

The Linnean

Communicating nature since 1788

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From habitat to cabinet

Bird decline in Indian grasslands

*A reconnection
with nature
THROUGH FUNGI*

Common threads
BOTANICAL ILLUSTRATION
AND PLANTS OF THE QUR'ĀN

NIUAFO'OU
A journey to the
remote South
Pacific



The
LINNEAN
SOCIETY
of London



About us

The Linnean Society of London is the world's oldest active society devoted to natural history. Founded in 1788 by botanist Sir James Edward Smith (1759–1828), the Society takes its name from the Swedish naturalist Carl Linnaeus (1707–1778), whose botanical, zoological and library collections have been in our keeping since 1829. These collections, awarded Designated status by Arts Council England, are of fundamental importance as a primary reference for the naming of plants and animals. They are enhanced by the Society's own rich library which provides key resources for scientific and cultural research.

Our vision is a world where nature is understood, valued and protected. To do this we aim to inform, involve and inspire people about nature and its significance through our collections, events and publications. Thanks to the wide-ranging expertise of our membership and our unique collections, we are a hub for science communication through interdisciplinary learning and engagement.



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Dear Fellows,

Our final issue of 2023 delves into the history of Indian grasslands, once classed as 'wastelands', but through the study of fossil pollen records we now know that they are 'old growth' open ecosystems. So how will this inform how they, and the bird species within them, are protected? Sutirtha Lahiri gives a fascinating overview in 'From Habitat to Cabinet'.



Madeleine Emily Day looks at how the COVID-19 pandemic had a great effect on how people relate to nature, notably through a surge in the study, and foraging, of fungi. Our Librarian Will Beharrell leafs through some of Alfred Russel Wallace's own books as we 'reunite' his personal library, and Sue Wickison, this year's Jill Smythies Award winner for botanical illustration, talks us through her career and her work leading up to the recent book and exhibition at the Royal Botanic Gardens, Kew—*Plants of the Qur'an*.

As always we have fantastic events to look out for, both online and in-house, as well as reviews and much more.

Finally, may I take this opportunity to wish you all the best for the holiday season, from everyone at the Linnean Society of London.

Leonie

Leonie Berwick

Editor, *The Linnean* & Publications Manager (leonie@linnean.org)

You can also find the online interactive version of this issue in the Members' Area.

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Publish

The Linnean is published three times a year, in spring, summer and winter (UK). All contributions are welcome, but please contact the Editor or see the *Guidelines for Contributors* document on our website before writing and submitting articles (www.linnean.org/thelinnean).

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What's on



LINNEAN LENS: EDWARD LEAR AND HIS MAGNIFICENT PARROTS

Speaker: Will Beharrell FLS

23 Jan | 14.00 GMT

Edward Lear is best remembered today as a writer of much-loved nonsense verse, but he was also one of his generation's most accomplished ornithological illustrators.

Join our Librarian Will Beharrell as we explore his undoubted masterpiece: his 42 illustrations of the Psittacidae—better known as the family of parrots. **(ONLINE ONLY.)**



REPTILES IN ISLANDS: GECKO STORIES FROM THE INDIAN OCEAN ISLANDS

Speaker: Ashwini Mohan

24 Jan | 12.30 GMT

Some of the most valuable lessons in evolution and drivers of speciation have been gained by studying island ecosystems, and reptiles are among some of the best storytellers.

Amongst reptiles, geckos—with limited dispersal abilities and hard-shelled eggs that can survive long-distance oceanic currents—are well-placed to uncover the links between islands and biodiversity. Here, Ashwini Mohan explores the diverse islands in the western Indian Ocean and the reptile biodiversity they harbour. **(ONLINE ONLY.)**



KNOWING AND NAMING: THE ROOTS OF ETHNO-ORNITHOLOGY

Speaker: Andrew Gosler FLS

26 Jan | 18.00 GMT

In 2023, the American Ornithological Society announced its intention to rename all eponymous English bird names, which focused attention on the politics of naming and on the question of what makes a 'good' bird name.

Andrew Gosler will consider this question through the analysis of 7,000 recorded English folk names of British birds. Mostly collected during the 19th century, the names indicate both the knowledge of birds held by country folk in the British Isles, and the sophistication of their naming. **(ONSITE AND ONLINE)**

To book for these and other events not shown, visit www.linnean.org/events



MISREADING CLIMATE CHANGE IN BANGLADESH

Speaker: **Camelia Dewan**

15 Feb | 18.00 GMT

Perilously close to sea level and vulnerable to floods, erosion, and cyclones, Bangladesh is one of the top recipients of development aid earmarked for climate change adaptation. Yet to what extent do adaptation projects address local needs and concerns?

Combining environmental history and ethnographic fieldwork with development professionals, rural farmers, and landless women, Camelia Dewan critiques development narratives of Bangladesh as a 'climate change victim' in her recently published book, *Misreading the Bengal Delta: Climate change, development and livelihoods in coastal Bangladesh*. **(ONLINE ONLY.)**

PATHLESS FOREST: THE QUEST TO SAVE THE WORLD'S LARGEST FLOWERS

Speaker: **Chris Thorogood**

28 March | 18.00 GMT (Nature Reader)

As a child, Chris Thorogood dreamed of seeing *Rafflesia*—the plant with the world's largest flowers. Now as a botanist at the University of Oxford's Botanic Garden, his book *Pathless Forest* tells the story of his journey to study and protect this remarkable plant—a biological enigma, still little understood, a leafless parasite. But with two in five of the world's species threatened with extinction, can *Rafflesia* be saved? **(ONSITE AND ONLINE.)**



Images: Camelia Dewan; Chris Thorogood; The Linnean Society of London



LINNEAN LENS: RUDBECKIAN REMAINS

Speaker: **Roger Gaskell**

12 March | 11.00–13.00 GMT

One of the treasures of the Linnean Society is a collection of 17th-century botanical woodblocks, made for Olof Rudbeck's ambitious encyclopedia of all then-known plants, *Campii Elysii* (Uppsala, 1701–1702).

Only a few copies of the first two of 12 projected volumes survived the great fire in Uppsala in 1702. Roger Gaskell will look at the blocks themselves, allowing us to see firsthand the skills of the block-cutters and the technical issues faced by printers. Of particular fascination is the rare survival of unfinished blocks, a unique insight into the actual process of cutting the images with a small knife on the pearwood blocks. **(ONLINE ONLY.)**

TREASURES TOURS

Guides: **Our fantastic Collections Team**

19 Jan, 1 Feb, 8 March | 14.00–15.30 BST

Join our expert staff on one of our sought after Treasures Tours, an in-depth, behind-the-scenes journey around our unique home at Burlington House in central London. See some of Carl Linnaeus's own personal collections and learn the story of the Linnean Society. **Book your place!**



News

THE INTERNATIONAL CONGRESS OF DIPTEROLOGY: THROUGH THE EYES OF AN ATTENDEE by Rochelle Daley



The Linnean Society supported the 10th International Congress of Dipterology this year, as part of its conference support grants.

Hello readers of *The Linnean*! My name is Rochelle Daley, a PhD candidate at the University of the West Indies (UWI), Mona, Jamaica. I am an entomologist with a particular interest in Sarcophagidae, forensic entomology, taxonomy, and larval morphology. In July, I was fortunate enough to attend my first international conference, the 10th International Congress of Dipterology (ICDX), of which The Linnean Society of London was a part. I am beyond grateful and delighted to share a snippet from this wonderful experience.

Held 16–21 July 2023, the ICD's 10th conference occurred in the Casino-Resort, Silver Legacy in Reno, Nevada, USA. Gathering from all over the world, Dipteran enthusiasts descended, quite like the flies they study, to present, share and discuss the most current advances in Dipteran research.

Approximately 200 students, academics, researchers and persons with general Dipteran interest from over 30 countries attended, including the USA, UK, Mexico, France, Japan, South Africa, Australia, Jamaica and many other countries). Over 100 oral and poster presentations were amassed within the conference period, and to accommodate the magnitude of presentations, three ballrooms within the hotel were utilised.

Captivating presentations

These presentations were grouped into different symposia based on shared themes such as fly taxonomic groups (Syrphoidea; Acalyptrates), applications of Dipterology (Dipterans as parasites and vectors), and geographical location (Advances in Afrotropical dipterology), etc. Each day began with a plenary address and then conferencegoers would choose which symposium or presentation they wished to attend. Some days it was admittedly hard to decide, given the astounding quality of the presentations throughout.



Visually beautiful, acoustically captivating and mentally stimulating, every presentation was a learning experience.

Because of my research interest, I admit I am somewhat biased when I say the symposia that made the biggest impressions on me were ‘Diptera Morphology’ and ‘Dipterology in Forensic Entomology’. Though I was also drawn to presentations where Sarcophagidae or larval morphology or microscopy were highlighted. The most impactful image from the oral presentation that remains engraved in my brain well after the conference was a beautiful image of a cephalopharyngeal skeleton generated using confocal imaging. However, this is not to say the other presentations were any less engaging; I attended as many presentations as possible.

I was also able to be a speaker myself, presenting on the ‘Use of Third Instar Morphology to Identify Sarcophagidae of Forensic Importance in Jamaica (Dipterology in Forensic Entomology Symposium)’. Conferencegoers were forced to listen to me go on about my love of internal larval structures and complete bias towards the fly family, Sarcophagidae. Though it was nerve-racking to present before the best Dipterists in the world, their feedback, criticism and questions were well worth it. This presentation was based on a research article I am currently working on with my supervisor, Dr Eric Garraway (UWI, Mona).

Networking on the fly

Apart from the academic presentations, there were a host of engaging social activities to facilitate networking among

ABOVE: Sarcophagidae specialists at the conference; (LEFT TO RIGHT) Nikolas Johnston (Australia), Gregory Dahlem (USA), Thomas Pape (Denmark), Caroline De-Souza (Brazil), Rochelle Daley (Jamaica), Daniel Whitmore (Germany) and Krzysztof Szpila (Poland).

participants, including daily coffee and lunch breaks, receptions, outings within the surroundings and a lovely banquet dinner, where the food was only a secondary highlight. The banquet address, ‘Charismatic Diptera—Who Are We Kidding?’ by Dr Erica McAlister FLS from London’s Natural History Museum was awesome and awe-inspiring. There was not a dry eye in the room, as uncontrollable laughter led to tears.

As the main organiser of this event, Dr Stephen ‘Steve’ Gaimari (ICDX Chair) and his team were instrumental in the great success and execution of the conference. I was able to attend through grant funding provided by the conference sponsors, and I am truly thankful. The ICDX created a space where budding researchers with limited experience and resources could engage in academic conversation, whilst learning from and sharing comradery with those at the top of their fields. It was the equivalent of having a ‘meet and greet’ with your favourite celebrity. The memories and friends that I have made at the ICDX will remain with me and encourage me in my academic pursuits. I think I can speak for everyone who attended when I say I am looking forward to the 11th staging of the congress in Croatia. And as we say in Jamaica, ‘big up yuh self’, Steve and team.

Sea Monsters and *Systema Naturae*: A digital adventure

In November, the Society partnered with STEM Live for an innovative and engaging digital journey through the history of classification—and why it matters today.

With STEM Live, we were thrilled to welcome over 5,000 viewers and schools through the doors of our historic building. Streamed into homes and classrooms around the country, this live digital event took young people on a tour around Burlington House and into our vault to see some of Carl Linnaeus's own library and specimens. Children could also put their classification skills to the test by creating their very own sea monsters. Through this virtual experience, the workshop aimed to stimulate curiosity and critical thinking, fostering a deeper comprehension of, and appreciation for, the natural world.

The session was presented by one of our Fellows, Sally-Ann Spence, where she interviewed Education Manager Ayesha Meredith-Lewis (pictured here, being filmed in conversation) about the classification of



plants and animals, and how to apply this to the natural world closer to home. Sally-Ann also spoke to Isabelle Charmantier, our Head of Collections, about the history of Linnaean classification, using the books and specimens in our collection as a guide.

Ayesha says of the partnership: 'We were overwhelmed by the positive response from students, who asked some fantastic questions about Linnaeus and classification. We're also really grateful to Sally-Ann and the fantastic production team at STEM Live, who helped us to bring our iconic home at Burlington House and its rich scientific heritage to schools across the country.'

Watch the live while it is still available: <https://stemlive.co.uk/lessons/how-to-classify-a-sea-monster/>



Biological Journal Special Issue: Cuban biodiversity

The November special issue of the *Biological Journal of the Linnean Society*—'Cuba: Biodiversity, Biogeography and Evolution'—takes a deep dive into the evolutionary history, biodiversity and conservation of this fascinating Caribbean country.

Papers cover a wide range of topics, including DNA barcoding of the Greater Antillean butterflies; the phylogeography of the fish species *Limia vittata*, providing insights into its evolutionary history; and the biogeography and diversification of the Caribbean clade of the plant genus *Miconia*.

Special issue available on the Oxford University Press website: <https://academic.oup.com/biolinnean/issue/140/3>

Native Soil

We are proud at the Linnean Society to have Fellows from around the world, all with wide-ranging expertise and a plethora of hidden talents. One such Fellow is Dr Sarah Watkinson, who has spent most of her career as a plant scientist at the University of Oxford.

Alongside academic papers, Sarah is the author of several works of prize-winning poetry, including *Photovoltaic* (2021, Graft Poetry) and *Dung Beetles Navigate by Starlight* (2017, Cinnamon Press). She has also been the inaugural poet in residence at the University of Oxford's Wytham Woods.



Most recently Sarah has published *Native Soil* (ISBN: 9798985428636, £16.99), her first novel, an unusual blend of environmental science and romance, set mainly in Yorkshire. Says Richard Fortey of the novel:

'An intriguing story weaving together natural history, academic battles, and the green revolution. The landscape of Yorkshire is described with verve and delight. A doomed romance binds the tale together, as the competing claims of love and scientific research vie for supremacy.'

Congratulations Sarah!



Trees: New exhibition in 2024



After the success of our 2023 exhibition about Alfred Russel Wallace (1823–1913), with over 700 visitors in just four months, in 2024 we will be starting the year with an exhibition looking into the fascination with, study and importance—scientific, cultural and otherwise—of TREES.

On display you'll see a variety of unique, significant and simply beautiful arboreal-related material from the Society's collections, like Robert Schomburgk's watercolour illustration of 'The Mora—Tree of Guiana' from his expedition of exploration to what was then British Guiana, now Guyana, for the Royal Geographical Society. Other treasures on display will include a stunning, coloured copy of Aylmer Bourke Lambert's landmark book *A description of the genus Pinus*, as well as specimens from Carl Linnaeus's herbarium.

The exhibition begins 16 January 2024 (Tues–Fri, 10.00–17.00)...it's not to be missed!

CHRISTMAS CLOSURE

The Society will be closed to visitors from 23 December 2023 to 16 January 2024, during which time our library will undergo its annual housekeeping. We look forward to welcoming you back in the New Year!



Letters

Equus quagga quagga: Its past defined, but what of its future?

Peter Heywood (2021, 2023) draws attention to human impact as a major factor in the extinction of the zebra-like *Equus quagga quagga* Boddaert 1785, as a wild animal in 1878 and in a Dutch zoo in 1883. We might feel guilty about our forebears' role in hunting quaggas and failing to maintain a breeding, captive population of them; immortalising this subspecies in a zoological trinomial (plus six other conspecific subspecies of the so-called common or plains zebra, *E. quagga* Boddaert 1785) is of little ecological consequence. Whilst it teaches us a hard lesson, guilt tends to drain one's energy rather than inspire us to seek compensatory measures.

On a more positive note, we Linneans should echo Heywood's comment that: 'Taxonomy does have an important role in conservation.' Whilst DNA technology has yet to reinstate the quagga using its genome recovered from museum specimens, Heywood (2023) seems to have overlooked the potential of selective breeding from near living relatives.

Controversially, so-called 'Rau quaggas' have indeed already been bred back from reduced-striped individuals of *E. quagga burchelli* (Heywood 2013). Starting with the first-born foal in 1988, Rau quaggas are already grazing alongside the more common plains zebra in Molcala National Park, RSA, and there are plans to extend such releases to the Western Cape.

H. L. Pearson FLS (hugh.pearson@edf-energy.com.uk)



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Response from the author:

I appreciate Mr Pearson's comments on my article. The selective breeding by the Quagga Project yielding plains zebras that resemble quaggas in having reduced stripes and brown coat coloration is intriguing (<https://www.quaggaproject.org/>). As noted, I discussed this venture in my 2013 paper and it is portrayed more fully in my 2022 book, *The Life, Extinction, and Rebreeding of Quagga Zebras: Significance for Conservation* which describes Rau quaggas living in South African habitats where quaggas once roamed. Selective breeding was not included in my article in *The Linnean* because of space constraints and because its focus was on the extinction of quaggas and the decrease in numbers of other zebras.

P. Heywood FLS FRSB (Peter_Heywood@Brown.edu)

Letters can be sent to the Editor at leonie@linnean.org.

Thank you to those who wrote with their views on President Anjali Goswami's piece 'Upon Denying a Rose Its Name'. The Society plans to use them, either in full or in part, in a future issue of *The Linnean* or within an event, in conjunction with more discussion around this topic.

From Habitat to Cabinet

Bird decline in Indian grasslands



by Sutirtha Lahiri

Ecologically and socially important habitats are being decimated at a rapid rate throughout the world, from the destruction of habitats to land-use change for agriculture and plantations, to fossil-fuel enabled systemic climate change denial and leniency. This thought ran through my head as I sat on the train, watching the scenery pass by as I traveled through the landscape of the Uttar Pradesh and Bihar states in North India. Vast stretches of green rice fields exist within a mosaic of village ponds, land demarcated for plantation (showing only soil mounds and dead saplings), clumps of occasional bamboo and a wall of trees constantly in the background. When I was small, I often wondered about this never-ending wall of trees; was it one long and contiguous stretch of forest? Of course, I now know it is just a trick of the eye, but the idea of a forest being connected for the entirety of my journey was an endearing one.

And now, I watch this same landscape race by as the rain hits my window. The same landscape that—just one hundred years ago—housed extensive grasslands along several river floodplains. These grasslands, which now exist only in small pockets, buried within multiple types of land-use, were once home to birds like the critically endangered Bengal florican (*Houbaropsis bengalensis*) and pink-headed duck (*Rhodonessa caryophyllacea*), the latter of which may or may not already be extinct. This was fresh in my mind because just a month before, I had been at the Natural History Museum's branch in Tring, holding the specimens of both species in my hand.

The impact of agriculture

The story of the grassland is as much an account of agriculture and tea plantations as it is of biodiversity. When India was colonised, much of the country's natural habitats were mapped extensively for timber extraction, and as a result, grasslands, because of the lack of trees, were marked as 'wastelands' (Lahiri 2023). This was to ensure that these lands could be converted for either silvicultural practices or for the expansion of agriculture and commercial crops like tea and coffee. Historical records indicate that the Wasteland Rules of 1854 aided in the British endeavor to expand tea in multiple states throughout India—including the same grasslands I work in. When these lands were found suitable, many British officers were engaged in surveying them to assess their potential for tea expansion. Several officers were sent to different parts of Eastern India as tea surveyors and planters, and alongside this, many officers were also documenting the area's natural history. The naturalist Charles M. Inglis (1870–1954), for example, collected numerous grassland birds from various parts of North Bengal and Assam. Many of his specimens come from grasslands and savannah patches in the tea estates that were being formed at the expense of the grassland habitats. He says of the landscape: 'The area of savannah throughout the district is much smaller than it was formerly and constantly on the decrease owing to the extension of cultivation, tea[...]' (Inglis 1951)

LEFT: Plate of the pink-headed duck (*Rhodonessa caryophyllacea*) from E. C. Stuart Baker's *The Indian Ducks and Their Allies* (1908).

BELOW: Specimen of the critically endangered, potentially extinct, pink-headed duck, in the collections of the Natural History Museum in Tring. (This one 'died in captivity' in 1931.)





ABOVE: The Bengal florican, like the pink-headed duck, is critically endangered.

Decline in habitat was already rampant in the 1930s, and only accelerated from the 1950s. Previously, much of these grassland habitats that encompassed the Terai and the Duars landscape of the lowlands of the Himalayas had been inaccessible due to the prevalence of malaria, thick vegetation and the presence of large herbivores and predators. Many British officers, including Allan Octavian Hume (1829–1912), a Fellow of the Linnean Society, had the following to say in *A Manual of the Game Birds of India* by Eugene Oates: ‘[...] and all around for many hundreds of yards stretched a dense unbroken thicket of elephant grass, 15 feet high, and so thickly set that it was next to impossible to force one’s way through it.’

In his *Report on the Province of Assam* (1854), Andrew John Moffatt Mills adds that ‘the soil is very productive, but cultivators are subject to great loss by [...] the ravages of wild animals which inhabit large tracts of reed and grass jungles’.

However, the late 1940s–1950s brought with them the advent of the green revolution and the US-funded malaria eradication programme, which not only made the region safer for exploration, but also allowed large-scale drainage of the ‘swamps’ and conversion to agriculture (Strahorn 2009).

The grassland birds

Back at the Natural History Museum in Tring, I pulled out drawers and drawers of grassland birds that are endemic to the wet grasslands, georeferencing the locality information for many of these species in order to try and understand how they have changed over time. This included species from my home state West Bengal, where Charles Inglis and Louis Mandelli (1833–1880)—another tea planter in the region—extensively collected specimens of birds, including the slender-billed babbler (*Argya longirostris*) and the black-breasted parrotbill (*Paradoxornis flavirostris*). Both these species warrant attention, with the former last seen in the 1950s, and the parrotbill not seen in the state in almost 100 years.

