

LINNEAN SOCIETY OF NEW SOUTH WALES

LINN S'O'C' NEWS

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NEWSLETTER EDITOR:
Dr Helene A. Martin
School of BEES
University of New South Wales
SYDNEY NSW 2052
h.martin@unsw.edu.au

SOCIETY OFFICE:
Suite 3, 40 Gardeners Road
KINGSFORD NSW 2032

Telephone:
(02) 9662 6196

POSTAL ADDRESS:
PO Box 82
KINGSFORD NSW 2032

Mobile Service
0408 693 974

E-MAIL: linnsoc@inet.net.au

WEB SITE: <http://linneansocietynsw.org.au>

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NEW MEMBERS

We welcome our new members:

Dr Daniel Bickel. Fields of interests: entomology, Diptera

Mr Alex Kenins. Fields of interests: freshwater algae, aquatic ecology, botany

Dr Sandra Claxton. Field of interest: Australian terrestrial Tardigrada.

NEW COUNCIL MEMBER

We welcome Dr Dan Bickel to the Council of the Linnean Society of NSW. Dr Bickel, formerly of the Australian Museum is a specialist in the Diptera family Dolichopodidae, which has a rich recent fauna with some 7000 described species globally, but many more undescribed.

It also occurs in Baltic amber, partially because species enjoy resting on tree trunks and thereby get trapped in the sticky resin. Dr Bickel recently gave the society a fascinating talk about amber.

LINNEAN MACLEAY FELLOWSHIP

Applications are invited for the Linnean Macleay Fellowship for the year 2018. Applicants must be Members of the Society, reside in New South Wales, and have a degree in Science or Agricultural Science from the University of Sydney. Applicants are required to outline the proposed research and where it will be carried out. The Fellowship pays \$3,200 per annum, and the Fellow must engage in full time research on the project. The regulations governing the Fellowship are available on request from the Secretary or the Society's web site. These regulations were stipulated in Sir William Macleay's will and the Society is obliged to adhere to them.

Applications close 15 November, 2017

REPORTS FROM THE RECIPIENTS OF RESEARCH GRANTS

Mr Kyle **Ferguson**, University of Queensland, award from the Betty Mayne Fund

Project: *Geochemically 'fingerprinting' fossils collected from Chinchilla, an Australian Pliocene age fossil deposit.*

The Chinchilla Sands is exposed for 65 km between Nangram and Warra, Northern Darling Downs, Queensland and is one of the richest Pliocene (5.3-2.6 million years ago) age fossil deposits in Australia. Thousands of fossils have been excavated from this region for well over a century and a half. However, the palaeontological importance of the collection is still poorly understood.

Inadequate documentation and site localities for a substantial portion of Chinchilla material makes it difficult to determine stratigraphic positioning. Analysis of diagenetically incorporated trace elements can assist in assigning fossil provenance. A geochemical analysis could determine if the signatures vary between localities.

Results: Seventy five samples were collected from Chinchilla fossils in the Queensland Museum. The results are being analysed and a manuscript is being prepared.

Daniel C **Huston**, University of Queensland: Award from the Joyce Vickery Fund

Project: *Evolutionary radiation of enenterid and gorgocephalid trematodes in Australia*

Digenetic trematodes are a group of extraordinarily diverse parasites. Their life cycle has a main vertebrate host and a secondary invertebrate host, almost always a mollusc. There may be more than one invertebrate host. Two of the lesser-known families, Enenteridae and Gorgocephalidae have diversified almost entirely in the fishes of the family Kyphosidae. This family of circum-global herbivorous fishes is at its highest diversity in Australian waters. The taxonomy of the parasites is very confused and that of the host fishes is uncertain in many cases. Sites from north Queensland to southern Australia will be sampled and the taxonomy of the parasite studied using both morphology and molecular genetics.

