

# The Linnean

Communicating nature since 1788

Vol 38 | No 2 | October 2022

## Energy and the Changing Climate

WE ARE THE ARCHITECTS  
OF OUR FUTURE

*Authors of the  
Anthropocene*  
Is anyone listening?

*Analysing  
the gender  
balance in our  
MEDALS  
AND AWARDS*

**Alfred C. Kinsey**  
*Taxonomist*

JOHN A. BURTON FLS  
*A wonderful original*

The  
LINNEAN  
SOCIETY  
of London

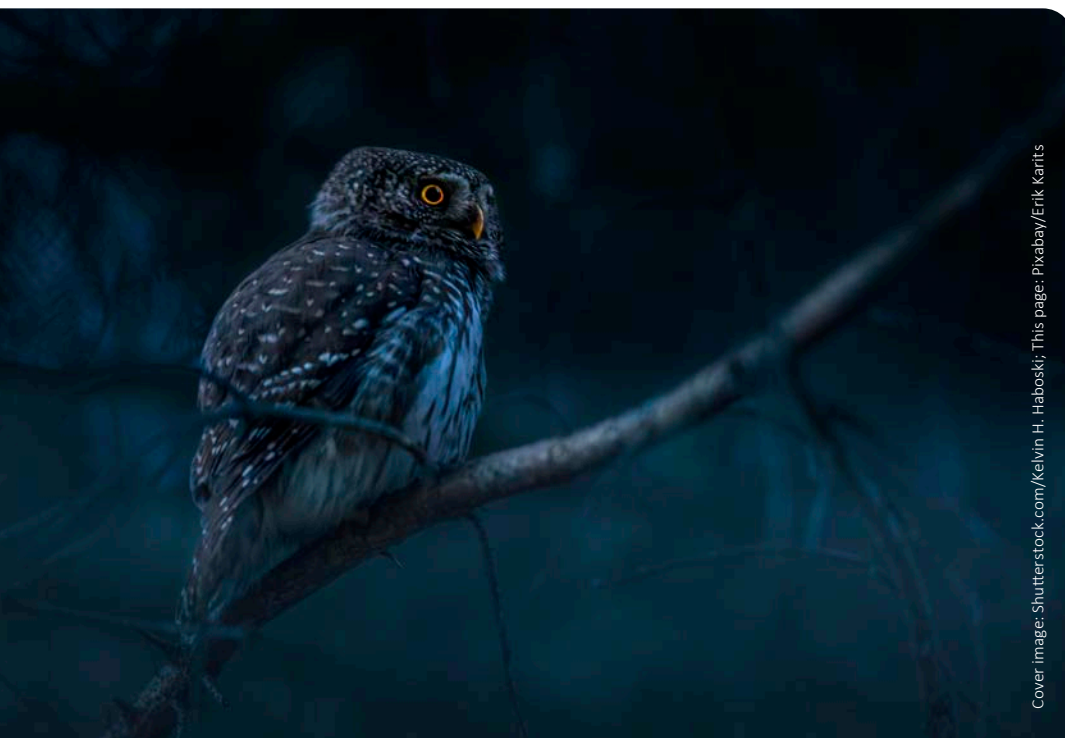




## About us

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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*Communicating nature since 1788*

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# Dear Fellows,

It's now moving into the autumn in our part of the world, and the temperature is dropping. The cost-of-living crisis, propelled by the rise in energy prices, has made many headlines in the UK. In this issue, Chris Rhodes gives a timely overview of our use of energy resources, and describes our position as being in 'ecological overshoot'. John Feltwell adds to this with his piece on future predictions for biodiversity by the 'Authors of the Anthropocene'—but who has heeded them?

Past President Sandra Knapp has assembled a preliminary analysis of the gender balance in our medals and awards, and publishes her findings here—it is interesting reading. We also take a look at the stories behind some of the portraits found in our rooms, upon the discovery of a number of old documents relating to their care. In September, we learned of the passing of our Royal Patron, Her Majesty The Queen, Elizabeth II; a short piece on p. 12 looks at Her Majesty's visit to the Society for its 1988 Bicentenary.

And there is much more, including details for our upcoming events, news (welcome to new President Anjali Goswami!) and book reviews.

Thank you for your continued support of the Society.

*Leonie*

Leonie Berwick

Editor, *The Linnean*  
& Publications Manager



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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](http://www.linnean.org/thelinnean)).

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# What's on



## AMATEUR LEPIDOPTERISTS AND MUSEUMS: PAST AND PRESENT

Speaker: Erica Fischer

2 November | 12.30 BST

People have been collecting and preserving insect specimens for centuries; butterflies and moths have been particularly popular due to their often-striking appearances. The majority of digitised butterfly and moth specimens in US institutions were collected by amateur lepidopterists, not professional entomologists.

However, there has been a steep decrease in the acquisition and donation of specimens to these collections since the 1990s. Amateur lepidopterists have played a large role in the growth. Why are their contributions declining? **(ONLINE ONLY.)**



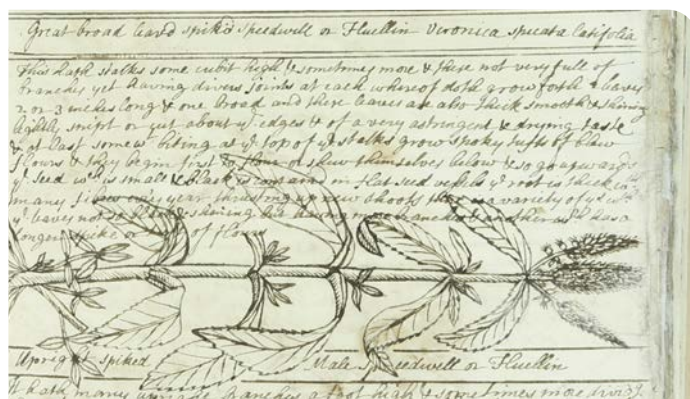
## PLAGUES UPON THE EARTH: THE NATURAL HISTORY OF HUMAN GERMS

Speaker: Kyle Harper

9 November | 18.00 BST (Nature Reader event)

The COVID-19 pandemic has given us an unfortunate reminder of the destabilising potential of emerging infectious diseases. Plague and pestilence have been a part of the human past from the beginning to present, and this talk will explore what we know, don't know, are learning, and might learn about the deep past of humanity's germs.

Historian Kyle Harper will present the history of infectious disease as the intertwined tale of human progress and microbial ecology. **(ONLINE ONLY.)**



## LINNEAN LENS: BOTANICAL NOTEBOOKS OF FRANK NICHOLLS

Speakers: Liz McGow, Janet Ashdown

14 November | 14.00 BST

Join our archivist Liz McGow and conservator Janet Ashdown as they delve in to the fascinating and turbulent history of the botanical notebooks of Frank Nicholls, physician to George II. This unusual manuscript, dated 1773, contains detailed descriptions of British plants alongside beautiful pen and ink drawings, including loose fragments and specimens, and was almost destroyed during the Blitz. **(ONLINE ONLY.)**

To book for these and other events not shown, visit [www.linnean.org/events](http://www.linnean.org/events)

## HOW GENOME SIZE CONSTRAINS PLANT ECOLOGY AND DISTRIBUTION

**Speaker: Andrew Leitch**

**24 November | 18.00 BST**

The amount of DNA in each cell of an organism, called the 'genome size', varies enormously between species. This talk will show how huge differences in the total bulk of DNA has consequences for how and where a plant can live.

**(THIS EVENT WILL BE ONSITE AT BURLINGTON HOUSE AND LIVE STREAMED; PLEASE SELECT THE CORRECT TICKET WHEN BOOKING.)**



## FOUNDER'S DAY LECTURE 2022: LINNAEUS ON HUMAN DIVERSITY

**Speakers: Isabelle Charmantier, Staffan Müller-Wille**

**2 December | 18.00 BST**

Was Carl Linnaeus a modern scientific racist? What did the world look like for him, and what place did humans, in their diversity, occupy in it?

By following Linnaeus's evolving views about human diversity, this talk will answer these questions and more, discussing whether he fits into the foil of a modern scientific racist, or not.

**(THIS EVENT WILL BE ONSITE AT BURLINGTON HOUSE AND LIVE STREAMED; PLEASE SELECT THE CORRECT TICKET WHEN BOOKING.)**



## CHRISTMAS LECTURE 2022: A WORLD OF URBAN BIRDS

**Speaker: David Lindo**

**15 December | 18.00 BST**

Join us at the Society as David Lindo, AKA The Urban Birder, virtually takes us on a tour of the urban world of birds. Over 20% of the globe's bird species have been recorded within our towns and cities, sometimes without us noticing. You may even be surprised at some of the species David will be featuring!

David is a regular television and radio presenter, and has been featured on the BBC, ITV, Channel 4 in the UK as well as other TV and radio channels around the world including CBS in the United States. **(ONLINE ONLY.)**

## TREASURES TOURS (NOV–DEC)

**3 November, 1 December | 14.00–15.30 BST**

Join our expert staff for an in-depth, behind-the-scenes tour of our unique collections, and beautiful home, in Burlington House on London's famous Piccadilly.

You'll see the library and collections of Carl Linnaeus that helped to create the binomial system of naming nature that we still use today. And 'take a turn' about our stunning and airy library, its shelves packed with books about natural history.

**THESE TOURS ARE POPULAR: PLEASE BOOK WELL IN ADVANCE!**





# News

## Welcome to Our New President: Anjali Goswami

Having been in the role of President-elect since 2021, Professor Anjali Goswami was officially sworn in as our new President at the Society's Anniversary Meeting in May. Many of you will already know that Anjali is a comparative biologist of international renown, whose academic contributions span the life and earth sciences. She is a Research Leader in Life Sciences and Dean of Postgraduate Education at the Natural History Museum, and Honorary Professor of Palaeobiology at University College London.



Anjali Goswami, photographed in the Society's library

In a statement about the Society's role in her research, and her vision of her presidential tenure, she said, 'The Society has been so valuable to me in my work, providing a community that welcomed me as an early career researcher and a new arrival to the U.K. I've met so many people with varied experience and expertise through events at the Linnean Society, and I'm excited to help open up those opportunities to others and continue broadening our reach.'

Central to this will be continuing the fantastic work Sandy has begun on modernising our governance and Bye-Laws. Having been on the working group for this over the last year, I've seen how central these are to the workings and capabilities of the Society. These changes will enable the Society to maximise our impact on science and global communities and better support our Fellows and members around the world, new and old.

I'm also eager to bring in new voices from under-served audiences and to support the work of the staff of the Society as they work to uncover unheard stories from within natural sciences. The Linnean Society has always brought together different disciplines, but like many organisations, we haven't always been inclusive to people with different backgrounds and experiences. Ensuring our Society is open for all people who are passionate about natural history enriches the debates and the work that we do, and is critical for achieving a world where nature is understood, valued and protected.'

## Thank You to Sandra Knapp PPLS

As we welcome Anjali, we must also say a huge thank you and goodbye to our President of the past four years, Dr Sandra Knapp. As many of you will know, her first year was spent having treatment for cancer, yet even during this time Sandy did as much as she could in support of her role on Council, with the help of her stalwart Vice Presidents. We were all incredibly grateful that her treatment was successful, and that she could stay on for another three years. She worked hard to redefine the Society's vision and mission, and to start implementing changes recommended by the Governance Review held late in 2018. As a result, the Society is now focussed on evolving its Bye-Laws, structure and strategy.



Towards the end of her role as President, Sandy was photographed as American naturalist and correspondent of Charles Darwin, Mary Treat, for the exhibition 'Darwin in Conversation' at Cambridge University Library.

Sandy supported the Society's Burlington House campaign to the fullest in 2021, mobilising contacts and writing statements, press releases and generally throwing her hat into the ring wherever possible. She was also interviewed, championing our cause, by *The Observer* in February of 2021. Due to this and the combined efforts of the institutions around the Burlington House courtyard, Sir David Attenborough OM HonMLS wrote to then-Prime Minister Boris Johnson on behalf of the Burlington House societies.

Sandy was also always available to introduce our lectures and meetings, give her input into collaborative projects whenever asked, and expertly directed Q&A sessions. We cannot thank her enough for her dedication to the Society. She can now invest even more of her time into her lifelong passion, botany, specifically her field of expertise, the Solanaceae. Sandy's term as President ended in May, but we hope she will return to see us often.

**'Darwin in Conversation' runs until 3 December 2022; to see Sandy's portrait and the full exhibition, visit <https://www.lib.cam.ac.uk/darwin>.**

## Support Us, Support the Study of Nature: LEAVE A LEGACY

As we reflect on what we have been able to achieve in 2021 and 2022, it's an opportune moment to mention how much we value the engagement of our Fellowship—whether through supporting our events, volunteering to help with our activities and governance, or by donating to help fund our valuable work. For example, in 2021 we were enormously grateful to receive over £350,000 in legacy income. This will either be used to deliver our various charitable activities or to enable us to build a reserve to invest in our long-term security. If you would like more information about how you might be able to assist us in a similar way, please don't hesitate to get in touch or visit [www.linnean.org/legacy](http://www.linnean.org/legacy).





## LINNEANA SYMPOSIUM: RENEWING CONNECTIONS

Isabelle Charmantier, *Head of Collections*

Isabelle Charmantier attended a two-day symposium in the Orangery of the Linnaeus Garden in Uppsala, Sweden in May. *Linneana! Linné och 1700-talet i arkiven och praktiken* (Linnaeus and the 18th century, in archives and in practice) was co-organised by the Institute for History of Ideas and Science (Uppsala University) and the Hagströmer Library (Karolinska Institutet).

The first day's talks centred on Linnaeus in libraries and archives, such as his *Systema naturae*, or his Lapland diary. Isabelle gave a talk on the Linnean Society's Linnaean material, and how to access it, while Helena Backman gave an overview of the Linnaean collections at Uppsala University Library.

The second day focused on material practices, with fun practical sessions: tasting coffee and tea surrogates, including Carl Linnaeus's own 'Lapp tea'; and experiencing the aroma and taste of 18th-century medicines. Annika Windahl Pontén FLS led a dance performance and a very enjoyable try-out session (from which it was concluded that Swedish 18th-century dancing resembled a sedate ceilidh!).

The trip was incredibly enriching, enabling the renewal of connections with colleagues not seen for three years, and from which future collaborations are already emerging. It also allowed for a moving and solitary visit of Linnaeus's summer home of Hammarby, under the clear blue sky of a beautiful Swedish spring day.

Image: Isabelle Charmantier



CLOCKWISE FROM ABOVE: Isabelle in front of Linnaeus's summer home of Hammarby; Tasting tea and coffee 'surrogates', including 'Lapp tea'; The Orangery in the Linnaeus Garden in Uppsala, Sweden.

## Branching Out: New paper reveals change to dinosaur family tree

Researchers from the University of Cambridge in the UK and Universidade Federal de Santa Maria in Brazil have published a paper in the *Zoological Journal of the Linnean Society* detailing a new analysis of bird-hipped dinosaurs. A press release from the University of Cambridge outlines their findings.

Attempting to resolve the question ‘where do ‘bird-hipped’ dinosaurs, or ornithischians, come from?’, David Norman FLS and his colleagues analysed early dinosaurs and saurischians. In 2017, David and his former PhD students Matthew Baron and Paul Barrett suggested that ‘these dinosaur family groupings need to be rearranged, re-defined and re-named’, with the idea that bird-hipped dinosaurs and lizard-hipped dinosaurs evolved from a common ancestor—a potentially controversial thought, though it has ‘long been recognised that bird-hipped dinosaurs are anatomically distinct’. Norman states, ‘The first unarguable ornithischian remains date from less than 200 million years ago, meaning there is a 25+ million-year ornithischian gap.’ Working collaboratively with Mauricio Garcia and Rodrigo Müller in Brazil, Norman and his team analysed a range of bird-hipped dinosaur species and dinosaur ancestors, and the outcome was ‘a family tree that depicts saurischians as a succession of animals on the stem of the branch leading to Ornithischia’.



The paper, published in September, argues that ornithischians appeared in the Late Triassic. Norman reveals, ‘the very earliest ornithischians were, technically, saurischian. From a taxonomic perspective, classifying saurischians as early ornithischians seems counterintuitive. But, taking a Darwinian perspective, the unique anatomical characteristics of ornithischians had to evolve from somewhere, and where better than from their nearest relatives: their saurischian cousins!’

Norman, D. B *et al.* (2022). Taxonomic, palaeobiological and evolutionary implications of a phylogenetic hypothesis for Ornithischia (Archosauria: Dinosauria). *Zoological Journal of the Linnean Society*. <https://doi.org/10.1093/zoolinnean/zlac062>

## Update on Arrangements with Our Journals

**Gail Cardew, CEO**

Our journals are core to our history and help us to develop and share the latest scientific knowledge. Covering biology, botany, zoology and evolution, our journals are unique in publishing on specialist topics and those that cross traditional boundaries.

Last year, our Council established a working group to review the working arrangements of the journals. This exercise was instigated by the concerns of the Editors over production difficulties, and was further shaped by both ongoing work to improve the accountability and transparency of the Society’s internal governance and the challenging financial backdrop facing the Society.

As a result, Council decided to establish an in-house editorial office to provide administrative support, and we’re pleased to welcome Hassan Rankou as our new Journals Editorial Manager—you can read more about his new role on p. 11.

This will help to standardise the production process across the journals. In addition, closer working with our engagement team will help us to bring interesting journal articles to the attention of a wider audience.

They also decided the Editors should have fixed terms to enable us to bring in new ideas and perspectives, and that there should be an open and transparent recruitment process for these posts. You will have seen adverts for the roles of Editor in Chief for two of the journals. Professor Mike Fay and Dr Maarten Christenhusz, current editors for the *Botanical Journal of the Linnean Society* and *Zoological Journal of the Linnean Society* respectively, will help to settle the new role holders in over the coming months, before standing down in spring 2023. We’d like to thank both for the tremendous work they have done in running the journals over the past years.



## STAFF CHANGES: WELCOME AND FAREWELL

### Head of Engagement: Anna Perman

Anna joined us in May as Head of Engagement. This new role brings together our publications, events, digital communications, social media, and education within one team.



She joins us from Guy's and St Thomas', where she managed research communications and engagement, including COVID-19 studies. Prior to this she has worked in press and communications at Cancer Research UK, the British Science Association and the publisher BioMed Central. She has held voluntary roles on art and science projects and on the committee of the STEM Public Relations Association.

As well as spending her spare time teaching dance, she enjoys getting out into the countryside with her two dogs. She is a keen gardener and working on growing fruit and vegetables in a small urban space.

She is looking forward to working with the staff and Fellows of the Society to share a love of the natural world and help everyone understand how they can best protect it.

### Journals Editorial Manager: Hassan Rankou

Hassan recently joined us in his new role as Journals Editorial Manager, though he has worked as the Assistant Editor of the *Botanical Journal of the Linnean Society* for many years. He



received his PhD in Biodiversity Conservation and Climate Change from the University of Reading, UK, and has a BSc and MSc in Biodiversity Conservation. He is an Honorary Research Associate at the Royal Botanic Gardens, Kew.

