PULSE

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NEWS FROM THE LINNEAN SOCIETY OF LONDON – A FORUM FOR NATURAL HISTORY

Maybe it's because I'm a Londoner

A recent visit to the stores at the Linnean Society brought me face to face with a plaster roundel of William Yarrell, a Fellow who, like me, was a self-taught amateur naturalist, born and raised in the great metropolis that is London.

William Yarrell (1784–1856) FLS, FZS was born in the borough of Westminster, in Duke Street near where the Society now stands on Piccadilly. A successful businessman, Yarrell taught himself about the natural world, and by the 1820s he had assembled a considerable natural history collection. He was elected a Fellow of the Linnean Society in November 1825 (Treasurer and Vice-President from 1849), and was an original member of the Zoological Society (founded 1826) and the Entomological Society of London (founded 1833). Yarrell published over 70 scientific papers on aspects of natural history, but his principal works were two well-known and popular books *A History of British Fishes* (1836) and *A History of British Birds* (1843–56), published by John Van Voorst FLS (1804–98).

However, he is perhaps best remembered for the naming of a new species of swan; smaller than the whooper swan *(Cygnus cygnus)*, and different to the more familiar mute swan *(Cygnus olor)*, Yarrell presented his findings to the Society in 1830. He proposed that it be named Bewick's swan *(Cygnus columbianus bewicki)* in honour of his friend the artist and engraver Thomas Bewick (1753–1828), with whom Yarrell had been corresponding since 1825.

Though Yarrell died in Great Yarmouth, Norfolk, and was buried in his family's plot in St Mary's Church, Bayford in Hertfordshire, he had lived almost all of his adult life in London's Ryder Street, in Westminster. His executors, Van Voorst and a relative named Edward Bird, arranged for a memorial to the well-respected Yarrell to be placed in his local parish church, St James' Church, Piccadilly. The memorial shows Yarrell in profile in a central roundel, itself supported on the backs of two

swans, possibly Bewick's. The sculptor of the memorial, however, was a mystery, until Society volunteer David Pescod discovered that Van Voorst gifted a plaster copy of the roundel in December 1859 in the *Proceedings*. The sculptor, a 'Mr N. Burnard', is probably the Cornish-born sculptor Neville Northey Burnard (1818–78).

Yarrell died leaving a well-deserved estate of around £17,000 (over one million pounds in today's money). Yet Burnard died in November 1878, in the workhouse in Illogan, Cornwall. His work had been exhibited at the Royal Academy for the last time in 1873, after which his private life rapidly deteriorated. He took to excessive drinking, possibly in response to the death of his 11-year-old daughter Charlotte in 1870, and the loss of his wife Mary Ann around the same time (though it is unclear whether she died or left him). Unable to fulfil commissions, his clients and friends abandoned him and he returned to his native Cornwall, living as a vagrant.

The London borough where Yarrell once lived now has the city's highest concentration of rough sleepers. St James' Church Piccadilly is well known for its welcoming approach to those who have fallen on hard times, and fittingly, many seek refuge on the pews in front of the memorial to Yarrell by Burnard.

Glenn Benson
Curator of Artefacts

LEFT:
The memorial in St James' Church, Piccadilly

BELOW:
The Society's plaster copy of the roundel
© The Linnean Society of London

Sources:

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13 September 1856. *The Illustrated London News.*

