

The newsletter of the Society of Australian Systematic Biologists.

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Issue 6 (June 2011)

Editorial

A recent paper in Trends in Ecology and Evolution by two Brazilian scientists, Carbayo and Marques (doi: 10.1016/j.tree.2011.01.004) estimated the cost of describing the entire animal kingdom at \$263 billion USD. While at first glance this looks prohibitively expensive, spread out over several countries and several decades, it starts looking achievable. In addition, comparing this figure with other institutions, we find that it is approximately a quarter of the total annual revenue gathered by the top three petroleum companies (ExxonMobil, Royal Dutch Shell and BP), half of annual US defence budget, and two thirds of the estimated annual value of the illicit drug trade. In the Australian context, it is 20 times the 2010 profit registered by BHP Billiton, and 10 times the combined 2010 profit of the ten largest Australian companies (http://tinyurl.com/3geg4cd). This sort of money is in circulation and is being turned over by endeavours arguably less justifiable than species discovery. The scientific acheivement of documenting the world's animal fauna and the evolutionary and ecological insights it will provide, not to mention the discovery of extra food, pharmacological, biomimetic and genetic resources, makes this sum of money a worthwhile investment.

Samuel Brown

SASB General Meeting

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About the Society

The next General Meeting of the Society will be on Wednesday, 7 December 2011 during the joint SASB/Invertebrate Biodiversity and Conservation Conference (http://ibcc2011.org/) in Melbourne at the tentative time of 5 pm. General Meetings are the Society's only face-to-face membership events, and all members are welcome to attend. There will be reports from the President and the Treasurer, and elections for officers and Council. Please contact secretary Andrew Thornhill (Andrew.Thornhill@anu.edu.au) if you would like to add general business items to the agenda.

Bob Mesibov

10th Invertebrate Biodiversity & Conservation Conference 4 - 7 December 2011 Melbourne, Australia

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Adventures of an early-career systematic biologist

My PhD thesis examined aspects of the phylogeography and evolutionary history of burrowing crayfish species in Australia at a range of evolutionary scales. To fully understand current phylogeographic patterns of these freshwater species, we needed to understand not only current connections between river systems and river basins, but also to integrate information about ancient riverine connections and drainage rearrangements. The identification of these connections is particularly challenging in coastal catchments adjoining shallow seas such as Bass Strait, where ancient riverine systems existed during marine lowstands, linking a terrestrial landscape containing freshwater habitats between Victoria and Tasmania. Bass Strait is now a shallow seaway approximately 350 km wide and 500 km long with an average depth of 60 m. Based on present-day bathymetric data, lowstands large enough to link Victoria and Tasmania were likely restricted to within the last 10 million years. Developments in GIS and recent advances in seafloor mapping data allow the simulated re-construction of palaeo-coastline and corresponding drainage models, enabling testing of hypotheses of faunal contractions and migrations across present-day shallow seas. The analysis of high resolution seafloor information by Dr Daniel Ierodiaconou revealed a system of remnant, now marine-inundated palaeo-drainage systems within the continental shelf between Victoria and Tasmania. My analyses showed that these palaeo-drainage systems have likely facilitated inter-population connectivity of freshwater crayfish species with distributions that span Bass Strait (i.e., those species present in Victoria and neighbouring islands such as King Island and Tasmania) (Figure 1). Daniel, Dr Craig Sherman and I are presently furthering this research, examining the phylogeography of Geocharax gracilis trans-Bass Strait.

My research also examined the deeper intra- and intergeneric phylogeny of the Australian burrowing freshwater crayfish genera *Geocharax*, *Gramastacus*, *Tenuibranchiurus*, *Engaeus* and *Engaewa*. *Geocharax* and *Gramastacus* were found to monophyletic genera, while *Engaeus* is nonmonophyletic with *E. lyelli* most likely representing an undescribed genus. Generic level diversification among these genera coincides with the mid Miocene aridification of Australia and there is a sister relationship between *Engaewa* in southwestern Australia and the other four genera in eastern and southeastern Australia, despite populations being isolated in the present day by over 3000 km of mostly desert to the West, or by the Great Dividing Range on the East coast.