BELOW: Allan Octavian Hume FLS; Some specimens of the (now rare) Manipur bush quail in the collections at NHM Tring show Hume as the collector.

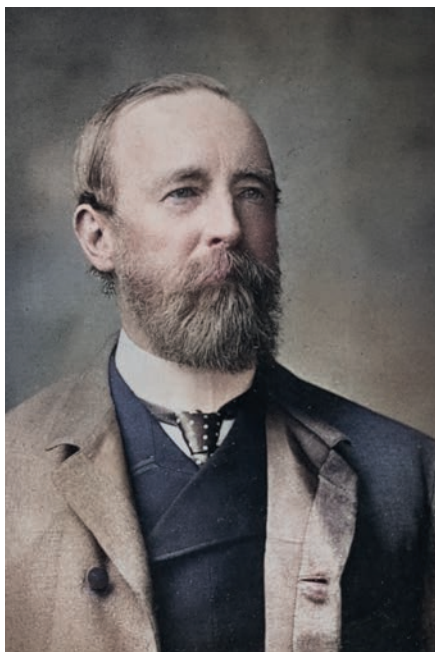


Image: The Linnean Society of London; Sutirtha Lahiri/Trustees of the Natural History Museum, London; Shutterstock.com/Surajeet 96

Similarly, species like the pink-headed duck or the Manipur bush quail (*Perdica manipurensis*), described from wet grasslands of the northeastern states of Assam, West Bengal and Bihar, are now either presumed extinct or haven't been seen in decades. A subspecies of the Manipur bush quail was described by William Robert Ogilvie-Grant and Charles Inglis in 1909, from the Mornai Tea Estate in Assam. They noted how exceedingly common, though site specific, they were to patches of grass at the time, but the Manipur bush quail has now not been seen in decades. (It was also Inglis who had the last known wild record of pink-headed duck found in the region on 21 June 1935 (Inglis 1940, Krishnan 2022).)

Grassland habitat loss, by way of rampant agriculture, is causing species such as the parrotbill or the bush quail to become increasingly rare, or locally extinct. Recent global analyses also confirm this; that widespread agriculture expansion is causing a decline in grassland birds globally (Vickery and Herkert 2001, Kher and Dutta 2021, Douglas et al. 2023).

Recognising the real value of grasslands

While colonial ideas about grasslands and their origins and utilities made a sustained impact on how grasslands have been viewed, both by the public and within the discourse of governance, there is now much evidence to suggest that open ecosystems are even more unique and old. In a recent paper published in *Science* (Pearce et al. 2023), researchers have found evidence, through the study of fossil pollen records, for the large-scale prevalence of open ecosystems during the last interglacial period (129,000–116,000 years ago). Such evidence of the presence of open ecosystems, prior to the arrival and expansion of humans, directly challenges the long-held notion that grasslands were created via anthropogenic regimes, usually by way of fire, and that forests were destroyed to create these ecosystems.

This evidence has important implications for how we protect and restore them. Recognising that some open ecosystems may be 'old growth' (similar to the notion of 'old-growth forests') allows us to make recommendations for what kind of vegetation to recreate in those landscapes, and what kind of biodiversity it might sustain. While studies suggest that old-growth grasslands may take decades to restore (Nerlekar and Veldman 2020), according protections to these systems—such as by declaring conservation reserves, acknowledging the negative impacts of wanton tree plantations, recognising indigenous and pastoralist stewardship of grasslands—can go a long way in their protection.

In India, while recognition of open ecosystems is still at a nascent stage from the perspective of the government and respective policies, grassland-level initiatives are making a dent. Institutions, nonprofits and researchers are teaming up to protect swathes of grasslands and monitor biodiversity and livelihood opportunities in the semi-arid grasslands of Banni in Gujarat and Saswad in Maharashtra. Declaration of conservation reserves and the sustainable use of fire and grazing are also protecting grasslands in Arunachal Pradesh. In the arid grasslands of Western Rajasthan, The Bustard Recovery Project (named on behalf of the critically endangered bird, *Ardeotis nigriceps*) has for years engaged with local partners and the government for restoration of grasslands, in situ conservation breeding



ABOVE: The population of the great Indian bustard, the state bird of Rajasthan, had shrunk to less than 150 individuals in 2013. Plans were made for the conservation of the species by India's Ministry of Environment, Forest and Climate Change (MoEFCC), and The Bustard Recovery Project was launched in 2016 for a five-year programme, extended to 2024. (<https://tinyurl.com/projectbustard>)

of bustards and active removal of invasive plant species. All of these efforts—while smaller in scale compared to the amount of grassland present in India—are nonetheless motivating in their dedication to protecting an ecosystem that has been systematically understudied and neglected.

Historical species inform the future

A look into museum cabinets gives us the chance to inspect how ecological change is not only rampant, but constant. Natural history museums are increasingly being used to inform conservation in biodiverse regions throughout the world; well-kept historical data from specimens, as well as the diaries and journal entries of collectors, serve as baseline information for resurveys. Such surveys have already found widespread decimation of fauna across different habitats, from the rainforests in South America (Gomez et al. 2020, Palacio et al. 2019) to deserts in North America and Africa (Iknayan and Beissinger 2018, Ogada et al. 2022). Changing climate—either through temperature or rainfall patterns—as well as consistent changes in land use has, as we know, affected biodiversity. Historical specimens paired with archival records are allowing us to better understand these changes, in order to devise strategies to future proof the diversity of species with which we share our world. While many of the species are now confined, perhaps rather ironically, to the climate-controlled cabinets of natural history museums, these specimens offer a reminder of the past, and, hopefully, a roadmap for the future.

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Anton Pantaleon Hove's *Agricultural Espionage Mission to Gujarat*

by H. J. Noltie FLS



PREVIOUS PAGE: Ripe cotton bolls before harvest in Gujarat, India.

BELOW: The title page from Hove's *Tours for scientific and economical research, made in Guzerat, Kattiawar, and the Conkuns 1787–88* (1855).

'He seems to have had none of that behaudering [swaggering], offensive assumption of European superiority, which so often makes respectable Natives shy of cultivating a close acquaintance with the English.'

Alexander Gibson on Anton Pantaleon Hove, 1855

During recent visits to the library of London's Natural History Museum (NHM), where I have been cataloguing their extensive collection of Indian botanical drawings, Andrea Hart, Head of Library Special Collections, has sometimes presented me with mystery botanical drawings to see if I can assist with their identification (<https://tinyurl.com/hovedrawings>). The latest offering contained a slim folder of uncatalogued drawings bearing the names 'A. P. Hove' and 'Dr Scott', which were familiar from my work on the pioneering forest conservator Alexander Gibson (1800–1867) and the history of botany in the Bombay Presidency (Noltie 2002). It was Gibson who in 1855 published an edition of the diary of an expedition to Gujarat undertaken in 1788/9 by the Pole Anton Pantaleon Hove (c. 1762–1830). The East India Company (EIC) surgeon Helenus Scott (1760–1821), a student of the Edinburgh botanical professor and Regius Keeper of the Royal Botanic Garden John Hope (1725–1786), was one of many interesting botanists born in my own adopted county of Angus.

Hove's Gujarat expedition

Details of the Gujarat expedition and its background have been given by Ray Desmond in his *European Discovery of the Indian Flora* (Desmond 1992) and Jordan Goodman in his *Planting the World* (Goodman 2020), on which the following summary is based. The original documents are among the papers of botanist Sir Joseph Banks (1743–1820) in the Wellcome Library.

In his early 20s, Hove turned up in England in the early 1780s using the improbable surname 'Au'. He initially worked in the nursery garden of botanist/nurseryman Johann Graefer in Islington, whence he moved to the Royal Garden at Kew. He came to the attention of Banks and Charles Blagden (secretary of the Royal Society) and was recommended for an expedition to investigate South West Africa as the site of a possible convict station. Blagden noted that 'his education has been far beyond his present situation in life' (Goodman 2020: 51); he knew languages, sciences, could draw, had medical knowledge and a good writing style. As Anthony Pantaleon Hove he sailed for Cape Town in 1785 but the expedition was a disaster and he returned to England in 1786. Despite this, at Angra Bay in what is now Namibia, he had collected seeds, including 17 pelargoniums, for Kew and herbarium specimens for Banks.

The following year, as Anthony (Anton) Pantaleon Hove, he was sent on a mission to Western India by the Board of Trade (the 'Committee of Privy Council for Trade and Foreign Plantations'), under its chairman Charles Jenkinson, Lord Hawkesbury. The ostensible purpose was to collect seeds for Kew, but Hove also had private instructions from Banks:

the real object of your mission is to procure for the West Indies seeds of the finer sorts of cotton with which the Ahmoed [Ahmedabad] Country where you are ordered to reside abounds (Desmond 1992: 206).

His real mission was therefore to investigate cotton—its cultivation, the soils and climate of Gujarat, which Banks believed (mistakenly as it would turn out) to be the source of the best Indian varieties. He was 'to keep that in view as your main

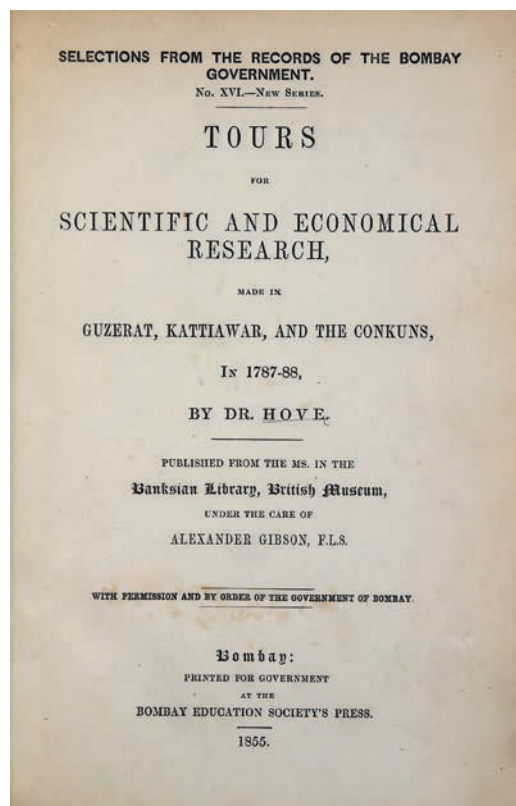
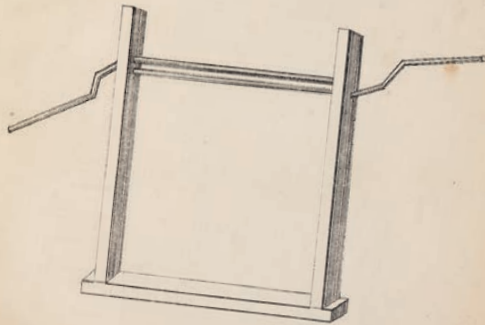


Fig. 1.

Machine for Cleaning Cotton from the Seed.



object, & consider the collections for His Majesty's garden as secondary to it' (Desmond 1992: 206). Hove departed for India on the ship *Warren Hastings* on 14 April 1787. The aim was to concentrate on the area between Bharuch and Ahmedabad, travelling in local clothes in the guise of a physician. As it would potentially interfere with the cotton trade between India and China run by the East India Company, the mission was to be kept secret from it, which believed Hove to be collecting only seeds of botanical interest for Kew. The seeds were to be sent directly to Soho Square and reports, written in Polish, to Hove's brother who would have them translated and forwarded to Banks.

En route to India Hove spent nearly a fortnight at Johanna (= Anjouan, Comoros Islands), from where some collections reached Kew. He landed at Bombay on 29 July 1787 and headed north, travelling on horseback and by palanquin. On 24 October he reached Ahmedabad where he stayed for a month, but was twice robbed, so went south to Cambay (now Khambhat) in the Kattiawar region

of Gujarat. He didn't have enough money, the £300 he had taken was used up in three months, but in Bombay he had been helped financially by Dr Scott and in March 1788 drew a bill on Lord Hawkesbury for the enormous sum of £2,125. By this time Banks had discovered that Gujarat cotton was inferior to that of Bengal and, appalled at Hove's extravagance, recalled him. But Hove had already decided to return to Britain and left India on the Danish ship *Norge* on 2 February 1789, reaching London on 18 August.

Banks managed to save Hove's reputation by playing down the costs and bigging up the botanical results to Hawkesbury, the Home Secretary and the Prime Minister: these amounted to 23 varieties of cotton, 80 living plants and seed of 170 species. The plants and seeds went to Kew, but the herbarium specimens and Hove's botanical drawings were kept by Banks—the ones shown to me at the NHM. There are 10 drawings, and though two are annotated 'Dr Scott', they are probably all by Hove himself. Though pencil field sketches with thin colour watercolour washes, they show him to have been a competent draftsman. Eight (*Aristolochia bracteolata*, *Cadaba fruticosa*, *Capparis* sp., *Cleome gynandra*, *Hibiscus hirtus*, ?*Leucas* sp., *Pancratium longifolium* and *Vitex negundo*) were made in Gujarat and two (*Angraecum eburneum* ssp. *superbum*, *Kalanchoe pinnata*) on the island of Johanna. Related specimens of two (possibly three) of the species illustrated have been found in the NHM herbarium, where many other specimens doubtless remain to be found. The *Pancratium* is the type of *P. cambayense* Herbert (1837).

LEFT: Plate depicting a 'Machine for cleaning cotton from the seed' from Hove's *Tours for scientific and economical research...* (1855).

BELOW: One of the 10 drawings found in the Natural History Museum's collections, *Pancratium longiflorum*, most likely annotated by Hove with 'N. 1 *Panocratium*—Cambay Hills, Sandy Places. Gool Sobool'.





Hove had also acquired much useful information—e.g. on the cultivation of ebony and sandalwood, the first specimens of mangosteen to reach Britain and on grain crops (Hove's manuscript 'Account of esculent grain cultivated in the Guzerat' is in the State Library of New South Wales).

His name has not been altogether forgotten in botany as De Candolle named *Solanum hovei* in 1852 based on one of his specimens, and in 1812 W. T. Aiton had published the genus *Hovea* (coined by Robert Brown). The genus is one of Australian legumes and was named to commemorate his role as a Kew collector, rather than any connection of Hove with the southern continent.

Helenus Scott, son of the minister of Auchterhouse, took Hope's botany class in 1778, went to Bombay as an assistant surgeon in 1783, and was author of two novels including *The Adventures of a Rupee* (1782). Scott retired to Britain, but in 1821 emigrated with his children to Australia and died on board the ship on the way.

Hazards faced by botanical collectors

Plant collectors have historically faced many hazards including accidents, murder, shipwreck and loss of specimens. Never before, however, have I encountered a problem faced by Hove in Kattiawar: of becoming involved in a game of sexual forfeits. In an allusion to the incident in the edited version of Hove's diary (Gibson 1855), my curiosity was aroused by the mention of a passage 'the details whereof I [Gibson] have for decency's sake omitted'. The manuscript survives in the British Library, which I consulted it in 2000 during research for the *Dapuri Drawings* in which I merely summarised the events of the evening of 8 July and early hours of 9 July 1788. It therefore seems worth publishing here the full account, not so much for its salacious content, but for the subtlety of Hove's use of a language that, as noted by Blagden, is remarkable. (Please note: Parts of this passage may be deemed distasteful by some readers and are included solely in an historical context, represented in full so as to give a factual account.)

Visit to the Rajah of Dolca 8th July 1788

After this meal which was their dinner the Rajah stood up & made a grave speech, at which the youngest of the company seem'd to smile & addressing himself to one of the elderly women she withdrew with him. As the Rajah on going out did not say he was going home, I thought that he went to breath [sic] fresh air, for notwithstanding the hall was very spacious & otherwise airy, now it was remarkably hot, occasioned by the populace that were in. However as his stay was considerably longer than I had reason to suppose, I enquired of the Governess where he had gone, who as it happened misunderstood my meaning, & taking me by the hand I was conducted into a narrow apartment, which had a small reservoir of water, & illuminated with wax tapers, but as I was a stranger to the motives for which she brought me here, I quietly set myself down on the sofa, waiting for the Rajah's return, however she gave me soon to comprehend the cause for her conducting & accompanying me here in which I could not be mistaken.

On our return to the Hall, I found the Rajah seated in the place he had formerly occupied & his Gallant who was at least sixty, but the greatest part were retired. On asking the Rajah whether they would return & being answered in the affirmative, I could then not be deceived in the institution of this society.

Betel was now served in with the horrid beverage of Opium to those that were in the Hall as likewise to the rest as they came in. In a short period after the company had again collected together a speech was made by that woman who accompanied the Rajah, to which every person kept profound silence & attention.

On the conclusion one of the young women called on the Rajah, who however did not go with her, & having taken ten gold mores out of his turban, he placed it on a receiver of gold, which was placed on a silver pedestal in the midst of the hall, a general laughter now issued both by males & females, & he gave me to understand that in case I should be called upon &

OPPOSITE: Hove has annotated this illustration with 'Vitex trifoliata or Fermentation shrub flowers all the year round' (now *Vitex negundo*).



ABOVE: The orchid *Angraecum eburneum* subsp. *superbum*, drawn by Hove during his stay on the island of Johanna (now Anjouan, Comoros Islands).

be a new azalea, which led to the introduction to Britain of one of the most ornamental and scented of shrubs, *Rhododendron luteum*. As 'Azalea pontica, the yellow azalea' it flowered in the nursery of Thomas Watson at Islington in the spring of 1798, introduced that year from plants supplied by 'Mr Anthony Hove, of Warsaw'. From a biographical point of view this had an important result: an informative article by William Curtis, who must have had access to Hove's journal of a trip to what are now Belarus, Ukraine and Turkey in the summer of 1796 (Curtis 1799). Hove visited 'Mohilow' (now

did not conform agreeable to one of the females wishes, the same forfeit would be expected, but if the reverse the other sex are compelled to pay double the forfeiture.

I then observed to him that I should have no objection to conform myself to this rule, but being in a feeble condition & reduced by my late illness, I therefore hoped they would remit me this time. In consequence he made an apology to the assembly which was seconded by the Governess & I freed myself from inviting and invitations. The rest however had not the same indulgence, & were compelled either to retire with the person called or pay the forfeit.

About midnight the leaves were spread before every person & the same victuals was again distributed as before. After this meal, the Rajah made again a speech, & calling upon one of the young girls, the parents of whom were present, they withdrew, & soon after the congregation resumed the old practice of retiring or paying forfeits, which lasted with great merriment till the break of day, when Betel was served again. The Rajah having deliver'd the forfeit money to the Governess which amounted to upwards of 600 gold mores, entirely paid by men, he made a long speech, after which, the horses & hackerys being ordered, every person was besprinkled with rose water & retired with the greatest solemnity to their respective homes, & only me & the Rajah staid to rest at the Temple. (BL Add. Ms 8956 ff. 171–173).

Later life

Little is known of the 40 years of Hove's life following his return from India. From letters to Banks, he appears to have made a collecting trip to Poland in 1795, but the country was in a state of revolution, and his collections were destroyed so he retreated to St Petersburg in September. He reached Odessa in August 1796 finding what he took to

Mogilev, then in Russia, now in Belarus) and the estate of Count Stanislaus Potoki (1755–1821), and although the count was at this date living abroad, the mention is suggestive of a link between Hove and members of the enlightened element of the Polish aristocracy. Until 1772 Mogilev was part of the Polish-Lithuanian Commonwealth, but in that year became part of Russia—might the upheavals of the partition of Poland lie behind Hove's emigration to England? From there Hove travelled south, down the valley of the Dnipro, and reached 'Oczokow' (now Ochakiv) on the Black Sea in Ukraine from where he crossed to Trebizond in Turkey.

Marriage

That Hove at some point married, and that his wife's Christian name was Jane, is known from a notice in a Polish newspaper which reveals that, under the Latinised name of 'Joanna', she had legally been declared a lunatic in London on 7 August 1837 (Anon 1837). The notice, in Latin with a Polish translation, is from the Court of Chancery and seeks relations of her by then late husband (or their heirs), who might have a claim on his estate, to present themselves in Chancery Lane to prove it. That they were given a mere six weeks to do so, seems like a deliberate deterrent. The notice states that Hove had died at Bath in January 1830. Despite the state of her mental health Jane would survive for another four years. Her death is reported in *The Gentleman's Magazine* of October 1841: 'Sept. 4 ... At Kensington, aged 86, Jane, widow of Antoni Pantaleon Howe, esq.' (Anon 1841). Its appearance in this publication, and that her husband was denoted 'esquire', is another indication of genteel status. Did his financial security depend on a reward for his espionage activities, or did he develop a subsequent career or profession—in which case what was it and where? So many unanswered questions remain regarding this enigmatic man.

Death

The end came in 1830. Hove's burial, under the name Antoni P. Howe, is recorded on 4 February in the burial register for the parish of St Michael's, Bath (p 147). At the time he was living in Paragon Buildings, which again suggests that he cannot have been reduced to poverty. In a Bath directory of 1819, he is not listed as living in the town, so perhaps he went there only latterly and due to ill health. His age at death is given as 68, which would imply a birth date of around 1762.

A further twist to Hove's polynomial nomenclature was to take place post-mortem. In Desmond's usually highly reliable *Dictionary* (1994: 358) he appears as Anton Pantaleon Hoveau. Was this an attempt, by means of concatenation, to reconcile the later Hove with the earlier and mysterious 'Mr Au'?

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Royal Botanic Gardens Kew, Natural History Museum, London



ABOVE: *Hovea linearis* from Paxton's *Magazine of Botany, and Register of Flowering Plants* vol. 12 (1845). The generic name was coined by Robert Brown but published by W. T. Aiton.

