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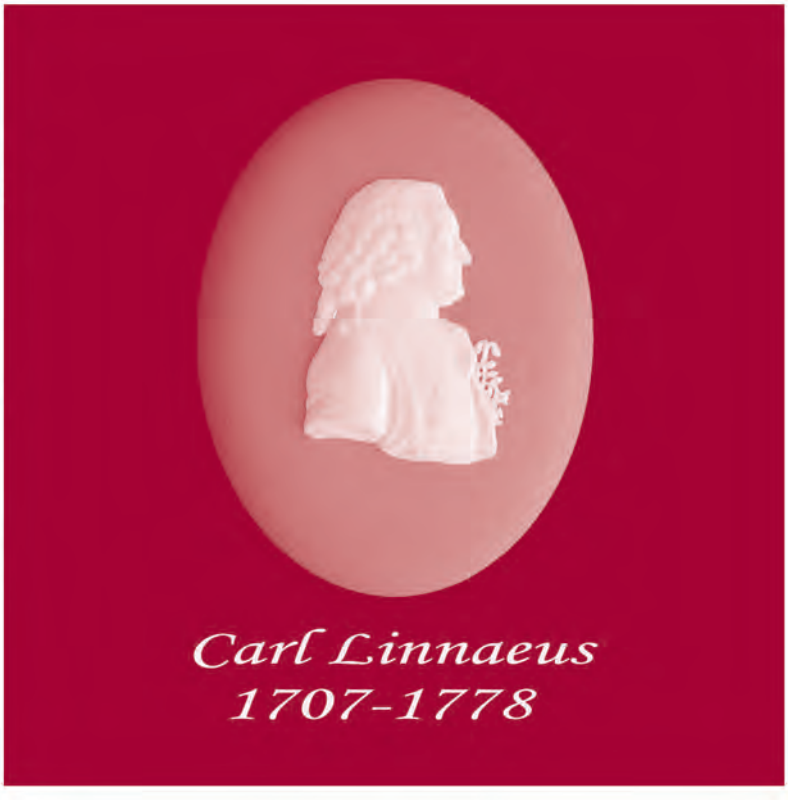

NEWSLETTER AND PROCEEDINGS OF THE LINNEAN SOCIETY OF LONDON

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A forum for natural history

THE LINNEAN SOCIETY OF LONDON

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THE LINNEAN

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Editorial

This October *Linnean* contains three articles, two zoological and one botanical. The latter article discusses whether or not Linnaeus was colour blind. Initially it compares Linnaeus' condition with that described by the amateur botanist, John Dalton (1766-1844). To Dalton the flower called the Pink appeared blue, as did roses, *Statice armeria*, red campion, red clover and ragged robin. However, by candle light some flowers such as *Pelargonium* appeared their normal colour – red. After Dalton's death, on his instruction his eyes were removed and have recently been subjected to DNA analysis which revealed that Dalton was a duteranope, insensitive to green light. Linnaeus described the flower of *Andromeda* as blue and the author suggests that Linnaeus, like Dalton, may have been a duteranope. The author concludes with a table of plants with the specific name *caerulea*.

The first zoological article concerns *Papillio encelatus* Linnaeus 1758 of which no type material has been located. The author examines suggestions that *P. encelatus* is an oriental member of the Danainae or maybe an African! After deciding that *P. encelatus*, identified by Yeats as *Amauris* but whose specific identity was uncertain, the author concludes that the name *Papillio encelatus* should be suppressed.

The second article concerns the setting up by a Scotsman named Drummond of a colony called the Swan River in Australia. It was the only British colony in Australia established by land grants. Drummond was an avid plant collector, in particular orchids, tubers and seeds, some of which were sent to John Lindley back in England. In 1836 HMS *Beagle* arrived in King George Sound and spent eight days there, but apparently Darwin had little contact with the Swan River settlers. Many years later Darwin corresponded with Drummond, having been introduced to him through Sir William Jackson Hooker, for whom Drummond had been collecting seeds for several years. Darwin, at the time, was working on the Australian orchid *Leschenaultia formosa* and wrote to Drumond for information on its fertilisation. Drummond eventually confirmed that bees did in fact pollinate the orchid. Drummond kept up his correspondence with Darwin and also sent him seeds of which Darwin wrote notes on their dispersal.

This issue also includes a review of Peter Forey's new book on the *Coelacanth: Portrait of a Living Fossil* and, sadly, an obituary of Terence Ingold, the Society's oldest Fellow.

BRIAN GARDINER
Editor

Society News

As you read this, we will be just two months from the end of 2010 – the International Year of Biodiversity. This has been a wonderful opportunity to share the message of the importance of biodiversity with a global audience and to communicate the message that we all have a role to play in preserving biodiversity for future generations. As a Society we continued to celebrate this International Year with two events in June – a

Call for Nominations for 2011

Nominations are now sought for the Society's **Medals and Prizes** to be awarded in 2011. These are the Linnean Medal for Botany, the Linnean Medal for Zoology, the Darwin-Wallace Medal, the Bicentenary Medal, the HH Bloomer Award, the Irene Manton Prize and the Jill Smythies Award and the Trail-Crisp Award*.

If you would like to nominate an individual for any of these awards, please complete the nomination forms available by selecting the appropriate award on the Medals and Prizes section of our website (*http://www.linnean.org/index.php?id=330*). Completed nomination forms should be sent to The Executive Secretary, in hard copy or by email (*ruth@linnean.org*) to arrive not later than **31st December 2010**. Electronic signatures will be accepted. Please note that the proposer and seconder for all medals and prizes must both be Fellows of the Linnean Society of London.

Fellows wishing to make recommendations to Council for its nominations for new **Council Members**, for **Officers**, or for **Foreign Membership** must make these recommendations known to the Executive Secretary by **December 31st 2010**.

Dr Ruth Temple
Executive Secretary

* The Society is delighted to include the Trail-Crisp Award in its call for nominations for the 2011 Medals and Prizes. This award, last presented in 1987, is presented in recognition of an outstanding contribution to Biological Microscopy published in the United Kingdom, with preference being given to the younger worker. The award is made by Council at intervals to any person not at the time a member of Council. A bronze medal and a purse provided out of the fund is presented to the recipient of the award.

two day joint conference with the Natural History Museum entitled "Sequencing the Red and the Dead" and an excellent lecture from Professor Bill Sutherland from the University of Cambridge – "The need for evidence-based conservation", in which he emphasized the need to share information as a vital component of contributing to decision and policy-making.

In July, we hosted another joint meeting (with Royal Botanic Gardens, Kew) – a two-day conference on Early Events in Monocot Evolution. This well-attended meeting, brought together a global network of researchers and again emphasized the importance of sharing information within the research network and the wider public about the latest developments in this important area. A more detailed report of this meeting will appear in the December issue of *PuLSe*. A group of Society Fellows and guests also heard more about the role of museums in conducting research and communicating findings to the general public when we visited the National Museum, Cardiff in July for the Society's annual Conversazione (see Hazel Marsden's report on p.3)

So, as we move towards the close of the International Year, how do we ensure that the message of the importance of biodiversity continues to be conveyed? As a Society with a core mission – "the cultivation of the Science of natural history in all its branches" – we are well placed to do this and will continue to contribute to consultations and to

host meetings on scientific issues of importance. We are now utilizing new technology to communicate our message – please follow us on Facebook or Twitter. If there are other activities in which you think the Society should engage to convey our message, please do let me know. I am aware that many Fellows are actively engaged in many aspects of natural history; please consider submitting an article for *PuLSe* magazine so other Fellows can find out more about your projects and perhaps get involved themselves. And please utilize these final few months of 2010, to talk to others about the Linnean Society and consider recommending them for election to our growing Fellowship.

RUTH TEMPLE

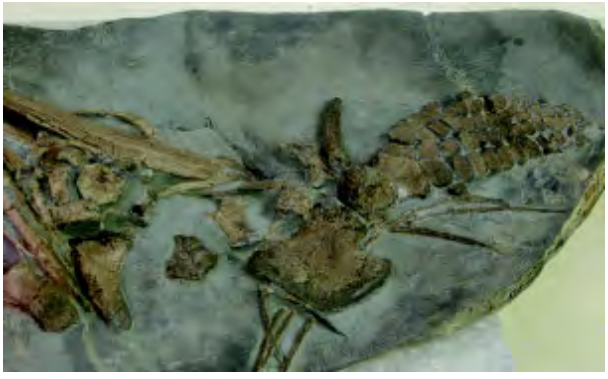
Executive Secretary

P.S. Many Fellows will remember Professor William Stearn who was President of the Linnean Society of London from 1979-1982 and a distinguished botanist. Sadly, Professor Stearn died in 2001, but the Society's current President, Dr Vaughan Southgate, Past-President Professor David Cutler, and Executive Secretary Ruth Temple, were delighted to be able to celebrate with his widow, Ruth Stearn, on 10th August 2010, the occasion of her 100th birthday! We presented Mrs Stearn with a bouquet from the Society and enjoyed sharing many memories of the Society with her and her family. Mrs Stearn sends her very best wishes to all Fellows.

The President, Dr Vaughan Southgate, Past President Professor David Cutler and Executive Secretary, Ruth Temple with Mrs Ruth Stearn on her 100th birthday.

The Conversazione

This year's Conversazione was held on July 17th in the National Museum in Cardiff on a very pleasant, sunny afternoon. It was organised by Professor Dianne Edwards (University of Cardiff) and Dr Michael Wilson (National Museum, Cardiff). We met in the very elegant surroundings of the foyer of the Museum and split into two groups for the backstage tour.



One of the fossils in a display for the Conversazione, exhibited by the Paleontology Department at the National Museum, Cardiff. The specimen is an ichthyosaur, *Ichthyosaurus communis* Conybeare, a marine reptile from the early Jurrasic period, south east Wales.

Our group began and ended the tour with rocks! I have to declare an interest here as my mother's subject (she was one of the first women university lecturers) was Geography with Geology and my grandfather was the geologist, G.W. Tyrrell, author of *Principles of Petrology*, *Volcanoes* etc. With a daughter-in-law whose degree is Geology, rocks are in the family! Cindy Howells and Caroline Butler from Palaeontology took us through some samples of the Museum's vast collection of specimens. We looked at fossilized ferns, spiders, ammonites and various fossilized plants. The Museum holds around 700,000 specimens from around the world; 15,000 of these are type, figured and cited specimens. About 300 of them are holotypes, the original specimen from which a species is described.

Participants at this year's Conversazione in Cardiff.

The next visit was to see part of the fabulous collection of botanical art explained by Maureen Lazarus. She showed us works from contemporary local artists and also by artists of international repute e.g. Ehret. Graham Oliver then showed us a new web- based taxonomic tool to study the Marine Bivalves of the British Isles. Andy Mackie told us more about the marine invertebrate research at the Museum including distribution surveys of benthic invertebrates in the Irish Sea. Michael Wilson completed the tour by explaining some specimens from the extensive entomological collection held at the Museum.

We then went to the University of Cardiff to view a fascinating display of rock art by Richard Weston (Professor of Architecture) who has used scanned pictures of rocks as the inspiration for wonderful fabric designs for scarves and rugs (now on sale at Liberty's no less!). We then moved to the Council Chamber for a splendid buffet.

Our grateful thanks to the organisers and the presenters for taking time to show and discuss their work with us – their passion for their subjects was very evident.

