guatemalensis	parth					413
Typhlodromus gutierrezi			8			211
haplodiploid type unspecified						
Typhlodromus phialatus			8			211
haplodiploid type unspecified						
Typhlodromus porathi			8			211
haplodiploid type unspecified						
Typhlodromus pyri						414
PGE						
Typhlodromus rhenanus			8			211
haplodiploid type unspecified						
Typhlodromus sp.			8			211
haplodiploid type unspecified						
Typhlodromus stemlichti			8			211
haplodiploid type unspecified						
Typhlodromus transvaalensis	parth					213
Podocinidae						
Podocinum pacificum	parth		10			211
Podocinum sagax			10			213
haplodiploid type unspecified						
Polyaspidae						
Polyaspis sansonei						407
Polyaspididae						
Apionoseius infirmus						407
Polyaspidoidea						
Uroseius hunzikeri						407
Rhodacaridae						
Rhodacarellus silesiacus	parth					213
Rhodacarus denticulatus	parth					213
Trachytidae						
Polyaspinus cylindricus	parth					407
Polyaspinus patavinus						407
Trachytes aegrota	parth					407
Trachytes irenae						407
Trachytes lamda	parth					407

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Trachytes minima						407
Trachytes montana	parth					407
Trachytes pauperior	parth					213
Trachytes pi	parth					213
Trachyuropodidae						
Trachyuropoda coccinea						407
Trachyuropoda pulchella	parth					407
Trachyuropoda pyriformis						407
Trematuridae						
Leiodinychus orbicularis						407
Oodinychus karawaiewi						407
Oodinychus obscurasimilis						407
Oodinychus ovalis						407
Oodinychus spatulifera						407
Trematurella elegans						407
Trichouropoda schweizeri						407
Trichouropoda sociata						407
Urodinychidae						
Fuscouropoda appendiculata						407
Phaulodiaspis borealis						407
Phaulodiaspis rackei						407
Uroobovella advena						407
Uroobovella arcuatus						407
Uroobovella cordieri						407
Uroobovella fracta						407
Uroobovella inermis						407
Uroobovella obovata						407
Uroobovella perforatus						407
Uroobovella woelkei						407
Uropodidae						
Cilliba cassidea						407
Cilliba erlangensis	parth					407
Cilliba minor	parth					213
Cilliba sopronensis						407
Cilliba sp. 1						407
Cilliba sp. 2	parth					407
Neodiscopoma pulcherrima						407
Neodiscopoma splendida						407
Olodiscus minimus	parth					213
Pseudouropoda calcarata						407
Pseudouropoda structura						407
Pseudouropoda tuberosa						407
Uropoda hamulifera						407
Uropoda italica	parth					407
Uropoda kargi						407
Uropoda minima	parth					407
Uropoda misella	parth					407
Uropoda orbicularis	parth					407
Uropoda undulata						407
Urotrachytes formicarius						407
Veigaiidae						
Gamasolaelaps whartoni	parth					213
Veigaia cerva	parth					213
Veigaia exigua	parth					213
Veigaia kochi	parth					213
Veigaia nemorensis	parth					213
Veigaia parlita	parth					213
Veigaia planieola	parth					213
Veigaia pusilla	parth					213
Veigaia tranisalae	parth					213
Veigaia uneata	parth					213
Phasmatodea						
Phasmatidae						
Acanthoxyla fasciata	parth					415
thelytoky						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Acanthoxyla geisovii thelytoky	parth					415
Acanthoxyla huttoni thelytoky	parth					415
Acanthoxyla inermis			36			416
Acanthoxyla intermedia thelytoky	parth					415
Acanthoxyla prasina thelytoky	parth					415
Acanthoxyla speciosa thelytoky	parth					415
Acanthoxyla suteri thelytoky	parth					415
Clitarchus hookeri			36			416
Phasmidae						
Acrophylla titan			36	35	XO	297
Aplopus mayeri			36	35	XO	297
Baculum artemis			72	72		297
Bostra sp.			36	35	XO	297
Carausius furcillatus				66		297
Carausius furcillatus				87		297
Carausius juvenilis			42	41	XO	297
Carausius morosus	parth		64			417
Carausius morosus				65		297
Carausius rotundato-lobatus			22	21	XO	297
Carausius sp.			42	41	XO	297
Carausius theiseni				41		297
Carnacia telesphorus			44	43	XO	297
Clitumnus extradentatus			38	37	XO	297
Clonistria exornata			34	33	XO	297
Ctenomorpha chronus			30	30	XY	297
Ctenomorpha chronus			32	32	XY	297
Ctenomorphodes sp.2			40			297
Ctenomorphodes tessulatus			38	37	XO	297
Didymuria violescens also XY			33	33	XO	297
Didymuria violescens race_3			38	37	XO	297
Didymuria violescens race_4			36	35	XO	297
Didymuria violescens race_5			32	31	XO	297
Didymuria violescens race_6			33	32	XY	297
Didymuria violescens race_7			31	30	XY	297
Didymuria violescens race_8			29	28	XY	297
Didymuria violescens			29	28	XY	297
Didymuria violescens			27	26	XY	297
Didymuria violescens			40	39	XO	297
Didymuria violescens			40	39	XO	297
Dubreuilia lineata			26	25	XO	297
Dyme krugiana			50	49	XO	297
Extatosoma tiaratum			36	35	XO	297
Extatosoma tiaratum			38	37	XO	297
Genus7 longiceps			42			297
Genus8 sp1			46	45	XO	297
Lampionus sp.?			24	23	XO	297
Lampionus sp.I			30	29	XO	297
Lampionus sp.III			36	35	XO	297
Lampionus sp.V			36	35	XO	297
Menexenus semiarmatus			46	45	XO	297
Oncotophasma sp.			42	41	XO	297
Orxines macklotti			38	37	XO	297

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Pachymorpha simplicipes			34			297
Pachymorpha sp.3			30	29	XO	297
Pachymorpha squalida			34	33	XO	297
Parasipyloidea annulatus			30	29	XO	297
Parasipyloidea cercata			40	39	XO	297
Parasipyloidea granulosa			36	35	XO	297
Parasipyloidea sp2			40	39	XO	297
Parasipyloidea sp3			28	27	XO	297
Parasipyloidea sp4			39	38	XO	297
Parasipyloidea sp5			39	38	XO	297
Parasosibia parva			54	53	XO	297
Phibalosoma phyllinum			42	41	XO	297
Phobaeticus sinetyi			52	51	XO	297
Podacanthus typhon			28	28	XY	297
Podacanthus viridiroseus			36	35	XO	297
Podacanthus wilkinsoni			36	35	XO	297
Pseudobacteria sp.			48	46	XO	297
Sipyloidea panaeticus			22	21	XO	297
Sipyloidea sipylus			80	80		297
Sipyloidea sp6			38			297
Tropiderus childrenii			34	33	XO	297
Vetilia enceladus			38	38	XY	297
Phylliidae						
Acanthoderus grandis			44	43	XO	297
Acanthoderus inermis			44	43	XO	297
Bacillus atticus			34			418
Bacillus grandii benazzii			34	33	XO	418
Bacillus grandii grandii			34	33	XO	418
Bacillus libanicus					XY	297
Bacillus lynceorum	parth	3	51			418
Bacillus rossius			36	35	XO	297
Bacillus rossius				36		297
Bacillus rossius-grandii benazzii			35			418
Bacillus rossius-grandii grandii			35			418
Bacillus whitei	parth	2	35			418
Clonopsis androgenes			44			419
Clonopsis felicitatis			36	35	XO	419
Clonopsis gallica	parth	3	54			419
Clonopsis gallica			56	56		297
Clonopsis maroccana			22	21	XO	419
Clonopsis soumiae	parth		72			419
Clonopsis sp. 1			36	35	XO	420
Clonopsis sp. 2			72			420
Epibacillus lobipes				36		297
Isagoras schraderi			34	34	XY	297
Isagoras sp.			48	47	XO	297
Isagoras subaquilus			28	27	XO	297
Leptynia attenuata			36	36	XY	421
Leptynia attenuata			36	35	XO	297
Leptynia caprai			40	39	XO	421
Leptynia montana			38	37	XO	421
Leptynia sp.			40	39	XO	421
Phalces longiscaphus			36	35	XO	297
Phyllium bioculatum			34	33	XO	297
Pijnackeria barbarae			38	37	XO	422
Pijnackeria hispanica		3	57			423
Moved from Genus Leptynia Scali 2009						
Pijnackeria hispanica		4	76			423
Moved from Genus Leptynia Scali 2009						
Pijnackeria hispanica			38	37	XO	423
Pijnackeria hispanica			54	54		297
Moved from Genus Leptynia Scali 2009						
Pijnackeria lelongi			38	37	XO	422
Pijnackeria lucianae			38	37	XO	422
Pijnackeria masettii		3	57		XO	422

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Pijnackeria originis			38	37	XO	422
Prisopus ariadne			28	28	XY	297
Prisopus berosus			50	49	XO	297
Pseudophasma menius			24	23	XO	297
Timematidae						
Timema poppensis						424
Timema shepardi	parth					424
Phthiraptera						
Goniodidae						
Chelopistes meleagridis				12		425
achiasmatic male meiosis						
Unknown sp.				11		426
achiasmatic male meiosis						
Gyropidae						
Gyropus ovalis				4		427
achiasmatic male meiosis						
Haematopinidae						
Haematopinus asini				18		427
achiasmatic male meiosis						
Haematopinus consobrinus				14		427
achiasmatic male meiosis						
Haematopinus suis			10	10		427
achiasmatic male meiosis						
Heptapsogasteridae						
Unknown sp.				11		426
achiasmatic male meiosis						
Hoplopleuridae						
Hoplopleura sp.			16			427
achiasmatic male meiosis						
Linognathidae						
Linognathus tenuirostris			12			427
achiasmatic male meiosis						
Menoponidae						
Menacanthus stramineus			10	10		427
achiasmatic male meiosis						
Pediculidae						
Pediculus capitis			12	12		427
achiasmatic male meiosis						
Pediculus corporis			12	12		427
achiasmatic male meiosis PGE						
Pediculus vestimenti			10	10		427
achiasmatic male meiosis						
Philopteridae						
Goniodes stylifer				24		427
achiasmatic male meiosis						
Lipeurus baculus			12			427
Polyplacidae						
Polyplax serrata			16			427
achiasmatic male meiosis						
Trichodectidae						
Bovicola caprae				14		428
achiasmatic male meiosis						
Bovicola limbata			14	14	XY	428
achiasmatic male meiosis						
Plecoptera						
Perlidae						
Calineuria jezoensis			26	25	XO	429
Perla abdominalis				26	XXO	430
Perla baetica				26	XXO	430
Perla bipunctata			22	21	XO	430
Perla cephalotes				26	XXO	430
Perla immarginata			10	10	XY	430
Perla marginata			24	22	XXO	431
Perla maxima			20	19	XO	430
Perlodidae						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Isogenus alpinus				24		430
Isogenus fontium				26	XXO	430
Isogenus imhoffi				26		430
Isoperla grammatica				26	XXO	430
Isoperla rivulorum				26	XXO	430
Perlodes intricala				33		430
Perlodes jurassica				31		430
Perlodes microcephala				27	complex XO	430
Protura						
Acerentomidae						
Acerentomon maius			12	12	XY	432
Acerentomon meridionale			9			432
Acerentomon microrhinus			16			432
Eosentomidae						
Eosentomon sakura			10	10	XY	433
Eosentomon transitorium homomorphic			18	18	XY	433
Psocoptera						
Amphientomidae						
Seopsis sp. holocentric			16	15	XO	434
Seopsocus acuminatus holocentric			18	17	XO	434
Amphipsocidae						
Amphipsocus japonicus holocentric			16	16	XY	434
Dasypsocus japonicus holocentric			16	15	XO	435
Kolbia quisquiliarum holocentric			16	16	XY	434
Archipsocidae						
Archipsocus sp. holocentric			18	17	XO	434
Caeciliusidae						
Asiocaecilius singaporensis holocentric			18	17	XO	434
Caecilius fuscopterus holocentric			18	17	XO	434
Caecilius sp.1 holocentric			18	17	XO	434
Caecilius sp.2 holocentric			18	17	XO	434
Dypsocus sp. holocentric			18	17	XO	434
Enderleinella obsoleta holocentric			18	17	XO	434
Valenzuela burmeisteri holocentric			18	17	XO	434
Valenzuela flavidus apomictic	parth	3	27			434
Valenzuela gynapterus holocentric			18	17	XO	434
Valenzuela labinae holocentric	parth		27			434
Valenzuela oyamai holocentric			18	17	XO	434
Valenzuela piceus holocentric			18	17	XO	434
Valenzuela sp. apomictic	parth	3	27			436
Ectopsocidae						
Ectopsocopsis cryptomeriae holocentric			18	17	XO	434
Ectopsocus briggsi holocentric			18	17	XO	437

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Ectopsocus briggzi holocentric			18	17	XO	434
Ectopsocus maindroni holocentric			18	17	XO	434
Ectopsocus meridionalis apomictic	parth	3	27			434
Elipsocidae						
Elipsocus abdominalis holocentric			18	17	XO	434
Elipsocus moebiusi holocentric			14	13	XO	434
Elipsocus pumilis holocentric			18	17	XO	437
Elipsocus pumilis holocentric			18	17	XO	434
Elipsocus westwoodi holocentric			18	17	XO	434
Hemineura dispar holocentric			18	17	XO	434
Reuterella helvimacula holocentric			18	17	XO	434
Epipsocidae						
Epipsocus lucifugus holocentric			18	17	XO	434
Hemipsocidae						
Hemipsocus sp. holocentric			18	17	XO	434
Lachesillidae						
Lachesilla pedicularia holocentric			18	17	XO	437
Lachesilla pedicularia holocentric			18	17	XO	434
Lachesilla quercus holocentric			18	17	XO	434
Lachesilla tanaidana holocentric			18	17	XO	437
Lachesilla tanaidana holocentric			18	17	XO	434
Liposcelidae						
Liposcelis bostrychophilus holocentric	parth		16			434
Liposcelis divergens holocentric	parth		18			434
Mesopsocidae						
Mesopsocus honkongensis holocentric			18	17	XO	434
Mesopsocus laticeps holocentric			18	17	XO	434
Mesopsocus unipunctatus holocentric			18	17	XO	434
Peripsocidae						
Diplopsocus fasciatus holocentric			18	17	XO	434
Peripsocus alboguttatus holocentric			18	17	XO	434
Peripsocus golubae holocentric			18	17	XO	434
Peripsocus parvulus holocentric			18	17	XO	434
Peripsocus phaeopterus holocentric			18	17	XO	434
Peripsocus quercicola holocentric			18	17	XO	434
Peripsocus sp. holocentric			18	17	XO	434

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Peripsocus subfasciatus apomictic	parth	3	27			434
Philotarsidae						
Aaroniella badonneli apomictic	parth	2	18			434
Haplophallus orientalis holocentric			18	17	XO	434
Philotarsus picicornis holocentric			18	17	XO	434
Pseudocaecilliidae						
Pseudocaecilius hirsutus holocentric			18	17	XO	434
Pseudocaecilius maculosus holocentric			18	17	XO	434
Psocidae						
Amphigerontia bifasciata holocentric			18	17	XO	437
Amphigerontia bifasciata holocentric			18	17	XO	434
Amphigerontia contaminata holocentric			18	17	XO	434
Amphigerontia jezoensis holocentric			16	15	XO	437
Amphigerontia jezoensis holocentric			16	15	XO	434
Atlantopsocus adustus holocentric			18	17	XO	434
Atrichadenotecnum nudum holocentric			18	17	XO	434
Blaste conspurcata holocentric			18	17	XO	434
Brachinodiscus cf. lepidus holocentric			18	17	XO	434
Cerastipsocus fuscipennis holocentric			18	17	XO	434
Cerastipsocus venosus holocentric			18	17	XO	434
Hyalopsocus contrarius holocentric			18	17	XO	434
Loensia moesta holocentric			18	17	XO	434
Loensia picicornis holocentric			18	17	XO	434
Loensia variegata holocentric			14	13	XO	437
Loensia variegata holocentric			14	13	XO	434
Metylophorus nebulosus holocentric			18	17	XO	434
Neopsocopsis hitricornis holocentric			18	17	XO	434
Psococerastis gibbosa holocentric			18	17	XO	434
Psococerastis interrupta holocentric			18	17	XO	434
Psococerastis reticulata holocentric			18	17	XO	434
Psococerastis sinensis holocentric			18	17	XO	434
Psocus leidyi holocentric			18	17	XO	434
Ptycta incurvata holocentric			18	17	XO	434
Sigmatoneura kolbei holocentric			18	17	XO	437

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Sigmatoneura kolbei holocentric			18	17	XO	434
Trichadenotecnum majus apomictic	parth	2	18			434
Trichadenotecnum medium holocentric			18	17	XO	434
Trichadenotecnum sexpunctatum holocentric			18	17	XO	437
Trichadenotecnum sexpunctatum holocentric			18	17	XO	434
Trichadenotecnum sinuatum holocentric			18	17	XO	434
Psoquillidae						
Psoquilla marginepunctata holocentric			20	19	XO	434
Psyllipsocidae						
Dorypteryx domestica holocentric			30	29	XO	434
Dorypteryx domestica holocentric			30	29	XO	434
Psocatropos sp. holocentric			30	29	XO	434
Ptiloneuridae						
Triplocania caudata holocentric			18	17	XO	434
Stenopsocidae						
Graphopsocus cruciatus holocentric			18	17	XO	434
Stenopsocus aphidiformis holocentric			24	23	XO	437
Stenopsocus aphidiformis holocentric			24	23	XO	434
Stenopsocus immaculatus holocentric			18	17	XO	434
Stenopsocus lachlani holocentric			24	23	XO	434
Trichopsocidae						
Trichopsocus brincki holocentric			18	17	XO	434
Trichopsocus clarus holocentric			18	17	XO	434
Trichopsocus dalii holocentric			18	17	XO	434
Trogiidae						
Lepinotus inquilinus holocentric			18	17	XO	434
Lepinotus reticulatus holocentric			18			434
Trogium pulsatorium holocentric			22	21	XO	434
Raphidioptera						
Raphidiidae						
Agulla astuta			26	26	Xy+	438
Agulla bicolor			26	26	Xy+	438
Agulla bractea			26	26	Xy+	438
Rhaphidia major			26	26	XY	439
Rhaphidia nigricollis					Xy+	438
Rhaphidia xanthostigma			26	26	Xy+	440
Siphonaptera						
Leptopsyllidae						
Leptopsylla musculi			22	22	XY	405
Pulicidae						
Ctenocephalus canis			14	14	XY	405
Ctenocephalus orientis			16	16	XYY	441
Xenopsylla astia			20	18	XXXYY	442

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Xenopsylla cheopis			18	17	XXY	442
Xenopsylla prasadi			10	10	XXYY	442
Strepsiptera						
Myrmecolacidae						
Stichotrema dallatorreanum	parth					443
Stylopidae						
Xenos peckii				16		444
orig. Acroschismus wheeleri						
Xenos sp			8	8	XY	445
heteromorphic						
Thysanoptera						
Phlaeothripidae						
Gynaikothrips uzeli			26	13		446
arrhenotoky						
Gynaikothrips uzeli			30	15		446
arrhenotoky						
Gynaikothrips ficorum			30	15		446
arrhenotoky						
Haplothrips statices			30	15		446
arrhenotoky						
Haplothrips tritici			20	10		446
arrhenotoky						
Liothrips sp			24	12		446
arrhenotoky						
Neoheegeri verbasci			24	12		446
arrhenotoky						
Thripidae						
Aptinothrips rutua			100	50		446
arrhenotoky						
Aptinothrips rutua			106	53		446
arrhenotoky						
Frankliniella insularis			28	14		446
arrhenotoky						
Frankliniella schultzei			34	17		446
arrhenotoky						
Heliothrips haemorhroidalis			42	21		446
arrhenotoky						
Heliothrips haemorrhoidalis			32	16		446
arrhenotoky						
Heliothrips haemorrhoidalis			52	26		446
arrhenotoky						
Heliothrips haemorrhoidalis			56	28		446
arrhenotoky						
Limothrips dentricornis			38	19		446
arrhenotoky						
Parthenothrips dracaenae			30	15		446
arrhenotoky						
Retithrips syriacus			38	19		446
arrhenotoky						
Selenothrips rubrocinctus			36	18		446
arrhenotoky						
Sericothrips staphilinua			28	14		446
arrhenotoky						
Taeniothrips iconsequene			32	16		446
arrhenotoky						
Taeniothrips iconsequene			36	18		446
arrhenotoky						
Taeniothrips iconsequene			40	20		446
arrhenotoky						
Taeniothrips simplex			20	10		446
arrhenotoky						
Trichoptera						
Goeridae						
Goera pilosa				44		447
Hydropsychidae						

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source
Amphipsyche senegalensis	parth					448
Hydropsyche pellucidula			29	30	ZO	449
Hydropsyche sp.			29	30	ZO	449
Hydroptilidae						
Oxyethira fagesii			27	28	ZO	447
Leptoceridae						
Athripsodes aterrimus				50		447
Athripsodes excisus				50		447
Limnephilidae						
Allogamus auricollis			59	60	ZO	450
Anabolia furcata			59	60	ZO	449
Anabolia soror			59	60	ZO	449
Apatania zonella	parth					448
Chaetopteryx villosa			59	60	ZO	447
Glyphotaelius pellucidus			59	60	ZO	451
Halesus tesselatus				42		447
Hesperophylax designatus				60		447
Hydatophylax infumatus				60		447
Limnephilus affinis				12		447
Limnephilus auricula			57	58	ZO	447
Limnephilus centralis				26		447
Limnephilus flavicornis				60		447
Limnephilus lunatus			25	26	ZO	447
Limnephilus nigriceps				32		447
Limnephilus politus				60		447
Limnephilus rhombicus				60		447
Limnephilus stigma				60		447
Potamophylax stellatus				60		447
Molannidae						
Molanna angustata				54		447
Phryganeidae						
Agrypnetes crassicornis				100		447
Dasystegia obsoleta				56		447
Dasystegia varia				56		447
Phryganea bipunctata				56		447
Phryganea grandis				56		447
Trichostegia minor				38		447
Polycentropidae						
Plectronemia conspersa			25	26	ZO	449
Polycentropus flavomaculatus			25	26	ZO	449
Psychomyiidae						
Psychomyia flavida	parth					448
Rhyacophilidae						
Rhyacophila cf. obtusidens				46		447
Rhyacophila nubila				46		447
Rhyacophila sp.			45	46	ZO	449
Stenopsychidae						
Stenopsyche griseipennis			25	26	ZO	447
Stenopsyche marmorata					ZO	452
Zoraptera						
Zorotypidae						
Zorotypus hubbardi heteromorphic			38	38	XY	453
Zygentoma						
Lepismatidae						
Lepisma (Thermobia) domestica			36	34	XO	248
Lepisma domestica			36	34	XO	248
Lepisma saccharina				34		454
Lepisma saccharina_2			60	58	XO	248

Taxa	Sexual System	Ploidy	Female 2n	Male 2n	Sex Chrom. Karyotype	Source

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Appendix B

Genbank accesion numbers

Sequences retrieved from GenBank. Chimeric OTUs that represent a taxonomic unit higher than species are indicated with a †. Chimeric OTUs that function as "anchors" are indicated with an *.

Species	28s	16s	18s	COI	ArgK	Wng	Elf1a
Adephaga							
Carabidae							
Abacetus†	AF398681.1					AF398635.1	
Abax ovalis		AF533283.1		GU347012.1			
Abax parallelepipedus	GU347362.1	AF533280.1		GU347018.1			
Acinopus picipes				AJ583309.1			
Agonum marginatum	GU347370.1		GU347714.1	GU347026.1			
Agonum muelleri	FJ173081.1		FJ173119.1	GU347034.1			
Amara aenea	FJ173093.1		FJ173123.1				
Amara apricaria			AF002774.1			AF398565.1	
Amara aulica	GU347386.1		GU348075.1	EU710807.1			
Amblycheila baroni	EU797338.1	L42908.1	AF423057.1			EU797284.1	
Amblystomus†				AJ583325.1			
Amblytelus curtus	AF398683.1		AF012484.1			AF398566.1	
Amphasia sericea				EU710812			
Anchomenidius astur	FJ173090.1						
Anisodactylus hispanus				AJ583290.1			
Anisodactylus virens				AJ583292.1			
Anthia†	AF398696.1					AF437906.1	
Apenes†	AF398713.1					AF398567.1	
Aptinus displosor			AF012480.1			AF398569.1	
Arthropterus†	AF398644.1		AF012516.1			AF398570.1	
Asaphidion curtum	GU556078.1		AF002792.1			GU556027.1	
Bembidion tibiale	GU347476.1		GU347820.1	GU347132.1			
Bembidion balli	EF648838.1		EF648613.1		EF648695.1	EF649474.1	
Bembidion inaequale inaequale	EU677692.1				EU677521.1	EU677672.1	
Bembidion lapponicum	EF648841.1		EF648619.1			EF649479.1	
Bembidion levettei carrianum			AF002791.1			AF398571.1	
Bembidion levettei levettei	AF398647.1		EF648620.1		EF648702.1	EF649480.1	
Bembidion assimile				DQ155770.1			
Bembidion concolor	EF648833.1		EF648611.1		EF648693.1	EF649472.1	
Bembidion californicum	EF648832.1		EF648610.1		EF648692.1	EF649471.1	
Bembidion levigatum	GU556083.1					GU556032.1	
Bembidion lampros	GU347437.1		GU347781.1	GU347093.1			
Bembidion properans	GU347455.1		GU347799.1	GU347116.1			
Bembidion insulatum	GU556081.1					GU556030.1	
Bembidion nigripes				DQ059789.1			
Bembidion rapidum	EU677690.1			DQ059790.1	EU677518.1	EU677668.1	
Bembidion umbratum	EU677691.1				EU677520.1	EU677671.1	
Bembidion bifossulatum	EF648835.1		EF648614.1		EF648696.1	EF649475.1	
Bembidion aenulum	GQ424256.1			GQ424227.1		GQ424283.1	
Bembidion confusum	EF648840.1		EF648617.1		EF648699.1	EF649478.1	
Bembidion coxendix	EF648837.1		EF648618.1		EF648700.1	EF649481.1	
Bembidion americanum	EF648834.1		EF648612.1		EF648694.1	EF649473.1	
Bembidion mexicanum	GU454739.1		AF012490.1	GU454769.1		GU556033.1	
Bembidion sejunctum semiaureum	GU454738.1			GU454768.1			
Bembidion tetracolum			GU347814.1	DQ155825.1			
Bembidion transversale	EU677688.1				EU677517.1	EU677667.1	
Bembidion decorum	GU347423.1		GU347767.1	GU347079.1			
Bembidion obtusum	GU556085.1			DQ155728.1		GU556034.1	
Bembidion planatum	GU556086.1					GU556035.1	
Bembidion punctulatum	GU347480.1		GU348171.1	GU347136.1			
Bembidion antiquum	EF648843.1		EF648621.1		EF648703.1	EF649482.1	
Bembidion arenobilis	EF648963.1		EF648630.1		EF648716.1	EF649503.1	
Bembidion bellorum	EF648867.1		EF648639.1		EF648728.1	EF649534.1	
Bembidion chalceum	EF648875.1		EF648644.1		EF648733.1	EF649550.1	
Bembidion honestum	EF648994.1		EF648649.1		EF648739.1	EF649553.1	
Bembidion integrum	EF649055.1		EF648659.1		EF648751.1	EF649608.1	
Bembidion louisella	EF648902.1		EF648666.1		EF648757.1	EF649644.1	
Bembidion rothfelsi	EF648927.1		EF648678.1		EF648763.1	EF649656.1	
Bembidion rufotinctum	EF649099.1		EF648687.1		EF648772.1	EF649670.1	
Bembidion ruficorne	GU347463.1		GU347806.1	GU347118.1			
Bembidion articulatum	GU347409.1		GU347753.1	GU347068.1			
Bembidion tairuense	GU556089.1		GU556134.1			GU556038.1	
Bembidion quadrimaculatum dubitans	GU556087.1		GU556133.1	DQ155801.1		GU556036.1	
Brachinus †	AF398693.1		AF012478.1			AF398572.1	
Bradybaenus†				AJ583311			
Calathus brevis	GU254349.1						GU254437.1
Calathus fuscipes	FJ173072.1		FJ173118.1	GU323022.1			FJ173134.1
Calathus abaxoides	GU254368.1						GU254456.1
Calathus ambiguus chevrolati	GU254401.1						GU254482.1
Calathus ascendens	GU254378.1						GU254464.1
Calathus asturiensis	GU254390.1						GU254474.1
Calathus auctus	GU254381.1						GU254466.1
Calathus circumseptus	FJ173086.1						FJ173180.1
Calathus erratus	GU254355.1						GU254443.1
Calathus freyi	GU254379.1						GU254465.1
Calathus granatensis	GU254340.1						GU254473.1
Calathus melanocephalus	GU254342.1						GU254432.1

Species	28s	16s	18s	COI	ArgK	Wng	Elf1a
Calathus micropterus	GU254350.1						GU254438.1
Calathus mollis	FJ173071.1		FJ173117.1				FJ173133.1
Calathus rectus	GU254369.1						GU254457.1
Calathus rotundatus	GU254387.1						GU254472.1
Calosoma inquisitor	AB031419.1					AY183580.1	
Carabus abbreviatus		AF231686.1					
Carabus cancellatus						AY183653.1	
Carabus granulatus		AF219428.1				AF219564.1	
Carabus monticola						AY183630.1	
Carabus nemoralis	GU347495.1		AF012507.1			EU797291.1	
Carabus auronitens auronitens	GU347487.1		GU348178.1	GU347140.1		AY183598.1	
Carabus blaptoides blaptoides						AY183625.1	
Carabus fruhstorferi						AY183609.1	
Carabus lineatus lateralis						AY183601.1	
Carabus punctatoauratus		L42910.1	U75561.1			AY183602.1	
Carabus solieri						AY183605.1	
Carabus splendens		AF190040.1				AY183604.1	
Carabus nitens	GU347501.1		GU348190.1				
Carabus problematicus				DQ155753.1		AY183633.1	
Carabus hortensis hortensis						AY183651.1	
Carabus caelatus						AY183595.1	
Carabus violaceus germari						AY183592.1	
Carabus creutzeri kircheri						AY183584.1	
Carabus hispanus						AY183600.1	
Carabus melancholicus costatus						AY183654.1	
Carabus rutilans						AY183603.1	
Carabus blaptoides						AY183607.1	
Carabus fruhstorferi						AY183609.1	
Carenum interruptum			AF012491.1				
Carterus fulvipes				AJ583283.1			
Carterus rotundicollis				AJ583284.1			
Chlaenius †	AF438039.1		AF201404.1			AF437921.1	
Cicindela sedecimpunctata			AF012518.1			AF398579.1	
Cicindela marginata		AF132989.1		AJ514980.1			
Cicindela marutha		AF133000.1					
Cicindela dorsalis		AF438894.1	U75564.1				
Cicindela circumdata				AJ514976.1			
Cicindela aurulenta		AY523657.1	DQ337114.1				
Cicindela hybrida		AJ879182.1		AJ583538.1			
Cicindela lunulata		AJ515105.1		AJ514961.1			
Cicindela punctulata		AF438891.1		AY165729.1			
Cicindela repanda		AF438884.1	U75563.1				
Cicindela sexguttata		AF438886.1		AY165643.1			
Cicindela splendida		AF438861.1		EU723580.1			
Cicindela tranquebarica		AF438889.1		DQ923390.1			
Cicindela undulata		AJ515118.1		AJ514992.1			
Clivina†	GU347505.1		GU347849.1	GU347163.1			
Colliuris pennsylvaniea	AF398712.1					AF398581.1	
Craspedophorus†	AF438045.1					AF437928.1	
Ctenostoma †	EU797350.1		EU797405.1			EU797297.1	
Cychrus caraboides	GU347513.1		GU347857.1	AB109837.1			
Cylindera cognata	GU983749.1			GU983830.1			
Cymindis bedeli	AF398651.1		AF002773.1			AF398583.1	
Demetrias atricapillus				DQ155934.1			
Dicrochile brevicollis	AF438058.1					AF437936.1	
Diplocheila†	AF438061.1					AF437939.1	
Dixus capito obscuroides				AJ583278.1			
Dromius†	AF438063.1		GU347871.1	DQ155916.1		AF437942.1	
Drypta†	AF438064.1						
Dyschirius†	GU347528.1		AF201401.1	GU347184.1			
Egadroma marginatum				AJ583270.1			
Euthenarus promptus				AJ583258.1			
Galerita bicolor	AF398686.1		AF002780.1			AF398590.1	
Graphipterus†	AF398711.1					AF398593.1	
Harpalus aesculans				AJ583350.1			
Harpalus affinis	FJ173087.1		FJ173121.1	AJ583348.1			FJ173145.1
Harpalus anxius subcylindricus				AJ583353.1			
Harpalus attenuatus				AJ583357.1			
Harpalus contemptus				AJ583344.1			
Harpalus decipiens				AJ583335.1			
Harpalus dimidiatus				AJ583342.1			
Harpalus distinguendus				AJ583347.1			
Harpalus ebeninus				AJ583356.1			
Harpalus honestus				AJ583341.1			
Harpalus pennsylvanicus				DQ059798.1			
Harpalus rubripes	GU347567.1		GU347911.1	AJ583354.1			
Harpalus serripes				AJ583352.1			
Harpalus wagnerii				AJ583339.1			
Lebia†	AF438084.1			DQ059805.1		AF437959.1	
Lecanomerus†	AF438088.1			AJ583255.1		AF437963.1	
Licinus†	GU347576.1		GU348264.1	GU347229.1			
Lophyra†	GU983704.1			AJ514975.1			
Loricera pilicornis	GU347593.1	EF517579.1	GU348281.1	FN868618.1			EF588668.1
Loxandrus†	AF398661.1		AF002778.1			AF398600.1	
Macrocheilus†	AF438092.1					AF437965.1	
Mantichora amigdaloides			AF423056.1				