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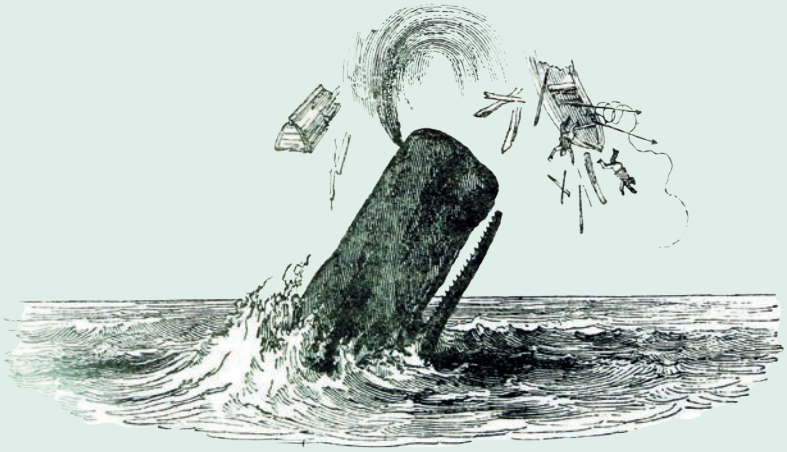
THE EXTRAORDINARY DIARY OF FRANK EDWARDS

Part Two: Oil and Ice

Following on from Part One, we left Frank along the North Alaskan coast as part of the North Pacific whaling fleet in 1888. His diary reveals that he regarded the whales with a mix of curiosity and respect. As a crew member of the small whaleboats being lowered to hunt them, he often gets closer to these huge animals than he would like to.



Of Whales and Whaling

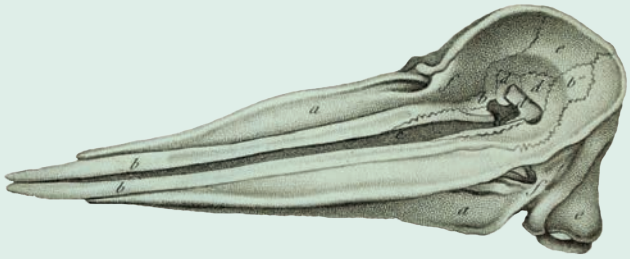
Whilst species identification is not always straightforward in the diary, occasionally it is very clear; in the Central Pacific Ocean, for example, Frank stated that they were "Sperm Whaling" *(Physeter microcephalus)*. Smaller whaleboats approached very close to the school of whales, where the whale was harpooned, and a "bomb" (i.e. a foot-long explosive bullet) was fired from a gun into the side of the animal when it came up to breathe. This was a drastic whaling technique, and Frank commented that "the effect makes it feel anything but comfortable". He also remarked that if one whale was wounded, the other whales approached it, "as if to see what is up".

Some other whale species were specifically mentioned. A large "Bowhead" whale *(Balaena mysticetus)* was killed on the 28 April 1888, and Frank recounted how its two "lips" were cut off first—their weight estimated at two tonnes each. Its head was "a most wonderful looking thing of an immense size". An old harpoon and unexploded bomb were found wedged inside.

Sometimes the whales fought back—they pitched and capsized boats, surfacing below them, hitting out with their flukes. Crew members were swept into the water or became entangled in the lines and ropes. One whale swam straight at the boat with its mouth wide open, causing Frank to fear they might all be swallowed; a fear going back all the way to the Book of Jonah and beyond.

The Abram Barker also encountered "Devil fish". These were not the species of ray which are referred to as devil fish now; Frank clearly stated "this is a species of whale". They were actually gray whales *(Eschrichtius robustus)*, dubbed "Devil fish" because of their fierce fighting behaviour when hunted. This, coupled with the fact that they did not yield as much oil as other species, meant that gray whales were often avoided by whaling ships, including the Abram Barker.[1]

Right whales had a similarly fearsome reputation, but were commercially important enough to be pursued. On 9 October 1888, Frank noted: "When struck [they] fight hard with the boats and anything they can see they go in for smashing. For myself I have no wish to catch any of these interesting creatures." The name "right whale" can apply to three different species of the genus *Eubalaena:* the North Atlantic right whale *(E. glacialis)*, the North Pacific right whale *(E. japonica)* and the Southern right whale *(E. australis)*, but it is likely to be the North Pacific right whales that the Abram Barker encountered.



