Phylum **Arthropoda** von Siebold, 1848[1] (1,242,040 species, of which †27,745)[2]
- Subphylum 1 †**Trilobitomorpha** Størmer, 1944 (19,606 species)[3]
- Subphylum 2 **Chelicerata** Heymons, 1901 (113,894 species, of which 1,957)[4]
  - Class 1 **Pycnogonida** Latreille, 1810 (1330 species, of which †8 species)[5]
  - Class 2 †**Aglaspidida** Walcott, 1911 (†11 species)[6]
  - Class 3.1 †**Xiphosura** Latreille, 1802 (†98 species)[7]
  - Class 3.2.1 †**Eurypterida** Burmeister, 1843 (†246 species)[8]
  - Class 3.2.2 †**Chasmataspidida** Caster & Brooks, 1956 (†8 species)[9]
  - Class 3.3 **Arachnida** Cuvier, 1812 (112,201, of which †1,586)[10]
    - Order 1.1 **Opiliones** Sundevall, 1833 (6,519 species, of which †35 species)[11]
    - Order 1.2 **Scorpiones** C.L. Koch, 1851 (2,068 species, of which †121 species)[12]
    - Order 2.1 **Solifugae** Sundevall, 1833 (1,116 species, of which †3 species)[13]
    - Order 2.2 **Pseudoscorpiones** de Geer, 1778 (3,494 species, of which †40 species)[14]
    - Order 3 **Palpigradi** Thorell, 1888 (83 species, of which †1 species)[15]
    - Order 4 †**Phalangiotarbida** Haase, 1890 (†31 species)[16]
    - Order 5 **Ricinulei** Thorell, 1876 (73 species, of which †15 species)[17]
    - Order 6.1 **Opilioacarida** Zakhvatkin, 1952 (37 species, of which †2 species)[18]
    - Order 6.2 **Holothyrida** Thon, 1905 (27 species)
    - Order 6.3 **Ixodida** Leach, 1815 (896 species, of which †5 species) [19]
    - Order 6.4 **Mesostigmata** G. Canestrini, 1891 (11,424 species)
    - Order 7.1 **Trombidiformes** Reuter, 1909 (25,821 species, of which †24 species)[20]
    - Order 7.2 **Scarcoptiformes** Reuter, 1909 (16,412 species, of which †113 species)[21]
    - Order 8.1 †**Trigonotarbida** Petrunkevitch, 1949 (†65 species)[22]
    - Order 8.2.1.1 †**Uraraneida** Selden & Shear in Selden e*t al*., 2008 (†2 species)[23]
    - Order 8.2.1.2 **Araneae** Clerck, 1757 (43,579 species, of which †1,106 species)[24]
    - Order 8.2.2.1 †**Haptopoda** Pocock, 1911 (†1 species)[25]

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1. **BY** Zhi-Qiang Zhang (for full auhor addresses, see **Auhor name and address** after **References**). The title of this contribution should be cited as "Phylum Arthropoda von Siebold, 1848 *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness". This classification at the subphylum level generally reflects the high level relationship summarized by Giribet & Edgecombe (2012: Fig. 5), with modification and updates as indicated (see notes on Crustacea).
   Fossil Marellomorpha not included in the phylogentic relationships focused on Recent taxa in Giribet & Edgecombe (2012). Grimaldi & Engel (2005) listed three genera.
2. Only Recent species were counted for many insect orders and all of Myriapoda; so the total number of species should be considered incomplete, as diversity of fossil taxa is underestimated.
3. See Adrain (2011, this volume).
4. There are broad consensus of high level relationship within Chelicerata (Dunlop 2010; Giribet & Edgecombe 2011); this classification at the class level generally reflects the high level relationship summarized by Giribet & Edgecombe (2011: Fig. 5), with modification and updates as indicated.
   Grimaldi & Engel (2005) listed three poorly kown arthropod taxa taxa (†Sidneyiida, †Emeraldellida Størmer, 1944 and †Sanctacarida); their placement is uncertain in the current system (e.g. Dunlop 2010; Giribet & Edgecombe 2012).
5. See Bamber (2011, this volume).
6. Data from J. Ortega-Hernandez (personal communication, 15 Dec. 2011).
7. Fossil horseshoe crabs; based on Dunlop *et al.* (2011).
8. Fossil sea scorpions; based on Dunlop *et al.* (2011).
9. Based on Dunlop *et al.* (2011).
10. Arachnid classification reflects mostly the phylogenetic hypothesis by Shultz (2007), but his Acaromorpha is now disputed (see Dunlop 2010).