Species	28s	16s	18s	COI	ArgK	Wng	Elf1a
Mecyclothorax†	AF398648.1		AF012482			AF398601.1	
Megacephala sobrina		DQ152064.1	DQ152123.1				
Megacephala brasiliensis		DQ152044.1	DQ152106.1				
Megacephala whelani		DQ152041.1	DQ152100.1				
Microlestes†	AF438095.1			DQ155976.1			
Mystropomus subcostatus	EF694843.1			EF694889.1			
Nebria brevicollis		EF517580.	AF201395.1	FN868614.1			
Nesarpalus sanctaecrucis				AJ583310.1			
Notagonum†	AF337390.1		DQ337161.1			AF337564.1	
Notiobia†	AF438101.1			AJ583303.1		AF437972.1	
Notiophilus†	EU797369.1		AF002804.1	DQ155829.1		EU797312.1	
Olisthopus†	FJ173098.1		FJ173127.1			AF437973.1	FJ173155.1
Omus californicus		AF438907.1	AF012519.1				
Oodes†	AF438104.1					AF437975.1	
Ophonus azureus				AJ583367.1			
Ophonus brevicollis				AJ583372.1			
Ophonus longicollis				AJ583365.1			
Ophonus stictus				AJ583361.1			
Orthomus velocissimus pardoi	FJ173088.1						FJ173146.1
Oxycheila†	EU797376.1		AF201393.1			EU797318.1	
Pamborus alternans		AY722961.1					AY847575.1
Pamborus opacus	AB109869.1	AY722981.1					
Pamborus tropicus		AY722971.1					
Paraphonus †				AJ583322.1			
Penetretus†	GU556108.1		GU556142.1			GU556052.1	
Pentacomia†		L42928.1	AF423039.1				
Percus politus	AY334312.1		FJ173128.1				FJ173160.1
Perileptus areolatus	GQ293625.1	FR729593.1	GQ293503.1	GQ293688.1		GU556054.1	
Pheropsophus†	AF398678.1		AF012477.1			AF398619.1	
Platyderus lusitanicus				AY551835.1			
Platyderus varians	FJ173091.1		FJ173122.1	FJ173211.1			FJ173149.1
Platymetopus†				AJ583319.1			
Platynus †	AF438123.1						
Poecilus chalcites				DQ059807.1			
Poecilus cupreus	GU347618.1		GU348308.1	AY574578.2			
Poecilus lucublandus	EU142440.1		EU142291.1	DQ059816.1		EU142321.1	
Poecilus versicolor	AB243479.1			AY734990.1		AB243533.1	
Pogonus chalceus	GU556114.1		GU556144.1			GU556057.1	
Promecoderus†			AF012499.1				
Prothyma†				AJ514997.1			
Pterostichus diligens	AB243463.1						
Pterostichus angustatus	EU142393.1			EU142534.1			
Pterostichus nemoralis	FJ173089.1						FJ173147.1
Pterostichus aterrimus nigerrimus	GU347624.1		GU347968.1	GU347280.1			
Pterostichus interruptus	AB243487.1					AB243541.1	
Pterostichus melanarius	AF398707.1		AF002779.1	DQ063219.1		AF398623.1	
Pterostichus ziegleri	GU347687.1		GU348031.1	GU347343.1			
Pterostichus niger	AB243470.1	AF190039.1	GU347991.1	GU347304.1		AB243524.1	
Pterostichus niger	AB243470.1	AB253869.1	GU347993.1	GU347311.1		AB243524.1	
Pterostichus anthracinus	GU347621.1		GU347965.1	GU347278.1			
Pterostichus minor				DQ155942.1			
Pterostichus nigrita	GU347663.1		GU348003.1	DQ155787.1			
Pterostichus flavofemoratus	AB243493.1					AB243547.1	
Pterostichus morio						AB243548.1	
Pterostichus spinolae	AB243495.1					AB243549.1	
Pterostichus alacer						AB243542.1	
Pterostichus alacer	AB243488.1					AB243542.1	
Pterostichus globosus ebenus	FJ173114.1		FJ173132.1	FJ173234.1			FJ173170.1
Pterostichus globosus ebenus	FJ173114.1		FJ173132.1				FJ173170.1
Pterostichus madidus				FN868607.1			
Pterostichus madidus				FN868607.1			
Pterostichus herculaneus	EU142343.1			EU142482.1			
Pterostichus oblongopunctatus	GU347667.1		GU348011.1	GU347323.1		AB243534.1	
Sarothrocrepis corticalis	AF398670.1					AF398624.1	
Scarites laevigatus				AF042676.1			
Scarites terricola				AF042678.1			
Scarites hespericus				AF042679.1			
Scarites occidentalis				AF042677.1			
Scarites buparius				AF042674.1			
Scarites eurytus				AF042675.1			
Scarites subterraneus	AF398708.1		AF002795.1			AF398625.1	
Siagona†			AF012493.1				
Sphallomorpha†	AF398679.1		AF398717.1			AF398636.1	
Stenolophus lecontei				DQ063220.1			
Stenolophus mixtus	GU347691.1		GU348379.1	DQ155940.1			
Stenolophus teutonus	FJ173094.1		FJ173124.1	DQ155970.1			FJ173151.1
Stomis†	EU142459.1			DQ155941.1		AB243535.1	
Syntomus†	AF438140.1			DQ155915.1		AF437962.1	
Tachys †	GU556120.1					GU556063.1	
Therates†			AF423047.1				
Trechus obtusus	GQ293608.1	GQ293726.1		DQ155831.1			
Trechus quadristriatus	GQ293619.1	GQ293743.1	GQ293534.1	FN868615.1			
Zabrus†	FJ173096.1		FJ173125.1	AY551887.1			
Dytiscidae							
Agabus confinis		AY138608.1					
Agabus conspersus		AY138610.1					

Species	28s	16s	18s	COI	ArgK	Wng	Elf1a
Agabus biguttatus		AY039258.1		AY039267.1			
Agabus bipustulatus		AF428198.1	AJ318687.1	AF309332.1			
Agabus ramblae		AY138626.1		AY138716.1			
Agabus sturmi		AY138633.1		AY138723.1			
Colymbetes paykulli		AY334104.1	FN257262.1	AY334220.1		AF392005.1	
Colymbetes striatus			FN257254.1			FN256314.1	
Cybister japonicus				DQ813680.1		DQ813718.1	
Cybister lateromarginalis		AJ850360.1	AF201408.1	DQ813681.1			
Cybister sugillatus		AJ850361.1	AJ850502.1	DQ813686.1		DQ813722.1	
Cybister tripunctatus		AJ850362.1	AJ318702.	DQ813687.1		AF392010.1	
Dytiscus circumcinctus		AY368226.1		AY368230.1			
Dytiscus dauricus		AY138644.1		AY138732.1			
Dytiscus marginalis*			FN257263.1	FR751067.1		DQ813725.1	
Dytiscus marginalis czerskii				FR751063.1			
Eretes strictus		AY138646.1	AJ318704.1	AY138734.1			
Hydaticus†	FJ818198.1			DQ431209.1		AF392019.1	
Hydroporus humilis		AF518261.1	AF201409.1	AF518291.1			
Hydrovatus†	EU797361.1	EF056679.1	AJ318716.1	EF056609.1		EU797307.1	
Hygrobia hermanii	EU797362.1	AY071780.1	AJ318673.1	AY071806.1		EU797308.1	
Ilybius aenescens		AF428202.1		AF309350.1			
Ilybius albarracinensis				AF309334.1			
Ilybius ater				AF309343.1			
Ilybius chalconatus		AF428200.1		AF309335.1			
Ilybius erichsoni		AY138661.1		AY138748.1			
Ilybius fuliginosus				AF309349.1			
Ilybius guttiger				AF309341.1			
Ilybius montanus				AY138753.1			
Ilybius quadriguttatus				AF309339.1			
Ilybius subaeneus				AF309342.1		AF392029.1	
Ilybius vittiger				AF309336.1			
Ilybius wasastjernae				AY138759.1			
Nebrioporus lanceolatus*		AY250927.1	AJ850481.1	AY250967.1			
Platambus maculatus*	EF417072.1	AY138675.1	AJ850434.1	AF309330.1			
Rhantus exsoletus			FN257256.1			FN256316.1	
Stictotarsus griseostriatus		AJ850354.1	AJ850497.1	AJ850606.1			
Stictotarsus ibericus		EF670030.1		EF670064.1			
Gyrinidae							
Dineutes†	EU677683.1				EU677511.1		
Gyrinus†	EU797355.1	EF517575.1	AF201412.1			EU797302.1	
Haliplidae							
Haliplus flavicollis	EF417063.1						
Haliplus immaculatus	EF417065.1						
Haliplus lineatocollis		AY071777.1	AJ318666.1	AY071803.1			
Haliplus mucronatus		AY071778.1	AJ318667.1	AY071804.1			
Haliplus ruficollis			AF201406.1				
Peltodytes†	EU797379.1		EU797410.1	AY071816.1		EU797321.1	
Noteridae							
Canthydrus†	FJ818125.1			FJ819590.1			
Noterus clavicornis	EU797368.1	AY071788.1	AF201416.1	AY071814.1			
Trachypachidae							
Trachypachus holmbergi	EU797395.1	EF517582.1	AF002807.1			EU797332.1	
Trachypachus slevini	EU797396.1		EU797418.1			EU797333.1	
Archostemata							
Micromalthidae							
Micromalthidae†	EU797367.1	EF517576.1	EF517587.1		EU677506.1	EU677658.1	GQ503344.1
Myxophaga							
Torridincolidae							
Torridincolidae†	EU797393.1	DQ202611.1	DQ337168.1	HM804293.1			HM156718.1
Polyphaga							
Anobiidae							
Gibbium psylloides	DQ202685.1	DQ202568.1	EF363013.1	DQ221970.1			
Lasioderma sp	EF213912.1	EF213843.1	AY748105.1	DQ222030.1			
Ptinus†			EF362997.1	EF214362.1			
Stegobium paniceum		DQ202557.1	AY748103.1	DQ221964.1			
Anthicidae							
Anthicidae†		DQ202590.1	AY748188.1	DQ221962.1			
Anthribidae							
Araecerus fasciculatus	AY424406.1			EF484370.1			
Platystomus†			AJ849976.1				
Ptychoderes†	FJ000457.1		FJ867781.1		FJ859959.1		FJ867887.1
Attelabidae							
Apoderus coryli	HQ883528.1	AJ495454.1	AJ496336.1	HQ883609.1	HQ883842.1		
Deporaus †			AJ849981.1				
Larinus†		AJ495520.1	AJ496357.1		HQ883854.1		
Liparus†		AJ495580.1					
Bostrichidae							
Bostrychopsis bengalensis*				HM002623			
Sinoxylon†	DQ202653.1	DQ202589.1	AY748107.1	HM002618.1			
Brentidae							
Ceratapion penetrans				FJ621369.1			
Eutrichapion†		AJ495468.1		DQ487090.1			
Rhopalapion longirostre		AJ495465.2					
Brentus anchorago			AJ849987				
Nanophyes marmoratus		AJ495479.1	AJ850031.1	DQ155774.1			
Nemocephalus†			AJ849988.1				
Buprestidae							

Species	28s	16s	18s	COI	ArgK	Wng	Elf1a
Acmaeodera†	EU797336.1		AF423771.1			EU797282.1	
Agrilus angustulus		AJ937901.1					
Anthaxia hungarica	DQ198702.1	DQ198623.1	DQ100484.1	DQ198545.1			
Buprestis†		EF209425.1	EF209485.1	EF209545.1			
Castiarina adelaidae			DQ337150.1				
Castiarina rufipennis			DQ337152.1				
Chrysobothris†	DQ202658.1	DQ402092.1	FJ000486.1	DQ222000.1			
Coraebus†	AB232645.1						
Meliboeus†				FN298878.1			
Byrrhidae							
Byrrhus†	DQ198705.1	DQ198625.1		DQ198548.1			
Cantharidae							
Cantharis fusca			AB298810.1	GU323028.1			
Cantharis livida				DQ156055.1			
Cantharis rufa	DQ198767.1	DQ198684.1		DQ198607.1			
Cantharis rustica			AF451940.1	DQ156062.1			
Chauliognathus expansus				AY095220.1			
Chauliognathus fallax				AY095214.1			
Chauliognathus flavipes				AY095216.1			
Chauliognathus lineatus				AY095218.1			
Chauliognathus octomaculatus*	EU677679.1		HM156710.1	AY095217.1		EU677654.1	
Chauliognathus riograndensis				AY095215.1			
Chauliognathus tetrapunctatus				AY095219.1			
Malthinus†	DQ198775.1	DQ198692.1	AF451938.1	DQ198615.1			
Oedemera podagrariae*	GU073729.1	GU073829.1	EF209976.1	DQ221991.1			
Oedemera virescens			EF209972.1				
Rhagonycha fulva				X88963.1			
Rhagonycha lignosa	DQ198770.1	DQ198687.1	AF451939.1	DQ198610.1			
Stenotrachelidae							
Cephaloon lepturides		EF490135.1	EF209980.1				
Cerambycidae							
Acalolepta fraudatrix		AB533612.1		AB533643.1			
Acalolepta luxuriosa		AB533611.1		AB533642.1			
Acmaeops†			AF267400				
Agapanthia daurica	HM046526.1	HM034774.1		HM062967.1			
Anoplophora chinensis†		AB533608.1		AY174165.1			
Anoplophora malasiaca		AF332929.1		AF332945.1			
Apomecyna†				FJ559021			
Apriona japonica		AB533627.1		AB533658.1			
Asemum striatum			AF267398.1	AY389494.1			
Batocera rubus				FJ559005.1			
Callidium violaceum				GU003918			
Chloridolum thaliodes				AB457202.1			
Chlorophorus annularis	HM046531.1	HM034779.1		HM062975.1			
Clytus arietis				GU003932.1			
Cyrtoclytus†	HM046533.1	HM034781.1		HM062990.1			
Distenia gracilis		DQ417760.1					
Eburia†		DQ417764.1	AF267402.1				
Elaphidon†	AJ841654.1	AJ841404.1	AJ841525.1	AM283242.1			
Epiglenea comes				AB457192.1			
Gaurotes†	AJ841661.1	HQ832599.1	AF267401.1	AM283248.1			
Glenea†				AB457034.1			
Leiopus†			AY748117.1	EU436853.1			
Leptura†	HM046547.1	HM034797.1		HM062969.1			
Macrotoma†				FJ559020.1			
Mecynippus pubicornis		AB533598.1		AB533629.1			
Mesechthistatus binodosus				AB278221.1			
Mesosa myops japonica		HQ832603.1		HQ890340.1			
Monochamus galloprovinciallis galloprovinciallis*			EU373304.1	AY260835.1			
Monochamus galloprovinciallis pistor				AY260836.1			
Monochamus saltuarius		AB533600.1		AY260841.1			
Monochamus sartor				AY260838.1			
Monochamus sutor		AB533603.1		AY260843.1			
Monochamus urussovi	HQ832608.1			AY260844.1			
Oberea†			AF423773.1	AB457194.1			
Phaea†				AF267467.1			
Phymatodes†		DQ202535.1	AY748116.1				
Phytoecia†	AJ841658.1	AJ841407.1	AJ841529.1	AM283245.1			
Plagionotus†		AF332932.1		AF332948.1			
Pogonocherus hispidus				DQ155997.1			
Prionus†	FJ000425.1	HM034784.1	AF267413.1	HM062974.1			
Pterolophia†				FJ559037.1			
Purpuricenus†		DQ417769.1		DQ861317.1			
Rhagium mordax			AY748118.1				
Rosalia†				AB457199.1			
Saperda†	AJ841659.1	HM034791.1	AJ841530.1	HM062986.1			
Spondylis buprestoides			AF267399.1				
Stenygra†			AF267406.1				
Strangalia†	HM156701.1	EU734906.1	HM156709.1	EU839772.1			HM156719.1
Stromatium†				FJ558998.1			
Tetraopes femoratus				AF267481.1			
Tetraopes tetropthamus	U65185.1		U65131.1	AF267478.1			
Tetropium castaneum		DQ861331.1		GU003935.1			
Tetropium fuscum				GU003936.1			
Tetropium gabrieli				EU883935.1			

Species	28s	16s	18s	COI	ArgK	Wng	Elf1a
Uraecha bimaculata		AB533616.1		AB533647.1			
Xenolea†				FJ559039			
Xylotrechus†				JN000003.1			
Chrysomelidae							
Acanthoscelides obtectus	AY676680.1	AY826458.1		AY676622.1			
Bruchidius aureus	DQ524352.1			DQ524356.1			
Bruchidius saundersi	DQ524353.1			DQ524359.1			
Bruchidius urbanus				DQ524362.1			
Bruchus pisorum	DQ307644.1	HQ178237.1		EF484372.1			
Bruchus rufimanus	DQ307645.1			AY390695.1			AY997367.1
Callosobruchus analis	FJ389501.1	EU553813.1		FJ465152.1			
Callosobruchus chinensis	AY625366.1			AY265224.1			
Callosobruchus maculatus	AY625367.1	FJ389506.1	FJ000512.1	EF570085.1			
Callosobruchus subinnotatus	AY625369.1			AY625419.1			
Conicobruchus indicus	HQ178427.1	HQ178212.1		HQ177486.1			
Pachymerus†	HQ178551.1	HQ178242.1		AY390668.1			
Spermophagus†				AY390669.1			
Zabrotes subfasciatus	AY881194.1			AY881214.1			
Acalymma blandulum				AF278543.1			
Acalymma fairmairei	AY243708.2	AY533638.1		AY242442.1			
Acalymma trivittatum		AY533639.1		AY533584.1			
Acalymma vittatum	AY646317.1	AY533641.1		AY533586.1			
Aedmon†	AY271867.1		AY244857.1	AF479421.1			AF466312.1
Agathomerus†	FJ000431.1		FJ000507.1				
Agelastica coerulea	AY243678.2	EF421504.1		AY242413.1			EF421464.1
Agroiconota propinqua	AY927699.1						
Alagoasa arcifera	AY313817.1			AY308979.1			
Alagoasa bipunctata				AF479464.1			AF466334.1
Alagoasa cruxnigra	AY313806.1			AF479438.1			AF466336.1
Alagoasa decemguttata	AY313803.1			AY308967.1			
Alagoasa extrema	AY313805.1			AY308969.1			
Alagoasa libentina	AY313813.1		AY244850.1	AF479471.1			AF466338.1
Altica lythri				DQ155917.1			
Aphthona lutescens		EF421506.1		DQ155776.1			EF421466.1
Apophylia†	AY646304						
Argopus punctipennis	FJ973693.1	FJ973801.1	FJ973895.1				
Asiorestia†	AJ841595.1	AJ841348.1	AJ841466.1	AM283186.1			
Asphaera abdominalis				AF479444.1			
Asphaerina unicolor	AY313827.1			AF479448.1			AF466323.1
Aspidomorpha difformis	AJ841631.1	AJ841383.1	AJ841502.1	AM283217.1			
Aulacophora†	AY171444.1		AY244864.1	AY171417.1			AY171468.1
Aulacoscelis melanocera		AY533621.1		AY533565.1			
Baliosus†	AJ841642.1	AJ841392.1	AJ841513.1	AM283227.1			
Basilepta balyi	AJ781631.1	AJ781514.1	AJ781568.1	AM283167.1			
Blepharida rhois	AY171435.1	AJ841350.1	AJ841468.1	AY171408.1			AY171460.1
Bromius obscurus	AJ781677.1	AJ781551.1	AJ781614.1				
Calligrapha alni		AM160793.1		AM160947.1			AM160847.1
Calligrapha alnicola		AM160794.1					AM160849.1
Calligrapha amator		AM160806.1		AM160960.1			AM160859.1
Calligrapha apicalis		AM160807.1		AJ575190.1			AM160860.1
Calligrapha bidenticola		AM160809.1					
Calligrapha californica corepsivora		AM160810.1	AJ841418.1				AM160863.1
Calligrapha confluens		AM160811.1					AM160864.1
Calligrapha fulvipes		AM160816.1		AY055520.1			AM160867.1
Calligrapha multipunctata bigsbyana		AM160822.1	AJ841419.1	AJ575194.1			AM160873.1
Calligrapha philadelphica		AM160826.1		AJ575192.1			AM160876.1
Calligrapha polyspila		AM160828.1					AM160879.1
Calligrapha rowena		AM160833.1					AM160883.1
Calligrapha scalaris		AM160835.1					AM160885.1
Calligrapha vicina		AM160844.1					AM160893.1
Capraita†	AY313828.1			AF479449.1			AF466324.1
Cassida fuscorufa		AB104502.1					
Cassida rubiginosa	AJ841632.1	AJ841384.1	AY676687.1	AM283218.1			
Cerotoma atrofasciata	AY646323.1	AY533642.1		AY533587.1			
Cerotoma ruficornis	AY646322.1						
Chaetocnema chlorophana	AJ841599.1		AJ841470.1	AM283190.1			
Chaetocnema concinna				DQ155710.1			
Chalcophana†	AY243658.2		AY244842.1	AY242399.1			
Chalepus†	AJ841643.1	AJ841393.1	AJ841514.1	AM283228.1			
Charidotella sexpunctata	AY927709.1		AJ841504.1	AM283219.1			
Chelymorpha cassidea	AY927701.1		AF267433.1				
Chlamisus†				AF092680.1			
Chrysolina 'aurichalcea'		AF097080.1		AY796210.1			
Chrysolina curvilinea		AJ008053.1		AJ008086.1			
Chrysolina affinis		AJ008037.1	AJ622062.1	AJ008079.1			
Chrysolina americana		AJ008034.1		AJ008080.1			
Chrysolina bicolor		AJ008054.1		AJ008082.1			
Chrysolina carnifex		AJ008058.1		AJ008083.1			
Chrysolina cerealis		AJ008055.1		AJ008084.1			
Chrysolina coerulans	AY171429.1	AF097083.1		AY171403.1			AY171454.1
Chrysolina colasi		AJ008049.1		AJ008085.1			
Chrysolina diluta		AJ008057.1		AJ008087.1			
Chrysolina fastuosa		AJ008056.1		AJ008088.1			
Chrysolina femoralis	AJ841548.1	AJ008060.1	AJ841421.1	AJ008089.1			
Chrysolina gemina		AJ008051.1		AJ008091.1			
Chrysolina geminata		AJ008042.1		AJ008092.1			

Species	28s	16s	18s	COI	ArgK	Wng	Elf1a
Chrysolina graminis		AF097086.1		AF097030.1			
Chrysolina grossa	AJ841549.1	AF097087.1	AJ841422.1				
Chrysolina haemoptera		AJ008044.1		AJ008093.1			
Chrysolina herbacea		AJ008052.1		AJ008095.1			
Chrysolina lucida		AJ008059.1		AJ008097.1			
Chrysolina marginata		AJ008062.1		AJ008099.1			
Chrysolina obsoleta		AJ008041.1		AJ008101.1			
Chrysolina peregrina		AJ008038.1		AJ008102.1			
Chrysolina polita		AJ008039.1		AJ008103.1			
Chrysolina timarchoides		AJ008040.1		AJ008105.1			
Chrysolina varians		AJ008043.1		AJ008106.1			
Chrysolina veridana		AJ008036.1		AJ008108.1			
Chrysomela interrupta		AY027728.1		AY027610.1			
Chrysomela lapponica		AY027738.1		AY027620.1			
Chrysomela mainensis interna	AJ841550.1	AY027735.1	AJ841423.1	AY027617.1			
Chrysomela populi		AY027744.1		AY242404.1			
Chrysomela schaefferi		AY027756.1					
Chrysomela tremulae	AY171423.1	AY027758.1	FJ000527.1	AY171397.1			AY171449.1
Colaspis†	AJ781655.1	AJ781532.1	AJ781592.1	AM283171.1			
Colasposoma auripenne	AJ781648.1	AJ781527.1	AJ781585.1				
Coptocephala†	AJ841582.1	AJ841336.1	AJ841453.1	AM283156.1			
Coptocycla adamantina	AY243649.2		AY244836.1	AY242390.1			
Crioceris asparagi	AJ781684.1	AJ781558.1	AF267426.1	AM283148.1			
Crioceris duodecimpunctata	FJ000446.1		FJ000520.1				EU880722.1
Crioceris paracenthesis		AJ231163.1					
Cryptocephalus venustus	AJ841589.1		AJ841460.1				
Cyrtonus arcasi	AM403398.1	AM403365.1					
Cyrtonus contractus	AM403402.1	AM403369.1					
Cyrtonus cupreovirens	AM403403.1	AM403370.1					
Cyrtonus cylindricus	AM403405.1	AM403372.1					
Cyrtonus dufouri	AM403406.1	AM403373.1					
Cyrtonus elegans	AM403408.1	AM403375.1					
Cyrtonus fairmarei	AM403410.1	AM403377.1					
Cyrtonus majoricensis	AM403416.1	AM403383.1					
Cyrtonus pardoi	AM403417.1	AM403384.1					
Cyrtonus plumbeus	AM403422.1	AM403389.1					
Cyrtonus puncticeps	AM403423.1	AM403390.1					
Cyrtonus rotundatus	AM403424.1	AM403391.1					
Cyrtonus ruficornis	AM403426.1	AM403393.1					
Dactylispa†	AJ841644.1	AJ841394.1	AJ841515.1				
Deloyala guttata	AJ841635.1	AJ841386.1	AJ841506.1	AM283221.1			
Desmogramma†	AJ841551.1	AJ841308.1	AJ841424.1	AM283125.1			
Diabrotica adelpha	AY243735.2			AY242469.1			
Diabrotica balteata	AY243731.2	AY533625.1	AF195200.1	AY533569.1			EF421472.1
Diabrotica cristata				AY533580.1			
Diabrotica limitata 15-punctata	AY243747.2			AY242481.1			
Diabrotica longicornis				AF278547.1			
Diabrotica nummularis		AY533624.1		AY533568.1			
Diabrotica porracea	AY243737.2	AY533627.1		AY533571.1			
Diabrotica scutella		AY533623.1		AY533567.1			
Diabrotica sexmaculata		AY533622.1		AY533566.1			
Diabrotica speciosa	AY646319.1	AY533635.1		AY533579.1			
Diabrotica tibialis	AY243746.2	AY533632.1		AY533576.1			
Diabrotica undecimpunctata		AY533628.1		AY533572.1			
Diabrotica undecimpunctata howardi	AY243738.2	AJ781555.1	AJ781618.1	AM283202.1			
Dibolia†	AY171442.1	EF421514.1	FJ973917.1				EF421474.1
Dicladispa testacea		AJ231164.1	AJ841516.1	AM283229.1			
Diorhabda†	AY171446.1			AY171419.1			AY171469.1
Disonycha†	AY171434.1		AJ841472.1	AY171407.1			AY171459.1
Donacia bicolor				EU880600.1			EU880749.1
Donacia biimpressa	EF532415.1	EF532550.1		EF532505.1			
Donacia clavipes	EF532418.1	EF532553.1		EF532508.1			EU880809.1
Donacia hirticollis		AY232588.1		EU880682.1			EU880789.1
Donacia subtilis				EU880714.1			EU880757.1
Donacia vulgaris			AY748122.1	EU880631.1			EU880781.1
Doryphora†	AJ841552.1	AJ841309.1	AJ841425.1	AM283126.1			
Entomoscelis†		AJ008077.1		AJ008110.1			
Epitrix fasciata	AY243668.2		AY244848.1	AY242409.1			
Eumolpus†			AF267460.1				
Exema canadensis	AJ841579.1	AJ841333.1	AJ841450.1	AM283153.1			
Exora encaustica narensis	AY243762.2	AJ841367.1	AJ841486.1	AY242497.1			
Galeruca†		EF421521.1	AJ841488.1				EF421481.1
Galerucella bimarnica		EF116927.1		EF177824.1			
Galerucella calmariensis				AY247725.1			
Galerucella lineola		EF421518.1		AY247726.1			EF421478.1
Galerucella nymphae		EF421516.1	AF267443.1	AY247717.1			EF421476.1
Galerucella placida				EF133454.1			
Galerucella pusilla	FJ973717.1		FJ973920.1	AY247724.1			
Galerucella tenella				AY247723.1			
Gastrophysa cyanea	AY243664.2	AY027751.1	AY244843.1				
Gastrophysa poligoni		EF421520.1					EF421480.1
Gastrophysa viridula	FJ973721.1	AY027752.1	FJ973924.1	DQ156057.1			
Glyptina†		FJ973824.1	FJ973925.1				
Gonioctena linnaeana		AF014604.1					
Gonioctena sibirica*		AB104501.1	AJ622061.1	FJ346979.1			FJ346980.1
Gonioctena springlovae		AB104498.1					

Species	28s	16s	18s	COI	ArgK	Wng	Elf1a
Gonioctena variabilis		AY027750.1					
Gonioctena viminalis		AF014601.1					
Gynandrobrotica lepida	AY243718.2	AY533643.1		AY533588.1			
Gynandrobrotica nigrofasciata	AY243717.2	AY533644.1		AY533589.1			
Heikertingerella†	FJ973723.1	FJ973826.1	FJ973927.1				
Hemipyxis†	FJ973724.1	FJ973827.1	FJ973928.1				AF466316.1
Hermaeophaga†	FJ973725.1	EF421522.1	FJ973929.1	DQ155806.1			EF421482.1
Hilarocassis exclamationis	AY927718.1						
Hypolampsis†				AF479423.1			AF466314.1
Isotes multipunctata	AY243723.2			AY242457.1			
Labidomera clivicollis	AJ841555.1	AJ841312.1	AF267437.1	AM283129.1			
Laccoptera†	AJ841637.1	AJ841388.1	AJ841508.1	AM283223.1			
Lachnaia†	AJ841584.1	AJ841338.1	AJ841455.1	AM283157.1			
Lema†	AY243659.2		AY676686.1	AY242400.1			
Leptinotarsa haldemani				DQ459377.1			
Leptinotarsa juncta	AJ841557.1	AJ841314.1	AJ841430.1	HQ605771.1			
Leptinotarsa texana				HQ605774.1			
Lilioceris†	AJ841574.1	AJ841328.1	AF267425.1	AM283150.1			
Linaeidea aenea	AJ781682.1	AJ781556.1	AJ622058.1	AY027616.1			EF421483.1
Lochmaea capreae	FJ973738.1	EF421524.1	FJ973942.1	AY247728.1			EF421485.1
Longitarsus exsoletus	AJ841604.1	AJ841356.1	AJ841475.1	AM283194.1			
Luperus†	AY646336.1		AY748123.1				
Lysathia ludoviciana				EU117150.1			
Macrohaltica†	AJ841605.1	AJ841357.1	AJ841476.1	AM283195.1			
Macrolenes dentipes		AJ231165.1					
Microrhopala vittata	AY243650.2	AJ841400.1	AJ841521.1	AM283234.1			
Monolepta†	AJ841623.1	EF421526.1	AJ841494.1	AM283209.1			EF421487.1
Monoxia†	AY243778.2	U20682.1		AY242512.1			
Neocrepidodera†			EF362972.1				
Nodonota†	AJ781661.1	AJ781537.1	AJ781598.1				
Notosacantha†	FJ000447.1		FJ000521.1				
Octotoma scabripennis	AJ841651.1	AJ841401.1	AF267431.1	AM283235.1			
Oedionychus cinctus	FJ973757.1	FJ973853.1	FJ973962.1	AF479429.1			
Oides†	AY646292.1	EF421528.1	AF267438.1	AY796204.1			EF421489.1
Omophoita octoguttata	AY313838.1		HM036738.1	AF479430.1			AF466317.1
Omophoita personata	AY313839.1			AF479431.1			AF466318.1
Omophoita sexnotata				AF479441.1			
Ophraella communa		U20694.1		HQ664676.1			
Ophraella notulata*	AY243783.2	U20710.1	AJ841495.1	AY242517.1			
Ophraella pilosa	U20713.1						
Ophraella sexvittata		U20715.1					
Ophrida†	FJ973759.1	FJ973854.1	FJ973964.1	FJ977975.1			
Oreina alpestris		GQ392138.1		GQ392324.1			
Oreina cacaliae	AJ841558.	HQ435544.1	AJ841431.1	GQ392437.1			
Oreina elongata		GQ220082.1		GQ220210.1			
Oreina ganglbaueri		GQ392195.1		GQ392378.1			
Oreina intricata		AF097102.1		AF097040.1			
Oreina variabilis		AF097106.1		AF097044.1			
Oreina virgulata		AF097107.1		AF097045.1			
Oulema melanopus	AJ841577.1	AJ841331.1	AJ841448.1				
Pachybrachis†	AJ841592.1	AJ841346.1	AJ841463.1	AM283164.1			
Paranaita bilimbata	AY313840.1			AF479481.1			AF466343.1
Paratriarius†	AY243728.2			AY533591.1			
Paria†	AJ781640.1	AJ781522.1	AJ781578.1				
Paridea†	AY243696.2						
Paropsis atomaria				DQ335220.1			
Paropsis porosa*	AY171438.1		AJ841432.1	AY171411.1			AY171463.1
Paropsisterna beata				FM209242.1			FM209275.1
Phaedon†	AJ841560.1	AY027760.1	AJ841433.1	DQ155742.1			
Philhydronopa†				FM209237.1			FM209270.1
Phratora laticollis	AJ841561.1	AY027753.1	AF267435.1	AM283136.1			
Phratora tibialis		AY027754.1					
Phyllotreta†	FJ973766.1	FJ973861.1	FJ973971.1	FJ977982.1	EU420057.1		
Plagiodera versicolora	AJ841562.1	AJ841319.1	AJ841435.1				EF421494.1
Plagiometriona†				GQ268947.1			
Platyphora†				AY055518.1			
Podagrica malvae	AJ841609.1	AJ841361.1	AJ841480.1				
Podontia†	FJ973769.1		FJ973974.1	FJ977985.1			
Prasocuris†	AJ841563.1	AJ841320.1	AJ622059.1	AM283138.1			
Psylliodes affinis				DQ155877.1			EU110898.1
Psylliodes chrysocephalus				EU110830.1			EU110901.1
Psylliodes cupreus				EU110835.1			EU110927.1
Psylliodes dulcamarae				EU110836.1			EU110928.1
Psylliodes marcidus*	AJ841610.1	EF421531.1	AJ841481.1	EU110850.1			EF421492.1
Psylliodes napi				EU110853.1			EU110914.1
Pyrrhalta viburni	AJ841626.1	AJ841378.1	AJ841497.1	AY247731.1			EF421496.1
Sagra femorata	HQ178449.1	HQ178243.1	FJ000515.1	HQ177510.1			
Sermylassa halensis	AY243676.2	EF421535.1	FJ973978.1	FJ977988.1			EF421497.1
Smaragdina†	AJ841585.1	AJ841339.1	AJ841456.1	AM283158.1			
Sphaeroderma†	FJ973776.1	EF421537.1	FJ973981.1	FJ977991.1			EF421499.1
Stolas angulata	AY927738.1						
Syphraea†	AJ841611.1	AJ841363.1	AJ841482.1	AM283199.1			
Systena†	AY171432.1	FJ973874.1	FJ973986.1	AY171405.1			AY171457.1
Timarcha aurichalcea		AJ231136.1					
Timarcha balearica	AM403397.1	AJ236387.1					
Timarcha calceata		Y18828.1					

Species	28s	16s	18s	COI	ArgK	Wng	Elf1a
Timarcha cornuta		AJ278896.1					
Timarcha cyanescens		AJ231139.1					
Timarcha erosa vermiculata		AJ622029.1					
Timarcha espanoli		AJ231140.1					
Timarcha fallax		Y18827.1					
Timarcha geniculata		AJ236380.1					
Timarcha goettingensis		AJ231142.1					
Timarcha gougeleti		AJ236381.1					
Timarcha granadensis		AJ231143.1					
Timarcha hispanica		AJ231144.1					
Timarcha insparsa		AJ231145.1					
Timarcha intermedia		AJ236384.1					
Timarcha interstitialis		AJ236368.1					
Timarcha intricata		AJ622026.1					
Timarcha lugens		AJ231149.1					
Timarcha marginicollis		AJ231150.1					
Timarcha maritima		AJ622030.1					
Timarcha metallica		Y18826.1					
Timarcha monserratensis		AJ236374.1					
Timarcha perezi		AJ008078.1		AJ008111.1			
Timarcha pimelioides		Y18824.1					
Timarcha recticollis		AJ231154.1					
Timarcha rugosa		AJ231155.1					
Timarcha scabripennis		AJ622038.1					
Timarcha sinuatocollis		AJ236372.1					
Timarcha strangulata		AJ231157.1					
Timarcha tenebricosa	FJ000452.1	AJ231158.1	FJ000528.1	AY171412.1			AY171464.1
Timarcha ventricosa		AJ622039.1					
Trirhabda canadensis				AY515056.1			
Trirhabda virgata	AJ841628.1		AJ841499.1	AY515115.1			
Walterianella†	AY313794.1		AY244853.1	AF479456.1			AF466327.1
Xanthogaleruca luteola		EF421538.1					EF421500.1
Yingaresca†				AY515034.1			
Zygogramma bigenera	AJ841568.1	AJ841324.1	AJ841441.1	AY171413.1			AY171465.1
Ciidae							
Cis†	DQ202638.1		AY748191.1	DQ156020.1			
Octotemnus†			EF209887.1	FM877949.1			
Sulcasis†			DQ337129.1				
Cleridae							
Enoclerus moestus	FJ000412.1	EF517585.1	AY748128.1				
Thanasimus†			AY748129.1	AY790473.1			
Trichodes apiarius			EF209693.1				
Trichodes nutalli				GU013585.1			
Trichodes ornatus	EU145713.1		AF423775.1				
Coccindellidae							
Adalia bipunctata			AJ272139.1	X88933.1			
Aiolocaria†				EF192080.1			
Anatis†	GU073731.1	GU073833.1	GU073676.1	GU073920.1			
Azya†	FJ687707.1		FJ687666.1				
Calvia quatruordecimguttata	GU073732.1	AM779600.1	GU073677.1	EF192097.1			
Chilocorus bipustulatus	GU073768.1	GU073875.1	GU073718.1	GU073959.1			
Chilocorus renipustulatus	GU073769.1	GU073876.1	GU073719.1	GU073960.1			
Chilocorus rubidus				EF192085.1			
Chilocorus stigma			EU145610.1				
Chnoodes†	JF763542.1						
Coccinella septempunctata	DQ202668.1	DQ202558.1	AY748147.1	AJ313071.1			
Coelophora†	FJ687721.1		FJ687679.1				
Coleomegilla maculata lengi	GU073740.1	GU073845.1	GU073688.1	AY615732.1			
Cryptognatha†	JF763548.1						
Cryptolaemus montrouzieri	FJ687709.1	GU073865.1	FJ687668.1	GU073908.1			
Curinus coeruleus				AY283622.1			
Cycloneda sanguinea	FJ687723.1		FJ687681.1				
Epilachna†	AB353862.1	AB354089.1	EU145616.1	AB002178.1			
Exochomus quadripustulatus	FJ687736.1	AM779604.1	EF209855.1	DQ155759.1			
Hippodamia convergens	EU164644.1	EU164588.1	EU164617.1	EU164681.1			
Hippodamia parenthesis				JF296238.1			
Hippodamia quinquesignata ambigua	FJ687715.1		FJ687673.1				
Hyperaspis lateralis lateralis	FJ687726.1		FJ687685.1				
Illeis†	JF763569.1		FJ687680.1	EF192090.1			
Micraspis cardoni	FJ687720.1		FJ687678.1	EF192086.1			
Microweisea†	JF763575.1						
Olla†	GU073748.1	GU073855.1	FJ687675.1	EU164680.1			
Orcus†	FJ687740.1		FJ687699.1	JF763665.1			
Prodilis†	JF763589.1						
Psyllobora taedata	EU145666.1	GU073859.1	EU145604.1	GU073944.1			
Rhyzobius†	GU073773.1	EF512342.1	EF512320.1	DQ155761.1			
Rodolia cardinalis	GU073776.1	GU073883.1	GU073726.1	GU073967.1			
Scymnus nubilis	GU073764.1	GU073871.1	GU073714.1	GU073955.1			
Sumnius†	JF763613.1						
Curculionidae							
Cactopinus†	EU090343						
Cryphalus abietis			AF375247.1	AF187109.1			
Crypturgus pusillus				EU011813.1			EU011826.1
Dendroctonus adjunctus	AF308380.1		AF308332.2	AF067992.1			AF308423.1
Dendroctonus approximatus				AF068000.1			
Dendroctonus brevicomis				AF068002.1			