An Underutilised Resource

The whaling success of the Abram Barker was limited. Throughout the journey 11 whales were taken, with a total oil yield of 329 barrels. This would still have been worth good money—using barrel prices listed in Frank's diary, the total yield would have been worth about $16,450. The whale bone would also have fetched a substantial sum; the whale bone obtained by the Abram Barker was recorded as 2,300 pounds. (However all of this has to be offset against the running costs of the ship.) Interestingly, in the official records the amount of oil obtained by the Abram Barker was given as 100 barrels. Even when accounting for the 203 barrels offloaded at Honolulu, this is still a considerable discrepancy and shows that it may be worthwhile comparing individual diaries like Frank Edwards' with officially recorded yields.[2]

Other Whalers, especially the indigenous whale hunters, seem to have had more success. Forty-one whales killed by other vessels were expressly mentioned, as well as (21 September 1888): "three ships of the fleet which had come from Westward [i.e. Wrangel and Herald Island]—all the ships there have whales, some 6, others 5, 4, 2, etc."

Similarly, he recounted on 29 September 1888 that 13 ships were frozen in near Herald Island, in the Arctic (ships were often stuck in, and sometimes destroyed by, pack ice). They had been "all getting large catches of whales" but had now 40 miles of ice between them and the open sea.

Still, when considering the plethora of whaling ships mentioned in the diary, this does not seem to be a high yield. It underlines the decline of commercial whaling yield after decades of over-exploitation, and the desperate lengths the ships were still prepared to go to.

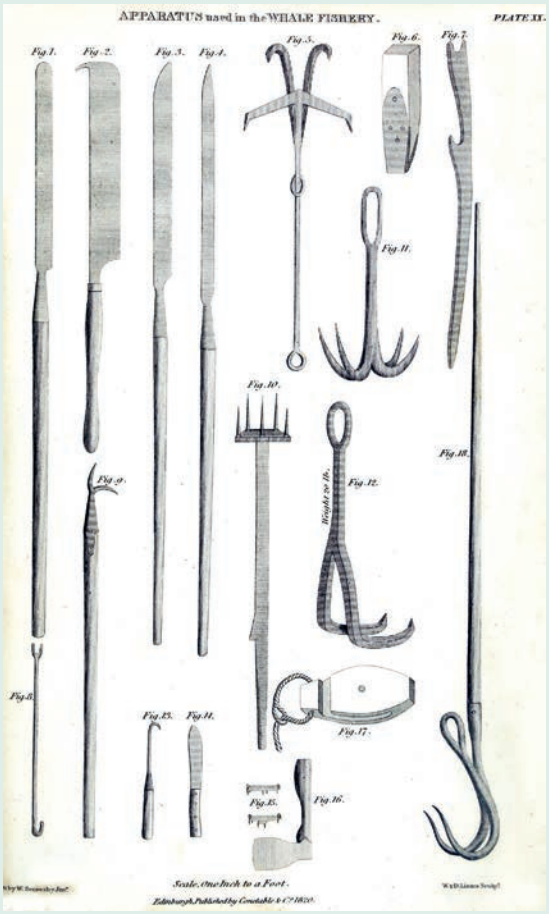
The diary also shows how rare certain species of whale had become in areas where they had been abundant. In *North Atlantic Right Whales*, David W. Laist outlines that first-hand whaling accounts like this one are an important contribution to our knowledge about whale populations: "Historical whaling records are important for many reasons", but "historically based perspectives are […] underutilised by biologists and resource managers trying to ensure the survival of rare and endangered wildlife".[3] In his book, he painstakingly mines these historical records for the crucial data they contain.

LEFT:
The dangers of whaling could often have a psychological effect on the crew
All images © The Linnean Society of London

BELOW:
Whale bone was a very profitable venture; the Abram Barker records collecting over 2,300 pounds during its voyage

LEFT:
Though it sounds like something straight out of *Moby Dick*, the diary records instances of whales fighting back

BELOW:
Frank records materials similar to these used in pursuit of whale oil, though he states that he himself has "no wish" to hunt them



In recording his journey, Frank Edwards has provided invaluable insights and data, not only into the behaviour and distribution of whales but also into the but also into the distribution and thickness of ice, which can be compared with later data in the context of climate change.