11. See Kury (2011, this volume).
12. See Prendini (2011a, this volume).
13. See Prendini (2011b, this volume).
14. See Harvey (2011, this volume).
15. See Prendini (2011c, this volume).
16. Based on Dunlop *et al.* (2011).
17. See Prendini (2011d, this volume).
18. See Beaulieu *et al.* (2011, this volume), with a list of families and diversity estimates for each family within the mite superorder Parasitiformes, including Opilioacarida, Holothyrida, Ixodida and Mesostigmata.
19. Based on Guglielmone *et al.* (2010).
20. See Zhang *et al.* (2011, this volume). The second mite superorder, Acariformes, consists of Trombidiformes and Sarcoptiformes.
21. This order includes two suborders: Oribatida and Endeostigmata. Accoding to Schatz *et al.* (2011, this volume), Recent Oribatida (including Astigmata) currently include 249 families, 2399 genera and 16197 species; exclusively fossil taxa include 2 families, 20 genera and 108 species; Walter *et al.* (2011, this volume) estimated 10 families, 27 genera, 108 species for Endeostigmata, of which 3 genera and 5 species are based on fossil.
22. Based on Dunlop *et al.* (2011).
23. Selden *et al.* (2008).
24. See Dunlop & Penney (2011, this volume).

Order 8.2.2.2.1 **Amblypygi** Thorell, 1883 (170 species, of which †9 species)[26]
Order 8.2.2.2.2.1 **Thelyphonida** Latreille, 1804 (119 species, of which †9 species)[27]
Order 8.2.2.2.2.2 **Schizomida** Petrunkevitch, 1945 (264 species, of which †4 species)[28]
Subphylum 2.1 **Myriapoda** Latreille, 1802 (11,885 species)[29]
Class 1 **Chilopoda** Latreille, 1817 (3,100 species)[30]
Class 2.1 **Symphyla** Ryder, 1880 (197 species)[31]
Class 2.2.1 **Pauropoda** Lubbock, 1868 (835 species)
Class 2.2.2 **Diplopoda** de Blainville in Gervais, 1844 (7,753 species)
Subphylum 2.2.1 **Crustacea** Brünnich, 1772 (66,914 species)[32]
Subphylum 2.2.2 **Hexapoda** Latreille, 1825 (1,029,741 species, of which †6,182 species)[33]
Class 1.1 **Collembola** Lubbock, 1870 (8,130 species)[34]
Class 1.2.1 **Protura** Silvestri, 1907 (804 species)[35]
Class 1.2.2 **Diplura** Börner, 1904 (800 species)[36]
Class 2 **Insecta** Linnaeus, 1758 (1,020,007 species, of which †6,182 species)[37]
Order 1 **Archaeognatha** (513 species)[38]
Order 2.1 **Zygentoma** Börner, 1904 (561 species, of which †1 species)[39]
Order 2.2.1.1 **Ephemeroptera** Hyatt & Arms, 1890 (3,240 species)[40]
Order 2.2.1.2.1.1 †**Geroptera** Brodsky, 1994 (†2 species)[41]
Order 2.2.1.2.1.2.1 †**Protodonata** (†42 species)[42]
Order 2.2.1.2.1.2.2 **Odonata** Fabricius, 1792 (5,899 species)[43]
Order 2.2.1.2.2.1.1 †**Palaeodictyoptera** Goldenberg, 1877 (†115 species)[44]
Order 2.2.1.2.2.2.2.1 **Mischopterida** Handlirsch, 1906 (†100 species)[45]
Order 2.2.1.2.2.2.2.2 †**Diaphanopterodea** Handlirsch, 1906 (†50 species)[46]
Order 2.2.2.1 †**Paoliida** Handlirsch, 1906 (†12 species)[47]
Order 2.2.2.2.1 †**Caloneurodea** Martynov, 1938 (†14 species)[48]
Order 2.2.2.2.2 †**Titanoptera** Sharov, 1968 (†15 species)[49]

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25. Based on Dunlop *et al.* (2011).
26. See Prendini (2011e, this volume).
27. See Prendini (2011f, this volume).
28. See Prendini (2011g, this volume).
29. Recent species only; many fossil species were described but were not included in this edition due to lack of time, so the total number of species should be considered incomplete.
30. See Shear (2011, this volume).
31. See Minelli (2011, this volume), which also covers Pauropoda and Diplopoda.
32. See Ahyong *et al.* (2011, this volume), which provided a classification of all families and an estimate of 1,003 families, 9,522 genera and 66,914 species for Recent Crustacea. Crustacea is paraphyletic according to Giribet & Edgecombe (2011). Here traditional consensus classification presented in Ahyong *et al.* (2011) is followed.