HAZEL MARSDEN

David Lyall MD FLS RN (1817-1895) gets a blue plaque in Cheltenham

A small ceremony took place on 26 June 2010 when the Mayor of Cheltenham, Councillor Anne Regan unveiled a plaque on 24 London Road Cheltenham, the house occupied by David Lyall, naval surgeon, explorer and plant collector after his retirement. David Lyall was the subject of the biographical article which I wrote and is published in *The Linnean* (Vol. 26(2), July 2010, pp. 23-48). My brothers, who live in Cheltenham, brought the draft article to the attention of Dr Roger Woodley, chairman of the Plaques Committee of the Cheltenham Civic Society, and the Society subsequently decided to include David Lyall in their programme. The plaque was sponsored jointly by the Cheltenham Civic Society and by my brothers and me, who are distant collateral relatives of the botanist.

The plaque features a representation of *Ranunculus lyallii*, the giant New Zealand buttercup, the largest of the genus, which is probably the best-known plant collected by the prolific Dr Lyall.

Also present at the unveiling were Martin Horwood, MP for Cheltenham, Mr and Mrs Howells, the owners of 24 London Road, Stephen Clarke, chairman, Cheltenham Civic Society and Dr Roger Woodley. We were also delighted and honoured to be joined by Professor Dianne Edwards FRS FLS of the Council of the Linnean Society who travelled up from Cardiff especially to be there. Roger Woodley organised the whole event with great efficiency.

The blue plaque on 24 London Road, Cheltenham.

Plaque ceremony, 26 June 2010, at 24 London Road, Cheltenham. Left to right: Cllr Anne Regan, Mayor of Cheltenham; Dr Andrew Lyall FLS; Martin Horwood MP; Mrs Howells and Mr Howells, owners of 24 London Road; Prof Dianne Edwards FRS FLS; Mr Stephen Clarke, chairman, Cheltenham Civic Society; Mr David Lyall.

After the ceremony Mr and Mrs Howells invited us into their house and gave us an informal tour. 24 London Road is one of a row of Regency villas built in 1829 in the typical Cheltenham style with verandas on the first floor level, which were popular with military families who had retired from service in India. Mrs Howells is a keen gardener and has the ambition to grow *Ranunculus lyallii* in her back garden. I had to warn her that I tried in my garden in Dublin, using seeds obtainable from Chiltern Seeds, so far without success, probably because the native habitat of the plant is the slopes of Mount Cook in South Island, New Zealand and requires melted ice water trickling through its roots – not an easy condition to reproduce in an English garden. The RHS Plant Finder also lists two nurseries in Scotland who stock the plant, but that seems a bit like cheating and it would in any case be more exciting and interesting to grow it from seed. If any Linnean members have succeeded Mrs Howells and I would be delighted to hear from you. A friend of mine, Dr Mary Toomey, a professional botanist and lecturer, formerly of Trinity College Dublin, and author of several books on clematis, succeeded in growing *Ranunculus lyallii* in her garden in Dublin and it produced flowers, but sadly it only survived for about two years. But we wish Mrs Howells the best of luck.

After the ceremony those present repaired to a nearby church hall for a reception sponsored by the Civic Society. Roger Woodley reminded me that I had said in the article that David Lyall, the botanist, was better known from his plants in North America than in the country of his birth, and that the Civic Society had now taken some steps to correct that omission. A satisfactory outcome and an experience enjoyed by all, on a hot and sunny summer day.

ANDREW LYALL

Library

The initial phase of the Smith Correspondence Project, funded by the Wellcome Trust, has now been completed and I am delighted to be able to report that further funding has been secured, from a different source, which will make it possible for us to enhance these newly-created records. Fuller descriptions of the content of the letters

will be added, together with details of plant names, collectors mentioned and so on. All of this extra detail will enable links to be made with information relating to the specimens within the Smith Herbarium.

Janet Ashdown and Lucy Gosnay, our conservation team, continue their work on cleaning the Smith herbarium sheets and they are well on track to complete this project on time. Recently, a conservator, working on restoring the Marianne North paintings at Kew, took a few days out to volunteer with us. Under Janet's supervision she worked on cleaning herbarium specimens and undertook some book repair work.

In July, the digitisation of the primary shell collection was completed and the material was returned to the Society. All the specimens have been handled with scrupulous care by the staff of the Natural History Museum's photographic unit and the images that have been produced are second to none. Now the various elements of the Linnaean Collections are together once more in the Collections Store. It seems a long time since all the Linnaean material was last under one roof – it has actually been more than 4 years – so it is very satisfying to have everything back where it belongs. The high-quality of the images on the website and the huge number of hits and page requests from people all over the world are irrefutable proof that it has certainly been a very worthwhile exercise.

Our annual visits from Amercan university summer-school groups have now taken place. We especially enjoy welcoming the groups from Harvard and from the University of Maryland. All the students are always very lively and well-versed in their subject.

During this quieter summer period we have been able to undertake some "housekeeping" tasks. With the help of our Honorary Archivist and two of our volunteers we have been busy sorting, listing, boxing and labelling the archives that will go into the large mahogany cupboards in the Tower Room. Some of this material has been removed from the East Basement and has thus freed up some precious space. Work is currently being undertaken to improve the conditions in that area in order to make it more suitable for the storage of lesser-used periodicals.

Our volunteers have been working hard as usual on their projects. John Sellick is currently transcribing the correspondence collections of James Murie and Spencer Savage. Pia Wilson has completed an Access database of Fellows' details up to those elected in 1920. Hazel Marsden is putting records for the Society's portraits into the online catalogue and is within striking distance of the end of that project. She has reached Andreas Vesalius, " the Father of modern anatomy", and only has another 150 or so entries to go. Alan Brafield has been heavily involved in the sorting and listing of the archives being transferred to the Tower Room.

LYNDA BROOKS

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Correspondence

Corrigendum

When David Pye's letter was published in the July *Linnean* we unfortunately omitted several lines concerning the "steering" of hot air balloons. The lines in question are highlighted below in the paragraph from which they were omitted: My sincere apologies for their omission – Mary Morris.

"There is another interesting question to do with 'steering' hot air balloons. They move passively with the wind but can be swung to left or right by changing their altitude. The explanation is that the Coriolis effect on the wind interacts with ground friction to cause wind direction to vary with height (see *htto://www.windwisdom.net/tutor2.httn*_from University of Michigan – this is currently carrying a viral health warning but I can send a clean photocopy by post on request). **It certainly works, even close to the Equator – in the Serengeti at 2.5 deg S, our pilot saw some lions way off to the right and veered over to give us a closer look, then corrected his course to continue to the agreed landing spot (and waiting champagne breakfast) right on a narrow road as park regulations insist**. I corresponded briefly with the author of the website who assured me that the response is even better close to the equator – but I really don't quite understand that bit."

From: Duncan M. Porter, FLS Blacksburg, Virginia

Darwin's plant fossils

Thanks to Barry Thomas for his paper on Charles Darwin's plant fossils from the *Beagle* voyage in the April 2009 *Linnean* (Thomas, 2009). I had searched for them unsuccessfully at the Natural History Museum in the early 1980s. As I wrote in reference to them in my study of Darwin's *Beagle* collections:

"It is obvious that, although [Robert] Brown never published on Darwin's plant fossils, he provided the information regarding them that Darwin needed for his various geological publications. Presumably, they are at the British Museum (Natural History), although a few are with the other fossils in the Sedgwick Museum at Cambridge." [Porter, 1985, p. 1000]

Although he found a number of Darwin's specimens at the Natural History Museum, apparently Thomas was unaware of those at Cambridge.

There are no known letters between Darwin and Brown, which is not surprising when one realizes that the two met fairly often at the British Museum (Natural History) and meetings of the Linnean Society. It is unfortunate that Darwin did not make notes on his conversations with Brown, like he did later for those, for example, with Joseph Dalton Hooker (8 December 1844, Burkhardt and Smith, 1987, pp. 399-403). Otherwise, we might be certain of Brown's contribution to Darwin's geological research.

Thomas (p. 41) hypothesizes that Darwin's use of "yellow or green" in his notes on the fossils he was collecting "suggests that it refers to the colour of the paper that

the specimens were wrapped in". Before he left on the *Beagle*, Darwin had a series of small paper labels printed in different colours that were printed with numbers from 0 to 999. Thus, those that were white indicated 0 to 999, red indicated 1000 to 1999, green 2000 to 2999. and yellow 3000 to 3999 (Porter, 1986, pp. 6-7; 1987, pp. 152-153). These paper labels were used for plants, animals, and geological specimens, but there were separate series for biological and geological collections. They corresponded to the separate series of numbers in the six Specimen Notebooks (plants and animals) and the four Geological Specimen Notebooks (rocks, minerals, and fossils). Three of the Specimen Notebooks were devoted to dried specimens with paper labels, three were for "Specimens in spirits of Wine", which had small tin labels, with the numbers hammered into them. Like the plants, the zoological and geological specimens probably were wrapped in blank newsprint.

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From: Patrick F. James Salisbury SP3 5PW

Some years ago when I first suspected a linkage between high ability and tasting bitter things I thought that the Fellows would provide a useful 'control'. With Dr Marsden's full approval I brought along some P.T.C. (phenyl-thio-urea) to a meeting for them to try.

It started well but I forgot, all scientists are really over-grown fourth-formers and presently they were trying to out perform one another as to how much each could stand.

Some were sick. I don't think anyone died immediately of thyroid destruction, and from the distribution I learnt that more than one gene was involved, and so had to switch to PROP (6-n-propyl-2-thiouracil), a single gene marker on Chromosome 5.

I believe that I should belatedly apologise and thank all those Fellows who so kindly sacrificed themselves for science but it has definitely cut my attendance at events, just in case!

P.S. One could entitle this "How not to do research".

Papilio enceladus Linnaeus, 1758

R.I. Vane-Wright

Department of Entomology, The Natural History Museum, Cromwell Road, London SW7 5BD, UK

Linnaeus's use of the name *Enceladus* for a tropical butterfly is derived from Greek mythology (Heller, 1945), where it refers to one of the children of the Earth-goddess *Gaia*. In earth system science, *Gaia* is celebrated as the name given by James Lovelock (1979) to his theory about the homeostatic nature of the biosphere. In astronomy, *Enceladus* is celebrated as the sixth-largest moon of Saturn: just 500 km across, the Cassini mission revealed *Enceladus* to be one of the most interesting and puzzling objects in our solar system (Astronomy Magazine online, 2008). In coleopterology, *Enceladus* Bonelli, 1813, is the generic name of a large carabid beetle. But in lepidopterology, *Enceladus* lies in limbo: *Papilio enceladus* Linnaeus, 1758, belongs to the small list of Linnaean butterfly names that have defied accurate identification: *acastius, damone, eribotes, helie, idmon, ixilion, jason, strilidore* and *timanetes* are the others (Honey & Scoble, 2001; Vane-Wright, 2007). Thunberg (1804: 8) and Aurivillius (1882) failed to find any type material of *P. enceladus* in Queen Louisa Ulrika's collection at Uppsala, where it should have been located.

