The Linnean

Communicating nature since 1788

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A Leg Up on Parenting

What harvestmen reveal about behavioural evolution

Playing Host

The Entwined Lives and Histories of Parasites and People

Without Costing the Earth

The Sustainability Dilemma of Digital Preservation

The LINNEAN SOCIETY of London



Herbarium

Plants in a new light

Photographed by Lena Granefelt

FREE EXHIBITION
10.00–17.00 Tues–Fri
10 September 2026–10 March 2027

The Linnean Society of London
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www.linnean.org

The LINNEAN SOCIETY of London

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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.

Cover image: *Amazochroma* harvestman protecting eggs
© John Uribe

Dear Fellows,



As we move into autumn in the northern hemisphere, we look ahead to a particularly busy period of events at the Society, including our Orchidaceae Symposium, the Linnean Edinburgh Lecture on 'restoring nature by moving species', and our Founder's Day Lecture.

On 10 September, just before publishing this issue, we were delighted to welcome our Patron, Her Royal Highness The Princess Royal, and her husband, Vice Admiral Sir Tim Laurence. More about the visit will follow in the next issue of *The Linnean*.

In this issue, Glauco Machado explores what harvestmen—and their extraordinary diversity of parenting strategies—can reveal about the evolution of animal behaviour, drawing on fieldwork, iNaturalist observations and evolutionary data. We also consider the environmental impact of our digital records, as Digital Assets Manager Andrea Deneau shares findings from her research into more sustainable digital preservation.

Elsewhere, Dino J. Martins takes us into the hidden world of parasites, while Dorian Haskard FLS traces Sir Joseph Banks's fascination with colchicum and its uses from gout to modern medicine and biotechnology. Maura Flannery FLS explores James Philip Mansel Weale's remarkable orchid paintings, and their unexpected connections to Charles Darwin and our Curator of Artefacts, Glenn Benson FLS, takes a deep dive into the cultural and social aspects of… the pineapple.

Leonie

Leonie Berwick
Editor, *The Linnean* and Publications Manager (leonie@linnean.org)

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

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Image: The Linnean Society of London

What's on



Outsider Animals | Cherishing Shunned Creatures

Speaker: Marlene Zuk
15 Oct 2026 | 18.00 BST (Onsite: £)

What can rats, raccoons, gulls and cockroaches teach us about animal intelligence, and ourselves? In this thought-provoking lecture, Marlene Zuk explores the surprising cognitive abilities and behaviours of the often-overlooked animals living alongside us. From raccoons raiding our rubbish to cockroaches revealing clues about the evolution of pregnancy, these unpopular creatures challenge our assumptions about which animals matter. Along the way, Zuk asks us to reconsider how we relate to other species, what makes an animal belong somewhere, and what our attitudes towards urban wildlife reveal about our own place in nature.



An Evening with the Sunbirds of the World

Speaker: Robert Cheke
22 Oct 2026 | 18.00 BST (Onsite: £)

In collaboration with the British Ornithological Club

Discover the dazzling world of sunbirds and their fascinating relatives in this illustrated talk by tropical zoologist Robert Cheke. Drawing on the updated 2025 edition of *Sunbirds of the World,* Cheke explores recent taxonomic discoveries alongside new research into breeding behaviour, pollination and physiology. From the Old World's sunbirds to flowerpeckers, spiderhunters and sugarbirds, discover how these remarkable birds compare with hummingbirds—and uncover the latest insights into their evolution, ecology and vital roles in the natural world.



Astonished By Beauty | The Essential Practice of Natural History

Speaker: Thomas Lowe Fleischner
3 Nov 2026 | 18.00 GMT (Onsite: £)

What happens when we truly pay attention to the natural world? In this richly illustrated talk, naturalist and conservation biologist Thomas Lowe Fleischner explores natural history as the timeless practice of noticing and connecting with the more-than-human world. Drawing on his new book *Astonished by Beauty*, he reveals why paying attention matters not only to science and conservation, but to our well-being and society. Through vivid stories and photographs, Fleischner invites us to rediscover our innate capacity for wonder, and see nature afresh.

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

Images: The Linnean Society of London;Jean VD Meulen; Courtesy Thomas Lowe Fleischner



Blue Archives | Anna Atkins, Cyanotype and Ecological Photography

Speaker: Aindreas Scholz
18 Nov 2026 | 12.30 GMT (Online: Free)

Revisit Anna Atkins's pioneering *Photographs of British Algae* in this thought-provoking lecture exploring photography, botany and today's climate crisis. Aindreas Scholz examines cyanotype chemistry, algae, seawater and archives, connecting Atkins's 19th-century practice with his own ecological photography. He considers how plants, water and photographic materials can inspire more thoughtful approaches to care, responsibility and our environmental future.

Symposium | Orchidaceae Taxonomy, Diversification and Biogeography

Speakers incl.: Oscar Alejandro Pérez-Escobar, Richard Bateman, Gill and David Mathers, Monika Lipińska
25 Nov 2026 | 09.30–18.00 GMT (Hybrid Day Meeting: £)

Explore the extraordinary world of orchids in this symposium examining their evolution, diversity and remarkable adaptations. With almost 30,000 species worldwide, orchids offer unique insights into biodiversity. Leading researchers examine their origins, pollination, genomes, mycorrhizal relationships, taxonomy and biogeography.





Linnean Edinburgh Lecture | Restoring Nature by Moving Species

Speaker: Martin Gaywood
19 Nov 2026 | 18.00 GMT (Onsite at the Anatomy Lecture Theater, Edinburgh EH8 9AJ: £)

Join Martin Gaywood for a look at how species reintroductions and conservation translocations are helping restore threatened wildlife and ecosystems. Gaywood explores fascinating projects in Scotland and beyond, from high-profile mammals and birds to overlooked plants and invertebrates. He examines the biological and social challenges involved, alongside creative new approaches to conservation.

Founder's Day Celebration 2026 | A Boogie with Linnaeus

Speaker: Annika Windahl Pontén
3 Dec | 18.00 GMT (Onsite: £)

Step into the musical world of the Linnaeus family! Discover the music, dances and festivities that brought their social lives to life, drawing on travel diaries, family music collections and other fascinating sources. Explore these historical glimpses with Annika Windahl Pontén, then put history into motion with a lively dance workshop. Come curious—and bring your dancing shoes!



Images: Courtesy Aindreas Scholz; Martin Gaywood, Oscar Pérez-Escobar; Annika Windahl Pontén

News

ANNIVERSARY MEETING 2026: A SHARED CELEBRATION OF SCIENCE, NATURE AND COMMUNITY

From pioneering research to inspiring leadership, this year's Linnean Society medals and awards showcased the remarkable people advancing our understanding and protection of the natural world.

As a Trustee of the Linnean Society and Chair of its Medals and Awards Committee, I was delighted to attend the Anniversary Meeting, where this year's Medal and Award recipients were recognised and celebrated. It marked my first Anniversary Meeting as Chair of the Committee, making the occasion particularly special.

Over the preceding months, the Committee had reviewed and ranked nominations for the various awards—a difficult task when faced with a diverse and impressive range of candidates. It was particularly rewarding to celebrate the first cohort of recipients selected by our committee. Many attended the ceremony in person, while others joined remotely, highlighting the truly international nature of this year's awards.

A personal and engaging event

Hearing each winner reflect on their work, and what the award meant to them, was particularly striking. Each awardee was recognised for a distinct contribution to our understanding of the natural world, yet the connections between them were equally compelling. Despite their different career stages and backgrounds—from professional and amateur naturalists to artists and advocates for nature—there was a strong sense of shared purpose.

Chris Packham, awarded the Linnean Medal for the protection of nature, made several connections with fellow recipients, particularly Amy Bray, winner of the JSL Emerging Leader Award. Our Irene Manton Prize winner, Natalia Ruiz-Vargas, also connected with Diana Carneiro, recipient of the Jill Smythies Award. What stood out so strongly was that all of the awardees seemed equally engaged in, and appreciative of, each other's work, creating a real sense of shared achievement and mutual respect.

Notably, several Fellows commented on how moving they found the atmosphere of the event, having the opportunity to speak with the recipients and other attendees at the



FRONT ROW (L TO R): Natalia Ruiz-Vargas, Diana Carneiro, Amy Bray, Sierra Lopezalles; BACK ROW (L TO R): James T. Stroud, President Mark Watson and Chris Packham CBE

Image: The Linnean Society of London



Irene Manton Prize winner Natalia Ruiz-Vargas chats with Jill Smithies Award recipient Diana Carneiro.

reception. For me, the ceremony, acceptance speeches and conversations with individual award winners brought to life both the dedication behind their work and the many different ways in which people contribute to our understanding of, and care for, the planet.

Medals, Awards, Prizes and Grants: Providing opportunities

The Linnean Society's line-up of medals, prizes and awards recognise striking achievements that reflect the diverse approaches to understanding and protecting the natural world. Each year, they embody a refreshing reminder of the Society's principles and values. Some awards recognise academic achievement across progressive career stages, while others applaud the often game-changing contributions made by amateur naturalists. Where some awards focus on the understanding of nature, others celebrate vital leadership or advocacy for its protection.

This is also an opportunity for you. I invite all Fellows to visit the Society's website at **www.linnean.org/medals**, explore each award category and nominate someone whose work has made a difference, broken new ground or inspired you. Please do take the time to nominate, as together our award recipients reflect the breadth and vitality of our community.

I also urge members, particularly early career researchers, to make the most of our grants and to publish in the Society's journals. I hope PhD supervisors will support and encourage their students in submitting their work, as student authors may be eligible for the Irene Manton Prize for botany or the John C. Marsden Prize for zoology.

Finally, I hope many Fellows will join us at next year's Anniversary Meeting to celebrate our award winners and the achievements that continue to motivate all of us at the Society and beyond.

Nominate by 30 September at **www.linnean.org/medals**

Phil Gilmartin, LS Medals and Awards Committee
(info@linnean.org)

Image: The Linnean Society of London

Curiosity in Bloom: Inspiring Young Learners



I enjoyed learning about evolution and how creatures evolve into something different.

—Year 6 student

Our [workshop] teacher was very knowledgeable and enthusiastic. The children really enjoyed hearing all the anecdotes. The activities were well pitched and there was a good balance of discussion, listening and doing. Thank you!

—Year 6 teacher

I really enjoyed getting to see real specimens. I learned that Carl Linnaeus was the first to call us *Homo sapiens*.

—Year 10 student

As we start the new school year in the UK, it seems fitting to reflect on the growing impact of the Linnean Society's educational outreach. From September 2025 to July 2026, our education programme reached more young people than ever before, bringing the natural world to life through hands-on workshops, inspiring stories and real scientific specimens.

The response from teachers and parents has been equally encouraging. The number of workshops for the year have increased by 68% (34 in 2025, to 57 in 2026 so far), and feedback has given an average rating of 4.88 out of 5 when asked how likely they were to book again. Beyond the numbers, teachers' comments highlight the enthusiasm and expertise of our education team and the lasting impression these sessions leave on learners.

One parent of a home-schooled student praised the friendly and engaging approach of the workshop leaders, noting how they adapted discussions to suit the children's ages and interests. A Year 4 teacher shared that every child in their class wanted to visit the Linnean Society after taking part in a workshop at school. Following a visit to the Society, a Year 6 teacher described the session as knowledgeable and enthusiastic, with a well-balanced mix of stories, discussion and practical activities that kept pupils engaged throughout.

The learners themselves were just as positive. Sixty-three students shared feedback and every response was favourable. Pupils highlighted discovering the lives and ideas of Charles Darwin, Carl Linnaeus and Alfred Russel Wallace, exploring evolution and seeing real specimens up close.

This year also saw the introduction of three new workshops, broadening the programme for different age groups. These included a new 'Plants' workshop for Key Stages 1 and 2 (5–11 year-olds), alongside two new workshops designed for Key Stage 4 students (14–16 year-olds), creating even more opportunities to explore natural history through the Society's collections.

Beyond our workshops, we also expanded our outreach through **Nature Networks**, a six-week nature club for young people aged 11 to 13 who face barriers to outdoor education. Delivered in schools by the Linnean Society and funded by the John Lyons Charity, the programme received 100% positive feedback and will continue into the next academic year.

As we look ahead, we're excited to build on this momentum. We're currently looking for another secondary school to join Nature Networks, so if you have links with a school that could benefit from taking part, we'd love to hear from you. Together, we can continue inspiring the next generation to discover, explore and value the natural world.

Dan Simonsen, Education Manager
(dan@linnean.org)

Image: The Linnean Society of London

Work Experience: Interview with Annabel

Did you know that as part of our commitment to expanding engagement and inspiring the next generation, the Linnean Society hosts a work experience programme? Every year, we welcome students behind the scenes, offering them the chance to discover more about the Society, explore careers in science and heritage, and experience first-hand what it's like to work alongside our teams.

In July, we welcomed several work experience students, giving them the opportunity to learn, ask questions and get involved in the life of the Society. We wanted to find out what they made of their time with us, what surprised them and what they'll take away from the experience.

Here, Annabel shares a little about her time at the Linnean Society and what the experience has meant to her.