33. Classification reflects consensus phylogenetic relationship in Trautwein *et al.* (2012); inclusion of fossil orders follows Grimaldi & Engel (2005).
34. See Janssens & Christiansen (2011, this volume).
35. Based on Szeptycki (2007), and updated using Zoological Records from 2007.
36. This number is cited by Chapman (2009) and also Tree of Life Web Project. 1995. Diplura. Version 01 January 1995 (temporary). http://tolweb.org/Diplura/8204/1995.01.01 in The Tree of Life Web Project, http://tolweb.org/ .
37. Diversity estimates for fossil insects are not available for many orders and thus total diversity is underestimated.
38. Based on Foottit & Adler (2009) and updated using Zoological Records from 2008.
39. Alternative name Thysanura; estimates based Foottit & Adler (2009) and updated using Zoological Records from 2008. Fossil taxa are represented in at least 1 family (Data from Paleobiology Database on 15 December, 2011 using "Taxon Count" search)—note that these data may be incomplete.
40. Based on Foottit & Adler (2009) and updated using Zoological Records from 2008; Foottit & Adler listed 3,046 species.
41. Fossil taxa are represented in 2 genera and 1 family (Data from Paleobiology Database on 15 December, 2011 using "Taxon Count" search)—note that these data may be incomplete; Grimaldi & Engel (2005) mentioned "a few species" for this order.
42. Fossil taxa are represented in 27 genera and 5 families (Data from Paleobiology Database on 15 December, 2011 using "Taxon Count" search)—note that these data are incomplete. Zoological Record lists a total of 48 species/subspecies names.
43. Based on Foottit & Adler (2009) and updated using Zoological Records from 2008; Foottit & Adler listed 5,680 species; Trueman (2007) mentioned "around 6,000 species" for Odonata.
44. Fossil taxa are represented in at least 82 genera and 25 families (Data from Paleobiology Database on 15 December, 2011 using "Taxon Count" search)—note that these data are incomplete.
45. Concept and estimates follow Rasnitsyn & Quicke (2002); this order includes two orders listed in Grimaldi & Engel (2005): †Dipliptera (=Archodonata Martynov, 1932) and †Megasecoptera Brongniart, 1885.
46. Based on Rasnitsyn & Quicke (2002).
47. Based on Prokop & Nel (2007).
48. Fossil taxa are represented in at least 11 genera and 7 families (Data from Paleobiology Database on 15 December, 2011 using "Taxon Count" search)—note that these data are incomplete; a total of 25 genera 9 families in David Eades. Polyneoptera Species File Online. Version 1.0/4.0. [retrieval date]. http://Polyneoptera.SpeciesFile.org, but Eades did not provide species for some genera.

Order 2.2.2.2.3 **Orthoptera** Olivier, 1789 (24,276 species, of which †421 species)[50]
Order 2.2.2.3.1 **Phasmida** Leach, 1815 (3,029 species, of which †15 species)[51]
Order 2.2.2.3.2 **Embioptera** Lameere, 1900 (464 species[52], of which †1 species)
Order 2.2.2.4.1 **Grylloblattodea** Brues & Melander, 1932 (34 species)[53]
Order 2.2.2.4.2 **Mantophasmatodea** Zompro, Klass, Kristensen & Adis, 2002 (21 species, of which †6 species)[54]
Order 2.2.2.5.1 **Plecoptera** Latreille 1802 (3,788 species[55], of which †45 species[56])
Order 2.2.2.5.2 **Dermaptera** deGeer, 1773 (1,978 species)[57]
Order 2.2.2.6.1 **Zoraptera** Silvestri, 1913 (37 species)[58]
Order 2.2.2.6.2.1 **Mantodea** Burmeister 1838 (2,400 species)[59]
Order 2.2.2.6.2.2 **Blattodea** Brunner, 1882 (7,314 species)[60]
Order 2.2.3.1 †**Miomoptera** Martynov 1927 (†47 species)[61]
Order 2.2.3.2.1 **Psocoptera** Shipley, 1904 (5,720 species)[62]
Order 2.2.3.2.2 **Phthiraptera** Haeckel, 1896 (5,102 species)[63]
Order 2.2.3.3.1 **Thysanoptera** Haliday, 1836 (6,019 species, of which †155 species)[64]
Order 2.2.3.3.2 **Hemiptera** Linnaeus 1758 (103,590)[65]
Order 2.2.4 †**Glosselytrodea** Martynov 1938 (†30 species)[66]
Order 2.2.5.1 **Hymenoptera** Linnaeus 1758[67] (116,861 species)[68]