The full list and details of Hove's illustrations can be found as supplementary material to this issue at www.linnean.org/thelinnean (2021–2023).

The illustrations will be digitised and made available as part of the NHM's Digitised Collections in the future. <https://www.nhm.ac.uk/our-science/services/library/collections>

Acknowledgements

I am grateful to David Hollombe (California) for supplying an image of the burial register with Hove's record; to Phillip Cribb for identifying the orchid drawing; to Crofton Black for translating the Latin of the Polish newspaper notice; and to Jacek Wajer for sharing information about Hove.

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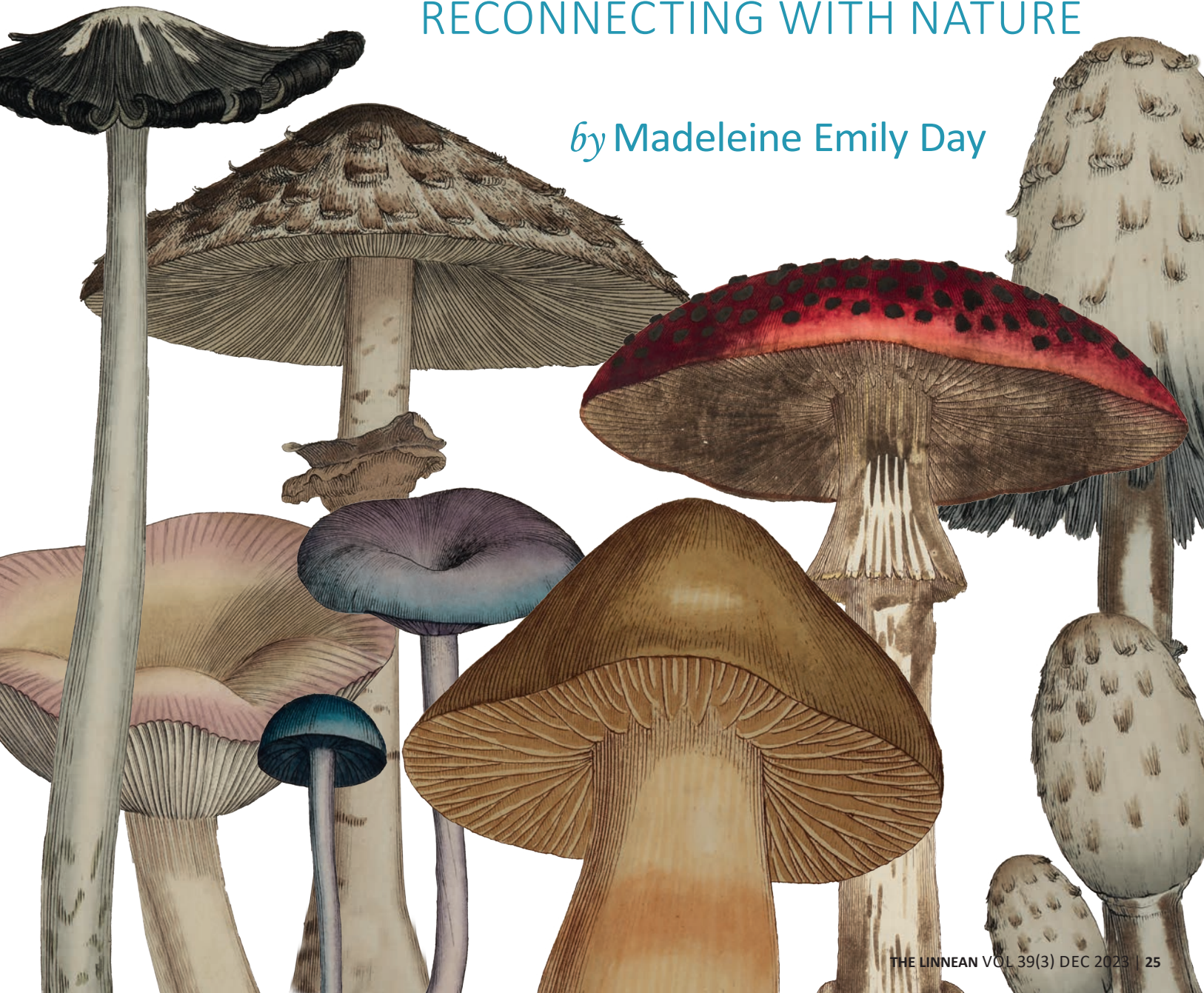
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A Fungal Renaissance

RECONNECTING WITH NATURE

by Madeleine Emily Day





PREVIOUS PAGE:

Illustrations of fungi from James Sowerby's *Coloured figures of English fungi or mushrooms* (1797).

ABOVE: The COVID-19 pandemic led to an increased connection to green spaces and a surge in foraging.

Fungi have been quietly thriving beneath our feet, shaping the course of evolution, ecology and human history for millions of years. Once thought to belong to the kingdom of plants, they were classified as such by Carl Linnaeus, who described them as 'thievish and voracious' (Pouliot 2023). They have since been placed in their own kingdom, separate to plants, animals and bacteria, and are genetically more closely related to humans than plants. A remarkably diverse group of organisms, they range from microscopic single cells, like baker's yeast, to huge structures below the ground. Fungi have influenced almost every ecosystem on Earth and are thought to have helped in the conquest of land by plants more than 500 million years ago.

They are nature's recyclers, transforming dead material into vital nutrients for plants and other life forms, and establish an extensive network of threads called mycelium, similar to the roots of a tree, which permeate the ground connecting and sustaining entire ecosystems. A type of fungi called mycorrhiza can form a symbiotic relationship with plants, including many of the crops we eat, which facilitates nutrient exchange and enhances growth. In some species of fungi, the mycelium of the fungus enters the cells of a plant, facilitating nutrient exchange in a mutualistic relationship for both fungus and plant. The characteristics of fungi have captivated explorers and enthusiasts alike, yet fungi's profound significance has often gone unnoticed, relegated to the margins of scientific research. However, over the last few years, a burgeoning wave of interest and appreciation for it has emerged. Part-driven by the COVID-19 pandemic and a subsequent resurgence of interest into the natural world, this 'fungal renaissance' has sparked new curiosity about these mysterious organisms and, as we continue to unravel the complexities of fungi, we gain a deeper understanding on the interconnectedness of all forms of life on Earth.



Reconnecting with nature

The pandemic was a global crisis that altered lives, routines, and challenged society, but brought with it an unexpected silver lining. As the world grappled with the uncertainties of isolation, many people across the UK sought refuge in the great outdoors, drawn to the natural world on their doorstep with a newfound appreciation. And amongst the many wonders of nature, fungi have emerged as a particularly intriguing subject. The statistics paint a compelling picture of this transformative trend: according to the Office for National Statistics (ONS), in May 2020, 36% of people reported spending more time in nature compared to the pre-pandemic era, with this figure soaring to 46% by July of the same year. To many, the allure of public parks and green spaces was irresistible, with a notable upsurge throughout the summer of 2020 which surpassed any previous records.

There was an undeniable fact that this newfound communion with nature was significant. A resounding nine out of 10 individuals recognised the profound impact of natural spaces on mental health and well-being, and 38% of the population affirmed that nature's role in their well-being has never been more crucial. Parks became sanctuaries for individuals and a considerable 33% of people began visiting their local greenspaces more frequently, forging a deeper connection with their surroundings (Office for National Statistics 2021). Foraging, the activity of gathering mushrooms and plants in the wild usually for culinary use, experienced a surge in uptake during and after the pandemic. Waitrose & Partners Food and Drink Report 2012 reported an astonishing 89% rise in social media interest in foraging (Bailey 2021). According to an article published in *Frontiers*, foraging can improve social-ecological resilience, and can also provide immediate relief from trauma to communities, or an individual's physical, mental and financial health. Previous studies have shown that as people come to appreciate the personal worth of nature, they become more committed to its preservation as they regard it as something precious and worth protecting (Sardeshpande et al. 2021).

The enthusiasm for mushrooms reached its peak in 2022 according to one news outlet, earning it the title the 'The Year of the Mushroom' (Nayar 2022). This fascination with fungi led to a surge in sales of grow-your-own-mushroom kits with companies like Growcycle (based in Devon, UK) witnessing a staggering 320% rise in sales compared to the previous year. A US-based company, North Spore, saw an unprecedented 400% surge in demand for introductory growing supplies during the pandemic (Matei 2021).

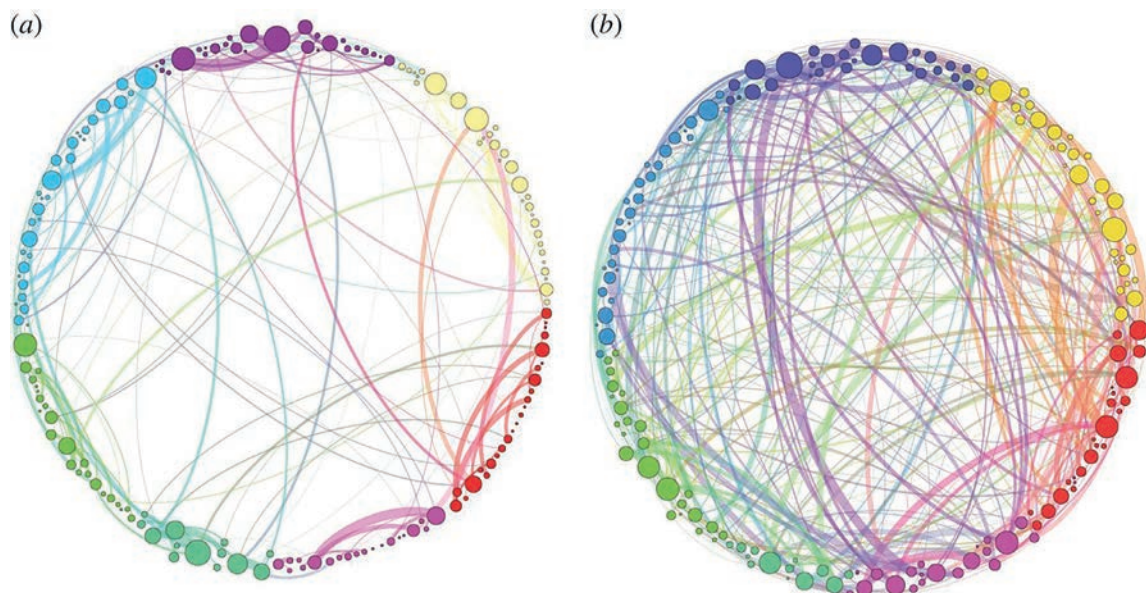
Fungi's paradigm shift

This reconnection with fungi has occurred alongside a shift in attitudes. Mushrooms have recently been poised as the next superfood, to aid with everything from stress management to cognitive function, with an increase in the production of mushroom supplements, such as lion's mane, reishi, cordyceps and turkey tail. Many mushrooms are known for their medicinal value but the current research, although promising, is limited and has so far only been studied in mice or cells. Mushroom supplement sales grew 47% in 2020, compared with 33% in 2019. Within the natural channel's immune-health category, 'mushrooms (other)' grew 53.8% to become the top-selling ingredient in the category, while reishi grew 37.8%, cordyceps grew 43.7%, and chaga grew 11.9% (Krawiec 2021).



ABOVE: The next superfood, a fascination with fungi has led to increased sales of grow-your-own-mushroom kits in the UK.





ABOVE LEFT: Psilocybin in a 'growbox'; **ABOVE RIGHT:** This simplified visualisation shows the neural connections during tests with a placebo (a) and psilocybin (b), which determined that 'psilocybin disrupts the normal organization of the brain with the emergence of strong, topologically long-range functional connections' (Petri et al. 2014).

Mushrooms have also been the subject of increasing clinical research. Psilocybin, a naturally occurring compound in some types of fungi, has been used in the treatment of many psychological disorders such as depression, anorexia nervosa and PTSD. It is also starting to be used to reduce stress in those with terminal illnesses or undergoing end of life care (Whinkin et al. 2023). Psilocybin has been proven to increase the brain's neuroplasticity, and has also been shown to allow the neurons in the brain to work through connections that it wouldn't normally use, allowing it to become more flexible and creative (Petri et al. 2014). This has also led to the change in social acceptance which is contributing to a change in laws around the world regarding these 'magic mushrooms'. Now, in many states across the US, magic mushrooms have been decriminalised, having legalised its supervised use (Makin 2023).

While the use of medicinal mushrooms may seem relatively new, elsewhere they have been used for centuries in sacred ancient rituals. María Sabina (1894–1985), a Mazatec curandera healer from the Sierra de Oaxaca mountains in Mexico, is renowned for introducing magic mushrooms to the wider world in the mid-20th century. Through ethnomycologist Robert Gordon Wasson, she significantly contributed to the broader recognition of the spiritual and psychoactive attributes of these fungi worldwide (Stephen 2020), though Sabina was eventually vilified for it while Wasson was lauded. It must also be noted that some academics are now 'working to analyse, through natural language processing, key colonial texts in Mexico that provide early ethnobotanical and ethnopharmacological accounts of psychoactive plants'. By combining this 'with anthropology and philosophy of psychedelics, [they] seek to contribute to a new historiography that is already being crafted by Mazatec indigenous scholars and Mexican anthropologists' (Schwartz-Marin et al. 2021). Perhaps increased interest in fungi will also be of benefit to this.

Yet, it is not just science which is becoming more open to the world of fungi. In 2021, fashion designer Iris van Herpen looked to fungi as inspiration for her collection, 'Roots of Rebirth'. In a press release, she detailed that it 'references the intricacy of fungi and the entanglement of life that breathes beneath our feet' (van Herpen 2021).

Fungi are catalysing a re-evaluation of agricultural practices. They play a key role in nutrient cycling and soil health, which is inspiring a shift towards more sustainable agriculture and better-informed farming methods. Practices like mycorrhizal inoculation and fungal based composting are starting

to become less reliant on harmful synthetic fertilisers and pesticides, which in turn is helping crop growth, yield and the reduction of agricultural runoff pollution (Kalamulla et al. 2022). Fungi are also gaining attention due to their bioremediation abilities. They have proven to be successful at removing a wide array of pollutants from damaged environments and wastewater, including heavy metals, textile dyes, petrol fuels and pesticides (Vaksmaa et al. 2023). They have also recently been shown to be a global carbon pool, with estimates suggesting that 13.12 Gt of CO₂ is passed to the underground mycelium network of mycorrhizal fungi globally every year. Astoundingly, this equates to around 36% of current annual emissions from fossil fuels (Hawkins et al. 2023).

Although we have, until recently, experienced years of ‘fungi blindness’, this hasn’t always been the case. In the late 19th and early 20th century mycology was in its infancy and women were key to establishing this new field (Ivry 2023). Beatrix Potter (1866–1943), perhaps better known for her beloved children’s books like *Peter Rabbit*, was not only a talented author but a pioneering mycologist. Her fascination with fungi led her to conduct scientific research, being one of the first to cultivate mushrooms from their spores and produce hundreds of intricate mycological drawings. Today, as we embrace fungi once more, Potter’s early work serves as a reminder of their enduring relevance, making her a trailblazer in a time when fungi are enjoying a renewed scientific interest (Breedlove 2019). Such is her impact on the early study of fungal spores that she has recently been honoured in the naming of *Potteromyces asteroxylicola*, a fossilised fungus found in the Rhynie Chert in Scotland, with evidence showing that it belongs to an extinct lineage of ascomycetes (Strullu-Derrien et al. 2023).



Unlocking opportunities

This ‘fungal renaissance’ represents a transformation in our perception of fungi, which encompasses their significance across socio-economic, environmental and cultural realms. The resurgence of interest has not only illuminated the ecological roles fungi play, but has also unlocked exciting opportunities from new food sources, new medical treatments and advances in biotechnology. Reconnecting with nature has also fostered a deeper appreciation for these strange and remarkable organisms in the realms of art, cuisine and even spirituality. As we continue to study and unveil the mysteries of fungi, it becomes increasingly evident that the renaissance is not a passing trend, but a lasting paradigm shift that will continue to inform our how we view our planet.

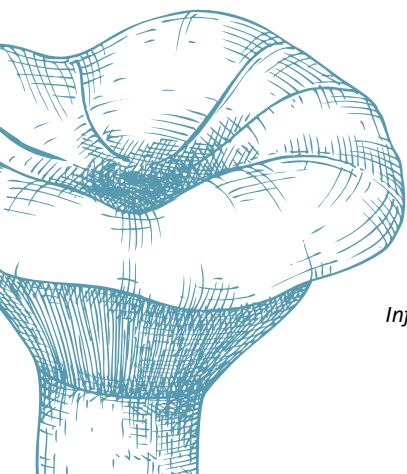
ABOVE: Beatrix Potter observed and faithfully recorded fungal spores and species, displaying excellent draughtsmanship.

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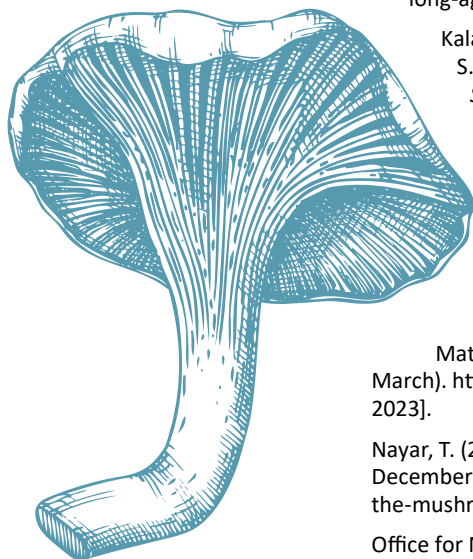
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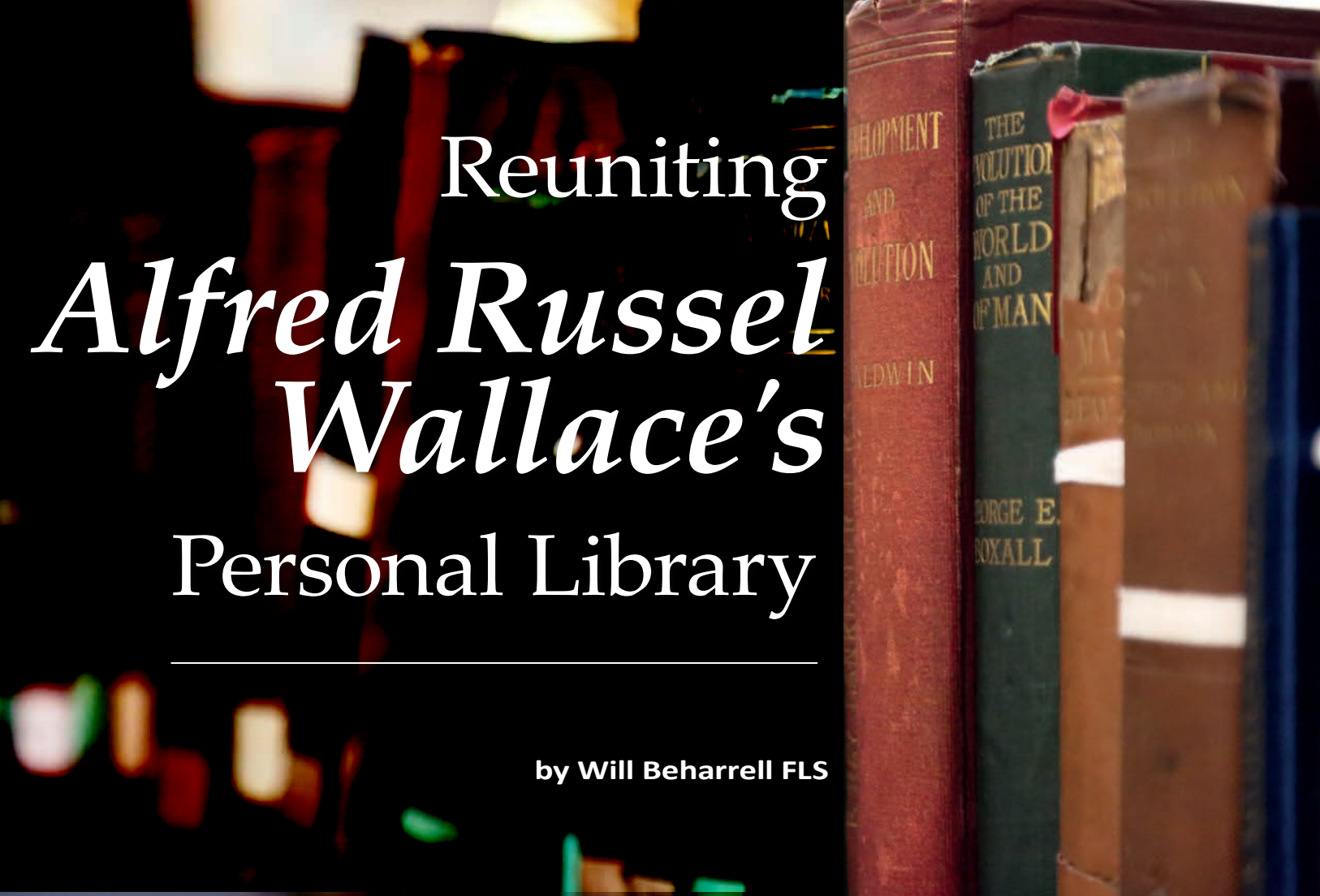
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Reuniting *Alfred Russel Wallace's* Personal Library

by Will Beharrell FLS

One of the Linnean Society's greatest treasures has been hiding in plain sight for over a century. The personal library of naturalist and explorer Alfred Russel Wallace (1823–1913) was deposited at Burlington House in 1915 and comprises nearly 300 volumes on all manner of scientific topics (with many items copiously annotated). And yet, in the ensuing decades, this monument to a lifetime's reading has kept a remarkably low-profile; the books interfiled among the general collections, and many readers, Fellows, and even staff members largely unaware of their existence. Now, as we celebrate the bicentenary of Wallace's birth, his entire library is being reunited in one space for the first time in over 100 years.