Species	28s	16s	18s	COI	ArgK	Wng	Elf1a
Dendroctonus frontalis	AF308381.1		AF308333.1	AF067986.2			AF308424.1
Dendroctonus jeffreyi	AF308382.1		AF308334.1	AF067994.2			AF308425.1
Dendroctonus murrayanae	AF308384.1		AF308336.1	AF067989.1			AF308427.1
Dendroctonus ponderosae	AF308385.1		AF308337.1	AF067987.1			AF308428.1
Dendroctonus pseudotsugae	AF308374.2		AF308327.1	AF375318.1			AF308418.1
Dendroctonus punctatus				AF067998.1			
Dendroctonus rufipennis				AF067996.1			
Dendroctonus simplex				AF067985.1			
Dendroctonus terebrans	AF308386.1		AF308338.1	AF375315.1			AF308429.1
Dendroctonus valens				AF067997.1			
Dryocoetes affaber			AJ850046.1	AF187113.1			AF186661.2
Dryocoetes autographus	HQ883565.1			AF438517.1	HQ883880.1		AF259873.1
Hylastes†	HQ883927.1			HQ883660.1			HQ883732.1
Hylurgops†	AF308364.1	AJ495569.1	AJ496371.2				AF308408.1
Ips acuminatus	EU090296.1	AF397470.1	AJ850040.1	AF113325.1			AF397612.1
Ips avulsus		AF397472.1		AF113330.1			AF397615.1
Ips bonanseai				AF113332.1			AF397616.1
Ips borealis		AF397474.1		AF113334.1			AF397617.1
Ips calligraphus calligraphus		AF397475.1		AF113335.1			AF397618.1
Ips confusus		AF397477.1		AF113341.1			AF397620.1
Ips cribricollis		AF397478.1		AF113343.1			AF397621.1
Ips emarginatus		AF397480.1		AF113347.1			AF397623.1
Ips hoppingi		AF397482.1		AF113353.1			AF397625.1
Ips hunteri		AF397483.1		AF113355.1			AF397626.1
Ips integer		AF397484.1		AF113356.1			AF397627.1
Ips knausi		AF397485.1		AF113357.1			AF397628.1
Ips lecontei		AF397486.1		AF113360.1			AF397629.1
Ips montanus		AF397488.1		AF113365.1			AF397630.1
Ips paraconfusus		AF397489.1		AF113367.1			AF397631.1
Ips perroti		AF397490.1		AF113369.1			AF397632.1
Ips pertubatus		AF397491.1		AF113370.1			AF397633.1
Ips pilifrons		AF397493.1		AF113373.1			AF397635.1
Ips pini		AF397494.1		AF113376.1			AF397636.1
Ips plastographus maritimus		AF397492.1		AF113378.1			AF397634.1
Ips sexdentatus		AF397496.1		AF113380.1			AF397637.1
Ips spinifer		AF397506.1		AF113381.1			AF397644.1
Ips tridens		AF397498.1		AF113384.1			AF397638.1
Ips typographus		AF397499.1		AF113385.1			AF397639.1
Ips woodi		AF397500.1		AF113388.1			AF397640.1
Orthotomicus caelatus	AF308390.1	AF397501.1	AF308343.1	AF187124.1			AF186672.1
Orthotomicus erosus	EU090302.1	AF397502.1		U82236.1			AF397642.1
Orthotomicus laricis			AJ850041.1	AF113392.1			
Orthotomicus latidens	EU090300.1	AF397503.1		AF113358.1			AF397643.1
Orthotomicus suturalis				EU191854.1			EU191886.1
Phloeotribus†	AF308372.1		AF308325.1	EU191863.1			EU191895.1
Pityogenes chalcographus				DQ515997.1			
Pityogenes hopkinsi*		AF397509.1	AF389045.1	AF187128.1			AF186676.1
Polygraphus grandiclava				EU428829.1			
Polygraphus poligraphus*	AF308363.1		AF308316.1	EU428842.1			AF308407.1
Scolytus†	AF375306.1		AJ850043.1	AF375329.1	HQ883910.1		HQ883746.1
Trypodendron lineatum	AF308394.1		AF250076.2	AF187132.1	HQ883923.1		AF186682.1
Xyleborus†	GU808581.1	AJ495567.1	AJ850045.1	HM064121.1	HM064385.1		AF508870.1
Xylosandrus compactus	GU808591.1			GU808706.1	GU808668.1		GU808743.1
Xylosandrus germanus	GU808598.1			GU808714.1	GU808674.1		GU808751.1
Acalles camelus	EU286365.1	EU286282.1		EU286447.1			
Acalles echinatus	EU286428.1	EU286346.1		EU286510.1			
Adexius scrobipennis	EU286372.1	EU286289.1		EU286454.1			
Anthonomus grandis		FJ423738.1	AF250091.2	AY266610.1			
Apion abruptum		AJ495474.1		DQ155878.1			HQ883698.1
Apoderus jekeli	HQ883529.1			HQ883610.1	HQ883843.1		HQ883697.1
Auletobius†	FJ000465.1		FJ000541.1				
Baris arthemisiae		AJ495565.1					
Barynotus moerens		AJ495512.1	AJ496356.2				
Barypeithes†		AJ495500.1	AJ496350.1	DQ155809.1			
Bothrometopus†				GQ132012.1			
Brachyderes incanus		AJ495503.1					
Callirhopalus bifasciatus			AF250079				
Centricnemus leucogrammus							GU565646.1
Ceutorrhynchus erysimi				DQ155881.1			DQ058708.1
Chlorophanus†	HQ883566.1			HQ883651.1	HQ883882.1		HQ883727.1
Cionus†		AJ495550.1	AJ496366.1				
Cleonus†		AJ495524.1	AJ496359.1				
Cosmopolites sordidus	AY131082.1			AY131111.1			AY131140.1
Curculio dentipes				AB501115.1			
Curculio distinguendus				AB501118.1			
Curculio nucum*	FJ867675.1		AF389059.1	AY327696.1			AY327661.1
Cylas formicarius			AF515703.1				
Diocalandra†	AY131075.1			AY131104.1			AY131133.1
Dorytomus†		AJ495533.1	AJ850011.1	DQ156033.1			
Dyslobus†		EF606981.1		EF575495.1			EF577091.1
Echinocnemus marmoreus	FJ867679.1		FJ867755.1		FJ859938.1		FJ867864.1
Eusomus ovulum		AJ495499.1	AJ496349.2				
Foucartia squamulata		AJ495501.1	AJ496351.2				
Gymnetron antirrhini			AJ850004.1				
Gymnetron tetrum	FJ867684.1		AF250096.2		FJ859941.1		
Hylobius abietis		AJ495585.1		EF450122.1			

Species	28s	16s	18s	COI	ArgK	Wng	Elf1a
Hylobius piceus	HQ883576.1			HQ883665.1	HQ883894.1		
Hypera nigrirostris			AJ850005.1				
Hypera postica		U16967.1	FJ867764.1		FJ859943.1		
Hypera punctata		U16968.1					
Hypera rumicus				DQ155880.1			
Hypomeces squamosus				EU522679.1			
Lepyrus†		AJ495586.1	AJ496375.1				
Limnobaris†		AJ495594.1	AJ496378.1				
Liophloeus tessulatus		AJ495497.1	AJ496348.1				
Listroderes†			AF389057.1				
Lixus†	HQ883562.1	AJ495518.1	AF250098.2	HQ883623.1			HQ883708.1
Magdalis†	FJ867691.1	AJ495593.1	AJ496377.1		FJ859947.1		FJ867873.1
Metamasius hemipterus	AY131079.1		AJ850017.1	AY131108.1			AY131137.1
Metialma†	HQ883536.1			HQ883617.1	HQ883849.1		HQ883703.1
Naupactus peregrinus			AF250083.2				
Naupactus xanthographus	FJ867695.1		FJ867775.1	HQ452972.1	FJ859952.1		FJ867878.1
Nedyus quadrimaculatus		AJ495560.1	AJ850048.1	EU111007.1			EU111038.1
Notaris†	FJ000469.1		FJ000545.1	EF517599.1			
Otiorhynchus armadillo		AJ495480.1					
Otiorhynchus raucus		AJ495574.1		AY165668.1			
Pachylobius picivorus			AF250103.2				
Peritelus†		AJ495485.1					
Phyllobius argentatus				DQ156044.1			
Phyllobius oblongus		AJ495492.3					
Phyllobius pyri		AJ495491.1	AJ850014.1	DQ156035.1			
Phytobius†	FJ867702.1		AF250094.2		FJ859957.1		
Pissodes nemorensis				U77981.1			
Pissodes schwarzi*			AJ850007.1	U77977.1			
Pissodes strobi				AY472043.1			
Polydrusus inustus							HQ223014.1
Polydrusus mollis	HQ223023.1						HQ223010.1
Polydrusus sericeus			AF250086.2				
Polydrusus undatus		AJ495496.1					
Procas†			AJ850025.1				
Rhinoncus †	HQ883539.1	AJ495561.1	AF389061.1	HQ883620.1	HQ883852.1		
Rhynchaenus†		AJ495549.1		DQ156022.1			
Rhynchites†		AJ495451.2	AJ849982.1				
Rhynchophorus ferrugineus			EF125057.1	EU780007.1			
Ruteria hypocrita	EU286370.1	EU286287.1		EU286452.1			
Scepticus griseus	AB663245.1						
Scepticus insularis	AB663244.1						
Sciaphilus asperatus		AJ495502.1					
Sitona hispidulus	FJ867710.1		AF250087.2				
Sitona lineatus		AJ495508.1	AJ496354.1	DQ155755.1			
Sitona suturalis		AJ495510.1					
Sitophilus granarius	AY131072.1		AF250070.2	AY131101.1	FJ859963.1		AY131130.1
Sitophilus oryzae	AY131070.1		AJ878601.1	AY131099.1			AY131128.1
Sitophilus zeamais	AY131071.1	EU131469.1	AJ850021.1				AY131129.1
Sphenophorus†	FJ867714.1		FJ867793.1		FJ859965.1		FJ867894.1
Strophosomus capitatum		AJ495504.1	AJ496352.1				
Strophosomus melanogrammum		AJ495505.1	AJ496353.1	AY196875.1			
Sympiezomias cribicollis				EU522680.1			
Tanymecus†	FJ867719.1	AJ495507.1	AF250088.2	FJ867822.1			
Tanysphyrus lemnae	AY131069.1	AJ495596.1	AJ850023.1	AY131098.1	FJ859970.1		
Telephae†			AJ850016.1				
Trachyphloeus†		AJ495516.1					
Tropiphorus carinatus		AJ495488.1					
Tychius†		AJ495544.1	AJ496365.1	DQ155813.1			
Zacladus geranii	HQ883540.1			AY837616.1	HQ883853.1		HQ883706.1
Eudiagogus†			AF250081.2				
Dermestidae							
Anthrenus†	EF213924.1	EF213862.1	EF213894.1	EF213948.1			
Attagenus†		DQ202544.1	AY748110.1	DQ221954.1			
Dermestes maculatus		HM051209.1		FJ763718.1			EU414679.2
Dermestes peruvianus	DQ202647.1	DQ202548.1	AY748111.1				
Orphilus subnitidus	EF213915.1	EF213848.1	EF213882.1				
Trogoderma glabrum				FJ589737.			
Trogoderma variabile			HM243241.1	HM243385.1			
Elateridae							
Adelocera†	AB231216						
Agriotes lineatus	DQ198733.1	DQ198643.1		DQ155913.1			
Agriotes obscurus	DQ198734.1	DQ198644.1					
Agriotes sputator		EU285480.1		DQ155945.1			
Agrypnus†	DQ198735.1	DQ198645.1	AF451943.1	DQ198567.1			
Athous†	DQ198738.1	DQ198648.1	AF451944.1	DQ198570.1			
Cardiophorus†	HQ333885.1	HQ333701.1	HQ333790.1	HQ333972.1			
Chalcolepidius†	HQ333847.1	HQ333671.1	HQ333752.1	HQ333937.1			
Conoderus dimidiatus	HQ333842.1	HQ333666.1	HQ333747.1				
Ctenicera mediana				AY165675.1			
Elater†	HQ333861.1	HQ333683.1	HQ333766.1	HQ333949.1			
Lacon profusa	HQ333884.1		HQ333789.1	HQ333971.1			
Limonius†	AB231252.1						
Melanotus†	AB231253.1	HQ333673.1	AB298868.1	EF424482.1			
Erotylidae							
Triplax thoracica	AY310698.1		AY310637.1				
Histeridae							

Species	28s	16s	18s	COI	ArgK	Wng	Elf1a
Hister†			AY028360.1				
Saprinus†		JF794585.1	AY028341.1				
Hydrophilidae							
Berosus†	AJ810756.1	AM287065.1	AJ810721.1	AM287087.1			
Helophorus aquaticus	AJ810749.1	AM287056.1	AJ810714.1	AM287078.1			
Hydrobius fuscipes	AJ810755.1	AM287070.1	AJ810720.1	AM287092.1			
Sternolophus rufipes	FJ818242.1			FJ819808.1			
Tropisternus†	EU797397.1		EU797419.1			EU797334.1	
Laemophloeidae							
Cryptolestes†			EF362981.1				
Lampyridae							
Aspisoma aegrotum*		EU009285.2	EU009248.1	EU009322.1			
Bicellonycha†		EU009265.1	EU009228.1	EU009302.1			
Ellychnia californica		EU009255.2	EU009218.1	EU009292.1			
Ellychnia corrusca		EU009262.1	EU009225.1	EU009299.1			
Lucidota†		EU009256.1	EU009219.1	EU009293.1			
Luciola cruciata	AB232651.1	AB436492.1		AB608760.1			
Luciola lateralis		AB436502.1	AB298851.1	AF360873.1			
Photinus australis		EU009261.1	EU009224.1	EU009298.1			
Photinus pyralis				DQ007905.1			
Photuris congener		EU301845.1					
Photuris pennsylvanica			U65129.1	AY165656.1			
Pyractomena angulata		EU009270.1	EU009233.1	EU009307.1			
Pyractomena borealis		EU009259.1	EU009222.1	EU009296.1			
Lucanidae							
Dorcus parallelipipedus			AY745569.1	DQ156023.1			
Lucanus†		AB178302.1	EF487586.1	AB110733.1		FJ606577.1	
Prosopocoilus†		AB178297.1		AB110728.1		FJ606563.1	
Lycidae							
Calopteron†	DQ181127.1		AB298856.1	DQ181201.1			
Metriorrhynchus†	DQ181114.1		DQ181040.1	DQ181188.1			
Melandryidae							
Melandryidae†	DQ202620.1	EF490139.1	EF209898.1	EF490167.1			
Tetratomidae							
Penthe†	DQ202639.1	EF517586.1	EF209892.1	DQ222035.1			
Meloidae							
Epicauta†	DQ202670.1	AM712128.1	FJ000495.1	DQ222031.1			
Mylabris†		AJ633652.1		FJ462782.2			
Pryrota decorata		AJ633668.1					
Tetraonyx†		AM712135.1					
Zonitis†		AM712134.1					
Melyridae							
Melyridae†	FJ000414.1		FJ000492.1	AY165674.1			
Nitidulidae							
Nitidula†	DQ202667.1	DQ202556.1	AY748176.1	DQ155899.1			
Passalidae							
Aulacocyclus†		EF487938.1	EF487588.1				
Odontotaenius disjunctus			AY745573.1	DQ028959.1			
Paxillus†	AF098384.1		DQ534686.1				GU187736.1
Phalacridae							
Phalacridae†	DQ202623.1	DQ202524.1	EF209792.1	FM877920.1			
Scarabaeidae							
Adoretus lasiopygus	DQ524609.1	DQ680893.1		DQ524384.1			
Adoretus versutus	DQ524614.1	DQ680864.1		DQ524388.1			
Amphimallon solstitialis	EU084161.1	EF487948.1	EF487668.1	DQ295268.1			
Anomala bengalensis	DQ524741.1	DQ680966.1		DQ524510.1			
Anomala dorsalis	DQ524743.1			DQ524512.1			
Anomala polita	DQ524742.1						
Anomala varicolor	DQ524628.1			DQ524518.1			
Anoplotrupes stercorosus		EF487857	EF487579.1				
Aphodius depressus				AY132509.1			
Aphodius luridus				AY132510.1			
Aphodius ater	AY132447.1	EF487992.1	EF487597.1	AY132415.1			
Aphodius constans				AY132514.1			
Aphodius rufus				AY132516.1			
Aphodius lineolatus			EF487610.1				
Aphodius paykulli				AY132556.1			
Aphodius sticticus				AY132558.1			
Aphodius erraticus				AY132561.1			
Aphodius consputus				AY132581.1			
Aphodius prodromus				DQ155727.1			
Aphodius sphacelatus				AY132583.1			
Aphodius contaminatus				AY132591.1			
Aphodius obliteratus			EF487619.1	AY132593.1			
Aphodius haemorrhoidalis				AY132596.1			
Aphodius borealis				AY132607.1			
Aphodius vittatus mundus		EF487813.1	EF487632.1	AY132608.1			
Aphodius fossor				AY132615.1			
Aphodius conjugatus				AY132525.1			
Aphodius distinctus				AY132553.1			
Aphodius elevatus				AY132523.1			
Aphodius fimetarius		EF487991.1	EF487600.1	AY132527.1			
Aphodius foetens				AY132529.1			
Aphodius foetidus				AY132528.1			
Aphodius moestus				AY132588.1			
Aphodius pedellus				AY132532.1			

Species	28s	16s	18s	COI	ArgK	Wng	Elf1a
Apogonia†	AY132499.1	EF487800.1	EF521876.1	AY132406.1			
Ataenius†	AY132454.1	EF487831.1	EF487638.1	AY132377.1			
Bolbites onitoides	DQ430857.1						
Bolboceras†		EF570408.1					
Bubas bison	AY131779.1	AY131595.1		AY131938.1			
Bubas bubalus	AY131780.1	AY131596.1		AY131939.1			
Caccobius schreberi	AY131747.1	AY131560.1		AY131916.1			
Canthidium†	EU162481.1	EU162530.1		EU162436.1			
Canthon indigaceus	AY131634.1	AY131443.1		AY131814.1			
Cetonia aurata	AJ810779.1		AJ810744.1	EU084041.1			
Cheironitis furcifer	AY131781.1	AY131597.1	DQ012283.1	AY131940.1			
Chiron digitatus	AY132462.1	EF487792.1	AY745576.1	AY132381.1			
Copris lugubris	AY131684.1	AY131493.1	AY821529.1	AY131860.1			
Copris lunaris				X88946.1			
Copris sinicus	AY131686.1	AY131495.1		AY131862.1			
Coprophanaeus †	AY131788.1	AY131604.1		AY131945.1			
Cremastocheilus†			AY821538.1				
Cyclocephala†		EF487979.1	EF487656.1				
Deltochilum aff amazonicum	AY131642.1	AY131452.1		AY131822.1			
Diabroctis mimas	AY131791.1	AY131607.1					
Dichotomius bos		HQ824537.1		HQ824543.1			
Dichotomius geminatus		HQ824533.1		HQ824539.1			
Dichotomius nisus		HQ824538.1		HQ824544.1			
Dichotomius semisquamosus		HQ824535.1	GQ443313.1	HQ824541.1			
Dichotomius sericeus		HQ824534.1		HQ824540.1			
Digitonthophagus gazella	AY131750.1	AY131563.1		AY131918.1			
Dynastes†	EU658919.1		AF002809.1		EU677503.1	EU677655.1	
Eucranium arachnoides	AY131722.1	AF499692.1	AY821527.1	AF499752.1			
Eurysternus caribaeus	AY131725.1	AY131536.1		AY131893.1			
Geotrupes spiniger			AY745561.1				
Glaresis†			AY745566.1				
Glyphoderus sterquilinus	AY131723.1	AY131534.1		AY131891.1			
Gromphas†	AY131706.1	AY131517.1		AY131877.1			
Gymnopleurus†	AY131731.1	AY131543.1		AY131900.1			
Haplidia†	EU084190.1			EU084066.1			
Heliocopris†	AY131707.1	AY131518.1	DQ012277.1	AY131878.1			
Hoplia†			EF487686.1	EF487755.1			
Hybosorus†	DQ202690.1	DQ202616.1	EF487584.1	DQ222020.1			
Lichnanthe rathvoni		EF487785.1	EF487583.1				
Malagoniella†	DQ430874.1		DQ430830.1				
Melolontha†	EU084231.1	EF487850.1	EF487702.1	HM120756.1			
Microcopris†	EF188112.1		EF188027.1				
Mimela†	DQ524724.1		EF487721.1	DQ524498.1			
Oniticellus fulvus	AY131741.1	AY131554.1	AY821522.1	AY131910.1			
Onitis†	AY131783.1	AY131599.1	DQ430835.1	AY131942.1			
Ontherus†	DQ430853.1	AY131521.1		AY131881.1			
Onthophagus fracticornis				JF340440.1			
Onthophagus hecate	DQ430887.1	EU162548.1		EU162454.1			
Onthophagus marginicollis	EU162503.1			EU162457.1			
Onthophagus nuchicornis*	EU162506.1	EU162556.1	DQ012282.1	EU162460.1			AY847568.1
Onthophagus pennsylvanicus	EU162508.1	EU162558.1		EU162462.1			
Onthophagus similis	AY131774.1	AY131590.1		AY131933.1			
Onthophagus taurus	DQ430885.1	EU162573.1		EU162476.1			
Orphnus†	GU226574.1						
Oruscatus davus	DQ430858.1						
Oryctes nasicornis			EF487658.1	EF487735.1			
Oxysternon†	EU432271.1	AY131608.1		EU477362.1			
Oxythyrea†	EU084149.1	EF487962.1	EF487653.1	EF487733.1			
Paracopris†			EF188042.1	EF188219.1			
Paragymnopleurus sinuatus	AY131733.1	AY131545.1		AY131902.1			
Pentodon†		EF487818.1	EF487659.1	EU084045.1			
Phanaeus chalcomelas	EU432226.1			EU477298.1			
Phanaeus igneus	DQ430855.1		DQ430828.1	EU477345.1			
Phanaeus vindex	EU432264.1			EU477347.1			
Phyllognathus dionysius	EU084152.1	EF487944.1	EF487661.1	EF487737.1			
Phyllopertha campestris	EU084291.1	EF487973.1	EF487722.1	DQ295285.1			
Phyllophaga delata*	AY521744.1		AY521832.1	GQ457144.1			
Phyllophaga drakii				GQ457147.1			
Phyllophaga fusca				EU156615.1			
Pleocoma†	FJ000407.1		AY745574.1				
Popillia japonica	GU226581.1		HQ630652.1				
Protaetia cuprea bancoi				DQ295300.1			
Psammodius oregonesis	EF656727.1	EF656685.1		EF656776.1			
Scarabaeus†	AY131799.1	AF499702.1		AY131957.1			
Schizonycha†	DQ524754.1	DQ681012.1	AY821540.1	DQ524521.1			
Serica†	EU084263.1	EF487872.1	EF487712.1	EF487776.1			
Sisyphus†	AY131807.1	AY131626.1	DQ012286.1	AY131965.1			
Sulcophanaeus†	EU432269.1			EU477356.1			
Tiniocellus spinipes	AY131743.1	AY131556.1	EF188046.1	EF188226.1			
Trichius zonatus			EF487655.1	EF487734.1			
Tropinota†	HQ599135.1						
Silphidae							
Nicrophorus†	EU147356.1	AB285555.1	EF213789.1	EU147476.1			
Nicrophorus vespilloides	EU147362.1			EU147490.1			
Phosphuga atrata	AB285573.1	AB285541.1		AB376111.1		AB285636.1	
Silpha perforata		AB285534.1		AB376168.1		AB285629.1	

Species	28s	16s	18s	COI	ArgK	Wng	Elf1a
Thanatophilus†	AB285580.1	AB285548.1	EF213790.1	DQ155789.1		AB285643.1	
Silvanidae							
Oryzaephilus surinamensis			FM877921.1				
Staphylinidae							
Aleochara†	EF213812.1		EF213791.1	GU270008.1			
Creophilus maxillosis villosus		FJ763702.1		FJ763716.1			
Nudobius cephalus	GU377335.1			GU377381.1		GU377483.1	
Ontholestes†	GU377338.1			GU377384.1		GU377486.1	
Philonthus†	HM583885.1			GU377387.1		GU377489.1	
Staphylinus†	EF213828.1		AY745632.1	DQ155985.1			
Tachinus†			GQ981067.1	DQ155695.1			
Tenebrionidae							
Alleculinae†			EF209961.1				
Arthromacra aenea			EF209971.1				
Blaps†		AY663882.1	AY663861.1	FN544306.1			
Diaperis boleti			EF209945.1	FM877930.1			
Elenophorus†			AF423769.1				
Erodius orientalis				FN544335.1			
Gnatocerus cornutus	EU048306.1	EU048290.1		EU048282.1		EU048298.1	
Gonocephalum†		AY663879.1	AY663856.1	FN544389.1			
Hegeter amaroides				Z71729.1			
Hegeter brevicollis				Z71733.1			
Hegeter costipennis				Z71739.1			
Hegeter fernandezi				Z71747.1			
Hegeter grancanariensis				Z71741.1			
Hegeter lateralis				Z71731.1			
Hegeter politus				Z71743.1			
Hegeter tenuipunctatus				Z71732.1			
Hegeter transversus				Z71734.1			
Latheticus oryzae	EU048307.1	EU048291.1		EU048283.1		EU048299.1	
Opatroides†				FM876597.1			
Palorus†		AJ438152.1		AF139907.1			
Phaleria†				FN544674.1			
Pimelia ascendens	AJ565942.1	AJ566048.1		AJ842966.1			
Pimelia atlantis atlantis	AJ565956.1	AJ566062.1		AJ248202.1			
Pimelia atlantis frigioides	AJ565953.1	AJ566059.1		AJ248199.1			
Pimelia baetica	AJ565961.1	AJ566067.1		AJ248206.1			
Pimelia boyeri	AJ565954.1	AJ566060.1		AJ248200.1			
Pimelia canariensis	AJ565943.1	AJ566049.1		AJ842969.1			
Pimelia costata	AJ565964.1	AJ566070.1		AJ248209.1			
Pimelia cribra	AJ565959.1	AJ566065.1					
Pimelia echidna	AJ565970.1	AJ566076.1		AJ248215.1			
Pimelia elevata	AJ565960.1	AJ566066.1		AJ248205.1			
Pimelia estevezi	AJ565948.1	AJ566054.1					
Pimelia fernandezlopezi	AJ565949.1	AJ566055.1		X97211.1			
Pimelia granulicollis	AJ565947.1	AJ566053.1		X97212.1			
Pimelia integra	AJ565963.1	AJ566069.1		AJ248208.1			
Pimelia interjecta	AJ565958.1	AJ566064.1		AJ248204.1			
Pimelia laevigata costipennis	AJ565950.1	AJ566056.1		AJ843063.1			
Pimelia laevigata laevigata	AJ565951.1	AJ566057.1		AJ843037.1			
Pimelia laevigata validipes	AJ565952.1	AJ566058.1		AJ843010.1			
Pimelia lutaria	AJ565939.1	AJ566045.1		X97216.1			
Pimelia maura	AJ565957.1	AJ566063.1		AJ248203.1			
Pimelia mauritanica	AJ565955.1	AJ566061.1		AJ248201.1			
Pimelia monticola	AJ565965.1	AJ566071.1		AJ248210.1			
Pimelia radula oromii				AJ842971.1			
Pimelia radula radula	AJ565941.1	AJ566047.1		AJ248198.1			
Pimelia rugosa	AJ565969.1	AJ566075.1		AJ248214.1			
Pimelia scabrosa	AJ565966.1	AJ566072.1		AJ248211.1			
Pimelia sparsa albohumeralis	AJ565945.1	AJ566051.1					
Pimelia sparsa serrimargo	AJ565946.1	AJ566052.1					
Pimelia sparsa sparsa	AJ565944.1	AJ566050.1					
Pimelia variolosa	AJ565962.1	AJ566068.1		AJ248207.1			
Probaticus†				FN544690.1			
Stenosis†				AM947780.1			
Tenebrio molitor	X90683.1	AJ438153.1	X07801.1	HQ891143.1			
Tentyria rotunda	FN392098.1	FN392041.1		FM876314.1			
Tentyria schaumi	AJ565974.1	AJ566080.1		Z71748.1			
Tribolium anaphe		AJ438150.1		AJ438061.1			
Tribolium audax		AJ438151.1		AJ438064.1			
Tribolium brevicornis	EU048305.1	AJ438149.1		EU048281.1		EU048297.1	
Tribolium castaneum	EU048301.1	AJ438143.1	HM156711.1	AJ438075.1		EU048293.1	AY819656.1
Tribolium confusum	EU048304.1	AJ438145.1		AJ438079.1		EU048296.1	
Tribolium destructor		AJ438147.1		AJ438067.1			
Tribolium freemani	EU048302.1	AJ438141.1		AF139902.1		EU048294.1	
Tribolium madens	EU048303.1	AJ438140.1		EU048279.1		EU048295.1	
Uloma†			EF209955.1				
Zophosis†	FN392101.1	FN392044.1		FN544775.1			
Trogidae							
Trox borrei		EF487978.1	AF423774.1	EF487783.1			
Trogossitidae							
Tenebroides†	DQ202661.1	DQ202553.1	EF209680.1	FM877907.1			
Outgroup Taxa							
Raphidioptera sp.	HM543340.1		EU815252.1	EU839719.1			AY620203.1
Sialis sp.	AY521793.1	EU734902.1	X89497.1	GU013624.1	EU677513.1	EU797281.1	HM156721.1

Appendix C

Carabidae trait data

Diploid number is the mean of all data available for each taxon included in the analysis. If there were conflicting records the mean of all available records was used. Values for winged and wingless indicate probabilities. In cases where a species was not represented the values used are calculated based on all data for the genus.