Order 2.2.5.2.1.1.1 **Strepsiptera** Kirby 1813 (609 species)[69]
Order 2.2.5.2.1.1.2 **Coleoptera** Linnaeus, 1758 (387,100 species, of which †600 species)[70]
Order 2.2.5.2.1.2.1 **Neuroptera** Linnaeus, 1758 (5,868 species)[71]
Order 2.2.5.2.1.2.2.1 **Megaloptera** Latreille, 1802 (354 species)[72]
Order 2.2.5.2.1.2.2.2 **Raphidioptera** Navás, 1916 (254 species)[73]
Order 2.2.5.2.2.1.1 **Trichoptera** Kirby, 1813 (14,999 species, of which †608 species)[74]
Order 2.2.5.2.2.1.2 **Lepidoptera** Linnaeus, 1758 (157,424 species, of which †86 species)[75]
Order 2.2.5.2.2.2.1 **Diptera** Linnaeus, 1758 (159,294 species, of which †3,817 species)[76]
Order 2.2.5.2.2.2.2.1 **Siphonaptera** Latreille, 1825 (2,075 species)[77]
Order 2.2.5.2.2.2.2.2 **Mecoptera** Packard, 1886 (757 species)[78]

49. Based on Shcherbakov (2011).
50. See Ingrisch (2011, this volume).
51. See Brock and Marshall (2011, this volume) for Recent taxa only. Fossil taxa are represented in at least 14 genera and 9 families (Data from Paleobiology Database on 15 December, 2011 using "Taxon Count" search)—note that these data are incomplete.
52. Based on Foottit & Adler (2009) and updated using Zoological Records from 2008.
53. Grimaldi & Engel (2005) mentioned 26 species placed in 5 genera in 1 family.
54. Updated with Arillo & Engel (2006), Eberhard *et al.* (2011). Note that this order and Grylloblattodea were placed in the order Notoptera by Arillo & Engel (2006).
55. Based on Foottit & Adler (2009) and updated using Zoological Records from 2008; Foottit & Adler listed 3497 species.
56. Fossil taxa are represented in at least 22 genera and 10 families (Data from Paleobiology Database on 15 December, 2011 using "Taxon Count" search)—note that these data are incomplete.
57. Based on Foottit & Adler (2009) and updated using Zoological Records.
58. Based on Foottit & Adler (2009) and updated using Zoological Records.
59. Based on Otte, D., Spearman, L. & Martin, B.D.S. Mantodea Species File Online. Version 1.0/4.0. [retrieval date 15 Dec. 2011]. <http://Mantodea.SpeciesFile.org>.
60. See Beccaloni & Eggleton (2011, this volume), without fossils; including 2,692 species of termites (no longer an order).
61. Data from Paleobiology Database on 15 December, 2011 using "Taxon Count" search; this should be viewed as incomplete.
62. Based on Foottit & Adler (2009) and updated using Zoological Records from 2008.
63. Based on Foottit & Adler (2009) and updated using Zoological Records from 2008.
64. See Mound *et al.* (2011, this volume).
65. Based on Foottit & Adler (2009) and updated using Zoological Records from 2008.
66. Based on Hong (2007) with updates.
67. Holometabola for 11 orders from Hymenoptera to Mecoptera.
68. Based on Hymenoptera Online http://hol.osu.edu/ (accessed 15 Dec. 2011), which placed these species in 7,745 genera and 118 families. Fossil taxa are represented in at least 789 genera and 89 families (Data from Paleobiology Database on 15 December, 2011 using "Taxon Count" search)—note that these data are incomplete. Foottit & Adler (2009), citing Huber in that volume, mentioned 144,695 species.
69. Based on Foottit & Adler (2009) and updated using Zoological Records from 2008.
70. See Slipinski *et al.* (2011, this volume).
71. Based on Foottit & Adler (2009) and updated using Zoological Records.
72. Based on Foottit & Adler (2009) and updated using Zoological Records from 2008; Foottit & Adler listed 328 species.
73. Based on Foottit & Adler (2009) and updated using Zoological Records from 2008.
74. See Holzenthal *et al.* (2011, this volume).
75. See Nieukerken *et al*. (211, this volume).
76. See Pape *et al.* (2011, this volume), but 5,969 dubious species not included in total count.
77. Based on Foottit & Adler (2009) and updated using Zoological Records.
78. Based on Foottit & Adler (2009) and updated using Zoological Records from 2008.

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