



Editorial

David Yeates, Director



David Yeates

This is a bumper issue of ANICdotes, evidence of lots of activity in the collection over the past few months. As we write this issue, CSIRO is going through a major restructure, with the Division that ANIC belongs to coming to an end this financial year. ANIC's future is with the CSIRO's Collections and Facilities, including the other biological collections, the telescopes, Southern

Surveyor, The Square Kilometre Array and the Australian Animal Health Laboratory (AAHL). This transition will see the collections recognised as significant national infrastructure, and we are sure that this will be a significant step in improving their maintenance and development into the future.

Most importantly, our new research scientist in phylogenomics, Andreas Zwick, arrived in January. Andreas came to us from The Natural History Museum in Stuttgart, Germany. He has extensive experience in the generation and interpretation of molecular sequence data, and has research interests in Hexapoda origins, the phylogeny of insects, and the systematics of Lepidoptera. Andreas hit the ground running, revitalising our molecular laboratory and facilities, and conducting a 2-week field tip to the Kimberleys to collect *Helicoverpa* and other Lepidoptera specimens and tissues.

Just before Christmas ANIC was the lead agency in a very successful Bush Blitz expedition to the Australian Alps, with staff from the Australian National Herbarium, the Australian Museum, the Queensland Museum and elsewhere. The weather was kind, the collecting was successful, and the helicopters made getting to the tops of the mountains very enjoyable. There is more information on the expedition in this issue.

This issue also includes articles on the recent Biodiversity Collections Digitization in the Pacific workshop attended by ANIC staff member Nicole Fisher. We have also just hired a Graduate Fellow in Computational Informatics to work on display and annotation of 3D images of insect specimens, and staff from the Department of Agriculture and Food Western Australia (DAFWA) have curated our aphid collection. This issue also includes an article on the various Jurassic fossil insects being discovered and described from the Talbragar Fish Bed near Gulgong in NSW.

The bibliography section of this issue is impressive, largely because the third Coleoptera volume of the *Handbook of Zoology* has just been published, with our coleopterists taking on a major role. As we go to press our collection manager Beth Mantle has taken maternity leave. We all wish Beth the best over the next few months.

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CONTACT: anicdotes@csiro.au | www.csiro.au/anic
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BANNER: *Graphium macleayanus* image from the [Biodiversity Heritage Library](#).

The Australian Alps Bush Blitz

David Yeates

Bush Blitz is Australia's largest nature discovery project, a multi-year, multimillion dollar partnership to document the plants and animals in hundreds of properties across Australia's National Reserve System (NRS). Since the program began in 2010 Bush Blitz has discovered about 600 new and undescribed species and has added thousands of species to what is already known - providing baseline scientific data that will help us protect our biodiversity for generations to come. The NRS is Australia's network of protected areas, conserving examples of our natural landscapes and native plants and animals for future generations. Based on a scientific framework, it is the nation's natural safety net against our biggest environmental challenges.

The NRS includes more than 10,000 protected areas covering 16.52 per cent of the country - over 12.7 million hectares. It is made up of Commonwealth, State and Territory reserves, Indigenous lands and protected areas run by non-profit conservation organisations, through to ecosystems protected by farmers on their private working properties. Bush Blitz surveys aim to find new species, and distribution records for described species, from our NRS.

The Australian Government Department of Environment invited the Australian National Insect Collection to act as the lead agency in a Bush Blitz survey expedition to the Australian Alps from 8-14 December 2013. Our sister CSIRO collection, the Australian National Herbarium, acted as lead agency for the plant collections made on the survey. A total of 15 scientists participated in the survey, including six ANIC staff, Director David Yeates, volunteer Glenn Cocking, postdocs Sara Pinzon Navarro and Karen Meusemann, PhD student Michaela Purcell and technical officer Chris Manchester. Joining the survey for entomological collections were Professor Gerry Cassis and PhD student Jackie Karras from the University of NSW and David



Some of the ANIC Team in the field

Britton from the Australian Museum. Kate Gillespie and Mim Jambrecina from Bush Blitz acted as field team leaders.