Taxon	Diploid Number	Winged	Wingless
ADCABR_Brachinus_sp	27.9	0.84	0.16
ADCACA_Calosoma_inquistor	28	0.58	0.42
ADCACA_Carabus_auronitens	28.5	0.06	0.94
ADCACA_Carabus_blaptoides	28	0.06	0.94
ADCACA_Carabus_caelatus	28	0.06	0.94
ADCACA_Carabus_cancellatus	27.5	0	1
ADCACA_Carabus_creutzeri	28	0.06	0.94
ADCACA_Carabus_fruhstorferi	28	0.06	0.94
ADCACA_Carabus_granulatus	22.5	0	1
ADCACA_Carabus_hispanus	28	0.06	0.94
ADCACA_Carabus_hortensis	28	0.06	0.94
ADCACA_Carabus_lineatus	28	0.06	0.94
ADCACA_Carabus_melancholicus	28	0.06	0.94
ADCACA_Carabus_monticola	28	0.06	0.94
ADCACA_Carabus_nemoralis	28.5	0	1
ADCACA_Carabus_problematicus	28	0.06	0.94
ADCACA_Carabus_punctatoauratus	28.5	0.06	0.94
ADCACA_Carabus_rutilans	29	0.06	0.94
ADCACA_Carabus_solieri	27	0.06	0.94
ADCACA_Carabus_splendens	29	0.06	0.94
ADCACA_Carabus_violaceus	28	0.06	0.94
ADCACA_Cychrus_caraboides	23	0	1
ADCAHA_Abax_parallelepipedus	35	0	1
ADCAHA_Agonum_muelleri	37	1	0
ADCAHA_Amara_sp	33.7	0.85	0.15
ADCAHA_Amphasia_sericea	29	1	0
ADCAHA_Anisodactylus_hispanus	37	0.97	0.03
ADCAHA_Apenes_sp	36	0.83	0.17
ADCAHA_Calathus_abaxoides	55	0.36	0.64
ADCAHA_Calathus_ambiguus	37	0.36	0.64
ADCAHA_Calathus_ascendens	23.5	0.36	0.64
ADCAHA_Calathus_asturiensis	39	0.36	0.64
ADCAHA_Calathus_auctus	37	0.36	0.64
ADCAHA_Calathus_brevis	37	0.36	0.64
ADCAHA_Calathus_circumseptus	43	0.36	0.64
ADCAHA_Calathus_erratus	37	0.36	0.64

ADCAHA_Calathus_freyi	36	0.36	0.64
ADCAHA_Calathus_fuscipes	37	0.5	0.5
ADCAHA_Calathus_granatensis	37	0.36	0.64
ADCAHA_Calathus_melanocephalus	37.5	0	1
ADCAHA_Calathus_micropterus	37	0.36	0.64
ADCAHA_Calathus_mollis	39	0.36	0.64
ADCAHA_Calathus_rectus	37	0.36	0.64
ADCAHA_Calathus_rotundatus	39	0.36	0.64
ADCAHA_Chlaenius_sp	36.5	0.93	0.07
ADCAHA_Colliuris_pennsylvanica	18	1	0
ADCAHA_Cymindis_sp	35.4	0.45	0.55
ADCAHA_Diplocheila_sp	38.9	1	0
ADCAHA_Dromius_sp	25	1	0
ADCAHA_Galerita_sp	30	0.8	0.2
ADCAHA_Harpalus_aesculanus	37	0.83	0.17
ADCAHA_Harpalus_affinis	37	1	0
ADCAHA_Harpalus_anxius	37	0.83	0.17
ADCAHA_Harpalus_attenuatus	37	0.83	0.17
ADCAHA_Harpalus_contemptus	37	0.83	0.17
ADCAHA_Harpalus_decipiens	37	0.83	0.17
ADCAHA_Harpalus_dimidiatus	35	0.83	0.17
ADCAHA_Harpalus_distinguendus	37	0.83	0.17
ADCAHA_Harpalus_ebeninus	37	0.83	0.17
ADCAHA_Harpalus_honestus	37	0.83	0.17
ADCAHA_Harpalus_pennsylvanicus	37	1	0
ADCAHA_Harpalus_rubripes	37	1	0
ADCAHA_Harpalus_serripes	38	0.83	0.17
ADCAHA_Harpalus_wagneri	30	0.83	0.17
ADCAHA_Lebia_sp	32	1	0
ADCAHA_Licinus_sp	30	1	0
ADCAHA_Loxandrus_sp	34.33	0.97	0.03
ADCAHA_Microlestes_sp	31	0.67	0.33
ADCAHA_Notiobia_sp	38.33	1	0
ADCAHA_Oodes_sp	25.33	1	0
ADCAHA_Ophonus_azureus	37	1	0
ADCAHA_Ophonus_longicollis	37	1	0
ADCAHA_Ophonus_stictus	37	1	0
ADCAHA_Poecilus_chalcites	37	1	0
ADCAHA_Poecilus_cupreus	43.5	0.72	0.28
ADCAHA_Poecilus_lucublandus	27	0.17	0.83

ADCAHA_Poecilus_versicolor	37	0.72	0.28
ADCAHA_Pterostichus_alacer	37	0.09	0.91
ADCAHA_Pterostichus_angustus	37	0	1
ADCAHA_Pterostichus_anthracinus	37	0.09	0.91
ADCAHA_Pterostichus_aterrimus	37	0.09	0.91
ADCAHA_Pterostichus_flavofemoratus	37	0.09	0.91
ADCAHA_Pterostichus_globosus	37	0.09	0.91
ADCAHA_Pterostichus_herculeanus	37	0	1
ADCAHA_Pterostichus_interruptus	37	0.09	0.91
ADCAHA_Pterostichus_melanarius	37	0.5	0.5
ADCAHA_Pterostichus_nemoralis	37	0.09	0.91
ADCAHA_Pterostichus_niger	37	0.09	0.91
ADCAHA_Pterostichus_nigrita	37	0.09	0.91
ADCAHA_Pterostichus_oblongopunctatus	28	0.09	0.91
ADCAHA_Pterostichus_spinolae	37	0.09	0.91
ADCAHA_Pterostichus_ziegleri	34	0.09	0.91
ADCAHA_Stenolophus_lecontei	25	1	0
ADCAHA_Stenolophus_mixtus	36	0.9	0.1
ADCAHA_Stenolophus_teutonus	24	0.9	0.1
ADCAHA_Stomis_sp	37	0	1
ADCALO_Loricera_pilicornis	19	1	0
ADCANE_Nebria_brevicollis	30	1	0
ADCANE_Notiophilus_sp	24	0.5	0.5
ADCAPS_Olisthopus_sp	41	1	0
ADCASC_Clivina_sp	36	0.83	0.17
ADCASC_Scarites_buparius	37.67	0.4	0.6
ADCASC_Scarites_eurytus	45	0.33	0.67
ADCASC_Scarites_hespericus	53	0.33	0.67
ADCASC_Scarites_laevigatus	61	0.33	0.67
ADCASC_Scarites_occidentalis_M	41	0.33	0.67
ADCASC_Scarites_terricola	57	0.33	0.67
ADCATR_Bembidion_aenulum	24	1	0
ADCATR_Bembidion_americanum	24	1	0
ADCATR_Bembidion_antiquum	24	0.89	0.11
ADCATR_Bembidion_arenobilis	24	0.89	0.11
ADCATR_Bembidion_articulatum	26	0.89	0.11
ADCATR_Bembidion_balli	24	1	0
ADCATR_Bembidion_bellorum	24	0.89	0.11
ADCATR_Bembidion_bifossulatum	24	1	0
ADCATR_Bembidion_californicum	24	1	0

ADCATR_Bembidion_chalceum	26	1	0
ADCATR_Bembidion_concolor	24	1	0
ADCATR_Bembidion_confusum	24	1	0
ADCATR_Bembidion_coxendix	23	1	0
ADCATR_Bembidion_decorum	24	0.89	0.11
ADCATR_Bembidion_honestum	24	1	0
ADCATR_Bembidion_inaequale	22	1	0
ADCATR_Bembidion_insulatum	24	1	0
ADCATR_Bembidion_integrum	24	0.89	0.11
ADCATR_Bembidion_lampros	23	0.5	0.5
ADCATR_Bembidion_lapponicum	24	1	0
ADCATR_Bembidion_levettei	22	1	0
ADCATR_Bembidion_levettei_carrianum	22	0.89	0.11
ADCATR_Bembidion_levigatum	24	1	0
ADCATR_Bembidion_louisella	24	0.89	0.11
ADCATR_Bembidion_mexicanum	24	1	0
ADCATR_Bembidion_obtusum	24	0.5	0.5
ADCATR_Bembidion_planatum	24	1	0
ADCATR_Bembidion_properans	24	1	0
ADCATR_Bembidion_punctulatum	24	0.89	0.11
ADCATR_Bembidion_quadrimaculatum	23.3	0.5	0.5
ADCATR_Bembidion_rapidum	24	1	0
ADCATR_Bembidion_rothfelsi	34	0.89	0.11
ADCATR_Bembidion_ruficorne	26	0.89	0.11
ADCATR_Bembidion_rufotinctum	24	1	0
ADCATR_Bembidion_sejunctum	24	0.5	0.5
ADCATR_Bembidion_tairuense	24	0.89	0.11
ADCATR_Bembidion_tetracolum	24.3	0.5	0.5
ADCATR_Bembidion_tibiale	24	0.89	0.11
ADCATR_Bembidion_transversale	24	1	0
ADCATR_Bembidion_umbratum	24	1	0
ADCATR_Pogonus_chalceus	22	1	0
ADCATR_Trechus_obtusus	23	0.5	0.5
ADCATR_Trechus_quadristriatus	23	1	0

Appendix D

Acari trait data

Species	Reproductive Mode	Female Diploid Number	Ploidy	Sex Chromosomes
Abacarus hystrix	sexual		haplodiploidy	
Acaropsellina docta	sexual	10	haplodiploidy	
Acarus siro	sexual	18	diplodiploidy	XO
Aceria ficus	sexual		haplodiploidy	
Aceria guerreronis	sexual		haplodiploidy	
Aceria oleae	sexual		haplodiploidy	
Aceria sheldoni	sexual	4	haplodiploidy	
Achipteria coleoptrata	sexual			
Achipteria punctata	sexual	18	diplodiploidy	
Achipteria species	sexual			
Acotyledon formosani	parthenogenetic			
Aculops cornutus	sexual		haplodiploidy	
Aculops fockeui	sexual		haplodiploidy	
Aculops lycopersici	sexual	4	haplodiploidy	
Aculops pelekassi	sexual		haplodiploidy	
Aculops tetanothrix	sexual	4	haplodiploidy	
Aculus persicae	sexual	4	haplodiploidy	
Aculus schlechtendali	sexual	4	haplodiploidy	
Aegyptobia ephedrae	sexual	4	haplodiploidy	
Aegyptobia sp.	sexual	4	haplodiploidy	
Aegyptobia thujae	parthenogenetic	4		
Aegyptobia vannus	parthenogenetic	4		
Afronothrus giganticus	parthenogenetic			
Afronothrus incisivus	parthenogenetic			
Afronothrus neotropicus	parthenogenetic			
Afronothrus russeolus	parthenogenetic			
Afronothrus schuilingi	parthenogenetic			
Agistemus camerounensis	sexual	4	haplodiploidy	
Agistemus exsertus	sexual	6	haplodiploidy	
Agistemus sanctiluciae	sexual	4	haplodiploidy	
Agistemus tranatalensis	sexual	6	haplodiploidy	
Allonothrus giganticus	parthenogenetic			
Allonothrus neotropicus	parthenogenetic			
Allonothrus russeolus	parthenogenetic			
Allonothrus schuilingi	parthenogenetic			
Allosuctobelba obtusa	parthenogenetic			
Allothrombium fuliginosum	sexual	24	diplodiploidy	
Amblygamasus septentrionalis	sexual	12	diplodiploidy	
Amblyomma americanum	sexual	22	diplodiploidy	XO
Amblyomma cajennense	sexual	22	diplodiploidy	XO
Amblyomma darwini	sexual	20	diplodiploidy	XY
Amblyomma dissimile	sexual	22	diplodiploidy	XO
Amblyomma helvolum	sexual	22	diplodiploidy	XO
Amblyomma inornotum	sexual	22	diplodiploidy	XO
Amblyomma limbatum	sexual	22	diplodiploidy	XY
Amblyomma maculatum	sexual	22	diplodiploidy	XO
Amblyomma moreliae	sexual	22	diplodiploidy	XY
Amblyomma sp.	sexual	22	diplodiploidy	XO
Amblyomma testudinarium	sexual	22	diplodiploidy	XO
Amblyomma triguttatum	sexual	20	diplodiploidy	XO
Amblyomma tuberculatum	sexual	22	diplodiploidy	XO
Amblyseius aberrans	sexual	8	haplodiploidy	
Amblyseius agrestris	parthenogenetic			
Amblyseius barkeri	sexual	8	haplodiploidy	
Amblyseius bibens	sexual	8	PGE	
Amblyseius brevipes	sexual	8	haplodiploidy	
Amblyseius chiapensis	sexual	8	haplodiploidy	
Amblyseius chilensis	sexual	8	haplodiploidy	
Amblyseius cucumeris	sexual	8	haplodiploidy	
Amblyseius deleoni	sexual	8	haplodiploidy	
Amblyseius deleoni.2	parthenogenetic			
Amblyseius herbarius	parthenogenetic			
Amblyseius hibisci	sexual	8	haplodiploidy	

Species	Reproductive Mode	Female Diploid Number	Ploidy	Sex Chromosomes
Amblyseius judaicus	sexual	8	haplodiploidy	
Amblyseius largoensis	sexual	8	haplodiploidy	
Amblyseius masiaka	sexual	8	haplodiploidy	
Amblyseius messor	sexual	8	haplodiploidy	
Amblyseius parasundi	parthenogenetic			
Amblyseius rotundus	sexual	8	haplodiploidy	
Amblyseius rubini	sexual	8	haplodiploidy	
Amblyseius salish	parthenogenetic			
Amblyseius sp.	sexual	8	haplodiploidy	
Amblyseius swirskii	sexual	8	haplodiploidy	
Amblyseius vazimba	sexual	8	haplodiploidy	
Amnemochthonius taeniophorus	parthenogenetic			
Anachipteria species	sexual			
Anatetranychus tephrosiae	sexual	6	haplodiploidy	
Androlaelaps casalis	sexual	14	haplodiploidy	
Annectacarus mucronatus	parthenogenetic			
Anoetus laboratorium	sexual	8	haplodiploidy	
Antennophorus grandis	sexual	24	haplodiploidy	
Anystis baccarum	parthenogenetic			
Anystis salicinus	parthenogenetic			
Apionoseius infirmus	sexual			
Aponomma concolor	sexual	20	diplodiploidy	XO
Aponomma fimbriatum	sexual	22	diplodiploidy	XO
Aponomma hydrosauri	sexual	18	diplodiploidy	XO
Aponomma undatum	sexual	20	diplodiploidy	XO
Archegozetes longisetosus	parthenogenetic			
Archegozets magnus	parthenogenetic			
Archoplophora laevis	parthenogenetic			
Archoplophora villosa	parthenogenetic			
Areolaspis bifoliatus	sexual	10	haplodiploidy	
Areolaspis sp.	sexual		haplodiploidy	
Argas brumpti	sexual	24		
Argas cooleyi	sexual	26	diplodiploidy	XY
Argas hermanni	sexual	26	diplodiploidy	XY
Argas japonicus	sexual	26	diplodiploidy	XY
Argas persicus	sexual	26	diplodiploidy	XY
Argas radiatus	sexual	26	diplodiploidy	XY
Argas reflexus	sexual	26	diplodiploidy	XY
Argas sanchezi	sexual	26	diplodiploidy	XY
Argas tridentatus	sexual	26	diplodiploidy	XY
Argas vespertilionis	sexual	26		
Argas zumpti	sexual	26	diplodiploidy	XY
Arrenurus bicuspidator	sexual	20	diplodiploidy	
Arrenurus caudatus	sexual	26	diplodiploidy	
Arrenurus maculata	sexual	20	diplodiploidy	
Arrenurus pustulator	sexual	23	diplodiploidy	
Arrenurus sp.1	sexual	20	diplodiploidy	
Arrenurus sp.2	sexual	26	diplodiploidy	
Arrenurus sp.3	sexual		diplodiploidy	
Arrenurus sp.4	sexual		diplodiploidy	
Arrenurus sp.5	sexual		diplodiploidy	
Artacris macrorhynchus	sexual	4	haplodiploidy	
Asca aelhiopica	parthenogenetic			
Asca afroaphidioides	parthenogenetic			
Asca aphidioides	parthenogenetic			
Asca cranela	parthenogenetic			
Asca evansi	parthenogenetic			
Asca garmani	parthenogenetic			
Asca muma	parthenogenetic			
Asca piloja	parthenogenetic			
Asca quinqueselosa	parthenogenetic			
Atopochthonius artiodactylus	parthenogenetic			
Atropacarus striculus	parthenogenetic			

Species	Reproductive Mode	Female Diploid Number	Ploidy	Sex Chromosomes
Austronothrus clarki	sexual			
Austronothrus curviseta	sexual			
Austronothrus flagellatus	sexual			
Balaustium sp.	parthenogenetic			
Banksinoma ovata	sexual			
Bdella capitosa	parthenogenetic			
Bdella tropica	parthenogenetic			
Blattisocius patagiorum	sexual	6	haplodiploidy	
Boophilus annulatus	sexual	22	diplodiploidy	XO
Boophilus microplus	sexual	22	diplodiploidy	XO
Brachychthonius berlesei	parthenogenetic			
Brachychthonius pius	parthenogenetic			
Brevipalpus californicus	parthenogenetic	2		
Brevipalpus obovatus	parthenogenetic	2		
Brevipalpus phoenicis	parthenogenetic	2		
Brevipalpus pulcher	sexual	4	haplodiploidy	
Brevipalpus russulus	sexual	4	haplodiploidy	
Brevipalpus spinosus	sexual	4	haplodiploidy	
Bryobia graminum	parthenogenetic			
Bryobia kissophila	parthenogenetic			
Bryobia lagodechiana	parthenogenetic			
Bryobia latens	parthenogenetic			
Bryobia neopraetiosa	parthenogenetic			
Bryobia praetiosa	parthenogenetic	8		
Bryobia rubrioculus	parthenogenetic			
Bryobia sarcothamni	sexual	8	haplodiploidy	
Caloglyphus berlesei	sexual	18	diplodiploidy	XO
Caloglyphus michaeli	sexual	16	diplodiploidy	XO
Caloglyphus mycophagus	sexual	16	diplodiploidy	XO
Camisia aff. lapponica	parthenogenetic			
Camisia carrolli	parthenogenetic			
Camisia horrida	parthenogenetic			
Camisia invenusta	parthenogenetic			
Camisia segnis	parthenogenetic			
Camisia spinifer	parthenogenetic			
Carabodes femoralis	sexual			
Carabodes granulatus	parthenogenetic			
Cenopalpus lanceolatisetae	sexual	4	haplodiploidy	
Ceratoppia bipilis	sexual			
Ceratoppia sp.	sexual			
Ceratozetes cf.	sexual			
Ceratozetes cuspidatus	parthenogenetic			
Ceratozetes gracilis	sexual			
Ceratozetes parvulus	parthenogenetic			
Cercoleipus coelonotus	sexual	26	diplodiploidy	
Chamobates borealis	sexual			
Chamobates voigtsi	sexual			
Cheiroseius sp.	parthenogenetic			
Cheletogenes ornatus	sexual	4	haplodiploidy	
Cheyletus eruditus	parthenogenetic	4		
Cheyletus malaccensis	sexual	4	haplodiploidy	
Chrysomelobia labidomerae	sexual		haplodiploidy	
Cilliba cassidea	sexual			
Cilliba erlangensis	parthenogenetic			
Cilliba minor	parthenogenetic			
Cilliba sopronensis	sexual			
Cilliba sp. 1	sexual			
Cilliba sp. 2	parthenogenetic			
Claveupodes delicatus	parthenogenetic			
Clavidromus jackmickleyi	sexual	8	haplodiploidy	
Cosmolaelaps gurabensis	sexual	12	haplodiploidy	
Cosmolaelaps sp.1	sexual		haplodiploidy	
Cosmolaelaps sp.2	sexual		haplodiploidy	

Species	Reproductive Mode	Female Diploid Number	Ploidy	Sex Chromosomes
Cosmolaelaps vacua	parthenogenetic			
Crotonia brachyrostrum	sexual			
Crotonia caudalis	sexual			
Cryptacarus promecus	parthenogenetic			
Cultroribula bicultrata	parthenogenetic			
Cultroribula divergens	parthenogenetic			
Cunaxa capreolus	sexual	22	haplodiploidy	
Cyrthermalllzia guadeloupensis	parthenogenetic			
Cyrthermalllzia sp.1	parthenogenetic			
Czenspinskia transversostriata	parthenogenetic			
Damaeobelba minutissima	parthenogenetic			
Damaeus angustipes	sexual			
Damaeus verticillipes	sexual	18	diplodiploidy	
Demodex caprae	sexual	4	haplodiploidy	
Dermacentor albipictus	sexual	22	diplodiploidy	XO
Dermacentor andersoni	sexual	22	diplodiploidy	XO
Dermacentor hunteri	sexual	22	diplodiploidy	XO
Dermacentor nitens	sexual	22	diplodiploidy	XO
Dermacentor occidentalis	sexual	22	diplodiploidy	XO
Dermacentor parumapertus	sexual	22	diplodiploidy	XO
Dermacentor silvarum	sexual	22	diplodiploidy	XO
Dermacentor sp.	sexual	20	diplodiploidy	XO
Dermacentor sp.2	sexual	22	diplodiploidy	XO
Dermacentor variabilis	sexual	22	diplodiploidy	XO
Dermanyssus gallinae	sexual	6	haplodiploidy	
Dermanyssus prognephilus	sexual	10	haplodiploidy	
Dermanyssus prognephilus.2	sexual	6	haplodiploidy	
Dermatophagoides farinae	sexual		diplodiploidy	XO
Dicrocheles phalaenodectes	sexual	6	PGE	
Discourella baloghi	sexual			
Discourella modesta	parthenogenetic			
Dolichotetranychus summers	sexual	4	haplodiploidy	
Elliptochthonius profundus	parthenogenetic			
Eniochthonius minutissimus	parthenogenetic			
Ensliniella kostylevi	sexual			
Ensliniella parasitica	sexual		haplodiploidy	
Eobrachychthonius latior	parthenogenetic			
Eohypochthonius magnus	parthenogenetic			
Eohypochthonius travei	parthenogenetic			
Eonychus curtisetosus	sexual	4	haplodiploidy	
Eonychus grewiae	sexual	4	haplodiploidy	
Eotetranychus befandrianae	sexual	4	haplodiploidy	
Eotetranychus carpini	sexual	8	haplodiploidy	
Eotetranychus friedmanni	sexual	6	haplodiploidy	
Eotetranychus grandis	sexual	6	haplodiploidy	
Eotetranychus imerinae	sexual	6	haplodiploidy	
Eotetranychus paracybelus	sexual	6	haplodiploidy	
Eotetranychus ranoma fanae	sexual	10	haplodiploidy	
Eotetranychus rinoreae	sexual	6	haplodiploidy	
Eotetranychus roedereri	sexual	6	haplodiploidy	
Eotetranychus sakalavensis	sexual	4	haplodiploidy	
Eotetranychus tiliarium	sexual	8	haplodiploidy	
Eotetranychus tulearensis	sexual	4	haplodiploidy	
Epidamaeus species	sexual			
Epilohmannia cylindrica	parthenogenetic			
Epilohmannia pallida	parthenogenetic			
Epilohmannia styriaca	parthenogenetic			
Epilohmannoides jacoti	parthenogenetic			
Epilohmannoides terrae	parthenogenetic			
Epitrimerus pyri	sexual		haplodiploidy	
Eremobelba gracilior	sexual			
Eriophyes laevis	sexual		haplodiploidy	
Eriophyes tiliae	sexual	4	haplodiploidy	

Species	Reproductive Mode	Female Diploid Number	Ploidy	Sex Chromosomes
Erythraeus sp.	sexual	16	diplodiploidy	
Euandrolaelaps sp.	sexual		haplodiploidy	
Eugamasus kraepelini	sexual	12	diplodiploidy	
Eugamasus magnus	sexual	10	diplodiploidy	
Eulaelaps shanghaiensis	sexual	16	haplodiploidy	
Eulohmannia ribagai	parthenogenetic			
Eupalopsellus brevipilus	sexual	8	haplodiploidy	
Eupalopsellus olearius	sexual	6	haplodiploidy	
Eupelops hirtus	sexual			
Eupelops plicatus	sexual			
Eupelops torulosus	sexual			
Eupodes sigmoidensis	parthenogenetic			
Eupodes sp.	sexual	18	haplodiploidy	
Eurytetranychus buxi	sexual	10	haplodiploidy	
Eurytetranychus madagascariensis	sexual	6	haplodiploidy	
Euseius hibisci	sexual		PGE	
Euseius quetzali	sexual		PGE	
Eutegaeus curviseta	sexual			
Eutetranychus banksi	sexual	6	haplodiploidy	
Eutetranychus eliei	sexual	8	haplodiploidy	
Eutetranychus grandidieri	sexual	4	haplodiploidy	
Eutetranychus orientalis	sexual	6	haplodiploidy	
Eutetranychus ranjatori	sexual	6	haplodiploidy	
Eutetranychus sambiranensis	sexual	4	haplodiploidy	
Euzetes globulus	sexual	18	diplodiploidy	
Evadorhagidia oblikensis	parthenogenetic			
Eylais mutila	sexual	6	diplodiploidy	
Eylais rimosa	sexual	4	diplodiploidy	
Eylais setosa	sexual	4	diplodiploidy	
Eylais sp.1	sexual	4	diplodiploidy	
Eylais sp.2	sexual	6	diplodiploidy	
Fosseremus laciniatus auct	parthenogenetic			
Frontipoda musculus	sexual	19	diplodiploidy	
Fuscouropoda appendiculata	sexual			
Fuscozetes species	sexual			
Gaeolaelaps aculeifer	sexual	18	haplodiploidy	
Gaeolaelaps sp.1	sexual		haplodiploidy	
Gaeolaelaps sp.2	sexual		haplodiploidy	
Galumna ithacensis	sexual			
Galumna sp.	sexual	18	diplodiploidy	
Gamasellodes bicolor	parthenogenetic			
Gamasellodes rectiventris	sexual		haplodiploidy	
Gamasellodes sp.	sexual		haplodiploidy	
Gamasellodes vermivorax	sexual		haplodiploidy	
Gamasellus vibrissae	parthenogenetic			
Gamasolaelaps whartoni	parthenogenetic			
Geckobiella texana	sexual		haplodiploidy	
Geholaspis alpinus	parthenogenetic			
Geholaspis berlesei	parthenogenetic			
Geholaspis longispinosus	parthenogenetic			
Geholaspis longulus	parthenogenetic			
Geholaspis mandibularis	parthenogenetic			
Geholaspis pauperior	parthenogenetic			
Gehypochthonius rhadamanthus	parthenogenetic			
Gehypochthonius urticinus	parthenogenetic			
Gehypochthonius xarifae	parthenogenetic			
Geolaelaps oreithyiae	parthenogenetic			
Glycyphagus domesticus	sexual	18	diplodiploidy	XO
Glyptholaspis americana	sexual		haplodiploidy	
Glyptholaspis confusa	sexual		haplodiploidy	
Glyptholaspis fimicola	sexual		haplodiploidy	
Glyptholaspis pontina	sexual		haplodiploidy	
Gozmanyina majesta	parthenogenetic			

Species	Reproductive Mode	Female Diploid Number	Ploidy	Sex Chromosomes
Gozmanyina majestus	parthenogenetic			
Graptoppia (Stenoppia)	parthenogenetic			
Gymnodamaeus bicostatus	sexual			
Haemaphysalis bancrofti	sexual	22	diplodiploidy	
Haemaphysalis bispinosa	sexual		diplodiploidy	XO
Haemaphysalis bremneri	sexual	22	diplodiploidy	XO
Haemaphysalis campanulata	sexual	22	diplodiploidy	XO
Haemaphysalis flava	sexual	22	diplodiploidy	XO
Haemaphysalis formosensis	sexual	22	diplodiploidy	XO
Haemaphysalis hystricis	sexual	20	diplodiploidy	XO
Haemaphysalis japonica	sexual	22		
Haemaphysalis kitaokai	sexual	20	diplodiploidy	XO
Haemaphysalis lagrangei	sexual	22	diplodiploidy	XO
Haemaphysalis leachi	sexual	16		
Haemaphysalis leporispalustris	sexual	22	diplodiploidy	XO
Haemaphysalis longicornis	sexual	29	diplodiploidy	XO
Haemaphysalis megaspinosa	sexual	22	diplodiploidy	XO
Haemaphysalis pentalagi	sexual	22	diplodiploidy	XO
Haemogamasus centrocarpus	sexual		haplodiploidy	
Haemogamasus longipes	sexual		haplodiploidy	
Halotydeus destructor	sexual		diplodiploidy	
Halotydeus destructor.2	parthenogenetic			
Haplochthonius simplex	parthenogenetic			
Harpyrhynchus brevis	sexual	4	haplodiploidy	
Harpyrhynchus novoplumaris	sexual	4	haplodiploidy	
Hawaiieupodes thermophilus	parthenogenetic			
Heminothrus interlamellaris	parthenogenetic			
Heminothrus longisetosus	parthenogenetic			
Heminothrus ornatissimus	parthenogenetic			
Heminothrus paolianus	parthenogenetic			
Heminothrus targionii	parthenogenetic			
Hemisarcoptes coccophagus	sexual	14	diplodiploidy	
Hermannia gibba	sexual	16	diplodiploidy	
Hermanniella species	sexual			
Hexanoetus conoidalis	sexual		haplodiploidy	
Histiostoma bakeri	sexual			
Histiostoma feroniarum	sexual	14	haplodiploidy	
Histiostoma formosana	sexual		haplodiploidy	
Histiostoma humiditatis	parthenogenetic			
Histiostoma julorum	sexual		haplodiploidy	
Histiostoma murchei	sexual		haplodiploidy	
Holonothrus sp.	sexual			
Holostaspella sp.	sexual		haplodiploidy	
Homeopronematus anconai	sexual		haplodiploidy	
Hormosianoetus laboratorium	sexual	8	haplodiploidy	
Humerobates rostrolamellatus	sexual	16	haplodiploidy	
Hyalomma aegyptium	sexual	22	diplodiploidy	XO
Hyalomma anatolicum	sexual	22	diplodiploidy	XO
Hyalomma anatolicum excavatum	sexual	22	diplodiploidy	XO
Hyalomma asiaticum	sexual	22	diplodiploidy	XO
Hyalomma asiaticum excavatum	sexual	22		
Hyalomma detritum	sexual	22	diplodiploidy	XO
Hyalomma dromedarii	sexual	22	diplodiploidy	XO
Hyalomma franchinii	sexual	22	diplodiploidy	XO
Hyalomma impeltarum	sexual	22	diplodiploidy	XO
Hyalomma marginatum	sexual	22	diplodiploidy	XO
Hyalomma rhipicephaloides	sexual	22	diplodiploidy	XO
Hyalomma rufipes	sexual	22	diplodiploidy	XO
Hydrachna globosa	sexual	12	diplodiploidy	
Hydrachna leegei	sexual	20	diplodiploidy	
Hydrachna sp.1	sexual	12	diplodiploidy	
Hydrachna sp.2	sexual	12	diplodiploidy	
Hydrachna uniscutata	sexual	12	diplodiploidy	

Species	Reproductive Mode	Female Diploid Number	Ploidy	Sex Chromosomes
Hydrodroma despiciens	sexual	6	diplodiploidy	
Hydrodroma despiciens.2	sexual	16	diplodiploidy	XO
Hydrozetes dimorphus	parthenogenetic			
Hydrozetes lacustris	parthenogenetic			
Hydrozetes parisiensis	parthenogenetic			
Hydrozetes terrestris	parthenogenetic			
Hydrozetes tridactylus	parthenogenetic			
Hydryphantes bayeri	sexual	10	diplodiploidy	
Hydryphantes clypeatus	sexual	6	diplodiploidy	
Hydryphantes ruber	sexual	12	diplodiploidy	
Hydryphantes sp.	sexual	10	diplodiploidy	
Hydryphantes sp.1	sexual	10	diplodiploidy	
Hydryphantes sp.2	sexual	10	diplodiploidy	
Hygrobates calliger	sexual	14	diplodiploidy	
Hypoaspis lubrica	sexual	14	haplodiploidy	
Hypochthonius luteus	parthenogenetic			
Hypochthonius rufulus	sexual	18	diplodiploidy	
Imparipes histricinus	sexual		haplodiploidy	
Indotritia acanthophora				
Iphidinychus geieri	parthenogenetic			
Iphiduropoda penicillata	sexual			
Iphiseius degenerans	sexual	8	haplodiploidy	
Iponemus confusus	sexual		haplodiploidy	
Iponemus radiatae	sexual		haplodiploidy	
Ixodes cornuatus	sexual	24		
Ixodes hexagonus	sexual	26	diplodiploidy	XO
Ixodes holocyclus	sexual	24	diplodiploidy	XO
Ixodes kingi	sexual	26	diplodiploidy	XY
Ixodes laysanensis	sexual	28	diplodiploidy	XY
Ixodes nipponensis	sexual	28		
Ixodes ricinus	sexual	28	diplodiploidy	XY
Ixodes tasmani	sexual	24		
Jacotella species	sexual			
Kennethiella trisetosa	sexual		haplodiploidy	
Kurosaia jiju	sexual			
Labidostomma luteum	parthenogenetic			
Laelaspis sp.	sexual		haplodiploidy	
Lasioseius berlesi	parthenogenetic			
Lasioseius denlalus	parthenogenetic			
Lasioseius subterraneus	sexual		haplodiploidy	
Lasioseius youcefi	parthenogenetic			
Lebertia porosa	sexual	16	diplodiploidy	
Lebertia sp.1	sexual	16	diplodiploidy	
Lebertia sp.2	sexual	18	diplodiploidy	
Lebertia stackelbergi	sexual	18	diplodiploidy	
Leiodinychus orbicularis	sexual			
Leipothrix dipsacivagus	sexual		haplodiploidy	
Leitneria granulata	parthenogenetic			
Lepidozetes singularis	sexual			
Leptotrombidium akamushi	sexual	12	diplodiploidy	XY
Leptotrombidium arenicola	sexual	28	diplodiploidy	
Leptotrombidium deliense	sexual	14	diplodiploidy	
Leptotrombidium fletcheri	sexual	14	diplodiploidy	
Leptotrombidium scutellare	sexual	14	diplodiploidy	XY
Liacarus coracinus	sexual			
Liacarus subterraneus	sexual			
Limnesia maculata	sexual	18	diplodiploidy	
Limnesia sp.1	sexual	18	diplodiploidy	
Limnesia sp.2	sexual	18	diplodiploidy	
Limnesia undulata	sexual	18	diplodiploidy	
Limnochares aquatica	sexual	6	diplodiploidy	
Limnozetes amnicus	parthenogenetic			
Limnozetes atmetos	parthenogenetic			

Species	Reproductive Mode	Female Diploid Number	Ploidy	Sex Chromosomes
Limnozetes borealis	parthenogenetic			
Limnozetes guyi	parthenogenetic			
Limnozetes latilamellata	parthenogenetic			
Limnozetes lustrum	parthenogenetic			
Limnozetes onondaga	parthenogenetic			
Limnozetes palmerae	parthenogenetic			
Limnozetes sphagni	parthenogenetic			
Linopodes sp.	sexual	18	haplodiploidy	
Liochthonius brevis	parthenogenetic			
Liochthonius sellnicki	parthenogenetic			
Liochthonius strenzkei	parthenogenetic			
Lohmannia banksi	parthenogenetic			
Lohmannia lanceolata	parthenogenetic			
Macrocheles boudreauxi	sexual	10	haplodiploidy	
Macrocheles glaber	sexual		haplodiploidy	
Macrocheles insignitus	sexual		haplodiploidy	
Macrocheles lerreus	parthenogenetic			
Macrocheles mammifer	sexual		haplodiploidy	
Macrocheles matrius	sexual		haplodiploidy	
Macrocheles merdarius	sexual		haplodiploidy	
Macrocheles muscadomesticae	sexual	10	haplodiploidy	
Macrocheles parapisentii	sexual		haplodiploidy	
Macrocheles penicilliger	parthenogenetic			
Macrocheles peniculalus	parthenogenetic			
Macrocheles peregrinus	sexual		haplodiploidy	
Macrocheles perglaber	sexual		haplodiploidy	
Macrocheles pisentii	sexual	10	haplodiploidy	
Macrocheles robustulus	sexual		haplodiploidy	
Macrocheles rodriguezi	sexual		haplodiploidy	
Macrocheles schaeferi	sexual		haplodiploidy	
Macrocheles scutatus	sexual		haplodiploidy	
Macrocheles similis	parthenogenetic			
Macrocheles sp.	sexual		haplodiploidy	
Macrocheles subbadius	sexual		haplodiploidy	
Macrocheles vernalis	sexual	10	haplodiploidy	
Mainothrus badius	parthenogenetic			
Malacoangelia remigera	parthenogenetic			
Malaconothrus crassisetosa	parthenogenetic			
Malaconothrus gracilis	parthenogenetic			
Malaconothrus hauseri	parthenogenetic			
Malaconothrus robustus	parthenogenetic			
Malaconothrus robustus asiaticus	parthenogenetic			
Malaconothrus sp.1	parthenogenetic			
Malaconothrus sp.2	parthenogenetic			
Masthermannia sp.1	parthenogenetic			
Meristacarus sp.	parthenogenetic			
Metaseiulus occidentalis	sexual	6	PGE	
Microppia minus	parthenogenetic			
Microtritia minima	parthenogenetic			
Mucronothrus nasalis	parthenogenetic			
Multioppia species	sexual			
Myialges pari	sexual	16	haplodiploidy	
Myianoetus sp.	sexual		haplodiploidy	
Nanhermannia comitalis	parthenogenetic			
Nanhermannia coronata	parthenogenetic			
Nanhermannia dorsalis	parthenogenetic			
Nanhermannia elegantula	parthenogenetic			
Nanhermannia nana	parthenogenetic			
Nehypochthonius porosus	parthenogenetic			
Nenteria breviunguiculata	sexual			
Nenteria stylifera	parthenogenetic			
Neodiscopoma pulcherrima	sexual			
Neodiscopoma splendida	sexual			

Species	Reproductive Mode	Female Diploid Number	Ploidy	Sex Chromosomes
Neognathus terrestris	parthenogenetic			
Neophyllobius aesculi	sexual	22	haplodiploidy	
Neophyllobius elegans	sexual	22	haplodiploidy	
Neophyllobius piniphilus	sexual	20	haplodiploidy	
Neoseiulus californicus	sexual		PGE	
Neoseiulus setulus	parthenogenetic			
Neotetranychus rubi	sexual	14	haplodiploidy	
Neotydeus ardisannae	parthenogenetic			
Neumania vemalis	sexual	4	diplodiploidy	
Neumania vernalis	sexual	4	diplodiploidy	
Nipponiella sp	parthenogenetic			
Nodele simplex	sexual	4	haplodiploidy	
Nothrus anauniensis	parthenogenetic			
Nothrus borussicus	parthenogenetic			
Nothrus macedi	parthenogenetic			
Nothrus monticolus	parthenogenetic			
Nothrus palustris	parthenogenetic			
Nothrus pratensis	parthenogenetic			
Nothrus quadripilis	parthenogenetic			
Nothrus silvestris	parthenogenetic			
Nothrus silvicus	parthenogenetic			
Nothrus terminalis carolinae	parthenogenetic			
Nothrus truncatus	parthenogenetic			
Novonothrus flagellatus	sexual			
Obuloides sp.	sexual	6	haplodiploidy	
Oligomerismus oregonensis	parthenogenetic			
Oligonychus andrei	sexual	4	haplodiploidy	
Oligonychus bessardi	sexual	8	haplodiploidy	
Oligonychus chazeaui	sexual	8	haplodiploidy	
Oligonychus coffeae	sexual	6	haplodiploidy	
Oligonychus gossypii	sexual	4	haplodiploidy	
Oligonychus monsarrati	sexual	8	haplodiploidy	
Oligonychus pratensis	sexual	8	haplodiploidy	
Oligonychus quercinus	sexual	6	haplodiploidy	
Oligonychus randriamasii	sexual	4	haplodiploidy	
Oligonychus sylvestris	sexual	4	haplodiploidy	
Oligonychus thelytokous	parthenogenetic			
Oligonychus ununguis	sexual	6	haplodiploidy	
Oligonychus virens	sexual	8	haplodiploidy	
Olodiscus minimus	parthenogenetic			
Oodinychus karawaiewi	sexual			
Oodinychus obscurasimilis	sexual			
Oodinychus ovalis	sexual			
Oodinychus spatulifera	sexual			
Ophionyssus natricis	sexual	18	haplodiploidy	
Oplitis alophora	sexual			
Oplitis franzi	sexual			
Oplitis wasmanni	sexual			
Oppia cf.	sexual			
Oppia nitens	parthenogenetic			
Oppia nodosa	parthenogenetic			
Oppia sp.	sexual	18	haplodiploidy	
Oppiella nova	parthenogenetic			
Oppioid sp.	sexual			
Oribatella calcarata	sexual			
Oribatella quadricornuta	sexual			
Oribatella sakamorii	parthenogenetic			
Oribatella sp.1	sexual			
Oribatella sp.2	sexual			
Oribatula sakamorii	parthenogenetic			
Oribatula tibialis	sexual			
Ornithodoros alactogalis	sexual	33		
Ornithodoros asperus	sexual	16	diplodiploidy	XY