After finishing my Ph D in 2009, I had the rare opportunity to continue my field explorations outside of Australia, collecting freshwater crayfish in Enaratoli in Papua (Indonesia, the island of New Guinea). There we encountered amazing people and terrain, but also suspicious locals who have been through upheavals with OPM (Papuan Independence Movement), Christians, mining companies and the Indonesian invasion. The local people seem to be afraid of losing further control of their homeland. Despite our biological research team being registered with and accompanied by local police, paying for samples, and being accompanied by Cenderawasih University staff and a local elder, it was very difficult to collect samples and at one stage we encountered angry Papuan locals, one of whom punched our guide in the head and attempted to assault him with two machetes. After resolving this confrontation, our expedition team had to "stand trial" in the village of Tigi. That is, from the local police station balcony we addressed a waiting crowd of around 300 onlookers from the local community. We needed to tell them that we were there for conservation biology, not mining, and they



Figure 1. Engaeus sericatus and the palaeodrainages of Bass Strait (Schultz et al 2008).

requested from us that we return some of our samples to their respective localities. The negotiations were translated between English, Indonesian and local Papuan languages by local elders, and we were greeted by half the community screaming abuse and the other half smiling and seemingly supporting our actions, all the while police standing guard for us armed with AK47s and Uzi machine guns. This was a memorable event but I have to admit it was slightly sketchy in the midst of it all. I would advise foreign researchers sampling in Papua to stay in the villages and pay the locals to collect the samples.

Post-studies, I also had the lucky opportunity to work in Antarctica (my second visit), working as a field assistant to Alejandro Velasco-Castrillon, a PhD student from the University of Adelaide. We spent a lot of time in the field, dropped by helicopter in remote locations to camp out in tents, bivvy bags and field huts. Our mission was to sample nematodes, rotifers, tardigrades, cladocerans and mites from soil and lakes in ice free areas. Geological studies indicate that the sample sites have been ice-free even throughout glacial maxima, so present day, resident micro-invertebrates may represent ancient populations. Examination of their DNA sequences presents an amazing opportunity to uncover the story of their biogeography and systematic and population biology.

In my relatively short research career, I have enjoyed the field and international travel, visiting museum collections and curators, working in the laboratory, publishing in scientific journals and presenting at conferences. I have the lucky opportunity to work with Prof Chris Austin—one of Australia's greats in crayfish biology (Astacology) and evolutionary biology. My lab and field colleagues such as Dr Graham Hosie (Australian Antarctic Division), Dr Thomas von Rintelen (Berlin Museum), Dr Adam Miller (Melbourne Uni) and Dr Daniel Ierodiaconou (Deakin University) have been incredi-

ble people to work with and it has been fantastic to get the chance to live and work in remote locations such as Darwin (which is where I carried out most of my research during the lab and write up stages of my Ph D), Warrnambool, Hobart, Austria, Antarctica, Papua, Indonesia and Vietnam.

I believe that my career has so far been an exciting one and I hope that it continues to stay this way. I can highly recommend systematic biology to all those looking for an exciting career path. It is a field of research that will take you to unexpected and demanding places and will open your eyes and mind to the ways of the world!

Mark Schultz

Schultz MB, Smith SA, Richardson AMM, Horwitz P, Crandall KA, Austin CM. 2007. Cryptic diversity in *Engaeus* Erichson, *Geocharax* Clark and *Gramastacus* Riek (Decapoda: Parastacidae) revealed by mito-chondrial 16S rDNA sequences. *Invertebrate Systematics* 21: 569–587.