The collection came to the Society's library by a rather circuitous route. Many books are deposited with the Society following the death of their owner—either via probate, sale, or as a gift from family members—but Wallace's books appear to have been bought by a third party before making their way to our shelves. Looking inside a Wallace volume, readers will find a striking Edwardian bookplate affirming that the item was presented to the library—not by Wallace's descendants—but a somewhat mysterious figure called Thomas Henry Riches (1865–1935).

Who was Thomas Henry Riches?

A few details can be cribbed from the documentary record. Thomas was a native of Aberdare, Glamorgan, but his birth was registered in Merthyr Tydfil in the summer of 1865. He led a somewhat itinerant life, moving to study in Cambridge in 1883, and marrying his first wife, Mary, in St Pancras,

BELOW: Alfred Russel Wallace, photographed in Singapore 1862.

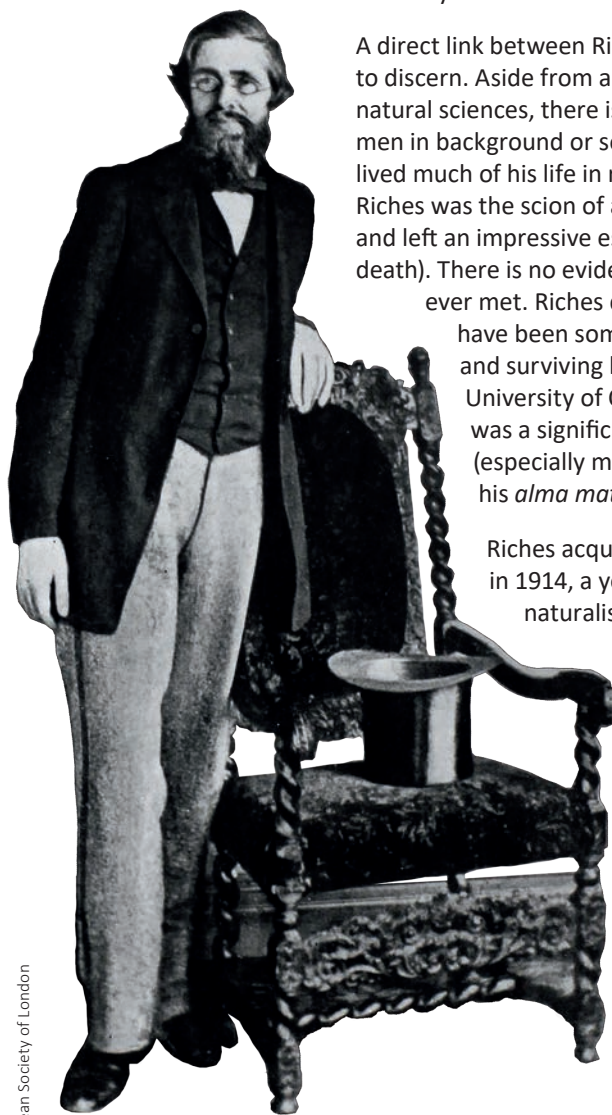


Image: The Linnean Society of London

London in 1889. By the time of the 1891 census the couple were living in Tavistock, West Devon, and by the 1901 census employed a respectable household of six domestic staff. Riches married again in 1909, to Katherine Anne (nee Maclean), and by 1911 had returned to London. The family's fortunes had clearly flourished, as they're recorded as living in a sizeable property in fashionable Chelsea, and with an increased domestic staff of nine. Further details are sparse, but the bookplate describes him as a resident of Shenley in Hertfordshire by 1913, and he was certainly buried there on 23 September 1935.

A direct link between Riches and Wallace is hard to discern. Aside from a shared interest in the natural sciences, there is little to connect the two men in background or social standing (Wallace lived much of his life in relative poverty, while Riches was the scion of a wealthy industrialist and left an impressive estate of £287,128 at his death). There is no evidence to suggest they

ever met. Riches does, however, appear to have been something of a bibliophile, and surviving bookplates held at the University of Cambridge suggest he was a significant donor of books (especially medieval manuscripts) to his *alma mater*.

Riches acquired Wallace's books in 1914, a year after the great naturalist's death. A letter in the archives of London's Natural History Museum (ref: [WCP6091](#))¹ shows Riches wrote to William Wallace (Alfred's son) in April 1914, intimating that he had offered £200 for the library, and that this had been accepted. However, the reason for the relatively speedy disposal—they were on the Society's shelves

less than a year later—is unclear. Perhaps Riches was disappointed with his purchase, or had always intended to make of it a philanthropic gesture? A letter to Linnean Society President E. B. Poulton in June 1914 (ref: [WCP6988](#))² records the initial offer, but gives no clues as to why Riches surrendered his prize so briskly. Sadly, the archives of the Linnean Society are otherwise silent on this point, although the Librarian's report of April 1915 usefully records:

During the year the Library also received by donation from Mr. Thomas Henry Riches, E.Z.S., 509 volumes, among them being many welcome additions, which had belonged to the late Dr. Alfred Russel Wallace, O.M., F.R.S., F.L.S. [...] New shelving for the accommodation of the books presented by Mr. Riches has been provided in the Residence at the expense of Sir Frank Crisp, Bart.

A few highlights

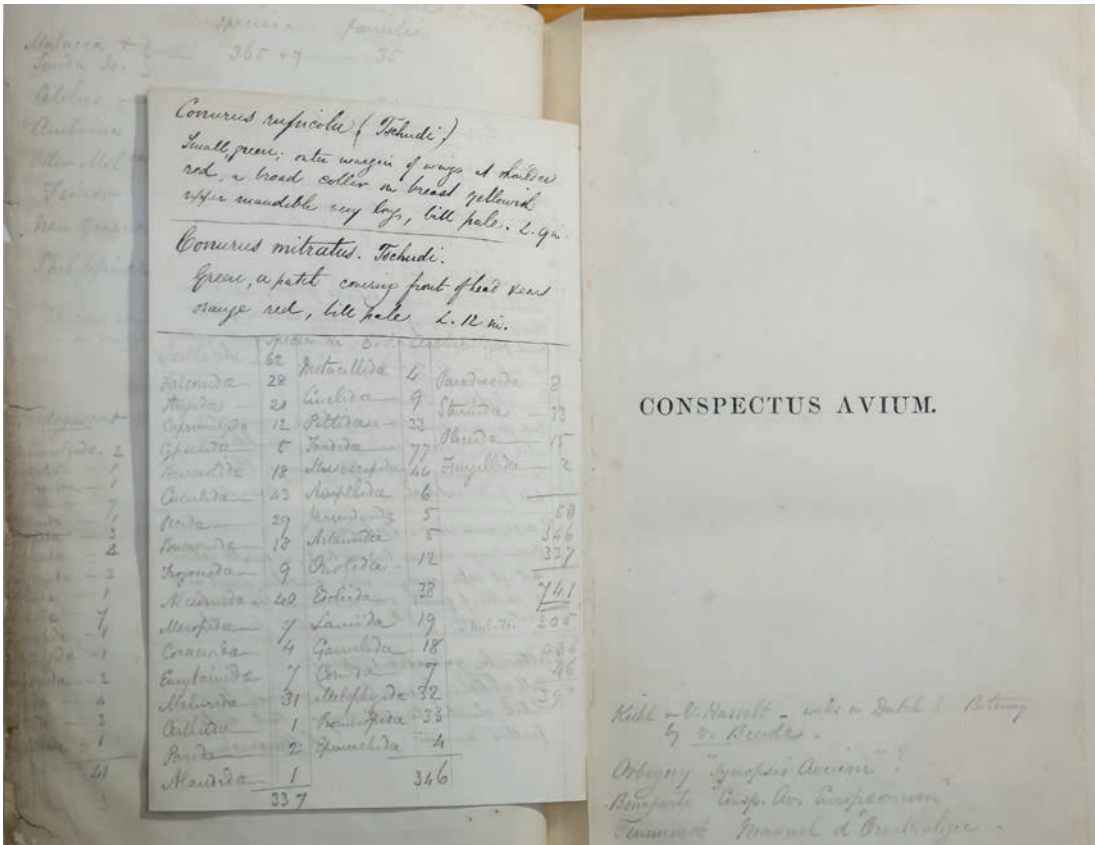
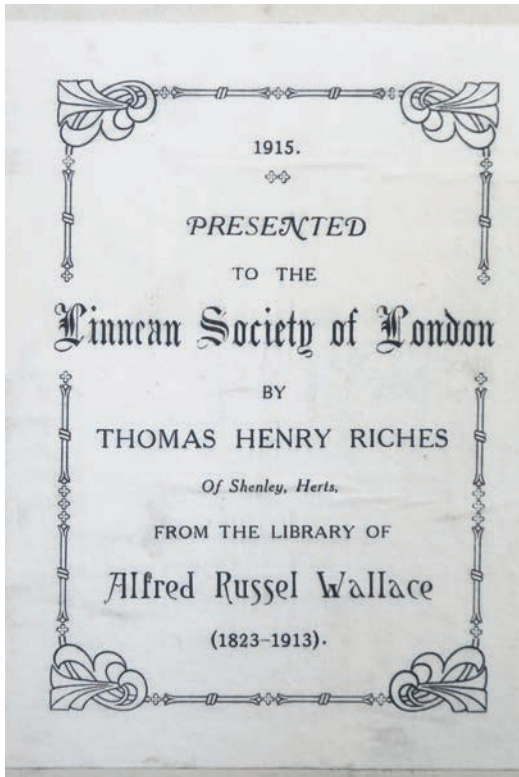
The books themselves are a varied bunch. Many focus on biological topics—as one might expect—but there are eye-catching diversions into memoir, gardening, and the arts and culture. One of the most heavily annotated volumes is a two-volume biography of Alexander von Humboldt (1769–1859), a hero of 18th- and 19th-century science, whose wide-ranging travels were an inspiration to both Wallace and Charles Darwin (1809–1882). Wallace's copy is black with marginal scrawl, with almost every page lovingly—perhaps obsessively—annotated.

Other highlights include items clearly adapted for use in the field. One of the older books in Wallace's collection, Charles Bonaparte's *Conspectus Generum Avium* (1850–1856), features a scale marked on the inside front board (perhaps as an impromptu ruler for the measuring of drawings or specimens) and is stuffed with field notes and sketches on Wallace's signature lightweight paper.

Other items feel more immediately personal. Volney Rattan's *Popular California Flora* (1887) may seem like a standard field guide, until

1 'WCP6091,' in Beccaloni, G. W. (ed.), *Epsilon: The Alfred Russel Wallace Collection*. Accessed: 20 October 2023.

2 Ibid.



CLOCKWISE FROM TOP LEFT: Bookplate from Alfred Russel Wallace's copy of Charles Bonaparte's *Conspectus Generum Avium*, donated by Thomas Henry Riches to the Society; One of Wallace's illustrations from the same publication; The title page accompanied by some of Wallace's copious annotations.



ABOVE: Wallace's annotated copy of John Lindley's *Elements of Botany* (1841), which includes a watercolour of a cockatoo, notes, sketches and this plant specimen. On the title page is written 'A. R. Wallace, July 1842'.

you realise it was purchased to accompany Wallace on his two-month visit to California in the same year. This was an important journey for Wallace: as formative in some ways as his more famous voyages to the Amazon and the Malay Archipelago. Ostensibly an opportunity to visit his brother John, it also allowed Wallace to witness the 'glorious' sequoia trees of Calaveras and the fabled landscape of Yosemite. It was also in California that Wallace met the godfather of American conservation, John Muir (1838–1914), having articulated his own views on land 'nationalisation' for the common good some years earlier, in 1882. With its complex provenance, this humble field work—annotated by Wallace throughout—begins to feel like a more intimate historical artefact.

Hidden in the long grass

If Wallace's library is so charismatic, why has its existence remained relatively obscure? Part of the difficulty undoubtedly lies in the decision to individually classify the 300-odd volumes and interfile them among the general holdings, rather than gather them discretely into one space. As indicated in the Librarian's report, there do seem to have been plans to unite the Wallace Library in the past, with erstwhile Treasurer and Vice-President of the Linnean Society Sir Frank Crisp donating money for the creation of a bespoke bookcase. Sadly, the money does not appear to have been used for its intended purpose. Former Linnean Society Librarian Gina Douglas recalls a core of Wallace material being kept together in the library during the tenure of Librarian Gavin Bridson, but these items were themselves dispersed sometime before 2008 (when the library was refurbished). The books then remained hidden in the proverbial long grass until earlier this year.

So why bother with the project at all? The reasons are two-fold. Firstly, having Wallace's books reunited in a single space is a key move in the effort to safeguard them for the future. Some items of Wallace provenance recorded in our historic catalogues have already gone astray over the decades (the loss of Wallace's review copy of Frances Galton's controversial *Hereditary Genius* is especially regrettable), and having the volumes gathered in a single run will hopefully make them more secure.

And secondly, after many years of comparative neglect, Wallace studies is a lively and growing area of academic research, especially following the publication of James T. Costa's superb biography, *Radical by Nature*, earlier this year. In that spirit, we were delighted to welcome Professor Jeb Bevers of Yavapai College, Arizona to the library in the summer of 2022, who—through six weeks of intense effort—was able to conduct a very nearly complete survey of the Wallace library material (the first such survey in recent memory). Deeply rewarding and enlightening, the project was nonetheless complicated by the dispersal of the required material, and the near-endless subsequent fetching and carrying. Having the books assembled in one spot will make them easier for staff and researchers to access. In a neat coincidence, the books will be stored alongside our other great repository of Darwin-Wallace material: the Charles Darwin Trust bequest of 2015. Gathered together, they will form one of the most important collections of Darwin-Wallace material outside of a major research library, and will hopefully provide a rich and effective centre for Darwin-Wallace studies for future generations of scholars and students.

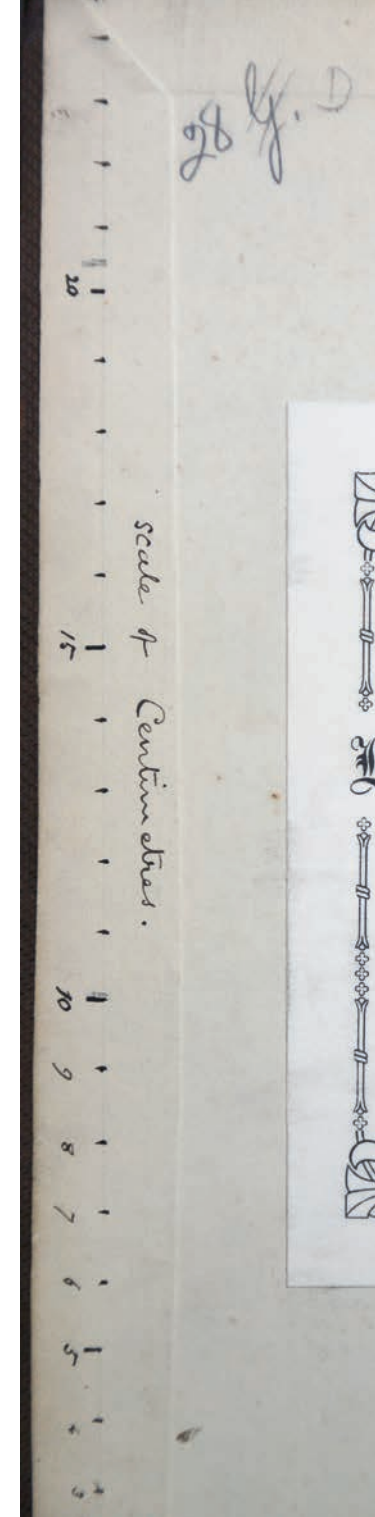
Get involved

If you're interested in learning more about the Wallace Library, an exhibition featuring several of his personal books—plus other 'Wallaceana' from our collections—is being held in our library until 20 December. Entry is free and open to all. And if you're keen to get involved in the conservation of these beautiful books, our AdoptLINN scheme also features a selection of works from the Wallace Library in need of your support. Please email library@linnean.org for further information.

Will Beharrell FLS, Librarian

Acknowledgements

I'm indebted to Professor Jeb Bevers FLS for his tireless work on the Wallace Library in 2022–2023. I am also grateful to Dr E. Charles Nelson FLS for supplying useful details on Thomas Henry Riches life and background, and to Gina Douglas HonFLS for information on the Wallace Library's more recent history. Lastly, my thanks to Dr George Beccaloni FLS (and the Alfred Russel Wallace Correspondence Project) and Alex Milne (Linnean Society Project Archivist) for supplying invaluable information concerning the circumstances of Riches's purchase and subsequent donation.



ABOVE: A 'ruler' or scale drawn by Wallace drawn on an inside cover, perhaps for use in the field.

Niuafu'ou

*Tongan outlier and one
of the most remote
islands in the Pacific*

by John Tennent FLS

ABOVE: A section of the round-island road on Niuafu'ou.

A planned butterfly survey of Niuafu'ou island, Tonga, in 2018 was part of a wider Pacific research project. The island has a reputation for being difficult to get to and even harder to escape from, so I was delighted when I found I could book a flight in the UK to the island from Tongatapu, the main island of Tonga. Upon arrival at Nuku'alofa airport the day before my 'scheduled' flight to Niuafu'ou in September, I received an email from the airline telling me the flight was delayed for 24 hours, followed by another informing me the flight was then delayed for a week. I soon found the flight was a phantom, and the monthly ferry had been cancelled, with no possibility of reaching the island in the foreseeable future. Unfortunately, any attempt to reach Niuafu'ou had to be abandoned.

Through the generosity of the Linnean Society's John Topp Fund, the Percy Sladen Memorial Fund and my good friend Martin Jacoby, the opportunity to make a second attempt to reach the island presented itself in 2022–2023. This time I had no onward flights and unlimited time, which was just as well because upon arrival in Sydney in late 2022 I found the Nioufu'ou ferry was in Fiji for major repairs and it would be some months before it returned to Tonga.

By early March 2023, repairs were complete and I left Sydney for Tonga. There was no seating on the boat. Instead, a series of carpeted raised platforms were available on which passengers placed their mat and then defended their chosen space against all-

comers. I was well-known to harbour staff by this time, and helpfully, as the only pālangi travelling (a pālagi or pālangi is a white person: my ticket was made out to 'pālangi John'), I was allowed to board early. Departure from the wharf at Tongatapu was emotional. Many of the passengers had travelled from Niuafu'ou to Tongatapu just before Christmas with the intention of returning home immediately thereafter, but without transport they'd been stuck for more than three months. There was said to be little or no food available on Niuafu'ou and I was advised that because of the very real difficulty in leaving the island it would be wise to take at least eight weeks food and other supplies.

Arrival at 'Tin Can Island'

Niuafu'ou was historically nicknamed 'Tin Can Island' due to the fact that mail was delivered by sealing letters and parcels into a tin before throwing it overboard to children treading water just offshore. Thankfully, we arrived at the island on a relatively calm sea to a brilliant orange-red dawn.

With only two small boats working, it took two days to transfer the large volume of freight, which included more than a hundred drums of fuel and a similar number of gas bottles, from ship to shore. There was a temporary camp and almost the whole of the island's population had come to the wharf in a series of rickety trucks and an occasional sleek government 4WD. As we waited patiently, I met a high percentage of the people living on the island—a good thing, as I was to spend the bulk of my time on the island walking the perimeter road and various paths through thick bush leading to gardens. My sleeping arrangements on that first day proved full of mosquitoes, mud wasps and other miscellaneous insects looking for somewhere to live. Washing was *via* a 'mandi'—a bucket filled with rainwater from a tank and thrown over oneself—very refreshing, and I was used to this from living on islands elsewhere, but here this required negotiating a labyrinth of fresh dog, cat and chicken poo. My freight, including clothes, nets and mosquito coils, was still on board the ship and at dawn the following morning I headed back to the wharf on the first truck that came along in the hope of making better arrangements.

The Deputy Principal of the main school, Ferdinand, was Austrian. He taught biology and having lived on the island for more than 20 years, was familiar with all the paths, many now overgrown. Ferdinand very kindly invited me to stay with him for as long as I wanted (we both knew this could run into months). Niuafō'ou is actually closer to Samoa and to Wallis and Futuna than to the main Tongan islands to the south. Almost circular, it is fundamentally a volcanic cone with a large saline lake (technically three lakes) in the centre, with two sizeable islands in the lake. In the southwest, lava flows (the result of eruptions in 1855, 1912 and 1929) remain dangerous and impossible to traverse. A good deal of the remainder of the island is highly fertile land, but hard to work. The forest is dense: ground vegetation is a tangle of often horizontal growth, making walking difficult. A 'road', in places little more than a track, goes around the island approximately midway between the coast and the crater rim, and shorter tracks run from the road to gardens where kava, taro and various fruits are grown.



ABOVE: (TOP) Dawn arrival at Niuafō'ou; (BOTTOM) Retrieving drums of fuel dropped from the ship into the sea.