What first led you to the Linnean Society's work experience programme, and what made you want to apply?

I first found out about the Linnean Society through researching societies online related to natural history and zoology. When I read about the Linnean I was intrigued, so decided to visit in the summer on one of the open days. I was instantly fascinated and after being told that the Linnean offered work experience, I jumped at the opportunity and decided to apply in hope for further insight into such an interesting place.

Have you always been interested in nature, or is there an aspect of the natural world that particularly inspires you?

From a very young age, I have always been very curious about nature and grown up with wildlife around me. Therefore, I think that I am most inspired by the zoological aspect of the natural world, and I hope to discover more about it in the future.

What have you been working on during your placement, and what have you enjoyed most?

I have enjoyed working in various areas of the Society and taking part in a broad range of activities, however I think I enjoyed visiting the Collections Store the most as it was amazing to see a variety of specimens from fish to Hercules beetles up close.

Has anything surprised you about working at a natural history society or seeing its work behind the scenes?

How many different moving parts there are to running both a charity and a society, which requires constant hard work in so many different sectors such as governance or education.



Looking back on your placement, what's the biggest lesson you'll take away—whether about nature, the world of work or your future ambitions?

The biggest lesson I'll take away from my work experience here is that teamwork and communication are essential. Everyone here at the Linnean was so welcoming and friendly to visitors and each other, and it made me realise how important teamwork is in order for an organisation to run smoothly and successfully.

Images: The Linnean Society of London

Welcome to Dan Simonsen...

In May, we said a temporary goodbye to Education Manager Ayesha Meredith-Lewis as she went on maternity leave. In her stead, we welcomed Dan Simonsen, who will be leading all things education. Dan has hit the ground running, delivering workshops onsite and activity days elsewhere, whilst overseeing our work experience programme and Our Local Nature Grants scheme.

Before joining the Society, Dan was a Learning Officer at the WWT London Wetland Centre, where he ran educational programmes connecting thousands of young people with nature. He began his career as a Biology teacher in a state-funded secondary school.

Two years ago, Dan left the classroom to pursue a career in the charity sector, aiming to have a greater impact on young people's opportunities to access and learn about nature. He feels honoured to take on this role, developing the opportunities the Linnean Society offers to children and young people. He is also looking forward to learning more about the Society's collections, history and activities.



...and welcome to Maddie Stannard

At the end of June, Maddie Stannard joined the Linnean Society as our new Engagement Officer, after we said a fond farewell to previous Officer Scarlet Forrester.

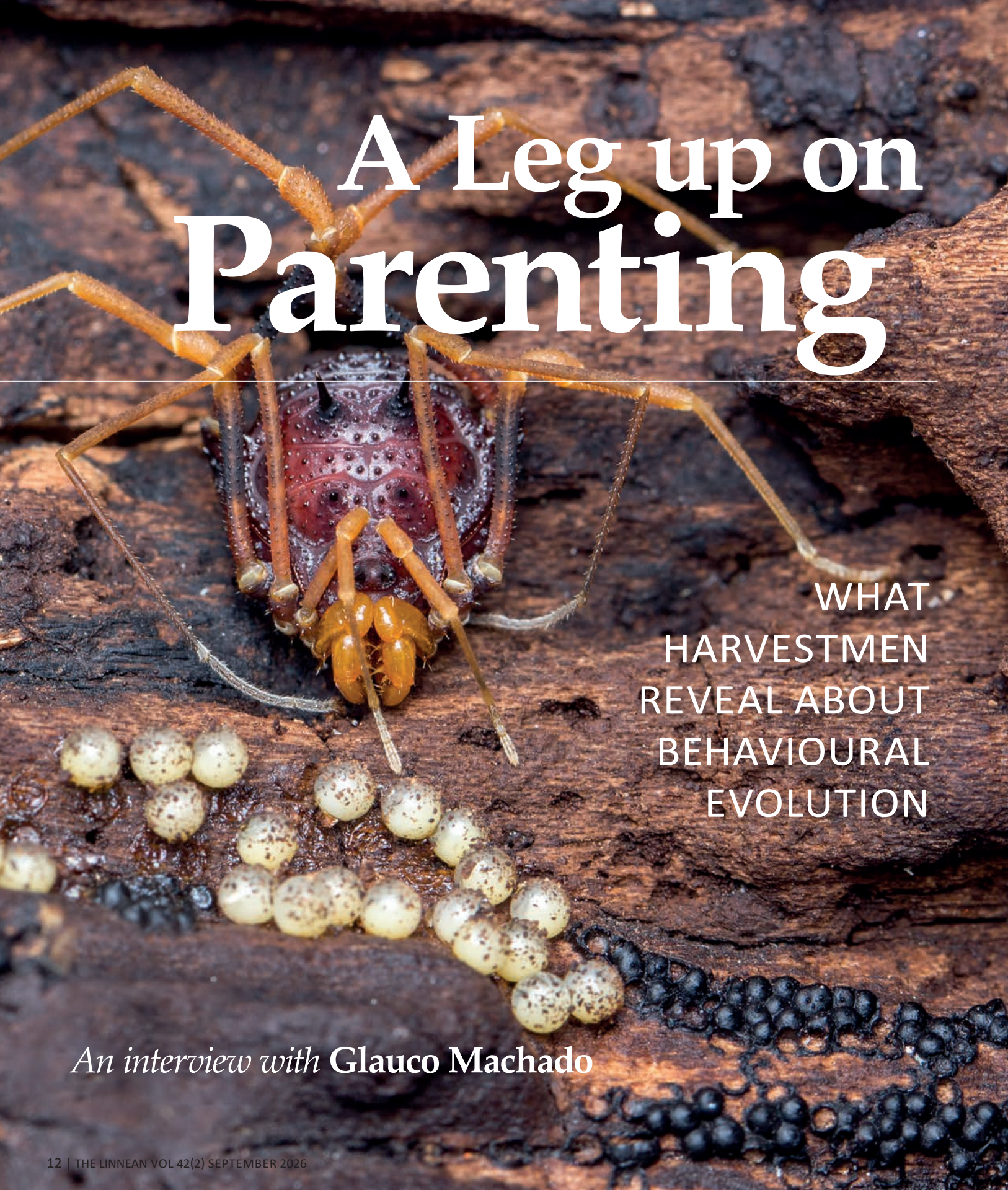
Maddie joins us from aquarium The Deep in Hull, where she delivered public engagement programmes in a marine conservation setting. A zoologist and science communicator by training, she brings diverse experience engaging the public with nature through seasonal workshops and hands-on science.

Maddie has already worked on some campaigns for social media, has supported both education workshops and general events, and has represented the Society at some external information days.

Maddie says: 'I was drawn to the Linnean Society for its historical importance and the opportunity to work with local communities and members, connecting people to a natural world they value.' She will support the Education and Events teams and looks forward to meeting you at one of our many upcoming events.



Images: The Linnean Society of London



A Leg up on Parenting

WHAT HARVESTMEN REVEAL ABOUT BEHAVIOURAL EVOLUTION

An interview with **Glauco Machado**

What can parental care reveal about the evolution of animal behaviour? More than you might think, especially in harvestmen, a group of arachnids with an extraordinary diversity of parenting strategies. In a paper published in the *Zoological Journal of the Linnean Society*, Glauco Machado and colleagues combined iNaturalist observations with field data and a large evolutionary tree to uncover multiple pathways to maternal and paternal care, frequent losses of care and the role of alternative egg-protection strategies. Here, Glauco speaks to Journal Officer Georgia Cowie about his fascination with harvestmen, why they are such a powerful system for studying behavioural evolution, and how citizen science is reshaping evolutionary research.

OPPOSITE: Female of the Amazonian harvestman *Amazochroma carvalhoi* (Gonyleptidae) caring for eggs under a fallen log in Brazil.

Georgia Cowie: What first drew you to studying harvestmen?

Glauco Machado: I started working with harvestmen in my first year as an undergraduate in Brazil, back in 1994. I immediately fell in love with these animals and began studying parental care. The species I worked on lived inside a cave, so it was fascinating to watch females guarding their eggs while predators tried to attack them.

I carried out an experiment to test how effective the mothers were at protecting their eggs, and they were remarkably effective. Whenever the female was present, she repelled every predator—remove the mother and the eggs were completely consumed.

I published those results, but then at a conference someone said to me, 'Inside a cave, everyone is a predator. There are no herbivores because there's no light for photosynthesis, so everything is a natural-born killer.' That made me wonder whether the same pattern would hold somewhere completely different.

During my PhD I found other species, this time in a tropical forest, where the females laid their eggs inside bromeliads. I repeated exactly the same experiment and again, the mothers were very effective. When I removed them, the eggs were entirely consumed. The only difference was the predators—inside the cave they were other harvestmen and crickets, but in the forest they were mostly ants.

At that time in the early 2000s, the literature on harvestmen was very limited. I decided to compile everything that had been published on parental care, searching papers in German, Spanish, French, Portuguese and English. That work became the first review of parental care in harvestmen. It gave us the bigger picture, but it also revealed a simple conclusion: we didn't have enough data. So, when I started my postdoctoral research in 2004, my goal was to visit sites across Latin America and build that dataset myself.

GC: How did this study grow out of that work?

GM: As I travelled, I'd occasionally find another species showing parental care. Each observation added to our understanding, but on its own it was only enough for a short note. Instead, I decided to save everything until I had enough for a much larger study.

Over time, other researchers also began sending me their observations because I had become known for working on parental care in harvestmen. I asked whether they'd be happy to hold onto their records so we could publish them together later, and many agreed.

Then, a couple of years ago, I attended a talk on birds. The speaker had used iNaturalist to build an ecological model of species distributions. I remember thinking, 'My God, that's a genius idea.'

Image: John A. Uribe Rosas



Within two days I'd found more than 150 new records of parental care on iNaturalist. I contacted everyone who had contributed observations over the years and told them I wanted to combine all our data into one comprehensive study.

The timing turned out to be perfect because we now have powerful methods for reconstructing the evolution of behaviour. One thing I didn't envision when I started this many years ago was that we now have lots of methods to reconstruct the history of characters or traits. Using phylogenies—the relationships between species—we can map behaviours and other traits onto the evolutionary tree. By mapping parental care onto the evolutionary relationships between species, we can ask questions that simply weren't possible 20 years ago. What was the ancestral state? How many times did parental care evolve? How often did species switch from no care to maternal or paternal care?

ABOVE: Glauco Machado studies the fascinating world of harvestmen, uncovering new insights into their behaviour, biology and evolution.

OPPOSITE: Male of the harvestman *Quindina* sp. (Nomoclastidae) caring for eggs laid on a disc-shaped nest hanging from a fern rootlet on a roadside bank in Colombia.

That's what makes this study unusual. It brings together decades of field observations, citizen science and modern methods for reconstructing trait evolution.

GC: What role do you think newer platforms like iNaturalist will play in future research?

GM: The idea was novel for me too. While writing this paper, I realised many researchers were already using iNaturalist to expand datasets and uncover entirely new information.

Most photographs don't tell you anything about behaviour, but that's almost beside the point. When you have thousands of images, even a small percentage becomes incredibly valuable. We searched around 25,000 photographs and found about 150 examples of parental care. That more than doubled our dataset.

The impact has been huge. As a result, the students in my lab are some of the co-authors to this paper, and in one of our lab meetings we were talking about how amazing conducting this study had been and how important iNaturalist is. My students and I were so excited by what we found that we started brainstorming other possibilities and we now have three more projects underway using only iNaturalist data.

Without it, we'd have needed to visit museums around the world. That would have taken years and cost a great deal of money. Instead, we completed the search in a week.

GC: Does that also make research more accessible?

GM: Absolutely, especially for researchers in Latin America. Many of our own animals are represented mainly in museums in Europe or the United States. Travelling to study those collections is expensive and often impossible.

With iNaturalist we can answer important scientific questions ourselves, without those barriers. It makes research much more accessible.

GC: How do you see the value of taxonomy in a study like this? As a natural history society, our journals have a strong taxonomic focus, but taxonomy is sometimes seen as a more traditional

Images: Glaucho Machado; John A. Uribe Rosas



discipline that fewer early-career researchers pursue. Do you see a strong future for taxonomy, and how do you think AI might shape its role?

GM: I think taxonomy is one of the most undervalued professions in biology. Taxonomists describe biodiversity. Without them, conservation simply isn't possible because you cannot protect a species that doesn't have a name.

Museums are equally important. In Brazil there are species that no longer exist in the wild but are preserved in museum collections. Those collections are curated and studied by taxonomists, so I think their role in modern science is more important than ever.

As for AI, I often found myself wishing there was a programme that could scan thousands of photographs and flag possible cases of parental care; it would save an enormous amount of time.

But I also know it would make mistakes. Sometimes a harvestman is standing over tiny pellets of soil or dung that look remarkably like eggs. A person can recognise the difference, but AI would almost certainly misclassify some of those images. It's a powerful tool, but it still needs expert judgement.

GC: That's really interesting to hear. I must ask, were harvestmen the first species you studied, or did your fascination with them come after working with other species?