The Bush Blitz expeditions are extremely well organised, with excellent logistics and catering, and the Alps Bush Blitz even included a helicopter at call all week. The weather played ball, and we could use the helicopter to access remote sites in the mountainous terrain of the Alps on all but one day of

the expedition. Sara and Michaela surveyed for weevils and *Fergusonina* flies respectively, Glenn cocking targeted moths and butterflies, and the remainder of the ANIC team focused on flies using a series of Malaise traps strategically positioned in a range of habitat types in the survey area of Namadgi National Park.



David and Mike

Material from the expedition is being curated, identified and databased in ANIC now. The survey team was impressed with the insect diversity encountered, especially as much of the survey area had been adversely affected by severe bush fires in 2003. In all, thousands of specimens and hundreds of insect species were collected. Many of the scientific team had not collected in the alpine bogs in the area before, and it was great to see the extent to which these had recovered from the fires, and the extensive rehabilitation work that had been carried out in these areas by the ACT National Parks staff. Highlights of the survey that we have already identified include the green mountain cockroach *Polyzosteria viridissima* in an alpine bog near the summit of Mount Murray. This population lies between those further south in the Snowy Mountains, and those further north in the Brindabellas, and

proves that populations were not necessarily extinguished by the 2003 bushfires.

Thousands of flies were collected in the Malaise traps, including many Bombyliidae, Therevidae and Asilidae. The elegant bee fly *Marmasoma sumptuosum* is rarely collected, but we hand collected many resting on an old dirt road in Namadgi NP. *Elegopogon bifidus* is a small, wasp mimicking asilid fly collected sweeping blossom. A few specimens of the bombyliid fly *Aleucosia calophthalma* were collected by hand, many were taken in the Malaise traps. While distributed widely in eastern Australia, it has not often been taken in the

survey region. Each of these species is also found in Tasmania. Therevidae are being identified now, but many specimens and species of *Anabarhynchus* and *Ectinorhynchus* dominated the malaise trap samples.

Anthela cnecias has been widely collected in the coastal ranges of southern NSW where it is found in swamps dominated by *Poa labillardieri*, which is almost certainly its larval foodplant. One specimen was taken on the blitz, one of very few known from the more inland Kosciuszko/Brindabella Ranges rather than the coastal ranges. A single female of an unidentified ennomine geometrid moth was found at the junction of the Boboyan Road and the track up Shanahans Mt., ACT. Coincidentally three males from Talbingo Mt, NSW were donated to ANIC. The appearance of a local species of macrolepidoptera not known to us before was unexpected.

The Bush Blitz program has many benefits - providing an opportunity for field work, and resourcing the time-consuming curation of specimens are two important ones. The program also funds species discovery and provides valuable information to assist in the management of the NRS. BHP employees also join in the field work, providing an outreach connection between the science and citizen scientists. ABRS deserves credit for initiating and continuing this valuable and unique program.