Schultz MB, Ierodiaconou DA, Smith SA, Horwitz P, Richardson AMM, Crandall KA, Austin CM. 2008. Sea-level changes and palaeo-ranges: reconstruction of ancient shorelines and river drainages and the phylogeography of the Australian land crayfish *Engaeus sericatus* Clark (Decapoda: Parastacidae). *Molecular Ecology* 17: 5291–5314. doi: 10.1111/j.1365-294X.2008.03996.x

Schultz MB, Smith SA, Horwitz P, Richardson AMM, Crandall KA, Austin CM. 2009. Evolution underground: a molecular phylogenetic investigation of Australian burrowing freshwater crayfish (Decapoda: Parastacidae) with particular focus on *Engaeus* Erichson. *Molecular Phylogenetics and Evolution* 50: 580– 598.

10th Invertebrate Biodiversity and Conservation Conference

St Mary's College, Melbourne, 4-7 December 2011

The 10th Invertebrate Biodiversity and Conservation Conference will be a joint meeting with the Society of Australian Systematic Biologists (SASB) and will be held at St Mary's College, the University of Melbourne, from 4 to 7 December 2011, with an associated workshop planned on Thursday 8 December. St Mary's College is ideally located on the northern part of the campus of the University of Melbourne and very close to the restaurants of Lygon Street, Carlton. The Carlton Gardens campus of Museum Victoria and the Victoria Market are within a 15 minute walk as is the Melbourne CBD.

The following symposia are scheduled, but individual presentations on other topics are welcomed. Abstract for all presentations are due 30 September 2011.

- Tropical invertebrate diversity—From rainforest to reef
- Species in principle and in practice —Morphological and genetic approaches to defining species boundaries
- Assessing and countering threats to invertebrates
- Biodiversity and biosecurity—Can one work without the other?



The program will take place over the following dates:

- Sunday 4 Dec 2011-Registration and icebreaker
- Monday 5 Dec 2011–Tuesday 6 Dec 2011—Conference presentations
- Tuesday 6 Dec 2011-Conference dinner
- Wednesday 7 Dec 2011-Final day of conference presentations

On Thursday 8 Dec 2011 a separate workshop "Invertebrate conservation" is being held which will involve interested conference registrants but will also involve other participants such as representatives of state and federal conservation agencies. For further details check out the conference website (http://ibcc2011.org/).

Samuel Brown

Bootstrap Camp at Mt Kaputar

Since 2007, Lyn Cook's Lab from The University of Queensland (UQ) and Mike Crisp's Lab from The Australian National University (ANU) have met annually somewhere in between the two universities to have a lab "retreat". The first time the groups met, one of the members christened the retreat "bootstrap camp" in reference to a measure of support used in phylogenetic analyses, and the name stuck. In 2010, five days of bootstrap camp were spent in Mt Kaputar National Park, and a 6th day was spent in the Pilliga Scrub.

Pink slugs in the forests

The plateaus of Mt Kaputar National Park, near Narrabri in NSW, were apparently formed 17–21 million years ago. The park contains several different habitats that are home to hundreds of species.

Within Mt Kaputar National Park, the unique pink slug *Triboniophorus graeffei* (an unusual form of the red-triangle slug) can be found in the subalpine eucalypt forests. Bort Edwards found the first pink slug of the trip. It is thought that the colour of the slugs acts as camouflage, because it is a similar shade to fallen eucalypt leaves. The slugs crawl up the eucalypt trees at night to feed, and can be found crawling back down the trunks in the morning (particularly if it's been wet or foggy).

Research talks

Each member of the two lab groups presented a talk to everyone about their current research—this year's topics included pollen, wasps, butcherbirds, coconuts, broad-leaved paper-barks, cycads, waratahs, eucalypts, and scale insects.

Cooking with the 'roos

We slept in National Park cabins near the summit of Mt Kaputar and everyone took turns cooking for the entire group with two or three "cooks" each night. We had won-



Renowned pink slugs in Mt Kaputar National Park. The photo on the right shows a slug next to a dead eucalypt leaf. Photos: Andy Wang



Some members of the Cook and Crisp labs on top of Mt. Lindesay in Mt Kaputar National Park, November 2010. Left to right: Andy Wang (UQ), Bort Edwards (UQ), Anna Kearns (UQ), Gunter Maywald (UQ), Andrew Thornhill (ANU), James Ingham (UQ), Penny Mills (UQ), Mike Crisp (ANU), Melita Milner (ANU), Lindsay Popple (ANU), Paul Lin (UQ) and Bee Gunn (ANU). Photo: Lyn Cook.