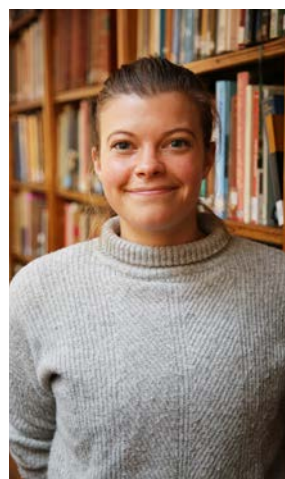
His applied research focuses on conservation of natural resources, ecological monitoring, flagship species, resource management, sustainable agroforestry, and participatory approaches by local communities to conserve biodiversity hotspots. His applied research in conservation and

training initiatives led him to become a Certified International IUCN Trainer and a Certified Climate Change Modeller, travelling to many countries to deliver training workshops and build the capacity of local students and communities.

He has an extensive experience in the editorial management of peer-reviewed journal publications, project management and research evaluation, and is a native speaker of both Arabic and French.

### Education Manager: Ayesha Meredith-Lewis

Ayesha started as our new Education Manager at the end of September. She has always loved the natural world, exploring it both inside a museum and outdoors in a forest. Ayesha has worked in education for the last 15 years and loves inspiring young people to engage with nature.



Previously, she has worked with young people at the London Wildlife Trust in such outdoor activities as birdwatching, river surveys, practical conservation, species ID and bushcraft. Before that she was working in the education team at London's Natural History Museum using their fantastic collection of specimens to encourage audiences to connect with the study of natural history.

Ayesha says: 'I'm looking forward to working with the local communities and schools in London, as well as on UK-wide projects. It is my goal to encourage as many as possible to engage with the Linnean Society and nature at large. I'm excited to be part of the new education team and to take on the new challenges it will bring.'

We said a sad farewell to **Joe Burton** as Education Manager, **Zia Forrai** as Education Assistant and **Cathy Youthed** this summer. Joe joined the Society in November 2017 and started both our portrait competition and the Our Local Nature grant scheme, encouraging and enhancing community nature projects. Zia supported the BioMedia Meltdown competition in September 2018 before becoming Education Assistant, delivering some fantastic workshops and tours. Cathy joined as Governance Manager in 2020 and transformed our processes. They will be greatly missed and we wish them all the best for the future.





# Her Majesty The Queen, Elizabeth II (1926–2022)

Her Majesty The Queen had been a longstanding figure in the history of not just the UK, but also of the Linnean Society of London, and it is with deep sadness that we offer our condolences to the Royal Family at the news of her passing on 8 September 2022. Upon ascending the throne in 1952, The Queen became a Patron of the Linnean Society, but had been an Honorary Member since 1947—a relationship of over 70 years. (Her Majesty Queen Elizabeth, the Queen Mother had also been a Patron of the Society for 64 years.) Something we have always appreciated was The Queen's love of animals and her evident joy at spending time in nature.

## Celebrating the Linnean Society's Bicentenary

In 1988, we had the pleasure of welcoming HM The Queen to the Society to be a part of its Bicentenary celebrations. On 17 March, The Queen and HRH Prince Philip, The Duke of Edinburgh attended a Royal Reception at our premises in Burlington House. After being received by then-President William G. Chaloner and Executive Secretary Cdr J. H. Fiddian-Green, R.N, the Royal Party was introduced to the Society's Officers, Council and staff.

A specially-designed page in the Society's Roll and Charter was signed by The Queen and the Duke of Edinburgh, who were joined by 232 members of the Linnean Society at the reception. (The page is illustrated with the floral badges of England, Scotland and Ireland—rose, thistle and shamrock—alongside oak leaves and acorns representing strength, wisdom and long life.) The Royal Party was then taken to the library to see displays of the collections, both specimens and printed materials, guided by the President and previous Officers like Professor William Stearn PPLS.

Later, we received this kind response: 'I send my thanks to you, the Foreign Members and Fellows of the Linnean Society of London, gathered together with their guests this evening, for their kind and loyal message of greetings, sent on the occasion of the Society's Bicentenary. As your Patron, I was delighted to receive this message and send my best wishes to you all for a most enjoyable occasion. I very much enjoyed the Reception held at Burlington House last March. Elizabeth R.'

## An esteemed Patron

In 2016, the Society was also incredibly appreciative to be included in the Patron's Fund on the occasion of HM The Queen's 90th birthday. We were selected to receive £2,500 from the fund which was put towards items to bolster our education outreach.

The Society sent letters of condolence to both His Majesty King Charles III and HRH The Princess Royal, and joined the rest of the UK in remaining closed for the State Funeral of HM The Queen on 19 September 2022.

**LEFT:** Her Majesty The Queen being greeted by Professor William Stearn PPLS (*Left*) and then-President Professor William G. Chaloner (*Right*), at the Society's Bicentenary celebrations in 1988.

**BELOW:** Images of HM The Queen were shown on the famous illuminated signs at London's Piccadilly Circus, near the Society's Burlington House home.

Images: The Linnean Society of London; Leonie Berwick





# ARCHITECTS of our FUTURE

## Energy and the changing climate

by Chris Rhodes FRSC FRSA FLS

**ABOVE:** Field of soya being harvested in Brazil. Formerly this land was rainforest, and the plumes of dust following the combine harvesters are topsoil, broken up as they pass over it. Once the land becomes unproductive due to soil erosion, yet more forest is cleared.

A Statistical Review of World Energy by BP in 2022 showed that 82% of the total primary energy used by humans on Earth is derived from fossil fuels, whose combustion causes global heating, from energy reined in by greenhouse gases, and impels climate change. Although our overall use of energy has increased by about 13% during the past ten years, the relative proportions of oil, gas, nuclear, and hydro in the energy-mix have changed very little. Coal use has fallen from 30% to 27%, but despite an increase in renewables, total wind-plus-solar-combined still count for less than 5% of global primary energy.

The lion's share (31%) of our energy is furnished by crude oil, which is the lifeblood of industrial civilisation; however, this is becoming harder and more expensive to produce. Before about 1930, for each barrel of oil's worth of energy expended, in excess of 50 barrels of oil were recovered. Now, globally, this Energy Return on Investment (EROI) is less than 20, and for heaviest oils,

probably under five, meaning relentlessly greater amounts of energy must be consumed to maintain the flow of this critical resource (Rhodes 2014).

### Oil production and use

Annually, the human enterprise devours a massive 30 billion barrels of crude oil (BP 2021): 83 million barrels a day, or almost 1,000 barrels a second. Snap your fingers, and another 1,000 barrels of oil are gone. Until about ten years ago, the world's main oil producers were Saudi Arabia and Russia, but the United States has now joined this exclusive club as a result of its success in hydraulic fracturing ('fracking'), which allows large volumes of light tight oil to be recovered, mainly from low-permeable shale, and now accounts for almost two-thirds of US oil production (EIA 2022).

Much of the oil remaining in the world is high-sulphur (sour) and heavy (e.g. from the



Orinoco belt in Venezuela), needing more costly processing, and most of it is unrecoverable. 'Extra-heavy' oil is not a freely flowing liquid but is bituminous, and resembles the black tar used for road surfacing. Sometimes, 'statistics' are released, mainly to encourage investors, such as there is more oil (in the form of 'oil shale') under America than there is under Saudi Arabia (Rapier 2012), but this refers to an ancient solid material called kerogen, which needs to be heated to 400–500 °C to turn it into a liquid that we recognise as oil; since this takes a lot of energy, the EROI is typically low (Rhodes 2014).

Oil not only fuels transportation, but (including natural gas liquids) is the raw 'carbon' chemical feedstock for plastics, chemicals, pharmaceuticals, and most modern devices like computers, cell phones, etc. Without oil and natural gas (for fertilisers) modern agriculture could not exist; additionally, it takes up to ten calories of fossil fuels to deliver each calorie of food onto the plate (Lott 2011). Some of the impacts of 'industrialised' agriculture on the biosphere are illustrated in the image opposite, which shows a field of soya being harvested in Brazil: the land itself was formerly rainforest, which has been cleared for crops, and the plumes of dust following the combine harvesters are topsoil, broken up by these heavy machines as they pass over it. Since the fields are left bare until the next crop is planted, the soil is blown or washed away (erosion). In a few years, the land loses its productivity, whereupon more rainforest is cleared: a relentless process of degradation. Even larger regions of the Brazilian Amazon are cleared to provide land on which to graze cattle for the meat industry (Butler 2021).

### Alternatives to oil

Although there will always be hydrocarbons in the ground, supplies of cheaply and easily procured oil are diminishing, and so we need to find alternative fuels, and carbon feedstocks for industry. Burning oil also contributes 12.4 billion tonnes (The World Counts 2022) of carbon dioxide to the atmosphere every year (a third of all CO<sub>2</sub> emissions), which is driving catastrophic global climate change. Obviously, as oil-production wanes, we will emit far less carbon, but struggle to maintain the dynamics of a complex oil-dependent globalised civilisation. Potential uncertainties in the geopolitical

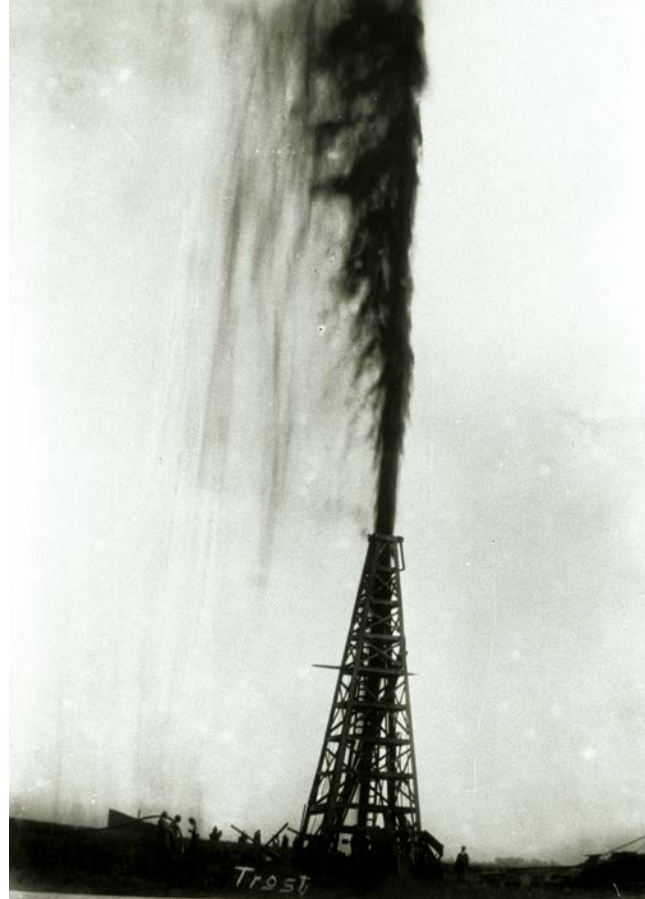
landscape, for example Russia's invasion of Ukraine, also urge actions toward reducing national dependencies on imported oil and gas (Rhodes 2022).

### Biofuels

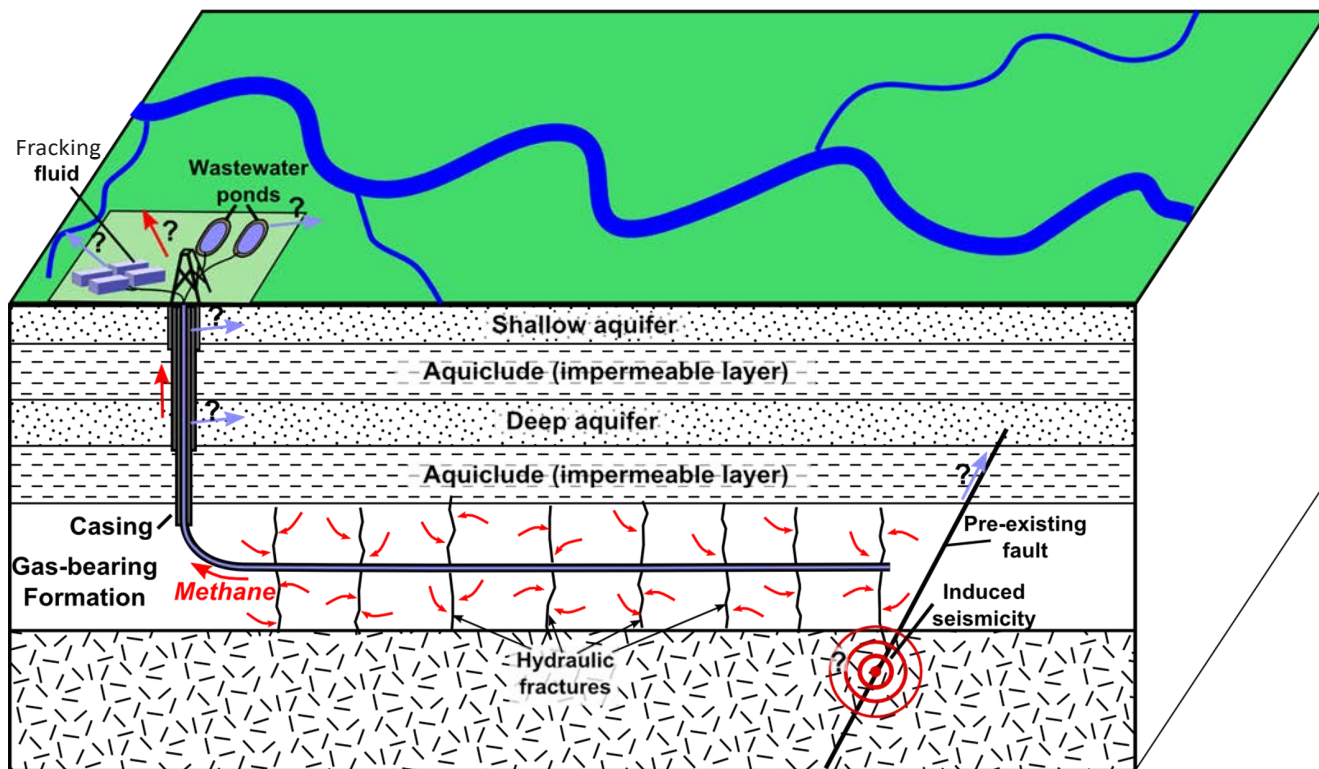
Biofuels (Rhodes 2015a) are often touted as a 'low-carbon' solution to a declining oil supply, and yet in the UK, even if all arable land was converted for the making of bioethanol (growing no food), we could only match less than half (45%) of the liquid fuel demand currently met from petroleum. Similar yields of cellulosic ethanol are expected from *Miscanthus × giganteus* ('Elephant Grass'), and although this can be grown on marginal land, large areas are still required. For biodiesel made from rapeseed the situation is even worse, and we could only produce one-seventh (14%) of our liquid fuel requirements in this way. Additionally, diesel fuel is needed to run tractors and combine harvesters to grow and harvest the biofuel crops, leading to a very low EROI, along with the consumption of large quantities of freshwater. Hence, it is unlikely that the currently less than 1% (BP 2022) of our total energy provided by biofuels will increase significantly.

### What about fracking?

Hydraulic fracturing, popularly known as 'fracking', involves creating cracks in a shale layer by pumping a fluid into it under high pressure, so that the oil or gas trapped within can flow out (OVERLEAF). The procedure has sparked controversy, particularly with regard to potential environmental contamination and adverse health effects (Michaux 2019). Leakage of methane, not only from fracking operations (Vaughan 2020) but across the whole of the global oil and gas industry (IEA 2020), is a matter of great concern, given the very high global heating potential



**ABOVE:** Oil well in Texas known in as 'Spindletop' in 1901. (See pg. 4 for the enlarged oil field in 1903.) Before about 1930, more than 50 barrels of oil could be recovered for one barrel of oil's worth of energy expended. Now, the return is nearer ten for US oil.



**ABOVE:** Schematic depiction of hydraulic fracturing for shale gas, showing main possible environmental effects.

of the gas, as compared with carbon dioxide. Nonetheless, some 65% of US oil (EIA 2022) and 79% of US natural gas are currently produced by fracking (EIA 2022).

In 2005, global output of conventional crude oil reached a plateau, and since then 71% of all growth in oil supply is from fracking, with much of the rest provided by extra-heavy oil (Michaux 2019). Outside of the US, the technology has proved far less successful, and given a persistently negative cash flow, the future viability of the shale industry is debatable. Should this falter, the global oil supply would struggle to meet demand, leading to soaring oil prices.

#### **Decline in 'cheap to produce' oil**

Oil demand is now back above 100 mb/d post-COVID-19, as global economies rebound. Yet, 81% of global liquids production is in decline, by an estimated 5–7%; the equivalent of a loss of 3–4.5 mb/d (million barrels per day) a year. For reference, just to maintain the existing output, a new Saudi Arabia's worth of production must be found every three years—the equivalent of three new Saudis by 2030!

Other oil production solutions are possible, but these will come mainly from 'unconventional' oil (such as oil sands, light tight oil, coal and gas-to-liquids conversion), plus (ultra)deepwater drilling. Such unconventional oil is more difficult, energy intensive and expensive to produce. Additional factors will also have an impact:

- It is highly uncertain how much light tight oil (from fracking shale) can be recovered, what the production rates might be, or if it can take up the slack from global existing field decline.
- From end-2014 to mid-2020, the market was oversupplied, forcing the oil price down: smaller investment at low oil prices, means less 'new oil' coming online in the next few years.
- A supply 'crunch' is predicted around 2025–2030 (Michaux 2019).

#### **The changing climate and overshoot**

The term 'Changing Climate' has been used to emphasise a set of world-scale problems, each often regarded in isolation, but which are actually



mutually entangled threads of a complex system that is failing (Rhodes 2015b). Although 'climate change', per se, is a major factor among them, remedying this alone (e.g. through net-zero emissions strategies), will not resolve the overall problem, which is that the human species is in a condition of ecological overshoot:

**OVERSHOOT** =  
the hyperconsumption of natural resources, at rates much faster than they can be replenished, and in excess of the biosphere's capacity to absorb and process the waste incurred by their use.

However, to shrink the human enterprise so that it operates within the carrying capacity of the Earth demands very large reductions in our consumption. To arrive at an estimate of just how much, we can appeal to the Ecological Footprint Analysis (Global Footprint Network 2022), which suggests around 40% as a global average, but closer to 70% in the richer, industrialised nations (see p. 18). Such 'one planet living' (see p. 19) requires a fundamental recasting of our goals and lifestyles, with far more substantive changes than essentially trying to preserve business as usual, merely with low-carbon energy in place of fossil fuels.

Even if we chose to continue burning fossil fuels, depletion would reduce their availability within the next few decades (Mohr *et al* 2015). Accordingly, it is essential to find alternatives,

in addition to mitigating the forces of climate change. While there is much speculation over how much renewable energy might actually be installed (Seibert and Rees 2021), it is likely that matching the energy derived from the coal, oil and gas currently burned will prove extremely difficult.

Clearly, by reducing our energy demand, the target for low-carbon sources is made more manageable, and significant energy savings are possible through re-localisation (so curbing transportation fuel requirements), by properly insulating buildings, and growing food locally, thus further building resilience at community level. Moreover, a buffer is provided against global supply chain failures, e.g. resulting from freak weather events, vagaries such as COVID-19 and Brexit, and geopolitical factors including outbreaks of war.

### Some symptoms of ecological overshoot

- Increasing atmospheric CO<sub>2</sub>/global heating.
- Ocean acidification and ocean temperatures both rising.
- Melting ice sheets, glaciers, sea ice.
- Rising sea-levels.
- Loss of corals.
- Decimated fisheries.