GM: It's an interesting story. As a child I was fascinated by turtles; I kept nine of them at home and spent hours watching them feed, fight and mate. When I started university, I wanted to study turtles, but the region where I studied in south-eastern Brazil had become so degraded that there were almost none left.



BELOW: Female of the harvestman *Goniosoma roridum* (Gonyleptidae) caring for eggs on a roadside bank in the Brazilian Atlantic Forest.

Image: Glauco Machado



LEFT: Males of the harvestman *Deltigalus* sp. (Gonyleptidae) caring for eggs laid on the underside of a leaf in the Brazilian Atlantic Forest.

Instead, I became friends with a teaching assistant who studied frogs. Every weekend I'd join him in the field and gradually became fascinated by what he was doing. Eventually I asked if I could work with his supervisor.

He told me there was a problem. Very sadly and suddenly, his supervisor had died in a car accident while returning from fieldwork. But he then he asked me a question that changed my life: 'Do you like frogs, or do you like behaviour?'

I wasn't mature enough to answer immediately. I thought about it for a week and came back saying, 'I think I like behaviour more.'

He smiled and took me to the cave where the harvestmen lived. He showed me females guarding their eggs and said there were no published studies on their behaviour. If I chose to study these animals, he told me, I could build an entire career around them. And that's exactly what I've done.

GC: Finally, why are harvestmen such important animals for studying parental care?

GM: Harvestmen are one of the best model systems because parental care has evolved repeatedly and independently. When a behaviour evolves many times, we can compare those events and ask what environmental or social pressures favoured its evolution. That's much harder when a trait evolves only once.

What's particularly unusual is that both maternal and paternal care have evolved multiple times. Paternal care is rare across the animal kingdom, which makes harvestmen exceptional.

Our work suggests maternal care evolved because guarded eggs are far less likely to be eaten. Paternal care is different. In many species, females prefer males that guard their eggs, so sexual selection also plays a role.

Those repeated evolutionary transitions allow us to understand not only how parental care evolved, but why. That's what makes harvestmen such a remarkable system for studying the evolution of behaviour.

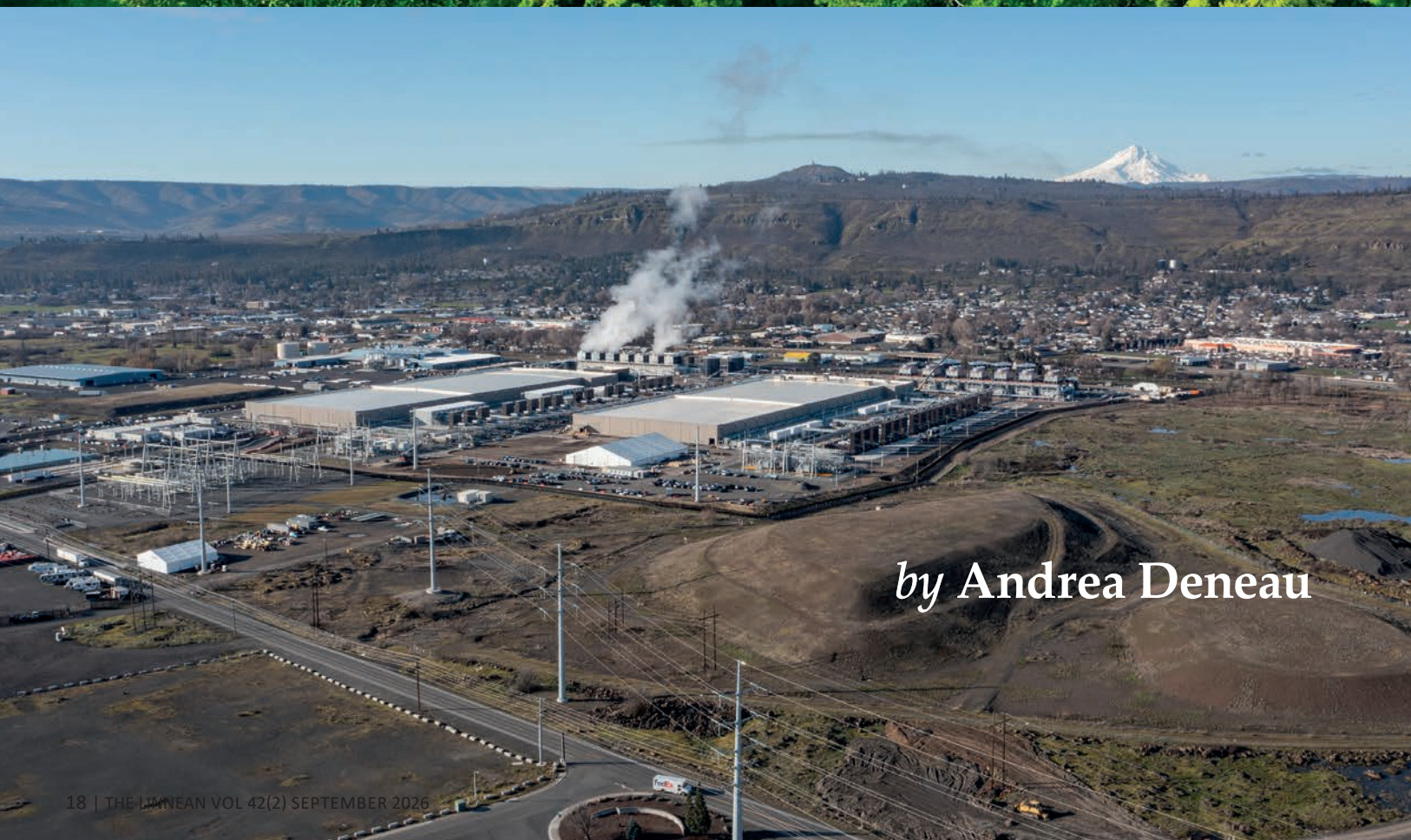
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More about the paper: Machado, G., Buzatto, B. A., Caetano, D. S., Flores, E., García-Hernández, S., Grob, O., Grossel, L. A., Höfer, H., Kury, A. B., Lancheros, H., Medrano, M., Oyarzún, C., Pérez-Schultheiss, J., Pinto-da-Rocha, R., Robledo-Ospina, L. E., Sáenz-Mancheno, J., Solano-Brenes, D., Quesada-Hidalgo, R., Triana, E., & Villarreal, O. (2026). One small step for citizens, one giant leap for science: iNaturalist records boost our understanding of the evolution of parental care in a clade of arachnids. *Zoological Journal of the Linnean Society* 207(2): zlag061. https://doi.org/10.1093/zoolinnean/zlag061

Image: Glauco Machado

Without Costing the Earth

THE SUSTAINABILITY DILEMMA OF DIGITAL PRESERVATION



by **Andrea Deneau**

The Linnean Society's Digital Assets Manager, Andrea Deneau, completed a Master's degree in Records Management and Digital Preservation in 2025. Her dissertation explored the environmental impact of digital recordkeeping and, in this article, she presents an illuminating overview of its key findings. While her research centres on recordkeepers—archivists and records managers—and the organisations in which they work, many of its insights and recommendations extend equally to personal recordkeeping. As custodians and users of digital collections and resources, we all have a part to play in rethinking our practices and expectations, and in recognising the environmental impact of the digital records we create, manage and preserve.

Framed by the urgency of the climate crisis and the growing recognition that digital recordkeeping practices have negative environmental impacts, my Master's dissertation addressed a gap in the existing literature by focusing specifically on digital recordkeeping in British cultural heritage organisations (CHOs). Many CHOs operate under constraints of budget, staffing and technical capacity. In the recordkeeping profession, there has been a growing awareness of how recordkeeping practices negatively impact the environment, however, it was unclear how much recordkeepers were aware of the impact of their profession and what solutions were available to them. In order to investigate pragmatic and economical ways CHOs can reduce their negative environmental impact, my dissertation examined four interrelated areas: electronic records management, digitisation and digital archives, digital preservation, and the awareness, assumptions and attitudes that shape practice. My research did not take artificial intelligence into account, but its increasing implementation and use by CHOs is another area that needs careful consideration in light of the climate crisis.

Understanding digital recordkeeping's environmental impact

Digital recordkeeping has a significant environmental impact, driven by the infrastructure and energy demands of information and communication technologies, including hardware manufacture, data storage, data centres, network transmission, duplication, preservation actions and electronic waste. Yet the true scale of this impact is difficult to measure, particularly where third-party providers or cloud services are involved. Despite this complexity, recordkeepers and their organisations still have an ethical duty to minimise the adverse effects of their work and embed environmental sustainability into everyday decision-making, as specified in the Archives & Records Association's (ARA) Code of Ethics (ARA 2024).

Laying the foundations

Records management was a natural starting point for identifying ways to reduce the environmental impact of digital recordkeeping. Effective records management reduces duplication, controls the growth of digital information, supports timely disposal and lowers storage demand, thereby benefiting both organisations and the environment. While there was an assumption that all organisations have a records management policy in place—the foundation of a good records management programme—I found that most CHOs do not include considerations for environmental sustainability in their policies. My research also showed that many organisations are still missing some of the foundations of robust electronic records management, with a notable proportion lacking clear management rules and providing insufficient staff training.

These gaps present practical opportunities for improvement. Stronger policies, more frequent reviews of appraisal approaches, regular weeding and clean-up activities, and stronger staff training could deliver immediate and cost-effective environmental gains. While I found that most CHOs did include digital records in their retention schedules, the nature, complexity and scale of digital records mean that appraisal strategies may need to be adapted and reviewed much more frequently—something that has not been considered by many organisations.

OPPOSITE: (Top) Green habitat in bloom; (Bottom) Aerial drone picture of a large hyperscale data centre facility, with steam rising from industrial cooling systems in The Dalles, Oregon, USA. Massive server buildings and nearby electrical infrastructure highlight the huge energy demand required for cloud computing, artificial intelligence processing and global internet data storage.

Images: Shutterstock.com/SaurOn; Shutterstock.com/Hrach Hovhannisyan

RIGHT: Calculate your own organisation's digitally-related carbon emissions through Digital Decarbonisation:

https://digitaldecarb.org/co2-data-calculator/

Digitisation with purpose

Almost all CHOs have undertaken or are undertaking digitisation projects. However, while digitisation can improve access and protect fragile originals, it is also energy-intensive and can create additional storage burdens, especially when high standards are applied indiscriminately or when mass digitisation proceeds without critical reflection. Organisations need to assess the usefulness of digitisation more carefully, weighing its environmental impact alongside access and preservation needs. Furthermore, differentiated workflows and technical standards can ensure that collections are digitised to a level appropriate for their intended use, rather than applying the same specification in every case. Alternatives such as improved catalogues, finding aids and digitisation on demand should be considered as more sustainable options for some collections. My research did find that many organisations would be open to such approaches, even if they are not yet widely embedded in current practice.

A proportionate approach to digital preservation

Digital preservation—the practice of ensuring the longevity of digital records—is one of the most environmentally demanding aspects of digital recordkeeping. It often involves redundant copies, fixity checking, migration, geographically distributed storage and long-term maintenance of access and preservation files. While digital preservation is essential to ensure the longevity of digital collections, many organisations uncritically apply the highest preservation standards to all their material, which is both financially and environmentally costly. To reduce their environmental impact, organisations should adopt proportionate, tiered approaches that identify what genuinely requires high-level preservation and where fewer or less frequent preservation actions may be appropriate. This might include lessening redundant copies, reducing fixity schedules, cold storage for infrequently accessed material, or more explicit decisions about retention periods. The greater challenge, particularly for organisations without specialist expertise, is knowing how much preservation is 'good enough'. This is made more difficult by the continued emphasis on highly risk-averse practices within the digital preservation community, which third-party digital preservation providers adhere to and promote. However, with organisations like the Digital Preservation Coalition now acknowledging the impact digital preservation has on the environment, there is hope that recommendations in best practices will be re-evaluated.

Awareness, assumptions and attitudes

Underpinning all of these technical and procedural areas are the issues of awareness, assumptions and organisational culture. My research found that while most recordkeepers feel an ethical responsibility to reduce their environmental impact and believe their organisations would be receptive to greener recommendations, many do not feel sufficiently informed about the environmental impacts of digital recordkeeping to become effective advocates for change. There is also a persistent perception that environmentally sustainable change would be costly, even though many of the measures identified in my research have the potential to save money—reducing unnecessary data, processing and storage.

There is a serious need for greater education, practical guidance, stronger collaboration and the inclusion of environmental sustainability within formal policy. This would give recordkeepers the confidence, knowledge and authority to communicate with, educate and manage the expectations of their organisations and their users. Professional bodies and recordkeeping authorities also have an important role to play by providing accessible, actionable recommendations that reflect both the urgency of climate change and the practical realities facing smaller and less well-resourced organisations.

5,750 Petabytes
storage per annum (heritage sector), not including duplication!
(Pendergrass 2019)

42%
of institutions surveyed for Andrea's Masters did not have a digital preservation programme

Only 10%
felt 'very informed' about the negative environmental impact of digital preservation

An organisation the size of the Society (c. 23 employees) generates approximately:

1,056 Gb of data daily

253.4 Tb annually

Which adds up to **6,334.2** Kg of CO_2 emissions

Equivalent to **7** flights from London to New York

What is the Society doing to help mitigate its digitally-related carbon emissions?