Linnaeus's classification of *P. enceladus*

Linnaeus (1758: 470) included *enceladus* as a member of one of his named subsections of *Papilio*, the *Danai festivi*. His description "Alis integerrimis fuscis: punctis marginalibus disci octo albis. *M.L.U. Habitat in* Indiis" can be translated as "Wings entire, dark: eight white spots on margins and disc. Specimen(s) in Queen Louisa Ulrika's Collection. From the Indies." Vane-Wright (2007) noted that the

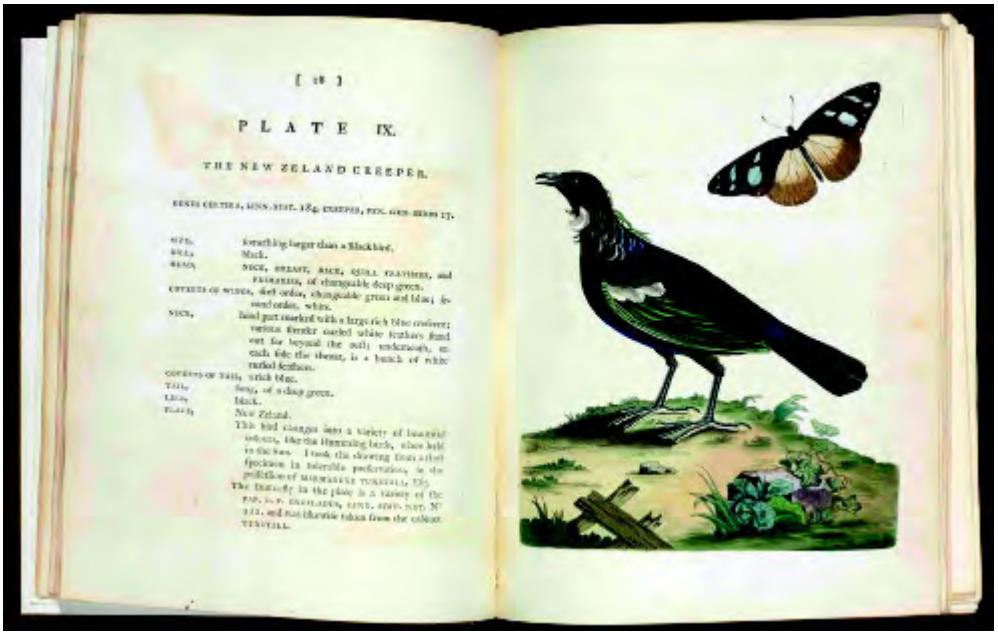
[18]

PLATE IX.

THE NEW ZELAND CREEPER.

Previous page: Plate and text from Brown's *New Illustrations of Zoology*. The text relating to the butterfly (detail this page) reads – The butterfly in the plate is a variety of the Pap. D. F. ENCELADUS, LINN. SYST. NAT. N° 112, and was likewise taken from the cabinet TUNSTALL." (Yeats in Brown, 1776: p. 18; Brown, 1776: pl. 9.) The Linnaean number refers to the entry for *Papilio enceladus* in the 12th *Systema Naturae* (Linnaeus, 1767: 766).

subsection Danai festivi most closely corresponds, in the modern classification of butterflies, to one of the best-known subfamilies of the Nymphalidae: the Danainae. The type species of *Danaus*, and thus type genus of Danainae, is *Papilio plexippus* Linnaeus, 1758, included by Linnaeus in the Danai festivi. At the time of introducing *enceladus*, Linnaeus (1758: 470–472) placed a total of 13 species of Nymphalidae in this subsection, now seen to represent a heterogeneous assemblage. As named by Linnaeus, they were, in order (with modern subfamily assignments in brackets, including the tentative conclusion for *enceladus* reached below):

Papilio midamus	"*in* Asia"	*Euploea midamus* (Danainae; China)
Papilio niavius	"*in* Indiis"	*Amauris niavius* (Danainae; W Africa)
Papilio enceladus	"*in* Indiis"	*Amauris* species (Danainae; W Africa)
Papilio obrinus	"*in* India"	*Nessaea obrinus* (Biblidinae; Surinam)
Papilio perius	"*in* Indiis"	*Parathyma perius* (Limenitidinae; Asia)
Papilio plexippus	"*in* America *septentrionali*"	*Danaus plexippus* (Danainae; USA)
Papilio chrysippus	"*in* Aegypto, America"	*Danaus chrysippus* (Danainae; China)
Papilio cassiae	"*in* Cassiis *Americes*"	*Opsiphanes cassiae* (Morphinae; Guianas)
Papilio sophorae	"*in* Sophora *Americes*"	*Brassolis sophorae* (Morphinae; Guianas)
Papilio mineus	"*in* China"	*Mycalesis mineus* (Satyrinae; China)
Papilio hyperantus	"*in* Europae *sylvis*"	*Aphantopus hyperantus* (Satyrinae; Sweden)
Papilio pamphilus	"*in* Europa"	*Coenonympha pamphilus* (Satyrinae; Sweden)
Papilio xanthus	"*in* Calidis *regionibus*"	*Catoblepia xanthus* (Morphinae; Guianas)

Lectotype specimens exist for these species except *P. niavius* (identity based on Clerck, 1764: pl. 32, fig. 2), *P. enceladus* (no original material or image known), *P. plexippus* (neotype), and *P. obrinus* (identity based on Clerck, 1764: pl. 31, figs 2, 3). The origins of these 13 taxa are China, Europe, Africa and Americas. Many butterflies described by Linnaeus from "Indiis" came from elsewhere, including West Africa (e.g. *Papilio nireus*: Honey & Scoble, 2001) – and, as noted above, *Amauris niavius*. Five different subfamilies of the Nymphalidae are included, of which the best represented are the Danainae.

Suggestions that *P. enceladus* is an Oriental member of the Danainae

Kirby (1871: 17), who catalogued *P. enceladus* doubtfully as a species of the milkweed butterfly genus *Euploea*, was probably the first to make this suggestion.

Aurivillus (1882: 63) considered that *P. enceladus* was based on a species belonging to the "Euploeæ", and likewise placed it with some doubt in *Euploea*, indicating that the description was insufficient to make a specific determination, and that the name should be rejected. Moore (1883: 323), citing the authority of Aurivillius, listed *enceladus* as an unverified member of *Euploea*, commented negatively on Brown's (1776) suggestion that it was an African *Amauris* (but see below), and noted an apparently verbal communication from Arthur G. Butler that it might be another Oriental danaid, *Danaus* (*Salatura*) *affinis* (as *mytilene* Felder & Felder). However, Talbot (1943a,b) did not include *Papilio enceladus* in his revisional notes on *Euploea* and *Danaus*, nor did Corbet (1943, 1949) include it in his accounts of *Euploea* and the Linnaean names of all Indo-Australian butterflies. Ackery & Vane-Wright (1984: 245) noted Aurivillius' and Butler's ideas regarding *Euploea* and *Danaus*, and proposed that the name should be suppressed. Honey & Scoble (2001: 322) confirmed that no type material had been located, and were unable to establish its identity. The on-line AnimalBase website notes that *Papilio enceladus* is "available … [but] no current allocation [is] known".

Suggestions that *P. enceladus* is an African member of the Danainae

Neither *Euploea* nor *Danaus* (*Salatura*) occurs on the African mainland, whereas the genus *Amauris* is endemic to and occurs throughout forested areas of the Afrotropical Region. Moore (1883: 323) commented on Brown (1776): *"Brown, in Illust. of Zoology, pl. 17, figures a species of* Amauris, *and states that "it is probably a variety of the* P. enceladus, *Linn." The description [of* enceladus*], however, does not fit any species of that genus with which I am acquainted."* Peter Brown (1776: plate 9, not "17") does give an image of what is clearly an *Amauris* from West Africa (possibly *A. tartarea*, which is very variable, or *A. damocles* – but see below), with the verbatim note: "The butterfly in the plate is a variety of the Pap. D.F. enceladus, Linn. Syst. Nat. No. 112, and was likewise taken from the cabinet Tunstall." Thus Moore's supposed quotation is not literal: the original wording in Brown (by Yeats – see below) is emphatic regarding the identity, albeit as a "variety", not provisional.

Amauris tartarea is the sister species of *A. niavius*, as established by Ackery & Vane-Wright (1984). Brown's image shows a butterfly with eight white spots on its forewings and, in this respect at least, and *contra* Moore, it does fit Linnaeus's description—if we assume he was referring to the forewing only (as might have been the case if the original specimen were poorly set, with the forewings covering the hindwings almost entirely: not uncommon in collections at that time). However, as the eight white spots are very different in size and shape, this correspondence could, of course, be fortuitous. In this context, it is notable that Emily Sharpe (1891: 54) listed *Amauris enceladus* (L.), together with *A. damocles*, *A. niavius*, *A. vashti* and *A. hyalites*, in an account of a collection of butterflies from Bangala (Congo). She gives her authority for *enceladus* as Kirby's catalogue – which leaves unanswered the question as to how she arrived not only at inclusion of *enceladus* within *Amauris* (Kirby having listed it under *Euploea*), but also its actual, specific identity, separate from four other well-known members of the genus. Possibly she referred to Brown but, if so, she failed to indicate that. Bryk (1937: 203, 204) accepted the idea that *enceladus* referred to *Amauris*, listing *enceladus* L., *enceladus* sensu Sharpe, and *enceladus* sensu Brown

separately, but all under *A. psyttalea* – currently treated as a synonym of *A. tartarea tartarea* (Ackery *et al.*, 2005). Bryk's catalogue is undoubtedly the source of the identity of *enceladus* with *psyttalea* given in the old BMNH card index (Beccaloni *et al.*, 2003). Talbot (1940), however, did not include the name *enceladus* in his overview of *Amauris*.

Thomas Pattinson Yeats

The entomological contributions to Peter Brown's work were made by Thomas Pattinson Yeats (Brown, 1776: preface) who, on the evidence of his own book (Yeats, 1773) was not only an excellent entomologist, but also very well-versed in details of the Linnaean system (Vane-Wright & Hughes, 2005: 41). Although Yeats spent some time in London before his untimely death in 1782, there is no evidence that he ever went to Sweden (although he did travel to the Netherlands: Nottingham University, online), and Linnaeus's collection did not arrive in London until after Yeats's demise.

The source of the material illustrated by Brown

Peter Brown, a Scandinavian, is known to have been active in London as a natural history illustrator during the latter half of the 18th century. *New Illustrations of Zoology* (Brown, 1776), which mainly features birds but also includes a few insects, is considered his most important work. An associate of various London-based naturalists, including Thomas Pennant and Joseph Banks, Brown was very familiar with the museum that Marmaduke Tunstall formed at his home in Welbeck Street (less than a mile north of Burlington House).

Marmaduke Tunstall (1743-1790) was primarily a bird collector, and author of *Ornithologica Britannica* (Tunstall, 1771), one of the first British works to use Linnaean binomens. Born at Burton Constable (now North Humberside) he inherited several family estates in Yorkshire, was educated in France, and then lived in London, where he developed his museum and menagerie. Five years after election to the Royal Society, in 1776 he moved to Wycliffe – now in Durham, but in Tunstall's day part of the North Riding of Yorkshire. Following his death his collection eventually passed to the Newcastle Society (Boyd & Jessop, 1998; Cheke, 2003; Woodward & Foote, 2004). A few remnants of Tunstall's vertebrate collection exist in the Hancock Museum (recently reopened as part of the Great North Museum). Tunstall's insect specimens, however, were sold by auction as early as 1792 (Jessop, 1999: 47), and none is known to have survived.

Together with Dru Drury, John Fothergill, Joseph Banks and Margaret Cavendish Bentinck (the Duchess of Portland), Tunstall was a sponsor of Henry Smeathman's collecting expedition to Sierra Leone (Fox, 1919: 213) during the period 1771-1775. Drury also acted as Smeathman's agent (Vane-Wright & Hughes, 2005), and evidently sent material on to his co-sponsors, and others, from the very considerable consignments that Smeathman sent back. Brown's *New Illustrations* includes images of five butterflies, all undoubtedly of West African origin, and all noted as belonging to Tunstall's collection. Without reasonable doubt, all of this material must have been collected in Sierra Leone or Guinea by Smeathman (Vane-Wright & Hughes, 2005; Vane-Wright *et al.*, in prep.; Douglas, 2004).

What species of *Amauris* does Brown's image represent?