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http://www.sasb.org.au pg 6 derful food, such as a Mexican night with tacos and tortillas. Kangaroos were the usual visitors while we were cooking. They were quite interested in our kitchen activities and seemed particularly fond of the old discarded charcoal from the BBQ.

Every dinner came with entrée, main course and dessert. Port, wine and chocolate were the preferred choices during the usual post-dinner chat.

Exploring Mt Kaputar and beyond

Four bushwalks were completed in the park. The main goal of the bushwalks was to observe the biodiversity and geology of Mt Kaputar National Park—particularly eucalypt beetles (paropsines), gall-inducing scale insects, sawflies, birds, eucalypts and cycads.

A day trip was also organized to the Pilliga Scrub, several hours south of Mt Kaputar. We had several stops along the tracks, so everyone could get out and explore. The Pilliga Scrub is a lot drier than the rainforest and wet sclerophyll forests of Mt Kaputar National Park, and consequently has different species of cycads, eucalypts and insects.

Scenery and weather

The scenery at Mt Kaputar National Park was gorgeous. We took photos and enjoyed stopping for lunch on top of some of the peaks. Unfortunately, sometimes these beau-tiful walks were interrupted by one or two downfalls of rain.

The Mt Kaputar and Pilliga Scrub bootstrap camp was an exciting experience, filled with amazing sites, beautiful scenery and a huge diversity of life. Now it's time to plan for the next camp!

Andy Wang

Penny Mills

School of Biological Sciences, The University of Queensland, Brisbane

8th Systematics Association Biennial Conference

Queen's University, Belfast, 4-8 July 2011

Registration is open for the 8th biennial conference of the Systematics Association, held for the first time in Northern Ireland! There is an exciting programme that includes both plenaries and thematic symposia, as well as a large number of contributed sessions. Currently scheduled symposia include:

- Next Generation systematics—Studying evolution and diversity in an era of ubiquitous genomics
- Arthropod systematics: are morphology, palaeontology and molecules coming together?
- Algal systematics: Where next?
- Advances in using museum specimens and ancient DNA in systematics research



View toward Sawn Rock in Mt Kaputar National Park. Photo: Andy Wang.



Adult sawfly on flower in Mt Kaputar National Park. Photo: Andy Wang.

Banksia: The newsletter of the SASB Issue 6 (June 2011) http://www.sasb.org.au pg 8 Symposia will include a mixture of talks from invited speakers and other contributions. The conference also presents excellent opportunities for contributed papers on any aspect of systematics and is a great forum for students and young researchers to present their work. For further details, including information on accomodation and travel, please see the conference website (http://www.systass.org/biennial2011/).

The organisers gratefully acknowledge the support of the British Phycological Society, Cambridge University Press, Genetics Society, The Linnean Society of London, and Queen's University Belfast.

> Juliet Brodie, President James Cotton, Programme Officer Peter Olson, Treasurer Christine Maggs, Local Organiser

Implications to go by the bored

(Sydney Daily Telegraph, 31 November 2011)

by science reporter Chloe Hammer

In what is believed to be a world first, a Sydney biodiversity conference has banned the phrase 'implications for conservation' from conference posters and presentations.

Organisers of the Ecosystematics and Conservation Conference say the ban is long overdue.

'It's time for people to put up or shut up,' according to co-organiser Prof Dan Gimlet of the University of Melbourne.

'If they have results that mean conservation practice should be changed,' said Gimlet, 'then they have an obligation to say what the changes ought to be.'