David and Karen with a Lizard

Australian Beetles, volume 1: Morphology, Classification and Keys

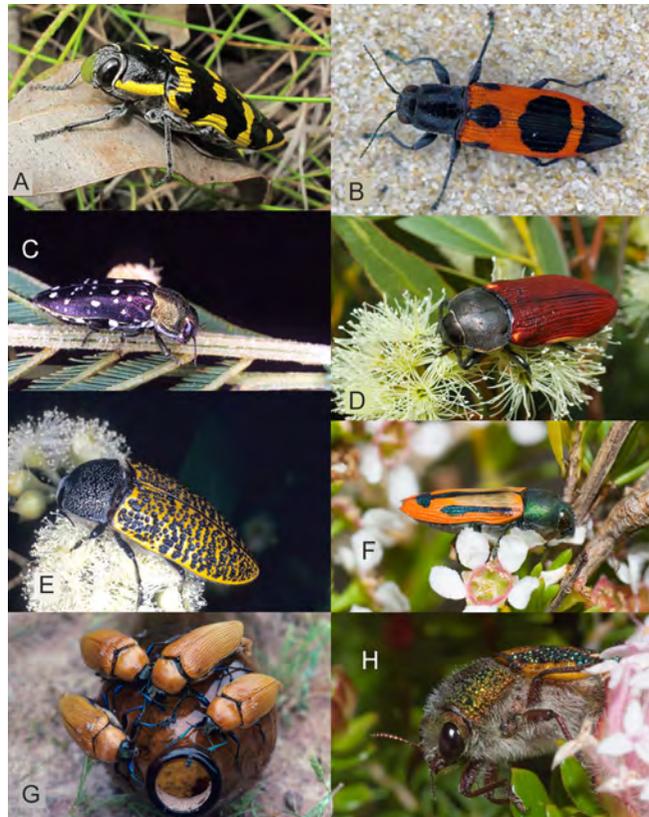
John F. Lawrence and Adam Ślipiński

With about 400,000 world species classified in 174 families, the beetles (Coleoptera) is by far the largest order of living organisms on Earth. There are about 20,000 described Australian species representing 117 families and most of them are little known.

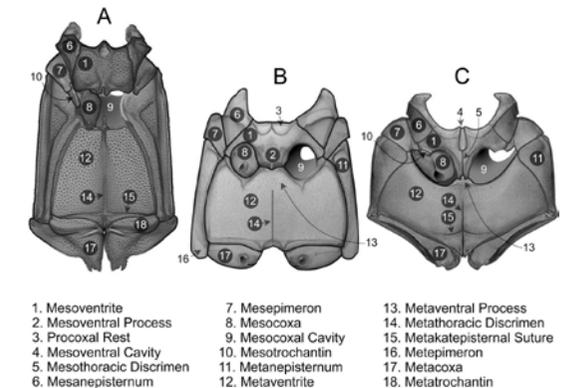
The recently published book about the Australian Beetles by CSIRO Publishing is a very welcome text for entomology students, people interested in natural history and for any serious beetle taxonomists worldwide. This book is the first volume in a series of three volumes on Australian Beetles that supersedes very popular and long out of print book by J. F. Lawrence and E. Britton (1994), which, in turn, was an expanded version of the chapter on Coleoptera in the *Insects of Australia* (Lawrence and Britton 1991).

Among others, the first volume includes extensive treatment of beetle morphology, illustrated by 1175 figures of adults, larvae and anatomical structures, and a large section on fossil history of beetles summarizing all significant fossil literature on Coleoptera from various regions with emphasis on the Mesozoic Era. It further contains completely revised family keys to adults and larvae followed by the classification and the family sections. Each family section contains a full adult and larval description based on Australian species, a section on world classification and distribution, another on the Australian fauna with notes on biology, and a list of subfamilies, tribes and genera occurring in Australia.

Volumes 2 and 3 of this series are in preparation and will be multi-authored with invited specialists from various parts of the world providing sections similar to those in "American Beetles", with adult keys to all genera occurring in Australia.



One of the Coloured Plates in the Book



Sample Content

The book has proven to be a very popular item worldwide, and since its publication in October 2013 the first print run has been sold out, and the volume is currently being reprinted.

Biodiversity Collections Digitisation in the Pacific

Nicole Fisher

iDigBio, East-West Center, Bishop Museum, University of Hawaii, and the Pacific Science Association joined forces to host the Biodiversity Collections Digitization in the Pacific workshop, held 25-27 March 2014 in Honolulu.

iDigBio, the National Science Foundation's national HUB for Advancing Digitization of Biological Collections (ADBC) welcomed participants from Australia, Canada, Denmark, Guam, Palau, and Papua New Guinea to Hawaii for this event. Nicole Fisher was one of 60 in attendance, presenting three talks on collection digitisation.

The first day of the workshop was devoted largely to international collaboration, funding opportunities, and project management. Donald Hobern, Executive Secretary of the Global Biodiversity Informatics Facility (GBIF) offered a keynote that focused on the importance of serving biodiversity data in a global environment. Judy Skog, Expert Consultant to the National Science Foundation and lead for the ADBC program, outlined her vision for the future of funding for biodiversity digitisation activities and offered a what, when, where, and how perspective on NSF programs for funding collections.