- ☞ Our Records Management Policy includes environmental considerations.
- ☞ We hold a dedicated staff-wide annual records clean up at the start of each year.
- ☞ Staff are given training in records management (it is also part of our induction for new staff).
- ☞ The Society is not actively taking on any large digitisation projects.
- ☞ As recommended, we offer digitisation on demand, rather than digitising everything.

What can you do personally?

- ☞ Participate in **Digital Cleanup Day** every March:
  - Delete emails when no longer needed.
  - Delete images and videos—be discerning.
- ☞ Manage your expectations when accessing online materials from institutions—be cognisant that not everything should be digitised.
- ☞ And one for us all—live in the moment—you don't need to record everything.

Image: University College London



ABOVE: In a commitment to mitigating the Society's digitally-related carbon emissions, we only scan on demand and have no large-scale digitisation projects planned at present.

Sustainability starts with selection

There is an urgent need for a paradigm shift in digital recordkeeping, at both organisational and individual levels. Rather than treating growth, permanence and constant availability as measures of success, recordkeepers and cultural heritage organisations need to reassess appraisal, retention, digitisation, preservation and access through the lens of environmental sustainability.

Many meaningful changes can begin with modest, pragmatic and cost-effective actions, and these small steps can, over time, support broader organisational change. CHOs have the same duty of care with their digital collections as they do their physical collections, but this care must be exercised with greater awareness, restraint and responsibility.

By making more purposeful, proportionate decisions about the records they create, keep and preserve, recordkeepers and their organisations can fulfil both a professional responsibility and a practical opportunity to help shape a more sustainable future.

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Digital Assets Manager, Linnean Society

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The Digital Preservation Coalition. Blogs on Environmental Sustainability: https://www.dpconline.org/digipres/tags/environmental-sustainability

The National Digital Stewardship Alliance (NDSA) Climate Watch: https://ndsaclimatewatch.substack.com/

The Carbon Literacy Project: https://carbonliteracy.com/

Image: The Linnean Society of London

Playing Host

THE ENTWINED LIVES AND HISTORIES OF PARASITES AND PEOPLE



by Dino J. Martins

PREVIOUS PAGE:
The famous flea image from Robert Hooke's *Micrographia* (originally published in 1665).

BELOW:
Bush hyrax (*Heterohyrax brucei*) in East Africa. It has a remarkable secret weapon: a specialised 'grooming claw' on the inner toes of its hind feet, which it uses like a tiny comb to pick parasites from its fur.

OPPOSITE: An *Anopheles* mosquito takes a blood meal. It can transmit *Plasmodium* parasites into the bloodstream which then multiply in the human body and cause malaria.

In his book *Hidden Creatures*, Dino J. Martins investigates the largely unseen world of parasites and the extraordinary relationships they have evolved with their hosts. Drawing on his experiences as a naturalist, as well as the work of generations of scientists and natural historians, he explores a side of nature that is unsettling, ingenious and deeply fascinating—and what these hidden creatures can reveal about the wider living world.

> *'We like to think of nature's beauties; to admire her outward appearance of peacefulness; to set her up as an example for human emulation. Yet under her seeming calm there is going on everywhere, in every pool, in every meadow, in every forest—murder, pillage, starvation and suffering.'*

The above words were penned over 120 years ago by Asa Chandler, the American parasitologist who wrote *Animal Parasites and Human Disease* (1918), a foundational historical work on the breadth and diversity of parasites. In it, Chandler captures the complexity and contradiction of nature manifested in parasites, and highlights both the wonder and awareness of the many-layered natural world, both beautiful and bizarre, that many naturalists through the ages have encountered.

All students and observers of nature, once they take a closer look, soon realise that 'under her seeming calm', there is a lot more going on. Throughout our illustrious history, if told by worms, fleas and microbes, humankind has been little more than tasty, convenient bags of nutrition that also provide free transport across the world. A broad sweeping view of life and all its richness and complexity is incomplete, though somewhat less rosy, without the recognition that many creatures have evolved through making a living by mooching off others.



Images: (Previous page) The Linnean Society of London; (These pages) Dino J. Martins

Islands in a sea of parasites

By some estimates, more than half of all species that exist are sustaining themselves through exploitation. Evolution has favoured those who have not just gone forth and multiplied, but also those who have done so at the expense of others. And it is not just the bodies of humans that are a potential habitat for myriad creatures both within and without.

Every single mammal, bird, reptile and higher plant represents a living island just waiting to be colonised by parasites. From a bird's feathers to a rat's fur to the spaces between the toes of the seemingly innocuous hyraxes that live on rocky outcrops on the African plains, all are potential habitats for parasites. Mountains to be scaled, rivers of blood and bodily fluids to frolic in and verdant fields of tasty tissues, muscles and organs to be tilled.

In researching and writing *Hidden Creatures*, I sought to combine natural history, intriguing biology and a bit of sleuthing to reveal the diverse world of parasites, and highlight how there was no escaping them in my own life as a naturalist. I also hope to inspire a growing interest in understanding how our behaviour and decisions, and even that of entire societies, can be driven by such tiny creatures.





ABOVE:
The author in the field with his dogs in Mpala, Kenya.

Parasite detectives

One of the things that really struck me about parasites, apart from their biology, was the deep, intricate thinking of those who had undertaken their study. How researchers rose to the challenge of figuring out the life-histories of parasitic species, explaining some of their adaptations and even just finding out which species the parasites lived on. The key was both their deep humanity, and the willingness to look beneath what was obvious.

The writings of naturalists, explorers, systematists, colonial medical officers and scientists of all kinds (including parasitologists) were key to adding layers to the book. I was able to do so thanks to the preservation of historical materials and access to some obscure books provided by the archives and libraries of the Linnean Society and the Wellcome Trust in London, and the American Museum of Natural History in New York. Librarians have always been some of my favourite people, and now I count them amongst my all-time heroes. Thanks to them I was able to learn about the personalities who brought to light the intricacies of parasitic life in the past, which continue to shape the world we live in.

Image: Dino J. Martins



LEFT: The work of Dame Miriam Louisa Rothschild helped advance our understanding of parasites, their life cycles and the parasite-host relationship.

Dame Miriam Rothschild: Fleas, flukes and fearless curiosity

Growing up in rural Kenya, I managed to get my hands on a copy of *Fleas, Flukes and Cuckoos* (1952) by Dame Miriam Rothschild and Teresa Clay. It revealed a whole new universe of thinking for me, and encouraged me to pursue my interests in looking at creatures that might be labelled 'disgusting'… but wondrous. From the library and archives at the Linnean Society I learnt more about Dame Miriam Rothschild (1908–2005), who made influential and life-long contributions to science, following in the footsteps of her father, entomologist Charles Rothschild (1877–1923), and zoologist uncle, Lionel Walter Rothschild, 2nd Baron Rothschild (1868–1937). Her father collected and described fleas, amassing records of some 500 new species. Following his suicide, Dame Miriam grew close to her uncle Lionel, whose collection now forms the Natural History Museum, Tring. Dame Miriam, herself a leading authority on fleas, would go on to receive the Society's H. H. Bloomer Award in 1968.

Dame Miriam's contributions included both science and human rights. During World War II she worked alongside Alan Turing at Bletchley Park, helping decoding efforts and earning a Defence Medal while advocating for Jewish refugees to be admitted to the UK in larger numbers. She championed everything from animal welfare to gay rights, contributing to the 1957 Wolfenden Report which recommended that 'homosexual behaviour between consenting adults in private should no longer be a criminal offence'. Her scientific contributions ranged widely and included studying clams and their trematode parasites, butterflies and their ecology, adaptations and mimicry through uncovering the links between their diets as caterpillars and their lives as adult butterflies to restoring meadows. She was and remains one of the world's greatest experts on fleas, continuing her research throughout her life, even wearing a special belt that had pockets woven into it to allow fleas to feed and stay warm against her skin.

Scientists, values and the world we choose

Today, as we learn more about Dame Miriam's remarkable life, and the lives of others like her, perhaps her story offers us a powerful lesson for challenging times: scientists have a responsibility not only to push the boundaries of knowledge, but also to stand up for the values that shape the kind of world we want to live in.

It begins with who we choose to recognise, listen to and learn from. When we embrace a more inclusive, diverse and expansive understanding of who can be a scientist, we don't simply open the doors to more people, we open up new ways of questioning and understanding the world. Our science becomes deeper, richer and more powerful because of it. And we must remember—we are all equal in the eyes of the flea.

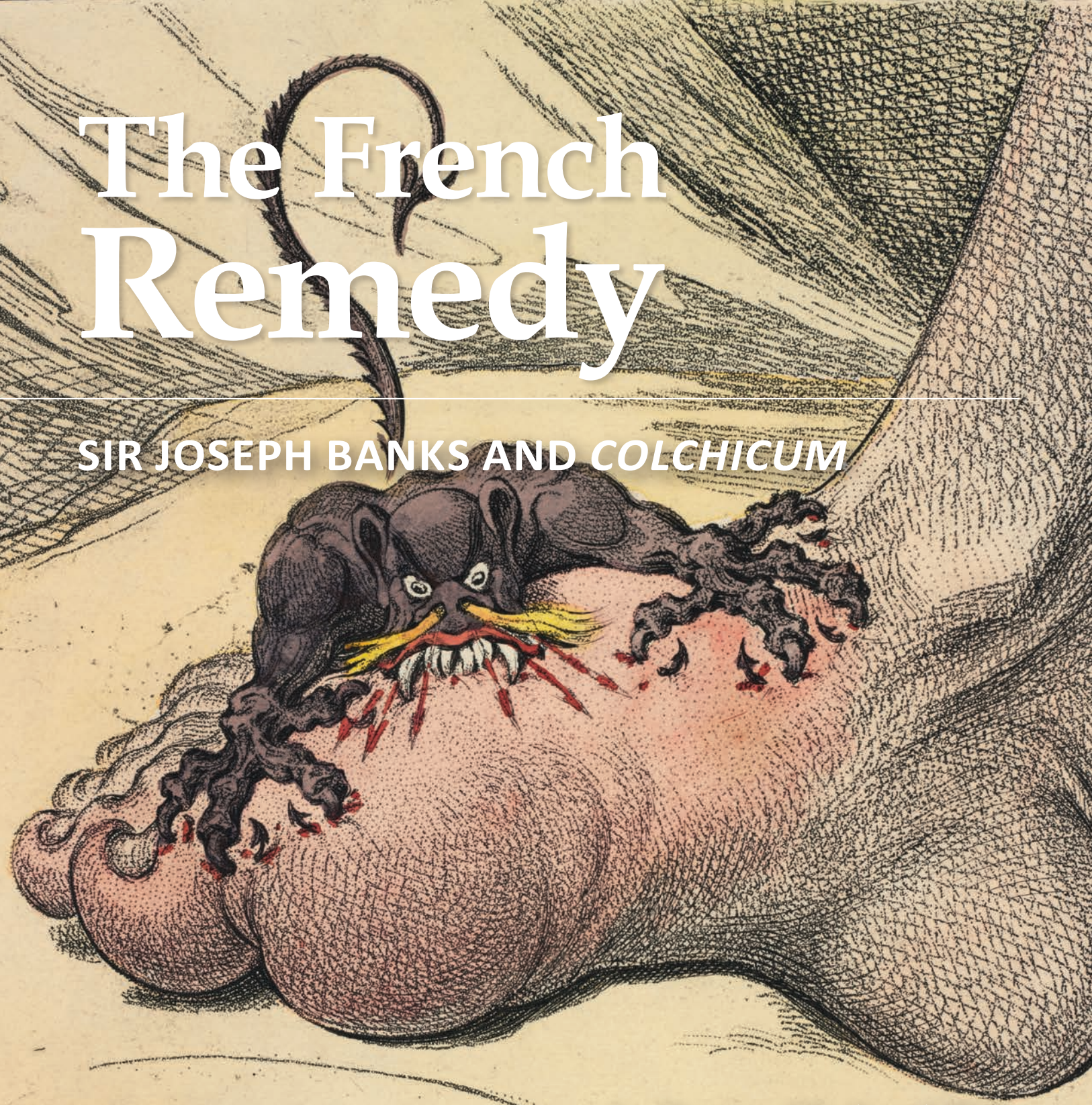
Dino J. Martins (Dino.Martins@stonybrook.edu)
Department of Ecology and Evolution, Stony Brook University, Stony Brook, New York

Find out more about *Hidden Creatures* at https://bit.ly/Martins-Hidden

Image: Wikimedia Commons

The French Remedy

SIR JOSEPH BANKS AND *COLCHICUM*



by Dorian Haskard FLS

When Sir Joseph Banks was struck by gout, an unlikely remedy from France set him on a path that would connect an excruciating illness with one of the most remarkable plant-derived compounds in medicine. Here, Dorian Haskard FLS investigates Banks's curiosity about *Colchicum* and its mysterious medicinal properties. His interest helped draw attention to a substance whose story would extend far beyond gout, encompassing the study of cell division and plant breeding, cancer treatment, evolutionary arms races and the possibilities of modern biotechnology.