My Opinion of the Arctic

Apart from the scientific and historical interest (the diary records sea-shanties and folk songs), the diary follows one person's exploration into the unknown. Frank seems low at times (as he put it, having the "lonlies"), not wanting to socialise, but he was clearly moved by the grandeur of his surroundings, recording a phenomenon that is now referred to as "ice blink" on 16 April 1888: "About midnight, saw the reflection in the skies caused by the ice". (An ice blink indicates the presence of light-reflecting ice which may be too far away to see.) And he was truly interested in the indigenous people of the Arctic. He recounted one episode where he offered some of them curry and rice, which they had clearly not tasted before: "their faces at the time of eating or tasting it would have done well for a comic paper; they thought I had poisoned them".

It is clear that the extremes of life at sea had an effect on the crews. Having entered the Bering Sea, the Abram Barker encountered the ship Fleetwing, whose captain "is gone out of his mind". The Fleetwing was later wrecked. It is hardly surprising, therefore, that when leaving the Arctic Frank breathed a huge sigh of relief: "We are now out of the Arctic Ocean and my only wish is never to see or even hear of such a place again. This is my opinion of the Arctic."

After his travels Frank Edwards sporadically kept in touch with his father. There was a final meeting with members of the family in 1912 in London, but after this all trace of him was lost. What we do have is his diary, held within the Society's collections—a unique and detailed resource.

Elaine Charwat FLS

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Taxonomy Tourism

A NOVEL CONCEPT IN SPECIES DISCOVERY

ABOVE:
The expeditions are led by experienced scientists, with paying participants helping with collection and research, and in some cases, scientific publication
© Pierre Escoubas

BELOW:
The field lab allows participants to gain wider experience with using microscopes, and get to grips with portable DNA-sequencing
© Jan Schilthuizen

Simon has just made his first discovery. On a night walk near the Kuala Belalong field centre in the rainforest of Brunei, he reached up to a dead leaf suspended over the trail. Everybody—the other participants, the three Bruneian students, the five trained zoologists with decades of field work under their belt, even the resident snail expert—had ducked and passed underneath this dead leaf without so much as giving it a glance.

But something on its surface caught Simon's eye. "Is that a slug?" he exclaimed, and picked off a slimy, well-camouflaged mollusc. All gathered round, aiming their head lamps at the specimen in the palm of Simon's hand, which withdrew its eyestalks from the light. The following day, the team's malacologist confirmed that what Simon had found was probably a new species, and over the following days, he and Simon set out to study it.

This may sound like a normal event on any tropical biological field expedition, but it was no ordinary field trip, and Simon is not a biologist. He is a pest control expert from Bristol who, together with his 14-year-old son, booked a place on one of our so-called *Taxon Expeditions*—species discovery expeditions for non-biologists.

Embedded Amateurs

About two years ago, cave biologist Iva Njunjić and myself came up with the idea for Taxon Expeditions, spurred by two observations. First, whenever we give talks about taxonomy for a general audience, people tend to be thrilled by the idea of discovering new animal species. "How do you know if you have found something new?" they would ask or, "Who decides how to name it?" Second, the international students that we take on our tropical biology field courses to Borneo would sometimes meet ecotourists in the local hostels, who would enquire as to whether such field courses also exist for non-biologists.

This revealed to us that organising biodiversity field trips for non-biologists might actually be a viable idea. Of course, there are already many organisations that offer educational and participatory trips for ecotourists. If you want to go birdwatching, photographing insects, identifying plants, or even lend a helping hand in the conservation of endangered mammals, there are many options for you.

But with Taxon Expeditions **(http://www.taxonexpeditions.com)** we decided to go one step further. We organise real scientific expeditions to biodiversity hotspots, led by well-known scientists and we allow a group of non-biologists to embed into and join the team as paying participants. We provide them with a basic field course in techniques for sampling insects and other invertebrates in caves, freshwater, leaf litter or the forest canopy. We also set up a field lab, complete with a digital library, microscopes, and a portable DNA-sequencing facility based on the latest Nanopore technology.