Although *A. tartarea* and *A. damocles* are morphologically very distinct, they have often been confused due to their co- (Müllerian) mimicry. However, even on pattern they are distinguishable. In *A. damocles*, the large forewing postdiscal pale space centred in cell CuA_1 very rarely extends broadly into cell CuA_2, but it does so almost invariably in *A. tartarea*. An individual *tartarea* in which the forewing pattern is very similar to that presented by Brown is illustrated in Aurivillius (1911: pl. 25, row "a", left).

The hindwing of Brown's image is, however, in some ways more characteristic of *A. damocles* (as illustrated e.g. by Vane-Wright, 2003: fig. 2), with the discal cell entirely pale, and the overall coloration buff and distinctly contrasting with the whiter forewing pale spots. In *A. tartarea tartarea* at least the tip of the hindwing discal cell is nearly always darkened, and the colour contrast between the fore and hindwing is less. Indeed, it is not inconceivable that Brown's image is based on forewings and thorax from a male *A. tartarea tartarea*, and hindwings and abdomen from a female *A. damocles damocles*. Because of the way dried butterfly specimens tend to break between meso- and meta-thorax, such "fore and aft" artefacts are not unknown in collections (I believe this is the most likely explanation for a curious image included in the generally excellent work of Henry Seymer – Vane-Wright & Hughes, 2005: pl. 2, fig. 4). Insect material is easily broken during capture, transit or subsequent handling, and early collectors sometimes spared no effort to patch up damaged and seemingly irreplaceable rarities (Hancock *et al.*, 2008). However, if forced to choose, I would say Brown's image most probably represents *A. tartarea*, despite the atypical hindwing. Alternatively, it could represent an otherwise unknown species of *Amauris* – but this must be a very remote possibility.

Conclusions

From this it can be concluded that the butterfly identified by T.P. Yeats in Brown (1776) as *Papilio enceladus* Linnaeus, 1758, is either *Amauris tartarea tartarea* Mabille, 1876, or rather less likely, *A. damocles damocles* (Fabricius, 1793) – or a chimera made up from parts of both of these West African species. Sharpe (1891) listed *A. enceladus* separately from *A. damocles*, which might suggest that she applied *enceladus* to *A. tartarea*. However, in the past, due to the mimetic similarity, the name *damocles* was frequently misapplied to *A. tartarea*, and we cannot be sure how Sharpe applied *damocles* at the time she was preparing her un-illustrated paper.

The only other *Amauris* species known from Sierra Leone and Guinea are *A. niavius* and *A. hecate* (Ackery & Vane-Wright, 1984: 113), neither of which fits Brown's image. Clearly, were *enceladus* accepted as synonymous with either *A. tartarea* or *A. damocles*, this would threaten the long established name of one or other of these well-known African milkweed butterflies. To make such an identity based on Brown's image, or part of it, might be acceptable, but the link between this image and Linnaeus' description, in the absence of Linnaean material, rests solely on Yeats's identification – which he qualified as being "a variety."

Thus, however plausible the suggestion that *P. enceladus* was based on a species of *Amauris*, the evidence is circumstantial and the specific identity uncertain. I therefore

remain convinced that, regrettable though it is to dispose of any of the great man's taxa, this Linnaean name "should be suppressed for all purposes except homonymy" (Ackery & Vane-Wright, 1984: 245). Steps need to be taken to present a case to the International Commission.

Ddedicated to the memory of the great German insect physiologist Professor Dietrich Schneider. An enquiry made by Dietrich in 1974 about two *Amauris* species sparked my life-long interest in milkweed butterflies. *Tiradelphe schneideri* Ackery & Vane-Wright, 1984, was named in his honour. For an appreciation, see Kaissing, K.E. & Steinbrecht, R.A. 2008. Nachruf auf Dietrich Schneider 30.7.1919 - 10.6.2008. *In* Steinbrecht, R.A. (ed.) *Zoologie 2008*, pp. 73-76. Munich: Deutsche Zoologischen Gesellschaft.

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James Drummond of the Swan River colony

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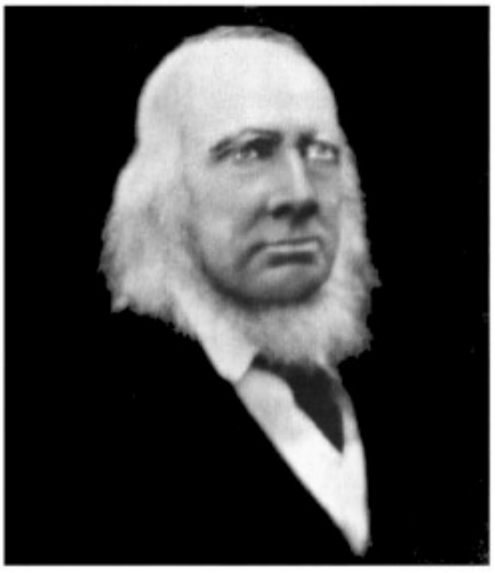
James Drummond was born in Angus-shire, Scotland in late 1786 or early 1787, being baptised in Inverarity on 8th January 1787 (Nelson, 1990), the eldest son of Thomas. The Drummonds claimed descent from a minor Scots aristocratic family, but their fortunes had waned. Thomas Drummond, worked as a gardener on the Fotheringham Estate and instructed both James and his younger brother Thomas Jnr. in horticulture.

We know little of James' formative years, but during this time the family must have made the acquaintance of William Jackson Hooker, who was then Regius Professor of Botany at Glasgow University. It was Hooker who recommended Thomas Jnr. for an expedition to America, and as we shall see, James corresponded regularly with Hooker after the latter became director of the Royal Botanic Gardens at Kew.

In 1808 The Royal Cork Institution employed 21 year old James to lay out their botanic garden (Carr & Carr, 1981). Shortly afterwards he married Sarah Mackintosh and they had six children. James became a noted field botanist and discovered several species of plant that were previously not known to occur in Ireland, and on 16th January 1810 he was elected an Associate of the Linnean Society of London. During his time at Cork he published a botanical textbook and several papers on Irish plants. In 1828 however, in the midst of an economic recession, the British government withdrew funding for the garden. Drummond offered to lease the site but this was declined and the only evidence the garden ever existed is one remaining cedar tree.

The out of work Drummond, with a large family, urgently needed a new position. He was perhaps relieved to be offered an appointment as 'Superintendent of Government Gardens' at the soon-to-be-established Swan River colony (now Perth & Fremantle, WA). Whilst this position was honorary, he was promised that if it was decided to establish a public garden in the colony, he could expect a salaried appointment.

So it was that Drummond and family set sail in February 1829, with the colony's other government officials under the leadership of Captain James Stirling on board the barque *Parmelia*. They arrived at the Swan River on the 1st June 1829, the conditions on arrival were atrocious, and the *Parmelia* grounded which caused considerable damage and leaking. However, for three days she rode out a storm at anchor before the passengers were able to disembark on 8th June on Garden Island. A tented, temporary settlement was established and Drummond was informed that they were unlikely to move to the mainland for a many months, so he decided to plant a garden there. The Swan River colony was the only British colony in Australia established by land grants to settlers. Under these conditions, Drummond's investment in the colony was valued at £375, and this figure entitled him to 5000 acres (20 km²) of land. His first grant was



James Drummond 1786-1863.
Picture courtesy Royal Western Australian Historical Society, Perth.

100 acres of rich alluvial soil at Guildford, being sited near a permanent fresh water supply. He took possession of this land on 16th November 1829, and established a public nursery. However, when Drummond tried to transfer his plants from Garden Island to this new site, he was refused permission by Stirling and told that John Morgan the storekeeper had been given control of his nursery. Drummond had just gained permission to select another 1000 acres (4 km²) of his grant on the Swan River so, annoyed with Stirling, he abandoned the Guildford site and chose a site in the present-day Perth suburb of Ascot.

Finally, in July 1831 Stirling, in a letter to the Geographical Society in London, stated he had decided to establish a Government garden and nursery adjacent to the temporary Government House (Stirling, 1831). He appointed Drummond to the position of 'Superintendent' with a salary of £100 per year and allowed him to live in a small house next to the site. James must have thought his future was assured, but the following year instructions were received from the Colonial Office in London that his position should be abolished and he was to vacate the house. The situation degenerated into a quarrel and Drummond moved to his grant in the Helena Valley, where he established a nursery and vineyard. Later in 1836, he exchanged his grant for land in the Avon Valley, settling at Newcastle (now Toodyay), in an area earlier explored by his son John (Love *et al*., 2010). This homestead they named Hawthornden after Drummond's ancestral seat.

In July 1835, Captain James Mangles wrote to George Fletcher Moore, one of Western Australia's early ruling elite (Cameron, 2000), asking him to obtain seeds and plants of Western Australian flora. Moore purchased a hundred packets of different kinds of seeds from Drummond's son Johnston, who was collecting with his father. Moore sent the seeds to Mangles, and later that year Mangles sent Moore two cases of 'rare and useful plants', asking Moore to return the cases filled with Western Australian plants. Moore passed both tasks on to James Drummond. Aware of Drummond's financial difficulties, Moore also agreed to bear the cost of returning the boxes to Mangles.

Drummond sent seeds of a number of species and some orchid tubers, that he had collected when exploring the Helena Valley. Drummond in return asked Mangles to help him find buyers for seeds and specimens. Mangles agreed and enclosed an order from the English botanist John Lindley. Later Mangles sent a frank letter to his cousin,

Ellen Stirling (the Governor's wife), in which he expressed frustration with Drummond. Ellen observed his letter was "… a very long one but abusing poor old Drummond occupied so large a portion of it that [there was] no room for any other subject". Ellen's sympathy for James was short lived however, when she discovered he had claimed a box of plants Mangles had addressed to her. The two had an angry argument that concluded with Drummond taking half. Ellen Stirling wrote to Mangles, saying that Drummond was getting "old and stupid and appears only desirous to promote his own views". Drummond however continued to collect for Mangles, putting together a large collection of living plants for him, including some orchid tubers. He also made a number of collections of pressed plants and seeds for Mangles to sell for him. The tubers were destroyed in passage, but the pressed plants arrived intact and Mangles lent them to John Lindley. It was not surprising Mangles would show the newly arrived specimens of orchids to Lindley, who was amongst other things, a leading authority on orchids at that time. Lindley described a number of new species from the collection, thus establishing Drummond's reputation as a botanical collector, if not helping to solve his financial problems.

Mangles soon became tired of Drummond's "commercial attitude towards botany", and wrote to him a letter in which he declined to dispose of his further specimens (Hasluck, 1955). On receiving Drummond's last collection Mangles passed them on to Lindley, who had offered to dispose of them. Lindley divided up the collection, which was then sold by George Bentham. Regrettably it was many years before Drummond received any payment.

Garden Island. Seamen's Huts and Workshops on Garden Island, South View *c.*1830. One in a set of several monochromatic watercolour sketches of the first settlement on Garden Island, by an unknown artist. Collection of Art Gallery of Western Australia.

Meanwhile on the 6th March 1836 a ship had arrived in King George Sound. It was *HMS Beagle* having sailed from the Galapagos via New Zealand. Unlike Banks and Solander who were there years earlier with Cook, *Beagle* had taken a southern route round Australia visiting Van Dieman's Land (Tasmania) along the way. At the time of its arrival in the Sound it caused scant interest and it appears that Darwin had little contact with the settlers. In fact, Darwin was not at all impressed by the eight days the ship spent there and he wrote in his diary:

> "The settlement consist from 30-40 small white washed cottages, which are scattered on the side of a bank & along a white sea beach. — There are a very few small gardens; with these exceptions all the land remains in the state of Nature & hence the town has an uncomfortable appearance. — At the distance of a mile over the hill, Sir R. Spencer has a small & nice farm, & which is the only cultivated ground in the district. The inhabitants live on salted meat & of course have no fresh meat or vegetables to sell; they do not even take the trouble to catch the fish with which the bay abounds: indeed I cannot make out what they are or intend doing. — I understand & believe it is true, that thirty miles inland there is excellent land for all purposes; this is already granted into allotments & will soon be under cultivation. The settlement of King George's [sic] Sound will ultimately be the Sea port of this inland district. — Certainly I have formed a very low opinion of the place; it must however be remembered that only from two to three years have elapsed since its effectual colonization, & for this great allowances must be made."