Sir Joseph Banks suffered his first attack of gout at the age of 44 years. James Gillray's *The Gout* gives a good idea of what Banks's foot looked like and how it felt. King George III wrote expressing sympathy: 'The King is sorry to find that Sir Joseph is still confined; and though it is the common mode to congratulate persons on the first fit of the Gout, he cannot join in so cruel an etiquette.' Sending congratulations upon a first attack of gout was customary, as the supposed release of humours was thought to indicate a robust constitution. Unfortunately, gout put Banks in a wheelchair for his final years.

In February 1810, George 2nd Earl Spencer visited Banks at 32 Soho Square and found him in a terrible state. Later that day he sent him a new proprietary medicine from France, *L'Eau Médicinale d'Husson* signing off 'God Bless you d$^{r.}$ S$^{r.}$ Jos. & prosper the bottle'. Banks was impressed and subsequently used his considerable influence to help clarify its ingredients and incorporate them into orthodox medicine. As the surgeon John Want had proposed that it was a tincture of the 'Autumn Crocus' *Colchicum autumnale*, Banks requested his doctor Sir Everard Home to provide him with the means to make a comparison:

> I consider a trial of the Vinum Colchici as a duty due from me to the Public: if I am cured by it & think it proper to change Housson for it in future, the credit for the medicine will be established, and no doctor afterwards object to prescribe it on pretence of not knowing the ingredients of which it consists.

Banks's verdict on his personal clinical trial, as well as that of the geographer James Rennell, merited a regional newspaper report:

> MR. WANT is authorised by Sir JOSEPH BANKS and Major RENNELL, to publish their decided conviction that his medicine ... and the *Eau Medicinale* are the same, as far as they have been enabled to judge from the appearance, taste, and smell. Several gentlemen conversant with the latter, who have seen Mr. Want at Sir Joseph's house, are of the same opinion.

Banks was most likely correct, but no bottle of *L'Eau Médicinale* has been put through modern analysis, if such a bottle still exists.

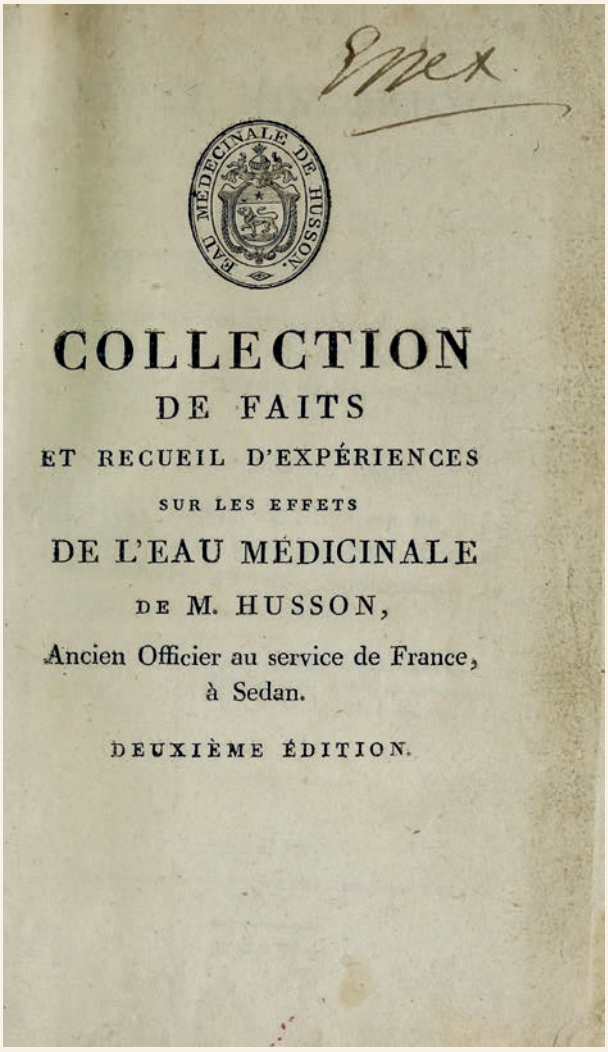
By March 1815 *Colchicum* tincture was in regular use by doctors in London. Banks wrote to Sir James Edward Smith, founder of the Linnean Society, saying it was 'found to be a more efficacious medicine with inflammatory rheumatism than any in the Pharmacopoeia.' His postscript 'Shocking work in France' would have referred to the news that Napoleon Bonaparte was rallying the army that would result in the Battle of Waterloo.

OPPOSITE: *The Gout* by James Gillray, 1799. From the Cleveland Museum of Art (bequest of Dr. Paul J. Vignos, Jr. 2011.182).

BELOW: Sir Joseph Banks painted by Thomas Phillips in 1810, soon after *L'Eau Médicinale* came to London. By this time Banks had suffered from gout for twenty-two years. Note the walking stick held by his right hand.



Images: Cleveland Museum of Art ; The Linnean Society of London



ABOVE: Title page of the promotional booklet for *L'Eau Médicinale*, 1783.

The next question was whether *Colchicum autumnale* was what Byzantine physicians of the middle-ages had called *Hermodactyl* (i.e. 'finger of Hermes'). Carl Linnaeus had grouped three species into the *Colchicum* genus and Banks corresponded with his cousin Lady Hester Stanhope in Lebanon to obtain more information from the local doctors. She sent him some 'roots' that the doctors recommended, but it is not clear whether they ever arrived. Nevertheless, in March 2016, the *Hereford Journal* informed its readers that *Eau Medicinale* 'owed it's virtue' to *Hermodactyl* and that 'the public is indebted to Sir Joseph Banks for a knowledge of these particulars'.

The isolation of colchicine

Extracts of medicinal plants might be effective—perhaps sometimes a little too effective. This was certainly true for *Colchicum autumnale* as standardisation of formulations was erratic and deaths from overdosing all too common. It was not until well after Banks had died that there was any progress in isolating the active ingredient. German chemist Philipp Geiger coined the term 'colchicin' to designate a compound he purified from *C. autumnale* in Heidelberg in 1833. However, he died soon after and other chemists were unable to replicate his protocol. The name stuck, and colchicine as we know it was first crystallised by pharmacist Alfred Houdé in Paris 50 years later (Houdé 1884). We now know that colchicine is also made by all plants in the *Colchicaceae* family, and so there may well have been more than one *Hermodactyl*, depending on what grew successfully locally.

The effect of colchicine on cell division

Walter Dixon and Walter Malden in Cambridge found that injecting colchicine into laboratory animals caused immature cells to appear in the blood, stuck in the process of dividing (Dixon & Malden 1908). This effect on cell division is a general one, but it was in botany that it was first exploited. If colchicine is washed away after exposure, cells may restart division but with double the original chromosome count. The technique was pioneered in the late 1930s by American botanist Albert Blakeslee at the Carnegie Institution, New York. Blakeslee had been trying to induce polyploidy for years, and colchicine offered an opportunity for fundamental genetic research on the heritability of plant morphology (Blakeslee 1939). The agricultural and horticultural industries took notice that treating seeds with colchicine resulted in 'bigger and better' plants, and this resulted in a plant breeding bonanza in the 1940s. Many garden and agricultural plants in use today owe their origin to colchicine (Singh *et al.* 2025).

Colchicine prevents mitosis by interfering with the assembly of the microtubular spindles that pull chromosomes apart to occupy new cells. Similar microtubules form integral components of cilia, flagella and spermatozoa tails. Using ^{3}H-labelled colchicine as a probe, Edwin Taylor and colleagues at the University of Chicago purified the colchicine-binding protein in sea-urchin spermatozoa tail microtubules and this was subsequently named tubulin (Shellanski & Taylor 1967; Mohri 1968). Microtubules are polymers of alpha- and beta- tubulin subunits, and colchicine prevents subunit conjugation during the dynamic polymerisation process (Ravelli *et al.* 2004). However, tubulin may not be colchicine's only intracellular target as it has also been found recently to interfere with actin microfilament dynamics as well (Aldogan *et al.* 2025).

Image: Wellcome Images



LEFT: *Colchicum autumnale* from Pierre Joseph Redouté's *Les Liliacées* (1802–1816). The flower and leaves have been illustrated separately as the 'Naked Lady' flowers in the autumn after the leaves have fallen. Corms (a perennating organ allowing a plant to survive through the seasons) used to be harvested in late summer to reduce loss of the active principal upon flowering.

Effects of colchicine in medicine

Very little was known about inflammation in Joseph Banks's day, and nothing about the involvement of uric acid in gout. It was not until the 1960s that it was generally accepted that gouty inflammation is caused by an innate immune response to the crystallisation of monosodium urate. This can be effectively suppressed by treatment with colchicine, and at a dose less than required to suppress cell division. The inhibition of cellular actin dynamics is therefore a more likely mechanism for colchicine's anti-inflammatory properties in gout. The same would be the case for an important new proposed role for colchicine in medicine which is in the prevention of heart attacks and strokes due to arterial disease (Akl *et al.* 2024).

Image: Shutterstock.com

There were hopes early on that the ability of colchicine to disrupt cell division might make it a useful anti-cancer drug, but it was too toxic at the dose required. However, interference with cancer cell division by targeting tubulin is the accepted mechanism of action of several other plant-derived drugs that were developed later and which are now in mainstream use in oncology. These include vinblastine and vincristine (from the Madagascar Periwinkle *Catharanthus roseus*) and paclitaxel (from the Pacific yew *Taxus brevifolia*) (Banerjee 2016). Secondary metabolites that inhibit tubulin are likely to have evolved in these various plants as part of host defence against herbivores, providing a good example of convergent evolution.

Colchicine and the evolutionary plant-insect arms race

We do not live in a static world, and there are interesting evolutionary questions to address. The first is why colchicine does not poison the plants that make it, a conundrum that Alfred Blakeslee wrote was 'like a snake being immune to its own venom' (Blakeslee 1939). Tubulin gene mutations have occurred in parallel with the evolution of colchicine synthesis such that autologous tubulin has a reduced affinity for the compound, but that may not be the whole story (Spasevska 2017). Secondly, how do larvae of the Indian lily moth *Polytella gloriosae* feed voraciously on colchicine-synthesising *Gloriosa superba* with impunity? In the evolutionary arms race between plants and insects, they have developed the ability to sequester colchicine such that the adult moth has significant concentrations in its wings and legs, no doubt adding substance to the warnings to its own predators provided by the moth's bright colouring (Sajitha *et al.* 2019).

Total synthesis of colchicine

Lastly, a sustainable supply of plants for medicines is not to be taken for granted. Biochemical methodology has now reached the point where the full metabolic pathway taking starting compounds through to a final secondary metabolite can be determined by combining transcriptomic and metabolomic data with enzymatic assays (Durand *et al.* 2024). In the case of colchicine, the pathway of multiple enzymatic steps that lead to its synthesis from the amino acid precursors L-tyrosine and L-phenylalanine in *Gloriosa superba* has now been determined, and the drug can now potentially be bioengineered at scale in model plants under industrial conditions (Nett & Sattley 2021).

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Much of the content of this article is provided in more detail in the author's *The Gout: A Medical Microcosm in a Changing World* (World Scientific, 2025).