Species	Reproductive Mode	Female Diploid Number	Ploidy	Sex Chromosomes
Ornithodoros capensis	sexual	20	diplodiploidy	XY
Ornithodoros gurneyi	sexual	12	diplodiploidy	XY
Ornithodoros lahorensis	sexual	26		
Ornithodoros macmillani	sexual	16		
Ornithodoros moubata	sexual	20	diplodiploidy	XY
Ornithodoros nereensis	sexual	25	diplodiploidy	XY
Ornithodoros savignyi	sexual	20	diplodiploidy	XY
Ornithodoros tartakovskyi	sexual	21	diplodiploidy	XY
Ornithodoros tholozani	sexual	16		
Ornithonyssus bacoti	sexual	16	haplodiploidy	
Ornithonyssus sylviarum	sexual	18	haplodiploidy	
Orthogalumna terebrantis	sexual	18	haplodiploidy	
Otobius lagophilus	sexual	20		
Otobius megnini	sexual	20		
Palaeacarus hystricinus	parthenogenetic			
Palaeacarus kamenskii	parthenogenetic			
Panonychus ulmi	sexual	6	haplodiploidy	
Paragignathus tamaricis	sexual	8	haplodiploidy	
Paralycus lavoipierrei	parthenogenetic			
Paralycus parvulus	parthenogenetic			
Parathyas dirempta	sexual	18	diplodiploidy	
Parhypochthonius aphidinus	parthenogenetic			
Pediculaster mesembrinae	sexual	6	haplodiploidy	
Pelelhiphis berlesei	parthenogenetic			
Pelelhiphis insignis	parthenogenetic			
Pelelhiphis rufeseens	parthenogenetic			
Peloribates cf.	sexual			
Penthaleus major	parthenogenetic			
Pergalumna curva	parthenogenetic			
Pergalumna emarginata	sexual			
Pergalumna formiparthenogenesis (obligate)ria	sexual			
Pergamasus brevicornis	sexual	12	diplodiploidy	
Petrobia harti	sexual	4	haplodiploidy	
Petrobia latens	sexual	8	haplodiploidy	
Phaulodiaspis borealis	sexual			
Phaulodiaspis rackei	sexual			
Phorytocarpais hyalinus	parthenogenetic			
Phthiracarus compressus	sexual			
Phthiracarus setosellus	sexual			
Phyllochthonius aoutii	parthenogenetic			
Phyllocoptruta oleivora	sexual	4	haplodiploidy	
Phytonemus pallidus	sexual	4	haplodiploidy	
Phytoptus tiliae	sexual	4	haplodiploidy	
Phytoseiulus persimilis	sexual	8	PGE	
Phytoseius amba	sexual	8	haplodiploidy	
Phytoseius finitimus	sexual	8	haplodiploidy	
Phytoseius sp.1	sexual	8	haplodiploidy	
Phytoseius sp.2	sexual	8	haplodiploidy	
Piona camea	sexual	22	diplodiploidy	
Piona coccinea coccinea	sexual	20	diplodiploidy	
Piona nodata	sexual	8	diplodiploidy	
Piona sp.1	sexual	8	diplodiploidy	
Piona sp.2	sexual	20	diplodiploidy	
Piona sp.3	sexual	22	diplodiploidy	
Piona sp.4	sexual		diplodiploidy	
Piona uncata uncata	sexual	20	diplodiploidy	
Plarynothrus altimontanus	parthenogenetic			
Plarynothrus banksi	parthenogenetic			
Plarynothrus biangulatus	parthenogenetic			
Plarynothrus bicarinatus	parthenogenetic			
Plarynothrus brevisetosus	parthenogenetic			
Plarynothrus carinatus	parthenogenetic			

Species	Reproductive Mode	Female Diploid Number	Ploidy	Sex Chromosomes
Plarynothrus castaneus	parthenogenetic			
Plarynothrus major	parthenogenetic			
Plarynothrus microclava	parthenogenetic			
Platynothrus peltifer	sexual	18	diplodiploidy	
Platynothrus punctatus	parthenogenetic			
Platynothrus septentrionalis	parthenogenetic			
Platynothrus sibiricus	parthenogenetic			
Platynothrus skottsbergii	parthenogenetic			
Platynothrus thori	parthenogenetic			
Platynothrus traversus	parthenogenetic			
Podocinum pacificum	parthenogenetic	10		
Podocinum sagax	sexual	10	haplodiploidy	
Podopterotegaeus tectus	parthenogenetic			
Podoribates pratensis	sexual			
Poecilochthonius spiciger	parthenogenetic			
Poecilophysis faeroensis	parthenogenetic			
Poecilophysis pratensis	parthenogenetic			
Polyaspinus cylindricus	parthenogenetic			
Polyaspinus patavinus	sexual			
Polyaspis sansonei	sexual			
Polyphagotarsonemus latus	sexual	4	haplodiploidy	
Pomerantzia benhami	parthenogenetic			
Pomerantzia kethleyi	parthenogenetic			
Pomerantzia prolata	parthenogenetic			
Porcupinychus insularis	sexual	8	haplodiploidy	
Poroliodes farinosus	sexual	18	diplodiploidy	
Proctolaelaps krimsei	sexual		haplodiploidy	
Proctolaelaps longipilis	sexual		haplodiploidy	
Protogamasellus brevicornis	parthenogenetic			
Protogamasellus hibernicus	parthenogenetic			
Protogamasellus massula	parthenogenetic			
Protogamasellus mica	parthenogenetic			
Protogamasellus sp.	parthenogenetic			
Protokalumma salicis	sexual			
Protoribates capucinus	parthenogenetic			
Protoribates lophotrichus	parthenogenetic			
Pseudonothrus hirtus	parthenogenetic			
Pseudoparasitus sp.	sexual		haplodiploidy	
Pseudouropoda calcarata	sexual			
Pseudouropoda structura	sexual			
Pseudouropoda tuberosa	sexual			
Pterochthonius angelus	parthenogenetic			
Punctoribates insignis	parthenogenetic			
Punctoribates punctum	sexual			
Pyemotes herfsi	sexual		haplodiploidy	
Pyemotes scolyti	sexual		haplodiploidy	
Pyemotes tritici	sexual	6	haplodiploidy	
Pyemotes ventricosus	sexual	6	haplodiploidy	
Quadroppia circumita	sexual			
Quadroppia quadricarinata	parthenogenetic			
Quadroppia sp.1	sexual			
Quadroppia sp.2	parthenogenetic			
Quadroppia sp.3	sexual			
Raoiella indica	sexual	4	haplodiploidy	
Rhagidia diversicolor	parthenogenetic			
Rhagidia gigas	parthenogenetic			
Rhinoseius colwelli	sexual		haplodiploidy	
Rhipicephalus bursa	sexual	24	diplodiploidy	
Rhipicephalus evertsi	sexual	22	diplodiploidy	XO
Rhipicephalus sanguineus	sexual	22	diplodiploidy	XO
Rhipicephalus secundus	sexual	22	diplodiploidy	XO
Rhizoglyphus echinopus	sexual	10	diplodiploidy	XY
Rhizoglyphus robini	sexual			

Species	Reproductive Mode	Female Diploid Number	Ploidy	Sex Chromosomes
Rhodacarellus silesiacus	parthenogenetic			
Rhodacarus denticulatus	parthenogenetic			
Rhyncaphytoptus ficifoliae	sexual		haplodiploidy	
Rhysotritia ardua	parthenogenetic			
Rhysotritia duplicata	parthenogenetic			
Riccardoella limacum	sexual	10	haplodiploidy	
Robustocheles mucronata	parthenogenetic			
Rostrozetes foveolatus	parthenogenetic			
Sancassania berlesei	sexual	18	diplodiploidy	XO
Sancassania michaeli	sexual	16	diplodiploidy	XO
Sancassania mycophaga	sexual	16	diplodiploidy	XO
Saniosulus nudus	sexual	6	haplodiploidy	
Sapracarus sp.	parthenogenetic			
Sapracarus tuberculalUs	parthenogenetic			
Sarcoptes scabiei	sexual	18	diplodiploidy	XO
Scheloribates laevigatus	sexual			
Scheloribates lanceoliger	sexual			
Scheloribates species	sexual			
Schizonobia oudemansi	sexual	8	haplodiploidy	
Schizonobia sycophanta	sexual	8	haplodiploidy	
Schizotetranychus australis	sexual	12	haplodiploidy	
Schizotetranychus schizopus	sexual	6	haplodiploidy	
Schwiebea elongata	parthenogenetic			
Scutacaridae flechtmanni	sexual	6	haplodiploidy	
Seiulus isolrichus	sexual	8	haplodiploidy	
Sellnickochthonius immaculatus	parthenogenetic			
Sellnickochthonius lydiae	parthenogenetic			
Sellnickochthonius suecia	parthenogenetic			
Sellnickochthonius zelawaiensis	parthenogenetic			
Sericothrombium schar/atinum	sexual	18	diplodiploidy	
Sericothrombium sp.1	sexual	26	diplodiploidy	
Sericothrombium sp.2	sexual	22	diplodiploidy	
Sericothrombium sp.3	sexual	18	diplodiploidy	
Shibaia longisensilla	parthenogenetic			
Siteroptes graminum	sexual	6	haplodiploidy	
Siteroptes reniformis	sexual	6	haplodiploidy	
Steganacarus magnus	sexual			
Stigmocheylus sp.1	parthenogenetic			
Stigmocheylus sp.2	parthenogenetic			
Stratiolaelaps miles	sexual	14	haplodiploidy	
Suctobelbella falcata	parthenogenetic			
Suctobelbella hamata	parthenogenetic			
Suctobelbella hurshi	parthenogenetic			
Suctobelbella laevis	parthenogenetic			
Suctobelbella palustris	parthenogenetic			
Suctobelbella similis	parthenogenetic			
Suctobelbella sp.1	parthenogenetic			
Suctobelbella sp.10	parthenogenetic			
Suctobelbella sp.11	parthenogenetic			
Suctobelbella sp.12	parthenogenetic			
Suctobelbella sp.13	parthenogenetic			
Suctobelbella sp.14	parthenogenetic			
Suctobelbella sp.15	parthenogenetic			
Suctobelbella sp.16	parthenogenetic			
Suctobelbella sp.17	parthenogenetic			
Suctobelbella sp.18	parthenogenetic			
Suctobelbella sp.19	parthenogenetic			
Suctobelbella sp.2	parthenogenetic			
Suctobelbella sp.20	parthenogenetic			
Suctobelbella sp.21	parthenogenetic			
Suctobelbella sp.3	parthenogenetic			
Suctobelbella sp.4	parthenogenetic			
Suctobelbella sp.5	parthenogenetic			

Species	Reproductive Mode	Female Diploid Number	Ploidy	Sex Chromosomes
Suctobelbella sp.6	parthenogenetic			
Suctobelbella sp.7	parthenogenetic			
Suctobelbella sp.8	parthenogenetic			
Suctobelbella sp.9	parthenogenetic			
Suctobelbella subcornigera	parthenogenetic			
Suctobelbella tuberculata	parthenogenetic			
Suctobelbella vera	parthenogenetic			
Synchthonius crenulatus	parthenogenetic			
Syringophiloidus minor	sexual	6	haplodiploidy	
Tarsonemus confusus	sexual		haplodiploidy	
Tarsonemus confusus.2	parthenogenetic			
Tarsonemus lobosus	sexual		haplodiploidy	
Tarsonemus nodosus	sexual		haplodiploidy	
Tarsonemus randsi	sexual		haplodiploidy	
Tarsonemus schlechtendali	sexual		haplodiploidy	
Tarsonemus sp.	sexual	4	haplodiploidy	
Tarsonemus talpae	sexual		haplodiploidy	
Tarsonemus virgineus	parthenogenetic			
Tarsonemus waitei	sexual		haplodiploidy	
Tectocepheus cuspidatus	parthenogenetic			
Tectocepheus minor	parthenogenetic			
Tectocepheus sarekensis	parthenogenetic			
Tectocepheus velatus	parthenogenetic			
Tegolophus hassani	sexual		haplodiploidy	
Tenuipalpoides acaciae	sexual	6	haplodiploidy	
Tenuipalpus inophylli	parthenogenetic			
Tetranychus atlanticus	sexual	6	haplodiploidy	
Tetranychus cinnabarinus	sexual	6	haplodiploidy	
Tetranychus hydrangeae	sexual	6	haplodiploidy	
Tetranychus kaliphorae	sexual	6	haplodiploidy	
Tetranychus ludeni	sexual	6	haplodiploidy	
Tetranychus neocalendonicus	sexual	6	haplodiploidy	
Tetranychus pacificus	sexual	6	haplodiploidy	
Tetranychus panici	sexual	8	haplodiploidy	
Tetranychus roseus	sexual	8	haplodiploidy	
Tetranychus tumidus	sexual	12	haplodiploidy	
Tetranychus urticae	sexual	6	haplodiploidy	
Tetranychus viennensis	sexual	6	haplodiploidy	
Tetranycopsis horridus	parthenogenetic	4	haplodiploidy	
Torpacarus omittens	parthenogenetic			
Trachytes aegrota	parthenogenetic			
Trachytes irenae	sexual			
Trachytes lamda	parthenogenetic			
Trachytes minima	sexual			
Trachytes montana	parthenogenetic			
Trachytes pauperior	parthenogenetic			
Trachytes pi	parthenogenetic			
Trachyuropoda coccinea	sexual			
Trachyuropoda pulchella	parthenogenetic			
Trachyuropoda pyriformis	sexual			
Trematurella elegans	sexual			
Trhypochthoniellus badius	parthenogenetic			
Trhypochthoniellus crassus	parthenogenetic			
Trhypochthoniellus excavatus	parthenogenetic			
Trhypochthoniellus setosus	parthenogenetic			
Trhypochthoniellus sp.1	parthenogenetic			
Trhypochthoniellus sp.2	parthenogenetic			
Trhypochthonius americanus	parthenogenetic			
Trhypochthonius nigricans	parthenogenetic			
Trhypochthonius silvestris	parthenogenetic			
Trhypochthonius tectorum	parthenogenetic	18		
Trichouropoda schweizeri	sexual			
Trichouropoda sociata	sexual			

Species	Reproductive Mode	Female Diploid Number	Ploidy	Sex Chromosomes
Trimalaconothrus glaber	parthenogenetic			
Trimalaconothrus novus	parthenogenetic			
Trimalaconothrus saxosus	parthenogenetic			
Trimalaconothrus simplex	parthenogenetic			
Troglocoptes sp.1	parthenogenetic			
Troglocoptes sp.2	parthenogenetic			
Troglocoptes sp.3	parthenogenetic			
Troglocoptes sp.4	parthenogenetic			
Tydeus caudatus	sexual	4	haplodiploidy	
Typhlodromus athiasae	sexual	8	haplodiploidy	
Typhlodromus caudiglans	sexual	8	haplodiploidy	
Typhlodromus chazeaui	sexual	8	haplodiploidy	
Typhlodromus contiguus	sexual	8	haplodiploidy	
Typhlodromus drori	sexual	8	haplodiploidy	
Typhlodromus fallacis	sexual	8	haplodiploidy	
Typhlodromus guatemalensis	parthenogenetic			
Typhlodromus gutierrezi	sexual	8	haplodiploidy	
Typhlodromus phialatus	sexual	8	haplodiploidy	
Typhlodromus porathi	sexual	8	haplodiploidy	
Typhlodromus pyri	sexual		PGE	
Typhlodromus rhenanus	sexual	8	haplodiploidy	
Typhlodromus sp.	sexual	8	haplodiploidy	
Typhlodromus stemlichti	sexual	8	haplodiploidy	
Typhlodromus transvaalensis	parthenogenetic			
Tyrophagus casei	sexual	10	diplodiploidy	XY
Tyrophagus neiswanderi	sexual	12	diplodiploidy	XY
Tyrophagus palmarum	sexual	16	diplodiploidy	XO
Tyrophagus putrescentiae	sexual	16	diplodiploidy	XO
Unionicola crassipes	sexual	18	diplodiploidy	
Urodiaspis pannonica	parthenogenetic			
Urodiaspis stammeri	sexual			
Urodiaspis tecta	parthenogenetic			
Uroobovella advena	sexual			
Uroobovella arcuatus	sexual			
Uroobovella cordieri	sexual			
Uroobovella fracta	sexual			
Uroobovella inermis	sexual			
Uroobovella obovata	sexual			
Uroobovella perforatus	sexual			
Uroobovella woelkei	sexual			
Uroplitella conspicua	parthenogenetic			
Uroplitella paradoxa	sexual			
Uropoda hamulifera	sexual			
Uropoda italica	parthenogenetic			
Uropoda kargi	sexual			
Uropoda minima	parthenogenetic			
Uropoda misella	parthenogenetic			
Uropoda orbicularis	parthenogenetic			
Uropoda undulata	sexual			
Uroseius hunzikeri	sexual			
Urotrachytes formicarius	sexual			
Varroa destructor	sexual		PGE	
Varroa jacobsoni	sexual	14	PGE	
Vasates aceriscrumena	sexual		haplodiploidy	
Veigaia cerva	parthenogenetic			
Veigaia exigua	parthenogenetic			
Veigaia kochi	parthenogenetic			
Veigaia nemorensis	parthenogenetic			
Veigaia parlita	parthenogenetic			
Veigaia planieola	parthenogenetic			
Veigaia pusilla	parthenogenetic			
Veigaia tranisalae	parthenogenetic			
Veigaia uneata	parthenogenetic			

Species	Reproductive Mode	Female Diploid Number	Ploidy	Sex Chromosomes
Xenillus tegeocranus	sexual	18	diplodiploidy	
Xylobates capucinus	parthenogenetic			
Xylobates oblongus	parthenogenetic			
Xylobates robuSlior	parthenogenetic			

.

Appendix E

Hymenoptera trait data

Species	Haploid Number	Eusocial	Colony Size	Parasite	Polyandry	Polygyny	Low Relatedness
Abia candens	16.0	0	1				
Acanthomyrmex ferox		1	57	0			
Acanthomyrmex notabilis		1	40	0			
Acanthomyrmex sp1	12.0	1		0			
Acanthomyrmex sp2	11.0	1		0			
Acanthomyrmex sp3	11.0	1		0			
Acanthomyrmex sp4	11.0	1		0			
Acromyrmex ambiguus	19.0	1		0			
Acromyrmex coronatus		1		0		0	0
Acromyrmex crassipinus	19.0	1		0			
Acromyrmex echinatior	18.0	1	10000	0	2	1	1
Acromyrmex heyeri	19.0	1		0			
Acromyrmex hispidus	19.0	1		0			
Acromyrmex insinuator		1		1	1		1
Acromyrmex landolti		1	1000	0	2		1
Acromyrmex octospinosus		1	1000	0	2	0	1
Acromyrmex subterraneus	19.0	1		0			
Acromyrmex versicolor		1	3000	0	2	1	1
Acropyga acutiventris	15.0	1		0			
Acropyga keira		1		0		0	0
Acropyga smithii		1		0		1	1
Acropyga sp1	16.0	1		0			
Acropyga sp2	15.0	1		0			
Acropyga sp3		1	1000	0			
Acropyga stygia		1	92	0			
Adelomyrmex biroi		1	10	0			
Aenictus brevicornis	12.0	1		0			
Aenictus currax		1	150000	0			
Aenictus laeviceps	11.0	1	97500	0	2	0	1
Aenictus sp1	15.0	1		0			
Aethercerus discolor	11.0	0	1				
Aethercerus dispar	12.0	0	1				
Aethercerus nitidus	11.0	0	1				
Aethercerus ranini	11.0	0	1				
Agapostemon splendens		0					
Agapostemon virescens	17.0	0	1				
Ageniaspis fuscicollis	10.0	0	1				
Aglaostigma albicincta	15.0	0	1				
Aglaostigma amoorensis	16.0	0	1				
Aglaostigma aucupariae	12.0	0	1				
Aglaostigma nebulosa	10.0	0	1				
Aglaostigma occipitosa	17.0	0	1				
Aglaostigma sapporonis	9.0	0	1				
Aglaostigma sp	22.0	0	1				
Agrothereutes extrematus	10.0	0	1				
Allantus luctifer	8.0	0	1				
Allantus meridionalis	9.0	0	1				
Allantus nakabusensis	10.0	0	1				
Allantus sp	8.0	0	1				
Alphostromboceros konowi	7.0	0	1				
Amblyopone australis	24.0	1	78	0			
Amblyopone fortis	22.0	1	96	0			
Amblyopone pallipes		1	22.5	0		1	1
Amblyopone pluto		1	36.5	0		0	0
Amblyopone reclinata	19.0	1	82	0			
Amblyopone sp1		1	89	0			
Ametastegia geranii	9.0	0	1				
Ametastegia pallipes	6.0	0	1				
Ammophila pictipennis		0					
Anagyrus lopezi	10.0	0	1				
Anastatus catalonicus	5.0	0	1				
Ancistrocerus adiabatuscytainus	6.0	0	1				
Ancistrocerus densepilloserus	6.0	0	1				
Ancistrocerus simulator	7.0	0	1				
Ancistrocerus spilogaster	6.0	0	1				
Ancistrocerus tuberculicepssutterianus	10.0	0	1				
Andrena duboisi	3.0	0	1				
Andrena dunningi		0					
Andrena sp	10.0	0	1				
Andrena togashii	3.0	0	1				
Andricus curvator	10.0	0	1				
Andricus fecundator	10.0	0	1				
Andricus kollari	10.0	0	1				

Species	Haploid Number	Eusocial	Colony Size	Parasite	Polyandry	Polygyny	Low Relatedness
Andricus quercuscalicis	10.0	0	1				
Aneugmenus japonicus	7.0	0	1				
Aneugmenus kiotonis	7.0	0	1				
Aneugmenus stramineipes	8.0	0	1				
Aneuretus simoni		1	40	0		1	1
Anisopteromalus calandrae	7.0	0	1				
Anochetus altisquamis	15.0	1		0			
Anochetus bequaerti		1	84	0			
Anochetus diegensis		1	13	0			
Anochetus faurei		1	434	0			
Anochetus graeffei	15.0	1		0			
Anochetus graeffei2	19.0	1		0			
Anochetus horridus	23.0	1		0			
Anochetus katonae		1	84	0			
Anochetus madaraszi	14.0	1		0			
Anochetus modicus	15.0	1		0			
Anochetus sp1	12.0	1		0			
Anochetus sp2	19.0	1		0			
Anochetus sp3	15.0	1		0			
Anochetus sp4	15.0	1		0			
Anochetus sp5	17.0	1		0			
Anochetus sp6	17.0	1		0			
Anochetus yerburyi	15.0	1		0			
Anonychomyrma itinerans	8.0	1		0			
Anonychomyrma scrutator		1	1750	0			
Anonychomyrma sp1	8.0	1		0			
Anoplius concinnus	14.0	0	1				
Anoplius viaticus	14.0	0	1				
Anoplolepis custodiens		1		0		1	1
Anoplolepis gracilipes	17.0	1	15000	0		1	1
Anoplonyx sp	8.0	0	1				
Anthidiellum notatum rufimaculatum		0					
Anthidium mormonum	16.0	0	1				
Anthophora acervorumvillosula	9.0	0	1				
Anthophora bomboides	18.0	0	1				
Anthophora californica	19.0	0	1				
Anthophora plumipes	9.0	0	1				
Aoplus pulchricornis	13.0	0	1				
Apanteles sp1	11.0	0	1				
Aphaenogaster albisetosus		1		0		0	0
Aphaenogaster araneoides		1	120	0			
Aphaenogaster ashmeadi		1	300	0		0	0
Aphaenogaster beccarii	15.0	1		0			
Aphaenogaster beccarii2	23.0	1		0			
Aphaenogaster carolinensis		1		0	0	0	0
Aphaenogaster cockerelli		1	6000	0		0	0
Aphaenogaster depilis	17.0	1		0			
Aphaenogaster dromedaria		1	100	0			
Aphaenogaster dulcinaea		1		0		0	0
Aphaenogaster famelica	17.0	1		0			
Aphaenogaster flemingi		1	300	0			
Aphaenogaster floridana		1	50	0			
Aphaenogaster fulva	18.0	1	281	0			
Aphaenogaster gibbosa	14.7	1		0		0	0
Aphaenogaster iberica	17.0	1		0			
Aphaenogaster lamellidens	19.0	1	300	0			
Aphaenogaster longiceps	23.0	1		0			
Aphaenogaster miamiana	18.0	1		0			
Aphaenogaster osimensis	16.0	1		0			
Aphaenogaster phalangium		1	120	0			
Aphaenogaster rudis	19.4	1	797	0	0	0	0
Aphaenogaster sardoa	17.0	1		0			
Aphaenogaster senilis	16.0	1	3906	0		0	0
Aphaenogaster smythiesi	14.0	1		0	0	0	0
Aphaenogaster sp1	15.0	1		0			
Aphaenogaster spinosa		1		0		0	0
Aphaenogaster subterranea	11.0	1		0		0	0
Aphaenogaster testaceopilosa	17.0	1		0			
Aphaenogaster tipuna	17.0	1		0			
Aphaenogaster treatae	21.0	1	881.33	0		0	0
Aphelinus abdominalis		0					
Aphelinus mali	5.0	0	1				
Aphidius colemani		0					

Species	Haploid Number	Eusocial	Colony Size	Parasite	Polyandry	Polygyny	Low Relatedness
Aphidius ervi		0					
Aphidius rhopalosiphi	7.0	0	1				
Aphytis mytilaspidus	5.0	0	1				
Apis andreniformis		1			2		1
Apis cerana	16.0	1	6884		2	0	1
Apis ceranaindica	16.0	1					
Apis ceranajaponica	16.0	1					
Apis dorsata	16.0	1	36630		2	0	1
Apis florea	16.0	1	6271		2	0	1
Apis mellifera	16.0	1	60,000		2	0	1
Apis mellifera adansonii	16.0	1					
Apis mellifera ligustica	16.0	1					
Apis mellifera mellifera	16.0	1					
Apomyrma stygia		1	52.5	0		1	1
Apterostigma angulatum		1	155	0			
Apterostigma collare		1	100	0	0	0	0
Apterostigma dentigerum		1	155	0		0	0
Apterostigma GR		1	27	0			
Apterostigma mayri	12.0	1	45	0	0	0	0
Apterostigma pilosum		1		0		1	1
Apterostigma robustum		1		0		0	0
Apterostigma SH		1	46	0			
Apterostigma sp1	10.0	1		0			
Apterostigma sp2	12.0	1		0			
Apterostigma sp3	16.0	1		0			
Apterostigma SQ		1	41	0			
Aptesis puncticollis	8.0	0	1				
Arge cyanocrocea	11.0	0	1				
Arge gracilicornis	8.0	0	1				
Arge melanochroa	10.0	0	1				
Arge nigripes	13.0	0	1				
Arge pagana	8.0	0	1				
Arge pectoralis	8.0	0	1				
Arge ustulata	8.0	0	1				
Ashmeadiella sp	16.0	0	1				
Asiemphytus albilabris	15.0	0	1				
Athalia bicolor	6.0	0	1				
Athalia cordata	6.0	0	1				
Athalia japonica	8.0	0	1				
Athalia kashmirensis	6.0	0	1				
Athalia lugensinfumata	8.0	0	1				
Athalia rosaerosae	8.0	0	1				
Athalia rosaeruficornis	8.0	0	1				
Atopomyrmex mocquerysi		1	65000	0			
Atta bisphaerica	11.0	1		0			
Atta cephalotes	22.0	1	1000000	0	2	0	1
Atta columbica	11.0	1	1420000	0	2	0	1
Atta laevigata	11.0	1		0	2	0	1
Atta sexdens	11.0	1	5000000	0	2	0	1
Atta texana		1		0			
Augochlora pura	11.0	0	1				
Augochlorella michaelis	16.0	1	3.5				
Augochlorella persimilis		1	3.5				
Augochlorella pura		1			0		0
Augochlorella striata		1	3.5		0	0	0
Augochloropsis brachycephala		0	1				
Augochloropsis metallica		0					
Augochloropsis sparsilis	8.0	0	1				
Aulacidea hieracii	10.0	0	1				
Austroplebeia australis		1	2000		0	0	0
Austroplebeia symei		1	2000		0	0	0
Axestotrigona ferruginea	18.0	1					
Baeosemus dentifer	11.0	0	1				
Baranisobas ridibundus	11.0	0	1				
Basiceros manni		1	34.5	0		0	0
Belyta depressa	8.0	0	1				
Biorhiza pallida	10.0	0	1				
Biosteres carbonarius	14.0	0	1				
Birka carinifrons	7.0	0	1				
Bombus affinis	18.0	1	176		0	0	0
Bombus atratus	20.0	1					
Bombus auricomus		1			0	0	0
Bombus bifarius		1					

Species	Haploid Number	Eusocial	Colony Size	Parasite	Polyandry	Polygyny	Low Relatedness
Bombus bimaculatus	18.0	1	60		1	0	1
Bombus californicus		1			1	0	1
Bombus citrinus		1			1	0	1
Bombus consobrinuswittenburghi	19.0	1					
Bombus deuteronymusmaruhanabachi	23.0	1					
Bombus diversus	18.0	1					
Bombus honshuensis	17.0	1					
Bombus hortorum		1	100		0	0	0
Bombus hypnorum		1	28.5		1	0	1
Bombus hypocrita	18.0	1					
Bombus ignitus	18.0	1					
Bombus impatiens		1					
Bombus lucorum	18.0	1	200		0	0	0
Bombus medius		1	2184				
Bombus moderatus	18.0	1					
Bombus morio	20.0	1					
Bombus muscorum		1	50				
Bombus nevadensis	17.5	1	139				
Bombus pennsylvanicus	18.0	1					
Bombus pseudobaicalensis	17.0	1					
Bombus ruderatus		1	400				
Bombus schrencki	17.0	1					
Bombus terrestris	18.0	1			0	0	0
Bombus terricola	18.0	1	100				
Bombus terricolaoccidentalis	18.0	1					
Bombus ussurensis	18.0	1					
Bothriomyrmex gibbus	11.0	1		0			
Bothriomyrmex hispanicus		1		0		0	0
Bothriomyrmex meridionalis		1		0		0	0
Bothriomyrmex pusillus	11.0	1		0			
Bothriomyrmex sp1	11.0	1		0			
Brachygastra augusti		1	1,000				
Brachygastra bilineolata		1	900				
Brachygastra lecheguana	28.0	1					
Brachygastra mellifica		1	7951		0	1	1
Brachygastra moebiana		1	400				
Brachygastra scutellaris		1	600				
Brachymeria intermedia	3.0	0	1				
Brachymeria lasus	5.0	0	1				
Brachymeria ovata	5.0	0	1				
Brachymyrmex depilis		1	110	0	1	0	1
Brachymyrmex heeri		1		0		1	1
Brachymyrmex pictusbalboae		1		0		1	1
Brachymyrmex sp1	9.0	1		0			
Brachymyrmex sp2		1	125	0			
Brachymyrmex spnov		1	200	0			
Brachymyrmex spnrobscurior		1	200	0			
Calameuta filiformis	20.0	0	1				
Calomyrmex laevissimus		1	250	0			
Calomyrmex spANIC-1	14.0	1		0			
Camargoia nordestina	17.0	1					
Camponotus abscisus		1		0		0	0
Camponotus aethiops	21.0	1		0		0	0
Camponotus albicoxis		1		0		0	0
Camponotus alii	21.0	1		0			
Camponotus americanus		1	3560	0		0	0
Camponotus atriceps	20.0	1		0		0	0
Camponotus balzani	20.0	1		0			
Camponotus bonariensis	20.0	1		0			
Camponotus brevis		1		0		0	0
Camponotus caryae	20.0	1		0			
Camponotus castaneus		1	350	0			
Camponotus chromaiodes		1	3560	0			
Camponotus cingulatus	20.0	1		0			
Camponotus claviscapus		1		0		0	0
Camponotus compressus	15.0	1		0			
Camponotus confusus		1	200	0			
Camponotus consobrinus	23.0	1		0	0	1	1
Camponotus crassisquamis	20.0	1		0			
Camponotus crassus	10.0	1		0			
Camponotus cruentatus	19.0	1		0		0	0
Camponotus discolor		1	70	0			
Camponotus dolendus	10.0	1		0			

Species	Haploid Number	Eusocial	Colony Size	Parasite	Polyandry	Polygyny	Low Relatedness
Camponotus excisus		1	300	0			
Camponotus femoratus	22.0	1		0			
Camponotus ferrugeneus		1	1777	0		0	0
Camponotus festinus	19.0	1		0	0	1	1
Camponotus floridanus		1	10000	0	0	0	0
Camponotus foreli	17.0	1		0			
Camponotus herculeanus		1	19688	0		0	0
Camponotus impressus		1	250	0		0	0
Camponotus japonicus	13.5	1		0			
Camponotus kiusiuensis	14.0	1		0			
Camponotus laevigatus		1	1950	0		0	0
Camponotus lateralis	14.0	1		0		0	0
Camponotus ligniperdus	14.0	1		0	0	1	1
Camponotus linnaei		1		0		1	1
Camponotus mitis	10.0	1		0			
Camponotus modoc		1	31845	0		1	1
Camponotus mucronatus		1	30	0		0	0
Camponotus mus	13.0	1		0			
Camponotus nawai		1		0	0	0	0
Camponotus nearcticus		1	70	0		0	0
Camponotus nipponicus		1		0	0	0	0
Camponotus noveboracensis		1	10900	0		0	0
Camponotus obscuripes	14.0	1		0			
Camponotus ocreatus		1		0	0	1	1
Camponotus papua		1	300	0			
Camponotus parius	20.0	1		0			
Camponotus pennsylvanicus		1	2800	0		0	0
Camponotus piceus		1		0		0	0
Camponotus pilicornis	25.0	1		0		0	0
Camponotus punctulatus	20.0	1		0			
Camponotus rectangularis		1		0		0	0
Camponotus rufipes	20.0	1		0			
Camponotus rufoglaucus	18.0	1		0			
Camponotus salvini		1		0		0	0
Camponotus sanctaefidei		1		0		0	0
Camponotus sericeiventris	20.0	1		0			
Camponotus sericeus	22.0	1		0			
Camponotus sexguttatus		1		0		0	0
Camponotus socius		1	350	0			
Camponotus solon		1	3698	0			
Camponotus sp-impressusgroup	26.0	1		0			
Camponotus sp1	9.0	1		0			
Camponotus sp2	19.0	1		0			
Camponotus sp3	20.0	1		0			
Camponotus sp4	19.0	1		0			
Camponotus sp5	18.0	1		0			
Camponotus sp6	20.0	1		0			
Camponotus sp7		1	5500	0			
Camponotus sp8		1	31	0			
Camponotus sp9		1	80	0			
Camponotus spANIC-1	23.0	1		0			
Camponotus spANIC-10	23.0	1		0			
Camponotus spANIC-11	16.0	1		0			
Camponotus spANIC-12	19.0	1		0			
Camponotus spANIC-13	10.0	1		0			
Camponotus spANIC-14	19.0	1		0			
Camponotus spANIC-2	23.0	1		0			
Camponotus spANIC-3	24.0	1		0			
Camponotus spANIC-5	16.0	1		0			
Camponotus spANIC-8	16.0	1		0			
Camponotus spANIC-9	18.0	1		0			
Camponotus spvariegatuscomplex	10.0	1		0			
Camponotus striatus		1		0		1	1
Camponotus subbarbatus		1	3560	0		0	0
Camponotus sylvaticus	20.0	1		0		0	0
Camponotus Taylori	12.0	1		0			
Camponotus thraso	20.0	1		0			
Camponotus truncatus		1		0		0	0
Camponotus universitatis		1		1			
Camponotus vagus	14.0	1		0			
Camponotus variegatus	13.0	1		0			
Camponotus vicinus		1	51000	0			
Camponotus vitiosus	9.0	1		0			

