The newsletter of the Society of Australian Systematic Biologists

Banksia

Banksia ericifolia (Photo: Mike Crisp)

Contents

Eucalyptus youngiana, WA (Photo: Lyn Cook)

In this issue

Next SASB conference

Esplanade Hotel, Fremantle, WA

6 - 9 December 2015

Time to start planning a field trip and organising those collecting permits. This year, the SASB conference is being held in Western Australia - a great opportunity to take a week or more off and sample some products (natural and human-made) of WA.

The conference will begin with a welcome reception on Sunday 6 December, with sessions from 7-9 December.

Shortly, the conference website will be up and running, and conference organiser, Mark Harvey (Western Australia Museum), will be calling upon members for suggestions for Symposia.

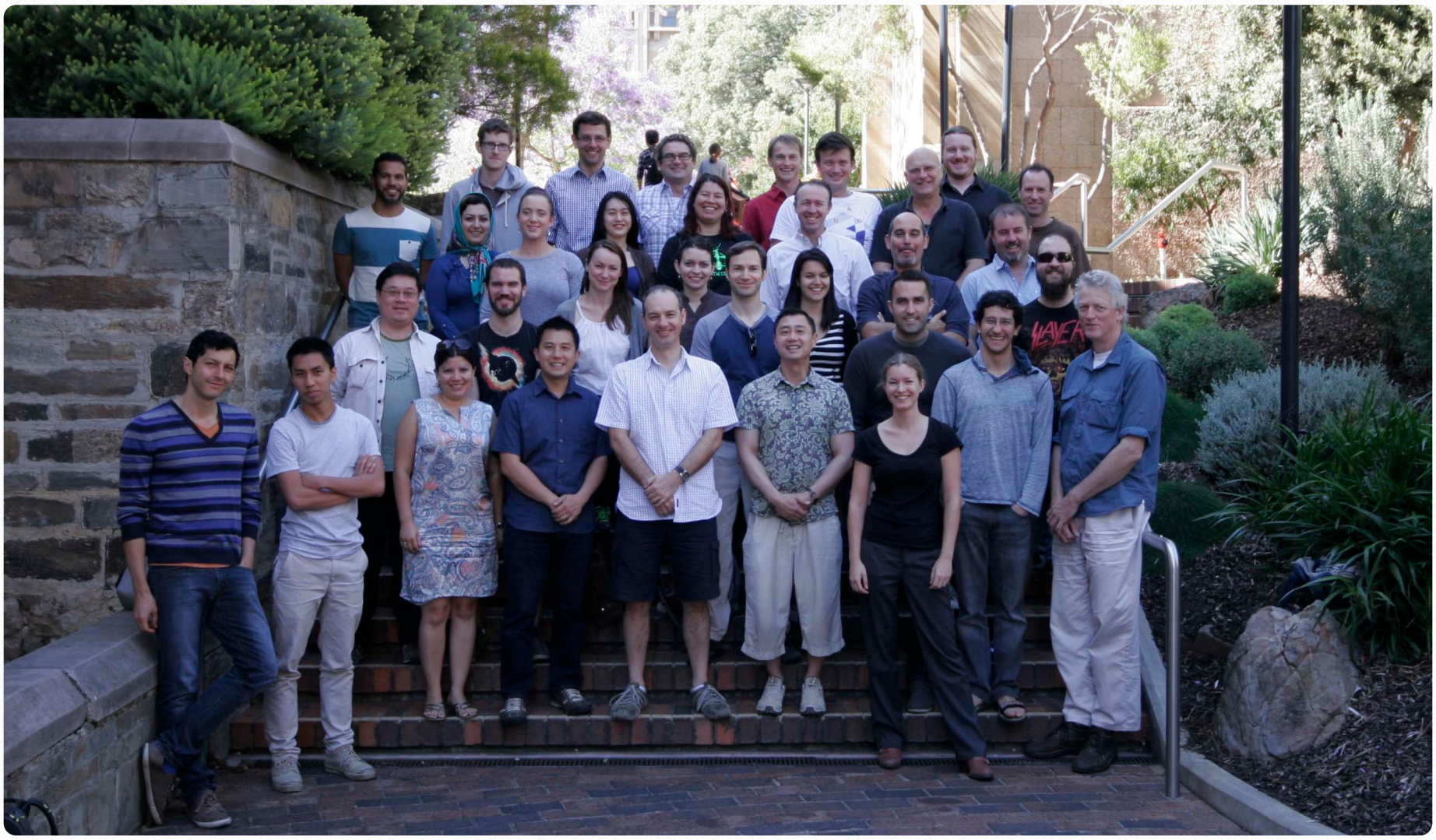
In the interim, if you need further information, please contact Mark at mark.harvey@museum.wa.gov.au

Fitzgerald River National Park, WA (Photo: Lyn Cook)

Report on “Workshop on Advanced Bayesian Phylogenetics”

17-21 November 2014, The University of Adelaide

by Simon Tierney



The Australian Centre for Evolutionary Biology and Biodiversity (The University of Adelaide) recently convened a workshop on the use of novel methods in phylogenetic analyses which incorporate graphical model concepts and operate in an R-like platform, using the software program RevBayes. This constitutes the next-generation of MrBayes, arguably the most widely applied Bayesian inference tool for phylogenetic reconstruction. The advantage of RevBayes is the ability to completely deconstruct phylogenetic models into their component parts and the subsequent flexibility that this delivers to the user.

RevBayes resources:
https://github.com/revbayes/revbayes/wiki
Höhna et al. (2014) Probabilistic graphical model representation in phylogenetics. Systematic Biology 63: 753-771. doi: 10.1093/sysbio/syu039

Our workshop was led by Fredrik Ronquist, a founding developer of both the aforementioned programs and currently the Head of Bioinformatics and Genetics at the Swedish Museum of Natural History Museum (Stockholm). RevBayes is still in its infancy and the Adelaide workshop represented only the second workshop in the world to exhibit this software since it’s public release in 2014. Changes to the source code four days prior to the beginning of the Adelaide event presented somewhat challenging circumstances for the workshop team. Particular kudos need to be directed to Seraina Klopfstein (The University of Adelaide), who danced happily in the minefield and was largely responsible for the coordination of what might have outwardly appeared as a velvety-smooth running operation.