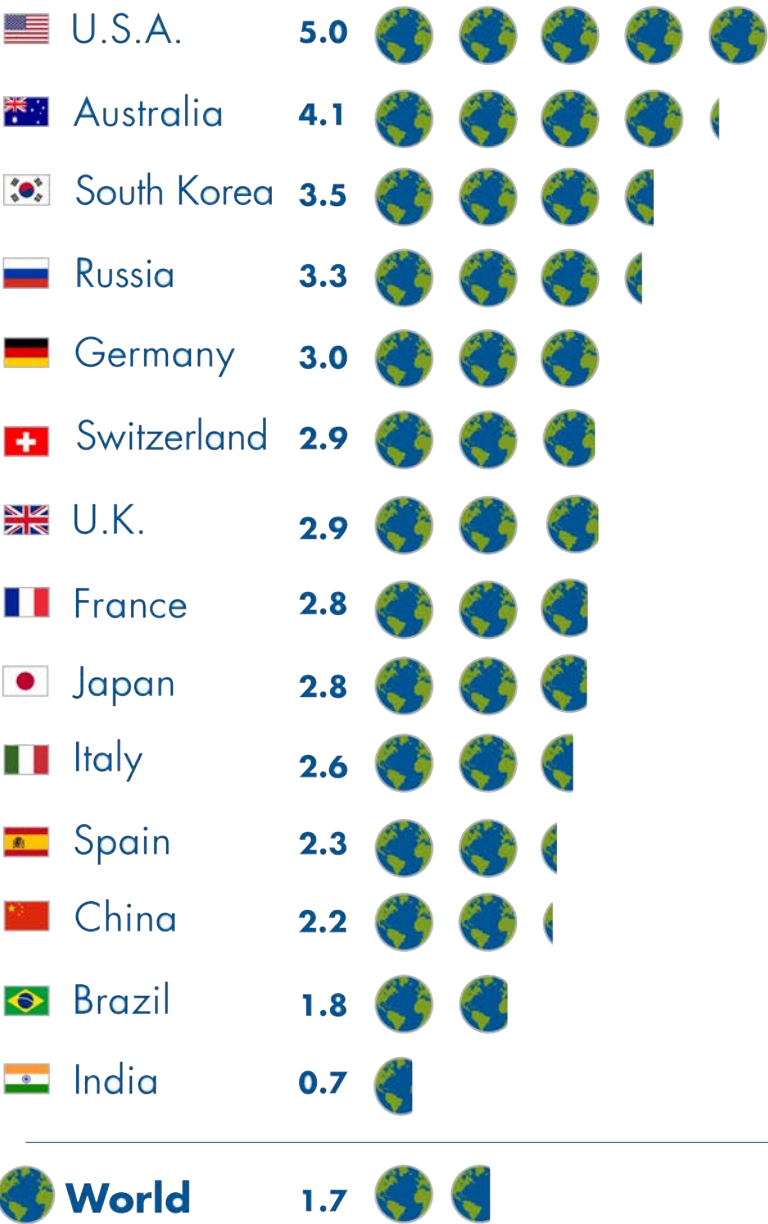
**BELOW:** Comparison of benchmark oil prices: low from end-2014 with price crash in April 2020 as a result of the COVID-19 pandemic.



Image: Wikipedia /AKS.9955

# How many Earths do we need

if the world's population lived like...



ABOVE: Ecological footprints of nations.  
Source: Global Footprint Network National Footprint Accounts 2018.

- Deforestation and habitat loss.
- Draining of fossil aquifers, rivers drying up.
- Soil erosion, desertification.
- Massive species extermination, insect die-off.
- Pollution of air, land, water, e.g. microplastics and ‘forever chemicals’.

Currently, our yearly consumption of ‘natural resources’ is unsustainable at 100 billion tonnes (Rhodes 2019), predicted to reach 184 billion tonnes by 2050. Even if we could switch our energy entirely to ‘net-zero’ emissions, current consumption and waste discharge would continue to exceed and degrade the Earth’s biocapacity. This has been expressed succinctly (Seibert & Rees 2022) by the following analogy:

What the passengers on the [MTI] Titanic need for survival is a dramatic course change, but what many of the ship’s engineers are proposing is to replace its FF engines with electric motors.

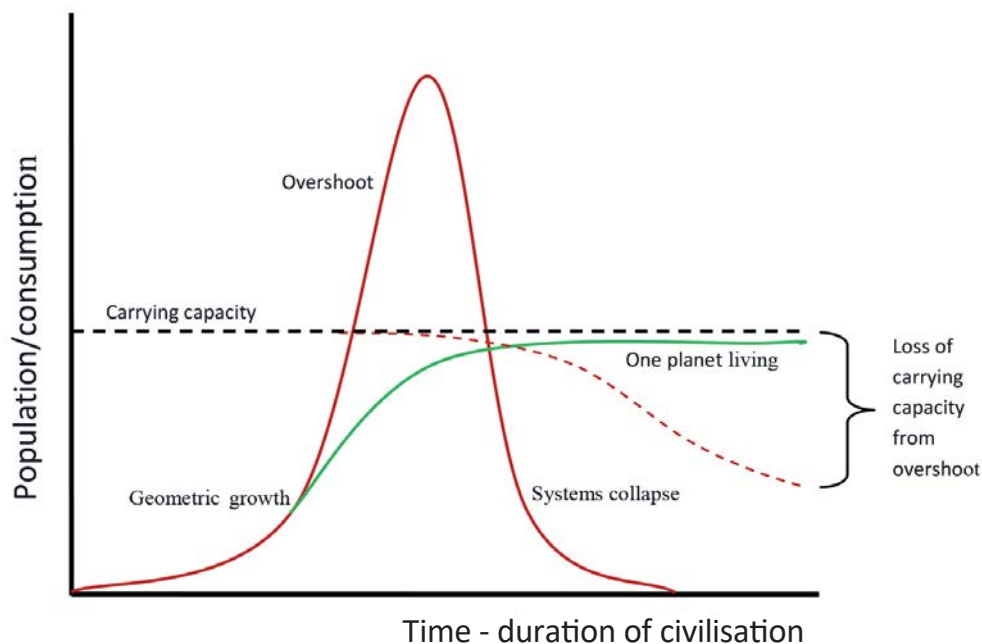
### Scientists’ warnings and the SWIA paper

The first Scientists Warning paper (Kendal 1992) mainly stressed the ecological damage being inflicted by humans, while a later study (Ripple *et al* 2017) demonstrated that the intervening 25 years had only witnessed further destruction of the ecosphere. The World Scientists’ Warning of a Climate Emergency report, published in 2019 (Ripple *et al* 2019) which has now been endorsed by a total of 14,594 scientists from 158 countries, emphasised a set of collective actions, aimed toward restoring and protecting natural ecosystems, conserving energy, reducing food waste, the adoption of a more plant-based diet, population control and economic reforms. However, two subsequent papers (Ripple *et al* 2020a) and (Ripple *et al* 2020b) merely confirmed a further, dramatic deterioration of all climate markers.

### World Scientists’ Warning into Action

The ‘WORLD SCIENTISTS’ WARNINGS INTO ACTION’ (SWIA) paper (Barnard *et al* 2021) was published on Friday 12 November 2021, the final day of the COP26 climate change conference,





**LEFT:** Alternative pathways: overshoot to collapse (red lines); or, controlled contraction to 'one planet living', well within Earth's human carrying capacity (green line).

although a definitive agreement was not actually reached until late on Saturday 13 November. It is the 'Into Action' qualifier that sets this publication apart from the previous warnings, since it offers practical means for steering away from the abyss, and toward a new territory where human needs are met, harmoniously, within the biocapacity of the Earth. SWIA summons all levels of leadership, from local to global, to make real the proposed changes. Only immediate, rapid and far-reaching action has a serious chance of keeping the Earth's mean global temperature below the 1.5 degree limit.

Massive though this challenge is, it is really a single identifier of a whole system that is out of balance: a mechanism of resource hyperconsumption which transgresses several vital, but interwoven, planetary boundaries, powered by burning 15 billion tonnes of fossil fuels per year (Rhodes 2019). Since it is the system of civilisation that must be fixed, any means to accomplish this must, of necessity, also be systemic in nature, and bring about a consolidated amelioration of climate change, biodiversity loss, and relentless degradation of the ecosphere.

The SWIA paper underlines six principal areas where effort must be focussed—Energy,

Atmospheric Pollutants, Nature, Food Systems, Economic Reforms and Population Stabilisation:

- **Energy:** Implement massive conservation practices, such as retrofitting buildings, relocalisation, and buying less 'stuff', that could halve UK energy demand. Transition from fossil fuels to low-carbon sources including solar and wind.
- **Atmospheric Pollutants:** Rapidly cut emissions of methane, soot, hydrofluorocarbons (HFCs) and other short-lived climate pollutants. This could reduce the short-term warming trend by more than 50% over the next few decades.
- **Nature:** Conserve, restore, rewild ecosystems such as forests, grasslands, peatlands, wetlands and mangroves, and allow a greater share of them to reach their ecological potential for sequestering atmospheric CO<sub>2</sub>.
- **Food Systems:** Shift to a more plant-based diet. Adopt more regenerative and local production methods: significantly reduce emissions of

methane and other GHGs, reduce deforestation, build soil. Curb food waste: globally, at least one-third of all food produced is discarded. Place-based food systems.

- **Economic Reforms:** Convert the economy from maximum GDP growth to one that operates within limits of the biosphere. Work towards regional self-reliance, and focus on restoring efficient levels of local production of food and consumer goods. Impose high taxes on high-carbon luxury goods/activities.
- **Population Stabilisation:** Stabilise a global population that is increasing by 200,000 people a day, using approaches that ensure social and economic justice, such as guaranteeing education for young men and women, and the availability of voluntary family planning services.

We call on all scientists to please sign this paper, and act in a united effort to avoid a catastrophic collapse of civilisation:

<https://www.scientistswarningeurope.org.uk/signature>

**‘We are called to be architects of the future,  
not its victims.’**

—R. Buckminster Fuller (1895–1983)

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# The Prance-Steere stamp collection

by Will Beharrell, *Librarian*

One of the great joys of the Linnean Society's collections is their material diversity. Alongside a rich library of rare books and archival papers sits a wealth of artworks, portraits, medals, coins, scientific instruments and biological specimens. Not until this year, however, did the Society possess in any great numbers one of our most familiar yet overlooked daily documents: the humble postage stamp.

All that has changed with the arrival of 50 binders of postage stamps from the collection of Sir Ghilleen Prance (Past President of the Linnean Society, 1997–2000), permanently deposited with the Society

**ABOVE:** The stamps are organised by country; the large sheet above celebrates every state bird in the US.

**RIGHT:** The Prance-Steere collection contains stamps relating to natural history from all over the world.

(CLOCKWISE FROM TOP LEFT) Stamp and printing plate from Japan; Ocean sunfish stamp (*Mola mola*) from former Yugoslavia; Sir Ghilleen Prance and William C. Steere; Zambian species cover the bottle palm (*Borassus aethiopum*), musuku (*Uapaca kirkiana*) and the baobab tree (*Adansonia digitata*).

under an agreement first struck in 2014. Sir Ghilleen's collection, meticulously organised by country of origin, takes biological subjects as its main theme, liberally augmented with depictions of historical figures, national dress, and other expressions of cultural heritage.

### A novel collection

The collection is the product of over 60 years' dedicated collecting, and in fact represents the combined efforts of two men. The name William C. Steere (1907–1989) is probably well-known to many in our Fellowship as a botanist, expert on bryophytes, and former Director of the New York Botanical Garden (whose bryophyte herbarium is now named in his honour). Less well-known was his enthusiasm for stamp-collecting, and following his retirement from the Garden his considerable philatelic collection was shared and amalgamated with that of his friend and colleague Sir Ghilleen. The unusual twin provenance of the collection is reflected in its official name, the Prance-Steere collection.

In discussions with Sir Ghilleen ahead of the collection's arrival, we attempted to ascertain particular thematic strengths that might be highlighted during cataloguing (and any future display). Sir Ghilleen was modest about his own collection, mentioning only that the stamps of Asian origin were notable and numerous. This was an understatement! Stamps issued by the government of Japan occupy an entire binder to themselves, generously supplemented with examples from across the Far East and South-East Asia. As Sir Ghilleen recalls: 'The Japanese section of the collection is particularly good because both Bill Steere and I had strong connections with that country, and we both received honours from the Emperor.'

### A different way of tracing history

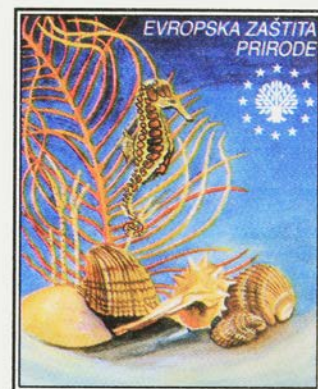
The stamps also possess considerable historic value as evidence of colonial administration in the 19th and 20th centuries, with many examples of stamps issued by colonial governments, or by the administrations of Crown Dependencies and Overseas Territories. Far from being mute relics, many serve as witnesses to turbulent periods in recent history, and as tangible evocations of different peoples and places.

No current members of the Society's Collections staff have experience of managing a rare stamp collection, so within a few weeks of delivery I set out for a meeting with colleagues at the Royal Philatelic Society (now located in new premises in Abchurch Lane, London). I am very grateful to the RPS's Head of Collections Nicola Davies for schooling me in the finer points of postage stamp cataloguing and care, including a whistle-stop introduction to the lesser arcana of Stanley Gibbons numbers (a cataloguing system for stamps).

It is clear that the staff will be working with Sir Ghilleen's gift for some time to come. We hope that, in time, an expert volunteer might be engaged to work more closely with the collection, and tease out some of its stories. Meanwhile, a skeleton record for the stamps has been created and can be viewed on the Society's online library catalogue, and a small exhibition of selected highlights is planned for display at Burlington House late in 2022. Meanwhile, we hope this little article will serve as a token of thanks to Sir Ghilleen for his wonderful gift, and as a first introduction to this most distinctive and unusual addition to the Linnean Society's holdings. In Sir Ghilleen's own words:

I chose the Linnean to receive this collection because of my long association with the Society and knowing the variety of other interesting items in the collections. Both Bill Steere and I wanted the collection to remain together rather than be split up ... and so I am very happy that it now has a permanent home ... where it can be useful to science and natural history.







# The Medals and Awards of the Linnean Society of London

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A preliminary gender analysis

by Sandra Knapp,  
*Past President*





Every year, the Linnean Society awards medals for outstanding contributions to the science of natural history—by scientists, ‘amateur’ naturalists, students and artists. The Society depends upon the Fellowship to nominate individuals for these awards, and to work to expand the reach and diversity of nominees. In past years, few nominations were received, so in 2020 we opened the nominations beyond the Fellowship, encouraging anyone to nominate excellent individuals for our awards. Criteria for all awards are prominently posted on the Society’s website, as are the names of previous awardees ([www.linnean.org/medals](http://www.linnean.org/medals)).

As expected, the number of nominations increased, but in my capacity as Chair of the Nominations Committee (during my time as President) I noticed that in some years there was an imbalance in the nominations, particularly with regard to gender, and therefore in the subsequent awards. Of the last four years, 2022 was an outlier with most medals going to men (1 woman:7 men), while earlier numbers were more equitable (2019—4:4; 2020—3:5; 2021—5:3). This prompted me to analyse our medals from the beginning to see if there were trends in the data. Here I will only present the data for a few of the Society’s awards, but will present the same analyses for all Society awards in graphical format in a future blog piece on the website.

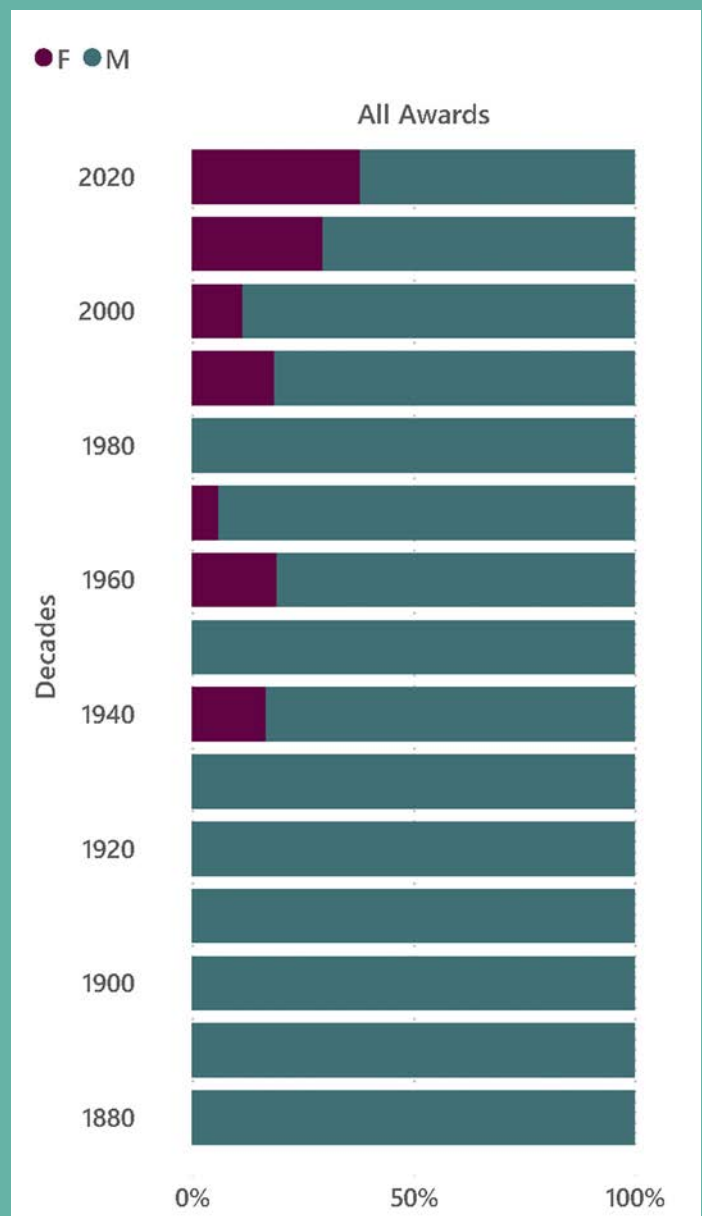
### Finding a balance

The Linnean Society of London has been awarding medals since 1888, with a few new awards being added in the time since. The gender balance of medal and award recipients over the last 134 years is highly skewed, with 87% of all awards going to men. But over time, the percentage of female recipients is increasing (see Fig. 1, gender balance by decade); noticeably, the Society had a particularly female-free patch in the 1980s which bears further analysis. The last decade in all the figures shown only represents three years (2020–2022), so should not be taken to suggest a true decline in female recipients for a ten-year period (e.g., Fig. 2, H. H. Bloomer Award). These data are presented here for completeness, and as a spur for those nominating for the Society’s awards for rest of this decade!

### The Linnean Medal

The Linnean Medal for scientific excellence was first awarded in 1888 to botanist Joseph Dalton Hooker (1817–1911). The medal was awarded alternately to a botanist and zoologist until 1958, when two (or sometimes three) medals were awarded each year. In the 1800s, Linnean Medal recipients were only men. Of all 197 Linnean Medals awarded since 1888, only 9% have been awarded to women (17), but in the 2000s this percentage rose to 19% (9 women of 47 recipients). In the last decade (2012–2022) 30% of the Linnean Medals were awarded

FIG. 1: GENDER BALANCE BY DECADE



to women (7 of 23 recipients). There is clearly improvement overall in gender representation in this, our oldest medal (see Fig. 2). These statistics, to some extent, reflect a gender bias in seniority in science (Huang *et al.* 2020) but are largely representative of the percentage of women in science more generally (29.3%; UNESCO 2019).