Species	Haploid Number	Eusocial	Colony Size	Parasite	Polyandry	Polygyny	Low Relatedness
Camponotus vitreus		1	4000	0			
Cardiocondyla batesii		1		0	1	0	1
Cardiocondyla elegans		1		0	2	0	1
Cardiocondyla emeryi		1	50	0		1	1
Cardiocondyla nuda	14.0	1	50	0		1	1
Cardiocondyla obscurior		1		0	1	1	1
Cardiocondyla paradoxa		1	50	0			
Cardiocondyla sp-Myrmobrachys	20.0	1		0			
Cardiocondyla sp1	20.0	1		0			
Cardiocondyla sp10	20.0	1		0			
Cardiocondyla sp11	13.5	1		0			
Cardiocondyla sp12	26.0	1		0			
Cardiocondyla sp13	9.0	1		0			
Cardiocondyla sp14	9.0	1		0			
Cardiocondyla sp15	16.0	1		0			
Cardiocondyla sp16	17.0	1		0			
Cardiocondyla sp17	10.0	1		0			
Cardiocondyla sp18	17.0	1		0			
Cardiocondyla sp19	19.0	1		0			
Cardiocondyla sp20	20.0	1		0			
Cardiocondyla sp21	10.0	1		0			
Cardiocondyla sp22	19.0	1		0			
Cardiocondyla sp7	22.0	1		0			
Cardiocondyla sp8	20.0	1		0			
Cardiocondyla sp9	19.0	1		0			
Cardiocondyla thoracica		1	70	0			
Cardiocondyla wroughtonii		1	50	0		1	1
Carebara asina	22.0	1		0			
Carebara pygmaeus		1	20000	0			
Carebara sauteri	18.0	1		0			
Carebara sp1	18.0	1		0			
Carebara sp2	22.0	1		0			
Carebara sp3	16.0	1		0			
Carebara sp4	13.0	1		0			
Carebara sp5	17.0	1		0			
Carebara sp6	21.0	1		0			
Carebara sp7	18.0	1		0			
Carebara sp8	22.0	1		0			
Carebara spANIC-6	19.0	1		0			
Carebara urichi		1	568	0			
Carebara vidua		1		0	1	0	1
Carinostigmus filippovi	14.0	0	1				
Cataglyphis bicolor	26.0	1		0			
Cataglyphis bombycinus		1		0		0	0
Cataglyphis cursor		1	2658	0	2	0	1
Cataglyphis hannae		1		0			
Cataglyphis ibericus	26.0	1		0			
Cataglyphis livida		1	333	0			
Cataglyphis piliscapus		1		0		0	0
Cataglyphis sabulosa		1	369	0			
Cataglyphis setipes	27.0	1		0			
Catolaccus grandis		0					
Celetrigona longicornis	15.0	1					
Centromyrmex alfaroi		1		0		1	1
Centromyrmex feae	22.0	1		0			
Centromyrmex sellaris		1	408	0			
Cephalotrigona capitata	17.0	1	1250				
Cephus cinctus	9.0	0	1				
Cerapachys biroi	14.0	1	600	0			
Cerapachys brevis	23.0	1		0			
Cerapachys cfcribrinodis		1	235	0			
Cerapachys edentata		1		0			
Cerapachys neotropicus		1		0		0	0
Cerapachys opaca		1	100	0			
Cerapachys polynikes		1	20	0			
Cerapachys sp1	25.0	1		0			
Cerapachys sp2	25.0	1		0			
Ceratina calcarata		0					
Ceratina dupla dupla		0					
Cerceris antipodes		0	1				
Chalepoxenus kutteri	12.0	1		1		0	0
Chalepoxenus muellerianus	12.0	1		1		0	0
Chalicodoma sculpturalis	16.0	0	1				

Species	Haploid Number	Eusocial	Colony Size	Parasite	Polyandry	Polygyny	Low Relatedness
Chalicodoma spissula	16.0	0	1				
Chalybion californicum		0					
Chalybion japonicum	24.0	0					
Charmon cruentatus	5.0	0	1				
Chasmias motatorius	17.0	0	1				
Cimbex femorata	8.0	0	1				
Cinetus lanceolatus	10.0	0	1				
Cirrospilus dialllus	6.0	0	1				
Cladius morio	6.0	0	1				
Cladius pectinicornis	6.0	0	1				
Cleptotrigona cubiceps	18.0	1					
Coelichneumon cyaniventris	13.0	0	1				
Coelichneumon sugillatorius	13.0	0	1				
Coelioxys sp	16.0	0	1				
Coelopisthia extenta	5.0	0	1				
Colobostruma alinodis	11.0	1		0			
Colobostruma sp1	10.0	1		0			
Colobostruma spANIC-1	11.0	1		0			
Colpoclypeus florus	6.0	0	1				
Colpognathus celerator	11.0	0	1				
Copidosoma buyssoni	12.0	0	1				
Copidosoma floridanum	9.5	0	1				
Copidosoma gelechiae	11.0	0	1				
Copidosoma truncatellum	10.0	0	1				
Corymbas fujisana	10.0	0	1				
Corymbas nipponica	10.0	0	1				
Cotesia glomeratus	12.0	0	1				
Cratichneumon viator	14.0	0	1				
Crematogaster arcuata		1		0		0	0
Crematogaster artifex		1	52275	0		1	1
Crematogaster ashmeadi		1	25000	0		0	0
Crematogaster atkinsoni		1	500	0			
Crematogaster BB		1	99	0			
Crematogaster biroi	12.0	1		0			
Crematogaster brasiliensis		1		0		0	0
Crematogaster brunnea	18.0	1		0			
Crematogaster bryophilia		1		0		0	0
Crematogaster carinata		1		0		1	1
Crematogaster crinosa		1		0		1	1
Crematogaster curvispinosa		1		0		0	0
Crematogaster distans		1		0			
Crematogaster dohrniartifex		1	56947	0			
Crematogaster dohrnirogenhoferi		1	5690	0			
Crematogaster elegans		1	300	0			
Crematogaster erecta		1		0		1	1
Crematogaster hespera		1		0			
Crematogaster irritabilissubtilis		1	5000	0			
Crematogaster jardinero		1		0		0	0
Crematogaster KA		1	39	0			
Crematogaster laboriosa	13.0	1		0			
Crematogaster laevis		1	1100	0			
Crematogaster larreae		1	789	0			
Crematogaster limata		1		0		1	1
Crematogaster lineolata		1	200	0		0	0
Crematogaster LO		1	221	0			
Crematogaster longispina		1		0		1	1
Crematogaster minutissima		1	200	0		1	1
Crematogaster minutus		1	150	0			
Crematogaster monteverdensis		1		0		1	1
Crematogaster montezumia		1		0		0	0
Crematogaster nigropilosa		1		0			
Crematogaster raptor		1		0		0	0
Crematogaster RE		1	125	0			
Crematogaster rochai		1		0		1	1
Crematogaster rogenhoferi		1	5128	0			
Crematogaster rothneyi	25.0	1		0			
Crematogaster scutellaris		1		0		0	0
Crematogaster smithi		1	165	0	0	0	0
Crematogaster sotobosque		1		0		0	0
Crematogaster sp1	20.0	1		0			
Crematogaster sp10	13.0	1		0			
Crematogaster sp11	12.0	1		0			
Crematogaster sp12	28.5	1		0			

Species	Haploid Number	Eusocial	Colony Size	Parasite	Polyandry	Polygyny	Low Relatedness
Crematogaster sp13	13.0	1		0			
Crematogaster sp4	13.0	1		0			
Crematogaster sp5	13.0	1		0			
Crematogaster sp6	18.0	1		0			
Crematogaster sp7	18.0	1		0			
Crematogaster sp8	12.0	1		0			
Crematogaster sp9	13.0	1		0			
Crematogaster spANIC-1	12.0	1		0			
Crematogaster spANIC-2	14.5	1		0			
Crematogaster subnuda	18.0	1		0			
Crematogaster subtilis		1	5000	0			
Crematogaster sumichrasti		1	1000	0		1	1
Crematogaster torosa		1		0		0	0
Croesus japonicus	8.0	0	1				
Croesus septentrionalis	8.0	0	1				
Croesus varus	8.0	0	1				
Cryptopone motschulskyi		1	20	0			
Cryptopone rotundiceps	6.0	1		0			
Cryptopone sauteri	14.0	1		0			
Cryptopone testacea	9.0	1		0			
Cullumanobombus rufocincus	19.0	1					
Cylindromyrmex brasiliensis	17.0	1		0			
Cynips divisa	10.0	0	1				
Cynips erinacea	12.0	0	1				
Cyphomyrmex cornutus	11.0	1	2072.5	0		0	0
Cyphomyrmex costatus	10.0	1	222	0	0	0	0
Cyphomyrmex longiscapus		1	152.67	0	0	0	0
Cyphomyrmex minutus		1	89.5	0			
Cyphomyrmex morschi		1	252	0	0	0	0
Cyphomyrmex muelleri		1	109	0			
Cyphomyrmex rimosus	16.0	1	200.5	0	0	0	0
Dacetinops cibdelus		1	10	0			
Dacetinops concinnus	8.0	1		0			
Daceton armigerum		1	5000	0			
Dacnusa sibirica		0					
Dacnusa sp1	17.0	0	1				
Dactylurina staudingeri	17.0	1					
Diacamma australe		1	129	0			
Diacamma ceylonense		1	332.33	0			
Diacamma cyaneiventre		1	214	0	0		0
Diacamma rugosum	7.0	1	40	0			
Diacamma sp1	18.0	1		0			
Diacamma sp2	22.0	1		0			
Diacamma sp3	15.0	1		0			
Diacamma sp4	33.0	1		0			
Diacamma sp5	29.0	1		0			
Diacamma sp6		1		0	0	0	0
Diacamma sp7		1	247	0			
Diacamma spfromMalaysia		1	86	0			
Diacamma spJapan		1	118	0			
Diadasia enavata	15.0	0	1				
Diadromus prosopius	11.0	0	1				
Diadromus pulchellus	11.0	0	1				
Diadromus subtilicornis	11.0	0	1				
Diadromus troglodytes	11.0	0	1				
Diadromus varicolor	11.0	0	1				
Diaeretiella rapae	6.0	0	1				
Dianthidium heterulkeiheterulkei	15.0	0	1				
Diastrophus nebulosus	10.0	0	1				
Dibrachys sp1	5.0	0	1				
Dicaelotus pumilis	11.0	0	1				
Dicaelotus spnrParvulus	11.0	0	1				
Diglyphus isaea		0					
Dinoponera australis		1	21.5	0			
Dinoponera gigantea	41.0	1	74	0			
Dinoponera lucida	57.0	1	90	0			
Dinoponera quadriceps	46.0	1	82	0	0	0	0
Diphyus latebricola	12.0	0	1				
Diphyus raptorius	12.0	0	1				
Diplolepis elganteria	9.0	0	1				
Diplolepis nervosum	9.0	0	1				
Diplolepis rosae	10.5	0	1				
Diplolepis spinosissimae	9.0	0	1				

Species	Haploid Number	Eusocial	Colony Size	Parasite	Polyandry	Polygyny	Low Relatedness
Diprion nipponicus	14.0	0	1				
Diprion pini	10.5	0	1				
Diprion similis	10.5	0	1				
Dirhinus himalayanus	5.0	0	1				
Dirophanes callopus	9.0	0	1				
Dirophanes fulvitarsis	10.0	0	1				
Dirophanes invisor	10.0	0	1				
Discoelius japonicus	12.0	0	1				
Discothyrea sp1	15.0	1		0			
Doleromyrma sp1	7.0	1		0			
Doleromyrma sp2	6.0	1		0			
Dolerus aeneus	8.0	0	1				
Dolerus ephippiatus	8.0	0	1				
Dolerus gessneri	8.0	0	1				
Dolerus hematodes	8.0	0	1				
Dolerus lewisii	14.0	0	1				
Dolerus niger	8.0	0	1				
Dolerus nigratus	8.0	0	1				
Dolerus similisjaponicus	9.0	0	1				
Dolerus subfasciatus	9.0	0	1				
Dolerus varispinus	8.0	0	1				
Dolerus yokohamensis	8.0	0	1				
Dolichoderus bispinosus		1		0		1	1
Dolichoderus imitator		1	25	0			
Dolichoderus lamellosus		1	80	0		0	0
Dolichoderus lutosus		1		0		0	0
Dolichoderus mariae		1		0			
Dolichoderus plagiatus		1		0		0	0
Dolichoderus pustulatus		1		0		0	0
Dolichoderus quadripunctatus	14.0	1		0		0	0
Dolichoderus scabridus	14.0	1		0			
Dolichoderus sp1	9.0	1		0			
Dolichoderus taschenbergi		1		0			
Dolichoderus thoracicus	15.0	1		0			
Dolichoderus validus		1	7000	0		0	0
Dolichovespula arenaria		1					
Dolichovespula maculata		1	181		0	0	0
Dolichovespula media		1	74		1	0	1
Dolichovespula norwegica		1	44		1	0	1
Dolichovespula saxonica		1	69		1	0	1
Dolichovespula sylvestris		1	76		1	0	1
Dorylus laevigatus		1	325000	0			
Dorylus molestus		1		0	2	0	1
Dorylus wilverthi		1	18500000	0	0	0	0
Dorymyrmex bicolor		1		0			
Dorymyrmex bicolor	13.0	1		0			
Dorymyrmex bossutus		1	1000	0			
Dorymyrmex bureni		1	1000	0			
Dorymyrmex elegans		1	1000	0			
Dorymyrmex flavus	13.0	1		0			
Dorymyrmex grandulus		1	1000	0			
Dorymyrmex insanus		1		0	0	0	0
Dorymyrmex pulchellus	9.0	1		0			
Dorymyrmex pyramicus	9.0	1		0			
Dorymyrmex reginicula		1	1000	0			
Dorymyrmex thoracicus	9.0	1		0			
Dryocosmus kuriphilus	10.0	0	1				
Dulophanes morio	6.0	0	1				
Dyspetes arrogator	10.0	0	1				
Echinopla sp1	12.0	1		0			
Eciton burchelli		1	762500	0	2	0	1
Eciton dulciumcrassinode		1		0		0	0
Eciton hamatum		1	400000	0		0	0
Eciton lucanoides		1		0			
Eciton mexicanum		1		0		0	0
Eciton vagansangustatum		1		0		0	0
Ectatomma brunneum	22.0	1		0			
Ectatomma edentatum	23.0	1	104	0			
Ectatomma muticum	20.0	1		0			
Ectatomma opaciventre		1	159	0			
Ectatomma parasiticum		1		1			
Ectatomma permagnum	23.0	1		0			
Ectatomma ruidum		1	160	0			

Species	Haploid Number	Eusocial	Colony Size	Parasite	Polyandry	Polygyny	Low Relatedness
Ectatomma tuberculatum	18.0	1	428	0		1	1
Ectemnius continuus		0					
Ectemnius rubicolanipponis	14.0	0	1				
Elinora koehleri	10.0	0	1				
Empria sp	15.0	0	1				
Empronus obsoletus	10.0	0	1				
Encarsia berlesei	5.0	0	1				
Encarsia formosa		0					
Encarsia pergandiella	6.0	0	1				
Ephedrus sp1	17.0	0	1				
Ephialtes manifestator	15.0	0	1				
Epyris nigir	14.0	0	1				
Eretmocerus eremicus		0					
Eretmocerus mundus		0					
Eriocampa mitsukurii	9.0	0	1				
Eudecatoma biguttata	9.0	0	1				
Eufriesea violacea	15.0	0	1				
Euglossa cyanaspis	21.0	0	1				
Euglossa hyacinthina	20.0	0	1				
Euglossa sp	21.0	0	1				
Eumenes fraternus		0					
Eumenes smithii		0					
Euodynerus foraminatus scutellaris	8.0	0	1				
Euodynerus hidalgo		0					
Euodynerus quadrifasciatus	5.0	0	1				
Eupelmus vesicularis	5.0	0	1				
Eurhopalothrix biroi		1	50	0			
Eurhopalothrix floridanus		1	100	0			
Eurhopalothrix procera		1		0			
Eurhopalothrix sp1	9.0	1		0			
Eurylabus torvus	10.0	0	1				
Eurytoma californica	10.0	0	1				
Eutomostethus juncivorus	6.0	0	1				
Exomalopsis aureopilosa	9.0	0	1				
Exomalopsis sp	8.0	0	1				
Fervidobombus atratus	20.0	1					
Fervidobombus californicus	19.0	1					
Fervidobombus fervidus	18.0	1	87.5		0	0	0
Fervidobombus morio	20.0	1					
Fervidobombus pennsylvanicus	18.0	1					
Forelius foetida	16.0	1		0			
Forelius mccooki	16.0	1		0			
Forelius pruinosus		1		0			
Forelius pruinosus		1	10000	0		1	1
Formica 3spp-fuscagr	27.0	1		0			
Formica 4spp	26.0	1		0			
Formica aquilonia	26.0	1	400000	0	1	1	1
Formica archboldi		1	500	0			
Formica argentea		1		0	0	1	1
Formica bradleyi		1		0	1	0	1
Formica candida	26.0	1		0	1	1	1
Formica cinerea	27.0	1		0			
Formica corsica		1		0		1	1
Formica cunicularia	27.0	1		0		1	1
Formica dakotensis	26.0	1		0	1		1
Formica dirksi		1		1			
Formica dolosa		1	630	0			
Formica exsecta	26.0	1	56089.5	0	1	0	1
Formica exsectoides		1	139938	0		1	1
Formica foreli		1		0		1	1
Formica frontalis	26.0	1		0			
Formica fusca	27.0	1	500	0	1	1	1
Formica gagates	27.0	1		0		1	1
Formica gerardi	27.0	1		0			
Formica grouvellei		1		0		1	1
Formica incerta		1	1191	0			
Formica japonica	27.0	1	3567	0	0	1	1
Formica lemani	27.0	1		0			
Formica lugubris	26.0	1	4000	0		1	1
Formica montana	27.0	1		0	1	1	1
Formica neorufibarbis		1	650	0			
Formica obscuripes	26.0	1		0	0	1	1
Formica opaciventris		1		0	1	1	1

Species	Haploid Number	Eusocial	Colony Size	Parasite	Polyandry	Polygyny	Low Relatedness
Formica pallidefulva		1	2556.5	0		0	0
Formica paralugubris		1		0	1	1	1
Formica pergandei	26.0	1		0			
Formica podzolica		1	3280	0	0	1	1
Formica polyctena	26.0	1	5500000	0		1	1
Formica pratensis	26.0	1		0	1	0	1
Formica pressilabris	26.0	1		0	1	1	1
Formica reflexa	26.0	1		0			
Formica rufa	26.0	1	100000	0	1	0	1
Formica rufibarbis	27.0	1		0			
Formica sanguinea	26.0	1		1	0	1	1
Formica schaufussidolosa		1	600	0		1	1
Formica selysi		1	40000	0	0	1	1
Formica subintegra	26.0	1		0	1	0	1
Formica subrufa	26.0	1		0		0	0
Formica subsericea		1	8916	0		1	1
Formica talbotae		1		1			
Formica transkaucasica		1		0	0	1	1
Formica truncorum	27.0	1	55000	0	1	0	1
Formica ulkei	26.0	1		0			
Formica uralensis	26.0	1		0			
Formica yessensis	26.0	1	307000000	0	1	1	1
Formicoxenus chamberlini	14.0	1		0			
Formicoxenus hirticolis	16.0	1		0			
Formicoxenus nitidulus	15.0	1		0		0	0
Formicoxenus provancheri	11.0	1		0		0	0
Formicoxenus quebecensis	14.0	1		0		0	0
Frieseomelitta doederleini	15.0	1					
Frieseomelitta ghiliani	15.0	1					
Frieseomelitta languida	15.0	1					
Frieseomelitta varia	15.0	1					
Gelis sp1	13.0	0	1				
Geotrigona mombuca	15.0	1	2500				
Gigantiops destructor	39.0	1	133	0			
Gilpinia abieticola	7.0	0	1				
Gilpinia frutetorum	7.0	0	1				
Gilpinia hercyniae	7.0	0	1				
Gilpinia pallida	7.0	0	1				
Gilpinia polytoma	6.0	0	1				
Glypta lapponica	9.0	0	1				
Gnamptogenys annulata	34.0	1		0			
Gnamptogenys bicolor		1	89	0	0		0
Gnamptogenys binghamii	11.0	1		0			
Gnamptogenys hartmani		1	317	0		0	0
Gnamptogenys horni		1	28	0			
Gnamptogenys ingeborgae		1	15	0			
Gnamptogenys macretes		1	40	0			
Gnamptogenys menadensis	21.0	1	204.5	0			
Gnamptogenys regularis		1		0			
Gnamptogenys sp2	23.0	1		0			
Gnamptogenys sp3		1	24	0			
Gnamptogenys striatula	17.0	1		0	1	1	1
Gnamptogenys strigata		1		0			
Gnamptogenys tornata		1		0			
Gorytes atricornis		0					
Habrobracon hebetor	10.0	0	1				
Habrobracon juglandis	10.5	0	1				
Habrobracon pectinophorae	10.0	0	1				
Habrobracon serinopae	10.0	0	1				
Halictus aerarius	14.0	1					
Halictus hesperus		1	149				
Halictus ligatus		1			0	0	0
Halictus lutescens		1	589				
Halictus marginatus		1			1		1
Halictus poeyi		1					
Harpagoxenus canadensis	18.0	1		1	0	0	0
Harpagoxenus sublaevis	20.0	1		1	0	0	0
Harpegnathos saltator		1	295	0	0	1	1
Hemibeleses nigriceps	16.0	0	1				
Hemichroa alni	9.0	0	1				
Heptamelus(Heptamelus) ochroleucus	10.0	0	1				
Heptamelus(Pseudoheptamelus) runari	7.0	0	1				
Heterischnus nigricollis	11.0	0	1				

Species	Haploid Number	Eusocial	Colony Size	Parasite	Polyandry	Polygyny	Low Relatedness
Heterischnus truncator	11.0	0	1				
Heteroponera dolo	12.0	1		0			
Heteroponera relicta	11.0	1		0			
Heterospilus prosopidis	17.0	0	1				
Homotherus locutor	11.0	0	1				
Hoplitis robusta	16.0	0	1				
Hylaeus affinis		0					
Hylaeus ellipticus	11.0	0	1				
Hylaeus nippon	8.0	0	1				
Hylaeus sp1	18.0	0	1				
Hylaeus sp2	28.0	0	1				
Hylaeus stevensi	14.0	0	1				
Hylaeus transversali	8.0	0	1				
Hypoponera confinis	19.0	1		0			
Hypoponera eduardi		1		0		1	1
Hypoponera gleadowi		1	32	0			
Hypoponera inexorata		1	50	0			
Hypoponera opaciceps		1	50	0			
Hypoponera opacior		1	50	0			
Hypoponera pruinosa	12.0	1		0			
Hypoponera sp1	19.0	1		0			
Hypoponera sp2	19.0	1		0			
Hypoponera sp3	18.0	1		0			
Hypoponera sp4		1	34	0			
Hypoponera sp5		1	24	0			
Hypoponera sp6		1	21	0			
Hypoponera spANIC-1	19.0	1		0			
Hypoponera spANIC-2	19.0	1		0			
Hypotrigona araujoi		1	2500				
Hypotrigona braunsi	14.0	1	425				
Hypotrigona gribodoi	14.0	1					
Ichneumon albiger	12.0	0	1				
Ichneumon amphibolus	12.0	0	1				
Ichneumon bucculentus	12.0	0	1				
Ichneumon confusor	12.0	0	1				
Ichneumon crassifemur	12.0	0	1				
Ichneumon croceipes	12.0	0	1				
Ichneumon extensorius	12.0	0	1				
Ichneumon formosus	11.0	0	1				
Ichneumon gracilentus	12.0	0	1				
Ichneumon gracilicornis	11.0	0	1				
Ichneumon ingratus	12.0	0	1				
Ichneumon inquinatus	13.0	0	1				
Ichneumon insidiosus	12.0	0	1				
Ichneumon lugens	12.0	0	1				
Ichneumon melanotis	12.0	0	1				
Ichneumon minutorius	12.0	0	1				
Ichneumon molitorius	12.0	0	1				
Ichneumon nereni	11.0	0	1				
Ichneumon sarcitorius	12.0	0	1				
Ichneumon stramentarius	10.0	0	1				
Ichneumon submarginatus	12.0	0	1				
Ichneumon suspiciosus	12.0	0	1				
Ichneumon validicornis	12.0	0	1				
Ichneumonidae sp1	15.0	0	1				
Iridomyrmex anceps	18.0	1		0			
Iridomyrmex anceps2	24.0	1		0			
Iridomyrmex gracilis	9.0	1		0			
Iridomyrmex humilis		1		0		1	1
Iridomyrmex mattiroloi	9.0	1		0			
Iridomyrmex purpureus	9.0	1	37500	0	0	1	1
Iridomyrmex scrutator		1	3000	0			
Iridomyrmex sp4	9.0	1		0			
Iridomyrmex spANIC-11	9.0	1		0			
Iridomyrmex spANIC-12	9.0	1		0			
Iridomyrmex spANIC-13	9.0	1		0			
Iridomyrmex spANIC-14	9.0	1		0			
Iridomyrmex spANIC-15	9.0	1		0			
Iridomyrmex spANIC-16	9.0	1		0			
Iridomyrmex spANIC-17	9.0	1		0			
Iridomyrmex spANIC-5	7.0	1		0			
Iridomyrmex spANIC-6	9.0	1		0			
Isepeolus viperinus	16.0	0	1				

Species	Haploid Number	Eusocial	Colony Size	Parasite	Polyandry	Polygyny	Low Relatedness
Janus integer	24.0	0	1				
Labidus coecus		1		0		0	0
Labidus praedator		1	2000000	0		0	0
Labidus spininodis		1		0		0	0
Laelius utilis	10.0	0	1				
Lagidina irritans	18.0	0	1				
Lagidina platycerus	18.0	0	1				
Lariophagus distinguesdus	5.0	0	1				
Larra bicolor		0					
Lasioglossum allodalum	20.0	1					
Lasioglossum cooleyi	18.0	1					
Lasioglossum duplex	9.0	1	5.5				
Lasioglossum imitatum		1	13.5				
Lasioglossum laevissumum		1			0	1	1
Lasioglossum lineatulus	12.0	1					
Lasioglossum lineatulus	12.0	1	2.5				
Lasioglossum malachurum		1	20.5		0	0	0
Lasioglossum marginatum		1	270		0		0
Lasioglossum rhytidophorum	6.0	1	6				
Lasioglossum rowheri		1			1		1
Lasioglossum taeniolellum	16.0	1					
Lasioglossum versatum		1	32.5				
Lasioglossum zephyrus	13.0	1	24.5		0	0	0
Lasius alienus	14.5	1	3000	0	1	0	1
Lasius brunneus	15.0	1		0		0	0
Lasius carniolicus		1	171	0			
Lasius cinereus		1		0		0	0
Lasius emarginatus	15.0	1		0			
Lasius flavus	15.0	1	4885	0	0	1	1
Lasius fuliginosus	14.0	1		0		1	1
Lasius grandis		1		0		0	0
Lasius lasioides		1		0		0	0
Lasius latipes		1		0			
Lasius minutus		1		0			
Lasius mixtus		1		0		1	1
Lasius myops		1		0		0	0
Lasius nearcticus	15.0	1		0			
Lasius neglectus		1	10000000	0	0	1	1
Lasius niger	15.0	1	39756.5	0	1	0	1
Lasius pallitarsus	14.0	1		0		0	0
Lasius pliferus		1		0		0	0
Lasius sabularum		1		0		0	0
Lasius sakagamii	15.0	1		0		1	1
Lasius talpa	15.0	1		0			
Lasius umbratus	15.0	1	3000	0			
Lepisiota capensis	9.0	1		0			
Lepisiota sp1	9.0	1		0			
Lepisiota sp2	9.0	1		0			
Leptanilla japonica		1	175	0			
Leptogenys attenuata		1	90	0			
Leptogenys bituberculata		1	300	0			
Leptogenys borneensis	23.0	1		0			
Leptogenys castanea		1	289	0			
Leptogenys chinensis		1	367	0		1	1
Leptogenys diminuta	17.5	1	361.33	0			
Leptogenys distinguenda		1	40000	0	0	0	0
Leptogenys hysterica	13.0	1		0			
Leptogenys iridescens	23.0	1		0			
Leptogenys kraepelini	13.0	1	21	0	0		0
Leptogenys minchinii	26.0	1		0			
Leptogenys myops	24.0	1		0			
Leptogenys nitida		1	595	0			
Leptogenys ocellifera		1	24000	0			
Leptogenys peugueti	27.0	1		0			
Leptogenys processionalis	23.0	1		0			
Leptogenys purpurea		1	1250	0			
Leptogenys schwabi		1	184	0			
Leptogenys sp1	24.0	1		0			
Leptogenys sp2	15.0	1		0			
Leptogenys sp3	27.0	1		0			
Leptogenys sp4		1	53	0			
Leptogenys sp5		1	782	0			
Leptomastix dactylopii		0					

Species	Haploid Number	Eusocial	Colony Size	Parasite	Polyandry	Polygyny	Low Relatedness
Leptomyrmex erytrocephalus	12.0	1		0			
Leptomyrmex fragilis		1	350	0			
Leptothorax acervorum	13.0	1	45.07	0	0	1	1
Leptothorax albipennis	8.0	1		0			
Leptothorax ambiguus		1	38	0		1	1
Leptothorax curvispinosus		1	69	0		1	1
Leptothorax goesswaldi	28.0	1		1			
Leptothorax gredleri	11.0	1		0	1	0	1
Leptothorax kutteri	24.0	1		1			
Leptothorax longispinosus		1	36.5	0	0	1	1
Leptothorax muscorum	19.2	1		0	0	1	1
Leptothorax nylanderi		1	37	0	0	0	0
Leptothorax pacis	26.0	1		1			
Leptothorax pergandei		1		0	0	0	0
Leptothorax pocahontas	18.0	1		1			
Leptothorax retractus	17.5	1		0		1	1
Leptothorax sp1	16.0	1		0			
Leptothorax sp10	17.0	1		0			
Leptothorax sp2	21.0	1		0			
Leptothorax sp3	17.0	1		0			
Leptothorax sp4	12.0	1		0			
Leptothorax sp5	12.0	1		0			
Leptothorax sp6	13.0	1		0			
Leptothorax sp7	14.0	1		0			
Leptothorax sp8	22.0	1		0			
Leptothorax sp9	15.5	1		0			
Leptothorax sphagnicola	13.0	1		0			
Leptothorax unifasciatus		1	116	0	0	0	0
Lestrimelitta limao	14.0	1			0	0	0
Leucospis affinis	6.0	0	1				
Leurotrigona muelleri	8.0	1					
Leurotrigona pusilla	15.0	1					
Linepithema humile	8.0	1	1000000	0	0	1	1
Linepithema pilifer	9.0	1		0			
Linepithema sp1	9.0	1		0			
Liometopum occidentale		1		0			
Liostenogaster flavolineata		1	27		0	0	0
Liostenogaster sp1	7.0	1					
Liostenogaster vechti		1	34				
Lissonota sp	11.0	0	1				
Loderus eversmanniobscurus	14.0	0	1				
Loderus genucinctusinsulicola	11.0	0	1				
Lophomyrmex bedoti	19.0	1		0			
Lophomyrmex sp1	19.0	1		0			
Lordomyrma sp1	11.0	1		0			
Lordomyrma sp2		1	12.5	0			
Macrocentrus grandii		0					
Macrocentrus thoracicus	13.0	0	1				
Macrodiprion nemoralis	7.0	0	1				
Macrophya albipuncta	8.0	0	1				
Macrophya annulitibia	10.0	0	1				
Macrophya apicalis	8.0	0	1				
Macrophya carbonaria	10.0	0	1				
Macrophya coxalis	10.0	0	1				
Macrophya esakiiexilis	8.0	0	1				
Macrophya falsifica	10.0	0	1				
Macrophya fascipennis	12.0	0	1				
Macrophya imitator	8.0	0	1				
Macrophya infumata	9.0	0	1				
Macrophya malaisei	10.0	0	1				
Macrophya montana	8.0	0	1				
Macrophya punctumalbum	10.0	0	1				
Macrophya ribis	12.0	0	1				
Macrophya rohweri	10.0	0	1				
Macrophya rufipes	10.0	0	1				
Macrophya sp	10.0	0	1				
Macrophya timida	10.0	0	1				
Manica rubida	22.0	1		0		1	1
Mastrus smithii	13.0	0	1				
Mayriella abstinens	9.0	1		0			
Megachile albitarsis		0					
Megachile rotundata		0					
Megachile ainu	16.0	0	1				

Species	Haploid Number	Eusocial	Colony Size	Parasite	Polyandry	Polygyny	Low Relatedness
Megachile pseudomonticola	16.0	0	1				
Megachile relativa	16.0	0	1				
Megachile rotundata	16.0	0	1				
Meliplebeia beccari	17.0	1					
Meliplebeia nebulata komiensis		1	1097.5				
Melipona anthidioides		1	894				
Melipona asilvae	9.0	1					
Melipona beecheii		1			0	0	0
Melipona bicolor bicolor	9.0	1			0	1	1
Melipona capixaba	9.0	1					
Melipona compressipes	9.0	1			0	0	0
Melipona crinita	9.0	1					
Melipona fasciata melanopleura		1	2000				
Melipona favosa	9.0	1			0	0	0
Melipona interrupta fasciculata	9.0	1					
Melipona mandacaia	9.0	1					
Melipona marginata	9.0	1	384.33		0	0	0
Melipona marginata carrikeri		1	210				
Melipona marginata marginata	9.0	1	191				
Melipona mondury	9.0	1					
Melipona nigra	9.0	1					
Melipona panamica		1			0	0	0
Melipona quadrifasciata	9.0	1	483.33		0	0	0
Melipona quinquefasciata	14.0	1			0		0
Melipona rufiventris	9.0	1					
Melipona scutellaris	9.0	1	666.67		0	0	0
Melipona subnitida	9.0	1			0	0	0
Meliponula becarii	17.0	1					
Meliponula bocandei	18.0	1					
Melissodes desponsa		0					
Melissodes illata		0					
Melittobia chalybii	5.0	0	1				
Meranoplus bicolor	8.0	1		0			
Meranoplus minor	11.0	1		0			
Meranoplus sp1	10.0	1		0			
Meranoplus sp2	11.0	1		0			
Meranoplus sp3	11.0	1		0			
Meranoplus sp4	11.0	1		0			
Meranoplus spinosus		1	150	0			
Messor aciculatus	22.0	1		0			
Messor andrei	20.0	1		0			
Messor barbarus	21.0	1		0		0	0
Messor bouvieri		1		0		0	0
Messor capitatus		1		0		0	0
Messor ebeninus		1		0	1	0	1
Messor minor		1		0		0	0
Messor sp1	20.0	1		0			
Messor structor		1		0		1	1
Messor wasmanni		1		0		0	0
Metapolybia sp	19.0	1					
Meteorus gyrator	10.0	0	1				
Meteorus pallipes	10.0	0	1				
Meteorus versicolor	8.0	0	1				
Microbembex monodonta		0					
Microstigmus arlei	3.0	1	3.5				
Microstigmus brasiliensis	5.0	1	3.5				
Microstigmus comes		1	6.5		0	0	0
Microstigmus cooperi	3.0	1					
Microstigmus crucifex	4.0	1					
Microstigmus luederwaldti	3.0	1	3.5				
Mirax sp1	10.0	0	1				
Mischocyttarus cassununga	32.0	1					
Mischocyttarus sp	34.0	1					
Miscophus slossonae		0					
Monoctenus nipponicus	15.0	0	1				
Monoctenus suffusus	7.0	0	1				
Monodontomerus clemellti	6.0	0	1				
Monodontomerus montivagus	6.0	0	1				
Monodontomerus obscurus	5.0	0	1				
Monodontomerus saltuosus	5.0	0	1				
Monomorium destructor		1		0		1	1
Monomorium dichroum	8.0	1		0			
Monomorium floricola		1		0		1	1