The workshop combined morning lectures with afternoon practicals to canvas the following topics (presenters in parentheses):

- Bayesian philosophy & graphical modelling (Ronquist, Klopfstein, Leijs)
- Markov Chain Monte Carlo simulation & phylogenetic trees (Tierney, Lee, Sanders)
- Substitutional models & their tests (Klopfstein, Ronquist)
- Clock analyses & tree calibration (Ho, Klopfstein, Ronquist)

Both Fredrik and Simon Ho (The University of Sydney) presented additional public lectures on aspects of their research programs, concerning 'Canary Island Biogeography' and 'Molecular Clocks in the Genomic Era' respectively. Workshop attendees consisted of a motley bunch of intelligentsia deriving from institutions in QLD, NSW, ACT, TAS, SA and Washington DC. A fine and educational time was seemingly had by all.

The Organising Committee would like to take this opportunity to thank all the organisers, presenters and volunteers for their contributions to this event, in no particular order: Andy Austin, Steve Cooper, Michelle Guzik, Sophie Harrison, Simon Ho, Josie Hyde, Mike Lee, Remko Leijs, Fredrik Ronquist, Kate Sanders, Danielle Stringer, Simon Tierney & Gwen van der Schyff.

Unknown Artist © UK National Portrait Gallery NPG D29685

Latitudes and longitudes: Part 2

Getting your locations right

by Bob Mesibov

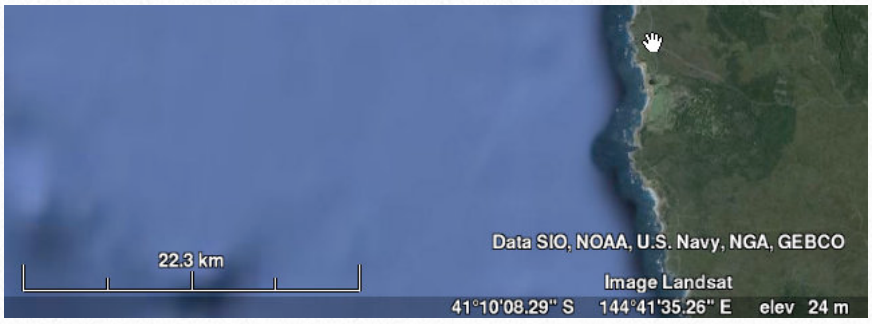
road sign, Karijini National Park, WA (photo credit: Lyn Cook)

In Part 1 of this article I discussed lat/long (latitude/longitude) formats, the relationship between lat/long and distance, and GPS error and how to deal with it when reporting lat/long. Here I cover Google Earth, datums, locations in words, and GPS elevations.

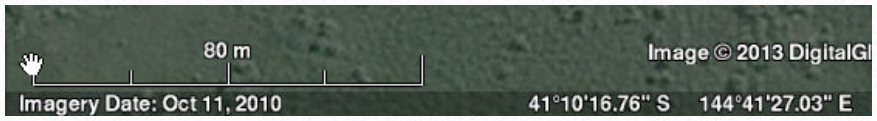
Google Earth

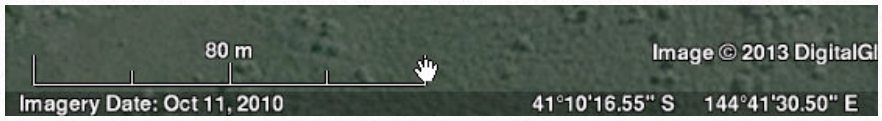
Google Earth is a wonderful Web service that can sometimes be used instead of a GPS for locating sampling sites. However, just like your handheld GPS, Google Earth tells fibs.

If you set your units to decimal seconds in Google Earth, the status bar at the bottom of the screen reads out the lat/long under the cursor to the nearest 0.01 second, as shown below. That's about ±15 cm. Really? ±15 cm?



What's more, the status bar lat/long is nicely tied to the distance scale provided in Google Earth. Note the lat/long at the two ends of the 80 m scale in the two images below (under the hand-shaped cursors). You can calculate the distance between the scale ends from the longitudes (see part 1 of this article), and I make it 81 m. Pretty good!





But ±15 cm? The cursor-operated lat/long in the status bar stops working at a certain zoom level (generally above 250 eye altitude), by which time the satellite image has blurred horribly, making it impossible for you to place the cursor correctly over your site. Before the status bar stops working, your placement of the

cursor on a Google Earth image will vary by metres, not centimetres.

In other words, the 41°10'16.55"S 144°41'30.50"E in the third image is way too exact for the process of reading locations from Google Earth, and you should round off a status bar lat/long, say to 41°10'16.6"S 144°41'30.5"E (which still implies a suspiciously low uncertainty of ca ±1.5 m).

Next question: can you test how good the match is between a location on a Google Earth satellite image and the corresponding true location on the surface of the Earth? That uncertainty depends on how accurately Google Earth has placed the satellite image on its mathematical model of the globe, a procedure known as georegistration. The accuracy of georegistration can vary from satellite image to satellite image and from date to date in an image series, and there isn't a way to check that from your desk – you need to do it in the field.

One method is to compare the Google Earth lat/long with the known location of an official government survey mark. I did this in 2012 in my home town, and found that the Google Earth position was 2-3 m from the survey mark's actual location on that particular satellite image. Not bad, but not quite in agreement with ±1.5 m, and definitely not with ±15 cm.

