

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

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NEW MEMBER

We welcome Mr David P. Barnes whose interests are history, natural sciences, photography, film and music.

DONATIONS TO THE RESEARCH FUNDS in 2017

A total of \$18,630 to the research funds has been received. Many thanks to our generous donors: Dr J.M.E. Anderson, two anonymous donors, Prof Roger Carolin, Dr Michelle Cotton, Ian Endersby, Dr Michael Engelbretsen, A/Prof Anders Hallengren, Mr Ian Hill, Mrs Betty Jacobs, Dr Stephen Johnson, Prof David Keith, Dr N.J. Littlejohn, Prof L. Selwood, Dr Lawrence Sherwin, Dr Helen Smith and Mrs Karen Wilson.

BIODIVERSITY OF MADAGASCAR, THE GREAT RED ISLAND, a talk by Karen Wilson

The island of Madagascar lies some 4-500 km off the east coast of Mozambique, Africa and it is about 1700 km long and 600 km at its widest place. It separated from India during the breakup of the old Gondwanan landmass and has been isolated for at least 40 million years. The topography controls the climate and the vegetation: central highlands run the length of the island and the eastern side of the island is better watered, while the western side is in a rain-shadow. Most of the island is in tropical latitudes and the temperatures are hot. The highlands, however, experience frosts.

Most of the rainforest is restricted to the east coastal strip and survives mainly because of the topography: a steep escarpment makes development impracticable. The central highlands are mainly grasslands and much of it is given over to rice growing. There is very little of the original vegetation left, and most of it is secondary growth but there are still some patches of original grassland and forest in the central highlands. The southwest is more arid and spiny forests are found there.

The long isolation has allowed the evolution of numerous endemics that are found nowhere else in the world. More than 80% of the plant species are endemic, and for the angiosperms, it is about 85%. There are many species of orchids and most of them are endemic. The spiny, small-leaved succulents *Didiereaceae* and *Pachypodium* spp. are limited to the dry spiny forests. There are six endemic species of baobab plus two African species. The baobabs have swollen, water storing trunks and are the "stars of the plant world". Of an estimated 850 species of *Rubiaceae* (many undescribed), 92 % are endemic, and this includes 45 species of coffee, which, however, are not used commercially.

Other well-known endemics include the leguminous flame tree and the traveller's palm that is not a palm but is related to the strelitzias. The Madagascan traveller's palm is most closely related to the Amazonian traveller's palm. There are 80 species of *Pandanus* and a *Winteraceae* that is related to *Tasmannia* in Australia. There are 19 genera and 67 species of *Celestraceae*, thought to have evolved in Madagascar and radiated out. In the drier regions, there are bulbous, water-storing species and agaves. There is less endemism amongst the mosses and ferns as their spores are easily dispersed. The plants show many connections with southeast Asia, less so with Africa and South America. The ocean currents are predominantly from the east, although this has not always been so. Molecular work also shows up the long isolation.

In the animal world, there are very few connections with Africa, despite the proximity. There are no lions, giraffes or penguins as portrayed in the animated film "Madagascar". There was once a pigmy hippopotamus. There were about 100 species of lemurs, all descended from the one ancestor. Early explorers described apes, but they were most certainly lemurs. Many lemurs have become extinct, especially the large-bodied ones. The puma-sized predator the fossa is related to the mongoose. So-called hedgehogs are related to the African shrew. There is less endemism amongst the birds as they are more mobile, although there are five endemic families. There was once a giant bird, the elephant bird, now extinct.

There are many species of chameleon and the smallest would fit on your fingernail. There is one that looks exactly like a dry leaf. The larger brightly coloured species that change colour to match the environment are well known. There are frogs, a few snakes, some related to the boas of South America and giant tortoises, freshwater fish and a land crab in the rainforest. There is even a native silkworm that lives on a species of *Euphorbiaceae*

Most of the people are of Indonesian descent, apparently carried there by the prevailing east-west ocean currents. Madagascar was a French colony, becoming independent in 1960. There is heavy pressure on the environment from a population that exceeds that of Australia. Outside of the main towns, most of the people live in rural poverty. There is very little electricity in rural regions and firewood (as charcoal) is the main source of fuel. Eucalypts and acacias are grown for fuel but in the more arid regions where they do not grow, the spiny species are harvested. The national parks have cattle and people living in them. The challenge is how do villagers make a living while protecting the environment at the same time. Various projects have been tried and some are working, but the problem is overwhelming.

Madagascar is a fascinating place to visit, but the overwhelming poverty, lack of development and such extensive destruction of the unique environment adds a sad note.

“TEARS OF THE GODS” – THE HISTORY AND SCIENCE OF AMBER: a talk given by Dr Dan Bickel

Amber is the hardened and fossilized resin of ancient trees, particularly of conifers. Trees produce the resin to seal wounds and excess may drip down or accumulate in cavities. Being sticky, it traps small insects and spiders, bits of plant material and other debris, and there may be spectacular preservation, such as the detail of hairs on insects. Amber is lightweight and easily transported by water, but it is soft and breaks down easily. Amber from the Baltic is the best known, but amber is found around the world and more is being found all the time.