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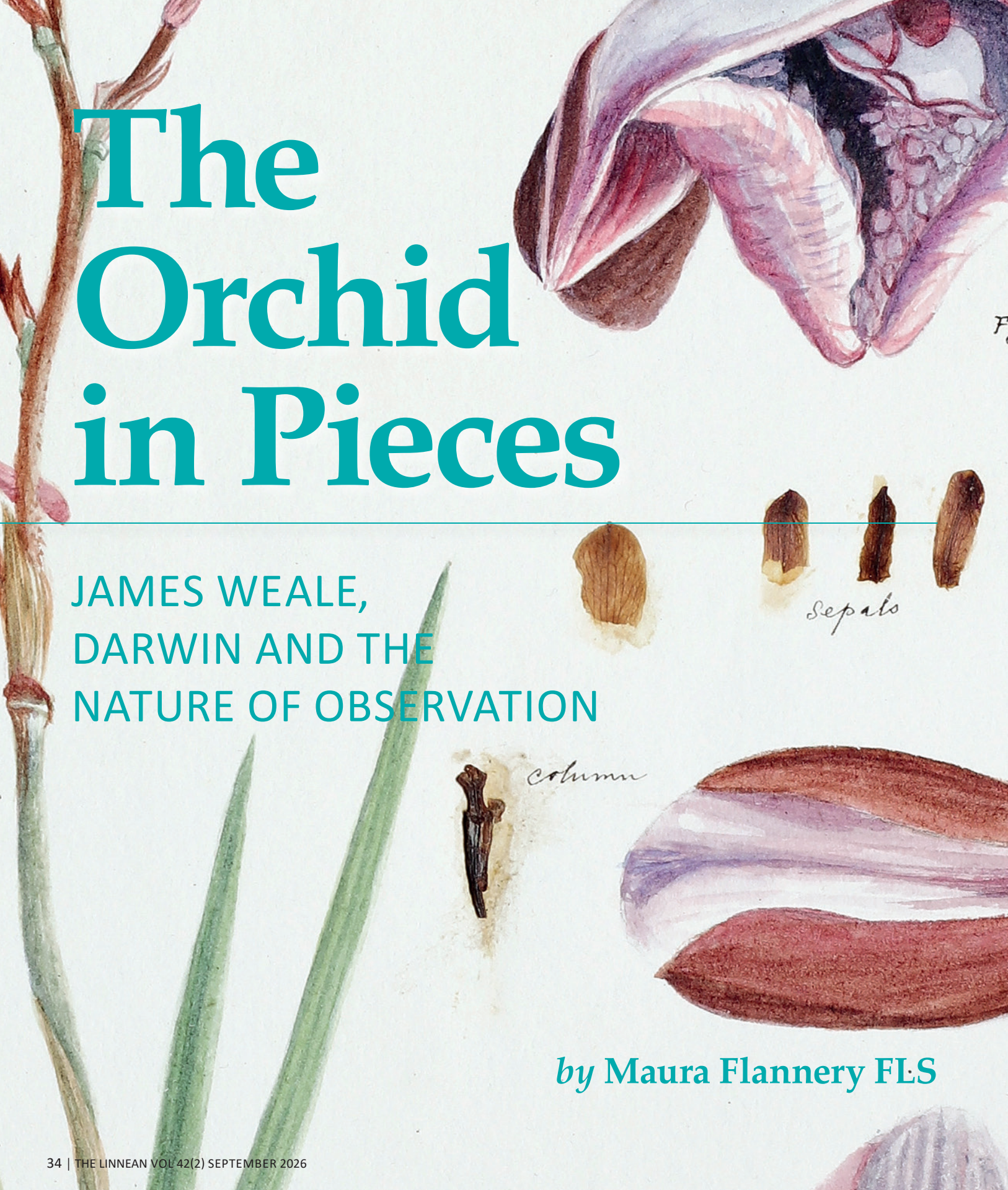
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The Orchid in Pieces

JAMES WEALE, DARWIN AND THE NATURE OF OBSERVATION



by **Maura Flannery FLS**

What happens when a botanical painting becomes a miniature specimen cabinet? Among James Philip Mansel Weale's orchid watercolours at the Linnean Society are extraordinary works that do more than depict plants: they dissect and magnify them, add labels and, remarkably, sometimes incorporate actual flower parts. Created by a Victorian farmer-naturalist in South Africa, these works open onto a world of orchids, insects, microscopy, collecting and scientific correspondence, and lead unexpectedly to Charles Darwin.

What did Weale observe in these flowers, and how did Darwin respond to his findings? Maura Flannery FLS explores the answers through the paintings, specimens, papers and correspondence that document their scientific context.

OPPOSITE: Detail of *Eulophia dregeana* (now *Eulophia hians* var. *hians*) drawing by J. P. M. Weale with specimens attached. LS ref.: DA/ENG/2/SP/1251/2 #35. Full illustration overleaf.

A painting with something extra

I first encountered the James Philip Mansel Weale (1838–1911) collection of orchid watercolours through a Linnean Lens presentation online, in which archivist Alex Milne showed several items from the Society's archive. The sheet she presented depicted a South African orchid that Weale identified as *Eulophia dregeana* Lindl. (OVERLEAF). It displayed the plant life-sized as a whole, as well as magnified views of the flower and its parts, each identified in an accompanying legend. But there's more: several actual flower parts had been pasted on the sheet, each labelled. In the lower left-hand corner patches of glue indicate where a labellum and sepal had apparently become detached.

The work caught my attention because of my interest in the relationship between art and herbaria (collections of preserved plants). Herbarium sheets often incorporate drawings of the same species, frequently in pencil and sometimes showing enlarged details of small structures. There are also many botanical illustrations based on herbarium specimens. This was the first time I had seen what was primarily a botanical illustration with specimens attached—of the 56 Weale illustrations in the Linnean Society's collection, 12 contain actual specimens.

A farmer becomes a naturalist

Born in London in 1838, Weale emigrated to South Africa's East Cape in his 20s. He was a farmer who became interested in natural history, especially in orchids and their fertilisation by insects. He first lived near the coast at Port Elizabeth, then farmed inland at Bedford, while also travelling in an area to the west called the Kagaberg—all three place names are recorded on some of the sheets. Many also have herbarium sheet numbers in the lower left-hand corner. It's known that he sent more than 300 plant specimens to the Albany Natural History Society, of which he was a member. Other specimens of his are held at the Royal Botanic Gardens, Kew, including a type specimen of *Disperis wealei*, named by the 19th century German orchid expert Heinrich Reichenbach (1823–1889).

Looking Closely: The microscope behind the paintings

Evidence from the drawings suggests that Weale owned a good microscope, necessary for painting the details of orchid parts for plants with small, and in some cases, tiny flowers. He also had access to a personal library, as he donated 330 books and journals to the Albany Museum before he left South Africa around 1888. He had read Darwin's 1862 book on orchids, cited articles published by the Linnean Society, and was familiar with entomological taxonomy as well.

In 2024 I visited the Linnean Society to study the drawings, each varying in both their content and level of detail. Some have no annotations at all; they are watercolours often over pencil sketches. Some depict the entire plant, many accompanied by enlargements of flower parts. Others consist only of close-ups, and a few have additional drawings on the reverse. While most portray orchids, there are also quite polished illustrations of other plants: one is labelled *Stapelia*, while another three

Images: The Linnean Society of London;



Fig 1. Nat size. Fig 2. front side & under view of Flower magn. Fig 3. Column & Labellum magn. Fig 3* Labellum laid open. D.

remain unidentified. Some sheets have only the scientific name of the orchid at the top, written in careful lettering. Many have the various individual drawings numbered, with a legend at the bottom giving a brief explanation. Where there are specimens, these often have the name of the part written beside them: sepal, petal, labellum, column, etc.

Some sheets have been annotated in pencil with scientific names that at times differ from Weale's determinations. These additions were by a contemporary of Weale's: Harry Bolus (1834–1911), a British botanist living in South Africa and noted for his work on orchids. He made many trips to London and was a member of the Linnean Society, but there is no indication of when the annotations were added.

OPPOSITE: Full plate of *Eulophia dregeana* (now *Eulophia hians* var. *hians*) drawing by J. P. M. Weale with specimens attached. LS ref.: DA/ENG/2/SP/1251/2 #35

Weale and Darwin: An unexpected connection

While Weale was not a member, he did have five papers read at Society meetings: one in 1867 and the others in 1870, all communicated by none other than Charles Darwin. Four dealt with orchids and the fifth with insect pollination in the Asclepiadeae. The Darwin Correspondence Project contains a number of letters between Darwin and Weale.

The earliest letter is to Weale, dated 6 May 1865, in response to Weale's letter of 19 February. Apparently, Weale had asked for suggestions for literature on identifying South African orchids, with Darwin replying that there was a dearth of such works, apart from expensive illustrated ones. He also wrote:

> Although I feel great interest in the fertilization of orchids yet I would suggest to you not to spend too much time on this subject as I suspect botanists will think that enough has been written on it, unless indeed you find something quite new (Darwin 1867).

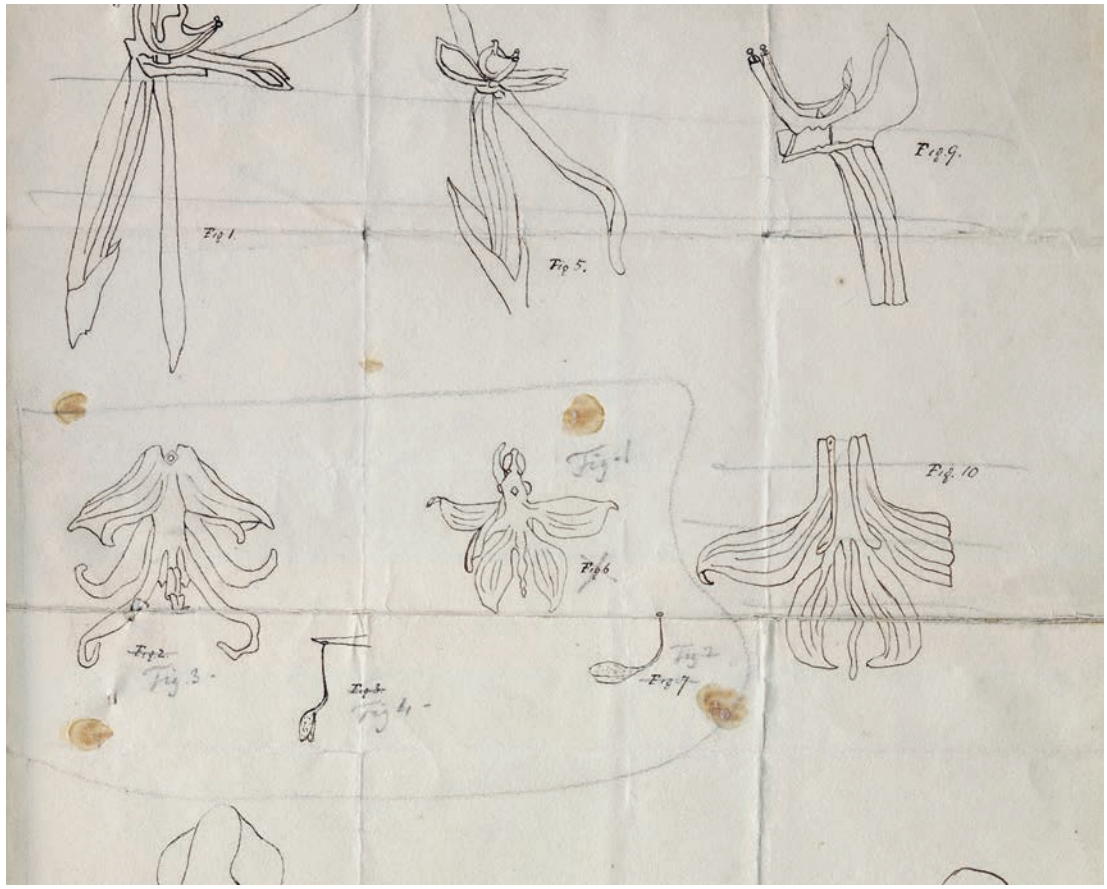
Weale evidently did find something new. Darwin must have thought he had broken new ground when he communicated Weale's 1867 manuscript to the Society. The Society's archive also contains letters from Darwin concerning Weale's manuscripts. In one, dated 22 February 1867, Darwin enclosed an article on a new orchid species, which Weale named *Bonatea darwinii*. It contained what Darwin called 'new and curious details on its fertilization [for this] extraordinary genus'. However, he added that 'the paper is too diffuse and perhaps gives too many extraneous remarks'. There was also the issue of the three plates Weale included. These are not among the 56 drawings but are instead kept with the correspondence. All are in pen and ink, making them very different from the others. On 9 December 1867, Darwin wrote in response to a revised version he received from the editor. He approved the changes and suggested a few more. He also thought there were too many figures and selected a few from the first plate for inclusion. The editor agreed and these appeared in the published work.

Orchids, insects and fertilisation

After describing the species' characteristics, Weale explained how it differed significantly from three other *Bonatea* species. The figures used in the published paper show differences between the labella, or lips, and the position of the pollinia, or pollen masses, of *B. speciosa* and *B. darwinii*. He described how the orchid is pollinated, citing a paper by fellow South African orchid enthusiast and entomologist, Roland Trimen (1865), but also providing his own observations.

Trimen, too, corresponded with Darwin, who noted what he learned from both men. Darwin's first edition of *The Various Contrivances of Orchids* was published in 1862, before either had written to him, but he cited their observations in the second edition, published in 1877, which gave a fuller description of fertilisation of *Bonatea*. He also included data on species of *Disa*, *Disperis*, and *Habenaria* that Weale wrote about in three of the papers he submitted to the Linnean Society in 1870, again communicated through Darwin.

Image: The Linnean Society of London



RIGHT: A portion of plate I for J. P. M. Weale's paper on *Bonatea darwinii*. The encircled figures appeared in the published article and compare structures in *B. darwinii* and *B. speciosa*. LS ref.: DA/ENG/2/SP/1249

Beyond orchids

In his article on Darwin's influence on South African evolutionary biology, S. D. Johnson (2009) describes Weale as 'one of Darwin's most valued South African correspondents' (p. 403). Interested in more than orchid biology, Weale also wrote about insect behaviour, and Darwin asked him to gather data from contacts familiar with indigenous populations. Specifically, he sent Weale a questionnaire with 17 queries on how various emotions were expressed and asked him to distribute it to anyone who might have knowledge of indigenous peoples.

There is no further correspondence between the two after Darwin submitted the 1870 papers to the Linnean Society. Its Council asked him to determine whether they should be published, and Darwin wrote on 11 March 1871 with his evaluation, and some edits. He did not think the watercolour plates (now housed in the Society's correspondence) accompanying the papers on *Disa*, *Disperis* and *Habenaria* were clear enough to be worth including, so they were not, although they may have been displayed when the papers were read.