You're unlikely to have an official survey mark in the neighbourhood of your biological sampling sites, so you might try getting a GPS reading at a point near your sites (an isolated rock, for example, or a track junction) which is clearly visible on the satellite image. Unless the difference between the GPS and Google Earth lat/long is much more than the error in your GPS reading (see part 1 of this article), you can be reasonably confident that Google Earth can be used to estimate your site lat/long in the vicinity. If the difference is 20 m and you trust your GPS to 10 m, don't use Google Earth to locate your sites!

In summary, round off those absurdly exact Google Earth lat/long figures and explain how you got them, e.g. 41°10'16.6"S 144°41'30.5"E (from Google Earth) if you're brave, or 41°10'17"S 144°41'30"E (from Google Earth) if you're cautious. Following on from the discussion of spatial uncertainty in Part 1, I personally would prefer 41°10'17"S 144°41'30"E ±25 m (from Google Earth), or 41°10'17"S 144°41'30"E (from Google Earth; coordinateUncertaintyInMeters = 25 m).

Datums

The lat/long coordinate system is anchored to the real Earth in a very complicated way. The anchoring is based on an array of fixed points with known locations, plus a mathematical model of the Earth's shape.

There are dozens of such coordinate systems, or datums. The one used by Google Earth and by default in most scientific publications is called 'WGS84'. It's the datum you should use for everyday work with your GPS unit although, if you need to, you can convert readings from one datum to another by changing the unit's settings. For purposes other than very accurate surveying, WGS84 is the same as 'GDA94' or 'GDA', which is the datum used on up-to-date Australian maps.

The differences between datums can be substantial. When Australia moved in the 1990s and 2000s from the 1966 datum to the 1994 one, the whole lat/long system shifted ca 200 m! In the old days, when samplers reported locations to the nearest minute (e.g. 41°10'S 144°41'E), or ca ±1.8 km, it wasn't important to pay attention to datum. Nowadays, if you're reporting locations like 41°10'16.6"S 144°41'30.5"E, the datum should be part of your documentation. A simple statement in your 'materials and methods' or metadata will do, such as “All locations reported below are based on the WGS84 datum”.


Diprotodon rock, Cape Le Grand National Park, WA (photo credit: Lyn Cook)

Locations in words

It's also a good idea to put your location into words. You can't usually specify a location as accurately with words as with numbers, but a verbal location is a useful check on your lat/long. Some good advice on what words to use is in the excellent free manual on georeferencing by Chapman and Wieczorek (2006, p. 7; see Further reading, below):

"*Provide a descriptive locality, even if you have geographic coordinates. The locality should be as specific, succinct, unambiguous, complete, and as accurate as possible, leaving no room for uncertainty in interpretation... Localities used as reference points should be stable – i.e., places (towns, trig points, etc.) that will remain for a long time after the collection events. Do NOT use temporary locations or waypoints as the key reference location. You may have made an accurate GPS recording for the temporary location and then referenced future collections from that point (e.g., 200 m SE of the Land Rover), and that may make perfect sense for that series of collections. It is meaningless, however, when those collections are later broken up and placed in a museum under a taxonomic arrangement, and no longer have a link to where the 'Landrover' was... If recording locations along a path (road, river, etc.) it is important to also record whether the distances were measured along the path ('by road') or as a direct line from the origin ('by air')... The most specific localities are those described by a) a distance and heading along a path from a nearby and well-defined intersection, or b) two cardinal offset distances from a single persistent nearby feature of small extent... [Example of the latter:] 'ice field below Cerro El Plomo, 0.5 km S and 0.2 km W of summit, Region Metropolitana, Chile'.*"

Here's an example from Victoria:

- "Mt Disappointment State Forest" is good,
- "Mt Disappointment State Forest, ca 14 km E of Wallan" is better, and
- "ca 100 m NW on Baynes Track from Morrisons Creek Road junction, Mt Disappointment State Forest, ca 14 km E of Wallan" is excellent.

For more examples and discussion, see the 'Locations in words' page on my Tasmanian spatial data website, http://www.geol.utas.edu.au/censis/locations/spawords.html

GPS elevations

As a journal editor and reviewer, I often see papers with sampling locality elevations given to the nearest metre, as in '761 m', without explanation. I can be reasonably certain that '761 m' figure came from a GPS, and that the author has a touching but misplaced faith in the capabilities of GPS units.

To begin with, the error for vertical locations with handheld GPS units is even larger than that for horizontal locations (see Part 1 of this article). A rough rule of thumb is that vertical error is at least 1.5 times the horizontal error, so if your GPS location is only good ±10 m, your GPS elevation is only good ±15 m.

But a more important reason not to report GPS elevations is that they aren't necessarily elevations above sea level. They can be elevations above a model of the Earth's surface (a reference ellipsoid) used by the GPS system. The difference between GPS elevation and elevation a.s.l. can be 80-100 m.

There are three alternative ways to record elevations above sea level. In decreasing order of cost, these are:

- a good-quality barometric sensor in a wristwatch or mobile device (but you need to learn its limitations)
- a large-scale paper map printed with contour lines (typically offering 5-10 m accuracy at 1:25000 scale)
- Google Earth elevations (in my experience, these are within 10 m of 1:25000 scale map elevations except on very steep terrain)

Q. What's suspicious about this lat/long and elevation (from a recent journal submission)?

"N 00°19', E 038°02', 1071 m"

A. The implied uncertainty in the lat/long means that the location specified is >300 ha. Is it likely that the elevation over such a large area varies by less than 1 metre? "1071 m" looks like a GPS elevation, so why isn't the lat/long given to the nearest second or, better, from the GPS reading?

Summing up

Downstream users of your lat/long data may not care how you got those figures, just like downstream users of barcodes may not care how you extracted and sequenced your specimen's DNA. As data provider, though, you have a responsibility to your users to explain how you got your numbers, and how believable they are. When reporting lat/long data, please

- give a suitably exact location in words as well
- explain how you got the lat/long (GPS, Google Earth etc)
- give the datum used (best is WGS84), and
- estimate the spatial uncertainty of the location.