Darwin did however collect a few specimens, mostly fish, and made no comment at all on the vegetation – which would not have been at its best at this time of year. The departure of the *Beagle* was delayed by bad weather and it left on the 14th March. The diary entry reads:

> "Our departure was delayed by strong winds & cloudy weather until this day. Since leaving England I do not think we have visited any one place so very dull & uninteresting as K. George's [sic] Sound."

From the Sound the *Beagle* sailed on to the Spice Islands. It never visited the settlement in the Swan River, and Darwin never met James Drummond. As we shall see however, many years later Darwin corresponded with Drummond and was grateful for his help.

It is interesting we know very little about Drummond as a person. Anecdotally he was supposed to be 'difficult' and he did have an uneasy relationship with the Stirling family and probably John Morgan. The Reverend John Ramsden Wollaston liked him though, describing him in his old age as "… a plain, agreeable old man – with white hair – enthusiastic in his Botanical pursuits…". Ellen Stirling wrote in a letter that "Mr Drummond's wife seems rather out of her element and will, I hope, improve, as she seems disposed to be rather touchy …" (Hasluck, 1990). But there was a great difference in situations between Ellen Stirling and Sarah Drummond. Ellen was a lively young woman of about 21, in a position of authority when she wrote that letter. Sarah on the other hand was already in her 40s, the mother of six children, struggling to raise them properly in extreme poverty. From their perspective the Drummonds must have been totally disillusioned that nothing had come of the government promises made. We know life for the family was not easy and James was devoted to plant collecting; his trips were only confined due to a shortage of income.

Settlement at Albany.This sketch drawn twenty years after Darwin's visit shows how sparse the settlement at Albany still was. From *My Experiences in Australia. Being Recollections of a Visit to the Australian Colonies in 1856-7.* by: A Lady (Mrs Allan Macpherson, fl. 1857.)

In 1839 Drummond had received a letter from his old acquaintance, Sir William Jackson Hooker, who by now was Director of the Botanic Gardens at Kew. Hooker requested seeds and plants, and offered to dispose of collections on Drummond's behalf. He also invited him to submit details of the botany of the Swan River colony, which he would publish in his 'Journal'. Drummond immediately started collecting for Hooker and began corresponding with him on a regular basis. He also received books and in one letter he expressed his thanks for being sent a microscope and wrote that it:

> "...has enabled me to detect a little Moss, which has given me more pleasure than anything I have found since the days of my discovery of *Hookeria laete-virens*, near Cork in Ireland."

Fortunately many of these letters to Hooker survive amongst the Director's correspondence at Kew. They were all written using every available scrap of the precious paper. One of these is published in the first issue of '*Hooker's Journal of Botany*' (Drummond, 1849).

In 1844, a recession plunged the Drummond family into severe financial debt, and they lost the family farm. James and his eldest son Johnston planned to make their entire living from collecting, but disaster struck again when in 1845 Johnston Drummond was killed by an Aboriginal during an expedition at Moore River. This caused James Drummond to give up collecting. However, fifteen months later he was awarded an honorarium of £200 from the Queen's Bounty for his services to botany. This inspired Drummond to begin collecting again, which led to him sending a fourth collection to Hooker.

Drummond successfully made a total of six collections for Hooker which are listed amongst the Contributions Registers at Kew, the last being in 1852 when he was now too old to continue. He retired a year later and lived out the remaining ten years of his life at Hawthornden, where he tended his grapevines and garden, and maintained an occasional correspondence with Hooker, and other botanists.

It was here in 1860 he received an unexpected letter (Burkhardt, F. *et al*. 1993),

Down, Bromley, Kent
May 16th. 1860.
Dear Sir
I hope that you will excuse the liberty which I take in writing to you and asking you a favour. Dr. Hooker has told me that I may use his name as an introduction.— I am very curious about the fertilisation of Leschenaultia formosa. I must just allude to its structure, though no doubt you are well acquainted with it. My belief is that insects in creeping in to suck the copious nectar brush open the indusium, and the hairs of their abdomens stir up the pollen and push it down on to the stigmatic surface. I find that this easily effected by a camel-hair brush. Now what I want to beg is for you to have the great kindness to watch for a short time the Leschenaultia and see whether Bees visit it; and if they do, to endeavour to observe whether in crawling in or whilst sucking, they do not open the lips of the indusium. As this plant may be visited by nocturnal insects, it would be a very interesting experiment to cover over with bag on frame made of very open gauze one or two plants (plucking off any open flowers) and then see whether they seed at all or less freely than plants left to the visits of insects.

This may appear a trifling enquiry to you; but the subject has been largely discussed by R. Brown, Aug: St. Hilaire and other celebrated Botanists; and Dr. Hooker and I are experimenting on the subject.— If any other Goodenaceæ, furnished with an indusium, grow near you, I should be infinitely obliged for any notices on their structure in relation to the following point, "how in one flower is it possible that pollen from another flower or plant of the same species could get into the indusium," I have strong reason to believe that this is a universal possibility. In the Leschenaultia, if insects open the indusium in the manner in which I suspect, their abdomens dusted with pollen from one flower might easily carry grains into the indusium of another flower.

I hope that you will excuse the liberty I take in begging this favour and I remain, Dear Sir
Your obliged Servant
Charles Darwin

Drummond despite his age (He was now in his 73rd year.), wrote two letters back almost immediately on or around 17th September. The first letter is now lost but the second talks generally about the plants (Burkhardt, F. *et al.* 1993),

Hawthornden Farm
Sep 17th 1860

Dear Sir,
In compliance with your request, I have paid particular attention to the Goodeniaceus plants which I have met with in flower, since I received your letter, I met with Lechenaultiae Grandiflora, in abundance covering the flat top of an ironstone Gravelly hill several acres in extent and so profusely covered with the flowers of this beautiful plant that the whole surface of the ground seems of a blue colour from its blossoms, but I have not been able to learn much relating to this genus which you have not found out by observing L Formosa in your greenhouse,

… of the Germen it is here no doubt impregnation takes place whenever it does take place but that comparatively speaking, is a very rare event in plants of this genus I may safely say that one seed vessel in 500 I would probably be within bounds if I said 5000 ever under any circumstances is fertilized by the pollen, and comes to maturity, the

Lechenaultias are all creeping rooted plants at least all the ornamental species and they are altogether independent of seeds for their reproduction. …

I have not yet been able to make any observations on Brunoniae, the habitat I knew of near my residence had been destroyed by a flock of sheep grazin over it, and I have not yet found another

I am Sir Your obedient Humble Servant
James Drummond

Drummond kept up the correspondence with Darwin and also sent him seeds. He could not provide Darwin with information about the activities of insects in the fertilisation of species of Leschenaultia until the end of the year – as seen in this letter Darwin wrote to Daniel Oliver,

Down Bromley Kent
Dec. 20th

My dear Mr Oliver
. . . Drumond of Swan River has sent me seeds of a Compos. Plant.— Styloncerus Humifusus of Labillard. As, after looking at them, I shall not want them, I have thought I would just mention that I had them, in case they shd. of any use at Kew; not that I suppose they would.— He has sent me seeds of Distylis which I shall plant.— You sent me a Goodenia, also, so I shall have plenty of this order now.— I have been pleased at a prophecy which I made to myself coming true, viz that Bees would open the indusium & get out the pollen & thus accidentally carry it from flower to flower, for Drummond writes that he watches a small Bee busily employed in extracting the pollen out of the indusium of a Brunonia.— This feat, would I expect puzzle our European Bees.—

Yours very truly
C. Darwin

Darwin later wrote notes on the adaptations of some Australian seeds for dispersal, which he sent to Hooker and acknowledged the help of Drummond (Burkhardt, F. *et al.* 1993).

Down Bromley Kent
Dec. 26th [1860]

My dear Hooker
Will you have kindness to read enclosed. Is the little fact new? Is it too trifling (on principle that "Lex de minimis non curat") to be worth printing? ***Do not let me publish rubbish.***— If worth publishing, shall I send it to Linn. Soc. or to Gardeners Chronicle? I looked at the seeds for simple amusement, & then the case seemed a **little** curious, & I thought Mr. Drummond would perhaps like to see his fact published.— To save you trouble I send envelope directed & stamped.—

Please do not let me publish absurdly small fact,— perhaps already well known.—
Ever yours
C. Darwin

(At the time, he believed that the parent plant was called *Styloncerus humifusus* The plant was later identified as *Pumilo argyrolepis*.)

The information was published as a letter in the *Gardeners' Chronicle and Agricultural Gazette*, 1861, under the heading 'Note on the achenia of *Pumilio Argyrolepis*' (Darwin, 1861). It is to be hoped Drummond saw the resulting publication. He died three years later on 26th March 1863 and was buried at Hawthornden beside his son Johnston. His wife died a little over a year later, and was buried beside him.

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The Enigma of the Sky-blue Andromeda, or: Was Linnaeus colour-blind?

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> "With respect to colours that were *white*, *yellow*, or *green*, I readily assented to the appropriate term. *Blue*, *purple*, *pink*, and *crimson* appeared rather less distinguishable: being, according to my idea, all referable to *blue*." John Dalton (1798)

The colours of flowers are very often impossible to describe in terms of the primary colours, and defining the intermediate colours – mauve, crimson, pink, or the ones that have floral names like lavender, lilac or rose-pink – is liable to lead to disagreement. For a substantial proportion of the population there is the added complication of what is commonly called "colour blindness", an inherited disorder which affects approximately eight out of every 100 males and four out of every 1,000 females.[1] There are "colour blind" individuals in every walk of life, and it cannot be assumed that among those with a predilection for studying plants, whether amateurs or professionals, none is unaffected by congenital colour vision deficiency.[2]

"Almost an exact sky-blue": the case of John Dalton (1766-1844)

It is a remarkable fact, little mentioned in botanical circles, that colour blindness was succinctly described by the renowned English scientist, natural philosopher and keen amateur botanist[3], John Dalton (1766-1844), best remembered for his Atomic Theory, after he had noticed that certain flowers which appeared to him to be sky blue were described as pink by others. In a letter to his cousin, Elihu Robinson, dated 20 February 1794, Dalton (1794) wrote:

> I am at present engaged in a very curious investigation: – I discovered last summer with certainty, that colours appear different to me to what they do to others: The flowers of most of the Cranesbills appear to me in the day, almost exactly *sky blue*, whilst others call them *deep pink*; but happening once to look at one in the night by candle light I found it of a colour as different as possible from day light; it seemed then very near yellow, but with a tincture of red; whilst no body else said it differed from the daylight appearance, my brother excepted, who seems to see as I do.

Later that year on 31 October, having conducted some more experiments, Dalton addressed the Manchester Literary and Philosophic Society on "Extraordinary facts relating to vision of colours ..." (Dalton, 1798). In this paper he explained that:

> Since the year 1790, the occasional study of botany obliged me to attend more to colours than before. ... I was always of opinion, though I might not often mention it, that several colours were injudiciously named. The term *pink*, in reference to the flower of that name, seemed proper enough; but when the term *red* was substituted for pink, I thought it highly improper; it should have been *blue*, in my apprehension, as pink and blue appear to me very nearly allied; whilst pink and red have scarcely any relation.