Co-organiser Dr Shirley Drillbit of the Australian National University agrees. 'I must have heard a hundred of these "implications" talks over the years,' she said. 'Who do the speakers think is going to leap into action when their talk is finished? And do what?'

Not everyone is pleased with the new conference policy. Associate Prof Nigel Awl of Griffith University says the ban is offensive.

'I've got three students besides myself on the conference program, and we all conclude our talks with, "These results have important implications for conservation," 'said Awl.

'Without that, where's our punchline? Besides, "implications for conservation" is in all our grant applications. It's half the reason we get money. Nobody funds biodiversity studies per se. They've got to be biodiversity qua conservation.'

'Qua pfui', responded Gimlet. 'The big lesson from biodiversity work is that there's life out there we didn't know about. Want to conserve it? Fine, then tell the land or water manager or owner what to do. If you don't know, nobody else does, and "implications" is meaningless.'

Awl complains that the conference organisers are demanding too much.

'I'm not a conservation biologist,' he said. 'How do I know what the implications are? I just know that they exist. It stands to reason that the more we learn, the more we should use what we learn in conservation. Maybe I could come up with something if I had additional funding, specifically for conservation.'

Drillbit said the case for such funding would have to be carefully phrased if it was made at the conference.

"We're also thinking of putting restrictions on "Further study is needed," ' she said. 'Recently we looked at 50-odd ANU biology theses. More than 95% began with "Very little is known" and ended with "Further study is needed." Not even Mills and Boon writers stick so closely to a formula. I think people can do better.'

Bob Mesibov

2nd National Postgraduate Training Workshop in Systematics

The University of Adelaide, 25–30 September 2011

This workshop will include advanced level training in phylogenetic methods, imaging techniques, barcoding, systematics theory, nomenclature and the taxonomic process, collection management, databases, publishing results, finding a job, and much more.

The workshop is designed for PhD students in the first and second years of their project, but applications will be accepted from anyone who has had less than three years of candidature. It is specifically designed for students undertaking projects that have a biological systematics component or are broadly relevant to systematics. Funding is available to assist students attend the workshop, but there is a maximum of 30 places available only to students enrolled in Australian and New Zealand Universities.

The deadline for expressions of interest is 6 June 2011. Please email expressions of interest to: michelle.guzik@adelaide.edu.au: Include your name, institution and School/Department, project title and brief 100 word description, years/months of candidature, name of primary supervisor and their email address.

The workshop is sponsored by Australian Biological Resources Study, the Australian Centre for Evolutionary Biology & Biodiversity (The University of Adelaide) and the Taxonomy Research & Information Network

Andy Austin

The Reach of Banksia

Each of the 'Fringe Taxonomy' articles in the last two issues of Banksia got a response from a person featured. Dr Hüseyin Özdikmen emailed from Turkey, and Trevor Hawkeswood phoned me at home. The former seemed content with my presentation. The latter was not happy with what I had written.

Spider guru Norman Platnick is also unhappy. His supplement to

Jiménez, M.L., Platnick, N.I. and Dupérré, N. 2011. The haplogyne spider genus *Nopsides* (Araneae, Caponiidae), with notes on *Amrishoonops. American Museum Novitates* 3708 :1-18. (doi: 10.1206/3708.2)

begins:

'In what may be the most preposterous "paper" ever produced in spider taxonomy, Dewanand Makhan and Somayeh Ezzatpanah recently attempted to establish "A new spider family, Hawkeswoodidae fam. nov. and *Amrishoonops amrishi* gen. et sp. nov. (Araneae) from Suriname."

Bob Mesibov

Fourth International Barcode of Life Conference

University of Adelaide, 28 November-3 December 2011

The 4th International Barcode of Life Conference will be held at the University of Adelaide, in Adelaide, Australia, from 28 November to 3 December 2011, in partnership with the Consortium of the Barcode of Life. The main scientific sections will be held on 30 November–3 December, with 28–29 November set aside for pre-conference workshops.