Beetle Genitalia

During the educational part of the course, the participants (people like Simon, but also William, a college-administrator from Austin, Texas; or import manager Angela from Singapore) collect specimens which they then study, under the guidance of taxonomic experts, in the field lab. On our Borneo expeditions, we focus on land snails and slugs, elmid riffle beetles and leiodid scavenging

beetles. On our Montenegro expeditions, we pay attention to water mites and underground snails. These groups of organisms are so species-rich and the regions so incompletely studied, that it is almost guaranteed that the taxonomists will be able to recognise one or more undescribed species among the multitude of specimens collected by the participants.

On the ten-day field trip, the experts (taxonomists, geneticists, and a macro-photographer) teach the participants how to study the specimens in such a way that they can deliver elements required for a scientific publication. During lectures and workshops, they learn how to make a morphological description of a slug, or how to dissect and draw the genitalia of a beetle. They get to extract and sequence a DNA-barcode and make publishable photographs of a beetle less than a millimetre in length. During the trip, the taxonomists fashion all these elements into a draft manuscript which is submitted to a taxonomic journal, sometimes as soon as the expedition returns to the civilised world. The names for the new species are coined and voted for during a fun-filled session on the last night of the field course.

Since we do almost all the research work (DNA analysis, descriptions, photography and drawings) in the field, there is usually no need to export any specimens. Most of the material that we collect is therefore deposited in local natural history collections, where it is available for study by local naturalists and conservationists, either physically or virtually (we deposit our records on websites like Beetles of Borneo **http://borneobeetles.myspecies.info/,** Bornean Terrestrial Molluscs **http://borneanlandsnails.myspecies.info/**, and iNaturalist **https://www.inaturalist.org/observations/txex.)**

The Real Benefit

So far, we have held four such Taxon Expeditions, two to Malaysian Borneo (Maliau Basin and Tawau Hills Park), one to the Durmitor mountain in Montenegro, and one to the Ulu Temburong forest in Brunei. (In 2019 we have three more trips planned.) The output so far has been a total of 13 new beetles, three new molluscs, and two new water mites. Scientific journal articles in which these species are described have been published[1,2,3] or are in preparation, usually with several of the lay participants as co-authors.

Of course, the output in new biodiversity information, and the fact that these trips have been funded entirely by the participation fees paid by the non-scientists, are a proof of principle that this system works and yields useful information. This is important in a time when obtaining conventional funding for basic science like alpha-taxonomy requires ever more persuasion.

However, we think the real benefit goes beyond the immediate financial and scientific sustainability: we have been able to

ABOVE:
A macro-photographer helps the team deliver elements required for publication
© Pierre Escoubas

BELOW:
Just a handful of expeditions has led to the discovery of over 18 new species
© Pierre Escoubas

familiarise a few dozen citizen scientists with the tricks of the trade of the field taxonomist. We have given them hands-on experience with discovering species new to science, and most importantly, we have highlighted the necessary work of taxonomists all over the world, in an attempt to complete Linnaeus' aim of cataloguing the living planet.

Presumably, these participants will come home from their travels and tell their friends and families about the work achieved, and discoveries made. They will probably also tell of the passion and energy by which their instructors introduced them to their particular favourite sliver of biodiversity. And their lives will be enriched by an experience that no other eco-tour can provide: the sense of having made a permanent, indelible contribution to the catalogue of life.

Prof. Dr. Menno Schilthuizen
Chief Advisor, Taxon Expeditions
info@taxonexpeditions.com

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HIDDEN REALITIES

Robert Brown's Microscope

One of the Linnean Society's greatest treasures is packed in a small mahogany box. It gave us a term commonly used in cell biology—the nucleus—and it also revealed a phenomenon known to all scientists, Brownian Motion. This little instrument is a single-lensed microscope belonging to Robert Brown (1773–1858), a physician, pioneering botanist, and the Society's President 1849–53. It had been made for him by an instrument maker named Robert Bancks who lived and worked at 441 The Strand, in central London. Bancks set up in business in 1796 and was joined by his son in 1820, later moving to New Bond Street.