Dalton (1798) gave several botanical examples:

> "Besides the pinks, roses, &c. of the gardens, the following British *flora* appear to me blue; namely, *Statice Armeria, Trifolium pratense, Lychnis Flos-cuculi, Lychnis dioica*, and many of the *Gerania* [*sic*]." (Those plants are familiar ones: respectively, thrift (*Armeria maritima*), red clover, ragged-robin, red campion (*Silene dioica*), and the cranesbills.)

> I have often seriously asked a person whether a flower was blue or pink, but was generally considered to be in jest. Notwithstanding this, I was never convinced of a peculiarity in my vision, till I accidentally observed the colour of the flower of the *Geranium zonale* [*Pelargonium zonale*: see Hunt *et alii*, 1995] by candle-light, in the Autumn of 1792. The flower was pink, but it appeared to me almost an exact sky-blue by day; in candle-light, however, it was astonishingly changed, not having then any blue in it, but being what I called red, a colour which forms a striking contrast to blue. Not then doubting but that the change of colour would be equal to all, I requested some of my friends to observe the phænomenon; when I was surprised to find they all agreed, that the colour was not materially different from what it was by day-light, except my brother who saw it in the same light as myself. This observation clearly proved, that my vision was not like that of other persons; – and, at the same time, that the difference between day-light and candle-light, on some colours, was indefinitely more perceptible to me than to others. It was nearly two years after that time, when I entered upon an investigation of the subject, having procured the assistance of a friend, who, to his acquaintance with the theory of colours, joins a practical knowledge of their names and constitutions.

Remarkably, portions of Dalton's eyes, which had been removed at his own instruction after his death, survived and were recently subjected to DNA analysis (Hunt *et al*, 1995; Mollon *et al*, 1997). The data obtained revealed that John Dalton was a deuteranope, insensitive to green light: "I take my standard idea from grass", Dalton (1798) told the audience at the Manchester Literary and Philosophical Society meeting, continuing: "This appears to me very little different from red. The face of a laurel-leaf (*Prunus Lauro-cerasus* [*sic*]) is a good match to a stick of red sealing-wax; and the back of the leaf answers to the lighter red of wafers."

Was Linnaeus "colour blind"? The case of the sky-blue *Andromeda*

One of the more puzzling of the names published by Carl Linnaeus in *Species plantarum* (1753) is *Andromeda cærulea*. Linnaeus gave it to a small shrub from Lapland ("*Habitat in* Lapponiæ *Alpibus*") which is today known as *Phyllodoce caerulea*, and consequently called blue heath (in Scotland, and in Norway and Denmark (as blålyng)) or blue mountain heather (in North America).

The specific epithet, from the adjective *caeruleus*, means blue. Stearn (1973) defined *caeruleus* as "somewhat lighter and duller" than indigo (which is the deepest blue), and at the same time listed it as one of the varieties of sky-blue, all of which tends to suggest it is a pure blue untainted with shades of red or green. Latin-English dictionaries sometimes add such phrases as "like the sky". The blue implied by *caeruleus* is the blue of, to name just three examples, the spring gentian (*Gentiana verna*), the blue variant of scarlet pimpernel (*Anagallis arvensis* subsp. *arvensis* var. *coerulea*), and the incomparable *Anchusa cespitosa* that is endemic to Lefka Ori (the White Mountains) in Crete.

There is very little that is sky-blue about *Phyllodoce caerulea*, and none of the usual dictionaries of plant names offers any explanation for the original name. Standard British floras and manuals describe the flowers as purple (Clapham *et al*, 1962), purple, fading to a pale bluish-pink (Coker & Coker, 1973), mauvish purple (Stace, 1991), bluish purple (Bean, 1921: 148, who added "distinct in this genus because of its colour"), or lilac to purple-pink (Huxley *et al*, 1999). Stoker (1940) went so far as to provide Horticultural Colour Chart (HCC) names and codes – "orchid purple (H.C.C. 31/3) to petunia purple (H.C.C. 32/2)" – noting, for good measure that the summer flowers were darker than the springtime ones. Starling (1982) gave the colour of *P. caerulea* flowers as "a pleasant pink if it were not for the dash of magenta which muddied them".

In *Species plantarum*, Linnaeus (1753: **I**: 393) provided the scantiest of descriptions, mentioning only the clumped peduncles, ovate corolla, and sparse, linear, obtuse, flattened leaves. He noted that the plant had been mentioned in several of his own earlier works, *Flora lapponica* (1737), *Hortus cliffortianus* (1738) and *Flora suecica* (1745), and also quoted a phrase-name from Buxbaum's publication *Plantarum minus cognitarum centuria IV* (1733) which may be translated as Heath with *Abies*-like leaves and *Arbutus*-like flower. There are no references in *Species plantarum* to flower tints or foliage colour, and no adjective of any kind (other than the epithet itself) that indicates blueness. Nothing written in *Species plantarum* explains why Linnaeus chose to give the shrub the specific epithet *caerulea*.

In his Lapland flora (Linnaeus, 1737) – none of Linnaeus' intermediate works are helpful – *Phyllodoce caerulea* was listed under the apparently explicit phrase-name *Erica flore purpurascente pendulo* which may be rendered as Heath with a hanging, purplish flower (or Heath with a hanging flower becoming purple): a perfect characterization. However the flowers were also treated in the much more lengthy description:

> *Floris calix purpureus, hispidus, minimus; Corolla ouata, longitudine vnguis, leuiter pentagona, intense caerulea (recentissime fere violacea) ...*
>
> The calyx of the flower is purple, covered with harsh bristles, very small; Corolla ovate, the length of a fingernail [*c.* ½inch], lightly pentagonal, intensely blue ...

The emphatic phrase "*intense caerulea*" seems entirely inappropriate for *Phyllodoce caerulea* – indeed it is inappropriate for the vast majority of species of Ericaceae because pure blue is a flower colour that is exceedingly rare in the family. On the other hand, the colours purple and violet are entirely apt, if vague.

It has been suggested that Linnaeus described the flowers as blue because that was the colour they attained when pressed and dried. I am not sure where this idea originated, but McClintock (1966: 216) wrote this:

> "... to call Menziesia *Phyllodoce caerulea* betrays use of a dried specimen, for only then may its flowers turn from pink to bluish – and authors who have never seen them fresh get taken in, and called them violet-blue and so on."

Starling (1988) averred that

> "a few days in the herbarium press will turn *P. caerulea* corollas to a rich dark blue and it may be that this is how the great taxonomist first encountered his native *Phyllodoce.*"

Linnaeus's intensely blue *Andromeda*, now known as *Phyllodoce caerulea.*
Photographed at Nordreisa, Troms, Norway, August 21, 2010:
© Torbjørn Alm & Unni Bjerke Gamst.

In *Flora lapponica*, after "*intense caerulea*", Linnaeus added the qualifying phrase, in parentheses, "*recentissime fere violacea*" – the very freshest flowers are almost violet. Was that intended to imply that it was only the not-so-fresh ones which were intensely sky-blue? Stearn (1973) noted that the phrase "*in statu recenti*" (in a fresh state) was the opposite of "*in sicco*" (dried). Yet that does not chime with "*flore purpurascente*" which, as noted, can have the sense of a flower becoming purple, in other words ageing to purple. Do *Phyllodoce caerulea* flowers turn sky-blue when pressed? I am grateful to Dr Torbjørn Alm, University of Tromsø, for these comments after he examined a pile of pressed specimens:

> In fact, the colour does not store well; only a few well-pressed specimens retain the colour, which I would describe as lilac, purple or light violet, and certainly not blue. Most flowers are rather bleached, looking more the colour of the dried flowers of *Campanula rotundifolia*, but sometimes retaining small spots or areas that are a little bluish – bluish grey or grey-blue – and certainly a far cry from the colour of blue skies.

However, Linnaeus' own diary of his Lapland adventures shows that he was describing the plants as he travelled along, surely fresh, not pressed and dried: "... Then I sat down to sort and describe the plants I had collected", he wrote (see Blunt, 1971: 63). Using the only English translation hitherto published (Linnaeus, 1811), it is possible to follow Linnaeus as he botanized in north-western Sweden during the summer of 1732. It was on 4 July that he

> ... met with an Andromeda with leaves like *Empetrum* ... . The stem and foliage were exactly like that plant, but somewhat larger. The calyx rough, short, with five teeth. Corolla of one petal, blue, ovate, with five spreading notched segments at it orifice.

Table 1. Plant names including specific names derived from *caeruleus*, *–a*, *–um* published by Linnaeus in *Species plantarum* (extracted from www.IPNI.org, 3 March 2006).

Name	*Spec. plant.*	possible/probable source of epithet
Aira caerulea	**I**: 63–64	C. Linnaeus, *Flora suecica*, no. 71 (1745): "Flos .. antheræ cæruleæ, pistilla purpurea. " There is no earlier source that I can detect.
Amethystea caerulea	**I**: 21	J. Amman, *Stirpium rariorum* ... 54 (1739): "Amethystina ... flosculis cum come e cæruleo-janthinis."
Andromeda caerulea	**I**: 393	–
Bignonia caerulea	**II**: 625	M. Catesby, *The natural history of Carolina* ...: **1**: 42 (1730): "Arbor Guaiaci latiore folio; Bignoniæ flore cæruleo ...".
Carthamnus caeruleus	**II**: 830–831	C. Bauhin, *Pinax*: 378 (1620): "Cnicus cæruleus asperior."
Catananche caerulea	**II**: 812 C.	Bauhin, *Pinax*: 130 (1620): "Chondrilla cærulea cyani capitulo."
Cynosurus caeruleus	**I**: 72	J. Ray, *Synopsis* (ed. 3): 399 (1724): "Gramen parvum montanum spica crassiore purpuro-cærulea brevi. ... *Small mountain spiked Grass with a thick short blue spike*."
Houstonia caerulea	**I**: 105	J. Plukenet, *Almagestum botanicum*: 324 (1696): "Rubia parva virginiana, ... flore cæruleo fistuloso."
Lonicera caerulea	**I**: 174	C. Bauhin, *Pinax* : 451 (1620): "Chamæcerasus montana, fructu singulari cæruleo."
Passiflora caerulea	**II**: 959–960	J. Boerhaave, *Index alter plantarum* ... 2: 81 (1720): "Granadilla pentaphyllos, flora cœruleo magno."
Polemonium caeruleum	**I**: 162	C. Bauhin, *Pinax*: 164 (1620): "Valeriana cærulea ... flore est communiter cæruleo, aliquando albo."
Trachelium caeruleum	**I**: 171	C. Bauhin, *Pinax*: 95 (1620): "Cervicaria Valerianoides cærulea. Trachelium umbelliferum cæruleum ...".
Trifolium caeruleum	**II**: 764	A. Q. Rivinus, *Ordo plantarum ... tetrapetalo* (1691): "Melilotus coeruleo".
Utricularia caerulea	**I**: 18	J. C. Commelin, *Flora malabarica* : 54 (1696): "Planta aquatica aphyllos repens, flore cæruleo".

Stamens ten, very short, with horned anthers. Pistil one, the length of the corolla, with a blunt pentagonal stigma.

Starling (1982; quoted by Metheny, 1991: 136) also advanced another explanation for the blue flower:

> "Three years ago, during a visit to Linnaeus' homeland I found, just across the border in Norway, the form of *Phyllodoce caerulea* that the "father of botany" would have known and, though not caerulean blue, it was closer to blue than to any other basic colour of the spectrum."