Days two and three focused on digitisation activities common to a broad range of collection and preparation types and featured presentations on digitisation workflows and components, pre-digitisation curation practices across collection types, imaging strategies and protocols, data extraction from a range of collection objects, processes essential to effective data management, the importance of linking museum studies and libraries to biodiversity digitisation practices, resources for public participation and crowd-sourcing, the importance of linking genomic data to specimen records, potential uses of digitised data, and strategies for education and outreach.



Course participants

The agenda, presentation documents, and session recordings are available for viewing and downloading at the workshop wiki.

<https://www.idigbio.org/content/biological-collections-digitization-pacific-0>



A group at work



Issues being raised



Questions being answered



A session in progress

Collection Management & Curation Column

Beth Mantle

While the recent Federal Government hiring freeze has affected on CSIRO's ability to hire new staff, including the long-awaited ANIC Data Curator role, we have been able to partner with another CSIRO Division and launch a Graduate Fellowship in Computational Informatics. This two-year appointment aims to develop new methodology and workflows to digitise some of the most precious specimens in ANIC. Building on existing image-based 3D reconstruction technologies, the Graduate Fellow will research and develop an open format for coherent display and annotation of a specimen. The primary outputs of this project will be a prototype workflow and web-based viewing environment for the digital versions of the specimens.

If you're planning to deposit a specimen at ANIC, whether it's a type specimen, a voucher specimen, survey material, or a beloved private collection, ensure you make contact with the Collection Management team as early as possible. We have detailed information on the processes involved in specimen deposition and the best way to prepare your specimens to maximise their chances of being accepted and properly incorporated into the collection. We can provide you with label templates, registration numbers for individual specimens, and data sheets to enable upload of specimen data into our collection management system, just to name a few things. Remember to start a conversation with us early to ensure a smooth process!

CSIRO is facing another organisation-wide restructure, which will take effect from the 1 July 2014. We don't anticipate this having any major impact on the day-to-day operations of ANIC but if there are any issues we'll be sure to communicate them with you as soon as possible.

Speaking of staying in touch, if you haven't joined us already then make sure you add the ANIC Facebook page to your list of favourites: <https://www.facebook.com/insectcollection>

This will be the last column I write for a little while. I am heading off on maternity leave in the next few weeks and I'm looking forward to starting a new journey into parenthood! My out-of-office email message will provide all the relevant contact information for while I'm away. I know that the collection will be left in great hands while I'm gone, and I look forward to rejoining the team sometime in the next six to twelve months.



Pinned ANIC Specimens



Updating the ANIC Aphid collection

Beth Mantle

During 2013 Cameron Brumley from the Department of Agriculture and Food Western Australia (DAFWA) had the opportunity to spend 10 days curating the ANIC Aphididae slide collection.

The extensive Aphididae slide collection is the largest in Australia and boasts a considerable amount of foreign material, neatly separated throughout the drawers from Australian records. Dr Mary Carver, the retired former ANIC aphid expert, was responsible for much of the collection's growth including bringing back with her many exotic slides

prepared alongside Hille Ris Lambers in Holland. There are a number of slides by H. Britten from around the world from the 1930s(?) including some great quality slides from Trinidad.

After the collection was brought together in its current form by Dr Laurence Mound, curation and updates of the collection have lately relied on visiting scientists. Through the NPBDN Laboratory Resident program Cameron was able to carefully revise around half of the aphid collection, bringing it into line with current taxonomy. The order of species placement was further arranged to suit logical taxonomic and alphabetical order. A number of identifications were carried out on partially or misidentified specimens, with the newly identified slides given updated labels and placed accordingly in the collection. Many more slides were cleaned, their labels repaired and spacers added to protect their coverslips. An updated list of the collection's holdings along with notes on changes is now in the care of Laurence Mound.

In general, the older slides from the 1930s and 40s have stood the test of time and are in better condition than many of the newer slides from the latter half of the 20th century. This might be due to the longer process used by the older entomologists, and the use of tried and tested and quality mountants such as Canada Balsam.

Cameron hopes to be able to return to ANIC in 2014 and finish the curation of the remaining half of the collection.