Hard lessons

I regard myself as experienced in the wilderness, but nearly lost my reputation on the first day when I climbed to the crater for an initial view of the magnificent lakes from the forested rim. After a long while, I reluctantly set off to return to the ‘road’ but soon found a plethora of paths through the dense vegetation that all looked much the same. Rather embarrassingly, I became hopelessly lost. I could see the crowns of a number of isolated

coconut trees and, on the principle that planted trees would probably be on fairly flat ground and accessible from the road, I moved towards them, but quickly found that there were no tracks and that the ground was sheer in places. It was beginning to get dark and the reality was that I was heading for a very uncomfortable night in the bush. Luckily—and it was luck—I came across a small track and recognised an area from the journey up, so eventually found my way back down to the road. Sporting a respectable number of cuts and bruises, and with soaring temperatures, I’d already drunk much of my water and had been carefully conserving the remaining litre for a couple of hours. Another lesson learned the hard way.

The island is impressively beautiful, but it’s not easy for the people who live there. Ground is fertile in places and there are relatively flat areas where clearing bush for any reason is difficult and must be maintained, for the unrelenting bush returns rapidly. The coastline is unreachable in many places, with steep cliffs and razor-sharp lava fields which have been oddly bare for a century or more without being inundated by the bush. The ‘wharf’ on the west coast is the only place approachable by ship and is about as far as it could be from village settlements. It is reached by a steep and slippery road that gets hopelessly muddy in the rain. There was once a settlement near the shore and there are remnants of buildings including a church that has now completely returned to the bush. There is industry here: volcanic pebbles on the black beach made smooth by the waves are in great demand on the main island of Tongatapu for the top layer of family graves, and there is always a supply of bags full of these pebbles ready to take advantage of a rare visiting ship.



ABOVE: (TOP) The inland lakes from the crater rim; **(BOTTOM)** Sharp lava fields still have little vegetation.

Diversity of fauna

Overall, butterfly diversity on the island was not as high as I had expected. I had predicted that there must surely be a species of the *Jamides* species-group (Lycaenidae) present, and equally confident

that at least one species of the danaine genus *Euploea* would fly there. This was correct on both counts: a species of *Jamides* and a distinctive subspecies of *E. lewinii* were common and both represented undescribed taxa. The reason for poor diversity may be that habitats are very similar across the whole island—and the three-month delay due to ferry repairs—meant I wasn't there at what might have been the optimum time. Birds are plentiful and remarkably quiet, including the introduced Indian mynah (*Acridotheres tristis*) and a species of bulbul. It was a real pleasure to walk alone in miles of forest, with no people seen all day and barely a sound. This is where the most easterly Megapode lives: *Megapodius pritchardii*, known locally as the Malau—rarely seen, but occasionally heard, its stronghold is on the islands in the lake. The north coast is spectacular, with larva made smooth and slippery by constant heavy waves, buffeting crabs that live a seemingly impossible existence there ... on tiptoe, feeding on whatever the sea has brought them as each wave recedes. Standing on the north coast of this, the most northerly island in Tonga, it is sobering to look north and know that the next land is the Aleutian Islands of Alaska more than 7,800 km distant.



Another creature I heard of before I set foot on Niufo'ou is the 'ofatu' worm; when I first saw one it reminded me of the witchetty grub in Australia (the larvae of a hepialid moth). But the 'ofatu' is the larvae of a longicorn beetle, *Olethrius scabripennis*, and is regarded as a great delicacy. It is well known throughout Tonga and is claimed by local people to be found only on Niufo'ou. With Ferdinand and a local friend, we went searching for it and soon found literally dozens in all stages, including adults, in a solitary dead trunk not far from the house, near the crater rim. We collected a large plateful of larvae which we were happy to pass on to a pregnant lady who was said to be experiencing a craving for them. She was welcome.



Leaving Niufo'ou

Like Tonga generally, the people of Niufo'ou are open and friendly. I would often receive a lift early in the morning to a distant part of the island and would then walk back over 6–8 hours, exploring large areas of habitat; on the road, drivers of any passing truck always stopped to offer a lift and seemed bemused when I politely declined. It was towards the end of the cyclone season and one could expect to experience a fair amount of rain, but it only rained on two days. After three weeks I was confident I'd seen everything that was flying at that time, and the total number of butterfly species recorded from the island was increased threefold.

And so the time came to leave. Surprisingly, a charter flight was planned one Wednesday; it was to bring a number of politicians from Tongatapu to Niufo'ou for several days to enable them to... well, no-one really knew. But it was cancelled on the day—it seemed the plane was in need of spare parts. Such is life in Tonga. But no matter, the ferry was coming the following week, but that

ABOVE: (TOP) Sally lightfoot crabs battle the waves to feed in the north of the island; (BOTTOM) 'Ofatu worms', the larvae of a longicorn beetle, *Olethrius scabripennis*, is a great delicacy on Niufo'ou.



ABOVE: The north coast of the island—the next northerly point, the Aleutian Islands of Alaska, lie almost 8,000 km away.

Image: John Tennent

more than 400 islands and described well over 100 new taxa. Invertebrate data are sparse, and the resultant dataset creates a comprehensive invertebrate inventory of a vast region and makes available the basic biogeographic, ecological, geographical and historical data for further, wider studies by others.

also ended up being cancelled. Stories of getting stuck on Niuafu'ou for weeks, even months, are a reality. I had enough food to last for more than another month, and the airline in Nuku'alofa knew that if I didn't show for my booked flight out, they were to cancel it and wait until they heard from me. Then, out of the blue, there came the news that the Tongan Police Commissioner would be arriving the following day on a commandeered army boat for an out-of-the-ordinary schools visit.

The boat duly arrived and I hitched a ride (I suspect that both an army and a police background helped)—a journey from hell then ensued. I haven't been physically sick for many years, but this was a small, fast boat heading south with a moderately heavy east-to-west swell. Then there was a spectacular electrical storm overnight, which several of us braved on deck, without life jackets, and eventually I retched, feeding the fish with the only things I'd eaten in some hours—two bananas.

A comprehensive list and a life's work

This was certainly an adventure! I had decided before leaving home that this was to be my last bout of fieldwork. It was a great way to finish remote Pacific Islands research before hanging up my butterfly net and concentrating on writing-up numerous loose ends.

In preparing a comprehensive list of Pacific butterfly diversity published in 2006, it became clear that there were large areas on the map about which little was known. The only way to resolve this situation was to go and look—over a period of 30 years since I began researching butterfly diversity in the southwest Pacific region, I've visited

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Weird, Wonderful and New

Indexing Frank Nicholls's illustrated notebooks (MS/24)

by Niki Simpson FLS



After these notebooks caught her eye in a Linnean Lens lecture (<https://tinyurl.com/yc9n95cj>) Niki Simpson offered to index the manuscript to enhance searching capabilities for this manuscript. As you will have read in Xinyi Wen's study of these notebooks ('The Line of Transmission' in the last issue of *The Linnean*), Nicholls's manuscript still has many fascinating connections to explore.

If you've read the Society's book, *L: 50 Objects, Stories and Discoveries from The Linnean Society of London*, you may already be aware that the two notebooks were badly damaged during a bombing in World War II, but underwent conservation many years later under the expert eye of the Society's Conservator, Janet Ashdown.

Attributed to Dr Frank Nicholls MD FRS (1699–1778), the notebooks have been given a preliminary date of 1733.¹ Nicholls was contemporary with Carl Linnaeus (1707–1778), and it was only a couple of years later that Linnaeus published his novel sexual system for classifying plants.² Like Linnaeus and others, Nicholls was striving to classify nature, but there is no indication in the notebooks that he was aware of Linnaeus's system; the illustrations show no emphasis on floral parts, consisting largely of whole, rooted plants and there is no mention of Linnaeus in the text. Occasionally only the flower is shown and, for a few, Nicholls homes in on specific diagnostic features.

As I worked through the pages, the unusual horizontal arrangement of the hand-drawn illustrations continued to



ABOVE: (TOP) Frank Nicholls; (BOTTOM) Diagnostic features of leaf and flower for the 'white water lily', rather than the whole plant, to distinguish it from the 'water lily with a yellow flower' above (Vol. 2, p. 5).

1 McGow, L. and Ashdown, J. (2022). *Botanical Notebooks of Frank Nicholls*. Linnean Lens (<https://tinyurl.com/yc9n95cj>). Accessed: 1 September 2023.
2 Linnaeus, C. (1735). *Systema Naturae*. Leyden.



ABOVE: Drawings of two orchids, shaded rather than in outline, on a badly damaged page (Vol. 1, p. 103).

fascinate me. Such an orientation looks strange today, but would also have been unusual in Nicholls's day, when published illustrations generally depicted plants upright. Many of his drawings bear resemblance to such woodcuts so it is likely that he copied from, or traced over, illustrations from various publications, as was customary at the time,³ and this may account for some shaded illustrations, rather than outlines. The paper is very thin, making tracing over high contrast woodcuts of a suitable size, a possibility. The small size of the notebooks is limiting, and it is likely he drew the plants rotated simply as a space-saving device. Intriguingly some common

plants, such as the primrose and corn poppy, are not illustrated, and there is only one illustration of seeds.

However, it was the text, rather than the illustrations that continued to hold my interest. There were early botanical terms new to me, for example 'codded' for 'podded' and charming spellings such as 'cuckow', 'lilly', 'turnep' and 'sopewort'. Nitrogen-fixing nodules are depicted on the roots of wood pease, quaintly described as 'many black tuberous particles here and there sending forth fibres [...]'. I struggled at first with his handwriting and the quirks of inconsistent spellings and capitalisation. I came across names weird, wonderful and new to me, such as the splendid 'Gold of Pleasure' and 'mithridate', apparently once used as an antidote to poison. Occasionally his notes mention matters medical, reflecting his working life as an eminent physician. I thought I was well versed in common names for our British flora, but there were plenty more for me to discover. Nicholls seemed well informed on common names from across the country.

I found myself immersed in the confusion of pre-Linnaean plant naming—multiple names, lengthy descriptive phrase names and common names, such as *Polygonatum floribus in singularis pediculis*, the 'Sweet smelling Solomons Seal with flours on single footstalks', all compounded by inconsistent abbreviations, with authorities being listed only for some genera. There is often no single name and even, for a few plants, complete uncertainty to the extent that he has left a blank space, presumably hoping to add a name later. Nicholls lists alternative names from at least 18 sources, adding them as he comes across them. According to Professor William Stearn who assessed these notebooks when they were acquired,⁴ the latest authority cited in the manuscript is John Ray. Just one plant, the birch, he notes has a 'name given it by all authors'.

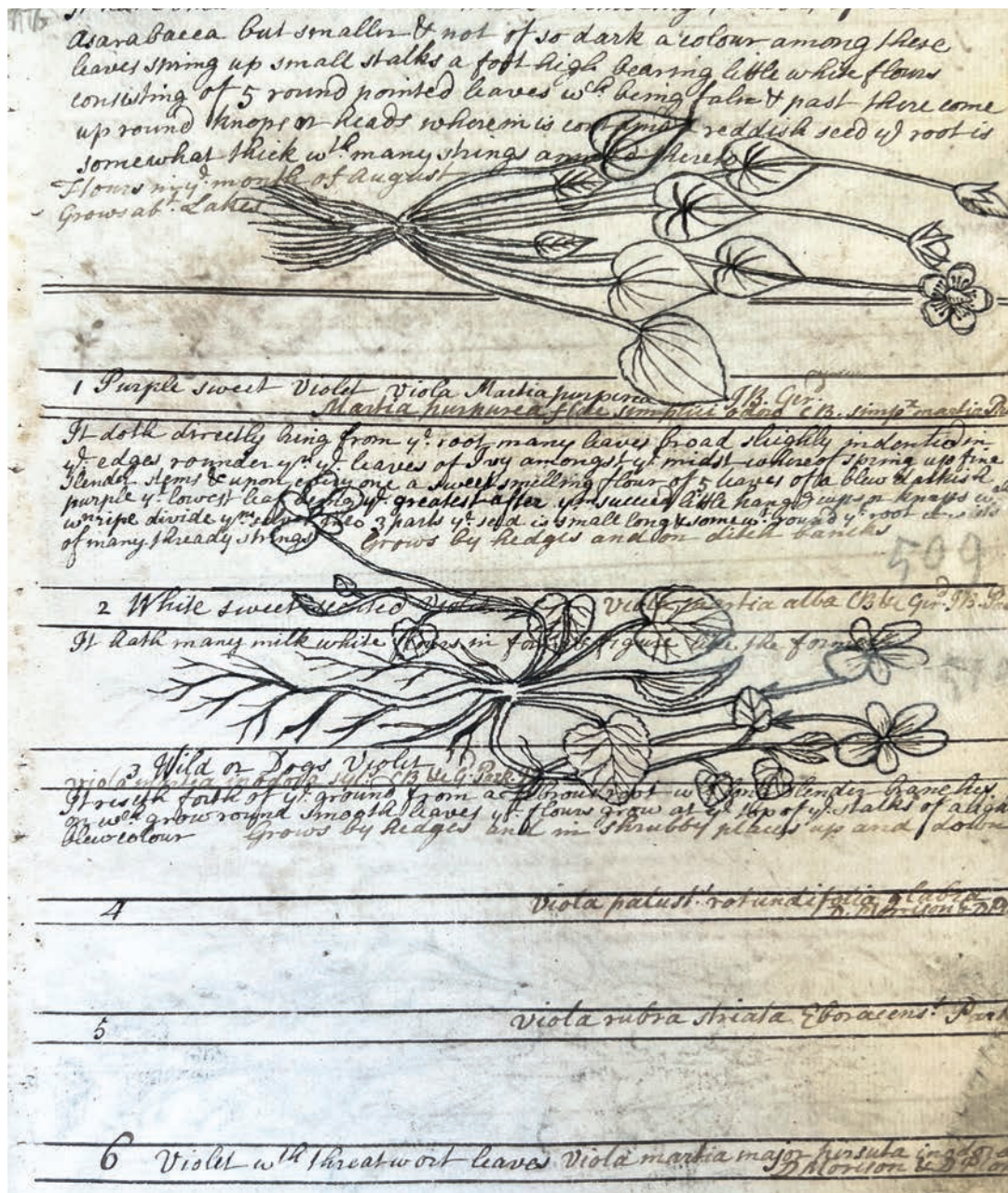
On some occasions the illustrations are drawn first with the text fitted around, but on others the illustration is filled in afterwards, even over the writing. The surviving notebooks include many grasses and trees, but no ferns, while orchids and aquatics are lumped, now incongruously, together.

3

Wen, X. (2023). The Line of Transmission. *The Linnean* 39(2): 46–49.

4

Proceedings of the Linnean Society of London, 159th session (1946–1947), part 1.



LEFT: The upper illustration has been drawn over the preceding text, but with the details of flowering time and locality fitted in paler ink around the drawing afterwards. The heading of the following 'Purple Sweet Violet' has been written after the drawing, but before the next entry's drawing. The lower entries are left blank to be filled in at a later date. (Vol. 1, p. 77)

Nicholls's manuscript comes across as a scientific endeavour, but with many gaps—a work in progress, with descriptions, observations, localities, flowering period and other information continually being added wherever possible, seemingly from his own observations and gathered from other botanists; Mr Ray's views in particular are mentioned. Nicholls himself comes across as a perfectionist; there is not a single crossing out, but continual additions, re-drawing and re-working of the pages until they were as complete and accurate as he could make them. For such a labour, perhaps over many years, it is sobering to reflect how narrowly these remarkable notebooks escaped complete destruction.

Niki Simpson FLS (nikisimp@aol.com)

A woman with blonde hair, wearing a light-colored sleeveless top and dark pants, is sitting on a large, flat rock. She is smiling at the camera. To her right, there is a small black bag and a white notebook. The background shows a rugged, mountainous landscape with green grass and rocky terrain under a cloudy sky.

Common Threads

OBSERVATION, ACCURACY AND
AN OPEN MIND IN BOTANICAL
ILLUSTRATION

by Sue Wickison

PREVIOUS PAGE: Our 2023 Jill Smythies Award winner Sue Wickison in Lesotho, Southern Africa, looking for the critically endangered Sehlabathebe waterlily *Aponogeton ranunculiflorus*.

OPPOSITE: A living specimen of the Sehlabathebe waterlily photographed, and the final illustration.

Our 2023 Jill Smythies Award winner, Sue Wickison, explains what drew her to botanical illustration, and how her path led her to a book and exhibition at the Royal Botanic Gardens, Kew, on the *Plants of the Qur'an*.

Having been born and brought up in Sierra Leone, West Africa, plants were always a part of my life. I was taught by my father, an amateur botanist, to closely observe, respect and learn the difference between plants, so I was drawn to combining science and art from an early age.

All of this later led to a degree in scientific illustration, specialising in botanical. I then worked at the Royal Botanic Gardens, Kew, over a nine-year period, recording different plant families, grasses, legumes and orchids for publications. A Winston Churchill Fellowship took me to the Solomon Islands to collect orchids for Kew, based up in the Western region of Munda. After years of work and travel into remote areas, 80 black and white plates were published in *Orchids of the Solomon Islands and Bougainville* and I had the honour of a new species, *Coelogyne susanae*, being named after me.

A collaborative process

When recording the characteristics of a species and creating a line drawing of the shape of a petal, leaf, hair or a tiny gland, absolute accuracy is key. Scientific illustration has changed little over the centuries and is the combination of working closely with a taxonomist to understand the characteristics of a species and using one's own skill in meticulous observation to capture a specimen for posterity.

As you might imagine, there are many stages to the work, often spread over weeks of research and, in some cases, years, that involve travel, sketches to understand the plant, composition work and preliminary colour notes from living material, even before starting the final watercolour paintings. Each piece can take months to complete depending on the size and complexity.

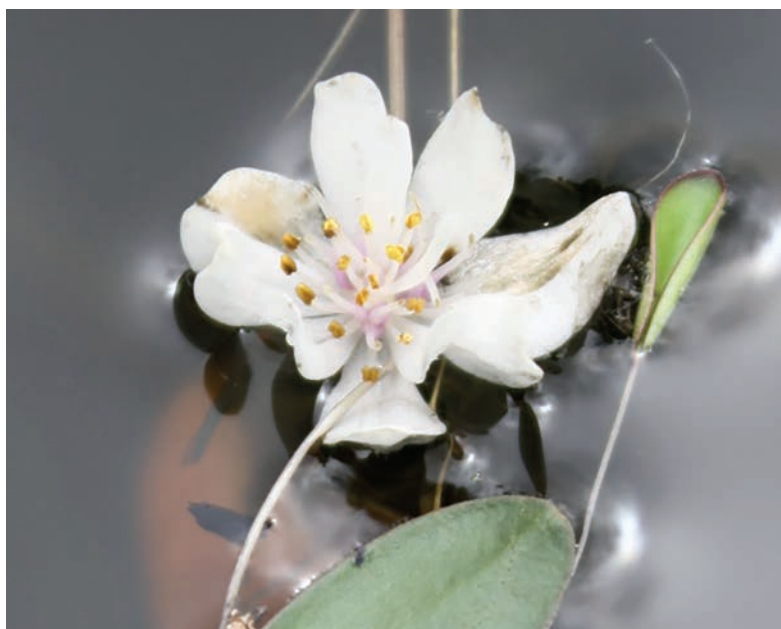
The Sehlabathebe water lily

In February 2012, while living in Lesotho in southern Africa, I had a fortuitous trip to the very remote Sehlabathebe National Park, high in the mountains. It is home to the tiny, critically endangered water lily *Aponogeton ranunculiflorus*, only found in the restricted area of the park and in a few locations in South Africa within a 10 km radius and at an altitude of 2,600–3,200 m.

Journeying from the Lesotho capital of Maseru to Sehlabathebe, the roads gradually reduced to gravel, with rugged rock that hugs hairpin bends and crosses mountain ridges, high above the tree line. The abundant diversity of species within the park's boundaries was impressive, like walking on a colourful bed of tightly packed species, in comparison to the overgrazed land just metres away.

Floating on the surface of the sandstone rock pools, the tiny white puffs of popcorn flowers (12–22 mm) of *A. ranunculiflorus*, were visible. The characteristic spiralled stems revealed the flower's ability to remain on the surface, regardless of the changing level of the water in the pools.

With permission to collect the rare plant and work at the National Herbarium of Lesotho in Roma, I made colour notes and enlarged microscope dissection drawings of the flowers. Unfortunately, I initially collected the wrong leaves floating on the surface beside the flowers. On returning in 2013 the frozen rock pools in Sehlabathebe determined





ABOVE: The symbiotic relationship between the New Zealand short-tailed bat and the parasitic plant the flower of Hades is represented in this illustration.

that instead I made the 1,235 km round trip journey to Grahamstown in South Africa, to meet Herbarium Curator Tony Dold at Rhodes University. Viewing the 1972 holotype when the plant was first described by A. Jacot Guillarmod, I was able to see the spherical 10mm corm and 70mm long leaves. I wish I had viewed the herbarium specimen before the field work, but hindsight is a great teacher. However, looking back at my photographs and specimens from the previous year, I realised that I had actually collected the complete plant after all. Measurements and drawings from the holotype were combined with the previous year's colour notes to work on the colour illustration.

The flower of Hades

Another fascinating puzzle to document was the symbiotic relationship between the endemic New Zealand short-tailed bat (*Mystacina tuberculata*) and the endemic parasitic plant, the flower of Hades (*Dactylanthus taylorii*). I worked closely with experts, particularly David Mudge, with a year's worth of trips into the bush collecting information, as well as observing video footage and museum specimens of the bat. From this, I was able to produce a large, wholly accurate painting of the plant's life cycle,

and the bat feeding at night on the male flowers that produce the nectar. Pollen from the flowers is transferred from the animal's face to female flowers as it moves through the clumps. I also included certain insects like the Wellington tree wētā (*Hemideina crassidens*) as it is another species that is attracted to the plant. The finished painting is in the Auckland Museum Collection.