Further reading

Wikipedia has an excellent article on datums:
http://en.wikipedia.org/wiki/Datum_%28geodesy%29

Chapman, A.D. and Wieczorek, J. (eds) 2006. Guide to best practices for georeferencing. Global Biodiversity Information Facility, Copenhagen, 80 pp. [Available online at http://www.gbif.org/orc/?doc_id=1288]

Mesibov, R. 2012. Known unknowns, Google Earth, plate tectonics and Mt Bellenden Ker: some thoughts on locality data. ZooKeys 247: 61-67. [Available online at http://www.pensoft.net/journals/zookeys/article/4195/]

Broken Head

by Alicia Toon (UQ) and Andrew Bentley (GU)

Attendees at Broken Head 2014

The annual Population Genetics and Systematics meeting of southern Queensland, aka "Broken Head", was held at UQ's Moreton Bay Research Station (MBRS), North Stradbroke Island, on the 20th to 21st of July 2014. This annual meeting grew out of a weekend lab retreat at Broken Head in northern NSW in 1992, hence the name, although in some years the name seems rather fitting by day two (after the social night).

By the mid 1990's, Broken Head was attended by many lab groups from southern Queensland and northern NSW. After a short hiatus in the naughties, it was revived as an annual event in 2011. Over the years it has been a great meeting place for students just starting out as well as experienced academics.

The latest meeting was funded by the Australian Water Environment Research Alliance (AWERA) and was attended by lab groups from Griffith University (Jane Hughes lab and Nancy Fitzsimmons), and several labs from The University of Queensland (Lyn Cook, Cynthia Riginos, Jennifer Ovenden, Jenny Seddon) as well as representatives from the Queensland Alliance for Agriculture and Food Innovation (QAAFI) (photo above).

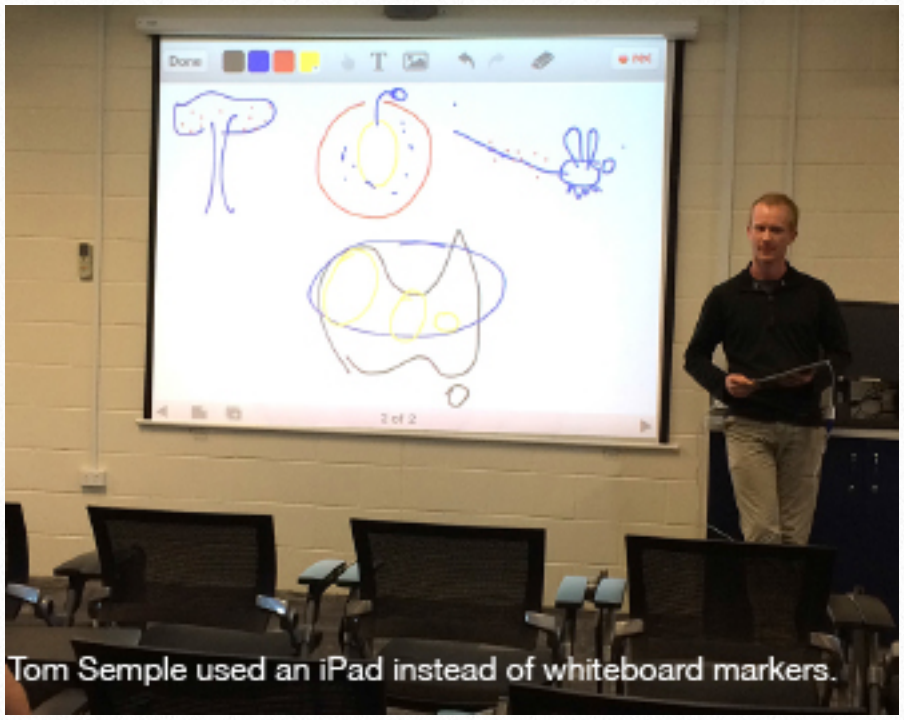
The informal structure of the talks gave the students (and staff) a great opportunity to present and discuss their current or future research projects. These projects varied across a range of topics and disciplines on freshwater, marine and terrestrial organisms, including student talks on molecular phylogenetics of rosellas, phylogeography of crayfish and species delimitation of scale insects. There were also presentations on population genetics using next generation sequencing, discussion about the difficulties and limitations of dating methods, and a call for a unified approach for data submission.

With PowerPoint slides kept to a minimum (one!), participants could re-enact the life of a teacher in the olden days, with talks relying heavily on whiteboard drawings and frantic hand gestures. While this brought the internal artist out in some, it was disastrous for others, with Andrew Mather (UQ) talking about hybrid rainbow fish receiving the "Worst map of Australia" Award. The best student talk went to John Little (Griffith University) who is working on groundwater fauna, the award for "Attention to detail" went to Penny Mills (UQ) for her talk about disjunct sister species of *Apiomorpha*, and "Best use of technology" went to Tom Semple (UQ) presenting his Honours research on systematics of the gall-inducing scale insect genus *Cystococcus* using an iPad instead of whiteboard markers.


Andrew Mather and his award-winning "worst map of Australia"

After a full day of talks, festivities continued with dinner at the local Little Ship Club followed by a dragon-themed trivia night hosted by Sofie Bernays and Jeremy Wilson back at the MBRS. With groups of about five, trivia tested many facets of knowledge and talent, from the quintessential Science, Sport and Geography, to deciphering toddler renditions of classic greatest hits and questions on Draconology. After talks on day two, several students headed over to Point Lookout to catch a glimpse of humpback whales on their annual journey up the coast in search of warmer waters.


Jenny Seddon hands John Little his prize for best student talk


Tom Semple used an iPad instead of whiteboard markers.

Please contact Alicia (a.toon@uq.edu.au) if you're interested in attending future meetings.

BowerBird – An Australian citizen science website

Dr Ken Walker
Senior Curator of Entomology
Museum Victoria

Fig. 6. First ever images of a live giant female cossid moth *Catoxaphylla cynauges*.