Some Astonishing Observations

This modest microscope played a key role in the early days of microscopy, though it was simply made. A brass column screwed into a boss fitted into the box lid, and a circular stage bearing a concave glass was fitted into a tapering support. At the top went a brass rod supporting the lens arm, while below the stage was a mirror to reflect light up through the specimen. Stage forceps were provided to hold a solid object, like a small insect or a flower. A set of six lenses was provided, ranging in magnification from 5x to 170x, two of which had Lieberkühn mounts—silvered reflectors that cast light downwards onto the top of an opaque specimen, such as a rock sample or a fragment of leaf. It was this instrument that launched Brown's remarkable career in botanical microscopy. He discovered the naked ovule of the gymnosperms, an extremely difficult demonstration even today, and recorded the streaming flow of cytoplasm within the cells of *Tradescantia*.

Yet it was in his observations of orchid epidermis that he made one of his best-known coinages. He wrote in 1831:

I shall conclude my observations on Orchideae, with a notice of some points of their general structure, which chiefly relate to the cellular tissue. In each cell of the epidermis of a great part of this family, especially of those with membranous leaves, a single circular areola, generally somewhat more opaque than the membrane of the cell, is observable … There is no regularity as to its place in the cell; it is not unfrequently, however, central or nearly so. As only one areola belongs to each cell, and as in many cases where it exists in the common cells of the epidermis, it is also visible in the cutaneous glands or stomata, and in these is always double—one being on each side of the limb—it is highly probable that the cutaneous gland is in all cases composed of two cells of peculiar form, the line of union being the longitudinal axis of the disk or pore.

After this meticulous observation, Brown adds the historical words: "This areola, or nucleus of the cell as perhaps it might be termed, is not confined to the epidermis …" It is here that the term first appeared; Brown's "areola" was thereafter known as the cell nucleus. As he recorded, others had seen it previously; indeed, the pioneering amateur Antony van Leeuwenhoek had drawings made in 1719 that showed the erythrocytes of fish, each containing a well-defined nucleus, so the feature had been observed more than a century before Robert Brown named it. These were astonishing observations recorded by Brown, yet all were made with a simple, single-lensed microscope.

A Gift of Great Importance

The instrument was in use from 1810 and, after Brown's death on 10 June 1858, his estate was administered by John Bennett, who had been his assistant since 1827. The year after Brown's death, on 5 February, Bennett penned a letter to the surgeon and naturalist Thomas Bell, who served as the Society's President from 1853–61. "I have been looking round for some trifling memorial of our late dear friend Rbt. Brown …," he wrote, adding that it was an object of

LEFT:
Council resolved that Brian J. Ford should restore Brown's microscope to use and it proved possible to observe microscopically fine structures as Robert Brown had done in Regency times.
© The Linnean Society of London

BELOW:
United after almost two centuries, Bancks microscopes made for (LEFT to RIGHT) Robert Brown (this instrument is currently at Kew), Joseph Hooker, George Bentham, and our microscope.
© Prof Brian J Ford