The Bicentenary Medal

The Linnean Medal is awarded to scientists at a later stage in their career, once they have made significant impact; the Bicentenary Medal, since its establishment in 1978, is awarded to a scientist under the age of 40 for excellence in the science of natural history. Since then, the Bicentenary Medal has been awarded to 44 people, 16% of whom were women (7). As seen with the Linnean Medal, female recipients have been steadily rising; in the 2000s,

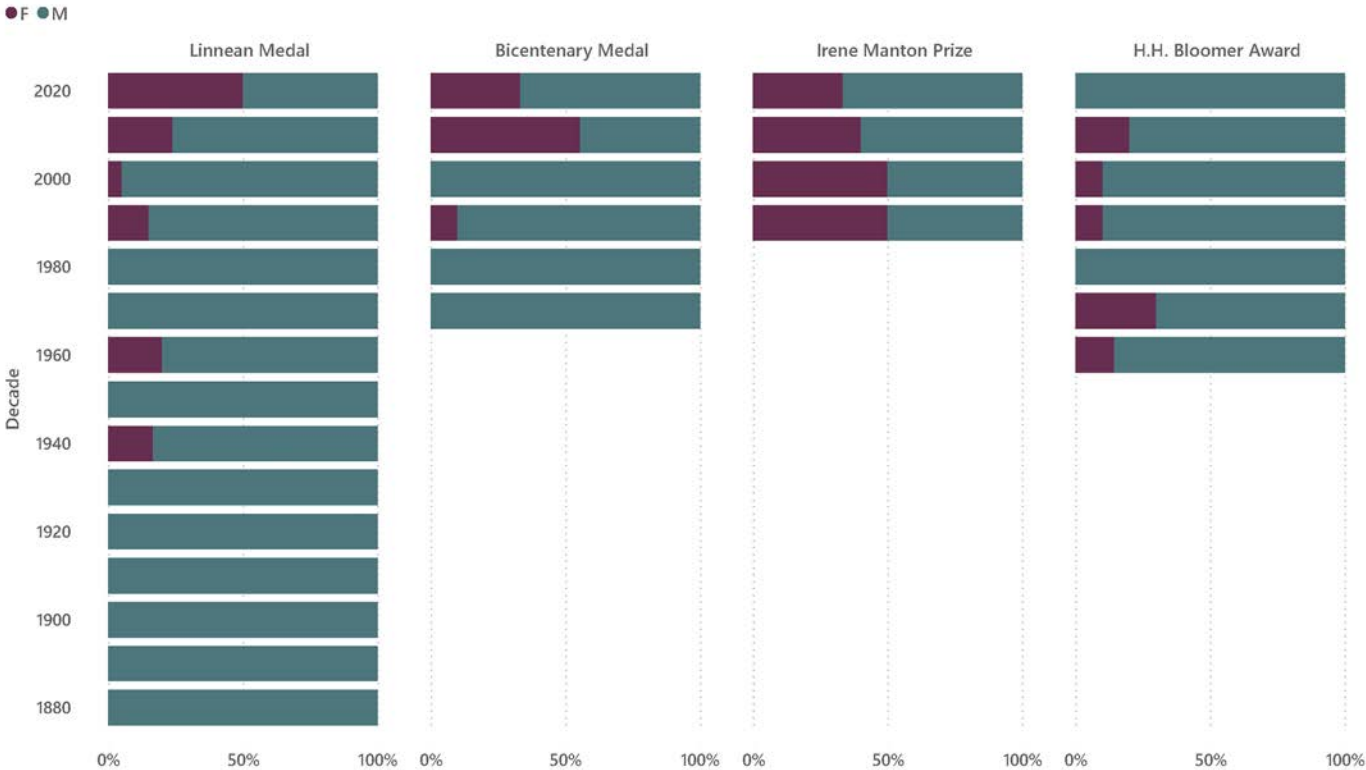
6 of 22 (26%) awardees were women, and in the last decade, the ratio of male to female awardees is 50:50 (see Fig. 2), more accurately reflecting the population at large, and the increasing numbers of women in the sciences (Huang *et al.* 2020). Similarly, the percentage of female recipients of the Irene Manton Prize for the best doctoral thesis in botany (plant sciences) is nearer equity (45% over all awards since 1990; see Fig. 2).

The H. H. Bloomer Award

The last award I will analyse here is the H. H. Bloomer Award, which is presented to an ‘amateur’ naturalist not in employment as an academic research biologist, for their contributions to the study of natural history. The contributions of such natural historians have been huge over the years, with early luminaries in our field (including Charles Darwin) very much being amateurs (Endersby 2008). The award was established in 1963 and since then, of the 59 awardees, 14% have been women (8) (see Fig. 2); this percentage has been



FIG. 2: GENDER BALANCE BY MEDAL OR AWARD



Medal images: The Linnean Society of London



maintained in the 2000s with 13% of H. H. Bloomer recipients being women (3 of 23 total awards), while in the last decade female recipients represent 20% (2 of 10).

The Linnean Medal

### We all have a part to play

While it is clear that in the early years of the Society, awards were exclusively given to men—women were not even elected to become Fellows until 1904—those nominating excellence in the field of natural history are now recognising the contributions of women to our field. But this does not mean we should be complacent about ensuring our awards reflect the diversity of natural historians whose contributions are celebrated. The Society is conscious about equality, diversity and inclusion in programmes and activities, including our awards. While I was able to analyse the gender distribution of our medallists and awardees over time, other diversity-related characteristics are less transparently available into the past. Going forward, diversity statistics on nominations and recipients will be recorded and anonymised to track progress over time for the future.

But we all have a part to play. As Fellows, you are encouraged—no, strongly requested—to nominate appropriate people for the Society's awards. Please do give some thought now to your nominations for September 2023. It is from these nominations that awardees are selected—we welcome your support in making them more diverse.

### Acknowledgement

Thanks to Sarah Vincent at the Natural History Museum, London, for making visualisations of these data.

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# Saving *Faces*

A TALE OF NATURAL HISTORY, PORTRAITS AND  
CONSERVATION AT THE LINNEAN SOCIETY

*by Janet Ashdown, Conservator*



It tires me a great deal to sit to anyone, but I should be the most  
*ungrateful & ungracious dog*  
 not to agree.

*Charles Darwin, on his proposed Linnean Society portrait.*

Anyone who has had the chance to visit our home on London's Piccadilly will know that many eminent 18th- and 19th-century naturalists can be found depicted on the walls of our rooms, perhaps overseeing the naturalists of the future. Inspired by the recent 'adoption' of a rare portrait, Conservator Janet Ashdown has scoured some old documents that reveal some of the history of our portrait collections and their care.

### Portrait of a plant hunter

Most of you are no doubt already aware of the Linnean Society's successful conservation scheme, AdoptLINN, which allows members to 'adopt' books and other archival materials for conservation, safeguarding them for future generations. However, did you know that occasionally portraits in need of conservation and cleaning are also available for adoption?

This was recently the case with our portrait of Francis Masson, the first 'plant hunter' sent out by the Royal Botanic Gardens, Kew, to bring back species from around the world. Born in Aberdeen in 1741, Masson was the botanist on board the sloop the HMS *Resolution*—Captain James Cook's second voyage of exploration in the Pacific—in place of Joseph Banks. Masson would travel to the Cape of Good Hope and spend 12 years in South Africa, travelling to places like the then-newly established settlement of Stellenbosch, the Kogelberg range and the stunning Namaqualand, all the time retrieving botanical specimens to send back to England. He became the first Briton to travel to many inland locations, continuing his expeditions in challenging terrain and unpredictable weather.

His report outlining his time in South Africa and the surrounding area was published in the *Philosophical Transactions of the Royal Society* in

1777, essentially becoming the first descriptions of the botany of the southern Cape. The delivery of Masson's plants to Kew would create a trend in plants from the southern Cape in the UK, making them a desirable addition to any garden. Throughout his life he also explored Madeira, the Azores, Spain and North Africa, sending back plants from as many places as possible. By the time of his death in 1805, he had introduced a thousand new species to the UK, including what is now considered the world's oldest potted plant, the Eastern Cape giant cycad (*Encephalartos*

**LEFT:** Occasionally, with help from our members and charitable trusts, the Society still purchases portraits relevant to both its history and vision, like this portrait of Pleasance Smith (wife of our founder, James Edward Smith) by John Opie.

**BELOW:** Adopted by Sandra Knapp PPLS through our conservation scheme AdoptLINN, this is the only known portrait of Kew's first 'plant hunter', Francis Masson (1741–1805).



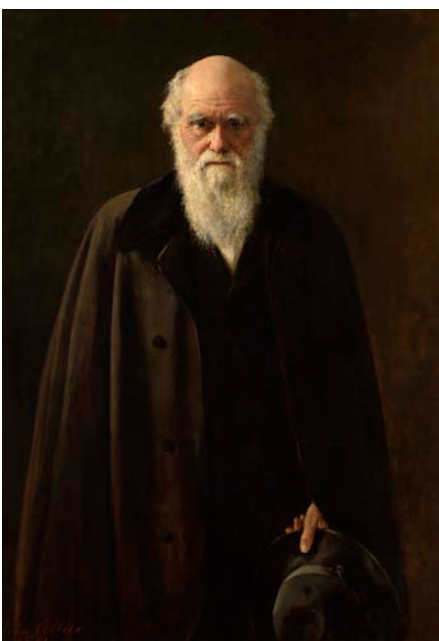
Images: The Linnean Society of London



**ABOVE:** The Eastern Cape giant cycad brought to Kew by plant hunter Francis Masson dates from 1775.

**RIGHT:** Our mystery portrait—can you help identify him?

**BELOW:** John Collier's famous portrait of Charles Darwin hangs in the Meeting Room.



*altensteinii*), brought to Kew in 1775 and still found in their Palm House today.

Our painting of Masson represents the man himself; without unnecessary adornment, and rather straightforward

and simplistic in style. In need of a little love and attention, the portrait which was adopted earlier this year by our Past President, Sandra Knapp, has been cleaned and conserved, and was on display at our Anniversary Meeting in May. While it may not be the most detailed of paintings, it is the only known portrait of the intrepid Masson, and it means a lot to both Sandy and the Society.

### A little background

The Society has a collection of approximately 71 framed portraits (not including a plethora of engravings and photographs), either hanging on the walls around our building in Burlington House, or in storage. Most of these are depictions of distinguished past Fellows, or people of prominence in the field of natural history, and

consist mainly of oil paintings on canvas, though there are a few watercolours, pastels, and pen and ink drawings. Among them are originals, copies of originals and even copies of copies! The quality of these portraits varies from poor to outstanding, but, for us, quality is secondary to subject matter, and a mediocre copy of a portrait of Carl Linnaeus (1707–1778) is as equally cherished as our fine portrait of Alexander Macleay (1767–1848) by Thomas Lawrence (1769–1830). Most of our portraits, whether originals or copies, can be ascribed to a particular artist, but some attributions remain unknown, or uncertain. This can change as new information comes to light, and it is always exciting when it does. The Society's portrait of

Linnaeus's 'apostle' Daniel Solander (1733–1782) was originally believed to be by neoclassical artist Johan Zoffany (1733–1810). For a short period the Zoffany association was discredited, but the attribution was later confirmed as the result of research for a 2007 biography of the German painter. Just as some artists of the Society's portraits are unknown, so too are a handful of sitters. We do not currently know the identity of either the sitter or artist of a rather handsome painting of a young man in an embroidered waistcoat (probably English, late-17th century), despite several attempts over the years to discover this. Do you recognise him?



### Gifts, subscriptions and commissions

How did the portraits come to be in the Society's possession? The first to be obtained was the Solander portrait, which was a gift from botanist Richard Salisbury in 1807. Throughout the 19th century the Society acquired further portraits, either as gifts (esteemed botanist Robert Brown presented a copy of Alexander Roslin's portrait of Linnaeus) or as purchases, often funded by subscription. John Collier's (1850–1934) iconic, moody portrait of Charles Darwin (1809–1882)—copies of which can be found at his home at Down House and in London's National Portrait Gallery—was paid for in this way.

Donations and purchases continued into the 20th century. George James's (1755–1795)





portrait of the celebrated botanical artist Georg Dionysius Ehret (1708–1770), painted c. 1767, was a gift from archaeologist Sir Arthur Evans in 1941, and our portrait of Alfred Russell Wallace (1823–1913) by Roger Remington was commissioned in 1997. In the 21st century, the Society purchased two stunning portraits of Lady Pleasance Smith (1773–1877), wife of the Society's founder James Edward Smith (1759–1828), by John Opie RA (1761–1807), made possible by generous donations from a charitable trust and a Fellow of the Society. An anonymous portrait of the Rev. John Lightfoot (1735–1788)—like Masson before him, this is the only known portrait of the parson-naturalist—was donated by his descendants in 2001, and a bright portrait of botanist and botanical illustrator the Rev. William Keble Martin (1877–1969, notable for his still-influential book *The Concise British Flora in Colour*, published in 1965) was donated in 2014. Most recently, a portrait of the American botanist David Hosack (1769–1835, developer of the first public 'educational' botanic garden in America, but perhaps best known as the physician who tended to Alexander Hamilton after his duel with Aaron Burr, for any *Hamilton* fans out there) by John Trumbull (1756–1843) was generously purchased for the Society in 2018.



### Improving representation and visual inspiration

As you can imagine, portraits were expensive, and consequently the vast majority found in our collection are of relatively wealthy and prominent men from the 18th and 19th centuries (often in later age). There is little diversity in these images, although there are some exceptions; James Sant's (1820–1916) large and rightfully imposing 1906 portrait of the admission of women to the Linnean Society of London, and another of the Society's first female president, Irene Manton (1904–1988). In an effort to start to redress this imbalance, a selection of photographs of some of the first women Fellows were enlarged, printed and framed in 2020, and are on display in the Library Reading Room.

Details from the many surveys of the Society's portraits carried out since our relocation to Burlington House in 1874 often indicated where they were hung, so we know that, over the years, our portraits have constantly been moved around the building, and have variously been on display in different areas, or stored away. Our future aim is to relocate a small number of portraits to enable the display of a wider variety of original artworks, plates and images from our collections, allowing us to visually tell the story of both the Society, and the study of natural history.

**LEFT:** This anonymous portrait of the Rev. John Lightfoot was donated to the Society, having been found rolled up in an attic after many years. It arrived with a tear in the canvas, which was then restored. It is the only known portrait of the parson-naturalist.

**RIGHT:** Portraits of some of our first women Fellows were placed on the columns in our library in 2020, in recognition of their impact on both science and the Linnean Society; microbiologist Grace Frankland (1858–1946) can be seen in the foreground.

**RIGHT:** Our Domestic Archives reveal that our portraits have been regularly assessed since the early 19th century; this invoice from 1818 is for work undertaken on three of our paintings.

The Linnean Society . J. W. Pigg  
1818

July 10 To Clean & varnish 3<sup>rd</sup> a whole  
length Portrait 4ft 2. by 3ft 4. } 3. 10 -  
To D<sup>o</sup> a Portrait 3ft. by 2ft 1. } 2 2  
To D<sup>o</sup> a Portrait 2ft 6. by 2ft 1. } 1 1  
To a new Gold half length frame  
17 feet. } 3. 10. 0  
To a D<sup>o</sup> frame, 12 feet } 2. 10 -  
To receding a carved frame } £ 12. 13. 0  
& spring. } 2 -  
£ 14. 13 -

2<sup>d</sup> Feb 1819  
To the said W. Pigg

22.

### Changing attitudes, new techniques

Works of art have always been subject to alteration by their owners. Paintings were routinely repaired and cleaned as well as altered to reflect the tastes of the time. Some were reduced or increased in size to fit a location,

some had parts repainted to suit society or individual taste, and missing areas were repainted according to the restorer's preference. Attitudes changed over the centuries, guided by changing philosophies in the art world, but it wasn't until the 19th century that an approach based on ethical standards began to emerge.



In the late 18th century, Pietro Edwards (1744–1821), a talented artist and restorer in Venice ‘was in many ways the first “conservator” in the sense that the term is used today’ (Muñoz Viñas 2020). He laid out a set of rules to be used when caring for paintings which respected the appearance of the original, and introduced the idea that the restorers’ work should, where possible, be reversible. In the century that followed, conservation gradually developed into a profession separate from that of the artist restorer.

Scientific approaches became more usual—investigations into pigments were made by Sir Humphry Davy in 1815, and in the 1850s Michael Faraday investigated the cleaning of varnishes and the effects of London air pollution. By the 1920s, laboratories were being set up in the UK, USA and Europe to analyse the causes of degradation and develop treatment methods for artworks. Today there are many institutions and research facilities world-wide which set the standards for best practise in the conservation of works of art.

In the early 19th century, the impact of physical and chemical treatments on paintings was not as well understood as it is today, and the ethical approach that conservators now take was either absent or emphasised different priorities. The contrast between the brief survey notes in our archive from 1818 and the condition and treatment reports from our paintings conservator in 2022 are enormous. Nowadays, every relevant detail of the artwork is recorded, along with photographs and details of any treatment undertaken.

### Protecting our portraits

From the earliest days of the Society, the environment of its rooms at this and previous locations has not always proven favourable to its portraits. Fellows smoked cigars, pipes and cigarettes within the rooms, lights were powered by gas, and rooms were heated with open coal and wood fires. (Smoking was only banned in enclosed workspaces in the UK in 2007, although smoking was rarely witnessed in the building for many years before this.) Dark, English winter months meant periods of cold, damp weather with poor ventilation. Conversely, in summer humidity levels could be high, and unfiltered light would stream through large windows

causing UV damage. The general London environment was polluted to a much greater degree than in recent years.

The result was that paintings were covered in grime, and some suffered damage to frames and canvases. In the 20th century, two major wars added to these problems. During World War II, when the Meeting Room curtains were kept permanently closed (in alignment with blackouts being instated in London), ventilation was limited and some glazed portraits on the outer wall became mouldy. The glazing on the front of these portraits exacerbated mould by hindering drying on the surface. Only a few oil portraits in the collection can be found with glazing. Why, you might ask? While glazing does protect against accidental damage, it also makes a large painting heavy to handle, and creates glare, impacting on the ability to fully view a portrait. (The Society’s approach to glazing has been to avoid adding it to paintings where it doesn’t already exist, though this policy is always under review.)

We’ve recently discovered records held in the Society’s Domestic Archive that show the cleaning and repair of our portrait collection has been undertaken at regular intervals from at least 1818, when an invoice from W. R. Bigg charged £14 13 shillings for cleaning and varnishing three portraits and re-gilding three frames (the equivalent of about £850 today). Sadly, there is no information about exactly which portraits were cleaned. However, another document from 1917 does expressly name several paintings, including the recommended cleaning of a portrait of Carl Linnaeus, and the removal of old varnish from an oil painting of Alexander Macleay (1767–1848) (*OVERLEAF*).

Surveys of the portraits were obtained at regular intervals (every decade or so) and these reports, although vague by the standards of today, do provide a valuable insight into the condition of the Society’s portraits over the years. Usually, only a few portraits were approved for treatment each time, presumably because of the expense, so it stands to reason that significant surveys were undertaken in the 1920s and 1950s, after WWI and WWII.