The International Barcode of Life Conferences is an important science and policy event that takes place every two years. The conference allows participants and sponsoring organizations to promote partnerships which enable the international scientific and policy community to better understand, quantify and manage their biodiversity with DNA Barcodes.

The 2011 Adelaide Conference will be the first international barcode conference held in the Southern Hemisphere. It will address a range of Barcoding applications and developments, including: illegal wildlife and timber trade; pest and disease diagnostics; forensics; quarantine identifications; environmental monitoring and assessment; animal, plant and microbial systematics; and Beyond Barcoding.

The deadline for the submission of abstracts has been extended to 15 June 2011. Please see the conference website (http://www.dnabarcodes2011.org) for more details.

Andy Austin

Creating line drawings in Inkscape

In the second issue of Banksia, I wrote a review of the free vector-graphics program Inkscape (http://www.inkscape.org). The following is a short tutorial showing the process I use to create publication-quality graphics using the program.

1. **Import picture:** Take or create a picture of the structure you want to illustrate. This can come from a digital photograph or a scanned copy of a hand line drawing from a drawing tube. It is possible to draw directly into Inkscape by mouse or drawing tablet, however I have neither the skills for the first, or the equipment for the second. Import your picture by File > Import (**Ctrl + I**) (Figure 1).

- 2. **Trace outline:** Roughly trace the outline of the structures of interest using the pencil tool $\frac{20}{2}$ (P) (Figure 2).
- 3. Simplify outline: The rough outline created above can be simplified and smoothed by Path > Simplify (Ctrl + L). Simplify as many times as needed.
- 4. Manipulate outline: The now smoothed outline can be manipulated using the nodes tool (F2). Move the nodes and handles to exactly match the outline (Figure 3).
- 5. Fill and stack objects: Create the final picture by filling each object with appropriate colour and changing line width and style Object > Fill and Stroke (Ctrl + Shift + F). Move objects up and down using Object > Raise (PgUp) and Object > Lower (PgDn) (Figure 4).

Why do it? Especially as the first step involves having a picture to begin with? Photos frequently show excessive detail, important structures can be obscured, and depth of field can be a problem too. Line drawings simplify the detail to show what is especially important. They can also easily account for obstruction and orientation. Hard-copy, inked drawings can be scanned into bitmap format, thereby gaining the benefits of portability and the ease of subsequent manipulation that computer graphics provide. However, bitmap images suffer from scalability issues (Figure 5). Vector graphics encode picture data as coordinates and paths, and can be scaled indefinitely without loss, or looking pixelated.

Inkscape saves pictures in the scalable vector graphics (SVG) format, which is based on XML. As more internet browsers develop SVG support it will become straightforward to post these graphics on webpages. It is also simple to convert SVG to PDF or EPS format, both of which are common formats for publication.

Samuel Brown

About the Society

SASB Officers:

Bob Mesibov (President) mesibov@southcom.com.au Penny Mills (Vice-President) Andrew Thornhill (Secretary) andrew.thornhill@anu.edu.au Samuel Brown (Newsletter Editor) sam.brown@lincoln.ac.nz Steve Cooper (Treasurer) Lyn Cook Michael Braby Mike Crisp

The Society:

The Society of Australian Systematic Biologists is open to all people who utilise the science of biological systematics as a basis for the study and understanding of nature. The Society is a non-profit inter-disciplinary organisation whose purposes are to promote the scientific study of biological systematics and to disseminate scientific and educational information related to its fields of interests.

Membership:

Membership is free. Details are available on the society website (http://www.sasb.org.au/contacts.html) and from the secretary.



Figure 1. Screenshot of Inkscape showing imported picture—an antenna of *Carpophilus robustus*. Photo: Samuel Brown



Figure 2. Roughly traced anntenomeres.



Figure 3. Manipulating smoothed outlines using the 'Nodes' tool.



Figure 4. Changing the colour and width of the outlines.

Figure 5. Finished drawing of antenna, showing the difference between vector graphics format (left), and the same image exported in bitmap format (right). To really see the difference, view at increased magnification.

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