Baltic amber is Eocene (50 million years) in age and it is found in large quantities in Poland and in the Ukraine where it is mined. It is not known why there is so much of it. Rivers drained large areas of coniferous forests and the resin was deposited in the delta where it was preserved. Today, storms erode the sediments and expose the amber. It is speculated that there must have been incredible flows of resin, but there could well be other explanations. Amber was highly prized in classical times and was traded, some reaching as far as China.

Amber may be carved and there are Neolithic and Bronze aged figurines. It is used in jewelry and varnish, and being hydrophobic, it may be used where this property is required. But amber is unstable if not kept under water, and it may become crazed or the surface oxidized to a cloudy patina. One piece of amber may be beautifully clear on one side, revealing inclusions but the other side is all roughened and cloudy.

Early Cretaceous (120 million years) Lebanese amber is one of the oldest and readily becomes brittle. A bee has been found in early Cretaceous Burmese amber and it is one of the oldest bees: there must have been flowering plants around at that time to sustain it. Dominican and Mexican amber come from a leguminous tree and is Tertiary in age. It is beautifully clear, often with many inclusions: flies, ants, termites: some mating pairs and even a small lizard. One piece had 47 inclusions: something must have attracted them to the resin while it was still sticky.

The preserved biota in amber may shed light on evolution. A primitive ant in mid Cretaceous amber from Mexico and the Dominican Republic indicates links with tiphild wasps, the most primitive of the ants. Most modern families of insects were in place by the beginning of the Tertiary. The Baltic Amber insects are essentially modern species. The biota may also comment on biogeographic topics. A family of primitive termites known only from the Northern Territory and New Guinea is found in amber from Mexico and the Dominican Republic where it is now extinct, showing that the group once had a much wider distribution. The fly *Atlatlia* is found in SW and SE Australia and New Caledonia, suggesting a Gondwanan origin, but there are three species in the Baltic amber. Its present distribution is thus a remnant of a much wider distribution.

Australian upper Cretaceous (90 million years) amber was found in cores from oil and gas exploration bores in the Otway of western Victoria. Amber found along the coast of Cape York in far north Queensland is probably Miocene in age. This amber has a chemical signature similar to kauri (*Agathis*) of New Zealand. There are four species of *Agathis* in north Queensland today. Two hundred and fifty inclusions of arthropods and a bird's feather have been found in the amber. There is Paleocene-Eocene amber in Tasmania.

In Greek mythology, the Sun God Helios drove the sun chariot across the sky each day. His son Phaeton begged to be allowed to drive the sun chariot, but when Helios reluctantly allowed him, he could not control the horses. When the sun chariot was too far away, the earth froze, when too close, it burnt the land and created the African deserts. Zeus intervened and killed Phaeton. Helios' daughters were distraught and cried for months, and the gods turned their tears into amber.

Dr Bickel's enthusiasm for amber was evident and his lecture was a fascinating story of amber science and its long history.

LINNEAN SOCIETY OF NEW SOUTH WALES

For Security reasons, there is now a locked gate between the carpark and the Classroom. If it is locked when you come to a lecture, just wait and someone will come and let you in.

PROGRAMME

**Wednesday 19 July at 6 pm, in the Classroom, Royal Botanic Gardens
Enter through the gate to the Herbarium Carpark on Mrs. Macquaries Rd.**

A/Prof PAUL ADAM

School of BEES, University of NSW

**THE TRUTH, THE WHOLE TRUTH AND NOTHING BUT THE TRUTH?
THE USE OF LANDSCAPE ART AS A SOURCE OF INFORMATION IN HISTORICAL ECOLOGY**

Historical ecology is a growing field.. One source of evidence may be provided by historical landscape paintings. In Australia, Gammage has used landscape paintings as one of his sources for reconstructing the pre European pattern of vegetation across the whole of Australia. His theory has been used to advocate particular approaches to fire management. There are however difficulties with treating art works as 'accurate' records, and the magnitude of these problems is poorly appreciated. To regard landscape painters as the 'photographers' of their day is inappropriate, but even photography presents issues when used as a source of information.

**Wednesday 20 September at 6 pm, in the Classroom, Royal Botanic Gardens
Enter through the gate to the Herbarium Carpark on Mrs. Macquaries Rd.**

Dr JACQUELINE NGUYEN

□ **Australian Museum**

**A FLOCK OF FOSSILS: EVOLUTIONARY HISTORY OF
AUSTRALIA'S SONGBIRDS**

Molecular studies have consistently supported an Australian origin for songbirds, the world's largest avian radiation that includes lyrebirds, robins, honeyeaters, ravens and swallows. If the majority of living birds had their roots in Australia, what does the fossil evidence tell us? In this seminar I will present recent fossil discoveries from Australia and discuss their important roles in shaping our understanding of songbird evolution.

Refreshments will be served from 5.30 pm

Everyone welcomed