Commonly, portraits selected for treatment were cleaned and re-varnished; some were polished. In 1926 an estimate from Major George Roller,

**BELOW:** This 1917 survey explicitly names the portraits, giving us a better idea of their previous care, and how we can support them with conservation schemes like AdoptLINN.

for the portrait of Henry Seymour, mentions: 'Cleaning and Varnish Regenerating by our evaporation of spirit process for 3 guineas.' The historic information relating to these paintings is invaluable for future conservation, as it can inform as to current condition and guide future treatment. It is hoped that the domestic archive will reveal more information as it is organised

and catalogued, with work currently in progress under the punctilious eye of Archivist Alex Milne.

### Modern aims of conservation and future of portraits at the Society

We now expect conservation and restoration of artworks to adhere to strict principles. The aim must be to repair any physical and environmental damage to the extent that the life of the painting is prolonged and protected from further damage, and that the image portrayed is unimpaired by distractions such as tears, poor previous repairs, graffiti and dirt (unless these features are deemed to be of historical importance). Any treatment undertaken should be discoverable on close inspection.

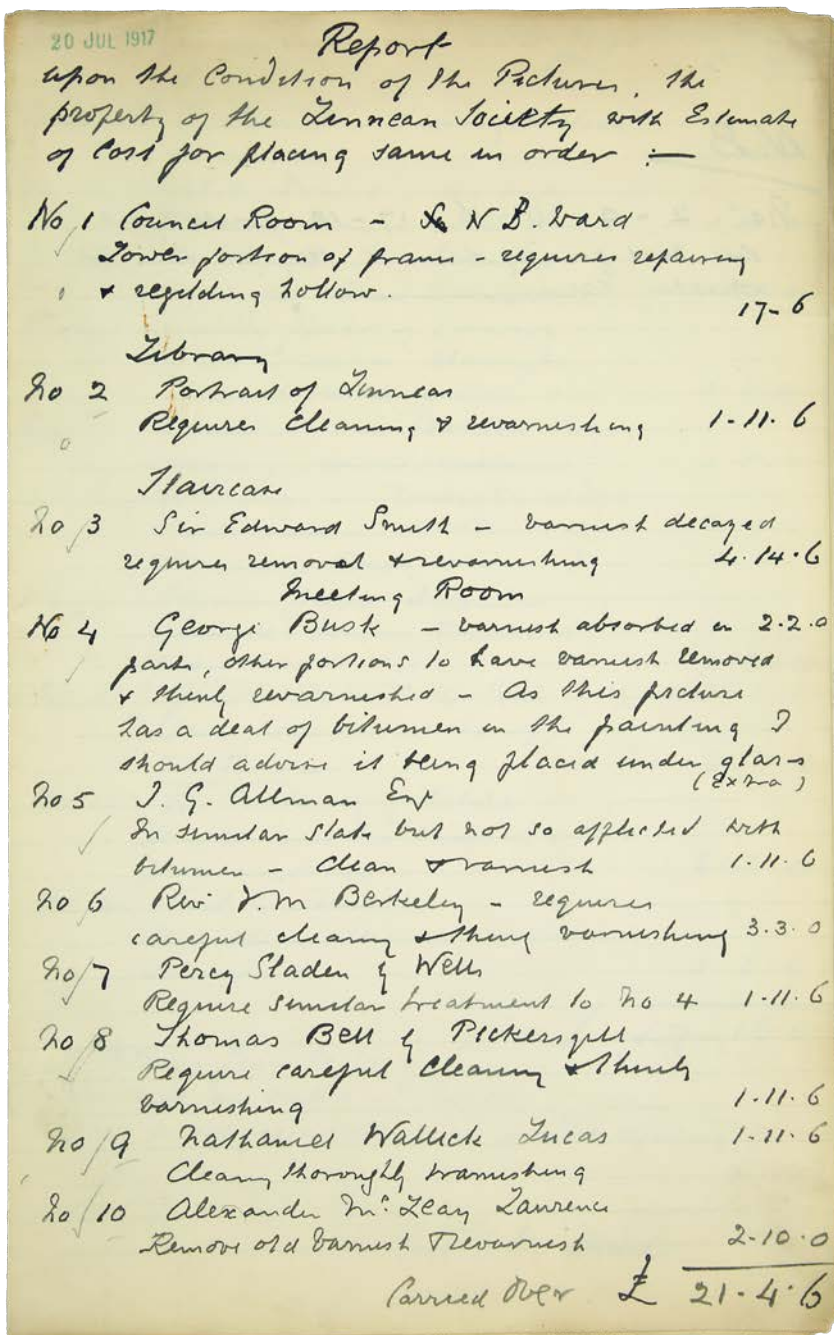
The Linnean Society has made many improvements to the collections environment, despite the many constraints of occupying an historic, Grade II listed building. Gone are the open fires and smoking, all windows are now protected with film and blinds to reduce excessive UV, and modern heating ensures more even temperature and humidity levels.

Conservation is a constant thread running through our collections care, and our AdoptLINN scheme allows us to sew all the elements together when striving to preserve our books, manuscripts and artwork. It is through the enthusiastic engagement and much-appreciated generosity of our members and visitors to the Society that we are able to tackle this work in a timely and conscientious way.

When our AdoptLINN supporters are inspired to adopt an item, we too are inspired. Thank you so much for your continued dedication.

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# If Linnaeus went shopping...

by Clare Donnison  
@DonnisonClare

If Linnaeus went shopping in Aber  
And arrived at the Morrisons store  
Would nomenclature leave him bewildered?  
Would he turn tail and flee from the door?

The poor man's a native of Sweden  
He doesn't speak **English** or **Welsh**  
He's also been dead quite a long time  
But for now—I've restored him to health

So I feel sure he'd stride through the entrance  
And look for the goods on his list  
Passing signs full of names unfamiliar  
'Til he got to the counter for fish

Here the catch of the day lies presented  
Artistically placed on the ice  
And for each an informative label  
With their binomial taxon and price

Our man's face would light up—the **genus**!  
The **species**! In Latin displayed  
Now I can resume with my purchase  
Where's the list for my shopping I made?

Now we speak the same language it's easy  
And you're using my system—how wise  
I had no idea this would be so  
On deciding to venture inside!

Have you any *Clupea harengus*?  
It's a favourite for Swedes such as me  
I'd like some to pickle—I love it  
And it's packed full of omega three

Now *Gadus morhua*—do you have some?  
I understand all of you Brits  
Are quite partial to add salt and vinegar  
And eat it from newsprint with chips

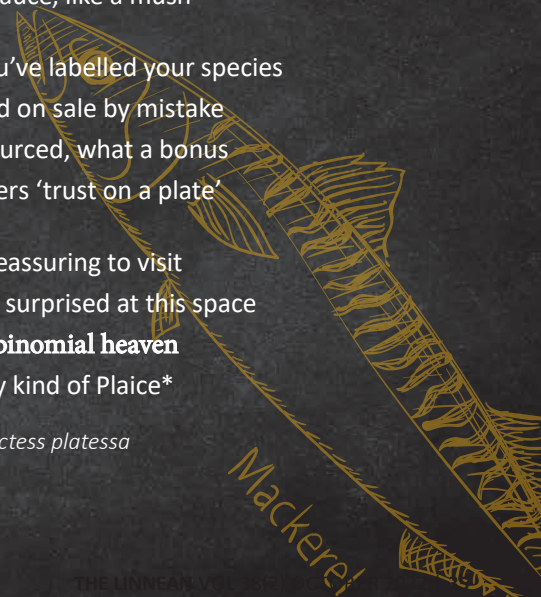
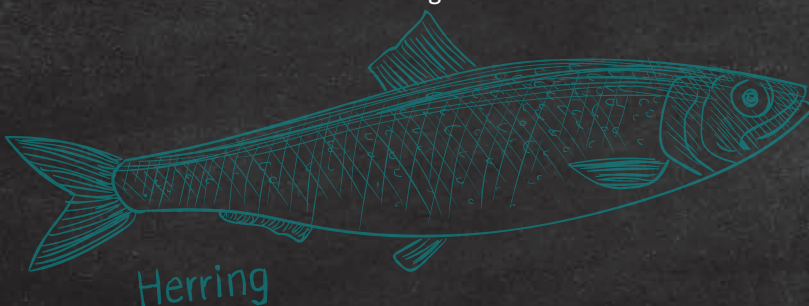
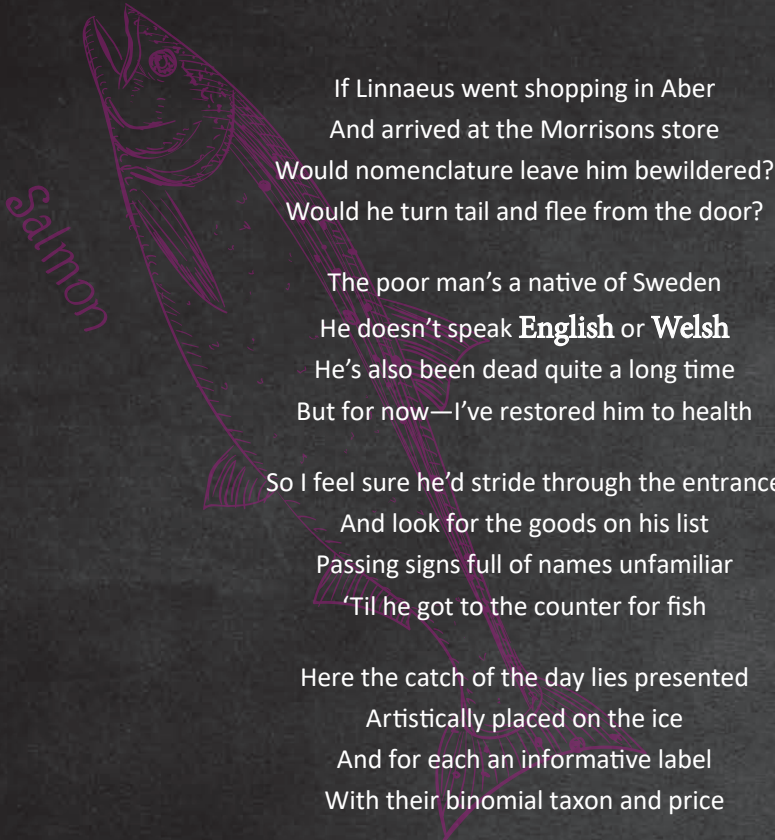
*Salmo salar*—the one that swims upstream  
I believe that it's farmed in the North  
I'd like two without bones for some poaching  
Then, is there one that you catch here, or in Borth?

A local fish might please the missus  
Is there plentiful *Scomber scombrus*?  
She likes it with gooseberry coulis  
A berry type sauce, like a mush

I'm so pleased that you've labelled your species  
None endangered on sale by mistake  
All responsibly sourced, what a bonus  
For your customers 'trust on a plate'

It's been so reassuring to visit  
I've been pleasantly surprised at this space  
This store is **binomial heaven**  
It really is my kind of Plaise\*

*\*Pleuronectess platessa*





## Is anyone listening?

by John Feltwell FLS

Much has been written on the decline of wildlife, particularly the insect apocalypse, with the decline likely to continue. Here, John Feltwell FLS reviews the works of several authors who have spoken out, but how much of their advice has been heeded? A number of the books selected are about the declining fortunes of UK wildlife—but the Anthropocene is a global event. Some of the proposed remedies are not a panacea for bringing back biodiversity.

The ‘Anthropocene’ is upon us—the (highly-debated) geological epoch characterised by rapid, anthropogenically-driven climate change—but how did we get here so quickly? A spate of books and pronouncements from royalty, academics and conservation bodies, have all basically said the same thing; we are into the *Sixth Extinction* (Kolbert 2014) with disappearing habitats and impacted biodiversity. It has been 59 years between *Silent Spring* (Carson 1962) and *Silent Earth* (Goulson 2021). So what is really being done to stop or slow the decline? Strangely, none of the following books are by Fellows of the Linnean Society.

### Main drivers in the decline

As we know, the main driver of species loss is the destruction of habitats; climate change comes a close second. When Sir David Attenborough HonMLS says ‘It’s too late to avoid climate change’, he really means it.<sup>1</sup> But NASA says it ‘may not be too late to avoid or limit some of the worst effects’ of climate change.<sup>2</sup> We can all hope.

1 Attenborough, D., (2022). <https://news.sky.com/story/attenboroughs-stark-warning-on-climate-change-its-already-too-late-12226694> (accessed 21 June 2022)

2 Is it too late to prevent climate change? (2022). <https://climate.nasa.gov/faq/16/is-it-too-late-to-prevent-climate-change/> (accessed 21 June 2022)





Those who have witnessed a decline in species are often moved to write about it. Such was the inspiration of Rachel Carson in the early 1960s, with her classic *Silent Spring* particularly focussing on the use of synthetic pesticides found everywhere in the environment, from mothers' milk up to pristine mountain lakes. If she were here to update her chapter on 'Elixirs of Death' she would no doubt have included the same story with regard to the proliferation of the use of microplastics.

It would be another 20 years before Norman Moore, the retiring chairman of the Nature Conservancy Council (NCC), would write his personal account of what was actually happening under his watch.<sup>3</sup> In the innocuously titled *The Bird of Time* (1987), he did not mince his words, with chapters on the 'Disappearing Heathlands', 'Disappearing Hedges and Ponds', 'The Loss of Special Places' and a chapter on the 'Habitat Crisis—and the Involvement of Government'. That says it all really—the massive decline had already started. In his postscript, he wonders whether 'the problems of maintaining genetic diversity' will be sustained and whether we would have 'the foresight [...] to put conservation [...] at the top of the agenda'. I will leave it to you to decide whether this has happened.

Moore would be delighted that his thesis has been corroborated by a more recent commentator, biologist Trevor Beebee with his *Climate Change and British Wildlife* (2018) in which he says:

We cannot escape the fact that most species in all taxonomic groups are declining in the UK primarily as a result of the unrelenting efforts of the agrochemical industry and habitat destruction.

In 2022, the UK government is attempting to improve nature conservation via its Environment Act 2021.<sup>4</sup> Biodiversity on new developments will be calculated using a software-driven biodiversity metric to maintain biodiversity levels.<sup>5</sup> However,



**ABOVE:** Sunset in the Amazon Basin—an important biodiversity hotspot that continues to be under pressure.

**LEFT:** Some interesting titles that discuss species decline, in order of publication from the bottom up. Sadly, of the books shown, only the author of this article is a Fellow.

this has been difficult to calculate when major infrastructures such as HS2—a high-speed railway line developed to link London to Birmingham—have cut through 14 biodiverse SSSIs (Site of Special Scientific Interest) and ancient woodlands. On their website, the HS2 authorities state that an area the size of Manchester (c. 600 km<sup>2</sup>) will be covered in concrete, but two million trees will be planted by way of compensation.<sup>6</sup> I feel positive that Moore would have had a whole chapter on the impact on SSSIs. Planting trees is not the simple cure-all for conservation catastrophies.

However, the 'best' book outlining the mistreatment of the British countryside is arguably campaigner Marion Shoard's *The Theft of the Countryside*, a complete exposé of the gross, unsustainable, irreplaceable loss of habitats, with chapters such as 'Subsidies for Destruction' and 'Paradise Threatened' (1980). It has not been surpassed and stands as a sad historical record of the assault on the ecological fabric of the UK.

In his more recent book *Hope in Hell: A decade to confront the climate emergency* (2020), environmentalist Jonathan Porritt argues for the phrase 'mass extermination' as a more appropriate term than 'mass extinction' for this man-made Anthropocene. And who would think

3 Interestingly, in *The Times* (22 June 2022) it was reported that HRH Prince William has admitted he has been reluctant to tell Prince George that so many elephants have disappeared under his watch.

4 Gov.uk (2022) The Environment Act 2021. <https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted> (accessed 22 June 2022). Not to be confused with the earlier The Environment Act 1995.

5 It is currently on Version 3.0 (previous versions were not fit for purpose) and will possibly be applicable in November 2023.

6 HS2: The Facts <http://www.rail.co.uk/hs2-the-facts/> (accessed 22 June 2022)



**ABOVE:** Cleared virgin rainforest being worked for crops in Sulawesi, Indonesia.

that trees *per se* would be at risk, but Peter A. Thomas's new *Trees* (2022) expounds that:

Over 15,500 (30%) of the world's estimated 60,065 species of tree are now threatened with extinction, due to agriculture, livestock farming and forest degradation.

With 142 species becoming extinct in the last five years (to 2021), the UK now has 15 endangered tree species.

### Biodiversity quantum lost

How do we know exactly how much we're losing, if we are not currently aware of all species on Earth? It has always been clear that we are losing species before they are discovered, especially with the loss of virgin rainforest. One 1980 study of 19 trees in Panama revealed a staggering 1,200 insect species, 80% of which were new to science. As the World Wildlife Fund (WWF) states: 'If there are 100m different species on earth, and the extinction rate is 0.01% a year, then at least 10,000 species go extinct every year.'<sup>7</sup>

In 2019, the National Biodiversity Network's (NBN) State of Nature report indicated that 60% of all species were in decline.<sup>8</sup> It also stated that 15% of species in Great Britain were threatened

with extinction, and that 8,431 species were already extinct. However, while much decline has been due to the changing climate; the 'biggest single impact upon nature in the UK over recent decades was changing agricultural management'. Decline is not entirely down to climate change.

Although declines in wildlife are found across all animals, it is ironic that insects, the largest group on earth, with many not even identified, has been particularly hit. In *The Insect Crisis* (2022), Oliver Milman sets out the parameters for the decline, including the loss of bees. This was corroborated by Rothamsted Research's array of moth traps set across the UK that showed a decline in moths in southeast England (between 1968–2007), from 25% to a maximum of 40% (Milman 2022).

Young scientists may be amazed to hear that windscreens used to be covered with a pâté of insects. A team of researchers with Buglife, the Invertebrate Conservation Trust working in association with the Kent Wildlife Trust, endeavoured to count flying insect numbers in the UK with citizen scientists. Participants cleaned their license plates, then counted any bug splatter at the end of their journey, uploading their findings to the Bugs Matter app. Using data from 2004–2021, researchers found that there had been a 58.5% decline in total flying bug numbers within the study's timeframe (Yirka 2022).

Fifteen of the 25 hotspots for biodiversity are in tropical Latin American rainforests, and Tony Juniper CBE, Chair of Natural England, says that the large-scale loss of rainforest in Ecuador 'has already led to one of the largest man-made mass extinctions' (Juniper 2018). For some balance, one could turn to the opinion of statistician Bjørn Lomborg, who wrote *The Skeptical Environmentalist* (1998). He says in his work *False Alarm* (2021) that: 'Global warming is causing an unprecedented greening of the world.' He backs this up by referencing satellite imagery. However, we all know, as Lomborg knows, that 'green' on a satellite map does not clarify what sort of vegetation is present. When rainforest is removed, other species can thrive, and though by satellite it may look full and rich, in reality it is species-poor, often with invasive species.

7 World Wildlife Fund (2022). [https://wwf.panda.org/discover/our\\_focus/biodiversity/biodiversity/](https://wwf.panda.org/discover/our_focus/biodiversity/biodiversity/) (accessed 20 June 2022)  
8 The State of Nature (2019) <https://nbn.org.uk/stateofnature2019/> (accessed 20 June 2022)



## The importance of biodiversity

Biodiversity is at the nub of the equation for reversing declines. The Linnean Society poses the question: ‘How do we make sense of biodiversity? The answer is classification.’<sup>9</sup> Carl Linnaeus (1707–1778) named 12,000 species of plants and animals with the assistance of his ‘apostles’ in far flung places. His was a recognition of great abundance; just a start, but a landmark one. Two hundred and forty-four years later and we continue to explore, collecting and discovering more species, and museums globally hold millions of specimens of insects that still await categorising and sorting.