Species	Haploid Number	Eusocial	Colony Size	Parasite	Polyandry	Polygyny	Low Relatedness
Monomorium glabrum	19.0	1		0			
Monomorium indicum	11.0	1		0			
Monomorium latinode	35.0	1		0			
Monomorium minimum	11.0	1	3000	0	0	1	1
Monomorium orientale	10.0	1		0			
Monomorium pharaonis	11.0	1		0	0	1	1
Monomorium rothsteini	11.0	1	47250	0			
Monomorium salomonis		1		0	1	1	1
Monomorium scabriceps	19.0	1		0			
Monomorium sp1	11.0	1		0			
Monomorium sp10	19.0	1		0			
Monomorium sp11	11.0	1		0			
Monomorium sp12	11.0	1		0			
Monomorium sp2	21.0	1		0			
Monomorium sp3	16.0	1		0			
Monomorium sp4	11.0	1		0			
Monomorium sp5	11.0	1		0			
Monomorium sp6	11.0	1		0			
Monomorium sp7	11.0	1		0			
Monomorium sp8	11.0	1		0			
Monomorium sp9	17.0	1		0			
Monomorium subopacum	17.0	1		0			
Monomorium viride	11.0	1	10000	0		1	1
Monomorium whitei	12.0	1	20225	0			
Monosoma pulveratum	8.0	0	1				
Mourella caerulea	17.0	1					
Muscidifurax zaraptor	5.0	0	1				
Mycocepurus goeldii	8.0	1	1352	0			
Mycocepurus smithii		1	163	0		1	1
Mycocepurus sp1	8.0	1		0			
Myopias sp1		1	60	0			
Myopias sp2		1	55	0			
Myopias sp3		1	30	0			
Myrmecia banksi	9.5	1		0			
Myrmecia brevinoda	42.0	1	2794	0		0	0
Myrmecia cephalotes	33.0	1		0			
Myrmecia chasei	23.0	1		0			
Myrmecia croslandi	1.5	1		0			
Myrmecia desertorum		1	29.76	0		1	1
Myrmecia dispar		1	62.66	0		0	0
Myrmecia forficata	26.0	1	211	0			
Myrmecia froggatti		1	38	0	0	0	0
Myrmecia fulvipes	21.3	1	108.56	0			
Myrmecia gulosa	19.0	1	908.31	0			
Myrmecia haskinsorum	9.0	1		0			
Myrmecia imaii	3.5	1		0		1	1
Myrmecia mandibularis	28.5	1	402	0		0	0
Myrmecia michaelseni	27.0	1	18	0			
Myrmecia nigrocincta	11.0	1	821	0		0	0
Myrmecia occidentalis	32.0	1		0			
Myrmecia pavida	22.0	1		0			
Myrmecia picta		1	6.91	0		0	0
Myrmecia piliventris	17.8	1	165.5	0			
Myrmecia pilosula	10.5	1	707.5	0		1	1
Myrmecia pyriformis	41.0	1	1361.5	0			
Myrmecia simillima	35.0	1	162.4	0			
Myrmecia spcfarnoldi	29.3	1		0			
Myrmecia spcffulvipes	6.0	1		0			
Myrmecia tarsata		1	1126	0			
Myrmecia tepperi	35.0	1	117	0			
Myrmecia varians		1	145	0		0	0
Myrmecia vindex	37.5	1	190.5	0		0	0
Myrmecina americana	14.0	1	37	0		0	0
Myrmecina graminicola	14.0	1	27	0		1	1
Myrmecina nipponica		1		0	0	0	0
Myrmecina sp1	33.0	1		0			
Myrmecina sp2	34.0	1		0			
Myrmecina spA		1	130	0	1		1
Myrmecina transversa		1	100	0			
Myrmica americana		1		0	0	1	1
Myrmica brevispinosa		1	445	0			
Myrmica fracticornis		1	627	0		1	1
Myrmica hirsuta		1		1			

Species	Haploid Number	Eusocial	Colony Size	Parasite	Polyandry	Polygyny	Low Relatedness
Myrmica incompleta		1	918	0		1	1
Myrmica kotokui		1	280	0			
Myrmica latifrons		1	255	0		1	1
Myrmica lobicornis	12.0	1		0	0	1	1
Myrmica lobifrons		1	1243	0		1	1
Myrmica pinetorum		1	396	0		0	0
Myrmica punctiventris		1	74.9	0	0	1	1
Myrmica rubra	23.5	1	5500	0	1	1	1
Myrmica ruginodis	24.0	1	2035.5	0	1	1	1
Myrmica sabuleti	23.0	1		0		1	1
Myrmica scabrinodis	22.0	1		0		1	1
Myrmica schencki	23.0	1	408	0		1	1
Myrmica schenckioides		1		1			
Myrmica spatulata		1	296	0		1	1
Myrmica spinosior		1		0	1		1
Myrmica sulcinodis	26.0	1	143.5	0	1	1	1
Myrmica tahoensis		1	175	0	0	1	1
Myrmicaria brunnea	22.0	1		0			
Myrmicaria eumenoides		1	19898.5	0			
Myrmicaria opaciventris		1	147230	0			
Myrmicaria sp1	22.0	1		0			
Myrmicaria sp2	22.0	1		0			
Myrmicaria sp3	22.0	1		0			
Myrmicaria sp4	22.0	1		0			
Myrmicaria sp5	23.0	1		0			
Myrmicocrypta ednaella		1	145	0	0	0	0
Myrmicocrypta sp1	15.0	1		0			
Myrmoteras barbouri		1	11	0			
Myrmoteras toro		1	23	0			
Myrmoxenus adlerzi	10.0	1		1			
Myrmoxenus algeriana	10.0	1		1			
Myrmoxenus bernardi	10.0	1		1			
Myrmoxenus corsica	10.0	1		1			
Myrmoxenus goesswaldi		1		0	0	0	0
Myrmoxenus gordiagini	10.0	1		0	0		0
Myrmoxenus kraussei	10.0	1		1			
Myrmoxenus ravouxi	10.0	1	40	1	0	0	0
Myrmoxenus stumperi	10.0	1		0			
Mystrium camillae	16.0	1	58	0			
Mystrium mysticum		1	43	0			
Mystrium oberthueri		1	35	0			
Mystrium rogeri		1	156	0			
Mystrium sp1		1	29	0			
Nannotrigona perilampoides		1			0	0	0
Nannotrigona sp	17.0	1					
Nannotrigona sp1	17.0	1					
Nannotrigona testaceicornis	17.0	1	2500				
Nasonia vitripennis	5.5	0	1				
Neivamyrmex alfaroi		1		0		0	0
Neivamyrmex asper		1		0		0	0
Neivamyrmex californicus		1		0		0	0
Neivamyrmex carolinensis		1	30000	0	1	1	1
Neivamyrmex gibbatus		1		0		0	0
Neivamyrmex humilis		1		0		0	0
Neivamyrmex impudens		1		0		0	0
Neivamyrmex leonardi		1		0		0	0
Neivamyrmex mexicanus		1		0		0	0
Neivamyrmex nigrescens		1	125000	0	2	0	1
Neivamyrmex nyensis		1		0		0	0
Neivamyrmex opacithorax		1	30000	0		0	0
Neivamyrmex pilosus		1		0		0	0
Neivamyrmex punctaticeps		1		0		0	0
Neivamyrmex swainsonii		1		0		0	0
Neivamyrmex texanus	18.0	1	30000	0			
Nematinus fuscipennis	8.0	0	1				
Nematinus luteus	8.0	0	1				
Nematinus willigkiae	8.0	0	1				
Nematus alaskaensis	8.0	0	1				
Nematus dimmockii	8.0	0	1				
Nematus erichsonii	7.0	0	1				
Nematus geniculatus	8.0	0	1				
Nematus leucotrochus	9.0	0	1				
Nematus lucidus	8.0	0	1				

Species	Haploid Number	Eusocial	Colony Size	Parasite	Polyandry	Polygyny	Low Relatedness
Nematus melanaspis	8.0	0	1				
Nematus nigricornis	8.0	0	1				
Nematus obductus	8.0	0	1				
Nematus olfaciens	9.0	0	1				
Nematus pallipes	8.0	0	1				
Nematus pavidus	8.0	0	1				
Nematus ribesii	9.0	0	1				
Nematus ruficornis	8.0	0	1				
Nematus rufipes	8.0	0	1				
Nematus sp	9.0	0	1				
Nematus sp1	7.0	0	1				
Nematus sp2	8.0	0	1				
Nematus sp3	8.0	0	1				
Nematus viminalis	8.0	0	1				
Nematus viridescens	8.0	0	1				
Neodiprion abietis	8.0	0	1				
Neodiprion compar	7.0	0	1				
Neodiprion dubiosus	7.0	0	1				
Neodiprion lecontei	7.0	0	1				
Neodiprion maurus	7.0	0	1				
Neodiprion nanulus	7.0	0	1				
Neodiprion nigroscutum	7.0	0	1				
Neodiprion pinetum	7.0	0	1				
Neodiprion prattibanksianae	7.0	0	1				
Neodiprion sertifer	7.0	0	1				
Neodiprion sp1	7.0	0	1				
Neodiprion sp2	8.0	0	1				
Neodiprion swainei	7.5	0	1				
Neodiprion taedaetaedae	7.0	0	1				
Neodiprion tsugae	7.0	0	1				
Neodiprion virginiana	7.0	0	1				
Neostromboceros itoi	6.0	0	1				
Neostromboceros nipponicus	7.0	0	1				
Neostromboceros okinawaensis	7.0	0	1				
Neostromboceros sinanensis	7.0	0	1				
Neotheronia bicincta		0					
Neuroterus laeviusculus	10.0	0	1				
Neuroterus numismalis	10.0	0	1				
Neuroterus quescusbaccarum	10.0	0	1				
Nogueirapis mirandula		1	3178.5				
Nomia nevadensisangelesia	21.0	0	1				
Nothomyrmecia macrops	47.0	1	69.67	0	1	0	1
Notoncus ectatommoides	22.0	1		0			
Ochetellus glaber	14.0	1	416	0		1	1
Odontomachus bauri		1		0			
Odontomachus brunneus		1	172.5	0			
Odontomachus chelifer	22.0	1		0			
Odontomachus clarus		1		0			
Odontomachus coquereli		1	38	0			
Odontomachus haematodus		1	300	0		0	0
Odontomachus hastatus	22.0	1		0			
Odontomachus latidens	15.5	1		0			
Odontomachus meinerti	22.0	1		0			
Odontomachus panamensis		1		0			
Odontomachus relictus		1	200	0			
Odontomachus rixosus	15.0	1	375	0			
Odontomachus ruginodus		1	200	0		0	0
Odontomachus scalptus	22.0	1		0			
Odontomachus simillimus	22.0	1		0			
Odontomachus sp1	22.0	1		0			
Odontomachus spANIC-1	22.0	1		0			
Odontoponera transversa	22.0	1		0			
Oecophylla longinoda	12.0	1	500000	0		0	0
Oecophylla smaragdina	8.0	1		0	0	1	1
Omalus djozanushondonis	19.0	0	1				
Onychomyrmex hedleyi		1	1073	0	0	0	0
Opisthopsis rufithorax	25.0	1		0			
Orectognathus clarki	15.0	1		0			
Orectognathus darlingtoni	11.0	1		0			
Orectognathus versicolor	11.0	1	104	0			
Ormyrus sp1	6.0	0	1				
Oronotus binotatus	11.0	0	1				
Orthocentrus sp1	14.0	0	1				

Species	Haploid Number	Eusocial	Colony Size	Parasite	Polyandry	Polygyny	Low Relatedness
Orthopelma mediator	11.0	0	1				
Osmia cornifrons	16.0	0	1				
Osmia cornuta	16.0	0	1				
Osmia glauca	16.0	0	1				
Osmia lignariapropinque	16.0	0	1				
Osmia nigrifrons	16.0	0	1				
Osmia pentstemonis	16.0	0	1				
Osmia taurus	16.0	0	1				
Oxytrigona spcfflaveola	17.0	1					
Oxytrigona tataira	17.0	1					
Pachycondyla aenescens		1		0		1	1
Pachycondyla analis		1	583	0	0		0
Pachycondyla apicalis	24.0	1		0		0	0
Pachycondyla arhuaca	12.0	1		0			
Pachycondyla astuta	10.0	1		0			
Pachycondyla caffraria		1	127	0			
Pachycondyla carinulata	12.0	1		0			
Pachycondyla chinensis	11.0	1	276	0		1	1
Pachycondyla concava	27.0	1		0			
Pachycondyla constricta	15.0	1		0			
Pachycondyla crassinoda	31.0	1		0			
Pachycondyla crenata	13.0	1	50	0		1	1
Pachycondyla curvinodis	13.5	1		0			
Pachycondyla dismarginata		1	30	0			
Pachycondyla gilberti	15.0	1		0			
Pachycondyla goeldii	12.0	1	500	0			
Pachycondyla harpax	48.0	1		0			
Pachycondyla havilandi		1	28	0			
Pachycondyla impressa	47.0	1		0			
Pachycondyla insignis		1	20	0		0	0
Pachycondyla inversa	15.0	1		0	1	1	1
Pachycondyla krugeri		1	52.5	0		1	1
Pachycondyla leeuwenhoeki	8.0	1		0			
Pachycondyla lutea	8.0	1		0			
Pachycondyla luteipes	11.0	1		0			
Pachycondyla marginata	23.0	1	1198.5	0		1	1
Pachycondyla mesonotalis	13.0	1		0			
Pachycondyla metanotalis	35.0	1		0			
Pachycondyla moesta	13.0	1		0			
Pachycondyla pergandei		1	19	0			
Pachycondyla purpurascens		1		0		0	0
Pachycondyla rubiginosa	38.0	1		0			
Pachycondyla rubra	16.0	1		0			
Pachycondyla rufipes	24.0	1		0			
Pachycondyla sp1	11.0	1		0			
Pachycondyla sp11	26.0	1		0			
Pachycondyla sp2	19.0	1		0			
Pachycondyla sp3	22.0	1		0			
Pachycondyla sp4	30.0	1		0			
Pachycondyla sp5	11.0	1		0			
Pachycondyla sp6	14.0	1		0			
Pachycondyla sp7	11.0	1		0			
Pachycondyla sp8	18.0	1		0			
Pachycondyla sp9	18.0	1		0			
Pachycondyla stigma	6.0	1	9	0			
Pachycondyla striata	52.0	1		0			
Pachycondyla striatula		1	15	0			
Pachycondyla sublaevis		1	9.6	0			
Pachycondyla subversa	13.5	1		0			
Pachycondyla succedanea	7.0	1		0			
Pachycondyla tarsatus		1	1214.67	0	1	0	1
Pachycondyla tridentata	14.0	1		0			
Pachycondyla unidentata	6.0	1		0		0	0
Pachycondyla venusta	24.0	1		0			
Pachycondyla verenae	28.4	1		0		0	0
Pachycondyla villosa	17.0	1		0	1	1	1
Pachyprotasis asteris	10.0	0	1				
Pachyprotasis caerulescenskashmirica	9.0	0	1				
Pachyprotasis erratica	10.0	0	1				
Pachyprotasis fukii	10.0	0	1				
Pachyprotasis hayasuensis	10.0	0	1				
Pachyprotasis hiensis	10.0	0	1				
Pachyprotasis hiyodorii	10.0	0	1				

Species	Haploid Number	Eusocial	Colony Size	Parasite	Polyandry	Polygyny	Low Relatedness
Pachyprotasis iwatai	10.0	0	1				
Pachyprotasis longicornis	10.0	0	1				
Pachyprotasis Malaise	11.0	0	1				
Pachyprotasis malaisei	11.0	0	1				
Pachyprotasis nigrinotata	10.0	0	1				
Pachyprotasis nogusai	10.0	0	1				
Pachyprotasis okutanii	10.0	0	1				
Pachyprotasis pallidiventris	10.0	0	1				
Pachyprotasis rapae	10.0	0	1				
Pachyprotasis sasabensis	10.0	0	1				
Pachyprotasis sawadai	10.0	0	1				
Pachyprotasis sengaminensis	10.0	0	1				
Pachyprotasis serii	10.0	0	1				
Pachyprotasis sp1	10.0	0	1				
Pachyprotasis sp10	11.0	0	1				
Pachyprotasis sp2	10.0	0	1				
Pachyprotasis sp3	10.0	0	1				
Pachyprotasis sp4	10.0	0	1				
Pachyprotasis sp5	10.0	0	1				
Pachyprotasis sp6	10.0	0	1				
Pachyprotasis sp7	10.0	0	1				
Pachyprotasis sp8	10.0	0	1				
Pachyprotasis sp9	10.0	0	1				
Pachyprotasis tanakai	10.0	0	1				
Pachyprotasis volatilis	10.0	0	1				
Pachyprotasis yamahakkai	10.0	0	1				
Pachyprotasis zukaensis	10.0	0	1				
Papyrius nitidus	8.0	1		0			
Paracharactus leucopodus	10.0	0	1				
Parachartergus colobopterus		1	393		0	1	1
Parachartergus smithii	27.0	1	150			1	1
Paraponera clavata		1	1031.5	0		0	0
Paratrechina arenivaga		1	100	0		0	0
Paratrechina concinna		1	100	0			
Paratrechina faisonensis		1	50.13	0			
Paratrechina flavipes		1	890	0	0	0	0
Paratrechina ha		1	351	0			
Paratrechina indica	15.0	1		0			
Paratrechina longicornis	8.0	1	2000	0		1	1
Paratrechina pallida		1	500	0			
Paratrechina parvula	7.0	1	100	0		0	0
Paratrechina phantasma		1	100	0			
Paratrechina pubens		1	300000	0		1	1
Paratrechina sp1	8.0	1		0			
Paratrechina sp10	15.0	1	200	0			
Paratrechina sp11		1	150	0			
Paratrechina sp2	13.0	1		0			
Paratrechina sp3	14.0	1		0			
Paratrechina sp4	8.0	1		0			
Paratrechina sp5	14.0	1		0			
Paratrechina sp6	15.0	1		0			
Paratrechina sp7	8.0	1		0			
Paratrechina sp8	15.0	1		0			
Paratrechina sp9	15.0	1		0			
Paratrechina spANIC-1	15.0	1		0			
Paratrechina steinheili		1	60	0			
Paratrechina vividula		1	168	0		0	0
Paratrechina wojciki		1	100	0			
Paratrigona subnuda	17.0	1			0	0	0
Partamona ailyae	17.0	1					
Partamona cupira	17.0	1	3012.5		0	0	0
Partamona helleri	17.0	1					
Partamona mulata	17.0	1					
Partamona pearsoni	17.0	1					
Partamona peckolti	17.0	1					
Partamona peckoltimusarum	17.0	1					
Partamona seridoensis	17.0	1					
Partamona spn	17.0	1					
Partamona vicina	17.0	1					
Patrocloides chalybeatus	8.0	0	1				
Pemphredon diervillae	4.0	0	1				
Pemphredon krombeini	8.0	0	1				
Pemphredon lethifer	8.0	0	1				

Species	Haploid Number	Eusocial	Colony Size	Parasite	Polyandry	Polygyny	Low Relatedness
Perga sp	8.0	0	1				
Perineura esakii	17.0	0	1				
Perineura japonica	17.0	0	1				
Perineura okutanii	17.0	0	1				
Perineura pictipennis	17.0	0	1				
Perineura sp	17.0	0	1				
Peristenus digoneutis		0					
Peristenus stygicus		0					
Phaenocarpa persimilis	17.0	0	1				
Phaeogenes melanogonos	11.0	0	1				
Phaeogenes nigridens	11.0	0	1				
Phaeogenes semivulpinus	9.0	0	1				
Phaeogenes spiniger	11.0	0	1				
Pheidole acutidens		1		1			
Pheidole adrianoi		1	350	0			
Pheidole argentina		1		0			
Pheidole bic		1	275	0			
Pheidole bicarinata		1	200	0			
Pheidole biconstricta		1		0		0	0
Pheidole bicornis		1	150	0			
Pheidole bilimeki		1	600	0		1	1
Pheidole binghamii	10.0	1		0			
Pheidole BSH		1	206	0			
Pheidole capellinii	10.0	1	172	0			
Pheidole CCC		1	375	0			
Pheidole CCR		1	134	0			
Pheidole cerebrosior		1	12	0			
Pheidole cho		1	88	0			
Pheidole cramptoni		1		0			
Pheidole dentata	10.0	1	873	0		0	0
Pheidole dentigula	10.0	1	300	0		0	0
Pheidole desertorum	10.0	1	24814	0		1	1
Pheidole DSS		1	22	0			
Pheidole elecebra		1		1			
Pheidole embolopyx		1		0	0	0	0
Pheidole eye		1	36	0			
Pheidole fallax	10.0	1		0		0	0
Pheidole fervens		1	300	0		1	1
Pheidole fervida	10.0	1	7317.5	0			
Pheidole fiorii		1		0		0	0
Pheidole flavens		1	1500	0		1	1
Pheidole floridana		1	1000	0		0	0
Pheidole gilvescens		1	500	0		0	0
Pheidole GLO		1	44	0			
Pheidole hfb		1	205	0			
Pheidole hortensis	10.0	1		0			
Pheidole hyatti	10.0	1		0			
Pheidole indica	10.0	1		0			
Pheidole inquilina		1		1			
Pheidole int		1	126	0			
Pheidole lanuginosa		1		1			
Pheidole latinoda	21.0	1		0			
Pheidole megacephala	10.0	1		0		1	1
Pheidole metallescens		1	1000	0		0	0
Pheidole MGA		1	152	0			
Pheidole MGS		1	159	0			
Pheidole MIC		1	62	0			
Pheidole microgyna		1		1			
Pheidole MIN		1	80	0			
Pheidole minutula		1	1500	0		1	1
Pheidole moerens		1	600	0		0	0
Pheidole morrisi		1	9250	0		1	1
Pheidole multispina		1	95	0		0	0
Pheidole mus	6.0	1		0			
Pheidole NEB		1	61	0			
Pheidole neokohli		1		1			
Pheidole NGA		1	62	0			
Pheidole nigricula		1	61	0		0	0
Pheidole NIT		1	547	0			
Pheidole nitidula	10.0	1		0			
Pheidole noda	18.7	1		0			
Pheidole obscurithorax		1	10000	0		0	0
Pheidole pallidula	11.0	1	3300	0	0	1	1

Species	Haploid Number	Eusocial	Colony Size	Parasite	Polyandry	Polygyny	Low Relatedness
Pheidole parasitica		1		1			
Pheidole PCHO		1	200	0			
Pheidole PEB		1	300	0			
Pheidole pilifera		1		0		0	0
Pheidole plagiaria	10.0	1		0			
Pheidole PNGA-nigricul		1	100	0			
Pheidole pnig		1	113	0			
Pheidole pnigb		1	105	0			
Pheidole poc		1	58	0			
Pheidole porcula	10.0	1		0			
Pheidole PPOC		1	200	0			
Pheidole praeses		1	200	0			
Pheidole PRUG-L		1	200	0			
Pheidole PRUG~B		1	170	0			
Pheidole renb		1	60	0			
Pheidole rpc		1	60	0			
Pheidole rugulosa		1	300	0		1	1
Pheidole ruida		1	124	0		0	0
Pheidole sbi		1	42	0			
Pheidole soritis	9.0	1		0	0		0
Pheidole sp1	9.0	1		0			
Pheidole sp10	10.0	1		0			
Pheidole sp11	10.0	1		0			
Pheidole sp12	10.0	1		0			
Pheidole sp13	10.0	1		0			
Pheidole sp14	10.0	1		0			
Pheidole sp15	10.0	1		0			
Pheidole sp16	10.0	1		0			
Pheidole sp17	10.0	1		0			
Pheidole sp18	10.0	1		0			
Pheidole sp19	10.0	1		0			
Pheidole sp2	10.0	1		0			
Pheidole sp20	16.5	1		0			
Pheidole sp21	10.0	1		0			
Pheidole sp22	8.0	1		0			
Pheidole sp23	19.0	1		0			
Pheidole sp24	9.0	1		0			
Pheidole sp25	10.0	1		0			
Pheidole sp26	11.0	1		0			
Pheidole sp27	10.0	1		0			
Pheidole sp28	19.0	1		0			
Pheidole sp29	10.0	1		0			
Pheidole sp3	10.0	1		0			
Pheidole sp30	10.0	1		0			
Pheidole sp31	9.0	1		0			
Pheidole sp32	10.0	1		0			
Pheidole sp33	10.0	1		0			
Pheidole sp34	10.0	1		0			
Pheidole sp35	18.0	1		0			
Pheidole sp36	21.0	1		0			
Pheidole sp37	10.0	1		0			
Pheidole sp38	10.0	1		0			
Pheidole sp39	15.0	1		0			
Pheidole sp4	10.0	1		0			
Pheidole sp40	10.0	1		0			
Pheidole sp41	10.0	1		0			
Pheidole sp42	10.0	1		0			
Pheidole sp43	14.0	1		0			
Pheidole sp44	9.0	1		0			
Pheidole sp45	9.0	1		0			
Pheidole sp46	9.0	1		0			
Pheidole sp47	16.0	1		0			
Pheidole sp48	10.0	1		0			
Pheidole sp49	9.0	1		0			
Pheidole sp5	10.0	1		0			
Pheidole sp50	9.0	1		0			
Pheidole sp51	9.0	1		0			
Pheidole sp6	10.0	1		0			
Pheidole sp7	9.0	1		0			
Pheidole sp8	10.0	1		0			
Pheidole sp9	10.0	1		0			
Pheidole spe		1	56	0			
Pheidole specularis		1	75	0		0	0

Species	Haploid Number	Eusocial	Colony Size	Parasite	Polyandry	Polygyny	Low Relatedness
Pheidole spininodis	10.0	1		0			
Pheidole subarmata	10.0	1		0			
Pheidole symbiotica		1		1			
Pheidole teneriffana		1		0		1	1
Pheidole tepicana	9.0	1		0			
Pheidole tysoni		1		0		0	0
Pheidole umphreyi		1		0		0	0
Pheidole vistana		1	3000	0		1	1
Pheidole woodmasoni	9.0	1		0			
Pheidole zeteki		1	81	0			
Pheidologeton diversus	21.0	1		0			
Pheidologeton sp1	21.0	1		0			
Pheidologeton sp2		1	3000	0			
Philidris cordata	8.0	1		0			
Philomastix sp	8.0	0	1				
Phyllocolpa sp	9.0	0	1				
Plagiolepis alluaudi		1		0		1	1
Plagiolepis ampeloni		1		1			
Plagiolepis grassei		1		1			
Plagiolepis pygmaea	9.0	1		0	2	1	1
Plagiolepis regis		1		1			
Plagiolepis schmitzii	9.0	1		0		1	1
Plagiolepis sp1	9.0	1		0			
Plagiolepis sp2	9.0	1		0			
Plagiolepis taurica		1		0		1	1
Plagiolepis xene		1		1			
Platythyrea conradti		1	302.33	0			
Platythyrea lamellosa		1	115	0			
Platythyrea parallela		1	50	0			
Platythyrea punctata		1	60	0		1	1
Platythyrea quadridenta	9.0	1	33.33	0		1	1
Platythyrea schultzei		1	21	0			
Platythyrea tricuspidata	46.5	1	29	0			
Plebeia denoiti	18.0	1					
Plebeia droryana	17.5	1	2700		0	0	0
Plebeia emerina	18.0	1					
Plebeia minima		1			0	0	0
Plebeia mosquito		1	1175				
Plebeia remota	18.0	1	2900		0	0	0
Plebeia saiqui		1	1500		0	0	0
Plebeia schrottkyi	18.0	1	300				
Plebeia sp1	17.0	1					
Plebeia subnuda	18.0	1					
Plebeina denoiti	18.0	1					
Podomyrma adelaidae	25.5	1		0			
Pogonomyrmex anergismus		1		1			
Pogonomyrmex apache	16.0	1		0			
Pogonomyrmex badius	16.0	1	7268	0	2	0	1
Pogonomyrmex barbatus	16.0	1	12358	0	2	0	1
Pogonomyrmex brevispinosus	16.0	1		0			
Pogonomyrmex californicus	16.0	1	4533	0	2	0	1
Pogonomyrmex carbonarius		1	500	0			
Pogonomyrmex coarctatus		1		0			
Pogonomyrmex colei		1		1			
Pogonomyrmex comanche	16.0	1		0			
Pogonomyrmex desertorum	16.0	1	500	0	2	0	1
Pogonomyrmex huachucanus	18.0	1		0			
Pogonomyrmex imberbiculus	15.0	1	41.5	0		0	0
Pogonomyrmex laticeps		1	45	0			
Pogonomyrmex longibarbis		1	250	0			
Pogonomyrmex magnacanthus	16.0	1	194	0		0	0
Pogonomyrmex maricopa	16.0	1	750	0	2	0	1
Pogonomyrmex mayri		1	603	0		0	0
Pogonomyrmex montanus	16.0	1	1665	0		0	0
Pogonomyrmex occidentalis	16.0	1	4103	0	2	0	1
Pogonomyrmex pima		1	326	0	1	1	1
Pogonomyrmex rugosus	16.0	1	6291.5	0	2	0	1
Pogonomyrmex subnitidus	16.0	1	5934	0		0	0
Pogonomyrmex tenuispinus		1	3000	0			
Polistes annularis		1	156		0	1	1
Polistes apachus	23.5	1					
Polistes bellicos		1	52.39		0	1	1
Polistes canadensis	16.0	1					

Species	Haploid Number	Eusocial	Colony Size	Parasite	Polyandry	Polygyny	Low Relatedness
Polistes carolinus	19.0	1	102.25				
Polistes chinensis	23.0	1	244.5		0	0	0
Polistes chinensis antennalis	23.0	1					
Polistes cinerascens	27.0	1					
Polistes dominula		1					
Polistes dorsalis		1	55.86		0	0	0
Polistes exclamans	33.0	1	107.56				
Polistes fuscatus	26.0	1			0	1	1
Polistes gallicus	21.0	1	25		0	0	0
Polistes hebraeus	9.0	1					
Polistes instabilis		1	60.02				
Polistes jadwigae	31.0	1			0	0	0
Polistes mandarinus	26.0	1					
Polistes metricus	26.0	1	76.26		1	1	1
Polistes nimpha	22.0	1					
Polistes omissus	14.0	1					
Polistes simillimus	28.0	1					
Polistes snelleni	30.0	1			0	0	0
Polistes versicolor versicolor	31.0	1			0	1	1
Polybia bicyttarella		1	80				
Polybia bistriata		1	60				
Polybia catillifex		1	18				
Polybia chrysothorax		1	30				
Polybia diguetana		1	800				
Polybia dimidiata		1	1,250				
Polybia emaciata		1	141				
Polybia erythrothorax		1	300				
Polybia jurinei		1	500				
Polybia micans		1	100				
Polybia occidentalis	17.0	1	261				
Polybia parvulina		1	900				
Polybia paulista	17.0	1	3457				
Polybia platycephala		1	300				
Polybia quadricincta		1	1,150				
Polybia rejecta		1	1,150				
Polybia ruficeps		1	1,100				
Polybia rufitarsis		1	80				
Polybia scrobalis		1	40				
Polybia scutellaris	17.0	1	1,300				
Polybia sericea	27.0	1	500				
Polybia simillima		1	300				
Polybia singularis		1	1,000				
Polybia sp1	16.0	1					
Polybia sp2	17.0	1					
Polybia striata		1	1,200				
Polybioides raphigastra		1	3,000				
Polybioides tabidus		1	4000		0	1	1
Polyergus breviceps		1	3000	1		0	0
Polyergus lucidus		1	133.75	1	1	0	1
Polyergus rufescens		1		1	0	0	0
Polyergus samurai	27.0	1		1			
Polyrhachis ammon	21.0	1		0			
Polyrhachis bicolor		1	845	0			
Polyrhachis debilis		1	325	0			
Polyrhachis dives	21.0	1	1000000	0			
Polyrhachis furcata		1	6418	0			
Polyrhachis gribodoi	24.0	1		0			
Polyrhachis hector	21.0	1		0			
Polyrhachis hippomanes	20.0	1		0			
Polyrhachis hirsutula		1	150	0			
Polyrhachis hodgsoni		1	9193	0		0	0
Polyrhachis illaudata	16.0	1	475	0			
Polyrhachis lacteipennis	21.0	1		0			
Polyrhachis lamellidens	21.0	1		0			
Polyrhachis limbata		1	100	0			
Polyrhachis muelleri		1	89	0			
Polyrhachis nigropilosa		1	1093	0			
Polyrhachis omyrmex		1	60	0			
Polyrhachis proxima		1	1422	0			
Polyrhachis rastellata	21.0	1		0			
Polyrhachis rufiventrus		1	200	0			
Polyrhachis schellerichae		1	7203	0			
Polyrhachis sp1	21.0	1		0			

Species	Haploid Number	Eusocial	Colony Size	Parasite	Polyandry	Polygyny	Low Relatedness
Polyrhachis sp2	21.0	1		0			
Polyrhachis sp3	20.0	1		0			
Polyrhachis spANIC-1	21.0	1		0			
Polyrhachis spinifera		1	150	0			
Polysphincta tuberosa	9.0	0	1				
Pompilidae sp1	15.0	0	1				
Pompilidae sp2	15.0	0	1				
Ponera coarctata		1	135	0			
Ponera exotica		1	50	0			
Ponera japonica	6.0	1		0			
Ponera pennsylvanica	6.0	1	17.5	0		0	0
Ponera scabra	3.5	1		0			
Ponera sp1	6.0	1		0			
Ponera sp2	6.0	1		0			
Ponera testacea		1		0		0	0
Praon abjectum	4.0	0	1				
Praon sp.		0					
Prenolepis imparis	8.0	1	527.48	0	1	1	1
Prenolepis jerdoni	19.7	1		0			
Prionopelta amabilis		1	495.5	0			
Prionopelta modesta		1		0			
Prionopelta opaca		1	20	0			
Priophorus varipes	6.0	0	1				
Pristomyrmex punctatus	12.0	1	200	0			
Pristomyrmex pungens		1	300000	0			
Pristomyrmex sp1	11.0	1		0			
Pristomyrmex sp2	14.0	1		0			
Pristomyrmex sp3		1	100	0			
Proatta butteli		1	5500	0		1	1
Proatta sp1	16.0	1		0			
Probolomyrmex boliviensis		1		0		1	1
Probolomyrmex dammermani		1	21	0			
Probolomyrmex sp1	14.0	1		0			
Proceratium crassicorne		1	30	0		0	0
Proceratium croceum		1	30	0		0	0
Proceratium goliath		1	106	0		0	0
Proceratium pergandei		1	25	0			
Proceratium silaceum	18.0	1	28	0		1	1
Proceratium sp1	24.0	1		0			
Proceratium sp2		1	17	0			
Proceratium sp3		1	13	0			
Procryptocerus batesi		1	70	0		0	0
Procryptocerus mayri		1	50	0		0	0
Procryptocerus scabriusculus		1	62	0		1	1
Prolasius spANIC-1	9.0	1		0			
Prolasius spANIC-2	9.0	1		0			
Propodea fentoni	10.0	0	1				
Protomognathus americanus	11.0	1	6.3	1	0	0	0
Protonectarina sylveirae	29.0	1	92500			1	1
Protopolybia acutiscutis		1	6,000				
Protopolybia emortualis		1	50				
Protopolybia exigua exigua	31.0	1	155.5				
Protopolybia holoantha		1	40				
Protopolybia minutissima		1	200				
Protopolybia pumila	21.0	1					
Protopolybia scutellaris		1	400				
Psenulus carnifronsiwatai	8.0	0	1				
Psenulus maculipes	21.0	0	1				
Pseudaugochloropsis graminea	8.0	0	1				
Pseudaugochloropsis sp		0	1				
Pseudoamblyteles homocerus	9.0	0	1				
Pseudohemitaxonus dryopteridis	5.0	0	1				
Pseudolasius breviceps		1	350	0			
Pseudolasius sp1	14.0	1		0			
Pseudolasius sp2	15.0	1		0			
Pseudolasius sp3	15.0	1		0			
Pseudolasius sp4	8.0	1		0			
Pseudolasius sp5	17.0	1		0			
Pseudolasius xene		1		0		1	1
Pseudomyrmex apache		1		0		1	1
Pseudomyrmex concolor		1	1104	0			
Pseudomyrmex cubaensis		1		0		1	1
Pseudomyrmex ejectus		1	80	0		1	1