In a subsequent article, he put it in slightly different terms:

> "Nowhere is *P. caerulea* caerulean blue, though the corolla of the Scandinavian form tends to be nearer to blue than that anywhere else in the plant's range" (Starling, 1988).

To my mind none of these theories adequately explains the inscrutable description, especially not the emphatic, albeit later, "*intense caerulea*". Can it be explained by colour blindness? How would an individual with inherited colour vision deficiency perceive and then find the correct words to characterize the subtly changeable colour of the flowers of *Phyllodoce caerulea*?

There are some remarkable parallels in the description by Linnaeus of *Andromeda caerulea*, and the the descriptions written more than six decades later by John Dalton (but there are also differences). Is this perhaps the explanation for *Andromeda caerulea*, that Carl Linnaeus had the same condition as John Dalton?

But just as one swallow doesn't make a summer, one "purple" flower termed *caerulea* doesn't prove colour blindness, yet the connection is highly suggestive. All Linnaeus' other caerulean plant names – a baker's dozen are in *Species plantarum* (see Table 1) – seem to be correct; some part of the plant can be termed blue. However it has to be remembered that not all of them would have been known to Linnaeus as living plants with freshly coloured foliage, flowers or fruits – some would have been only within his ken as pressed, dried herbarium specimens the colours of hay. Moreover, in all but two instances (the two exceptions being *Aira* and *Andromeda*), he simply lifted a diagnostic adjective from a previous botanist's description or polynomial, so he did not even have to have seen a pressed specimen (Table 1).

Was Linnaeus colour-blind? Perhaps not, yet during the Arctic summer of 1732 when he was travelling in Lapland he could have been, because it is possible to acquire a temporary colour vision deficiency. One cause of temporary colour-blindness is snow-blindness (Best & Haenal, 1907). Linnaeus' diary does not appear to allow for this: in the days prior to 4 July 1732, when he saw the sky-blue *Andromeda*, he was apparently in a landscape with little snow. Two days later, on 6 July, after leaving "Hyttan" (now called Kvikkjokk), he climbed into the mountains and the landscape changed, and there was snow. "When I reached the mountains," he wrote, "I seemed entering on a new world; ... indeed I was now, for the first time upon the Alps! Snowy mountains encompassed me on every side. I walked in snow, as if it had been the severest winter." However, it has also to be recalled that he was now well north of the Arctic Circle and in a land of perpetual light, the land of the midnight sun. In one passage, he recorded that he had problems with his vision (quoted from Blunt, 1971: 63):

> At midnight – if such I may call it when the sun never sets – I was walking rapidly, facing the icy wind and sweating profusely ... but always on the alert, when I saw as it were the shadow of this plant, but did not stop to examine it ... I don't know what it is that at night in our mountains disturbs our vision and makes objects far less distinct than by day, for the sun is just as bright. But from being near the horizon its rays are so level that a hat affords no protection to the eyes. Moreover the shadows are so extended, and by gusts of wind made so confused, that things not really a bit alike can hardly be told apart.

Does that last sentence allude to the colours of flowers, I wonder?

Unlike the prescient Dalton, Linnaeus did not instruct that his eyes should be examined after his death. All he asked was to be laid "in a coffin unshaven, unwashed, unclothed, wrapped only in a sheet" (Blunt 1971), and he was buried in the cathedral

in Uppsala on 22 January 1778. Linnaeus' remains, inaccessible as they are under "a flat stone near the entrance door of the Cathedral" (Blunt 1971), has since been designated (Stearn 1959; Heywood, 2002: 136) as the type for *Homo sapiens*. We will probably never discover if he had congenital colour vision deficiency.

Notes

[1.] Colour vision deficiency, sometimes also termed Daltonism, is the most common, inherited human defect (Spalding, 2002); approximately 8% of men have the deficiency, but because it is sex-linked, only about 0.4% of women.

[2] Many people have difficulty with colours in everyday life (see Cole, 2004; Spalding, 2004; Campbell *et al*, 2005). A survey of 40 British doctors (general practitioners) who were known to have colour vision deficiency found that 12 of them (30%) had problems with "birds, berries, flowers, insects, books and letterboxes" (Spalding, 2002: Table 1). A much smaller proportion (10%) had difficulty "naming colours" (Spalding, 2002: Tables 1 and 2). Another survey of 102 people with colour vision deficiency also indicated that about 30% had problems "identifying flowers because of colour" (Cole, 2004: Figure 1).

Colour blindness can also cause problems for botanists. I recall wryly that I was almost refused entry to Australia in 1971, to undertake my postgraduate research, because at my compulsory medical examination the doctor discovered that I am slightly red-green colour-blind. I knew that, of course, but it did not worry me: as a schoolboy I had almost assaulted the school doctor who had told me! I protested! I *can* distinguish a caerulean gentian – with flowers that "deep, deep, pure blue, the colour which the Greeks gave to the eyes of Athena" (Corry, 1880; Nelson & Walsh, 1991) – from plants with purple-pink flowers including the misnamed *Phyllodoce caerulea*. The lavender and pink variants of common milkwort (*Polygala vulgaris*) are clearly different from the caerulean blue ones (see also Nelson & Walsh, 1991).

[3] While Simms (1969) noted Dalton's herbarium collections (see also Wood, 1970), there seems to be nothing in recent botanical literature about Dalton's very remarkable account of flower colours and vision. Desmond & Ellwood (1994) make no reference to Dalton's paper, nor to his colour-blindness. Dalton's principal herbarium (it comprised eleven volumes; a catalogue was published by Adamson & Crabtree (1920)) was destroyed during World War II (Simm 1969), although there are two volumes of his plant specimens in the Royal Botanic Garden, Edinburgh (Wood, 1970). For a recent account of Dalton and his botanical contacts see Nelson (2006).

Acknowledgements

The heresy, if heresy it be, that Linnaeus may have been colour-blind is entirely my idea; I have not seen it suggested in any other place. For their most helpful discussions of various aspects of this topic, and the derivation of the specific epithet in *Phyllodoce caerulea*, I am greatly indebted to Ella May Wulff, Philip Oswald, Dr John Edmondson, Dr Tony Spalding, Dr Torbjørn Alm, Professor John D. Mollon, Professor Geoff Arden and Dr Chris Hogg.

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Book Review

Coelacanth: Portrait of a Living Fossil, by Peter Forey (ISBN 9780-9550740-9-7, Forrest Text, Swn y Nant 2009, 209pp).

The discovery of the living coelacanth *Latimeria* has become one of the great fishy stories of all time, and still represents a prominent landmark in the history of evolutionary studies. Coelacanths have a fossil record extending back 300 million years deep into the Devonian Period, but were thought to have been extinct for at least 70 million years until a modern one suddenly popped up in 1938! It caught scientists by surprise then, and *Latimeria* has been continuing to surprise us for another 70 years! Peter Forey has devoted much of his illustrious career as a research scientist at the Natural History Museum in London to comparing modern and extinct coelacanths, and is recognized today as one of the world's leading experts on their anatomy and evolutionary history. In *Coelacanth: Portrait of a Living Fossil*, he not only re-tells the story of Marjorie Courtenay-Latimer's fortuitous find and the subsequent scramble for additional specimens, but also brings us up-to-date on the last 70 years of coelacanth research, debate, competition, intrigue, injustice and even downright dishonesty! Not only has he squeezed more mileage out of this venerable fish tale, he also rips off a few scabs!

The book begins a century before the discovery of *Latimeria*, as scientists were just beginning to organize fossils into logical patterns and to seek their relationships

with modern life-forms. Forey first takes us through those years, from Louis Agassiz' first description of fossil coelacanths in 1839, to the brink of *Latimeria*'s discovery. He then describes the discovery and its aftermath, including the race to acquire more specimens and Hans Fricke's calculated (and successful!) attempts to observe live Comoran coelacanths in their home environment. This is followed by a description of *Latimeria*'s natural history, pulling together disparate bits of information from numerous scientific sources, and weaving them into a cogent (though still somewhat technical) account. Forey's next chapter, ostensibly about where *Latimeria* can be found today, is one of the best parts of the book and delves into both the scientific and the not-so-scientific (i.e. jucier) bits of the coelacanth saga, including its 1998 discovery in Indonesia, as well as the subsequent scientific back-stabbing and clumsy fakery that make the original sparring for Comoran coelacanths seem as tame as a game of croquet!

The next chapter deals with coelacanth evolutionary history, and seems aimed primarily at fellow paleontologists and students, although this section will nevertheless be of interest to coelacanth buffs everywhere. It is a lengthy section, especially considering that coelacanths must have one of the slowest rates of taxic and morphological evolution among vertebrates, but Forey still finds plenty to hold the reader's interest.

Forey continues with a splendid chapter entitled "Reputation 70 years on", in which several scientific disciplines are amalgamated, including cladistic phylogenetics, molecular genetics, paleontology, and comparative anatomy, to place *Latimeria* and its extinct lobe-finned relatives into the context of our own, fundamentally tetrapodal, evolutionary history. However, he mentions (mostly as footnotes) only some of the important mid-20th century scientific arguments concerning tetrapod origins, such as the now-discredited suggestion that they arose from two different ancestors, but neglects others (most notably the radical hypothesis, of which Forey was a leading proponent in the 1980's, that coelacanths are more closely related to tetrapods than are fossils such as *Eusthenopteron*... an idea that has been overwhelmed by subsequent paleontological discoveries and re-analysis of the evidence). In the final chapter, "Coelacanth people", Forey summarizes many of the leading figures (past and present) with a hand in the ongoing coelacanth story, but there is one glaring omission... himself!

Coelacanth existence may hang by a thread, but Forey's masterly book has woven it into a colorful tapestry that must have been tricky to stitch together, given the wide range of subject matter. This book is completely different from his previous, highly technical volume on coelacanths (Forey 1998), and I recommend it to anyone interested in coelacanth research, as well as historians of science wishing to stay abreast of the colorful story of "old fourlegs". New discoveries about *Latimeria* are still emerging, new fossil coelacanths are still being discovered (although that 70 million year gap in their record still needs to be plugged!), and a new generation of coelacanth researchers is upon us, so perhaps in a few years there will be even more stories to tell, but Forey's Portrait is an admirable update to the tale, told from a thoroughly modern perspective.

Forrest Text specialises in academic publications mostly in the life and earth sciences, but may not be well known to many readers; anyone wishing to order this book can do so by visiting their web-site, *http://www.forresttext.co.uk*.

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Doctor by Nature – Johnathan Couch: Surgeon of Polperro by Johns J.R., Cornwall: Polperro Heritage Press, 2010. 158pp ISBN 978-095595412-2.

Polperro a village on the Cornish coast, best known for pilchards and smuggling, also spawned several illustrious sons. Perhaps the most famous of which was Jonathan Couch, the subject of this biography.

Johns is a former journalist and broadcaster and much of the research for the book is derived from unpublished sources. It is easy to read, divided as it is into seventeen short chapters, chronicling Couch's life, work and family. There are two sections of plates, drawings throughout the text, an appendix consisting of an outline pedigree of his numerous offspring and an index.

The book states Couch, born in 1789, was the son of a local fish-curer's wife, but his father had established himself as a prosperous merchant, and was sufficiently wealthy to send young Jonathan to boarding school. Following his education he became apprentice to a local surgeon apothecary and went on to Guy's & St Thomas's Hospital in London.

Due in part to his father's illness, he returned to Polperro where he remained for the rest of his long life. He was attentive to his patients and they were, it seems, pleased to have such a competent doctor in their community.

Like many educated men of the day, he had an enquiring mind and sufficient time to indulge himself in a variety of pursuits, he was a linguist, Methodist preacher, antiquarian, naturalist, scientist and a competent draftsman.