Buglife estimates that there are 40,000 invertebrate species in Britain, 27,000 of which are insect species.<sup>10</sup> It is a herculean task for any entomologist to get their head around that many. Unlike plants, where seeds can lurk in the soil and potentially ‘repopulate’ an area, there is no ‘catch-up’ with invertebrates. In a sense, re-wilding, or *Wilding* (Tree 2018), could be construed as a diversion from the main issue of habitat loss. Conservation often depends on very focused conservation criteria, whether for mammals, birds or insects (i.e. reserves, etc.), rather than whole habitat conservation, in Britain particularly. In my own view, how can any remedial measure such as rewilding replace lost ancient woodlands, or the 97% of lost *Meadows* (Feltwell 1992) or lost *Rainforests* (Feltwell, 2008)? Small steps can make a local difference, but not on a global level—rewilding will not go anywhere to replace the rainforest, or UK habitats, lost over the last 30 years.

## The balance of nature

When I was lecturing in the 1980s I spoke about acres of rainforests being lost every hour. I think everyone listened, but few did anything, or felt they could do anything. Nothing seems to have changed. *The Guardian*, which (unique in the British press) keeps tabs on rainforest matters,<sup>11</sup> reported that ‘The Amazon rainforest is losing about 10,000 acres a day’, and that: ‘Since 1988,



humans have destroyed an area of rainforest roughly the size of California.’<sup>12</sup> The stats continue to be cited and revised.

Earlier, with *The Theft of the Countryside*, Marion Shoard also included a hard-hitting chapter called ‘Subsidies for Destruction’. In 1979–1980, the UK Government offered subsidies for the removal of hedgerows and woodland in order to grow crops, something I myself witnessed happen to the healthy ancient woodland quantum in East Sussex, in the High Weald Area of Outstanding Natural Beauty (AONB). The UK Government is now offering incentives for woodland creation.

Shoard was not the only one to note what was going on. Listeners of the BBC radio serial *The Archers* were perhaps unaware of the hard-hitting book by the programme’s ‘Agricultural Story Editor’, Graham Harvey, entitled *The Killing of the Countryside* (1997), where he firmly blames agriculture (e.g. 150,000 miles of hedgerows gone), UK government grant schemes, and the EU and its subsidies for the loss of habitats. His first chapter, ‘The Grim Reaper’, is a catalogue of countryside attrition that he often states would run counter to the benign world that Anglo-

**ABOVE:** According to the British Trust for Ornithology, in the last 50 years the population of yellowhammers in the UK has dropped by about 58%, due in part to changes in arable farming and loss of hedgerows.

9 The Linnean Society of London, 2022. <https://www.linnean.org/learning/who-was-linnaeus/career-and-legacy> (accessed 20 June 2022).

10 Buglife, The Invertebrate Conservation Trust (2022). <https://www.buglife.org.uk/> (accessed 22 June 2022)

11 Two of the books reviewed here are by writers from *The Guardian*: Oliver Milman and Ben Rawlence (both essentially written during lockdown).

12 Heacox, Kim. (2022) <https://www.theguardian.com/commentisfree/2021/oct/07/the-amazon-rain-forest-is-losing-200000-acres-a-day-soon-it-will-be-too-late> (accessed 22 June 2022)



**ABOVE:** Colourful macaws are highly susceptible to rainforest loss and trading. These scarlet macaws from South America need salt licks to top up their nutrients, and an abundance of rainforest to ensure success in their home range.

**RIGHT:** The author campaigning for the protection of biodiversity in Cévennes, France



Argentine naturalist William Henry Hudson (1841–1922) and esteemed nature writer Richard Jeffries (1848–1887) once described.

While species distribution is always in flux, some benefiting, and some expiring, global warming does not trump habitat loss—yet. As Rachel Carson said:

The balance of nature is not a status quo; it is fluid, ever shifting, in a constant state of adjustment. Man, too, is part of this balance. Sometimes the balance is in his favor; sometimes—and all too often through his own activities—it is shifted to his disadvantage.

That time is now.

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# A Wonderful Original: *John A. Burton FLS (1944–2022)*

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by Sara Oldfield FLS



**PREVIOUS:** John was presented with the John Spedan Lewis Medal at the Linnean Society in 2019. He called the Society his 'London home'.

John Burton, internationally renowned naturalist, conservationist and author, was a Fellow and keen supporter of the Linnean Society for over 45 years, calling the Society his 'London home'. John was awarded the Society's John Spedan Lewis Medal in 2019 for innovation in conservation, in recognition of his major contribution to saving wild species and wild places around the world, and further, inspiring others to do so. Bold in his approach, John was a genuinely creative thinker and not afraid to take risks to secure conservation gains. To quote Sir David Attenborough, John was 'a truly wonderful man, more altruistic, more energetic, braver and more original than almost anyone I have known'.

### Early years

Born on 2 April 1944, John's fascination with the natural world began as a child growing up in South London. His meticulous nature notes, recorded as a teenager, detail bird ringing, and fox and badger surveys, alongside newspaper cuttings and observations on developing environmental initiatives. An early goal was to work at London's Natural History Museum (NHM) and, on leaving school, his first job was as an Assistant Information Officer at the Museum. He left in 1969 to pursue a freelance career, initially as a natural history writer and journalist, soon moving into conservation.

In the early 1970s, John became the first wildlife consultant to the newly-formed Friends of the Earth. In 1975, he was invited to take an executive role with the Fauna Preservation Society (FPS, famously the world's oldest international wildlife conservation organisation, later the Fauna and Flora Preservation Society, or FFPS). By the time he left in 1987, John had transformed the organisation, which had now been renamed Fauna and Flora International (FFI) in order to focus on all threatened plants and animals (not only the popular, cuddly species). His early botanical projects focussed on the trade in mahogany and wild-collected Mediterranean bulbs. During this structural transformation John had hired Vivien Gledhill as his assistant through an advertisement, which would lead to a lifetime partnership. John and Viv married in 1980 and have worked closely together in all subsequent conservation roles. They shared a love of animals, keeping alpacas, axolotls, Bedlington terriers, lurchers and a rescue hare at various times in their London flats, and later, their Suffolk homes. These homes were always overflowing with fascinating books, music, John's collections of ethnographica and paintings, Viv's collection of vintage pottery, flowers and above all, friendship and lively conversation.

At the same time as developing FFI, John set up the first TRAFFIC office. This was initially part of the Species Survival Commission (SSC) of the International Union for the Conservation of Nature (IUCN), and worked to expose the scale and details of the illegal trade in wild plants and animals. Soon it became a flourishing and highly influential international organisation.

### Conservation

The mid-1970s and early 1980s were an exciting time for conservation. Following the first UNEP Conference in Stockholm in 1972, new NGOs were formed, the Convention on International Trade in Endangered Species (CITES) was ratified in 1975, national wildlife legislation was introduced in many countries, and IUCN Red Listing of threatened species was undertaken for many different groups. John is remembered by many for forging lasting friendships between young and enthusiastic staff working on these issues at the NHM, London Zoo (ZSL) and Royal Botanic Gardens, Kew (RBGK). Together with artists and writers, we volunteered for or became members of FFI, and enjoyed lectures followed by memorable cheese and wine feasts, and sometimes, by pints in the pubs of Camden.





John and Viv were always a very effective team in bringing together supporters of conservation, whether wildlife experts, schoolchildren, authors, small businesses or celebrities, showing how they can become involved in so many different ways. Their successes are highlighted in the remarkable achievements of the World Land Trust (WLT). John co-founded this organisation in 1989, and it went on to successfully save half a million acres of threatened habitat, and consequently, the species that depend on the land. This has involved raising over £50 million for purchasing and protecting land in Africa, Asia and Central and South America. Right from the outset it was about developing partnerships and respecting local ideas and needs; initially, WLT worked with the local organisation Programme for Belize. WLT raised the money to buy land threatened by development through a campaign enabling people to 'buy an acre of rainforest for £25'—an innovative model at the time. A later fundraising approach was the carbon offsetting scheme developed by WLT in 2005, allowing businesses and individuals to support forest protection and restoration projects with measurable, long-term community benefits, a positive climate impact, and significant biodiversity conservation value.

The second WLT project after Belize was in Costa Rica followed by an island with rich marine biodiversity in the Philippines, a rainforest restoration project in Brazil and eventually diverse projects in over 30 countries. In India, for example, WLT has helped secure 4,000 ha in the Garo Hills, across three elephant corridors where local people own, and benefit from, the reserves. Vivek Menon, Founder and Executive Director of the Wildlife Trust of India (WTI), wrote in a recent tribute to John: 'We salute his vision, his candid and pragmatic conservation ethic and his steadfast belief in his partners that has been the basis of long-term conservation success.' John and Viv's work helping to conserve elephants in partnership with the WTI was recognised with an award in 2018 from the Government of India.

### Writing, broadcasting and travels

John was also influential through his writing and broadcasting, reflecting his fascination with natural history that he never lost. He has written or edited more than 40 books. These include the co-authored

**ABOVE:** John's impact on the world of conservation, and natural history at large, cannot be understated. He's seen here on a World Land Trust Supporters visit to India in 2010. Sir David Attenborough called him 'more original than almost anyone I have known.'

definitive *Field Guide to the Reptiles and Amphibians of Britain and Europe (Collins Field Guide)* which contains descriptions of every species of reptile and amphibian found in mainland Europe, and the *Collins Guide to Rare Mammals of the World*. In the foreword to *Rare Mammals...* (which gives accounts, illustrations and maps for over 1,000 species), Sir Peter Scott wrote: 'I believe this book will make those who read it better able to take an active part in conservation and help reduce the tragic toll of vanishing species.'

John's early overseas travels were to Eastern Europe, where he not only studied birds, reptiles and amphibians, but also recorded local folklore and musical instruments. He had a particular interest in traditional music, and particularly the instruments used, which remained with him throughout his life.

Geographically, John's most recent conservation interests focused on the Gran Chaco of South America and the Southern Caucasus. Much of John's conservation work was slightly off-centre. He consistently pioneered the 'underdogs'—traditionally aiming to change attitudes to generally unloved species such as bats and reptiles', and, if you knew John, you wouldn't be surprised to know that he favoured the spiky, desert habitats and environments that most people wouldn't necessarily put at the top of their list 'to save'. He was inspired by the vast landscapes, wildlife and people of the Gran Chaco of Paraguay and Bolivia, believing this to be just as threatened, if not more so than tropical forests. Latterly, he was very smitten with Armenia; he loved the culture, the people, and the wildness of the Caucasus region. He wasn't afraid of political risk and always sought solutions to bring conservation and local people together. In the Caucasus, he was astonished by the botanical diversity and talked about it passionately.

### A committed conservationist

John's commitment to finding innovative and workable conservation solutions meant that he sought out people who shared his enthusiasm; people who were like-minded, weren't afraid to take risks, who were looking for moral support and belief in their work. Many conservationists around the world would say that without John's belief in their approach, and mentoring along the way, they may well have given up. WLT, with John's vision, brought together 30 in-country partners, encouraging them to share their successes, failures and challenges. This solid conservation alliance is perhaps one of John's greatest achievements. Closer to home he worked with the University of East Anglia in Norwich, Norfolk, to involve and inspire students through the work of the WLT and its overseas partners. For several years, WLT pioneered a Diploma course in Conservation and Project Administration collaborating with the University of East Anglia, inspiring a new generation of conservationists.

The author and journalist Simon Barnes writes that John's legacy takes the form of 'more than a million acres of thriving, teeming wild land'. This enormous legacy will be carried forward by the strong partnerships he developed, the people he supported and mentored, and the thriving conservation projects he established.

John died on World Biodiversity Day, 22 May 2022. His sister Anne predeceased him. He is survived by his brother Nick, Viv, and adopted daughter, the ethical chef Lola de Mille. John will be hugely missed by his family, his colleagues, the wider conservation community he influenced, and by so many friends around the world.

### THE JOHN BURTON MEMORIAL FUND

**A fund has been created in John's memory by the World Land Trust in support of some of the projects and overseas partners that he felt most strongly about. To donate:**

- 👉 <https://www.worldlandtrust.org/appeals/john-burton-memorial-fund/>
- 👉 Call 01986 874422 (office hours only)
- 👉 Cheques payable to World Land Trust (referencing JBMF on reverse); send to:  
World Land Trust, Blyth House, Bridge Street, Halesworth, Suffolk IP19 8AB

**Or email for further information: [donations@worldlandtrust.org](mailto:donations@worldlandtrust.org)**



# Alfred C. Kinsey

## Taxonomist

by Len Fisher FLS



**A**lfred C. Kinsey (1894–1956) is famed for his studies of human sexual behaviour, but his pioneering methods did not derive from a background in psychology. They emerged, instead, from his taxonomic studies of gall wasps.

**‘Most of us like to collect things,’ he wrote in his 1926 high school textbook, *An Introduction to Biology*. ‘If your collection is larger, even a shade larger, than any other like it in the world, that greatly increases your happiness.’**

By this criterion, Kinsey must have been one of the happiest men in the world. His collection of gall wasps, donated by his wife to the American Museum of Natural History (AMNH) after his death, numbered between five and eight million; the exact number still hasn’t been counted (Drucker 2014).

Kinsey began to assemble his collection while he was a doctoral student at Harvard. His father had wanted young Alfred to follow in his footsteps as an engineer, but Alfred was having none of it. He chose instead to study biology at the small-but-distinguished Bowdoin College in Maine, whose early graduates had included two famous writers (Nathaniel Hawthorne (1804–1864) and Henry Wadsworth Longfellow (1807–1882), and a U.S. President (Franklin Pierce (1804–1869)).

Kinsey graduated *magna cum laude*, but his father was unimpressed by his choice of subject, and did not attend his graduation. Kinsey then moved to Harvard, and began his study of the family Cynipidae, otherwise known as gall wasps, under the mentorship of the famous entomologist William Morton Wheeler (1865–1937).

Female gall wasps insert their fertilised eggs into the stem or leaf of a host plant, which responds by producing a characteristic ‘gall’ that both protects and nourishes the developing larva. Kinsey travelled the length and breadth of Mexico and Central America collecting specimens, sometimes spending weeks in remote and uninhabited areas. He focussed on oak gall wasps (Cynipini), which constitute some 85% of all gall wasps, and continued to contribute to their classification (difficult because of

**ABOVE:** Alfred C. Kinsey’s methods of data collection when researching gall wasps—like this California gall wasp (*Andricus quercuscalifornicus*)—would later be used in his famous studies on human sexual behaviour.

**RIGHT:** Kinsey inspecting insect galls, around 1930.



alternate unisexual and bisexual generations (Melika & Abrahamson 2000)) through his life (e.g. Kinsey 1937). The North American genus *Heteroecus* Kinsey is named after him, and the Mexican genus *Erythres* Kinsey (1937) has also recently been re-established as a valid genus (Pujade-Villar & Melika 2014).

### The pleasure of 'bug hunting'

After obtaining his doctorate, Kinsey moved to Indiana University, where he would spend the next 15 years continuing to increase his collection, usually with the aid of students. 'Think of that for a life!', he wrote to his old high school teacher, 'I am more and more satisfied that no other occupation in the world could give me the pleasure that this job of bug hunting is giving' (Kinsey 1920a). But not all shared his dedication for the outdoor life with minimal amenities. He sent one student home from a collecting trip for refusing to have a cold shower in the morning (Young 1994).

Kinsey eventually modified a half-ton pick-up truck (referred to by his students as 'Kinsey's juggernaut' (Yudell 1999)) to bring the unhatched specimens back to his laboratory, where he bred them and recorded a list of 28 detailed measurements of morphological features, such as wing veins and abdominal plates (Kinsey 1930). These were noted on sheets using an easily learned and accessible shorthand (Drucker 2014)—the forerunners of the sheets and methods that he and his colleagues would later use for studies on human sexuality. Unfortunately, none of the entomology sheets have survived.

The specimen was then glued to a card on which its details were recorded. The actual labelling was in such tiny writing that it required a magnifying glass both to write and to read it (Drucker 2014). 'To mount a gall wasp,' recalled his former student June Hiatt Keisler:

One picked it up carefully with tweezers, applied transparent cement ... and placed it on one of the clips of



cardboard, which was then impaled on a two-inch-long steel pin. The cardboards were mounted two deep and about three-quarters of an inch apart on each pin, and the pins were set about quarter of an inch apart in cork-bottomed [Schmitt] boxes, and in rows about two inches apart. The important thing was that the insects must not be broken and that they must all face towards the right ... (Drucker 2014).

Kinsey followed Morton Wheeler, who 'hate[d] genetics' (East 1924), in giving great weight to field work, as opposed to the laboratory-based genetic methods that were even then beginning to dominate taxonomy. He collected massive numbers of specimens, and used his observations of their characteristics to develop ideas about their relationships. This distinctly Baconian approach to science led him to propose various higher categories, which he maintained were 'realities and not simply mental concepts convenient for sorting organisms' (Kinsey 1936).

Kinsey's studies of gall wasps still contain much valuable data,<sup>1</sup> but his higher categorisations have been subject to considerable criticism, with the palaeontologist George Gaylord Simpson in particular dismissing them point by point (quoted in Drucker, pp. 55–58). Stephen J. Gould (1982) would later describe Kinsey's multiple cascading classifications as 'bloated taxonomies'.

### The study of human sexuality

Kinsey's ideological approach, and his occasional confusion of correlation and causation, appear distinctly old-fashioned today. But the dispassionate objectivity with which he collected and correlated factual information proved to be ideal tools when it came to a fresh examination of human sexuality.

Kinsey's interest in human sexuality as a subject for serious scientific study emerged from a series of 'marriage' seminars that he and a group of colleagues ran for undergraduates at Indiana University in 1938, having been petitioned by students in the Association of Women to do so. Such seminars were common in American

universities of the time, where many students were quite ignorant of sexual matters, and usually focussed on moral advice about 'healthy' practices and avoiding masturbation.

But, Kinsey being Kinsey, he decided to focus on actuality rather than morality. There were few books that he could recommend, but there was one that reflected the philosophy that he wished to pursue. This was *A Marriage Manual: A Practical Guide-Book to Sex and Marriage* (1936), by the American doctors Abraham and Hannah Stone.

The Stones argued that: 'an intelligent [marital] union should be based on an understanding of the biological processes involved.' This was just the message that Kinsey wished to convey, and he recruited seven other Indiana University faculty and staff to help him set up a course on this basis.

The course began on 28 June 1938, and attracted 98 students. In his opening lecture on the 'Biologic Bases of Society', Kinsey rejected the prevailing philosophy promoted by long-time campus marriage instructor and School of Medicine Professor Thurman B. Rice, who taught that students should not learn anything about sex before marriage, but learn through trial and error later (Drucker 2014).

Kinsey's lecture was taken by some students as a 'tacit admission [that experimenting with sex before marriage] would be good for health' (Drucker 2014). He followed it with a lecture on reproductive anatomy, which included illustrations of different coital positions. Other lecturers taught the physiology of sex, including the nature of male and female orgasms and the psychology of sexual satisfaction.