Cameron Brumley

Digging for Insect Fossils Down Under

Stefanie and Rolf Oberprieler

In December 2013 we undertook our second fossil dig of the year at the Talbragar Fish Bed with Chinese palaeontologists. In January we had been there with Prof. Bo Wang and Dr. Fang Yang, from the State Key Laboratory of Palaeobiology and Stratigraphy of the Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, and in December we took PhD student Chen-Yang Cai and his supervisor, Prof. Diying Huang, from the same institution there as well. Chen-Yang was a visiting student at the ANIC during November and December 2013, funded by the CAS to study Chinese beetle fossils together with Adam Ślipiński and John Lawrence and to learn about beetle classification as part of his PhD project.

The Talbragar Fish Bed, located near Gulgong in central New South Wales, is of Upper Jurassic age (151 million years old) and best known for its spectacular fish and conifer fossils, but in recent years it has also yielded a significant number and variety of insect fossils, of the orders Odonata, Plecoptera, Orthoptera, Hemiptera, Hymenoptera, Neuroptera, Coleoptera, Mecoptera and Diptera. It is one of Australia's only two Jurassic insect-bearing fossil deposits and forms an important evolutionary link between the older Lower Jurassic Mintjia fauna in Western Australia and the younger Lower Cretaceous Koonwarra fauna in Victoria. The Talbragar Fish Bed represents a southern-Gondwanan shallow freshwater environment and is one of the few fossil sites in Australia suitable for complete palaeo-environmental and -ecosystem reconstruction. Although over 400 insect fossils have been collected there to date, only seven have been formally described (as well as one spider), most in the last two years. Some of them represent the oldest records of insect families in the southern hemisphere, if not the only ones in Australia (e.g., weevils), and many are comparable to those found in the



Two new beetle discoveries. Beetles are amongst the most well-preserved specimens, often showing great structural details.



similar-aged Karatau formation in Kazakhstan and the slightly older Daohugou deposits in China.

As usual, our recent trip was coordinated by Robert Beattie, who has access to the site, and who was accompanied by a fellow teacher and fossil enthusiast from Berry, Jack Hinde. This time we had good weather (not the intense heat of January, when the bitumen melted on the roads), and with our combined muscle power and some much-appreciated prior mechanical excavation by the landowner we managed to unearth quite a number of blocks for splitting. Keen eyes then scrutinised the split pieces for any signs of tiny insects, and even though we did not discover anything really spectacular this time, we managed to find a number of well-preserved beetles and a few other insects that will be jointly studied and described in the future. Sitting hunched over piles of



Chen-Yang Cai unearthing the prized boulder of the day.



Prof. Huang, with his keen eye for tiny specimens.

rubble hammering away at rocks also allowed us to discuss prospective future collaborative research projects and reciprocal visits to our respective institutes. Like palaeontology overall, palaeo-entomology is a serious endeavour in China, and collaboration with Chinese colleagues can help significantly in the study of the Australian fossil insect fauna, for which little funding is available here. Last but not least, the trip provided an opportunity to show our Chinese visitors a bit of the land Down Under and to exchange stories about our respective cultures and societies. We look forward to further collaboration with the Nanjing Institute and hope for many more exciting insect discoveries at Talbragar.

Ainsley Seago

David Yeates



Ainsley Seago is a native of Seattle, now an Australian permanent resident. She has been a postdoctoral researcher at ANIC since 2008, when she completed her Ph.D. in beetle systematics at UC Berkeley. Her research interests include systematics and taxonomy of staphylinoid beetles, beetle phylogenetics, and the diversity and evolution of

iridescence (and other chromatic phenomena) in insects. She is also collaborating with truffle growers throughout SE Australia to determine whether Australia's native truffle beetles represent a potential threat to the perigord truffle industry.

During her first postdoctoral position, Ainsley worked with Adam Ślipiński to collect and analyse morphological data for the Beetle Tree of Life phylogenetic project. She also used a morphological/molecular dataset to infer the phylogeny of Coccinellidae, in collaboration with Adam and his student Jiahui Li, and coauthored a chapter in the Handbook of Zoology Coleoptera vol. II. Ainsley's research on beetle iridescence has produced several papers, an ANU honours thesis, and a grant to use the Australian Synchrotron to analyse the nanoscale

crystalline structures that produce iridescence in entimine weevils.