Couch is however best known for his work on subjects related to natural history and this book deals briefly with his wide range of interests. By 1838 he had published *The Cornish Fauna*. He published other books and a prolific number of papers on such diverse topics as, diseases in lambs, migration of birds and the habitats of bats. As far as he was concerned however, the pinnacle of his success had been marked by his acceptance as a Fellow of the Linnean Society in 1824.

With his background steeped in the local fishing industry he could, apparently, be frequently seen on the quay drawing and studying anything unusual the fishermen landed. His *magnum opus* would be his four volume *Fishes of the British Islands* published between 1862 and 1865, illustrated with engravings taken from Couch's own watercolours. The book is still a valuable source of reference to this day. One of his illustrations of *Myoxocephalus scorpius*[*] (short-spined sea-scorpion) is depicted on the Post Office stamp issued in January 1988 commemorating the bicentenary of the Linnean Society.

Couch's varied and 'colourful' life (including three marriages – the last to a girl of twenty-two whilst in his seventieth year), makes the story of this country doctor a fascinating read. It will also be of special interest to historians of natural history, providing as it does the background to one of the leading naturalists of his era.

BRYAN SHERWOOD

* In Couch's book it appears as plate LXII Greenland Bullhead *Cottus groenlandicus* Cuvier 1829. The currently accepted name is *Myoxocephalus scorpius* (Linnaeus 1758) [the author has *Mixocephalus,* which is incorrect].

Obituary

Professor Terence Ingold

Terence Ingold, who died on 31st May 2010, five weeks short of his 105th birthday, was a distinguished mycologist, author, university professor and administrator. He was the oldest and longest-serving Fellow of the Linnean Society, elected in 1927. In an unpublished autobiography (1984) he states that he joined "largely to use their excellent library in Burlington House, ...still, perhaps, the best biological library in Britain as far as the older literature is concerned." He served on Council from 1955-7, was Botanical Secretary from 1962-97, Vice President from 1954-5 and 1965-6. He delivered the Hooker Lecture in 1974 and was awarded the Linnean Medal for Botany in 1983. "It gave me great pleasure, and I feel especially proud when looking at the list of those who have had it in the past. I believe that the work of the Buckner's Close was a factor in the award". Buckner's Close was his home in Benson, Oxfordshire, where he continued to do research long after he had retired. On his 80th birthday the Society published a Festschrift (Dick *et al.,* 1985) including an appreciation by a former student and colleague (Plunkett, 1985).

He was born in Blackrock, Dublin on 3rd July, 1905. His father was a schools inspector. He attended school at Bangor, Co. Down and Queen's University, Belfast, graduating with First Class Honours in 1926. He was awarded a one-year scholarship at the Royal College of Science in London (now part of Imperial College). There, he was greatly influenced by Sir John Farmer, Head of the Department of Botany, and was absolutely thrilled to attend a field excursion led by him to Snowdonia where he was introduced to mountain plants. He returned to a studentship and demonstratorship at Queen's (1927-9). During this time, with colleagues, he mapped the vegetation of the Mourne Mountains. He also wrote several papers on the pH and salt concentrations of extracts from plant tissues, leading to a Ph.D.

In 1929 he was appointed to a lectureship in Botany at Reading University where he instigated the tradition of student excursions to Cader Idris where everyone camped. He was at Reading for seven years, then moved to University College, Leicester, as Lecturer-in-Charge of the Botany Department. It was here that he developed his interest in aquatic Hyphomycetes. In 1944 he was appointed as Professor of Botany at Birkbeck

Professor Terence Ingold when President of the British Mycological Society in 1971, drawing the fungus *Sphaerobolus stellatus*, the subject of his presidential address to the Society. Photo courtesy of his son, Professor Tim Ingold.

College, London, succeeding Dame Helen Gwynne-Vaughan, herself a mycologist. He held the chair at Birkbeck for 28 years, retiring at the age of 67 in 1972. During his early years there, while Britain was still at war, Birkbeck College was at Fetter Lane, in war-damaged premises, occasionally inconvenienced by German V2 rockets ("doodle bugs") but after the war ended it was re-housed in completed new buildings in Malet Street, next door to the University of London Senate House. At the University he served in many senior academic positions, and was especially influential as a member and Vice-Chairman of the Inter-University Council on Higher Education Overseas. In this capacity he made numerous visits, especially to former British colonies in Africa and Jamaica, to advise their governments on the setting up of University institutions there. Some of these were colleges which had been in special relations with London University, preparing students for the award of external London degrees. He also helped to set up the New University of Ulster at Coleraine and the University of Kent at Canterbury. After retiring he led a Commission from the World Bank to advise on the feasibility of making grants to support the development of higher agricultural education in S. India. For his overseas work he was awarded the C.M.G. in 1970. He was also awarded Honorary Doctorates from the Universities of Ibadan, Exeter and Kent.

Terence Ingold was an excellent teacher, demonstrator, lecturer and writer, with a great influence on mycology. He was especially helpful to "beginners", students and amateur mycologists in the field, attending fungus forays which he often led. His

publications include four books on spore discharge and dispersal in fungi and other cryptogams and *The Biology of Fungi* (1961), written from memory during boat trips to and from Canada in 1959. His publications and lectures were copiously illustrated by elegant line drawings. He has inspired many younger mycologists, some of whom have taken up influential positions in the subject. At Birkbeck College he built up an M.Sc. course in mycology. His former students include Bryan Plunkett, a colleague at Birkbeck, who worked on the development of agaric and polypore fructifications, Hilda Canter who became a leading world expert on chytridiaceous fungi, David Pegler, taxonomist at the Royal Botanic Gardens, Kew, Steve Moss, who made important discoveries on the ultrastucture of fungi endoparasitic in the guts of aquatic insect larvae and also in marine fungi, and Guy Willoughby who worked on the ecology of aquatic fungi at Windermere.

Ingold's research was notable for its breadth. One recurrent theme was spore discharge. He was greatly influenced by the publications of A.H.R. Buller, especially by the seven-volume work *Researches on Fungi.* His first mycological research paper was on the periodicity of spore discharge in the coprophilous pyrenomycete *Podospora* in 1928. The work was done at home with a simple microscope. His interest in periodicity of spore discharge continued later with work on discharge from perithecial stromata of *Daldinia.* Discharge from *Sordaria* was ingeniously studied using a spinning Perspex disk placed over perithecia. There were also studies on discharge in *Basidiobolus, Conidiobolus (Entomophthorales), Ascobolus, Epichloe, Acrospermum,* and *Loramyces (Ascomycetes).*His studies on *Basidiomycetes* included *Sphaerobolus, Itersonilia, Tilletiopsis, Bensingtonia,* jelly fungi, smut fungi and polypores. He also worked on resistance to freezing of agaric sporophores, retraction septa, cytoplasmic flow and the homing reaction in which hyphae grow chemotactically towards sexually compatible oidia. However, he will probably be best remembered for his work on the conidia of aquatic fungi. Whilst searching for chytrids, (a group of zoosporic fungi) in a stream near his home north of Leicester he examined an accumulation of foam and was astonished to find that it contained fungal spores of large size and unusual shape, mostly branched or worm-like. He traced their source to submerged decaying tree leaves. In 1942 he published a classical paper entitled "Aquatic Hyphomycetes of decaying alder leaves" in which he described 16 species belonging to 13 genera, emphasising the importance of spore development. This paper opened up a whole new field of mycological and ecological work. These fungi are found the world over in tree-lined streams and the concentration of their spores may reach several thousands per litre after leaf fall. Over 300 species are known, many described by Ingold himself. In his honour they are referred to as Ingoldian fungi. The accumulation of their spores in stream foam which can be preserved and their characteristic spore shapes enables their distribution to be easily studied. The conidia belong to several different groups of unrelated *Ascomycetes* and *Basidiomycetes* indicating parallel evolution of spore shape and habitat. Their sexual states (teleomorphs) fruit on wood and leaves which have been submerged in streams. The two basic conidial spore shapes are adaptations to trapping in rapid water flow. Great interest has followed the discovery that these fungi subject the leaves to "processing", increasing their protein content and softening the tissues, making the leaves more palatable to aquatic invertebrates which grow

more rapidly when fed on colonized leaves and feed preferentially on them. They are thus an essential link in the food chain from the leaves of riparian trees to aquatic invertebrates and fish.

In his "retirement" Terence continued active research using simple facilities at home for 20 years and published about 100 papers. He isolated from a jelly fungus a culture of an unusual basidiomycete, *Itersonilia perplexans,* which produces basidia bearing a single large spore. He recognised that this fungus had the potential for solving a long-standing puzzle, the mechanism of basidiospore discharge. Following Buller, he had suggested that the surface tension energy of Buller's drop (a drop which appears near the base of a basidiospore immediately before discharge) might in some way be harnessed in the discharge process. Photographic studies by others showed that there is another drop which appears on the adaxial face of the basidiospore. The drops are hygroscopic and, as they enlarge by absorbing water vapour, they coalesce, causing a momentum which brings about discharge – the surface tension catapult mechanism. Other research at home included extensive studies of the germination of the ustilospores of smut fungi.

Terence Ingold was held in high esteem by mycological societies and other organizations. He was an honorary member of the British Mycological Society of which he was twice President, and a corresponding member of the Mycological Society of America. He was President of the First International Mycological Congress held in Exeter in 1971. He was awarded the de Bary medal by the International Mycological Association in 1996. In 1998 he received the Millennium Botanical Award and Botanical Congress Gold medal from the International Botanical Congress.

A modest, warm, friendly man, Terence was devoted to his family. His wife Nora whom he married in 1933, died in 1995. They had four children, two of whom are professors. He is survived by them, five grandchildren and two great grandchildren.

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The Linnean Society Programme

2010

7th Oct	6pm Thurs.	'GETTING AWAY FROM THE URBAN LABORATORY' PROFESSOR FRANCIS OLIVER AND 100 YEARS OF ECOLOGY AT BLAKENEY POINT, NORFOLK John Pearson	Evening Meeting
8th Oct	1pm Fri.	COLLECTIONS, CLASSIFICATION AND CONSERVATION: CONTINUING THE LINNAEAN LEGACY Dr Ruth Temple FLS and Lynda Brooks FLS **This is one of a series of lectures in the Burlington House Courtyard being given as part of The Story of London Festival. Admission is by free tickets only; available from the Events Department at the Geological Society 020 743 20981 or email: events@geolsoc.org.uk	
21st Oct*	6pm Thurs.	THE NERC TAXONOMY AND SYSTEMATICS REVIEW Geoff Boxshall	Evening Meeting
27th Oct	Wed.	Linnean Society Paleobotany Specialist Group Meeting	
28th Oct	Thurs.	Linnean Society Palynology Specialist Group Meeting POLLEN AND SPORE RESEARCH: MORPHOLOGY, ECOLOGY AND PHYLOGENY	
23rd Nov	6pm Tues.	Darwin Lecture:** PLAGUES AND PEOPLE IN THE MODERN WORLD Sir Roy Anderson	Joint Evening Meeting with the Royal Society of Medicine
2nd Dec	6pm Thurs.	Founders Day Lecture: UNRAVELLING THE LINKS BETWEEN NATURAL HISTORY COLLECTIONS: THE J.C. MUTIS CASE M.P. de San Pio Aladrén	Evening Meeting
13th Dec	6pm Mon.	Christmas Lecture:** GEORGE'S CHRISTMAS CAROL YULE BE GLAD YOU CAME George McGavin	Evening Meeting

* Election of new Fellows † organiser(s) ** Registration required

Unless stated otherwise, all meetings are held in the Society's Rooms. Evening meetings start at 6.00pm with tea available in the library from 5.30. For further details please contact the Society office or consult the website (address inside the front cover).

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