Results: Collections of the trematodes in species of *Kyphosus* (family Kyphosidae) were made from Moreton Bay in southeast Queensland, Lizard Island and the Great Barrier Reef. Both known and unknown species of the trematodes were collected.

Mr Matt **Johansen**, Veterinary Science, University of Sydney: Award from the William Macleay Microbiology Fund

Project: *The role of cholesterol-associated genes for the early pathogenesis of Mycobacterium marinum in a zebrafish model.*

John's disease is a chronic intestinal inflammation in ruminants caused by *Mycobacterium avium* subspecies *paratuberculosis* and many mycobacterial species are capable of persisting intracellularly. Research with other species has shown that cholesterol is a key requirement for establishment and persistence of infection. This project will explore the genes involved in the cholesterol metabolism. Completing such studies in ruminants is not feasible hence zebrafish, a widely used model for mycobacterial infection will be used.

Results: The knockdown of genes in the cholesterol and lipid metabolism significantly reduced the bacterial burden in modified zebrafish embryos but gene expression of additional cholesterol and lipid genes were differentially regulated to accommodate for the knockdown. Work is continuing on this project.

Ms Valentina H. **McCormick**, University of Technology Sydney received the William Macleay Award for Microbiology

Project: *Assessing the threat of anthropogenic impacts to seagrass meadows as a consequence of the un-coupling of seagrass-microbe associations*

It is thought that ecological interactions between seagrasses and associated microorganisms strongly control the function of meadows and disruptions to the delicate balance results in decline of seagrass stocks. Seagrass meadows have substantial economic importance as a nursery for fish. Lake Macquarie, where thermal and nutrient discharges from power stations pollute the environment was chosen for study.

Results: Sampling sites were set up in Lake Macquarie near a power station and for comparison, at Palm Beach, Narrabeen Lagoon and Rose Bay. Bacterial and microalgal communities were more biogeographically conserved while fungal communities were more consistent with the plant and its surrounding microenvironments. Lake Macquarie shows distinctive microbiomes at both the regional and plant scales, suggesting both environmental and anthropogenic factors as potential drivers of microbial shift.

Ms Caitlin **Morrison**, University of Sydney: Awarded a Joyce Vickery grant.

Project: *Developing toll-like receptor (TLR) markers for studying how disease impacts the orange-bellied parrot*

The orange-bellied parrot is critically endangered with only about 20 individuals remaining in a wild population. It is one of only two obligate migratory parrot species. Despite release of captivity-bred individuals and other recovery actions, the wild population has continued to decline. Risks now include low genetic diversity, inbreeding depression, disease and loss of habitat. This project aims to develop markers for the innate immune system genes, the TLR, that can be used in future studies to assess risks of disease.

Results: Nine primer sets for seven TLR loci that work in other parrot species were trialled on the orange bellied parrot DNA and five sets proved partially effective but all of these sets produced non-specific amplification of the DNA. Primer redesign was necessary and all seven redesigned primers were effective at amplifying target loci at a level sufficient for sequencing, except for two that had to be redesigned again. Eventually, this resulted in seven sets of effective primers for the TLR loci in the orange bellied parrot, the aim of this project.

Mr Thomas **Semple**, Australian National University received the John Noble Award for Invertebrate Research

Project: *Phylogenetics, ecology and novel taxonomic techniques in thynnine wasps.*

Thynnines are depicted as a dominant group, second only to ants across much of Australia. There are currently 474 species of thynnine wasps and an estimate of at least 1000 additional known but not described species. This project aims to establish the first broad scale phylogeny of the thynnine wasps using DNA sequencing and 3D imaging using the immensely promising x-ray micro computed tomography that allows imaging of external and internal features of tiny organisms on the micro scale. This means a 10 mm wasp can be scanned at a 3-micron resolution, allowing examination of individual hairs. The immense datasets generated from scanning will be available to anyone for future study.