When the specimen becomes part of the image

The only orchid genus Weale wrote about with sheets bearing attached specimens is *Disa*. For *Disa crassicornis*, he displays the petals and sepals in the order in which they occur in the flower.

One more example is worth mentioning. It is one of only two cases in which intact flowers with spikes were attached. *Mystacidium* is a small, epiphytic orchid shown growing on a log, with the flowers attached to appear as if they are growing from the plant.

Image: The Linnean Society of London



RIGHT: *Disa macrantha* (identified by Bolus as *Disa crassicornis*) drawing by J. P. M. Weale with specimens. LS ref.: DA/ENG/2/SP/1251/2 #43

Image: The Linnean Society of London



RIGHT: *Mystacidium* drawing by J. P. M. Weale with orchid flowers and stipes attached as if growing on the plant, which is an epiphyte.
LS ref.: DA/ENG/2/SP/1251/2 #49

Art, evidence and Empire

Weale was not a botanical artist of the first rank, but he produced an exceptional group of works communicating a wealth of information about the species he studied. His magnifications suggest that he was drawing to increase his understanding of their structure. His papers reveal extensive observations on the relationships between orchids and their insect pollinators, all made while running a farm. Undoubtedly, his free time was made possible by the indigenous labour he employed, situating his work within the wider context of British colonial natural history in the age of Empire. It also documents one man's fascination with the nature he encountered in his adopted home and shows how specimens and art can both contribute to our understanding of plants.

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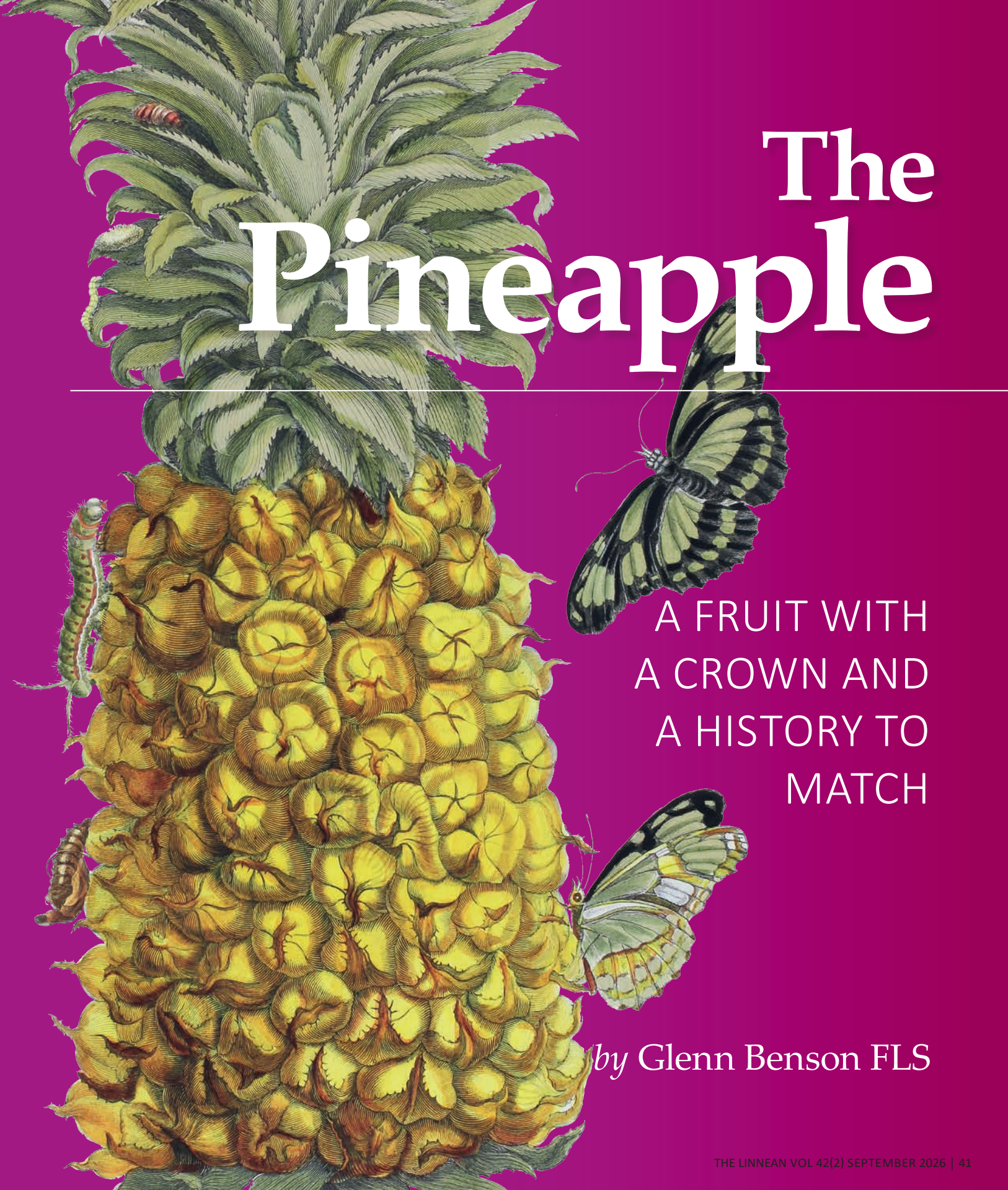
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Explore the extraordinary world of orchids in our symposium: **Orchidaceae | Taxonomy, Diversification and Biogeography,** examining their evolution, diversity and remarkable adaptations. **25 November 2026 | bit.ly/LinneanOrchidaceae**

Image: The Linnean Society of London

The Pineapple



A FRUIT WITH A CROWN AND A HISTORY TO MATCH

by Glenn Benson FLS

PREVIOUS PAGE: *Bromelia ananas* (now *Ananas comosus*) from Maria Sibylla Merian's *Dissertatio de generatione et metamorphosibus insectorum Surinamensium…* (1719).

Modern society is increasingly polarised: north and south, left and right, Marmite and, perhaps most contentiously of all, whether pineapple belongs on pizza.

Our Honorary Curator of Artefacts, Glenn Benson FLS, explores the remarkable history of a plant that travelled from the Americas to become a global commodity. Along the way, the pineapple became an emblem of wealth, abundance, prosperity and hospitality. It inspired architecture, ceramics, furniture and trophies and even gave its distinctive shape to the MK2 hand grenade. Today, an upside-down pineapple has acquired another, more recent meaning as a symbol associated with non-monogamy.

However, the pineapple's story is not all *piña coladas and walks in the rain*. Behind its image of tropical abundance lies a history intertwined with exploration, colonialism, commercial agriculture and environmental change.

From the Americas to the world

Christopher Columbus encountered the pineapple on the island of Guadeloupe during his second voyage in 1493. By then, *Ananas comosus* had already been cultivated for centuries by Indigenous peoples of tropical South America and had spread widely through the Caribbean and tropical Americas (O'Connor 2013; Kew Science n.d.).

The plant travelled rapidly with European expansion. By the end of the 16th century, pineapple cultivation had reached parts of Africa and Asia, including India, China and the Philippines (Kew Science n.d.) and a plant once confined to the Americas was becoming genuinely global.

A member of the Bromeliaceae family, the pineapple is overwhelmingly native to the Americas. Its accepted scientific name is *Ananas comosus* (L.) Merr., first published in 1917 by the American botanist Elmer Drew Merrill. The genus derives its name from *nanas*, an indigenous Tupi word associated with the fruit, while *comosus* means tufted or crested, referring to its crown of leaves (Kew Science n.d.).

The fruit is botanically unusual. It is not a single berry, but a multiple fruit formed from numerous flowers whose fleshy tissues fuse around a central stem. The familiar 'eyes' are the scars left by those individual flowers. The result is one of the more extraordinary structures in the fruit bowl.

The plant is also physiologically distinctive. Pineapple uses Crassulacean Acid Metabolism, or CAM photosynthesis, an adaptation that allows it to reduce water loss by opening its stomata mainly at night. This helps explain its ability to tolerate relatively dry conditions compared with many tropical crops (Bartholomew *et al.* 2003).

The pineapple arrives in Europe

For Europeans, however, the pineapple was far easier to admire than to grow. The first successful cultivation in Europe is generally associated with the Netherlands, where horticulturists developed increasingly sophisticated methods for growing tropical plants under glass. Around 1685, Agneta Block, a wealthy Dutch collector and botanist, successfully raised a pineapple at her estate of Vijverhof. The achievement was celebrated as a triumph of horticultural skill over an unsuitable climate (Lausen-Higgins & Lusby 2008).

Britain followed. The first reliable crop grown on British soil is credited to the Dutch gardener Henry Telende, who successfully fruited pineapples for Sir Matthew Decker at Richmond around 1714–1716. His methods helped trigger what became known as 'pineapple mania' (Lausen-Higgins & Lusby 2008).

Image: (Previous page) The Linnean Society of London

The pineapple required heat, glasshouses, skilled gardeners and considerable quantities of organic material to generate warmth. Growing one was therefore an expensive undertaking. In 18th-century Britain, the cost of producing a single pineapple could reach around £80, equivalent to thousands of pounds today (O'Connor 2013).

The fruit was therefore more a status symbol than something to eat. Wealthy households sometimes hired pineapples for dinner parties, using them as centrepieces that demonstrated both the host's wealth and the skill of the gardener who had produced them.

A fruit becomes a symbol

The pineapple soon escaped the dining table and entered the decorative arts. Its distinctive shape appeared in architecture, garden ornaments, furniture, ceramics and textiles. Once you start looking, pineapples seem to be everywhere. (The catch is that some apparent pineapples are actually pinecones, another popular decorative motif.)

The pineapple's symbolic power was straightforward: it represented rarity, hospitality and generosity. A host who could put a pineapple on the table was effectively announcing that neither money nor effort had been spared.

Its visual language proved remarkably durable. Pineapple motifs remain familiar on architectural finials and decorative objects, perhaps most notably The Pineapple in Scotland. The Pineapple, or Dunmore Pineapple near Airth in Falkirk, is one of Scotland's most extraordinary architectural curiosities: an 18th-century folly crowned by a colossal stone pineapple, rising dramatically from the grounds near Airth in Falkirk, Central Scotland.

Pineapples still appear on trophies, architectural details and objects associated with celebration and hospitality. Their symbolic journey has continued well beyond the colonial era: today, the pineapple can still suggest amity, welcome and open doors in mainstream décor, while, when turned upside down, it has acquired a very different meaning—signalling openness to non-monogamous relationships.

BELOW: The Pineapple (also known as the Dunmore Pineapple) is one of Scotland's most famous and eccentric architectural follies. Located in Dunmore Park near Airth in Stirlingshire, this 18th-century summerhouse built by John Murray, the 4th Earl of Dunmore, features a spectacular, highly detailed stone cupola carved into the shape of a giant pineapple.



Image: Shutterstock.com/cornfield

RIGHT: Colour postcard of a pineapple field in Hawaii, c. 1950s.

From luxury to war

Technology eventually changed the pineapple's social status. Improvements in glasshouse heating made cultivation more reliable, while advances in transport and preservation opened the way to large-scale commercial production. Canning was particularly important. Once pineapple could be preserved and transported in tins, consumers no longer needed to live in the tropics or possess a heated pinery to enjoy it (Bartholomew *et al.* 2003).

By the 19th century, advances in horticulture, engineering and transport were steadily pushing the pineapple down the social ladder, from aristocratic luxury towards an ordinary foodstuff. The transformation was dramatic: a fruit that had once represented extraordinary expense could increasingly be bought by people far beyond the world of Georgian country houses.

The same story continued into the 20th century as refrigeration, industrial processing and international trade turned pineapple into a mass-market crop. As the fruit became increasingly ordinary, however, the distinctive 'pineapple' name and appearance took on a very different association in the world of military technology.

Designed in 1918 and standardised in 1920, the iconic U.S. 'pineapple' hand grenade became a military staple due to its rugged, grooved design. While many believed these ridges were meant to shatter into uniform shrapnel, they actually served a far more practical purpose: providing soldiers with a slip-free grip in muddy trenches.

The modern pineapple

Today, *Ananas comosus* is cultivated across the tropical and subtropical world. Indonesia, the Philippines, Costa Rica, Brazil, China and India are among the major producers, while Costa Rica has become particularly important in the international fresh-fruit trade.

One cultivar has been especially influential. MD-2, also known as the Golden Pineapple, was developed for the fresh-fruit market and helped transform international pineapple consumption. Its sweetness, relatively low acidity and consistency made it particularly attractive to consumers and retailers (Bartholomew 2009).

Modern production, however, brings environmental and social questions. Pineapple cultivation can involve land clearance, fertiliser and pesticide use and substantial water consumption during processing. Like many intensive agricultural commodities, its environmental effects depend heavily on how and where it is produced.

There is also the question of what happens to the parts we do not eat. Processing produces large quantities of peel, crown, core and pomace. Recent research has explored ways to turn these materials from waste into useful resources, including sources of bioactive compounds, animal feed, biofuels, water-treatment materials and novel materials (Chaudhary & Singh 2024; Sarangi *et al.* 2022).