The course rapidly became popular, and enrolment more than doubled during the following year. A particularly important feature was that Kinsey conducted detailed interviews with the participants, learning about their real practices and beliefs, and offering advice with no moral judgment involved.

'By the summer of 1940,' says Drucker, 'Kinsey was increasingly aware of the objections of

<sup>1</sup> New species and genera continue to be discovered (e.g. Melika *et al* 2021) and classification is continually updated (Melika & Abrahamson 2000; Nylander 2004).



**RIGHT:** The cover of *Time* magazine, 24 August 1953. Kinsey is shown in amongst ‘the birds and the bees’, though the article would indicate that dealing with the emotions of human beings was quite distinct from dealing with the ‘motions’ of gall wasps.

### Organising the data

Kinsey saw his recording of sexual histories as a natural progression from the taxonomic approach that he had used in his gall wasp studies. When he eventually published *Sexual Behavior in the Human Male*, he argued that: ‘the transfer from insect to human material is not illogical, for it has been a transfer of a method that may be applied to the study of any variable population, in any field.’

The transfer was represented in dramatic form by the Californian playwright Steve Haskell in his carefully researched play *F\*cking Wasps*, produced at the Los Angeles ‘Theatre of Note’ in 2003. ‘The goal,’ says Kinsey’s character, ‘is to demonstrate myriad gradations of lifestyle. Not to categorize but to emphasise the variety.’

Which is exactly what Kinsey did—not as a goal, but as an outcome. He and his colleagues devised a questionnaire that took two hours to complete, and which elucidated no fewer than 521 individual pieces of information. Those who administered the questionnaire were expected to memorise it, and to note down the answers in a

several IU faculty members to the explicit nature of the course.’ The interviews were becoming increasingly important to Kinsey, and when the university President offered Kinsey a choice of continuing to record the histories but resigning from teaching the course, or teaching the course but letting others deal with the history/counselling aspect, he had no hesitation in adopting the former course. A fresh scientific study of human sexual behaviour was on its way.

code that the subject could not recognise. Some of the questions were subtle cross-checks on the subject’s truthfulness. If there was a conflict in the answers, the subject was asked to explain. If the explanation was unsatisfactory, then none of the subject’s answers were included in the study.

Kinsey based his recording scheme on that which he had developed for organising gall wasp morphological data, but using punched Hollerith cards instead of hand-written cards to aid in forming the data into multiple horizontal scales to display the complex data sets, and enable observation of correlations.

Eventually Kinsey and his colleagues published their data in two massive reports (Kinsey, Pomeroy & Martin 1948; Kinsey, Pomeroy, Martin & Gebhard 1953). Both focussed on reality, rather than morality, in what the authors described as a ‘taxonomic’ approach, as the Introduction to the first volume makes specifically clear:

The present volume is a taxonomic study of the frequencies and sources of sexual outlet among American males.

Kinsey was assisted in his statistical sampling of data by the biometrician Raymond Pearl (1879–1940). Even so, his statistical methods have been subject to criticism. In particular, his refusal to validate his data with a random sampling of individuals, where he argued that not all of those included in the random sample would answer the questions, so that the ‘random’ sample would actually be biased (Bullough 1998).

A second, more recent, criticism is that ‘With the very act of measuring, scientists can change the social reality they set out to quantify’ (Fausto-Sterling 2000).<sup>2</sup> This certainly applies to Kinsey’s work, which changed the way that Western societies in particular view sexuality. The Kinsey Reports, as the two volumes came to be known, greatly expanded the range of what was thought to be ‘normal’ human sexual behaviour, especially with regard to masturbation, homosexuality (now expanded to LGBTQ+) and female sexuality.

Despite the criticisms, the lasting value of Kinsey’s legacy lies in his use of taxonomic principles and

<sup>2</sup> This is a specific example of the more general Goodhart’s Law of Unintended Consequences, which states that ‘when a measure becomes a target, it ceases to be a good measure’. The complexities that result from this deceptively simple insight (e.g. Hilton & Gao 2022) are beyond the scope of this article.



the unbiased, rigorous, large-scale collection of data concerning real behaviour as an essential foundation for any interpretation of that behaviour. Alfred C. Kinsey, taxonomist, can be rightly proud of such a legacy. His obituary, with some details of his early life, was published by Christy (1999) in the *Proceedings of the Indiana Academy of Science*, under the curious heading of 'necrology'.

### Acknowledgments

I am grateful to Jennifer Simms MLS, Associate Librarian at the Indiana University Sciences Library, for searching out Christy's little-known obituary of Alfred Kinsey, and to Steve Haskell for providing the complete unpublished manuscript of his play *F\*cking Wasps*. Donna J. Drucker's book *The Classification of Sex* has been an invaluable reference source.

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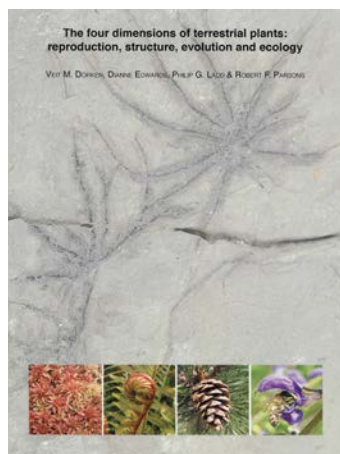
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# Reviews

## The Four Dimensions of Terrestrial Plants: Reproduction, structure, evolution and ecology

V. M. Dorken, D. E. Edwards, P. G. Ladd & R. F. Parsons.

344pp, Kessel Publishing House  
2021 (Paperback)  
ISBN 9783945941805  
Col./bw illust. 45€



One of the most invigorating and intellectual exercises available to a young botanist is a thick, well-illustrated book synthesising what is known regarding the colonisation of land by plants. How do/did the life cycles of so many embryophyte lineages contend with the presence and absence of flowing water? My personal revelation came late. I was an assistant professor for nearly five years before reading a paperback edition of Corner (1964). No one wrote holistic and speculative Botany as seductively as he did. Surely, I'm not the only one Corner left with a mental image of an Archaeopteryx munching arils while perched in a grove of the earliest fruit trees.

Of course, Corner has long been out of date as the evidence provided by molecular phylogenies, new fossils, advanced microscopy, and reproductive ecology mounts. To remain relevant, a new book addressing topics once found in *The Life of Plants* must be published every two or three decades. That is why we need a volume like the one under review here and why it needed four authors. Two are European. Two are Australian and that's clever. They guarantee we won't have another slanted treatment focussing primarily on examples from one hemisphere, followed by brief references to oddball relicts in obscure refugia.

The book divides into two parts. The first 241 pages focus on the spore and gamete story comparing Phyla with different modes of alternation of generation. This includes the evolution of structures in extinct and extant plants. The remaining 78 pages return to each Phylum to define their ecology including their past and present roles as biome engineers, and their current contributions to human resources. I much preferred this second half as a source of unfamiliar information. The authors remind us that plant geography, diversity, and the evolution of adaptive traits often reflect past disasters. For example, due to mass extinctions, animal dispersal of the fleshy seeds in extant cycads most probably reflects a comparatively recent and restricted trend dependent on the mammals of the Cenozoic. These surviving trees and shrubs are not waiting longingly for the return of Cretaceous dinosaurs.

Throughout the book illustrations are colourful and at their best when devoted to full-page diagrams of life-cycles and close-up photos of organs and sectioned tissues. A few are startling. I never expected a full page of photos devoted to a single seed of *Welwitschia* producing two emerging plantlets, each with its own two leaves. I've never seen so many exquisite photos of the pollination droplets of gymnosperms and that includes *Fitzroya cupressoides* where several ovules secrete so much fluid that they converge as one, compound, pollen trap.

Let me emphasise, though, that this is not a book to assign to undergraduates taking a General Botany course. The terminology and descriptions employed will be too dense for most students. Rather, all readers will be better off if they read appropriate chapters in a trusted textbook first like Evert and Eichhorn (2013), before attempting this book. The first page of the Introduction sent me running to its glossary as I did not know the difference between poikilohydry and homoiohydric.

On the other hand, this book offers a rich source of reference materials a professor might choose to augment lectures playing Q and A games with peers and students. For example, which family of ferns produce spores that germinate so fast that the resultant gametophytes release sperm 24 hours later (A: Marsilleaceae)? Which Order makes the biggest eggs in the Plant Kingdom (A: Cycadales)? In which family of seed plants does fertilisation occur only after the ovule falls to the ground? Well, I'm waiting...



The problem with this book is its lack of self-consistency. With four authors one wonders whether anyone was designated to enforce an outline reminding contributors to incorporate and explain the most pertinent research published over the last half century. If one author describes a structure in one Order shouldn't the text in the next chapter, follow through and describe comparable structures in allied Orders? For example, I have never read a better description of the structure and histology of the stems of the sporophytes of the Psilotales. Therefore, why aren't we entitled to the same information and photos in the Equisitales? You won't find the term, carinal canal, here. In fact, for a book focussing on how different lineages deal with the presence or absence of water there's little mention of stele evolution and diversification.

Following the superior photos of variation of micropyles and gametogenesis in the gymnosperms in chapter 3.3, one would also expect comparable treatment of variation of embryo-sacs and stigmas in the angiosperms. It doesn't happen. They could have written simply that the sheer number and kinds of cells in embryo-sacs vary throughout angiosperm lineages (Fahn 1997). While the Liliium-type sac depicted in chapter 3.4 is the preferred model in most General Botany classes it does not dominate megasporogenesis in the angiosperms. Isn't Liliium preferred because its physical size and ontogeny are easier to follow, section and mount? The authors should have also reminded their readers of past surveys of receptive, stigmatic surfaces varying from thin protein pellicles, to hydrophilic slime puddles, and rarely to hydrophobic liquid cuticles (see Heslop-Harrison & Shivanna 1977).

The word sporopollenin is used once in the text and not defined in the Glossary. If enclosing the male gametophyte in a pollen grain represents one of the triumphs of terrestrial evolution in seed plants why is there no discussion of variation in the bi-layered pollen wall and its apertures? This last question is posed specifically to one of the co-authors as the two of us worked in the same School of Botany for years. In our day that institution enjoyed what was probably the largest pollen lab in the southern hemisphere. It's also time to retire the term, 'dry pollen' when referring to buzz-pollinated flowers, as only submarine pollen may be considered wet. As animal-pollinated systems are more likely to embed pollen grains in an adhesive/cohesive, lipid-rich, pollen coat it's far better to refer to greasy versus grease-poor grains.

The lack of self-consistency mars the Ecology chapters. Pneumatophores appear but, shouldn't we also enjoy some reference to roots wearing velamen when discussing epiphytic monocotyledons? I would have liked to see attention paid to one of the most unique discoveries of the early-21st century. Specifically, thanks to Cronberg *et al.* (2006) we understand that various microarthropods transport moss sperm depositing them in archegonia. Furthermore,

we've known for a century that flies visiting the soft and smelly apophysis discs of mosses in the Splachnaceae disperse their sticky spores when the gametophytes grow on dung (Bequaert 1921; Marino *et al.* 2009).

There should have been a stricter approach to the composition of colour photos. When there are only six to a page they are models of clarity. Mass too many together and it becomes harder to read the white lettering against the light blue background (Figure 67). Likewise, Figure 135 offers 12 photos of floral presentation and prospective pollinators but four are too blurry. Australian co-authors should be ashamed of letting that happen to the glorious *Drakaea glyptodon*.

Sub chapters on regeneration are of increasing importance as we live in an age when fire cycles are far too frequent. While I agree that fern spore vagility encourages quick colonisation, especially on tropical islands, I was surprised the authors did not comment on vegetative colonisation by invasive rhizomes of brackens (*Pteridium*) following mining, overgrazing and bush fires on two hemispheres. The authors note that gymnosperms are poor sources of human nourishment. I agree, of course, but there's another way to consider their value as they provide us with expensive wild foods. As conifers of montane forests are under such stress, and are so dependent on ectomycorrhizae, some elevated regions of temperate Eurasia are centers of a viable industry in gourmet mushrooms (Bernhardt & Ren 2020). Perhaps that information will be used in a few decades in the next book on plant colonisation of the land.

**Peter Bernhardt, The Missouri Botanical Garden**

Bequaert, J. (1921). On the dispersal by flies of the spores of certain mosses of the family Splachnaceae. *The Bryologist* 24: 1–4.

Bernhardt, P. & Ren, Z.-X. (2022). Yunnan Mushroom Summers. *Fungi Magazine* 15(Spring): 20–27.

Corner, E. J. H. (1964). *The Life of Plants*. Chicago: University of Chicago Press.

Cronberg, N., Natcheva, R. & Hedlung, K. (2006). Microarthropods mediate sperm transfer in mosses. *Science* 313: 1255.

Evert, R. G. & Eichhorn S. E. (1993). *Raven, Biology of Plants*. New York: W.H.Y. Freeman and Company Publishers.

Fahn, A. (1997). *Plant Anatomy, fourth edition*. India: Aditya Books, Lucknow.

Heslop-Harrison, Y. & Shivanna, K. R. (1977). The Receptive Surface of the angiosperm stigma. *Annals of Botany* 41: 1,233–1,258.

Marino, P., Raguso, R. & Goffinet, B. (2009). The ecology and evolution of fly dispersed dung mosses (Family Splachnaceae): Manipulating insect behavior through odour and visual cues. *Symbiosis* 47: 61–76.

## Ecology and Natural History (New Naturalist)

David M. Wilkinson

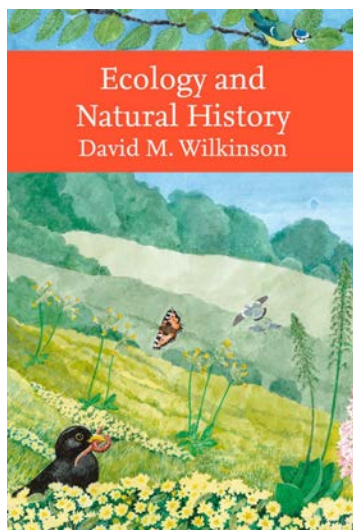
384pp, William Collins  
2021 (Hardback)  
ISBN 9780008293659  
Col. illust. £64.99

New Naturalist Series are not textbooks. They are for the interested student, the amateur naturalist and perhaps retired professional, who wants to know more about a subject from an authoritative and up to date source. This book meets that need exactly. The twelve chapters cover the major ideas and fields of ecological study. Professor Wilkinson deals with basic ideas like the capture and use of energy for production and recycling by decomposition. He explains what ecosystems and ecological niches actually are, all in easily readable and scientifically accurate text. These and other concepts are put into their historical contexts, showing how ideas and methods have developed during his and our lifetimes. For example, the chapter on ecosystems brings the reader abreast with the current status of Lovelock's Gaia concept.

Along the way, well-known sites of such research in the UK are described with the type of work performed at each: Wytham Woods for niches, Rothamsted for soil ecology and Wicken Fen for ecological succession. The descriptions of his visits to these places gives a real feel of what ecologists actually have to do, and how their methods and conclusions are changing with the ability to analyse much larger datasets. One emphasis is on the importance to ecosystems of the very diverse microorganisms that can now be identified and studied so much more reliably. Altogether, I think this has been done very well, combining the scientific knowledge into an interesting story.

The sections in the final chapter on global heating and the current interest in re-wilding should give the reader pause for thought. The author, who was Reader in Environmental Science at Liverpool John Moore's University, is now Visiting Professor at Lincoln and is very well qualified to write this review. The list of citations looks very useful. I think he has been let down somewhat by the reproduction of the pictures, several of which seem too dark while others lack definition. That aside, I found this an excellent book.

Brian Livingstone FLS



## Trees (New Naturalist)

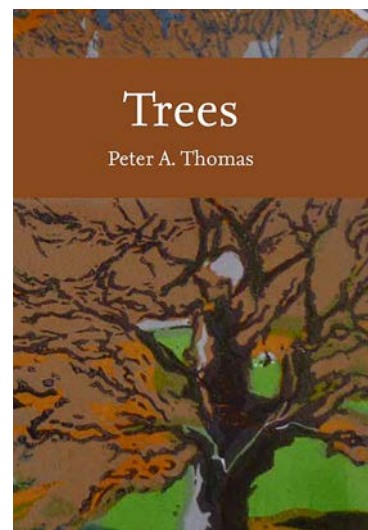
Peter A. Thomas

512 pp, William Collins  
2022 (Hardback)  
ISBN 9780008304515  
Col. illust. £65

Peter A. Thomas's *Trees* contains a lot of information, insight and international perspective. The first New Naturalist title to approach this subject since Oliver Rackham's lively *Woodlands* (2006) and H. L. Edlin's authoritative *Trees, Woods and Man* (1956), it has an uneasy marriage to make. The detailed field-studies work of the 1980s has now been succeeded by research into the global dynamics of trees and advanced statistical modelling, informed by data sets inconceivable even a decade ago. To be successful and up to date, a book that aims to give a contextual overview of the entire subject of trees for amateurs and professionals, must entwine tree biology, world ecology, and the global role that trees are currently playing in discussions about climate change and biodiversity collapse. It must do this, moreover, so effortlessly that the reader can link the observation of an autumn leaf to current narratives about global warming, without needing more than two cups of coffee to do so.

Setting out to write *Trees* therefore requires the constant linking of scientific insights with observed inferences and must bridge the gap between the old and the new with ruthless critical perspective. Thomas, with years of experience teaching woodland ecology in the UK and USA, largely manages this with aplomb, but occasionally it is the old that wins, forming a refined and comfortable backbone, while the new can sometimes feel shoehorned in.

The New Naturalist Series has the stated aim 'to interest the general reader in the wildlife of Britain by recapturing the inquiring spirit of the old naturalists', and here they have produced a book of great beauty and tangible quality. The remit of each of the New Naturalist books can be more selective (dealing with an area, such as *Pembrokeshire*, or a more limited clade, like *Gulls*), so this is a monster, checking in at 500 pages and covering most of the elements that the amateur or professional would think of concerning trees. After an introductory chapter about the 'Value of Trees', the book has a beautifully-shaped central section taking





the reader through the tree year, and everything associated with it. While pollination techniques and the growth of seedlings are combined in the 'Spring' section, the thorny subject of *cohesion-tension* theory is dealt with alongside other parts of the 'Summer' life of the tree. Seeds, fruit and leaf fall are incorporated into 'Autumn', and the structural elements of trees are found in 'Winter'. It is very well done. By comparison, the succeeding chapters on 'Genetic Engineering', 'Symbiosis', 'Pests and Pathogens', and 'The Future of "Our" Trees' seem something of an afterthought.

However the naturalist's attention is soon caught. How many people know that the steep rise in the oxygen content of the atmosphere might have been due to the lag between trees learning how to create lignin, and bacteria learning how to destroy it? How many of us—sneezing—stop to think that pollen, in being blown by the wind, becomes positively electrostatically charged and attaches itself to our noses? How many people can really assess the payoffs that occur in the size of nuts? Found in many of the paragraphs are the seeds of delight that come from fitting something observed and speculated upon into a scientific framework. Nowhere is this more apparent than in the observations of the horse chestnut, whereupon the yellow stripes of its flowers turn red once pollinated to discourage insect attention, but stay on the tree to give off a larger pollination signal.

By taking the world's trees as his subject, rather than just the 35 native British species, Thomas allows us to assess the gamut of tree mechanisms and devices. Thank heavens too for his broad definition of a tree; not Lord Denning's vague 'anything that one would ordinarily call a tree' nor the IUCN's complicated stem predictions.