Plants of the Qur'an

Travel has been a rewarding part of my career, not least with a recent eight-year journey to record 'Plants of the Qur'an'. The initial inspiration came during a visit to the Sheikh Zayed Grand Mosque in Abu Dhabi in 2015. The mosque was breathtaking, with extensive botanical motifs on the floors, columns and walls, and I wanted to find out what they represented.

Very little information existed, and following enquiries with with a friend, Dr Gwilym Lewis at Kew, a serendipitous introduction was made to senior botanist Dr Shahina Ghazanfar FLS, who was researching the plants of the Qur'an. So, from an idea as small as a mustard seed a collaboration grew, where Shahina would write about—and I would paint—all the plants

mentioned in the Qur'ān. This culminated in the publication of the book *Plants of the Qur'ān, History and Culture* and a successful five-month solo show at Kew, with millions of views on social media...all very overwhelming and humbling!

Mannas, date palms and cultural heritage

Each plant has its merits and challenges. One example is a plant associated with manna (*Haloxylon salicornicum*) found in Sharjah in the United Arab Emirates. At first glance, the plant seemed to me to be insignificant and that it would be very boring to work on. But when I put it under the microscope (x25 magnification), the incredible beauty and intricacy of the tiny 1 mm flowers, with the elegant pink-to-orange-to-white colour change in the winged fruit, taught me a valuable lesson in not taking things at face value. By enlarging the tiny details, we can enable others to share and appreciate something not often seen.

Counter to the tiny manna flower, when I illustrated the date palm (*Phoenix dactylifera*),

the image was over 1.2 m in height and appeared over two paintings. It showed the flowering stages and dissection of the tiny male and female flowers, as well as the mass of hundreds of flowers and dates in the fruiting stage. The process took two years, flying from New Zealand to Sharjah to collect and carefully record each stage.

During this undertaking, heritage in faith really resonated with me after speaking to a friend, Jameela, about the date palm seed. Her Muslim faith has strong links with the species; she told me about the relevance of the 'Fateel', the thread or funicle that joins the seed to the inner side of the fruit, and the 'Qitmeer', or protective sheath around the seed. Both are used as a unit of measurement in the Qur'an to judge your deeds, good or bad. She also mentioned an even smaller aspect of the seed, the 'Naqeer' or dimple in the seed, and a 'measure of good deeds', which I was not aware of. So, in the name of science, I had to eat a few more delicious dates and, sure enough, the small dimple was there—how had I missed something so important? It taught me

BELOW: Sue Wickison visiting the Sheikh Zayed Grand Mosquein Abu Dhabi, 2015.





ABOVE: Sue in her workshop illustrating a banana plant; having been inspired by many artists herself, like Ferdinand Bauer, Marianne North and Margaret Mee, she encourages others to follow their passion.

to look even more carefully, and that regardless of creed or culture, close observation is the common thread between us all.

Inspiration

Apart from the plants themselves, I have found great inspiration in the work of many artists, both historical and contemporary. Ferdinand Bauer (1760–1826) spent much time in the field and as you will have seen in the previous issue of *The Linnean* (issue 2(39): Sept 2023), developed a unique shorthand system of covering drawings mapping colours for each species colour, relating to his own colour chart of up to 1,000 different colours and hues. Sydney Parkinson (1745–1771) accompanied botanist Joseph Banks on James Cook’s first voyage to the Pacific in 1768 and was the first to illustrate plants from Australasia. Marianne North (1830–1890) was a prolific English biologist and botanical artist, notable for her plant and landscape paintings and her extensive foreign travels alone, with 834 of her paintings held at Kew. Then there is Margaret Mee (1909–1988), celebrated for her work in the Amazon, and more contemporary artists like Pandora Sellars (UK), Eunike Nugroho (Indonesia), Macoto Murayama (Japan) Ursula Romero (formerly Jess Shepherd) (Spain) Beverly Allen (Australia).

Should you want to pursue the path of botanical illustration, or any area of natural history illustration, *follow your passion*. There are courses, mentors and resources that can help. Katherine Tyrell’s website has a wealth of information on it as a starting point. (<https://tinyurl.com/botanyart>)

A fruitful year

This has been an extraordinary year for me; 2023 brought with it the completion of the Quranic plant illustrations, a five-month solo exhibition at The Shirley Sherwood Gallery at Kew and the publication of *Plants of the Qur’an, History and Culture*, with Dr Shahina Ghazanfar and Kew Publishing. Then to receive the Linnean Society’s Jill Smythies Award was so humbling. It was particularly special to me as a career pinnacle, but as with every piece of work you complete, it is about collaboration. The award reflects the knowledge, encouragement, inspiration and calibre of the various people I have been lucky to work with over the years, people like Shahina, Dr Gwilym Lewis and Dr Philip Cribb, to name just three.

Sue Wickison (www.suewickison.com)

John Beckwith (1759–1792)

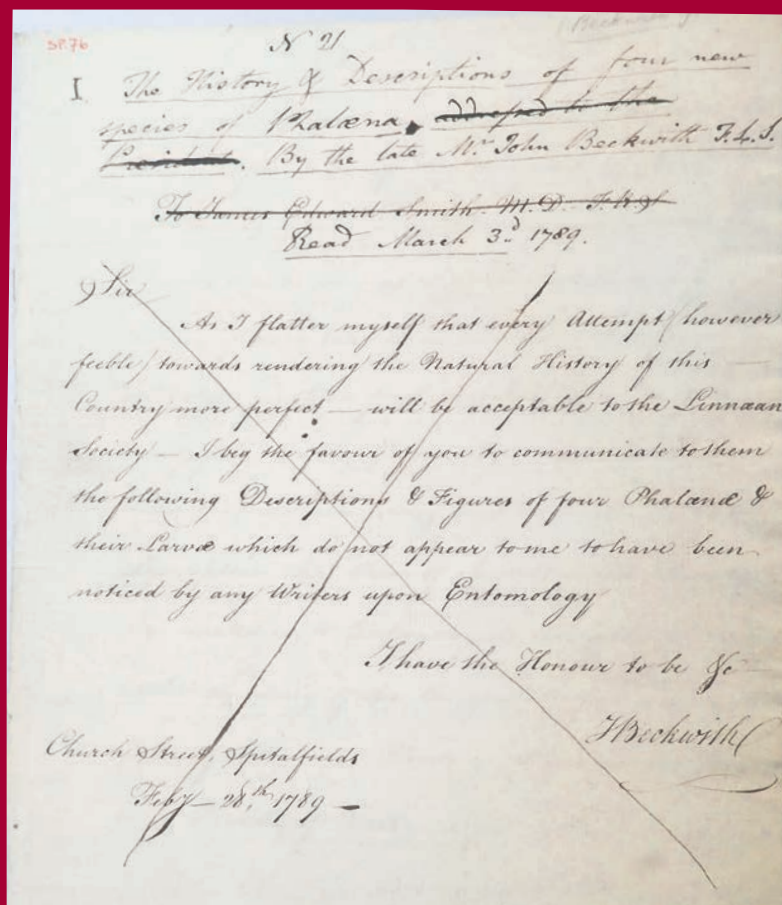
Forgotten entomologist and founder member of the Linnean Society

by E. Geoffrey Hancock FLS

John Beckwith seems to have been not only forgotten from amongst those who founded the Linnean Society but also for his entomological activities. His death, aged 32, on 27 January 1792 at Church St, Spitalfields was unmarked by any obituary or biographical treatment, probably attributable to his short period as a member.

Beckwith was at the first meeting of the Linnean Society, 26 February 1788, at the Marlborough Coffee House. Others present were Samuel Goodenough (1743–1827), Jonas Dryander (1748–1810), James Dickson (1738–1822), Thomas Marsham (1748–1819), John Timothy Swainson (1756–1824) and James Edward Smith (1759–1828). Joseph Banks (1743–1820) was invited as a prospective patron and supporter (Kennett 2016). Subsequent meetings were held at Smith's house where Linnaeus's collections were then kept, acquired by him in 1784 (Gage & Stearn 1988; Gardiner 1988). Membership lists of the Linnean Society described Beckwith as a medical man with an interest in entomology. He and Smith were born in the same year, and were the two youngest of the seven founder members of the Linnean Society.

A joining fee of one guinea was decided, plus a guinea annual subscription, and it was declared that each member should provide a dissertation within 12 months or forfeit another guinea (Kennett 2016). Beckwith read his paper to the Society on 3 March 1789, describing four species of British moths. If he felt pressure to provide a contribution it may explain how the four new names he bestowed were quickly consigned to synonymy. Indeed, one of them was a Linnaean name, the types of which could have been consulted in Smith's house. The paper was primarily an essay in natural history, describing his observations of adult and caterpillar behaviour and their foodplants. Beckwith had artistic inclinations and made his own illustrations for the plate, the originals of which do not appear to have survived. The article appeared posthumously (Beckwith 1794).



ABOVE: Letter from Beckwith on his 1789 submission to the Linnean Society (Linnean Society SP.76).



Personal details are rather scant. In 1780, Beckwith's address was given as 'Lant St, Southwark' when he was involved with the short-lived Society of Entomologists of London (SEL). This appears to be the earliest occasion when his name can be found in print. SEL was part of the lineage of London-based entomological societies as recounted by Griffin (1940), beginning with the 'First' Aurelians in 1742 and culminating with the Royal Entomological Society of London (RESL), founded in 1833. Poulton (1933) transcribed sections from the SEL manuscript proceedings (preserved in RESL). On 14 Nov 1780 Beckwith was proposed for membership by John Francillon (1744–1816) and Ralph Tinley (1738–1789), was duly balloted and became a member. At the first meeting of the following year Beckwith became Assistant Secretary, a post renewed in 1782 but before the end of that year the Society ceased to exist. Nevertheless, the members were the core of active entomologists for the period extending into the 19th century.

Beckwith's drawings

Two watercolours on vellum are known, both signed and dated 1788. One was presented to RESL by Frederick G. Dawtrey Drewitt (1848–1942). His letter of 14 December 1936 accompanying this donation says:

I have just come upon this beautiful drawing (on vellum) of three moths by Beckwith, a member of the old Society of Entomology of London—it's perfect miniature work! So it ought to go with the records of that Society. It must have been shewn at one of the meetings.

ABOVE: Three moths, watercolour on vellum from RESL archives signed and dated J. Beckwith 1788. (Royal Entomological Society Library and Archive, Ref. No 90/2.)

Drewitt was the inheritor of William Jones's *Icones*, being a descendant of the family, and donated that collection to Oxford University Museum between 1925 and 1938 (Vane-Wright 2021). It seems likely Drewitt acquired Beckwith's drawing as part of this inheritance. Wine merchant and entomologist William Jones (1745–1818) was also a member of SEL, but Drewitt thought the RESL a suitable depository for Beckwith's work.

A second watercolour of five moths also dated 1788 is in a private collection. Two of the depicted species are interesting. An extreme variety of the common garden carpet moth, *Xanthorhoe fluctuata* (Linnaeus), that also appears in the RESL drawing. This morph occurs at such low frequency in nature that it seems to have escaped being given a latinised trinomial as a form, variety or aberration—the usual fate of such things. The second one, in the centre of the composition, is not a British species, being a male of the Nearctic *Tarache aprica* (Hübner).



How it came to be available for Beckwith to draw is linked to his friend Tinley, from the days of SEL. Generally known as the exposed bird dropping moth in North America, it was dubbed the nun in Britain when formally announced by Haworth (1803) who harked back to its link with Tinley. Some years later, James Francis Stephens wrote that Tinley had actually caught the moth, although Haworth merely stated it was in Tinley's museum (Stephens 1828–1835). The specimen was probably imported as part of the brisk trade providing exotic insects to London-based collectors. Stephens also said the insect passed into Sir John St Aubyn's collection (Stephens 1828–1835). Geological and botanical elements of this are preserved in Plymouth Museum, but no St Aubyn insects seem to have survived. The moth has never been recorded in the UK as a vagrant, introduced or adventive species. The only possible conclusion is that Beckwith painted Tinley's unique specimen.

ABOVE LEFT: Five moths, watercolour on vellum, signed J. Beckwith 1788 in the possession of Ivan Donovan.

ABOVE RIGHT: Garden carpet moths—TOP: Beckwith 1788; CENTRE: Typical example; BOTTOM: A museum specimen in the Hunterian Museum, Glasgow similar to Beckwith's painting.

RIGHT: Detail of the male of the nun moth (*Tarache aprica*) from Beckwith's painting of 1788, with modern specimen for comparison.

OPPOSITE: (TOP) Type specimen of *Scarites beckwithii* Stephens, 1828 alongside detail from the plate accompanying his description (NHMUK015010126); (BOTTOM) *Phryganea beckwithii* Stephens, 1835, a caddis fly, with Stephens' manuscript label (NHMUK014524067).

Another founder member, Thomas Marsham, also produced an article on moths that addressed a problem he recognised in Linnaeus's descriptions of the larger ermine moths. Having found they embraced several more species he made the point that the work of Linnaeus rarely erred, but when it did these:

arise from the similarity of many species to each other and our not having seen the true species of Linnaeus ... [and] the truth of this observation has been proved in many instances, since the arrival of his valuable cabinet in this country (Marsham 1791).

Marsham clearly emphasised the value of access to Linnaeus's collection, then kept in Linnean Society President (and owner of the collection) James Edward Smith's house, to resolve such issues. Unfortunately, his two new species fared no better than Beckwith's, falling into synonymy. Nomenclatural niceties apart, both he and Beckwith made accurate observations of living insects and their approach indicated the value of juvenile stages in supporting species distinction. This was Marsham's only venture with Lepidoptera—thereafter he made contributions to the Coleoptera (e.g. Marsham 1802).

Beckwith's collection

References to Beckwith during the early 19th century discuss specimens in his collection. Clearly it was well-known and available for examination following his demise. Stephens described a beetle and a caddisfly from it (Stephens 1828–1835). Marsham was also familiar with Beckwith's collection and named some as new beetle species. It is not clear where Beckwith's collection was actually kept after his death. Botanist William Jackson Hooker (1785–1865) advised entomologist Simon Wilkin (1790–1862) to purchase it. Wilkin may have done so when he inherited sufficient wealth in 1808 to indulge in natural history when it became the nucleus of his insect collection (Wilkin 1900). Unfortunately, the businesses that provided Wilkin's income collapsed in 1811 and eventually he auctioned his possessions at a house sale on 18–20 November 1816. Over three days an impressive collection of natural history collections, books and other items were sold (Chalmers-Hunt 1976). Tantalisingly, Lot 156 was a 'Portrait of Dr Beckwith and seven others' and it may be possible to match the sitter and artist if such a painting is extant. Lot 162 was 'The elegant Cabinet of Insects as fully described at the end of the Catalogue' which was an appendix by Stephens called 'Wilkin's Catalogue'. Over 250 beetles are listed, a selection of the supposed total of 1,800 species. Other insect orders are given in varying detail and Beckwith is mentioned specifically in connection with Lepidoptera. The majority of species in 'Wilkin's Catalogue' is represented by two specimens a ratio recommended by Donovan (1794) and thus conformed to the period style for gentlemen's cabinets. Locating Beckwith specimens depends on tracking them through the history of Wilkin's collection.

Some sources imply that bankruptcy forced Wilkin to sell his collections directly to the Zoological Society of London, but the trajectory was not so clear cut. Stephens said his description and figure of *Scarites beckwithii* were drawn from 'the collection of Mr N. A. Vigors, Esq., and was formerly in that of Mr Beckwith' (Stephens 1828–1835). Nicholas Aylward Vigors's (1785–1840) specimens can be found in the Natural History Museum, London (NHM), labelled as part of an accession from the Zoological Society not until 1859, following its decision to concentrate on living animals rather than dead ones. The only insects recorded in this transfer were those of Vigors (Anon. 1906; Wheeler 1997). On arrival at Bloomsbury most were dispersed throughout the collection and lost their provenance, but some can be traced. For example, the type of *Scarites beckwithii* is an original Beckwith specimen and therefore dates from before 1792. This is a respectable age for the survival of a pinned insect and accounts for its condition. This species is native to North America, although when described it was thought it might have been collected in England. It may be another example of an import for collectors, as with the nun moth. Neither has been found in the UK alive to qualify

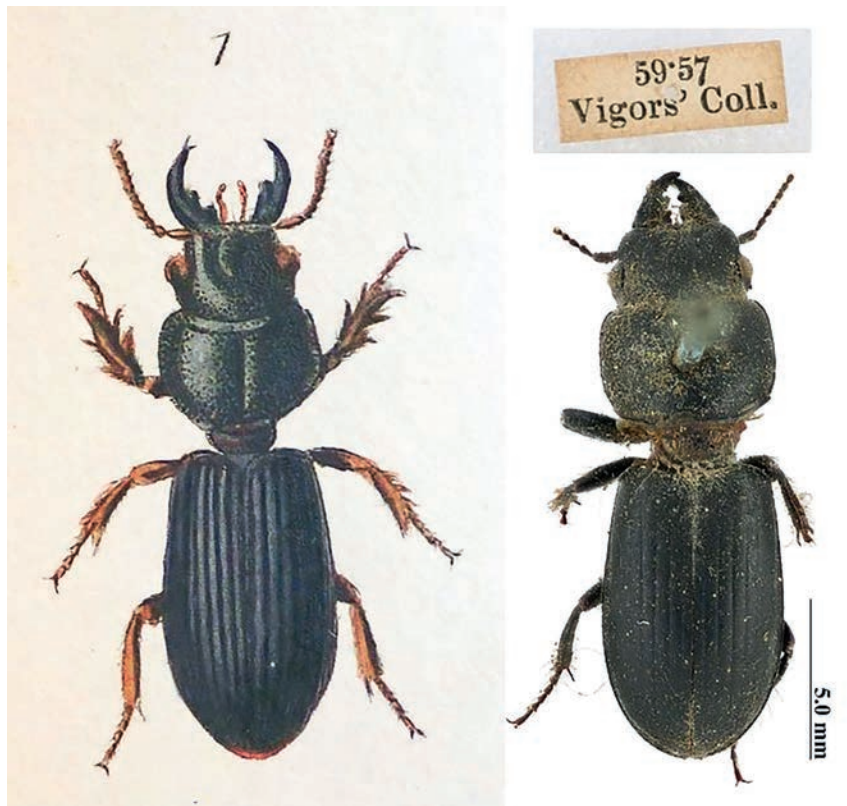
for any mention in lists of British fauna. In addition, there are a number of species named in Beckwith's honour. William Kirby (1759–1850) described a bumblebee *Apis beckwithella*, George Samouelle (1790–1846) named a brown lacewing *Hemerobius beckwithii* in 1819 and Stephens a caddisfly *Phryganea beckwithii*. Marsham (1802) listed six species of beetles that he had seen in Beckwith's collection, and at least two would be candidates for type status if they could be distinguished within the Stephens//Marsham drawers at the NHM.

Thomas Marsham, the other entomologically inclined founder member of the Linnean Society, acknowledged Beckwith particularly for his 'valuable museum' and William Kirby named his bee 'In memory of Beckwith that most expert English entomologist'. John Beckwith's legacy resides in his involvement with the naturalist community and the value of his collection. The last of these had a life beyond his own but has also passed from memory, and it is unfortunate that none of the taxa associated with his activities have survived the rigours of taxonomy's law of priority. A number of biographical unknowns and a greater scrutiny of collections may reveal more specimens.

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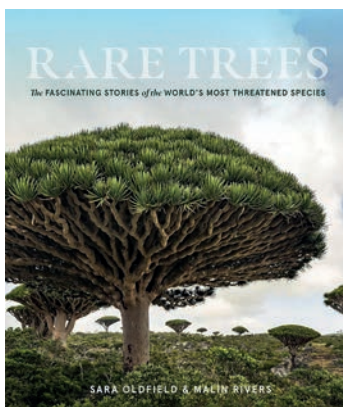
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Reviews

Rare Trees: The Fascinating Stories of the World's Most Threatened Species

Sara Oldfield and Malin Rivers

400 pp, Timber Press
2023 (Hardback)
ISBN 9781604699524
Col. illust. £35.00/\$40.00 US



Trees are 'in' and chosen as a subject for books by numerous authors on nature—including this reviewer. Inevitably, this competition sets the standards high and really good books on trees appear among a plethora of mediocre and even sub-standard publications. They are almost as rare as rare trees. After reading and browsing through a good deal of text and illustrations, I can begin with expressing my opinion that here we have a book on trees in the better category.

Its primary subject is the conservation of threatened trees. However, throughout there is much information on forests and their trees from an ecological point of view, as well as on where the rare trees occur and their abundance (usually declining). In Chapter One, forests are presented in four categories: three tropical (rain-, cloud- and dry forests), one combines temperate and boreal forests, and the last category deals with forests on islands. To start with the last, islands can harbour any of the other categories, but are special due to their isolation. In the evolution of species, this has often resulted in species unique to the island, but has also limited their distribution. Islands, as calculated by unit area, are often more species-rich than continents. Habitat loss and invasive species therefore impact more seriously on the biodiversity of islands. By comparison, the vast boreal forests in the Northern Hemisphere, containing far fewer species spread very wide, have almost no tree species in danger of extinction. In the tropical forests, by far the most species-rich of forest categories, reduction in area of undisturbed forest and fragmentation are the most imminent threats, and here we often even do not know all the species of trees present

and some may have become extinct without scientists knowing. These issues are concisely described and explained in this chapter.