Results: Five weeks were spent at the University of Western Australia using the high resolution X-ray microscope at the Centre for Microscopy and 50 specimens were scanned, producing an incredibly useful dataset. The results are being analysed. There will be further trips to Perth.

Mr Joshua R. **van Lier**, Australian National University, awarded a Joyce Vickery Grant

Project: *How acute habitat disturbance affects seaweed associated fishes in Ningaloo ecosystem.* Tropical seaweed meadows cover vast areas of coastal ecosystems and are home to a wide diversity of tropical fish. Focusing on the fish family Labridae (includes the wrasses and parrotfishes), this study aims to determine the extent of specialisation among the seaweed associated fishes and how they respond to an unseasonal loss of meadow habitat over the short (weeks) to medium (year) time scales. Canopy height of the seaweeds is an important driver of fish abundance, so canopy height will be reduced up to 50% in late summer and the fish surveyed before and after treatment.

Results: A total of 5,134 individual labrids in 25 species were recorded in a 6 month period. Unfortunately, extreme cyclone events precluded monitoring for a year after manipulation. A significant reduction in labrid species richness, abundance and biomass occurred between the control and treatment patches that continued for up to six months. Predatory fish made up a much higher proportion of the community post treatment.

Mr Ricardo **De Paoli-Iseppi**, Australian Antarctic Division, University of Tasmania: awarded a Joyce Vickery grant.

Project: *Molecular biomarkers for seabird age estimation; Implications for ecological monitoring.* The chronological age of an animal is a critical factor in animal populations. This study will use epigenetic biomarkers that have proven successful in age estimation in mammals but have not been applied to birds. The method will be validated on a population of known aged short tailed shearwater, the most abundant seabird in southern Australia on Fisher Island (off Flinders Island) that has been studied and banded for 40 years.

Results: During a field trip in December, 35 birds of known age from 2 to 21 years in age were found. Blood and feather samples were taken. Several genes that have shown age-related methylation in mammals were investigated in 67 sites in 13 target gene regions. In blood samples, five of the top relationships with age were identified. Feather samples were also weakly correlated with age. The majority of markers had no clear association with age (only 12 out of 131). The approach that works in mammals does not appear to work for this sea bird.

Mr Joshua **PENALBA**, Australian National University

Project: *The genomic origin of species: a case study of the avian group the Australian Meliphagoidea*

The Meliphagoidea includes fairy wrens, honeyeaters, pardalotes and Australian warblers. Incipient species pairs, such as a northern and a southern species in Queensland that hybridise in the geographic contact zone will be studied.

Results: A field trip in north Queensland filled in the gaps in museum collections. The study shows that patterns of differentiation when the populations are in contact are different to the patterns when the populations are geographically disjunct.

Ms Lucy N. **Wenger** (Australian National University) received the Julian E. Tenison Woods Award

Project: *Could coral reef fishes have evolved from seaweed-associated ancestors?*

Coral reefs support a spectacular diversity of fishes, suggesting many families of coral reef fishes have undergone dramatic radiations. Using the closely related genera of wrasses,

Macropharyngodon and *Xenojulis* of coral reefs and seaweed meadows respectively, this project explored whether they could have arisen from a common seaweed-associated ancestor.

Results: *Macropharyngodon* showed a strong preference for hard coral microhabitats, consuming foraminifers from sand-paved microhabitats whereas *Xenojulis* preferred canopy-forming seaweeds and a diet of epibiont prey in the canopy. *Xenojulis* was highly dependent on the seaweed canopy, for at the height of the seasonal reduction of the canopy by 10 cm, there was a 40% decline of *Xenojulis* abundance. This research suggests seaweed habitats should be conserved and managed as equally important components of the tropical marine ecosystem.

THE TRUTH, THE WHOLE TRUTH AND NOTHING BUT THE TRUTH? THE USE OF LANDSCAPE ART AS A SOURCE OF INFORMATION IN HISTORICAL ECOLOGY – a talk given by Dr Paul Adam.