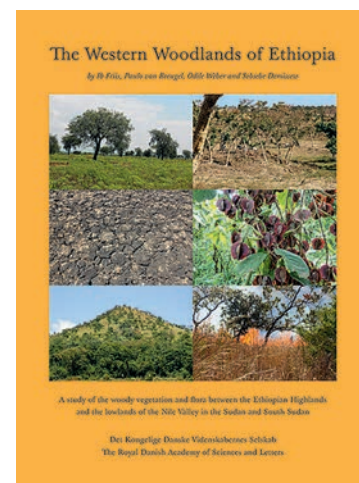
For interest and readability, I would recommend this book to everyone, but I also feel some opportunities have been missed. In particular, the opportunity to engage with certain fundamental questions; for example, the peculiarities and flexibility of tree DNA and the implications that this has for carbon sequestration and movement. Or serious engagement with aesthetic theory and psychology to rationalise the oft-quoted 'trees are good for us', potential exciting avenues of research, or a balanced weighing of the modern tree-owners' digital tools. The best New Naturalists are not textbooks; they are thrilling in that their format encourages 'cross-reading', and it is these connections that add the magic. If I had to choose one quibble, it would be that some of the fascinating facts are not sufficiently contextualised. But perhaps it doesn't matter; superb print quality, excellent, if rarely original diagrams, and great pictures, all on beautiful paper, make the book a pleasure to read. Impeccable references, index and of course, endpapers, create a bibliophilic delight.

Harriet Rix FLS

## The Western Woodlands of Ethiopia: A study of the woody vegetation and flora between the Ethiopian Highlands and the lowlands of the Nile Valley in the Sudan and South Sudan

Ib Friis, Paulo van Breugel, Odile Weber & Sebsebe Demissew

521pp, Narayana Press  
2022 (Hardback)  
ISBN 9788773044407  
Col./bw illust. £61



This book represents a continuation of ideas and research presented in *Forests and Forest Trees of Northeast Tropical Africa* (Friis 1992) and *Atlas of the Potential Vegetation of Ethiopia* (Friis *et al.*, 2010).

'The current study concentrates on the vegetation of the western escarpment of the Ethiopian Highlands and in the lowlands between the escarpment and the border with Sudan and South Sudan a zone stretching 200km from the southern part of the border with Kenya to the northwest point of the border with Eritrea.'

The aim is to put the Ethiopian woodlands into an African setting, outlining the geographical, historical and ethnic arrangements of the western lowlands such that readers can connect with difficult to obtain background information that may help understanding and back up future research.

To achieve this aim, the book is divided into 11 sections, many of which are further subdivided. Each section deals with a theme: Introduction; The western lowlands of Ethiopia their topography, geology, soils, climate, fires, history and population; Previous studies of the Western Ethiopian woodlands; Project background; Research questions; Methods and terminology; Descriptions of the profiles; The woody plants in the sample; Their distribution, ecological range and floristic element; Phytogeography and distribution (local, altitudinal, and general African); Environmental



adaptations and ecological categories; Modelled distributions of typical Ethiopian *Combretum-terminalia* woodland species; Cluster analyses and ordinations; Associations, indicator species and gradients; and the Conclusion: what are the answers to the scientific questions?

It is clear that the book is a mine of very detailed information that does not easily lend itself to be read from cover to cover—more to be dipped into according to the research sought. The authors must be applauded for the extent and range of their research efforts, but inevitably there are omissions in a volume of this size. From my perspective, I found the absence of labelled y axes on graphs both distracting and irritating (examples can be found on pp. 348, 350 and 352) and represent poor proof reading. That said, the coloured vegetation distribution maps are excellent, very clear in conveying their meaning. So too the many coloured photographs for example, on pp. 142, 144 and 161, all raising the quality of the book even further. No expense has been spared in the overall publication, and very largely these features have added much value to the study.

In a book of this size it is difficult, and perhaps unfair, to single out particular examples of interest but the following two caught my eye. They are both related to mechanisms used by some plants to resist fire and herbivore browsing. To survive drought and, additionally, fires, many woody plants living in woodlands and woody grasslands are confronted by grass and herbaceous fires, so store water in their trunks and

roots. To achieve this, many woody plants develop a thick corky fibrous bark that both resists fire and minimises water evaporation from the trunk. Examples include the baobab and large members of the *Ficus* taxa, which store water in their trunks.

Perhaps less well known is *Pterocarpus* (see ABOVE) which builds up water and nutrients in its roots, so that young plants killed in the fire may be quickly replaced by saplings growing from water-storing roots.

Other plants face the problem of grazing and damage due to the 40 plus different species of hooved mammals that browse woody plants. To deter grazing, plants have methods such as an unpleasant taste, thorns and spines. *Acacia* and other genera use aggressive ants as a mode of protection. Here the ants live inside 'ant galls' which are hollow and inflated spines with small openings that allow the ants to move in and out. In return the plant provides the ants with a form of nectar.

Finally, in my review of this massive work, it begets me to comment upon its accessibility to readers. Firstly, the cost of the publication at £61.00 (for hardback) represents a tremendous outlay from already stretched individual and departmental budgets; probably a department might have two copies and likewise a library, but the price has to be offset against the content and quality (in the main) of the book itself, which diminishes the actual cost in real terms. For those specialists working in this field, cost becomes



less of an issue because of the sheer volume of data and commentary included. It is this latter point that commends me to recommend dipping into and out of its pages and, may be, purchase at least one copy for reference.

Stephen Hoskins FLS

## Avian Illuminations: A cultural history of birds

Boria Sax

415pp, Reaktion Books  
2021 (Hardback)  
ISBN 9781789144321  
Col./bw illust. £25

The author of *Avian Illuminations* has had at least four books prior to this one published by Reaktion. Two of these are in the regular format of the series, comprising a usually short account of a single or a group of closely related species. The other two, similar to this one, are more wide-ranging, esoteric works about *Imaginary Animals* (2013) and about *Dinomania* (2018). People with an interest in or a knowledge of Anthropology, Archaeology (even Ornithology), Zoology or Zymology will find something to their taste (or distaste) in this wide-ranging tome.

Following a short eight-page Introduction, Part One, 'Birds in Philosophy and Religion' has five chapters (1–5) covering Parallel Worlds, Phoenix and Thunderbird, Bird Divination, Bird Souls and Migration and Pilgrimage. The four chapters (6–9) in Part Two, 'Birds in History', are entitled Nature-cultures (presented in that form), Avian Politics, Falconry and Plato's 'Man'. 'Birds in Art' are the subject of the four chapters (10–13) of Part Three under the headings of From Caves to Cathedrals, Art or Illustration? Birds, Flowers and Time, and, The Nightingale and the Rose. What would logically be Part Four becomes 'Conclusion, Birds and The Future' with two chapters (14–15) concerned with Extinction and Protection and Revival. These last two chapters bear a resemblance to similarly titled chapters in other books by Sax. Extinction (or potential extinction) is attributed to several causes including

humans revelling in death, the harvesting of feathers, eradication of predators, crop protection, introduction of invasive alien species and collection for science(!). Protection and revival can be achieved through watching and feeding birds and reviving and resurrecting them.

Boria Sax's day job is as a lecturer at Mercy College in New York City which describes itself as independent, nonsectarian and coeducational (a reviewer of an earlier book stated that English lecturers should not write about science). It is said of him that he is best known for his writings on human-animal relations and for his style that combines scholarship with narrative and lyricism. Many of his books and articles have somewhat idiosyncratic titles, but this has not prevented them being awarded a wide range of accolades. Sax has also found time to act as a consultant for several United Nations and International Organizations on human rights and welfare.

This book is not in the usual mould of the Reaktion series. Its 415 pages—twice the length of most of the Reaktion series—are printed on good quality glossy paper and bound in hardback (printing and binding being done in India). The paper quality has enabled superb reproduction of the black and white and colour illustrations, garnered from prehistory to the 21st century, that adorn most of the pages (some of the interpretations and analyses that accompany the figures are a bit obscure—at least to this reviewer). The book is very fully referenced although the superscript numbers referring to them and the arrangement by chapter instead of a continuous listing will not be to everyone's liking. Addenda cover Further Reading (mostly already having appeared in the References) and a limited list of websites about birds. One index lists bird species appearing in the text, and another provides a general overview of the contents. If one is interested in this type of book its cover price of £25 means it is of extremely good value.

Trevor Wilson FLS

## 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.

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Please join us in welcoming the following new members to the Society (elected May–Sept 2022):

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# Lives remembered

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## Gunnar Broberg (5 Sept 1943–30 April 2022)

The respected Linnaean scholar, Professor Gunnar Broberg of Lund, Sweden, passed away on 30 April at the age of 79, and is remembered by his wife Agneta and his children Lovisa, Anna, Karin and Olof. Gunnar gladly received all for conversations and listened with interest—the door was always open to his study.



Encouragingly, he discussed all possibilities and generously shared his knowledge. His personality was distinguished by his concern for his fellow human beings, his kindness, and his openness.

Growing up in a vicarage in the countryside of Södermanland, Sweden, and after his school years in Nyköping, he moved to Uppsala where he defended his dissertation on Carl Linnaeus's anthropology in 1976. He took up the Professorship in History of Science and Ideas at Lund University in 1990, and successfully built a far-sighted and creative research environment.

As a researcher, he had great breadth and depth. Nothing seemed uninteresting to him. He delved into the most varied subjects with curiosity and receptiveness. His research interests included the history of biology, zoology, and medicine, but he is mostly renowned for his research into Carl Linnaeus. Undoubtedly, he was the world's foremost Linnaean expert. His biography of Linnaeus, published in Swedish in 2019, was awarded many prizes. He was Editor-in-Chief of the yearbook (*Årsskrift*) of the Swedish Svenska Linnésällskapet (Swedish Linnaean Society) for over 40 years. When he passed away, he had recently concluded his commentary to Linnaeus's *Nemesis Divina*. In numerous books, articles, and chapters, he deepened knowledge about Linnaeus as a scientist, thinker, and in his private life, and placed him in his proper historical context.

Gunnar Broberg's interest in the human nature of his subjects distinguished him as a person and as a researcher. For him, history concerned both people and life. With subtle humour and empathy, he highlighted the telling examples that made historical figures come alive, their thoughts emerging from the silence of time. The Linnean Society was very grateful to

have worked with him in 2020, where he contributed pages to *L: 50 Objects, Stories & Discoveries from the Linnean Society of London* about his favourite 'treasures' in our collections, Olof Rudbeck's woodblocks and the Linnaean pearls.

At his death, he had written a book about learned encounters, about people meeting on a journey and connecting. This is what many will remember about him—his unfailing curiosity, and the wonderful friendliness he bore towards all those lucky enough to meet him.

by Professor David Dunér FLS

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## Field Marshal Sir John Chapple CBE (27 May 1931–25 March 2022)

Born in Maida Vale in London, Sir John Lyon Chapple was the son of Elsie, a doctor, and Charles Herbert Chapple, a Royal Engineers officer. As a child, John met Rudyard Kipling, and would go on to enrol in Windsor's Imperial Service College, which had absorbed Kipling's school. After completing his National Service, he attended Trinity College at the University of Cambridge, where he would meet his wife Annabelle. Upon marrying in 1959, their family would grow with children David, Rachel, Kate, and Sasha.

His long military career began with the 2nd King Edward's Own Gurkha Rifles (The Sirmoor Rifles). Shortly after he served with the 1st/2nd regiments during the communist insurgency known as the 'Malayan Emergency', and stayed in Malaysia for three more years, subsequently returning to the UK. He would command the 1st Battalion, 2nd Gurkha Rifles in the early 1970s before being appointed a Commander of the British Empire (CBE) in the Queen's Birthday Honours. He would go on to serve as the head of the British Army, or Chief of the General Staff (CGS), from 1988–1992.

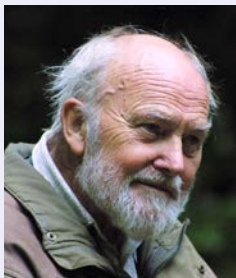
Whilst perhaps most notable for his military career, Sir John was also a member, trustee, supporter and patron to almost 100 organisations, including the Royal Geographical Society, World Wildlife Fund UK, and the Zoological Society of London, the latter of which he was also President from 1992–1994. He also served as Chairman of the UK Trust for Nature Conservation in Nepal.

He became a Fellow of the Linnean Society in May 1986, and he also participated in the Society's Field Trip to Norfolk in

2012. Sir John attended many of our lectures and meetings where he was always a kind, understated and humble guest.

### Ernest Emmett (5 September 1934–7 May 2022)

Ernest died peacefully at home early on the morning of 7 May after a long illness bravely borne. The youngest of six, his father was a chauffeur in Acton, West London, just before the outbreak of World War II. His interest in natural history began at a very young age, having been evacuated during the war to Chudleigh Knighton, a small village in south Devon, where he played in the lowland heath. (He would have been pleased that the heath is now an SSSI, home to the rare ant, *Formica exsecta*.) After returning to London, he attended Chiswick Grammar School for Boys, and would eventually work in the laboratory of a fire protection company developing more effective fire extinguishants, a job briefly interrupted by his National Service spent in Egypt and Aden.



After meeting his wife Valerie at Acton Technical College, his working life was divided into two parts, as a research chemist in industry and then in teaching chemistry in secondary schools. A family tragedy led to them moving near Chepstow in the Wye Valley in Wales, where Ernest continued to teach. Ernest's natural history interests here were broad, ranging from birdwatching, Lepidoptera, various other aspects of entomology and arachnids, as well as mycology.

Another move to Lancashire saw him doing surveys for the Nature Conservancy Council (NCC) at various sites around Morecambe Bay. Amongst others, he ran a light trap at Gait Barrows National Nature Reserve (NNR) and pitfall traps, mainly for spiders on the damp mires. He gave his Lepidoptera collection to Liverpool Museum.

Ernest joined the British Mycological Society (BMS) and was an enthusiastic member, becoming the BMS Foray Secretary in the 1990s, and together with other members of the Foray committee they organised the main forays and annual taxonomy meeting at the Royal Botanic Gardens, Kew, for several years. He also ran annual day fungus forays at Gait Barrows nature reserve, and he was active with the local wildlife trust group.

Shortly after moving to Scotland in the 2000s, Ernest and Valerie travelled around Scandinavia, where Ernest would eventually work with students there, extracting the DNA from material he collected, which he sent to a colleague

in Gothenberg University, Sweden to do the sequencing. He was the principal author for the *Mycena* section in the monumental *Funga Nordica*, devising the identification keys, making all the sections and the microscope drawings.

Ernest was elected a Fellow of the Linnean Society in 1989, and the BMS awarded him their Founder's Medal for his services to mycology at a ceremony in the Linnean Society's rooms in 2003.

Keen on science education to the end, he donated his body to medical science in the Anatomy Department of Dundee University. Having taught chemistry to many an aspiring young medic, he felt he could make a last contribution to their training in this way.

by Valerie E. Emmett

### Clive F. Mann (4 March 1942–24 August 2022)

Clive Mann died on 24 August 2022 following a short illness. An English biologist, Clive was educated at Colchester Royal Grammar School and graduated with a BSc. (Hons) in Zoology and Anthropology from University College, London, in 1964. Later that year he travelled to Uganda where he obtained a Diploma in Education from Makerere University, Kampala. After teaching at Soroti Senior Secondary School, he returned to the UK to continue teaching, but went back to East Africa in 1969 to resume teaching biology in Kenya.

An avid ornithologist, Clive contributed to the knowledge of the East African avifauna, principally through a bird ringing programme and publications before resuming teaching duties in the UK. His ornithological interests led to a PhD from the City of London Polytechnic in 1988 on passerine taxonomy using previously unused morphological characters such as birds' feet, musculature and tongues. One result of this research was his description of a new monotypic genus for the grey-chested Illadopsis, *Kakamega poliothorax* (Mann, C. F., Burton, P. J. K. & Lennerstedt, I. 1978). (A re-appraisal of the systematic position of the *Trichastoma poliothorax* (Timaliinae: Muscicapidae). *Bulletin of the British Ornithologists' Club* 94: 131–140.)

From 1981 until 1991 he was Head of Biology at a school in Brunei where he resumed research on tropical birds, culminating in a definitive book on the Birds of Borneo published in the British Ornithologists' Union's checklist series in 2008. He wrote two other books: *Sunbirds: A Guide to the Sunbirds, Flowerpeckers, Spiderhunters and Sugarbirds of the World* (2001, jointly with Robert A. Cheke) and *Cuckoos of the World* (2012, jointly with J. Erritzøe, F. P. Brammer and R. A. Fuller), both published as Helm Identification guides.



He served for many years on the Committee of the British Ornithologists' Club and was its chairman from 2001 to 2005. He was also a Trustee of the Trust for Avian Systematics (previously The Trust for Oriental Ornithology ([www.aviansystematics.org](http://www.aviansystematics.org))) for over 20 years. At the time of his death, he was preparing a second edition of *Sunbirds* and contributing to sections of a revised Howard & Moore checklist of the birds of the world.

by Robert A. Cheke FLS

### Wing Commander Gerald Mickleburgh (11 Nov 1928–April 2022)

Wing Commander Gerald Mickleburgh became a Fellow of the Society on 23 April 1953. His family told us that he was proud to be a member of the Society for over 79 years, and we are very sorry to have lost him.

Gerald studied Botany at the University of Leicester under Professor Tutin and Miss Ann Connolly. In the early 1950s he made a study of *Corynephorus canescens* Beauv; his family still hold samples of several of these grasses that he collected in Jersey and Norfolk. This was one of the subjects suggested to him by botanist C. E. Hubbard as an area of interest for the British Ecological Society's Biological Flora.

Well into his later years, Gerald continued his study of natural history. In his late 80s and early 90s, he participated in a National Plant Survey in Scotland, surveying the coastline, dunes and beach at Sandyhills in Dumfries and Galloway, with his vasculum on his shoulder.

### Howard 'Sid' Thomas (10 March 1948–12 July 2022)

Howard Thomas, known almost universally as Sid, was born and educated in Wales and had a career in scientific research based at the Welsh Plant Breeding Station, subsequently IGER, near Aberystwyth. After his retirement he held an emeritus position as Professor of Biology at Aberystwyth University. His research interests focussed especially on leaf senescence and the catabolism of chlorophyll, and his team played a lead role in identifying the gene underlying the green/yellow seed trait studied by Mendel.



He collaborated widely and held visiting positions at the Universities of Tohoku in Sendai and Zürich, and he was an ISI

Highly Cited author who published over 200 research papers, books and reviews, and was still publishing at the time of his death in July 2022.

Sid was a polymath, being a talented jazz musician and composer, and writing on music, literature and much more. He and his wife Helen were elected as Fellows of the Linnean Society in 2020, and both greatly enjoyed the Society's wonderful online talks over the past two years. He will be hugely missed as a much-loved and inspirational husband, father, grandfather, uncle, and mentor to the next generation of scientists.

by Helen Ougham and Ben Thomas

### Deaths Reported to Council

Prof. Gunnar Broberg

Field Marshal Sir John Chapple CBE

Mr Ernest Emmett

Mr Stephen Gage

Dr Ian Hornsey

Dr William Ingledew

Prof. Eduard Kolchinsky

Dr Clive F. Mann

Wing Commander Gerald Mickleburgh

Dr Ian Richardson

Prof. Howard Thomas

Mr Geoffrey Timms

Mr David Townsend

Dr James Zarucchi

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