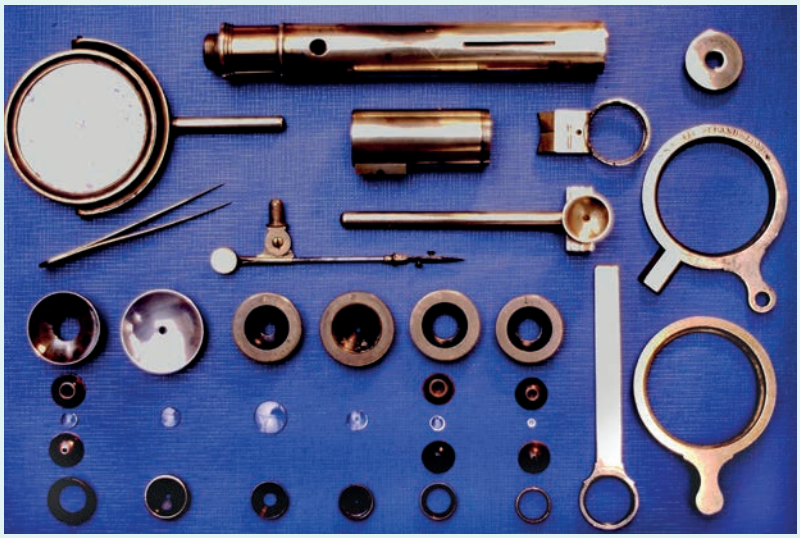
little intrinsic value, but was, "simply a relic." After Bell's death in Selbourne in 1880, the microscope was privately purchased and remained lost to scholarship until 1922, when the purchaser's daughter inherited it and decided to present it to the Society.

She was Miss Ida Silver of Reigate, who would later donate the glass-topped cabinet in the Society's entrance hall which still bears her name. On 19 January 1822 she wrote to the Society saying: "I have much pleasure in offering Mr Brown's microscope to the Linnean Society should they care to accept it." It was delivered next day to the office. Nobody showed much interest: when the centenary of Brown's naming of the nucleus was celebrated in 1932, the microscope was described in an article for the Journal of Botany as "surprisingly simple, being little more than a dissecting-microscope". In 1951 the organisers of the Festival of Britain asked to exhibit the microscope as an example of British scientific achievement, but Council declined. The microscope was considered insufficient for its task and, when I first saw it, it had been neglected and was dirty, distorted and had been wrongly assembled. It now seems surprising that this important artefact was so casually dismissed by academics, though (until I demonstrated the remarkable capacity of single lenses to reveal minutiae) it was universally accepted, in the era of the achromatic lens, that the images generated by those early simple microscopes were too poor to be useful. When the BBC produced their series with Adam Rutherford entitled "The Cell" in 2011, they used the No 2 lens of Brown's microscope to visualise the cell nucleus though little detail could be seen. Rutherford still gasped in wonderment, even though the results were so disappointing. Yet I was able to demonstrate that the same lens can create startlingly clear images of the same orchid tissue when carefully adjusted; the nucleus can be clearly seen, and so can the minute cytoplasmic inclusions that dot the contents of each cell.

This was not Brown's only microscope. Another is held in the Herbarium of the Royal Botanic Gardens, Kew, which bears a silver plate attesting to its owner; Brown also had high-powered single-lens microscopes manufactured by John Dollond. Bancks, father and son, became renowned for their skill and went on to provide similar microscopes for many luminaries including George Bentham, William Hooker, Charles Darwin and the Prince of Wales himself (later King George IV). Yet the doubts remained; in 1991 an American scientist insisted that Brownian Motion could never have been seen with such a primitive instrument, though I succeeded in reprising Brown's original observations and published them in Nature. Even so, the reference sources continue to err, claiming that Brown could see the movement "of pollen grains". Not so—the flickering grains that he observed were minute particles within particles of pollen.

Robert Brown was a diligent microscopist who used state-of-the-art equipment with consummate skill. Today's investigators, with everything automated and digitised, too easily conclude that previous generations could not match today's endeavours. In many ways the pioneers reached standards that few could emulate today. What Brown achieved was extraordinary—a fact that should perhaps be more widely appreciated.

Brian J Ford FLS



LEFT:
Dry specimens were mounted between slivers of mica in ivory sliders, the ancestors of today's slides. Around the circular brass stage was engraved the name of the manufacturer.
© Brian J Ford

BELOW LEFT:
Most conspicuous among the disassembled components are the body pillar (TOP), the substage mirror (LEFT) and the stage assembly (RIGHT). Six lenses provided a range of magnifications.
© Brian J Ford

BELOW RIGHT:
TOP: The BBC used our microscope in an attempt to resolve the cell nucleus (as Brown had done) for their documentary programme "The Cell". The results were blurred and indistinct.