Chapter Two discusses the many uses people make of trees and their derivatives. The emphasis here is on the uses of trees 'in the wild', not in cultivation such as trees in orchards or in plantations. Plantations can of course threaten tree species when they replace natural forest, such as the proliferating oil palm plantations in the mostly Asian tropics (pp. 318–319). Examples of uses are given for tree genera such as Dragon Tree (*Dracaena*, also featured on the dust jacket), Agarwood (*Aquilaria*), Camphor Tree (*Cinnamomum*), Blackwood (*Dalbergia*), Mahogany (*Swietenia*), Persimmon (*Diospyros*) and others, and each is treated with much information on not only its uses—traditional and industrial—but also its occurrence in the forest in terms of ecology and diminishing abundance. The uses are divided into categories such as medicinal, timber, 'music woods', fruit trees and ornamental trees and the examples in each category highlight the conservation issues resulting from these uses when they have become unsustainable. Many of these trees are difficult to grow in cultivation, because they grow very slow or for other, often ecological reasons, or simply because the natural populations can be easily 'harvested' which can happen without due regard to regeneration.

Chapter Three 'Special Tree Groups' selects conifers, magnolias, ashes, oaks, dipterocarps, palms and the family Sapotaceae for reviews of rare trees of conservation concern. Presented at the start of each review are the IUCN categories of threat of extinction, most but not all are in the threatened categories Vulnerable, Endangered and Critically Endangered (VU, EN, CR). Conifers get most of the attention with 72 pages and 21 species accounts, arranged by continent. The other groups are represented by fewer examples, with palms occupying the largest section of these (34 pages and 12 species). With the exception of ashes (*Fraxinus*) these other groups compare with conifers in numbers of species, but with palms (*Arecaceae*) counting c. 2,700 species being much larger. All have been subject to IUCN Specialist Group conservation assessments. Perhaps conifers feature prominently because they were assessed twice, a task I took on leading the IUCN Conifer Specialist Group, as is mentioned in the book, so the information available was perhaps more detailed. Fewer conifers and perhaps the inclusion of some other threatened tree groups could have

provided a more balanced overview. Those presented serve, I concede, as examples of the various issues encountered and strategies employed in the conservation of tree species. The information given is detailed and interesting and mostly accurate (but I did not place the Vietnamese Golden Cypress in a separate genus 'In the first rush of excitement' as stated on p. 221, but rather based on detailed taxonomic research).

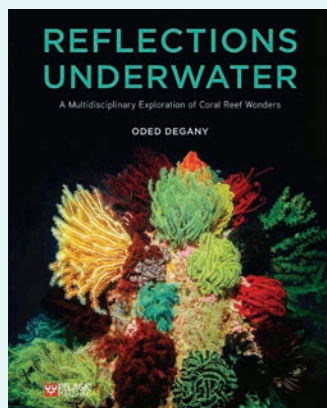
This book is well organised, well written and well presented. The numerous illustrations are of high quality and several are rare shots of trees that are difficult to find and access in their natural habitat. I envied some of the images of rare conifers in the wild that I have struggled and sometimes failed to obtain—trees in habitat are among the more difficult subjects for a nature photographer. Beautiful, near pristine landscapes pictured over two adjacent pages tell us better than with words that there is still much undisturbed forest, a precious 'asset' we must at all costs protect from exploitation and destruction. This book is an advocate for these forests and their rare trees and definitely in the better category of books on trees.

Aljos Farjon FLS

Reflections Underwater: A Multidisciplinary Exploration of Coral Reef Wonders

Oded Degany

288 pp, Pelagic Publishing
2023 (Hardback)
ISBN 9781784274139
Col. illust. £32



This publication is a corker—author Oded Degany has been original in describing ecosystems that make up coral reefs, not just in terms of biology but encompassing philosophy, psychology, evolution, art, zoology, physics, mathematics. It is a challenging read, but has been written so that each chapter is stand alone, allowing the reader to dip in and out according to their interest.

Nine chapters are followed by an epilogue, a glossary and a bibliography. The chapter titles are: (1) The Uniqueness of the Diving Experience; (2) Coral Reefs: A Holistic View; (3) The Reef Kaleidoscopic View: Why are Coral Reefs so Colourful?; (4) Illumination, Disguise and Vision Mechanisms in Coral

Reefs; (5) Mutual Aid: Coral Reefs as a Symbiotic Society; (6) Nature, Red in Tooth and Claw: Defence and Preying Mechanisms; (7) Reproduction: The Wild Side of Sex in Coral Reefs; (8) Evolutionary Themes; (9) Mathematical Beauty in Coral Reefs.

To give the reader a flavour of the publication, consider chapter two, Coral Reefs: A Holistic View. In this chapter, the author sets out to weave a narration starting with a historical perspective on the epics of Captain James Cook (1728–1779) who accidentally discovered Australia's Great Barrier Reef when his ship HMS Endeavour ran aground and was severely damaged. The author illustrates how the many shipwrecks of the 18th century led to an interest in the nature and mechanism behind coral reef habitat formation (described on p. 39 of the book). He describes the work of cartographer Captain Matthew Flinders (1774–1814) who surveyed the Australian coastline and later Charles Darwin (1809–1882) who understood that atolls are produced by biological activity resulting in the creation of coral reefs around volcanic craters.

Despite the myriad of forms which followed the Cambrian explosion (c. 542 million years ago) there are more life forms to be found in marine environments than terrestrial ones. The stony coral reefs of today first appeared more than 220 million years ago, but of the thousands of species that inhabit coral reefs only a small number produce the rigid limestone skeleton which gives the reef its form. The proliferation of coral reefs is presumed to have been due to symbioses between stony corals and emerging algae. Degany then discusses what corals are, the structure of the animals that produce them, how they reproduce, the symbioses with algae, the differences between a pristine reef and a harvested reef in terms of biomass. Later he attempts to answer the question: are coral colonies a superorganism?

Being interested in cephalopod vision I particularly enjoyed chapter four in which the masters of disguise (the octopuses) are colourblind, yet can produce dazzling displays of colour and texture in the blink of an eye. The mechanism is not fully understood, however one theory argues that they are not colourblind but use a combination of a unique optical effect called chromatic aberration together with an off-axis pupil to sense colours using only one photoreceptor. The suggestion is that a cephalopod might cause its eye to shift focus between wavelengths of light, i.e. determining the colour of an object by when it goes in and out of focus. It helps to explain the differences in shapes of cephalopod pupils and being off-axis, for example the 'w' shape of the cuttlefish pupil.

In general this book smacks of quality not only in its discourse, but also in the outstanding photographs (taken



by the author), even down to the quality of the paper. The bibliography is arranged not only by chapter but also subsections, which enables the reader to quickly track down relevant references. On pp. 253–255 there is a concise glossary which enables a lay reader to quickly look up unfamiliar terms.

This is a complex read, not just in the breadth of argument put forward, but also because of the many themes that permeate the chapters. That said, it can be profitably read by a non-scientist provided they have an open, curious mind waiting to be challenged by out-of-the-box thinking.

For £32, this is not a fortune to pay for a publication of this quality, and I highly recommend it to the reader.

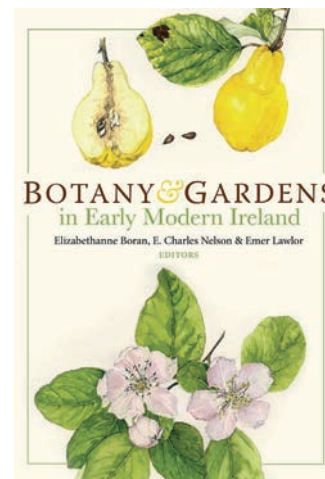
Stephen Hoskins FLS

Botany and Gardens in Early Modern Ireland

Elizabethanne Boran, E. Charles Nelson and Emer Lawler (Editors)

280 pp, Published by the Trustees of the Edward Worth Library by Four Courts Press Ltd.

2022 (Hardback)
ISBN 9781846820233
Col./bw illust. £45/€50



This beautifully produced, weighty volume provides a comprehensive history of botanical science and garden making in Ireland the 17th and 18th centuries. Many of the contributions were derived from papers presented at two conferences organised by the Edward Worth Library, Dublin and the Dublin Naturalists Field Club: 'Botany in Early Modern Ireland' (2017), and 'Gardens and Gardening in Early Modern Ireland' (2018). The book, printed on heavy, glossy paper is richly illustrated in full colour, appropriate for printing the numerous plant illustrations and portraits, including a magnificent portrayal of the eponymous Edward Worth in scarlet robes. Moreover, muted shades from sepia to grey-black, sometimes augmented with soft colour tints, are perfect for reproduction of the facsimiles of the many documents and book pages scattered liberally throughout the text.

Both conferences were, we are told in Emer Lawler's 'Forward', inspired by the botanical collection of Dr Edward Worth (1676–1733), a Dublin physician who left his extensive library to Dr Steevens' Hospital, Dublin, where they remain to this day. The Worth Library Trust, of which Lawler is a member, funded the treatise as part of its outreach programme.

The detailed 'Preface', by the Editors, provides a valuable guide to what is to follow. Of particular relevance are the major published sources of information relating to Ireland's botany and gardens during the early modern period. In the case of Irish floras, a series commencing with Caleb Threlkeld's *Synopsis stirpium Hibernicarum* (1726), with subsequent floras to finally, David Allardice Webb's *An Irish flora* in 1943. Unfortunately, more informal sources such as herbarium specimens and manuscript notebooks are comparatively rare.

So far as botany is concerned, a comprehensive bibliography by Robert Lloyd Praeger (1865–1953) was produced for his seminal work ‘Irish Topographical Botany’, published in *The Proceedings of the Royal Irish Academy* (1901). Other major sources, from the late 17th century onwards, were, notably, the Dublin Philosophical Society, Trinity College, the Royal Dublin Society, the Royal Irish Academy and the Belfast Natural History and Philosophical Society.

There is, however, a paucity of sources dealing with the history of Ireland’s more transient gardens, with the most significant material not appearing until the late 20th century when Edward Malins and the Knight of Glin’s outstanding 1976 work entitled *Lost Demesnes* led to significant publications by other authors, such as T. Reeves-Smith, T.C. Barnard, K. Lamb and P. Lowe. Since the 1970s, the Heritage Gardens’ Committees of Northern Ireland and the Republic, and major surveys by many heritage, conservation and restoration projects have also been important sources. Finally, a compendium of Irish cultivated plant names, building on studies of Irish nurseries by Eileen McCracken (1920–1988) and others, was published by the Irish Garden Plant Society.

The Editors acknowledge that the present volume owes an immense debt to these sources and provide references to them all in extensive footnotes, which constitute a most valuable resource.

The most potent message of the ‘Preface’ is, however, the extent of the impact of colonisation on the study of botany and related subjects in early modern Ireland, a situation reflected throughout the book and especially in the first section, entitled ‘Botany in Seventeenth-century Ireland’. This includes two papers by E. Charles Nelson, the first focused on the manuscript ‘Zoilomastics’ (c. 1626) of Philip O’Sullivan Beare and the second on what was known of Irish wild plants before 1690. A third paper, by Patrick Kelly, deals with William and Thomas Molyneux and the impact of the ‘New [experimental] Science’ in Dublin, especially after the establishment of the Dublin Philosophical Society by the latter in 1683.

Next, the book moves to Caleb Threlkeld’s flora writing (see above) and ‘Botany in the Eighteenth-century’. Emer Lawlor writes about Threlkeld as a dissenting minister, physician and botanist, while Declan Doogue focuses first on his plant records and then his pioneering studies of plant ecology.

At this point, the book shifts emphasis by moving to ‘Collecting Books on Botany and Gardens in early Modern Ireland’. First, Elizabethanne Boran writes about the Edward Worth Library, followed by Susan Hemmens, who deals with botany and gardens in the collection of Dublin’s Marsh Library. Established in 1707 by Narcissus Marsh (1638–1713),

this was Ireland’s first public library. Finally, Regina Whelan Richardson writes about the complementary subjects of pleasure gardens and gardening for pleasure in the Fagel Collection at Trinity College Dublin.

The book ends with a floristic flourish of histories and evocations of Early Modern Irish Gardens: ‘The Physic Garden at Trinity College Dublin’ (E. Charles Nelson); ‘Gardening in Mitchelstown: John K’Eogh’s *Botanologia universalis Hibernica*’ (Cork, 1735) (E. Charles Nelson); ‘Gothic Features in Eighteenth-century Irish Landscapes’ (Vandra Costello); ‘The Nursery and Seed Trade in Dublin Before 1800’ (Terence Reeves-Smyth); and the garden of ‘Ellen Hutchins (1785–1815)’, botanist in West Cork (Madeline Hutchins).

An excellent index is included and most usefully, an Index of Plant Names.

What a feast this book is, a rich serving of ‘Botany’ and ‘Gardens’, with Ireland at its heart, written by a distinguished team of authors and sensitive editors. It is, by turns, fascinating and informative, beautifully illustrated and an invaluable resource—simply a pleasure to read.

David S. Ingram FLS

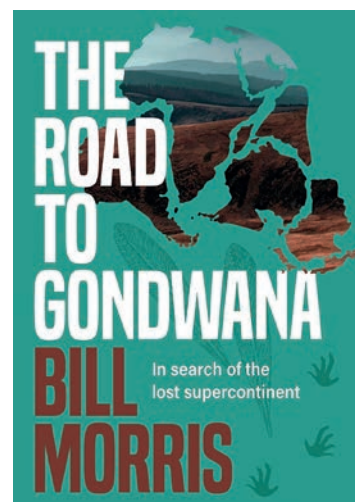
The Road to Gondwana: In Search of the Lost Supercontinent

Bill Morris

264 pp, Exisle Publishing
2023 (Hardback)
ISBN 9781922539335
Col./bw illust. £19.99

Discoveries in Earth Sciences typically begin with journeys, and this book opens with a famous

one, Robert Falcon Scott’s ill-fated expedition to the South Pole during which specimens of the fossil plant *Glossopteris* were collected from rocks exposed on the Beardmore Glacier. As Scott and his party were closing in on the South Pole in January 1912, Alfred Wegener was presenting his theory of continental drift to a meeting of the German Geological Association in Frankfurt. Wegener did not live to see his ideas become mainstream, meeting a similar fate to



Scott on the Greenland icecap in November 1930. This book takes journeys as its theme in a quest to find Gondwana and to experience it as a real place. Along the way, Morris traces the development of the concept of the supercontinent and explores its impact on our understanding of geology and biogeography. He takes to the road himself, travelling from New Zealand to Argentina and eventually to the Falkland Islands in search of the fossils that bind these lands together. This is a book for the general reader. It is informative, engagingly written, and it succeeds in its aim of bringing the ancient supercontinent to life.

The story of the discovery of Gondwana is indeed an epic tale that fully justifies book-length treatment. It spans hundreds of years, and it drew on many areas of science and technology. Moreover, the concept of Gondwana itself evolved in remarkable ways. To set the scene, Morris begins by taking us briskly through the historical development of geology as a science in Europe. Advances in cartography were also foundational as were the daring voyages of discovery that led to the collection of plants and animals from the southern hemisphere and to the recognition of striking similarities in the rocks on opposite sides of ocean basins. Perhaps less obvious though is the role of colonial expansion by Britain. One consequence of this was the development of large coalfields in Australia and India. And it is in these coals that the distinctive leaves of the iconic Gondwana fossil plant *Glossopteris* were first discovered in abundance, eventually making their way back to scientific circles in London and Paris. 'It was in the coal mines of the British Empire,' writes Morris, 'that scientists would first glimpse Gondwana.'

The modern concept of Gondwana is a product of great synthetic works of science, remarkable insights, bold hypotheses, and major discoveries about the dynamic nature of the Earth's crust. Morris takes us through the evolution of the concept from its birth within a static model of the Earth in the late 19th century through the ground-breaking and controversial hypothesis of continental drift that put the pieces of the supercontinent together, outlining its shape for the first time. Later, the exploration of ocean basins proved crucial, especially the discovery of mid-ocean ridges followed by radiometric dating and the observation of geomagnetic reversals in rocks of the seafloor. The discovery of mantle convection was another breakthrough. All of this led to the proposal of a plausible mechanism for continental drift in the 1960s. It turned out that it was the seafloor that was moving and thereby carrying the continents apart.

Gondwana existed in one form or another for hundreds of millions of years. Morris guides us through the evolution of flora and fauna from the earliest plant life to the great extinction that marked the onset of the Mesozoic Era and beyond. Here is where Gondwana itself really comes to life. By employing his skills as a documentary filmmaker, Morris uses narrative structures and artwork to develop broad perspectives on landscapes and then to take us deep into Gondwanan forests to meet the inhabitants. This vivid narrative is woven through the chapters of the book so that the reader is always immersed in Gondwana as a living, breathing continent. Morris also brings a delightful personal touch, recounting experiences fossil-hunting in his native New Zealand and his quest to collect *Glossopteris* in South America. This gives the book a documentary feel, and one can imagine it working as a framework for a TV series on Gondwana.

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In the final two chapters, Morris reflects on some of the diverse legacies of Gondwana today. One of these is the huge importance of coal to the economies of Australia, India, and South Africa and the sometimes-distressing impact of mining on local communities. It was massive environmental changes at the end of the Permian Period that drove the Gondwanan coal-forming forests to extinction. It is ironic that as the coals that formed in these primeval forests go up in smoke today, they are contributing to another form of global environmental change.

This book is a great read. Morris is at his best when writing about geology and travel, and he succeeds in giving the

reader a feel for the evolution of the supercontinent. I don't know of a recent comparable book on the subject. I recommend it to the general reader and to students and academics as an engaging introduction to the evolution of Gondwana and its impact on Earth history.

Paul Kenrick FLS

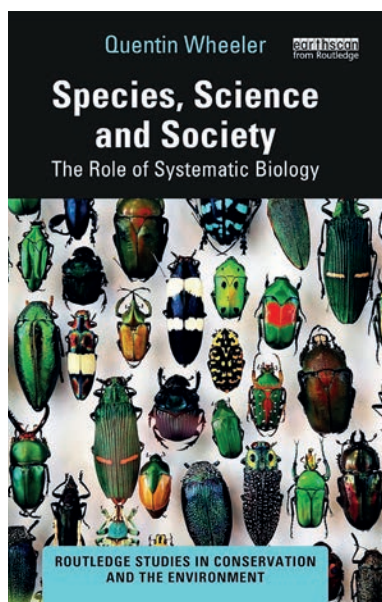
Species, Science and Society: The Role of Systematic Biology

Quentin Wheeler

240 pp, Routledge
2023 (Paperback)
ISBN 9781032484396
£23.99

Throughout history, taxonomy has contributed crucially to expanding our understanding of nature. By studying and organising the diversity of life on Earth, taxonomy has shed light on the relationships between species and with the environment and has provided the necessary evidence to support scientific theories and concepts. The advent of new technologies, together with changes in publication trends, has, however, progressively moved the focus of biodiversity studies away from taxonomy. This, in turn, has led to a progressive detachment between taxonomy and the rest of scientific disciplines studying biodiversity, with important consequences: we cannot protect what we do not know to exist, and, in that, taxonomy has an essential role to play.

It is in this context that author Quentin Wheeler presents *Species, Science and Society: The Role of Systematic Biology*, a book that highlights the value of taxonomy and the need of taxonomic studies in a world threatened by climate change and a rampant biodiversity crisis. The author dissects the state of the discipline of taxonomy, addresses the criticism it often receives, highlights its strengths and potential, and suggests a path of action for taxonomists to complete a planetary inventory of life on Earth. The message is clear:



if we aim to do it—and we should—the time is now. This requires the support of funding agencies and scientific institutions, an investment on the necessary workforce to address the task, and the integration of long-established morphological studies with cutting-edge technology, including the analysis of molecular sequence data. All these questions are often discussed among taxonomists, but the much needed comprehensive approach offered by the author has the potential to reach a much wider audience. In the 'Preface', Wheeler states that this book will be of interest to the systematics community and 'students with a basic background in biology'. In the opinion of this reviewer, it may also be of interest to researchers outside systematics, a reader interested in biodiversity and, importantly, institution managers and policy makers.

The author dissects the state of the discipline of taxonomy, addresses the criticism it often receives, highlights its strengths and potential, and suggests a path of action for taxonomists to complete a planetary inventory of life on Earth. The message is clear: if we aim to complete a planetary inventory of life on Earth—and we should—the time is now.

An entomologist with several decades' experience on insect taxonomy, Wheeler has been—among other roles—Director of the Division of Environmental Biology at the United States National Science Foundation, Keeper and Head of Entomology at the Natural History Museum in London, and President of the State University of New York College of Environmental Science and Forestry, where he founded the International Institute for Species Exploration. This combination of an extensive research career and management positions provides the author with a global perspective of all questions treated in this book.

The volume is divided in three parts, 22 chapters in total, with few images and a glossary of technical terms. The different chapters are nicely connected, but most of them work equally well if read as independent essays. The author decided not to cite support references throughout the text but to provide a ‘further reading’ list at the end of each chapter. This, he argues, helps the narrative style; although true, it also makes finding some information more difficult than ideal. Part I, approximately half of the book, discusses in detail our current knowledge of the world’s biodiversity and the current state of the discipline, touching on relevant questions that are now part of everyday conversation, including species extinction and climate change, and their connection with taxonomy. Parts II and III pay more attention to how we do taxonomy, what taxonomy can offer, and what the role of researchers, scientific institutions and society should be if we aim to truly understand biodiversity on Earth. Especially commendable are Chapters Eight (‘A science misunderstood greatly’), 10 (‘The illusion of knowledge’), 15 (‘Systematics under siege’) and 18 (‘Taxonomic renaissance’). Also, Chapter 20 (‘Hall of the Holocene’), which puts the focus on the role of institutions that maintain natural history collections and questions the ongoing trend to change the focus from taxonomic research to more fashionable issues already addressed elsewhere (ecology, planetary change).