Citizen science, where vast amounts of locational and species data are contributed freely by nature enthusiasts, is now the prime form of acquired observational science.

Citizen science is part of mainstream science in both the North America and Europe. The longest continuously running citizen science project is the American Audubon society annual two-week bird census that began in 1900. The data collected over the past 115 years provides researchers with a wealth of information on the long-term bird populations across North America. In Europe, citizen science is part of the EU culture. A recent paper discussed the topic of "Towards a society of empowered citizens and enhanced research".

Australia has but dipped its proverbial toe into these waters. Australia's only citizen science society, Citizen Science Network Australia (CSNA), held its first and only meeting, a workshop, at the Queensland Museum in early 2014 attended by 85 people. The CSNA is an active group and shows much potential to raise the awareness and potential of citizen science in Australia.

There are three significant international citizen science websites: Project Noah and iNaturalist based in North America and iSpot from the Natural History Museum of London. Australians seem to have favoured Project Noah where many Australian records have been posted. Unfortunately, Project Noah has so far refused to on-share its data with any of the international scientific biodiversity websites (eg. GBIF or EOL).

Citizen science also appears on mega social media websites such as Flickr and YouTube. Between these two websites, they hold over 4 billion images/videos, many of which are wonderful documentations of animal and plant images and behaviours. These websites attract favourable comments on the aesthetic quality of the images/videos and award them "medals of excellence" but rarely do you see an identification or any associated spatial and temporal data. Sadly, these websites offer little value to our scientific knowledge.

The Atlas of Living Australia (ALA) is a bold and visionary biodiversity project. Its initial primary task was to enable Australian biodiversity to be aggregated and made freely available to an online audience and large amounts of data came from Australian Museums and Herbaria. Fortunately, the "glue" to bind these disparate datasets together had been the subject of much discussion and resolution through the TWDG ("Taxonomic Databases Working Group" later renamed "Biodiversity Information Standards"). TWDG's gift to science was the acceptance of Darwin Core data standards. Darwin Core standards ensures data is gathered and recorded in a way that is interoperable – that is, to be shared with any natural history dataset. While the Darwin Core standard consists of hundreds of defined biological data strings, the minimum

Darwin core dataset consist of three pieces of data: Scientific name (anywhere from Kingdom to species) in conjunction with the name's associated spatial and temporal data. This minimum dataset allow us to plot a dot onto a species distribution map across a temporal scale. The more dots on a map, the better estimation of a taxon's known distributional range; the more dates show its temporal shifts across months or decades or even centuries. When it comes to species distributional data – more is better.

Donald Hobern, the original ALA director, recognized the need to engage with and to encourage the Australian citizen science community to contribute data to ALA through an Australian citizen science website rather than losing such data sources to the northern hemisphere citizen science websites mentioned above.

Citizen science

Citizen science project types fall mainly into two categories: Directed, the type most favoured by scientists; and, Serendipitous, the type which provides freedom and autonomy to citizen scientists. The Directed project type is where a scientist or an institution decides to conduct a research project, plans what data needs to be obtained and then seeks citizen science assistance to gather the required data. There are many excellent examples: The Great Koala Count, Dolphin and Prawn Watch to name but a few. The other form of the Directed project type is the now commonly known BioBlitz, where faunal and/or floral area surveys are undertaken within a specified area during a fixed time period. Examples of such are those sponsored by Bush Blitz or "Atlas of Life in the Coastal Wilderness" and their upcoming Mimosa Rocks BioBlitz. The nature of Directed Citizen Science projects ensures that specific datasets over a nominated time period are gathered in a particular data format. They also provide an immediate use for the acquired data.

Serendipitous data is collected by citizen scientists on anything that takes their interest and anywhere they are at the time – no nominated taxon, no fixed locations and no time restraints. Unfortunately, few scientists choose to engage with this data format - the taxa maybe outside of their area of expertise/interest or the method of data collection does not fit within a project's parameters. Often, the citizen scientist wants to communicate with a scientist to ask questions about what they photographed or to discuss a particular behaviour they witnessed. Few Directed project types include a social communication component.

Serendipitous data is perfect for the data needs of ALA. Thus, Donald financially backed the two year development phase to build an Australian, socially interactive, citizen science website we called BowerBird (www.bowerbird.org.au).

Bowerbird

BowerBird revolves around People and Projects. The BowerBird website creates an environment that allows like-minded people to gather and to share a common interest. BowerBird is simply a virtual 24/7 "local" Field Naturalist Club.

The BowerBird essence is simple: Take a photo or a video or an audio and post it with its associated spatial/temporal data. We call this part of a record "The Truth". Anything else that is added to that record, such as identification or a comment, or a tag or a description is called "An Opinion".

When people first join BowerBird, they apply their own filters on what records they see (Fig. 1). They do this by either creating their own project(s) or by joining existing projects or by following the contributions of other members. We opted for the user choice method as opposed to the "everyone sees everything" model. The image/record stream that a BowerBird member sees is solely determined by each member and each member's profile is unique.