BOTTOM: When the lighting and focus of the diminutive microscope were correctly adjusted, it did prove possible to show fine detail (with a nucleus visible in each cell and three stomata).
© BBC / Brian J Ford

FORTHCOMING EVENTS 2019

9 Jan
Lunchtime Lecture
12.30–13.00

Can Fossils Solve the Origin of Comb Jellies?
Speaker: Dr Jakob Vinther,
University of Bristol

17 Jan
Evening Lecture
18.00–19.00

Adaptations of Mammals to Urban Living
Speaker: Prof Dawn Scott,
University of Brighton

1 Feb
Day Meeting
10.00–17.30

Linnean Society Student Conference
Speaker: Prof Mike Benton FLS,
University of Bristol

13 Feb
Lunchtime Lecture
12.30–13.00

Deceivers, Doppelgangers and Degenerates
Speaker: Dr Ross Piper,
BBC's Wild Burma: Nature's Lost Kingdom

21 Feb
Evening Lecture
18.00–19.00

Annual Debate: The Future of Plant Science
In association with the London Evolutionary Research Network (LERN)

6 March
Lunchtime Lecture
12.30–13.00

The History of Seed Exchange
Speaker: Dr Maria Zytaruk,
University of Calgary

21 March
Evening Lecture
18.00–19.00

Nature's Palette: Understanding how Flowers Pattern their Petals
Speaker: Dr Edwige Moyroud,
University of Cambridge

22 March
Day Meeting
10.00–17.00

Linnean Society Conference: Diversity within Natural History
Speakers include: Prof Pratik Chakrabarti, Miranda Lowe FLS, Prof Richard Pancost

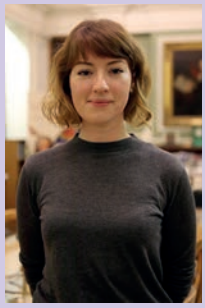
REGISTRATION IS ESSENTIAL FOR ALL EVENTS:
https://www.linnean.org/events
Please check our website for other events not listed here

Wishing you the best for the holidays!

The Linnean Society will close early on Mon 24 December, resuming normal hours on Weds 2 January. (Please check our website for library opening times.) May we take this chance to wish the very best to all of our Fellows for the holiday season; we look forward to welcoming you back in 2019.

ABOVE: © Pixabay

Dorothy Fouracre: Librarian



After the retirement of our Librarian, Lynda Brooks, in July, the collections team has undergone a change in structure, with Dr Isabelle Charmantier leading the team as Head of Collections. Our new Librarian, Dorothy Fouracre, took up the role in September and has hit the ground running, handling queries, organising displays, and taking over the reins for Linnaeus Link.

Before coming to the Society, Dorothy worked at Wellcome Collection, the Royal College of Surgeons and the Bodleian Library in Oxford. Dorothy says: "I especially enjoy working in libraries that have related museum and archive collections, so I'm excited about getting to know all the collections at the Society, and work towards making them more discoverable." Please join us in offering a warm welcome to Dorothy.

ABOVE: © The Linnean Society of London

Zia Forrai: Education Outreach Assistant

Zia Forrai joined the team in September to help deliver the BioMedia Meltdown Competition, an outreach project to inspire a love of natural history and biology in young people by exploring biology through artistic media.

Zia's previous role was in public engagement, at Wellcome Collection, creating workshops and tours related to the content, with interests including prosthetics, emergent technologies and biomimicry.

Zia says: "One of the things I'm most excited about working at the Linnean Society is expanding my own knowledge of natural history. Areas I've been most excited by have been: speciation; the legacy of Linnaean taxonomy (particularly understanding where viruses sit within the orders of life); horizontal gene transfer; and the evolution of consciousness." Welcome Zia!

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