In 2011, Ainsley was awarded an ABRS Bush Blitz grant to revise and describe the truffle beetles of Australia, including the Sogdini, Scotocryptini, and Neopeltopini, a continuation of her doctoral research on the systematics of Australian leioidids. She has identified over 50 new species and five new genera of Australia leioidids, and will continue her taxonomic work on this group after the conclusion of her contract at CSIRO.

Ainsley has been active in outreach and teaching throughout her six years in ANIC. In addition to conducting ANIC tours for



Ainsley's art work on display on the backs of the mighty 'Beetle Gang'.

school groups, ANU students, and wildlife artists, she has also lectured in entomology (now "invertebrate zoology") at ANU. In 2013-2014, she supervised a summer research student in beetle taxonomy and led a workshop on scientific illustration for a class of ANU art students.

Ainsley is also a scientific illustrator and artist, specialising in entomology and herpetology. She currently lives in Lyneham with her husband, toddler, cats, chickens, and axolotls.

Book Launch and Review

Ted Edwards

Conservation of the Richmond Birdwing Butterfly in Australia.
Donald P.A. Sands and Tim R. New.

Published by Springer, Dordrecht. 209 pp. 2013. Hardback price ca AUD 216. Downloaded copy AUD 172. (Hardback Euro 149.79, Electronic Euro 118.99).

On 21 November 2013, Gary Fitt launched this eagerly awaited book detailing the community conservation effort to aid the recovery of the Richmond Birdwing Butterfly, *Ornithoptera richmondia* (Papilionidae), threatened by the burgeoning development and urbanisation of the coastal rain forests of southern Queensland and northern NSW.

The senior author, Don Sands, worked for CSIRO Entomology for many years on biological control and is currently an Honorary Fellow in ecology in CSIRO Ecosystem Sciences. Tim New has a strong background in insect conservation and is a most productive author, notably writing *Butterfly Conservation in South-Eastern Australia: Progress and Prospects* published in 2011.

Don has always had very strong ties to the ANIC and taxonomy and his PhD thesis was on the taxonomy of the tribe Luciini (Lycaenidae). On retirement he became an honorary fellow with the ANIC but has affiliations with several Flagships. Don's words of wisdom from his many years in ecology and eight successful biological control projects, were that every single project required fundamental taxonomic input for its success.

Don's birdwing project grew from two basic observations. The first was that taxonomic questions existed on whether the Richmond Birdwing should be considered a species or subspecies so an examination of the current taxonomy was needed to determine its status. Evidence accumulated that the Richmond Birdwing was distinct from the other *priamus*-group

birdwings found in northern Australia and New Guinea. Such features as size, colour pattern, male morphology, a green pupa and a diapausing pupa which over-winters all indicated species rank. Clearly in conservation one has to know just what one is conserving taxonomically. The second was that the species had disappeared and was disappearing rapidly from former habitats and had been assessed as vulnerable particularly to land clearing.

The approach Don took was to involve State government, Local government and community bodies in its conservation. As a large and spectacular insect many people were willing to grow foodplants and remove poisonous plants so as to enjoy the butterflies in their gardens. This led to the establishment of the Richmond Birdwing Recovery Network (RBRN) with Don as prime mover and ecological consultant.

The result has been a classic of successful conservation by community involvement which will serve as a guide and template for all other such projects.

The book is divided roughly into two sections, the first is about the butterfly and its relatives and this contains numerous gems of observational ecology which inform us of the problems which face successful conservation schemes. The second is about the RBRN and is effectively a guide on how to create and operate a successful community project. Aspects like field days, meetings, propagation of foodplants and producing a vital newsletter are all detailed.

With current funding trends, community-based projects may well become the only viable conservation projects. Don is currently looking at the feasibility of a community conservation project on the Australian Fritillary, *Argyreus hyperbius* (Nymphalidae), a much greater challenge. The larvae feed on violets and populations seem to pop up from nowhere and then disappear, often for many years.



from left to right, Gary Fitt and Don Sands with the book. Photo: Robyn Mills

Recent publications

JOURNAL ARTICLES

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