At times, the reader may perceive that some questions are repeated too often throughout the book, especially the criticism of attempts to replace morphology with a DNA-based taxonomy. Wheeler presents a good case for why this should not be allowed; he appeals to the importance of studying morphology to correctly frame and address scientific questions, and also to our own perception of nature as human beings through morphological observation. The author’s view, shared by many in the taxonomic community, is explained in detail in the first chapters and subsequent repetition may seem unnecessary. This, in any case, does not detract from the book’s value.

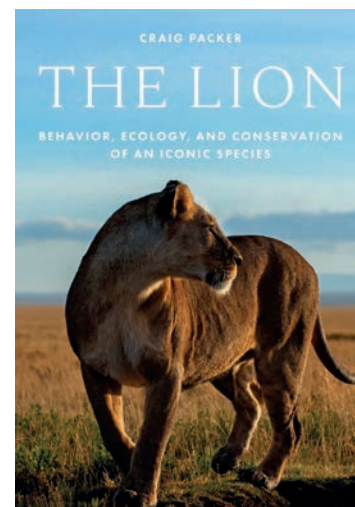
Quentin Wheeler combines a rigorous scientific approach to the world’s biodiversity with childhood memories and personal experiences, and his love for nature and taxonomy is echoed in every page. *Species, Science and Society* is a much-needed book highlighting the value of taxonomy. It is also a powerful reminder that the world’s biodiversity is complex, fascinating, and deserves urgent attention: there is much work to do before it is too late.

Pablo Muñoz-Rodríguez FLS

The Lion: Behavior, Ecology, and Conservation of an Iconic Species

Craig Packer

376 pp, Princeton University Press
2023 (Hardback)
Col./bw illust. £35
ISBN 9780691215297



Previous reviews have lauded Craig Packer’s *The Lion: Behavior, Ecology, and Conservation of an Iconic Species* as ‘reading like a fast-paced narrative non-fiction book’ and ‘the ultimate review of one of the world’s most iconic species, written by one of the world’s most iconic conservation scientists’. Prior to this book, *Simba: The Life of the Lion* by C. A. W. Guggisberg (1963), followed by the then-iconic *The Serengeti Lion: A Study of Predator-Prey Relations* by George Schaller in 1972. (The lion was perhaps not as iconic for this reviewer who, in 1972, had been attempting for the 10 preceding years with enthusiastic support from his Masai neighbours, to prevent lions from killing the cattle on the ranch that he then managed in central Tanzania). A span of 50 years between these landmark books certainly provides justification for the latest version. Packer’s book will be appreciated not only by practitioners in the biological sciences and natural history buffs but also by a more general readership.

The book comprehensively covers a gamut of subjects. Each of the 12 chapters opens with what the author considers an appropriate epigraph, and each is terminated by up to a dozen numbered ‘Key Points’ that serve essentially as a summary of the text. Paragraphs comprise a two-level hierarchy of sections.

The ‘Introduction’ is primarily a ‘Lion Primer’—basically a general introduction to some basics on the lion’s 24-hour day and a summary of the animal’s life course. Chapter Two describes social structure with the main premise that the lion is the only social feline. Chapters Three, ‘Infanticide and Expulsion’, Four, ‘Cub Rearing’ and Five, ‘Mating Competition and Paternal Care’, are a loosely-linked overview of the life cycle. During the 60-odd years of this reviewer’s intermittent contact with lions, particularly the enormous, black-maned



saunterer who regularly drank at the trough below our house on the slopes of Kilimanjaro, it did not occur to him that the mane (the subject of Chapter Six), was a type of ‘keep off’ sign to other males and an ‘invitation’ to females, serving a great number of other purposes related to hair length and colour. Chapter Seven, ‘Foraging Behavior’ precedes Chapter Eight, ‘Intergroup Competition’ and Chapter Nine, ‘The Evolution of Lion Sociality’. Predation, infanticide and disease, related in some respects to population density, contribute to maintaining numbers as described in Chapter 10, ‘Population Regulation’, whereas Chapter 11, ‘Interspecific Competition’ relates to prey availability and the war among lions, wild dogs, spotted hyaenas, leopards and cheetahs for survival. Infectious diseases, human-lion conflict (pastoralists and subsistence farming), bushmeat hunting and consumption, sport hunting and the now obligatory section in any form of media regarding climate change, are included in the final and 12th chapter, ‘Lion Conservation’. An unnumbered and somewhat unstructured ‘Afterview’, in the style of a short opinion piece, almost brings the book to a close but there is yet to come; ‘Acknowledgements’ and a table of morphometric data for the most common Serengeti species. Upwards of 500 references taken from citations in the text precede a comprehensive, but not complete, index.

Craig Packer is said to be the world’s foremost expert on African lions and has more than 40 years of experience in their study. Certainly well qualified to write about this big cat, much of the work produced by him as the single author has benefited immensely from inputs by a corpus of other scientists, research assistants and graduate students. The flowing text and frequent mentions of these associates throughout may benefit from the single author approach to the readability of the main text. It might possibly have been more ethical, however, to have produced this tome as a multi-author work. Some 173 full-page figures adorn the book—effectively one to every two pages. These are not, however, conventional figures, as each one (or almost each one) comprises up to seven graphics and charts and a similar

number of gorgeous full colour photographs that beautifully complement the graphs. The title of each figure is subtended by a paragraph-length explanation of the graphics and there are detailed, often lengthy, small-print technical footnotes on many of the plain text pages. All the photographs are by the Swedish freelance photographer Daniel Rosengren. A small font acknowledgement of Rosengren as the photographer on the title page is surely inadequate recognition of his contribution.

The Lion is certainly the ‘ultimate’ overview (as stated in one quote on the book cover) if this means it is the best and most comprehensive reading available in 2023. The wealth of information is not hidden by scientific jargon, yet clearly conveys the multiple aspects of lion biology, ecology and natural history. The photographs and graphics are a joy and add much value to the subject matter. When you personally have finally had a surfeit of Attenborough’s dulcet tones on the wonders of every kind of life on the planet, *The Lion* will relax and educate you on the life and times of the king of beasts in equal manner. At a mere £35 for the hardback edition, this book should have a place on the shelves of every kind of library from that of the individual bibliophile through to the national depository. As to it being ‘ultimate’ in the sense of being the last of a line—let us sincerely hope not, but let us also hope that there will be more about lions that do not solely grace the Serengeti ecozone.

Trevor Wilson FLS

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Books for Review

Please contact the Editor before sending books for review (leonie@linnean.org).

Books for review should be sent to the attention of the Editor at:

Burlington House, Piccadilly, London W1J 0BF

Please note: While the Society aims to review as many books as possible, a review is not guaranteed, and is dependent on finding a reviewer and the decisions of the Editor and Linnean Steering Group.

EXHIBITION REVIEW

Re/Sisters: An exhibition exploring gender and nature in art and activism in London's Brutalist Barbican

Barbican Centre, London. Until 14 January 2024. barbican.org.uk/ReSisters



Featuring the work of 50 artists from around the world, *Re/Sisters: A lens on gender and ecology* sheds light on the shared oppressions of people and planet, showcasing coral reefs, Arctic ice, the rainforests of Papua New Guinea and the streets of New York City.

Exploring the theme via photography, song/voice recordings, film and fabric, the exhibition pulls no punches on entry. Beginning with a section titled 'Extraction', the viewer is confronted with towering images of opencast mines and local people dwarfed by the scale of machinery and the

damage caused. Simryn Gill, whose work was also displayed at the Linnean Society in 2023, arrests the eye with her work showing the scale of extractive mining.

The work of artists Sim Chi Yin and Taloi Havini are highly evocative and effectively demonstrate the links of oppression. Through photographs and a three-channel video display respectively, they show the scale of destruction of sand and cobalt extraction for use in construction and electrical devices. By taking a process that is often hidden and translating it to large prints and screens, the links between this environmental destruction and the hidden violence women face are stark. Karikpo Pipeline by Zina Saro-Wiwa is similarly powerful, contrasting Shell oil infrastructure with traditional dances of the Ogoni, whose land it occupies, demonstrating the damage done to Indigenous communities in the pursuit of resources.

The following section is also striking—focusing on protest movements. Photographs and song pamphlets collected



during the anti-nuclear strikes of the 1980s, many taken in Greenham Common, are on display. Impactful greyscale portraits by Pamela Singh show the tree-hugging women of Chipko protesting deforestation in India. Photographs taken in Flint, Michigan, document the ongoing and manmade water crisis.

This highlights the intersectionality of oppression—those affected by the crisis in Flint are mainly Black families, young and old women protest nuclear weapons and tree felling, and a group at an anti-nuclear event hold a banner proudly declaring themselves 'dykes'. An auditory installation further demonstrates this: the narrator recalls being part of a peaceful disarmament march and being harassed by a crowd threatening to kill the women, singling out the lesbians and Jews in the crowd.

While doing an excellent job to highlight the ways racism and land occupation link with the environmental crisis, the advertised queer lens is weak. The exhibition also does not feature some of the more recent female voices of the ecological movements like Greta Thunberg and Vanessa Nakate. For an exhibition subtitled 'A lens on gender and ecology' there are no scientists present. There is nothing about gender bias in academia, in the field, or in politics. Although women are more likely to be affected by the effects of climate change and to suffer the harmful impacts of pollution, especially women of colour, there is nothing about this either. This gap seems especially conspicuous, as Londoner Ella Kissi-Debrah, who died aged nine due to an asthma attack, was the first person in the world whose cause of death was listed as air pollution.

Re/Sisters showcases such a range of artwork and media that there is something for everyone. Though light on some of the theory behind its central thesis (expecting the audience to have some baseline knowledge), it certainly sparks discussion.



Skims the surface of its central theme but handles certain aspects very well. Don't miss the second floor!

Dani Crowley (danielle@linnean.org)

Members

Please join us in welcoming the following new members to the Society (elected August–October 2023):

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Dr Manohara Acharya
Prof. Hema Achyuthan
Prof. Abiodun Ayodele
Mr Alexander Bell
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Prof. Richard Brown
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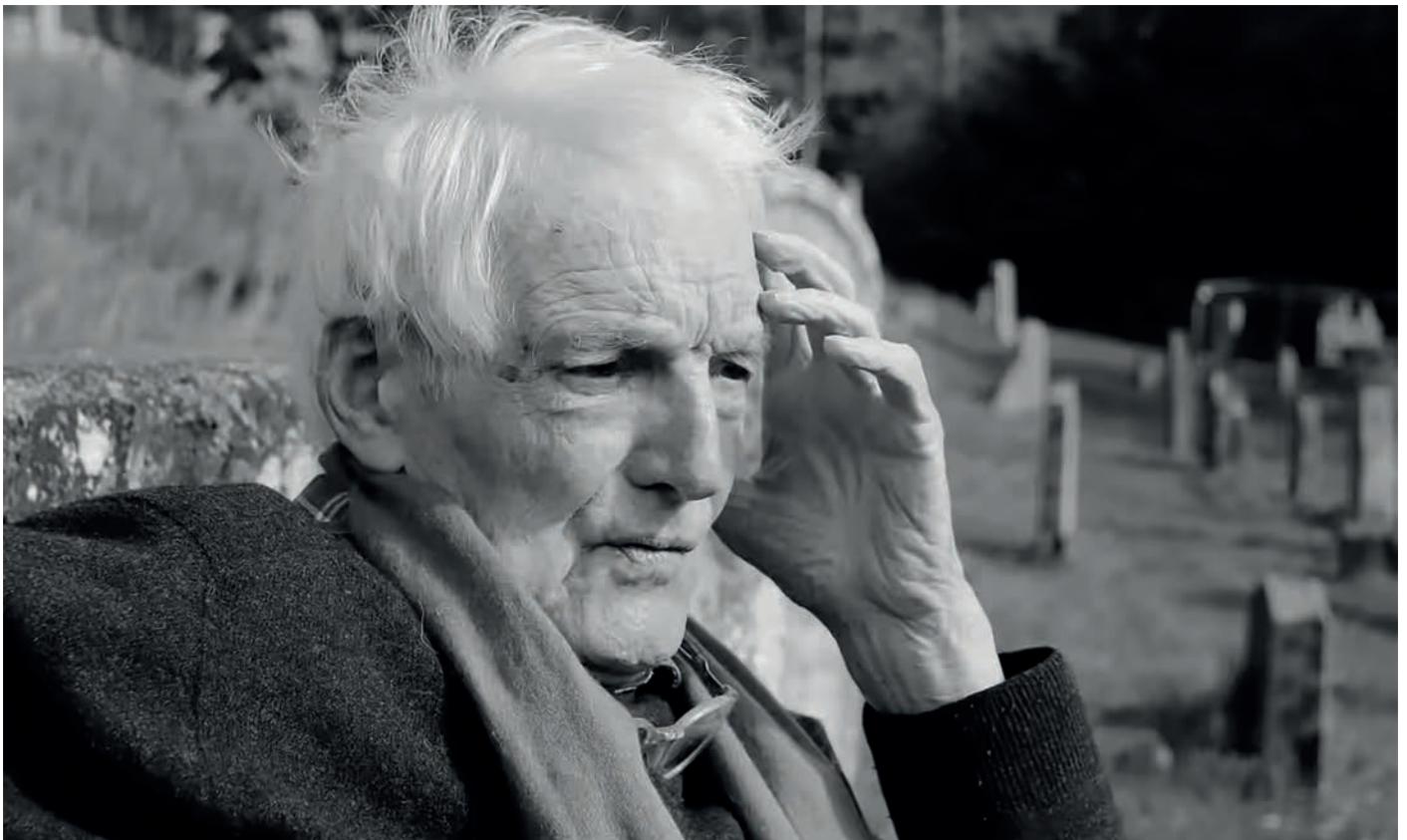
Lives remembered

Andrew Packard FLS (1929–2023): An Appreciation

The August 2023 special issue of the *Biological Journal of the Linnean Society* includes a dedication to the life of Andrew Packard FLS, 8 March 1929–15 June 2023.¹ Several contributors to this issue knew Andrew, and benefitted from discussions with him over many years across the wider aspects of biological thought which formed his mental forum. In some way he was a moving force, a blithe spirit, addressing many of the profound conundrums which face biology today. By nature he could never be *éminence gris*, being all too present, colourful and

vital in personage, too subtle and precise with words, and too kind and creative with criticisms. Anyone fortunate enough to have made his acquaintance would remember the meeting(s).

Andrew did not contribute to the current special issue. He did contribute however to another special issue of the *Biological Journal of the Linnean Society*: ‘The Role of Behaviour in Evolution’ (2014), which arose from a Linnean day meeting in September 2011. Co-authored with Jonathan Delafield-Butt,² the paper addressed Charles Darwin’s thoughts—not on species and origins (thankfully!)—but rather on feelings and emotions, and their place in evolution, and the authors separate these from ‘cognitive’ ideas. The paper is an



- 1 Vane-Wright, R. I. and Corning, P. A. (eds). (2023). Teleonomy in living systems. *Biological Journal of the Linnean Society* 139(4): [iii] + 341–587.
- 2 Packard, A. and Delafield-Butt, J. T. (2014). Feelings as agents of selection: putting Charles Darwin back into (extended neo-) Darwinism. *Biological Journal of the Linnean Society* 112: 332–353. <https://doi.org/10.1111/bij.12225>

exploration of deep behaviours, perhaps the deepest of all behaviours of living things. Earlier that same year (2011) Andrew, with the support of David Cutler, staged another Linnean day meeting—‘Strain-induced assembly hypothesis and the growth of form’. Some insight into his interests in this enigmatic topic can be found in a remarkable paper published in *Biology and Philosophy* in 2006,³ titled ‘Contribution to the whole (H). Can squids show us anything that we did not know already?’ Here Andrew explored and addressed the fundamental issues of multicellular organisms undergoing cell division and differentiating, becoming separate parts, yet remaining a unified and functioning whole. He offered the name *homeotaxy* or ‘peer conformity’ for this general principle of a unified whole. Attempting to grasp the nature of the growth (a growing apart *and* a growing together) and underlying unity of function of deep form, and give a name to this process, were his aims here. What he achieved needs deep reflection. Two further papers from his efforts in the eighth and ninth decades of his long life tie the ideas of deep behaviour and deep form, partly together. He contributed to a dialogue with John B. Cobb (scholar of Alfred North Whitehead’s process philosophy and a process theologian) on the limitations of both mind-body dualism and neo-Darwinism.⁴ Andrew then pointed to Erkki Haukioja’s theory of living entities as a more hopeful line of logic and process for a world comprising living things.⁵

These thoughts were the culmination of research over many decades, mainly on squids and octopuses, but sometimes detouring into teleosts and hemichordates, with Andrew taking the view of letting the animals speak for themselves as often as possible. The findings of gross and micro-anatomy, functional anatomy, general physiology and neurophysiology, behaviour and ontogeny and psychology were all given a written record by him. Almost 70 years of solitary and shared researches and publications can here perhaps be best summarised as Packard’s contributions to the untangling of the many arms of octopuses (and squids).

Andrew graduated from Oxford University (Pembroke College) in 1954, in classical Zoology and Comparative Anatomy by his own admission. He spent five years in New Zealand—four at Auckland University College, University of New Zealand, where he was offered a lectureship in zoology by the formidable Prof MacGregor, of Scots descent.

3 Contribution to the whole (H). Can squids show us anything that we did not know already? *Biology & Philosophy* 21(2): 189–211.

4 Packard, A. (2014). No need for dualism in evolutionary theory. A comment on John B. Cobb’s ‘A Fourth Variable in Evolution’. In S. Koutroufinis (ed.), *Life and Process: Towards a New Biophilosophy*. Berlin, Boston: De Gruyter, pp. 225–246.

5 Packard, A. (2014). Erkki Haukioja to the rescue? In S. Koutroufinis (ed.), *Life and Process: Towards a New Biophilosophy*. Berlin, Boston: De Gruyter, pp. 251–254.

6 DeSio, F. and Packard, A. (2010). John Zachary Young—Invitation to the dance. *Physiology News* (78): 32–34.

7 Young, J. Z. (1978). *Programs of the Brain*. Oxford: Oxford University Press, [Preface].

Andrew’s talent for teaching was immediately obvious, and impressed one student in particular in his first class in zoology, a young botanist who would become a leading light in developmental psychology, Colwyn Trevarthen. Andrew and Colwyn would become lifelong friends, and influence their fields of physiology and psychology, respectively, meeting again at The University of Edinburgh in Scotland, some years later.

After Auckland, Andrew worked one year in charge of the Portobello Marine Station, Otago. His first two papers appear to have been written during this period, for the Schools Publication Branch of the NZ Department of Education, both entitled *The Meaning of Animal Form* (Pt. 1: ‘Looking at animals’, 1958; Pt. 2: ‘Change and continuity’, 1959)—evidently his lifelong interests, including the pursuit of homeotaxy, were already nascent from the start.

Then he was in Naples, Italy, at Stazione Zoologica Anton Dohrn, where he encountered the remarkable anatomist and physiologist J. Z. Young. In a deeply insightful retrospective, co-authored with Fabio DeSio,⁶ J. Z. is quoted with approval: ‘Living systems can properly be said to act in pursuit of certain aims. Each tries to achieve certain standards appropriate to its way of life. The result of this continual striving, choosing and deciding, through millions of years, has been a progressive accumulation of information about how best to live⁷—50 words that also sum up the entirety of the 2023 *BJLS* special issue, as they do many of Andrew’s own preoccupations.

Following Naples, Andrew was appointed Reader in Physiology at the University of Edinburgh Medical School where he resumed his friendship with Colwyn, now a lecturer in the Psychology department there. Andrew and Colwyn co-hosted a seminar series on the biological nature of communication; Andrew’s knowledge of squid-squid communication through mottling, and Colwyn’s from human intra-cortical hemispheric communication made earlier with Roger Sperry at Caltech (who would win the Nobel Prize in 1981) and mother-infant communication (with seminal psychologist Jerome Bruner at Harvard). The biological nature of minds, and their sharing of feelings and intentions, would drive both their thinking for decades to come, and form a lasting legacy of correspondence and friendship.

After Edinburgh, Andrew returned to the University of Naples as Professor of Zoology at the Naples Zoological Station, where he retained an affiliation (and a flat) until his death. Sabbaticals and wanderings enriched his career and took him to Victoria, British Columbia, Hopkins Marine Station, and most recently to Stanford University, California where he engaged a fruitful collaboration with Professor of Oceans, Billy Gilly.⁸ Andrew retained his roots to Scotland, visiting family at Strathpeffer and friends there, until his final years.

Andrew retired to La Garde-Freinet, in the south of France, where he met his last romantic partner, painter Susanna Linhart (who sadly passed in 2021), and where he kept a friendship with Colin Blakemore, a fellow physiologist and previous head of the Oxford Physiology Labs. Always a keen painter, Andrew enjoyed his last years in his garden, with his cat, where the two shared evening walks, and Andrew would spend his days writing or with the paintbrush. His mind did not rest, corresponding and advancing biological thought in his subtle, but significant, contributions almost up to his death in June 2023.

**Robin Bruce, Jonathan Delafield-Butt, Denis Noble
and Dick Vane-Wright**

For more about Andrew,
read Mary Kaldor's obituary in *The Guardian*:
<https://www.theguardian.com/science/2023/sep/19/andrew-packard-obituary>

Deaths Reported to Council

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Prof. Norman Cole
Ms Barbara Griggs
Dr Clive Lovatt
Mr Elliott Nyegaard
Dr Andrew Packard
Mr Daniel Peterich
Mrs Margaret Steentoft
Mr Trevor Titterington
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⁸ <https://gillylab.stanford.edu/packard>



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