The pineapple has therefore entered another chapter of its history: not simply how to grow more fruit, but how to make better use of the plant.

What about Hawaii?

Few places are more strongly associated with pineapple than Hawai'i, although the islands are no longer a major producer.

The date of its introduction is uncertain (did it come to the islands via boat as a treatment for scurvy?), but the pineapple was definitely recorded in Hawai'i by 1813. Native Hawaiians called it *hala kahiki*, meaning 'foreign hala', because its distinctive, spiky exterior reminded them of the familiar fruit of the native *hala* (screwpine) tree.

Image: The Linnean Society of London



BELOW:
Native Hawai'ian workers harvesting pineapples in Hawai'i during the 1930s. This photo captures a moment of everyday labour within Hawai'i's plantation economy, while also reflecting a complex period in the islands' history—one shaped by Indigenous resilience, changing land and labour systems and the growth of commercial agriculture.

The commercial industry developed in the late 19th and early 20th centuries, particularly through James Dole and the Hawaiian Pineapple Company. The company's first profitable crop of canned pineapples was produced in 1903 and the industry expanded rapidly (Bartholomew *et al*. 2012). At its height, Hawai'i became synonymous with canned pineapple. However, in doing so, Dole had carved out vast single-crop estates across Hawai'i. This aggressive expansion forced Native Hawaiians off the self-sufficient lands they had farmed for generations and wreaked havoc on the islands' natural water networks. Rather than weaving the pineapple into local culture, by the 1930s these companies had simply co-opted traditional Hawaiian imagery to sell their fruit to the rest of the world. By the late 20th century, however, international competition had transformed the industry and Hawai'ian production declined dramatically.

And this is where pineapple's history takes one final, unexpected turn.

The 'Hawai'ian pizza' that isn't Hawai'ian

In 1962, Greek-born Canadian restaurateur Sam Panopoulos added canned pineapple to pizza at his restaurant in Chatham, Ontario. He called it 'Hawai'ian' because the pineapple came from a Hawaiian-branded can, not because the recipe originated in Hawai'i (Fleming 2017).

The pineapple had travelled an extraordinary distance: from Indigenous cultivation in the Americas, through European exploration and aristocratic obsession, into industrial agriculture and global trade, before ending up at the centre of one of modern food's most enduring arguments.



Image: The Linnean Society of London

Be more pineapple

Stand tall. Wear a crown. Be sweet on the inside.

—Katherine Gaskin AKA Salty Pineapple (entrepreneur)

The pineapple has come a long way. It has been a botanical curiosity, an exotic import, a symbol of wealth, a horticultural challenge, an industrial crop and a global commodity. Its history is also a reminder that seemingly familiar objects can carry complicated stories. The pineapple connects Indigenous agriculture with European expansion, colonial trade with industrialisation, horticultural ingenuity with environmental pressures and elite consumption with mass markets.

And perhaps that is its enduring appeal. It is simultaneously plant, food, ornament, status symbol and cultural icon. It is a fruit with a crown—and a history to match.

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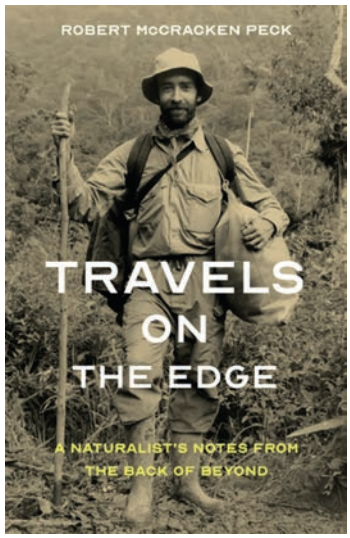
Image: Nancy Stedman

Reviews

Travels on the Edge: A Naturalist's Notes from the Back of Beyond

Robert McCracken Peck

240 pp, The American Philosophical Society Press 2026 (Hardback)
ISBN 9781606181539
Col./bw illust. £23.99



From remote wilderness encounters to front-row seats to moments of modern history, these essays chronicle a lifetime of scientific exploration balanced by humour, curiosity, and a deep respect for local cultures.

Travels on the Edge is a collection of stand-alone essays on the experiences of Robert McCracken Peck, the well-travelled photographer and chronicler of the Academy of Sciences of Philadelphia. His work has taken him to some of the most remote places on Earth, which over many years he has recorded in writing, photographs and scientific papers. *Travels…* is a very personal account of the experiences and adventures a well-travelled explorer and naturalist. Amongst the stories of many difficulties, illnesses and confrontations with local authorities (typical of work in such remote places), it is his ability to befriend and work with the local peoples that stands out.

Most expeditionary biologists who visit such unfrequented places have either been arrested or confronted by heavily armed people at some time. My own experience of such hazards was in Turkey and in an illegal gold mining area of Amazonian Brazil. Peck experienced house arrest in Huling, China and was confronted by a group of machete-wielding Shuar Indians in Ecuador. In South America, his expeditions took him to the interior of Venezuela amongst the indigenous tribes of the upper Orinoco following in the footsteps of Alexander von Humboldt and to montane forests of Ecuador inhabited by the aggressive Shuar people. Several most informative and interesting chapters recount his various expeditions to Mongolia amongst the nomadic herdsmen at different seasons of the year.

One chapter follows a 2001 voyage along the Alaskan coast that retraced the 1899 Henry Harriman expedition. Peck participated in this centenary trip to help repatriate Tlingit totem poles and artefacts, which had been removed from their village and deposited in US cultural institutions. This is a good early example of the repatriation of illegally removed specimens.

In addition to visiting some of the remotest and wildest parts of the planet, the author had the fortune to be in several more urban places at the right time.

Consequently, there are chapters about his presence in Berlin at the end of the famous wall in 1989, in the Vatican in 2013 when Pope Benedict resigned and in Havana at the time that President Obama re-established relations between Cuba and the United States. Towards the end of the book, two chapters recount the joys and hazards of travelling with his family, including nearly losing their children when the Trans-Siberian Express pulled away from the station with the parents still on the platform. Fortunately, they were able to clamber back onto the moving train to rejoin their children.

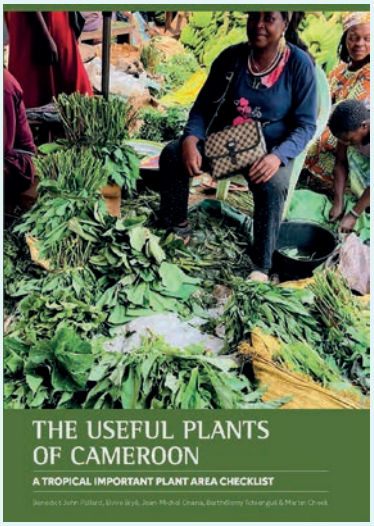
Many of these travels are put into context with the previous explorers to the regions visited by the author, so there is much information here from the experiences of Humboldt, Hemingway, Bartram, Thoreau and others, as Peck is a well-read explorer. For the biologist, there is information on the fishes of the Rio Orinoco, the wolves of Mongolia, lions in Tanzania, hummingbirds, frogs and noxious insects; however, the real skill of the author is the way in which he depicts, with some humour, the many interesting human interactions that he experienced in these remote places. For example, a near brush with death occured after a fish-collecting trip to Venezuela where he was infected by the microscopic worm *Strongyloides*. Fortunately, after puzzling many doctors

in Philadelphia, he was cured by a veterinarian who knew how to diagnose and treat this parasite that normally infects wild animals rather than humans, and so Peck lived to vividly recount this experience.

This is a well-written and fascinating personal account of the many places where the scientists of the Philadelphia Academy have ventured for their biological research, and it is well-illustrated by some of the author's informative photographs. This is a fine addition to the literature on the exploration of the remotest regions of our planet, and to me, it brought back memories of many similar experiences.

Sir Ghillean Prance PPLS

The Useful Plants of Cameroon: A Tropical Important Plant Area Check List



B. J. Pollard, E. Biyé, J.-M. Onana, B. Tchiengué and M. Cheek.

272 pp, Royal Botanic Gardens, Kew
2026 (Hardback)
ISBN 9781067655303
Not illust. £50

A remarkable catalogue of Cameroon's useful plants, drawing together botanical research, local knowledge and a wealth of overlooked sources.

The Useful Plants of Cameroon is exactly what it says—a most valuable and well-researched compilation of all the currently known useful plants of Cameroon. It documents 2,703 plant species for which some use has been recorded in the literature or through the experiences of the authors.

For each species entry, the scientific and local names, uses, voucher specimens and source references are given. This is followed by a section listing all the species across 14 categories of use, grouped under plant families according to the Global Economic Botany Data Collection Standard uses of Cook (1995). As might be expected, the list of medicinal species is by far the largest, followed by uses for materials and food.

These 14 categories are listed without further detail on their ethnobotany or how the plants are used. However, a useful introductory chapter by Elvire Biyé gives a glimpse into Cameroonian ethnobotany, expanding on the 'use' categories with many examples of plants used in music, fishing, house building and other aspects of everyday life. A useful paragraph on species used in the savannah and Sahelian zones is also included.

The majority of species listed are native to Cameroon, but a range of introduced and naturalised species with important local uses are also included, such as cashew, mango and species of *Citrus*. The data recorded here have been extracted from 160 different publications, including several that are little-known outside Cameroon. The sources range from classics such as Burkhill's *The Useful Plants of West Africa* to many newer publications, alongside data from herbarium specimens at Kew and Yaoundé collected over the past 20 years. It is a pity that there are no illustrations provided here.

For most entries, the data are short and precise, but for much-used species such as *Alstonia boonei* (Apocynaceae), long lists of local names in several languages and multiple references are provided. This makes the book a valuable resource for anyone interested in the ethnobotany and economic plants of West Africa.

Sir Ghillean Prance PPLS

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.

Members

Please join us in welcoming the following new members to the Society (elected May–Sept 2026):

Fellows

Ms Celia Carmen Aceae
Prof. Miguel Bastos Araújo
Dr Susi Arnott
Dr Amrutha Athalappil
Mr Sibi T. Baby
Prof. Richard Peter Bailey
Dr Mike Bintley
Dr Devidas Bhausaheb Borude
Mr Jake William Bransgrove
Ms Kirsten Carlson
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Ms Inessa Falina
Dr Thomas William Fieldsend
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Dr Nilesh Appaso Madhav
Dr Amit Kumar Mandal
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Prof. Wadzani Dauda Palnam
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Dr William Joseph Sanders
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Mrs Lynn Zhang



President Dr Mark Watson welcomes
Ms Celia Aceae as a Fellow.

Lives remembered

Neville Fay (4 June 1948–17 August 2026)

Neville Fay, a highly respected and influential figure in arboriculture, died on 17 August following a short illness. A Chartered Arboriculturist, author, consultant and expert witness, he devoted more than 35 years to advancing the understanding, care and conservation of trees.

Neville established Treework Environmental Practice in 1990, developing a forward-thinking approach to arboricultural consultancy. He became particularly recognised for his work with ancient and veteran trees, helping to shape the field of Conservation Arboriculture. His philosophy looked beyond individual trees to consider their habitats, soils, ecosystems and the wider environmental context in which they exist.

He was instrumental in developing the Specialist Survey Method, now the national standard for surveying veteran trees, and co-authored *Veteran Trees: A Guide to Risk and Responsibility* and *Tree Surveys: A Guide to Good Practice*. He also contributed to publications on historic landscapes and conservation. His work with laboratories, researchers and landowners explored the relationship between trees, roots and soil, with the aim of improving the resilience of mature and veteran trees.

A gifted communicator, Neville was passionate about sharing knowledge and encouraging fresh thinking. He founded the 'Innovations in Arboriculture' seminar series, bringing international speakers and new ideas to the profession, and delivered numerous well-attended seminars, workshops and lectures. He was a visiting academic at Middlesex University and gave talks at the Linnean Society, where he had been elected a Fellow in 1998. He was also a Fellow of the Royal Geographical Society and the Royal Society of Arts.

Neville's influence extended far beyond his consultancy work. He was a founder of Tree Aid, supporting community forestry in arid Africa, which has since been responsible for planting more than 40 million trees across the continent. He was also a founding member of the Ancient Tree Forum, of which he was a past chair, and helped establish the Sustainable Soils Alliance and the National Tree Safety Group.

His contribution to arboriculture was recognised with the Arboricultural Association Award for Continued Services to Arboriculture in 2009. He maintained longstanding professional associations with both the Arboricultural Association and the Institute of Chartered Foresters.

The Arboricultural Association described Neville as 'one of the great arboriculturists of our time', recognising his foresight and his ability to anticipate ideas that would later enter mainstream thinking. Treework Environmental Practice remembered him as an explorer and initiator of ideas, as well as someone whose warmth and generosity enriched the lives of those around him.

Neville's influence will endure through the organisations he helped create, the ideas he shared and the many people he inspired and challenged to think differently. His contribution to trees, people and the natural world will continue to be felt for generations.

Leonie Berwick (from online sources and Society archives)

Image: Pixabay/zockfreund

Deaths Reported to Council

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Professor John 'Nigel' Bell FLS

Professor Gerald Blunden FLS

Dr Athol McLachlan FLS

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