Species	Haploid Number	Eusocial	Colony Size	Parasite	Polyandry	Polygyny	Low Relatedness
Pseudomyrmex elongatus		1	80	0			
Pseudomyrmex ferruginea		1	461	0	0	0	0
Pseudomyrmex gracilis	35.0	1	93	0		0	0
Pseudomyrmex holmgreni	25.0	1		0			
Pseudomyrmex inquilinus		1		1			
Pseudomyrmex nigrocinctus		1		0		0	0
Pseudomyrmex pallidus		1	30	0		1	1
Pseudomyrmex penetrator	12.0	1		0			
Pseudomyrmex peperi		1		0		1	1
Pseudomyrmex schuppi	12.0	1		0			
Pseudomyrmex simplex		1		0		0	0
Pseudomyrmex sp1	21.0	1		0			
Pseudomyrmex sp2	25.0	1		0			
Pseudomyrmex sp3	22.0	1		0			
Pseudomyrmex viduus		1		0		1	1
Pseudopolybia compressa		1	300				
Pseudopolybia difficilis		1	323			1	1
Pseudopolybia vespiceps	8.0	1	40				
Psithyrus ashtoni	25.0	1		1			
Psithyrus citrinus	26.0	1		1			
Pteromalus puparum	5.0	0	1				
Pteromalus venustus	5.0	0	1				
Pteroptrix orientalis	11.0	0	1				
Pterygophorus sp	8.0	0	1				
Ptilothrix bombiformis	6.0	0	1				
Ptilotrigona lurida	11.0	1					
Pyramica alberti		1		0		0	0
Pyramica augustandrewi		1		0		0	0
Pyramica bauderi		1		0		1	1
Pyramica bunki		1	40	0			
Pyramica clypeata		1	25.31	0			
Pyramica creightoni		1	50	0		1	1
Pyramica deyrupi		1	50	0			
Pyramica dietrichi		1	50	0			
Pyramica dohertyi	12.0	1		0			
Pyramica eggersi		1	50	0			
Pyramica emmae		1	20	0		0	0
Pyramica gundlachi		1		0		0	0
Pyramica hexamera		1	25	0		0	0
Pyramica margaritae		1	250	0			
Pyramica membranifera		1	62	0		0	0
Pyramica mutica	18.0	1	72	0			
Pyramica ohioensis		1	53	0			
Pyramica ornata		1	20	0			
Pyramica pergandei		1	204	0		1	1
Pyramica pilinasis		1	30	0		1	1
Pyramica pulchella		1	33	0			
Pyramica rostrata		1	114	0		1	1
Pyramica schulzi		1		0		0	0
Pyramica sp1	19.0	1		0			
Pyramica sp2	13.0	1		0			
Pyramica sp3	8.0	1	50	0			
Pyramica subedentata		1		0			
Pyramica talpa		1	60	0			
Pyrobombus ardens	18.0	1					
Pyrobombus edwardsii	18.0	1					
Pyrobombus ephippiatus	18.0	1					
Pyrobombus huntii	18.0	1			1	0	1
Pyrobombus impatiens	18.0	1	450		1	0	1
Pyrobombus melanopygus	18.0	1					
Pyrobombus mixtus	18.0	1			1	0	1
Pyrobombus perplexus	18.0	1					
Pyrobombus sitkensis	18.0	1					
Pyrobombus ternarius	18.0	1	100		1	0	1
Pyrobombus vagans	18.0	1	70		0	0	0
Pyrobombus vosnesenskii	18.0	1					
Recurvidris sp1	12.0	1		0			
Rhopalum pygidiale	13.0	0	1				
Rhopalum watanabei	13.0	0	1				
Rhoptromyrmex melleus		1	5000	0			
Rhysipolis decorator	6.0	0	1				
Rhytidoponera aciculata	26.0	1		0			
Rhytidoponera araneoides		1	50	0			

Species	Haploid Number	Eusocial	Colony Size	Parasite	Polyandry	Polygyny	Low Relatedness
Rhytidoponera aurata		1	361	0			
Rhytidoponera chalybaea	21.0	1	271	0	0	0	0
Rhytidoponera confusa		1	387.5	0	0	0	0
Rhytidoponera impressa	21.0	1		0	0		0
Rhytidoponera laciniosa		1	125	0			
Rhytidoponera lamellinodis	26.0	1		0			
Rhytidoponera maniae	29.7	1		0			
Rhytidoponera mayri	25.0	1		0			
Rhytidoponera mayri	25.0	1	577	0	0	1	1
Rhytidoponera metallica	18.7	1	555	0		1	1
Rhytidoponera punctata	50.0	1		0			
Rhytidoponera purpurea	19.0	1		0		0	0
Rhytidoponera spANIC-10	23.5	1		0			
Rhytidoponera spANIC-11	25.0	1		0			
Rhytidoponera spANIC-13	26.0	1		0			
Rhytidoponera spANIC-14	11.0	1		0			
Rhytidoponera spANIC-15	25.0	1		0			
Rhytidoponera spANIC-16	26.0	1		0			
Rhytidoponera spANIC-9	24.0	1		0			
Rhytidoponera tasmaniensis-1	15.0	1		0			
Rhytidoponera tasmaniensis-2	23.0	1		0			
Rhytidoponera victoriae	21.0	1		0			
Rocalia japonica	11.0	0	1				
Rocalia longipennis	9.0	0	1				
Rocalia sp	8.0	0	1				
Sapyga pumila	25.5	0	1				
Scaptotrigona acantha	17.0	1					
Scaptotrigona angustula	17.0	1			0		0
Scaptotrigona appendiculata	16.0	1					
Scaptotrigona babai	16.0	1					
Scaptotrigona barrocoloralensis	17.0	1			0		0
Scaptotrigona chanchamayoensis	17.0	1					
Scaptotrigona clavipes	17.0	1			0	0	0
Scaptotrigona dentipes	17.0	1					
Scaptotrigona depilis	17.0	1			0	0	0
Scaptotrigona esakii	16.0	1					
Scaptotrigona fenestrata	16.0	1					
Scaptotrigona fiebrigi	17.0	1					
Scaptotrigona flavipes	17.0	1					
Scaptotrigona fulgiduslongiplumosis	13.0	1					
Scaptotrigona fulviventris	16.0	1			0	0	0
Scaptotrigona fuscipennis	17.0	1					
Scaptotrigona japonica	17.0	1					
Scaptotrigona latitarsis	17.0	1					
Scaptotrigona megastigmata	17.0	1					
Scaptotrigona minangkabou	20.0	1					
Scaptotrigona muelleri	8.0	1					
Scaptotrigona okinawana	17.0	1					
Scaptotrigona pectoralis barrocoloradensis	17.0	1			0		0
Scaptotrigona postica	17.0	1	27875		0	0	0
Scaptotrigona quadripunctata	17.0	1	1650		0	0	0
Scaptotrigona recursa	17.0	1					
Scaptotrigona smaragdula	14.0	1					
Scaptotrigona sp1	17.0	1					
Scaptotrigona spinipes	17.0	1					
Scaptotrigona subterranea	17.0	1					
Scaptotrigona violacea	16.0	1					
Scaptotrigona xanthotricha	17.0	1	223.5				
Scaura latitarsis		1	393				
Sceliphron caementarium		0					
Separatobombus griseocollis	19.0	1			0	0	0
Sericomyrmex amabilis	25.0	1	778.67	0	0	0	0
Sericomyrmex urichi		1	945.5	0		0	0
Siobla ferox	9.0	0	1				
Siobla metallica	9.0	0	1				
Siobla ruficornis	9.0	0	1				
Siobla sturmi	9.0	0	1				
Siobla venustaapicalis	9.0	0	1				
Sirex cyaneus	8.0	0	1				
Sirex juvencus	8.0	0	1				
Sirex noctilio	8.0	0	1				
Solenopsis abdita		1	200	0			

Species	Haploid Number	Eusocial	Colony Size	Parasite	Polyandry	Polygyny	Low Relatedness
Solenopsis aurea	16.0	1		0			
Solenopsis carolinensis		1	200	0		1	1
Solenopsis CO		1	42	0			
Solenopsis COR		1	47	0			
Solenopsis fugax	11.0	1		0		1	1
Solenopsis GA		1	19	0			
Solenopsis geminata	16.0	1	28000	0	0	1	1
Solenopsis globularia		1	50	0			
Solenopsis invicta	16.0	1	152039.67	0	0	1	1
Solenopsis lou		1		0	1		1
Solenopsis MEK-005		1	70	0		1	1
Solenopsis MI		1	16	0			
Solenopsis molesta	11.0	1	80	0		1	1
Solenopsis nickersoni		1	200	0			
Solenopsis OR		1	140	0			
Solenopsis papuana		1	1000	0		1	1
Solenopsis pergandei		1	10000	0			
Solenopsis picta		1	200	0		1	1
Solenopsis PL		1	54	0			
Solenopsis PO		1	185	0			
Solenopsis richteri	16.0	1	300000	0	0	1	1
Solenopsis saevissima	16.0	1		0			
Solenopsis SO		1	555	0			
Solenopsis sp1	19.0	1		0			
Solenopsis sp2	11.0	1		0			
Solenopsis spnrabdita		1	200	0			
Solenopsis spnrcarolinensis		1	200	0			
Solenopsis SS		1	184	0			
Solenopsis tennesseensis		1	200	0			
Solenopsis texana		1		0		1	1
Solenopsis tonsa		1	200	0			
Solenopsis xyloni	16.0	1		0		1	1
Sphinctomyrmex cfsteinheili		1	240	0			
Sphinctomyrmex steinheili	23.0	1		0			
Stelis chlorocyanea	17.0	0	1				
Stelopolybia areata		1	6875				
Stelopolybia multipicta	32.0	1	5000				
Stelopolybia pallipes_pallipes	32.0	1					
Stelopolybia vicina		1	1000000				
Stenamma alas		1	200	0		1	1
Stenamma brevicorne	4.0	1	70	0		0	0
Stenamma debile		1	110	0		0	0
Stenamma diecki		1	72	0		0	0
Stenamma expolitum		1	200	0		0	0
Stenamma felixi		1		0		0	0
Stenamma impar		1	54	0		0	0
Stenamma meridionale		1	15	0		0	0
Stenamma schmitti		1	121	0		0	0
Stenamma westwoodii	20.0	1		0		1	1
Stenichneumon culpator	14.0	0	1				
Stenodynerus frauenfeldi	10.0	0	1				
Stictiella serrata		0					
Stigmacros spANIC-1	19.0	1		0			
Stigmacros spANIC-3	10.0	1		0			
Streblognathus aethiopicus		1	43.5	0	0		0
Streblognathus peetersi		1	95	0			
Stromboceros koebelei	7.0	0	1				
Strongylogaster blechni	9.0	0	1				
Strongylogaster filicis	8.0	0	1				
Strongylogaster lineata	8.0	0	1				
Strongylogaster macula	7.0	0	1				
Strongylogaster mixta	9.0	0	1				
Strongylogaster moiwana	9.0	0	1				
Strongylogaster onocleae	8.0	0	1				
Strongylogaster osmundae	7.0	0	1				
Strongylogaster ruber	9.0	0	1				
Strongylogaster secunda	9.0	0	1				
Strongylogaster tambensis	7.0	0	1				
Strongylognathus afer		1		1			
Strongylognathus huberi	14.0	1		1			
Strongylognathus karawajewi		1		1			
Strongylognathus minutus		1		1			
Strongylognathus pisarskii		1		1			

Species	Haploid Number	Eusocial	Colony Size	Parasite	Polyandry	Polygyny	Low Relatedness
Strongylognathus potanini		1		1			
Strongylognathus testaceus		1		1		1	1
Strongylognathus tylonum		1		1			
Strumigenys bajarii		1	400	0			
Strumigenys br		1	15	0			
Strumigenys doriae	11.0	1		0			
Strumigenys elongata		1		0		0	0
Strumigenys emmae		1	100	0		0	0
Strumigenys friedae	12.0	1		0			
Strumigenys frivaldszkyi		1	15	0			
Strumigenys gl		1	18	0			
Strumigenys godeffroyi	21.0	1		0			
Strumigenys gundlach		1		0		0	0
Strumigenys lj		1	16	0			
Strumigenys ljls		1	48	0			
Strumigenys loriae		1	400	0			
Strumigenys louisianae		1	90	0		1	1
Strumigenys mayri		1	100	0			
Strumigenys mi		1	48	0			
Strumigenys nf		1	26	0			
Strumigenys rogeri		1	100	0		0	0
Strumigenys sp1		1	80	0			
Strumigenys wk		1	26	0			
Subterraneobombus appositus	16.0	1					
Subterraneobombus borealis	16.0	1					
Svastra obliquaexpurgata	21.0	0	1				
Sycaonia sicaria	11.0	0	1				
Syspasis alboguttata	11.0	0	1				
Syspasis scutellator	11.0	0	1				
Tapinoma erraticum	8.0	1		0		1	1
Tapinoma indicum	6.0	1		0			
Tapinoma litorale		1	20	0		1	1
Tapinoma madeirense		1		0		1	1
Tapinoma melanocephalum	5.0	1	500	0		1	1
Tapinoma minutum		1		0	0	1	1
Tapinoma nigerrimum	9.0	1		0		1	1
Tapinoma ramulorum		1		0		1	1
Tapinoma sessile	8.0	1	300	0		1	1
Tapinoma simrothi	9.0	1	65952	0		1	1
Tapinoma sp1	5.0	1		0			
Taxonus alboscutellatus	9.0	0	1				
Technomyrmex albipes	8.5	1	2912000	0		1	1
Technomyrmex sp1	15.0	1		0			
Technomyrmex sp2	14.0	1		0			
Technomyrmex sp2bicolor	14.0	1		0			
Technomyrmex sp3	15.0	1		0			
Telenomus fariai	10.0	0	1				
Temnothorax acervorum		1	323	0			
Temnothorax affinis	9.0	1		0		0	0
Temnothorax albipennis		1	412	0			
Temnothorax allardycei		1	23	0		0	0
Temnothorax ambiguus	11.0	1	46	0		1	1
Temnothorax andrei	10.0	1		0			
Temnothorax angustulus	23.0	1		0			
Temnothorax bradleyi		1	50	0			
Temnothorax cfinterrupus	12.0	1		0			
Temnothorax cflichtensteini	14.0	1		0			
Temnothorax congruus	9.0	1		0			
Temnothorax corticalis	10.5	1		0			
Temnothorax crassipilis	17.5	1		0			
Temnothorax crassispinus		1		0	0	0	0
Temnothorax curvispinosus	23.0	1	226	0			
Temnothorax duloticus	24.0	1		1			
Temnothorax exilis	11.0	1		0			
Temnothorax faberi	15.5	1		0			
Temnothorax flavicornis	11.0	1		0			
Temnothorax gredosi	17.0	1		0			
Temnothorax interruptus	12.0	1		0			
Temnothorax kraussei	14.0	1		0			
Temnothorax lichtensteini	14.0	1		0		0	0
Temnothorax longispinosus	12.0	1	94.5	0		1	1
Temnothorax melas	13.0	1		0			
Temnothorax minutissimus		1		1			

Species	Haploid Number	Eusocial	Colony Size	Parasite	Polyandry	Polygyny	Low Relatedness
Temnothorax nadigi		1		0		1	1
Temnothorax neomexicanus		1		0		0	0
Temnothorax niger	18.0	1		0		0	0
Temnothorax nigriceps	9.0	1		0		0	0
Temnothorax nitens		1		0		0	0
Temnothorax nylanderi	11.0	1		0		1	1
Temnothorax obliquicanthus		1		0		0	0
Temnothorax palustris		1	50	0			
Temnothorax parvulus	14.0	1		0		0	0
Temnothorax pergandei		1	50	0		0	0
Temnothorax rabaudi	9.0	1		0			
Temnothorax racovitzai	21.0	1		0		0	0
Temnothorax recedens	12.0	1		0		0	0
Temnothorax rottenbergii	11.0	1		0			
Temnothorax rugatulus	13.5	1	100	0		1	1
Temnothorax salvini		1		0		0	0
Temnothorax schaumii	9.0	1	121	0		1	1
Temnothorax smithi		1	35	0		1	1
Temnothorax sordidulus	11.0	1		0			
Temnothorax specularis	17.0	1		0			
Temnothorax spinosior	12.0	1		0			
Temnothorax spinosius	16.0	1		0			
Temnothorax ssptuberumgroup	12.0	1		0			
Temnothorax subditivus		1		0		0	0
Temnothorax texanus		1	50	0			
Temnothorax tristis	21.0	1		0		1	1
Temnothorax tuberointerruptus		1	220	0			
Temnothorax tuberum	9.0	1		0		1	1
Temnothorax unifasciatus	8.5	1	63	0		0	0
Tenthredo abdominalis	10.0	0	1				
Tenthredo amoena	18.0	0	1				
Tenthredo angustiannulata	8.0	0	1				
Tenthredo arcuata	12.5	0	1				
Tenthredo atra	10.0	0	1				
Tenthredo basizonata	9.0	0	1				
Tenthredo bipunctula	10.0	0	1				
Tenthredo brevicornis	19.5	0	1				
Tenthredo colon	10.0	0	1				
Tenthredo contusa	10.0	0	1				
Tenthredo convergenata	10.0	0	1				
Tenthredo crassa	10.0	0	1				
Tenthredo cylindrica	10.0	0	1				
Tenthredo decens	10.0	0	1				
Tenthredo dentina	10.0	0	1				
Tenthredo fagi	13.0	0	1				
Tenthredo ferruginea	11.0	0	1				
Tenthredo finschiseguro	10.0	0	1				
Tenthredo flavomandibulata	10.0	0	1				
Tenthredo fortunei	12.0	0	1				
Tenthredo fukaii	10.0	0	1				
Tenthredo fulvaadusta	10.0	0	1				
Tenthredo fuscoterminata	11.0	0	1				
Tenthredo gifui	12.0	0	1				
Tenthredo hilaris	9.0	0	1				
Tenthredo hokkaidonis	10.0	0	1				
Tenthredo japonica	10.0	0	1				
Tenthredo jozana	9.0	0	1				
Tenthredo latifasciata	10.0	0	1				
Tenthredo limbata	10.0	0	1				
Tenthredo livida	10.0	0	1				
Tenthredo mandibularis	10.0	0	1				
Tenthredo marginella	11.0	0	1				
Tenthredo matsumurai	19.0	0	1				
Tenthredo melanogastra	10.0	0	1				
Tenthredo mesomelas	10.0	0	1				
Tenthredo mortivaga	10.0	0	1				
Tenthredo nigropicta	10.0	0	1				
Tenthredo nitidiceps	10.0	0	1				
Tenthredo notha	19.0	0	1				
Tenthredo obsoleta	10.0	0	1				
Tenthredo olivacea	10.0	0	1				
Tenthredo omissa	10.0	0	1				
Tenthredo opaciceps	10.0	0	1				

Species	Haploid Number	Eusocial	Colony Size	Parasite	Polyandry	Polygyny	Low Relatedness
Tenthredo opposita	9.0	0	1				
Tenthredo ornatula	10.0	0	1				
Tenthredo picticornis	10.0	0	1				
Tenthredo platycera	10.0	0	1				
Tenthredo procincta	10.0	0	1				
Tenthredo providens	10.0	0	1				
Tenthredo pseudolivacea	10.0	0	1				
Tenthredo rubrocaudata	10.0	0	1				
Tenthredo solitaria	10.0	0	1				
Tenthredo sp	9.0	0	1				
Tenthredo sp1	10.0	0	1				
Tenthredo sp2	10.0	0	1				
Tenthredo sp3	10.0	0	1				
Tenthredo sp4	10.0	0	1				
Tenthredo sp5	10.0	0	1				
Tenthredo sp6	10.0	0	1				
Tenthredo subolivacea	10.0	0	1				
Tenthredo takeuchii	10.0	0	1				
Tenthredo temula	10.0	0	1				
Tenthredo ussuriensis	10.0	0	1				
Tenthredo velox	10.0	0	1				
Tenthredo viridatrix	10.0	0	1				
Tenthredo viridis	12.0	0	1				
Tenthredopsis carinata	8.0	0	1				
Tenthredopsis litterata	9.0	0	1				
Tenthredopsis nassata	9.0	0	1				
Tenthredopsis sp1	8.0	0	1				
Tenthredopsis sp2	8.0	0	1				
Tenthredopsis sp3	8.0	0	1				
Terataner alluaudi		1	78	0		1	1
Terataner foreli		1	22	0			
Tetragona angustula	17.0	1					
Tetragona buchwaldi		1	2152.5				
Tetragona clavipes	17.0	1	6500		0	0	0
Tetragona iridipennis		1	2550				
Tetramorium adelphon	11.0	1	6272	0		1	1
Tetramorium brevidentatum	10.0	1		0			
Tetramorium caespitum	14.0	1	7316.43	0		0	0
Tetramorium caldarium		1		0		1	1
Tetramorium eleates	14.0	1		0			
Tetramorium forte	14.0	1		0			
Tetramorium guineense	11.0	1		0			
Tetramorium impurum		1		0		0	0
Tetramorium kheperra	7.0	1		0			
Tetramorium lanuginosum	7.0	1		0			
Tetramorium pacificum	11.0	1		0			
Tetramorium pnyxis	10.0	1		0			
Tetramorium semilaeve	7.0	1		0		1	1
Tetramorium seneb	10.0	1		0			
Tetramorium simillimum	7.0	1	300	0		1	1
Tetramorium smithi	13.0	1		0			
Tetramorium sp1	10.0	1		0			
Tetramorium sp10	18.0	1		0			
Tetramorium sp11	10.0	1		0			
Tetramorium sp12	12.0	1		0			
Tetramorium sp2	9.0	1		0			
Tetramorium sp3	10.0	1		0			
Tetramorium sp4	9.0	1		0			
Tetramorium sp5	10.0	1		0			
Tetramorium sp6	11.0	1		0			
Tetramorium sp7	9.0	1		0			
Tetramorium sp8	13.0	1		0			
Tetramorium sp9	7.0	1		0			
Tetramorium spinosum	13.0	1	70	0			
Tetramorium tsushimae		1	3000000	0		1	1
Tetramorium walshi	7.0	1		0			
Tetraponera allaborans	16.0	1		0			
Tetraponera sp1	22.0	1		0			
Tetraponera sp2	21.0	1		0			
Tetraponera sp3		1	6953	0		0	0
Tetrastichus gigas	6.0	0	1				
Tetrastichus megachilidis	6.0	0	1				
Thrinax athyrii	6.0	0	1				

Species	Haploid Number	Eusocial	Colony Size	Parasite	Polyandry	Polygyny	Low Relatedness
Thrinax japonicus	8.5	0	1				
Thrinax melanogyne	6.0	0	1				
Thrinax minomensis	8.0	0	1				
Thrinax paucipunctatus	6.0	0	1				
Thrinax sasayamensis	6.0	0	1				
Thrinax struthiopteridis	6.0	0	1				
Thrinax tokunagai	7.0	0	1				
Torymus baccharidis	6.0	0	1				
Torymus californicus	6.0	0	1				
Torymus capillaceus	6.0	0	1				
Torymus koebelei	5.0	0	1				
Torymus occidentalis	6.0	0	1				
Torymus tubicola	6.0	0	1				
Torymus umbilicatus	5.0	0	1				
Torymus vesiculi	6.0	0	1				
Torymus warreni	6.0	0	1				
Trachusa gummifera	16.0	0	1				
Trachymyrmex cornetzisp1		1	300	0	0	0	0
Trachymyrmex isthmicus		1	236	0	0	0	0
Trachymyrmex jamaicensis		1	100	0			
Trachymyrmex opulentus		1		0		0	0
Trachymyrmex ruthae		1	331	0			
Trachymyrmex septentrionales	10.0	1	966.67	0		0	0
Trachymyrmex sp1	6.0	1		0			
Trachymyrmex sp2	9.0	1		0			
Trachymyrmex zeteki		1	348.5	0	0	0	0
Trichiosoma lucorum	8.0	0	1				
Trichogramma brassicae		0					
Trichogramma chilonis	5.0	0	1				
Trichogramma deion	5.0	0	1				
Trichogramma dendrolimi	5.0	0	1				
Trichogramma evanescens	5.0	0	1				
Trichogramma nubialale	5.0	0	1				
Trichogramma platneri		0					
Trichogramma pretiosum	5.0	0	1				
Trichogramma sp1	5.0	0	1				
Trigona carbonaria		1	10000		0	0	0
Trigona clypearis		1	500		0	0	0
Trigona corvina		1	7200				
Trigona fuscipennis	17.0	1					
Trigona hockingsi		1	6500		0	0	0
Trigona jaty		1	3500		0		0
Trigona julianii		1	963				
Trigona mellipes		1	2000		0	0	0
Trigona silvestri		1	500				
Trigona spinipes	17.0	1	63500				
Trigona staudingeri	17.0	1					
Trigona subterranea	17.0	1					
Trigonaspis megaptera	10.0	0	1				
Trigonisca atomaria		1	500				
Trigonisca buyssoni		1	136				
Trybliographa bochei	10.0	0	1				
Trychofoenus sp1	14.0	0	1				
Trypoxylon albitarse	16.0	0	1				
Trypoxylon asuncicola	16.0	0	1				
Trypoxylon fabricator	16.0	0	1				
Trypoxylon nitidum	13.7	0	1				
Trypoxylon obsonator	14.0	0	1				
Trypoxylon petiolatum	14.0	0	1				
Trypoxylon politum		0					
Trypoxylon sp1	12.5	0	1				
Trypoxylon sp2	13.0	0	1				
Tycherus australogeminus	11.0	0	1				
Tycherus bellicornis	10.5	0	1				
Tycherus dilleri	11.0	0	1				
Tycherus fuscicornis	11.0	0	1				
Tycherus ischiontelinus	9.0	0	1				
Tycherus ophthalmicus	11.0	0	1				
Tycherus osculator	11.0	0	1				
Tycherus suspicax	11.0	0	1				
Typhlomyrmex meire	10.0	1		0			
Typhlomyrmex rogenhoferi	18.0	1		0			
Urocerus augur	18.0	0	1				

Species	Haploid Number	Eusocial	Colony Size	Parasite	Polyandry	Polygyny	Low Relatedness
Urocerus gigas	13.0	0	1				
Venturia canescens	11.0	0	1				
Vespa crabro	25.0	1	550		1	0	1
Vespa ducalis		1			0	0	0
Vespa mandarinia	25.0	1			1		1
Vespa simillima xanthoptera	25.0	1			1		1
Vespula flaviceps	25.0	1					
Vespula germanica		1	61640		2	0	1
Vespula maculifrons		1	11793		2	0	1
Vespula pensylvanica		1	1594				
Vespula rufa		1			1	0	1
Vespula squamosa		1			2	1	1
Vespula vulgaris	25.0	1	1385		2	0	1
Virgichneumon digrammus	17.0	0	1				
Virgichneumon faunus	11.0	0	1				
Vollenhovia brachycera		1	150	0			
Vollenhovia emeryii	18.0	1		0		1	1
Vollenhovia nipponica		1		1			
Vollenhovia sp1	11.0	1		0			
Vollenhovia sp2	25.0	1		0			
Vollenhovia sp3	17.0	1		0			
Vollenhovia sp4	18.0	1		0			
Vollenhovia spANIC-3	20.0	1		0			
Vulgichneumon saturatorius	9.0	0	1				
Wasmannia auropunctata		1	571.33	0		1	1
Xenomyrmex floridanus		1	50	0		0	0
Xestophanes potentillae	10.0	0	1				
Xylocopa virginica krombeini		0					

Appendix F

R code for ancestral condition test

This function is dependent on the R phytools package version 0.4-31. This function is part of the package evobiR and may be installed directly from github.

```
# Installation
library(devtools)
install_github('coleoguy/evobir')
library(evobiR)

# Code for the Ancestral Condition Test
function (trees, data, derived.state, iterations = 10)
{
   dt.vec <- data[, 3]
   names(dt.vec) <- data[, 1]
   ct.data <- data[data[, 3] != derived.state, ]
   ct.vec <- as.numeric(ct.data[, 2])
   names(ct.vec) <- ct.data[, 1]
   anc.states.cont.trait <- list()
   if (class(trees) == "multiPhylo") {
      for (leslie in 1:length(trees)) {
         cat(paste("Performing ASR of continuous character on tree:",
            leslie, "\n"))
         anc.states.cont.trait[[leslie]] <- anc.ML(trees[[leslie]],
            ct.vec, model = "BM")
      }
   }
   if (class(trees) == "phylo") {
      anc.states.cont.trait[[1]] <- anc.ML(trees, ct.vec, model = "BM")
   }
   anc.state.dt <- list()
   if (class(trees) == "multiPhylo") {
      for (abbi in 1:length(trees)) {
         temp.anc <- make.simmap(trees[[abbi]], dt.vec, model = "ARD",
            nsim = 1, pi = c(1, 0), message = F)
         anc.state.dt[[abbi]] <- temp.anc
      }
   }
   if (class(trees) == "phylo") {
      temp.anc <- make.simmap(trees, dt.vec, model = "ARD",
         nsim = 1, pi = c(1, 0), message = F)
      anc.state.dt[[1]] <- temp.anc
   }
   producing.nodes.list <- list()
   if (class(trees) == "multiPhylo") {
      for (i in 1:length(trees)) {
         anc.state.bi <- anc.state.dt[[i]]
         ss_nodes <- anc.state.bi$mapped.edge[, 1] > 0 & anc.state.bi$mapped.edge[,
            2] > 0
```

```
        wanted_branches <- ss_nodes[ss_nodes == T]
        wanted_nodes <- names(wanted_branches)
        wanted_nodes <- gsub(",.*", "", wanted_nodes)
        producing.nodes.list[[i]] <- unique(wanted_nodes)
    }
}
if (class(trees) == "phylo") {
    anc.state.bi <- anc.state.dt[[1]]
    ss_nodes <- anc.state.bi$mapped.edge[, 1] > 0 & anc.state.bi$mapped.edge[,
        2] > 0
    wanted_branches <- ss_nodes[ss_nodes == T]
    wanted_nodes <- names(wanted_branches)
    wanted_nodes <- gsub(",.*", "", wanted_nodes)
    producing.nodes.list[[1]] <- unique(wanted_nodes)
}
hd.nodes <- vector()
if (class(trees) == "multiPhylo") {
    for (i in 1:length(trees)) {
        anc.states <- anc.states.cont.trait[[i]]
        producing.nodes <- producing.nodes.list[[i]]
        hd.nodes[i] <- mean(anc.states$ace[names(anc.states$ace) %in%
            producing.nodes])
    }
}
if (class(trees) == "phylo") {
    anc.states <- anc.states.cont.trait[[1]]
    producing.nodes <- producing.nodes.list[[1]]
    hd.nodes[1] <- mean(anc.states$ace[names(anc.states$ace) %in%
        producing.nodes])
}
hd.nodes <- mean(hd.nodes)
null.anc.nodes <- vector()
counter <- 1
number.of.trans <- vector()
if (class(trees) == "multiPhylo") {
    for (i in 1:length(trees)) {
        producing.nodes <- producing.nodes.list[[i]]
        number.of.trans[i] <- length(producing.nodes)
        anc.dt <- anc.state.dt[[i]]
        anc.ct <- anc.states.cont.trait[[i]]
        node.states <- describe.simmap(anc.dt)$states
        anc.cond.nodes <- anc.ct$ace[names(anc.ct$ace) %in%
            names(node.states)[node.states != derived.state]]
        for (j in 1:iterations) {
            null.anc.nodes[counter] <- mean(sample(anc.cond.nodes,
              length(producing.nodes)))
            counter <- counter + 1
```

```
            }
        }
    }
    if (class(trees) == "phylo") {
        producing.nodes <- producing.nodes.list[[1]]
        number.of.trans[1] <- length(producing.nodes)
        anc.dt <- anc.state.dt[[1]]
        anc.ct <- anc.states.cont.trait[[1]]
        node.states <- describe.simmap(anc.dt)$states
        anc.cond.nodes <- anc.ct$ace[names(anc.ct$ace) %in%
names(node.states)[node.states !=
            derived.state]]
        for (j in 1:iterations) {
            null.anc.nodes[counter] <- mean(sample(anc.cond.nodes,
                length(producing.nodes)))
            counter <- counter + 1
        }
    }
    plot(density(null.anc.nodes), main = "", xlab = colnames(data)[2],
        lwd = 2)
    max.y <- range(density(null.anc.nodes)[2])[2]
    lines(x = c(hd.nodes, hd.nodes), y = c(0, max.y), col = "red",
        lty = 1, lwd = 2)
    text(17, 0.4, label = paste("p-value", sum(null.anc.nodes <
        hd.nodes)/length(null.anc.nodes)))
    bigger <- (sum(null.anc.nodes >= hd.nodes)/length(null.anc.nodes)) *
        100
    smaller <- (sum(null.anc.nodes <= hd.nodes)/length(null.anc.nodes)) *
        100
    cat(paste("Derived State Mean Ancestral Cond:", hd.nodes,
        "\n"))
    cat(paste("Number of producing nodes:", mean(number.of.trans),
        "\n"))
    cat(paste("Mean of null dist:", mean(null.anc.nodes), "\n"))
    cat(paste("SD of null dist:", sd(null.anc.nodes), "\n"))
    cat(paste(bigger), "% of simulations had a derived state which arrose\n",
        "with a mean continuous value larger than inferred for the observed derived
state\n")
    cat(paste(smaller), "% of simulations had a derived state which arrose\n",
        "with a mean continuous value smaller than inferred for the observed derived
state\n")
    results <- list()
    results[[1]] <- hd.nodes
    results[[2]] <- number.of.trans
    results[[3]] <- null.anc.nodes
    results[[4]] <- bigger
    results[[5]] <- smaller
```

```
  names(results) <- c("OriginatingNodes", "NTrans", "NullDist",
    "bigger", "smaller")
  return(results)
}


# Code for the creation of simulated data
# Sim Functions
#simulate trees
library(geiger)
library(phytools)

make.trees <- function(taxa=200, iterations=100, b=1, d=.5){
 trees <- list()
 for(i in 1:iterations){
  set.seed(i)
  trees[[i]] <- drop.extinct(sim.bdtree(b=b, d=d, stop="taxa", n=taxa, extinct=F))
 }
 class(trees) <- "multiPhylo"
 return(trees)
}

sim.cont <- function(trees, iterations=100, rate=.2){
 cont.traits <- list()
 for(i in 1:iterations){
  set.seed(i)
  foo <- sim.char(trees[[i]], par=rate)
  foo2 <- as.vector(foo)
  names(foo2) <- row.names(foo)
  cont.traits[[i]] <- foo2
 }
 return(cont.traits)
}
stretch.trees <- function(trees, cont.trait, low.quar=1, high.quar=1, iterations = 100){
 #now we will scale branches based on their
 #reconstructed continuous trait value
 stretched.trees <- list()
 for(i in 1:iterations){
  x <- cont.trait[[i]]
  node.vals <- fastAnc(trees[[i]], x)
  names(x) <- 1:length(x)
  node.vals <- c(x, node.vals)
  current.tree <- trees[[i]]
  lookup <- current.tree[[1]]
  scale.factor <- vector()
  for(j in 1:nrow(lookup)){
   scale.factor[j] <- mean(c(node.vals[lookup[j, 1]], node.vals[lookup[j, 2]]))
```

```
    }
    low <- summary(scale.factor)[[2]]
    high <- summary(scale.factor)[[5]]
    for(j in 1:length(scale.factor)){
      if(scale.factor[j] >= high){
        scale.factor[j] <- high.quar
      }else if(scale.factor[j] <= low){
        scale.factor[j] <- low.quar
      }else{
        scale.factor[j] <- 1
      }
    }
    current.tree[[4]] <- current.tree[[4]] * scale.factor
    stretched.trees[[i]] <- current.tree
  }
  return(stretched.trees)
}

sim.disc <- function(trees, q=list(rbind(c(-.02, .02), c(0, 0)))){
  disc.cor <- list()
  test <- F
  while(test == F){
    foo <- sim.char(trees, par=q, model="discrete", root=1)
    if(sum(foo == 1) > sum(foo == 2) & sum(foo == 2) > 1){
      test <- T
    }
  }
  foo2 <- as.vector(foo)
  names(foo2) <- row.names(foo)
  disc.cor <- foo2
  return(disc.cor)
}
```

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Biographical Information

Heath Blackmon has been an amateur naturalist and beetle collector since childhood. He graduated summa cum laude with a Bachelors of Science degree in Environmental Science with a concentration in fisheries and wildlife biology from Oregon State University in 2010. He continued his education working with Dr. Jeffery P. Demuth at the University of Texas at Arlington earning a PhD in Quantitative Biology in 2015. Heath has been recognized for his research and teaching, receiving a NESCent graduate fellowship, the Carrizo Oil and Gas doctoral fellowship, and the T.E. Kennerly Excellence in Teaching award.

Heath's research interests are centered on building an understanding of the relationships between phenotypic traits and genomic traits and using comparative approaches to bridge the gap between pattern and process. He will be leaving the University of Texas at Arlington for a postdoctoral position in the lab of Dr. Emma Goldberg at the University of Minnesota and plans on pursuing a career in academia.