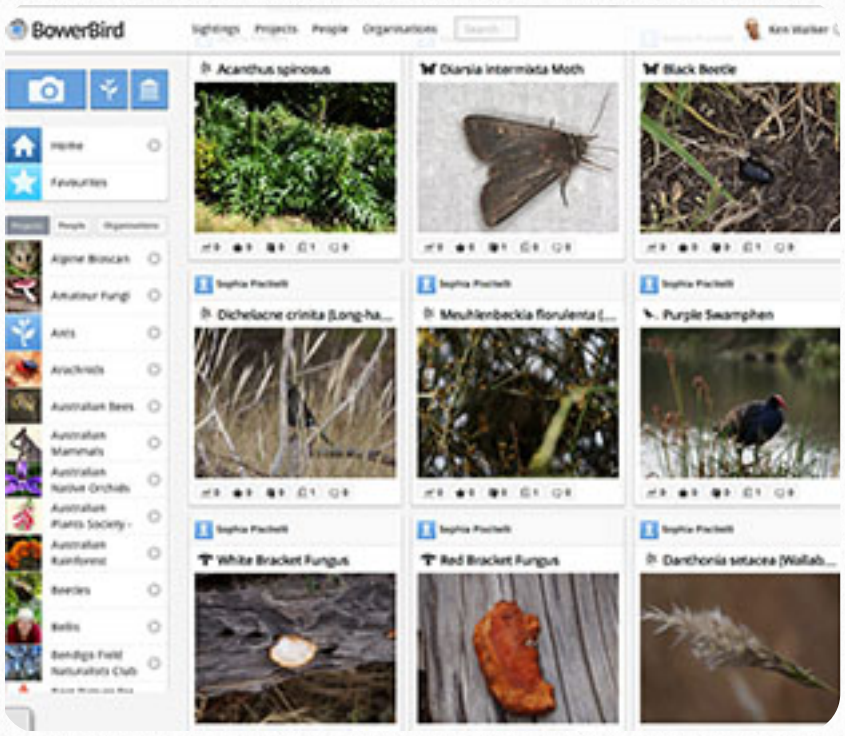


Fig. 1. A typical BowerBird record stream showing a wide variety of plant and animal taxa.

BowerBird projects range from the small to the large. The smallest BowerBird project is called "My Quarter Acre Block" which currently has only 3 members and 6 records. The largest is called "Insects" which has over 1,000 members and over 8,000 records. However, a project's success is not determined by the membership of the project. If a member in the "My Quarter Block" project adds a new insect record to their project, they can choose to share that record with the "Insects" project. That way, the 3 members of the "My Quarter Acre Block" plus the 1,000+ members of the "Insects" project will all see that record. Anyone from these two project groups can suggest an identification, add a comment, post a tag, write a description or engage in a social discussion with any other member from either project.

BowerBird's managerial hierarchy is flat with no one having anymore "privileges" or "back-doors" than anyone else. Anyone can leave the website membership and their loss will not affect the running of the website. Only the BowerBird programmers have the ability to remove an objectionable post which, to date, has not been needed.

BowerBird went live in May 2013 and currently has over 2,000 members who have uploaded approximately 28,000 records of: Algae, Amphibians, Angiosperms, Arthropods, Bacteria, Birds, Bryophytes, Chromista, Crustaceans, Ferns and allies, Fungi, Gymnosperms, Insects, Mammals, Molluscs, Protozoans and Reptiles .. to name but a few. Almost 20,000 of these records have been identified (to some level) and all identified records get uploaded to ALA each Monday afternoon.

The BowerBird membership determines the records identification accuracy. Any member can offer an identification for any record within any project they have joined. Any member can offer a different identification to the one already posted. When more than one identification is offered for a single record, the membership can "Vote" for which of the alternative identifications they believe to be correct. The Votes are important as alternative identifications may be added days, weeks or even months after an initial identification. ALA always uploads the entire BowerBird identified dataset and compares any previously uploaded record to see if the voted name parameters have changed. If changed, then ALA will change the scientific name associated with the record.

Data

Identification, nomenclature and classification are vital to the success of BowerBird and much time and effort was made to assist with the accuracy of this process. BowerBird has been designed exclusively for an Australian audience. With this restriction in mind, we built a BowerBird Master Names checklist for the known Australian biota covering the seven known Kingdoms. The checklist contains the full classification and all known common names for over 220,000 Australian species names. The checklist is a hybrid between the Australian Faunal Directory (AFD), the Australian Plant Name Index (APNI), Fungal, Bacterial, Chromista checklists and has been updated through addition of missing taxa and updating of invalid names on the National Species Lists. This means users can only provide identification names selected from the BowerBird Master Names checklist. No one can add a misspelt species or offer an invalid name. Names (common or scientific) can found either through a search by typing the leading three characters of any name – BowerBird will then show all available names beginning with these letters. Names can also be found by progressively opening a 7-columned row of hierarchical names from Kingdom to Phylum then Class, Order, Family, Genus (and subgenus if available) and finally species. Clicking on any taxon level opens all available names in the immediate classification level below. When a name is selected, the name's full classification is appended and if a species name is selected, then all known common names are automatically added to the selected name. Once this information is saved, it provides a vast array of predictable query terms for users.

A major pinch point for any website is the ease of creating a new record with uploaded images and supplying associated Darwin Core data. A completed BowerBird record must contain evidence of the record (i.e., image, video or audio) as well as associated spatial/temporal data. Many Directed single taxon citizen science website (e.g., Great Koala count) allow users to provide name only records without the need to provide any evidence to substantiate validity of the record – and that makes sense for commonly known single taxon projects (e.g., Great Koala Count). However, for the Serendipitous approach to work, we have mandated that every BowerBird record must contain evidence of the record (ie. Image, video or audio). This allows others to question an identification but more importantly, it allows others to learn from BowerBird records. BowerBird accepts a wide variety of image types with a preference for landscape rather than portrait images. The GPS values can be added in a variety of ways. The user can drop and drag a pointer onto a scalable Google map, or search for a postal address or type a range of GPS co-ordinates formats (decimal degrees, lats and longs or UTMs). The date is by day and month.

Many modern digital cameras now automatically embed on each image the GPS coordinates and date when the image is taken. If an image contains such metadata, then through a program called EXIF, BowerBird will automatically downloads this metadata from the image file and populate the appropriate create new record template fields.