Landscape art is being used in historical ecology with the hope of finding out what the environment was like in times gone by. For example, the Medway estuary has sedimentary problems and when trying to establish how far back these problems go researchers found a 1680's painting of the estuary. But the scale is wrong: the ships are too large and the trees too small. Artists are inclined to paint what they want us to see and accuracy must be questioned. Landscape is a surprisingly modern concept and scenery even more so.

A distinction must be made between topographic art and artistic representation. Topographic sketches are accurate and recognizable for they were done mainly by the military for their own purposes. There has long been a school for teaching midshipmen topographic art and it still operates today. Some artists attempted accuracy with the aid of a pinhole camera, but it draws in the edges, producing some distortions. The Claude Glass is a plano-convex mirror about 4 inches across, on a black foil and the artist drew what he saw in the mirror, which however, distorted colours.

Bill Gammage (2011) wrote "The Biggest Estate on Earth: how Aborigines made Australia". Early European settlers had noted how open and park-like the native vegetation was and he concluded that aboriginal management had made it so. He consulted written and visual records (paintings) to come to this conclusion. His work has been used to advocate management practices along purported aboriginal practices, especially in the use of fire. Dr Adam has examined the reliability of using early colonial paintings as scientific evidence.

Gammage regarded artists as the "photographers" of their day, but discrepancies between the pictures he selected (and it is not known how or why he selected them) and the landscape it was supposed to represent soon become obvious. Aborigines were put in Tasmanian landscapes when it is known they had all gone at the time of the painting. Aborigines were shown using woomeras when it is known that Tasmanian aborigines never used woomeras. Aborigines are shown clothed in loin-clothes! And the list goes on and on.

Joseph Lycett was sentenced to transportation for forgery and he was an accomplished portrait painter. He did many paintings of landscape, some thought to be accurate but he clothed the Aborigines. Some paintings of Tasmania and around Lake George were attributed to him but he never visited those places: it is not known who did them. When he returned to England, he made etchings of the paintings, "tidying" them up with the purpose of encouraging settlers to go to Australia. John Heaviside Clark published ten paintings of Australian landscape, but he never visited Australia. It is not known who did them, but there seems to have been a connection between Lycett and Clark. Because

Lycett had been a convict, it was avoided mentioning his name. Those were the days before any copy write laws.

Artists would travel around the country doing sketches, then back in the studio construct the large scale pictures, inserting the sketches where they thought appropriate: they were more “photo-shoppers” than photographers of the day. If Aborigines managed the landscape with fire, there are surprisingly few paintings showing fire or the effects of fire. These early paintings should be viewed in the light of the agenda of the artist: the political, commercial or other message they wished to convey to the viewer, and if done for commission. Although photographs are more accurate, the interpretations can be controversial.

Paul intends to publish the findings of his research in the Proceedings.

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 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.

**Wednesday 18 October at 6 pm, in the Classroom, Royal Botanic Gardens
Enter through the gate to the Herbarium Carpark on Mrs. Macquaries Rd.**

Dr NEIL JORDAN

**Centre for Ecosystem Science, University of NSW & Taronga
Conservation Society Australia & Botswana Predator Conservation
Trust**

**UNDERSTANDING AND MANIPULATING ANIMAL
COMMUNICATION FOR CONSERVATION**

Animals communicate using a range of signals in diverse contexts including hunting, defending territories and in inter-specific competition. My research focuses on large carnivore communication in particular, and subsequently applying this understanding to

direct their movements and behaviour. I have a particular focus on human-wildlife conflicts that currently tend to be managed reactively by removing predators using lethal control and translocation. In contrast to these traditional approaches, I aim to developing biologically-relevant preventative tools that promote coexistence between livestock, people and predators. I will give examples from Botswana and Australia, including lions, African wild dogs, and dingoes

Refreshments will be served from 5.30 pm

Everyone welcomed