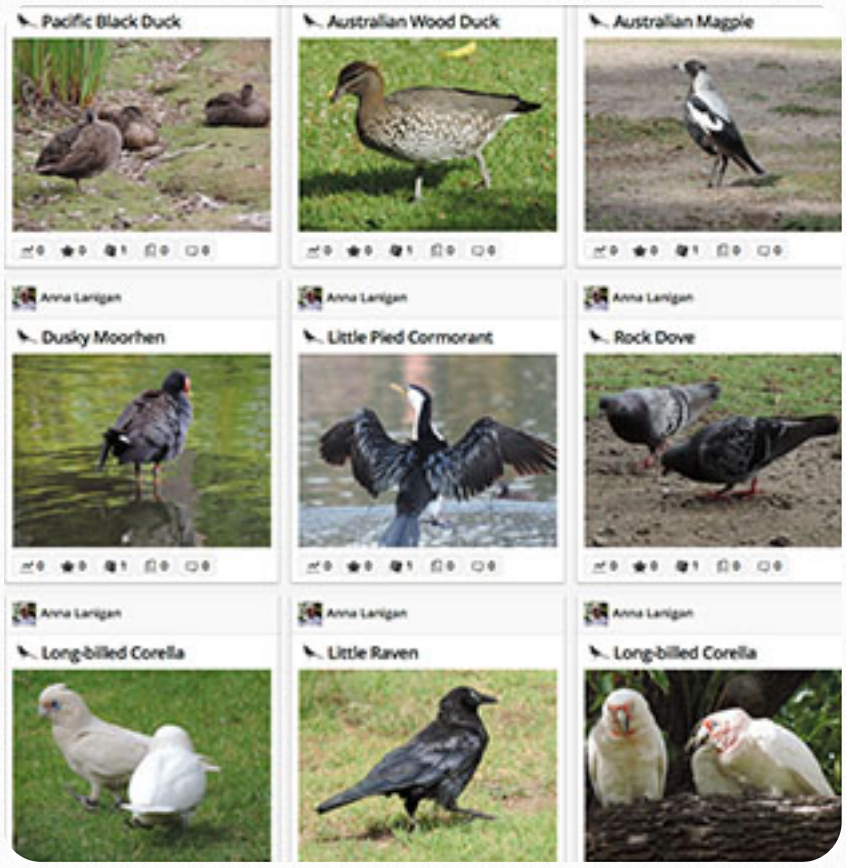


Fig. 2. A snap shot of Anna's Craigieburn BowerBird bird records.

The social aspect of BowerBird is strong with members able to add tags, comments and write descriptions to any record available to them. It's great to see many rich conversations happening between several members on a single record. When uploading a record, many people record behavioural and site-specific data such as time of day, weather conditions and surrounding habitat.

I'm not how many readers have ever experienced standing beside a UV light-sheet used to collect night flying insects. The insects fly in from the surrounding areas and remain unseen until they suddenly "arrive" onto the light-sheet without warning. The BowerBird records stream is somewhat akin to UV light-sheet collecting. You never know what type of record or what images or from where will simply appear on your screen. The variety of animals and plants as well as the variety of locations is fascinating to watch unfold. Some taxa you know well and other you have never seen before. And, the image quality for the vast majority is superb.

Interestingly, BowerBird now seems to have reached its own identification critical mass of named images to now be used as the first port of call for identification searches. If you think you know the Family or Genus or species, then a search on BowerBird first, before on Google images, is now a common action. It is also excit-

ing to run a check on ALA to see what and where a species has been previously recorded – sometimes you will find no existing records and yours will be the first on ALA.

When a record is uploaded from BowerBird to ALA, it lists the name of the record creator. This is often seen as a feather in the cap for many citizen scientists and an acknowledgment to the value of their efforts.

I have given many BowerBird talks to naturalist groups which has attracted many people to join and to contribute to the website, sometimes opening up a new avenue of life to them. In August 2014, I gave a talk to the Craigieburn Camera Club. Later a member of that club told me that "it was like the planets all lined up" with the opportunities BowerBird provided her. Anna had been documenting and recording the bird life of the Craigieburn area but had no venue other than Flickr to record her finds. Since August, Anna has now created about 10 separate BowerBird projects, each for different bird survey areas, and Anna has added over 1,000 images/records of birdlife in the Craigieburn area (Fig. 2). I know the joy and satisfaction this work has brought to Anna and with her records now on ALA the scientific value of her efforts can be shared by others on a national/international scale.

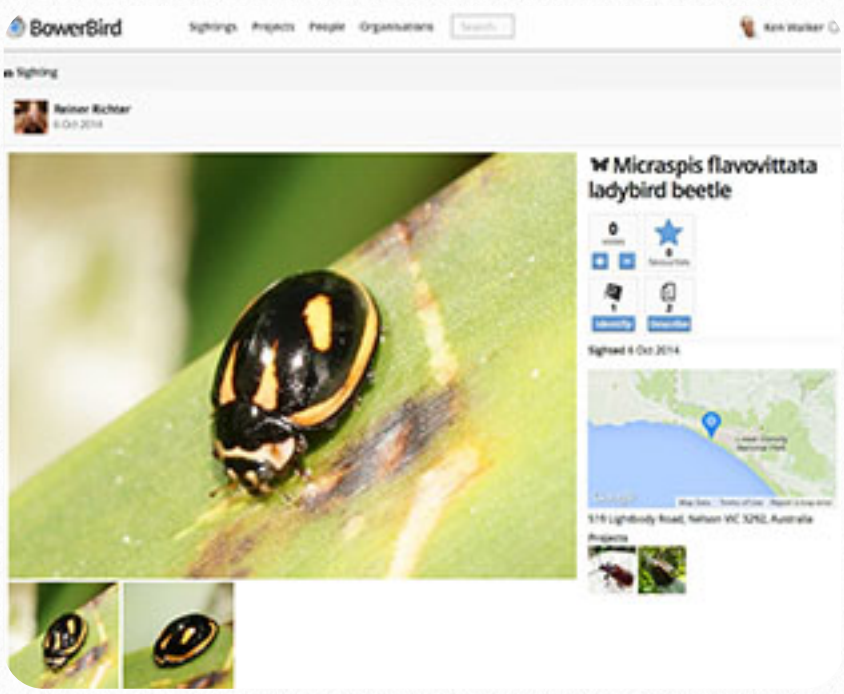


Fig. 3. The first images of live *Microapis flavovittata*. A presumed-extinct Australian lady beetle.

"Back from the dead"

Late in 2014, Reiner who has a keen interest in photographing Odonata (dragon and damselflies) was in a swamp just west of Portland, Victoria when he noticed and photographed some ladybeetles sitting on the swamp reeds. Reiner reported seeing about 50 individuals. When I saw his ladybeetle images (Fig. 3), I checked Reiner's images against the recently launched CSIRIO-ANIC (Australian National Insect Collection) Australian ladybeetle website but I could not find a species match. So, I emailed Reiner's images to the ANIC researcher who had created the ladybeetle website. Initially, he questioned the veracity of the record's location, as he did not believe it was an Australian species. Suspecting a possible invasive species, he emailed the image to the world ladybeetle authority at the British Museum. The BMNH email reply arrived the following day entitled "Back from the Dead". It was indeed an Australian species, known only from four specimens - two housed in Museum Victoria and two in BMNH. The last recorded sighting of this species, *Microapis flavovittata*, was back in August 1949. A presumed extinct species had been rediscovered thousands of kilometres from its last known location. A species recovery plan is now in development.

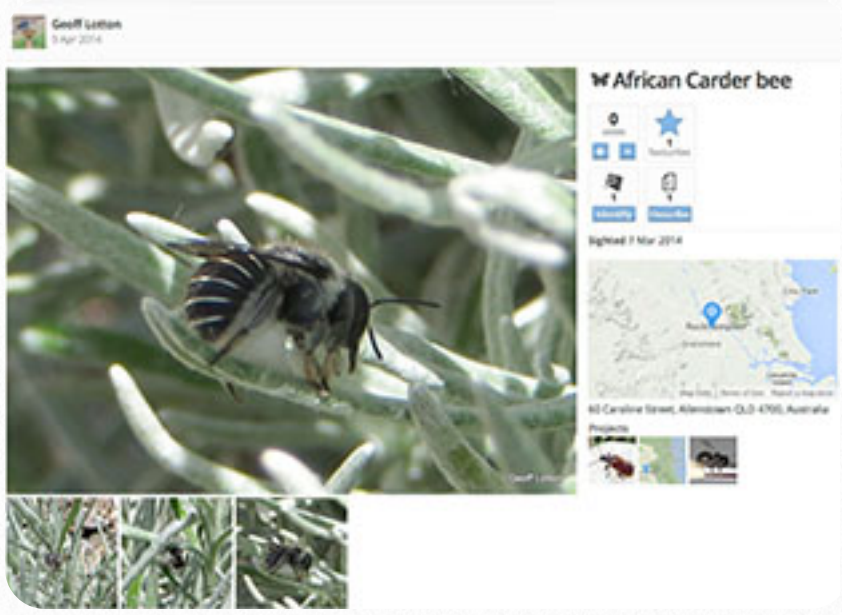


Fig. 4. First record of the South African carder bee in Rockhampton on 7 March 2014.

Tracking invasive species

BowerBird has been useful in tracking the spread of a known invasive species. In 2000, the South African carder bee was first recorded in Brisbane region and in 2007, it was further recorded in Sydney but there were no further records outside of these two areas. Then in February and March of 2014, two independent BowerBird members posted images of a bee that they had not previously seen in their area (Fig. 4). Their request was "Bee ID?" (This follows a similar pattern to when three members of the public brought the Red Imported Fire Ant to the attention of three different Brisbane entomologists.) One image location was near Rockhampton while the other was at Albury on the Victoria border. Both records were immediately recognised as the South African carder bee. These records significantly expanded the known distribution of this invasive and were of great interest to biosecurity people in Queensland, New South Wales and Victoria. A new pollinator coming into any area has a potential to cause an explosion of exotic sleeper weeds that have waited for a specific pollinator to aid their spread. BowerBird has a native bee project with over 200 members – that's 400 eyes watching out for the first record of the exotic Bumblebee found in Tasmania to appear on mainland Australia – a disaster waiting to happen.

Rare images

Gio is a 16 year old school student who likes to fossick amongst the low tide rocks near his home on Port Phillip Bay. After rolling over one such rock, a spider emerged which Gio photographed and videoed before replacing the rock. Gio had taken the first ever live images of the little known Marine spider, *Desis kenyonae* (Fig. 5). This spider silks together rocks in the inter-tidal zone to keep out the sea water at high tide and comes out at low tide to

forage. There are only six records for this species in Port Phillip Bay and last was in 1974. Mike Gray (Australian Museum arachnologist) said the same species had been recorded in Sydney Harbour but the species had not been seen in over 80 years. Gio was the toast of the Australian Arachnological community and he received a number of emails from them. What a thrill for someone following a science pathway at school.

Serendipity certain played a major role in the first ever live image capture for one Australia's largest moths. Daniel was driving in a very remote area of Western Australia (Mullewa) when "mother nature called". So he pulled off the road and walked into the bush a little way. While signing his name on a tree trunk, he looked up and saw an enormous moth with a blueish tinge and with an abdomen length of almost 10cm (Fig. 6 - front page of article). Daniel returned to his car to collect his camera and then took a series of images which were subsequently posted to BowerBird. Daniel had found the female of the elusive cossid moth *Catoxaphylla cynauges*. Despite is body size, the female is elusive because it is brachypterous meaning it shortened wings cannot support it flying so females never come to UV light sheets. The only way to find a female is to physically search in the bush – a near impossible task considering the adults do not have functional mouthparts and therefore are very short lived. The female in the image can be seen with its abdomen slightly curled – no doubt releasing a pheromone to attract a flighted male.

First BioBlitz

Finally, BowerBird was recently successfully used for a Directed citizen science project. The City of Melbourne Council and Museum Victoria recently conducted the first ever BioBlitz of the Melbourne CBD during the months of October and November. While the Museum's involvement was limited to a two day survey of the Fitzroy Gardens and the WestGate Park, over the two months the project ran and through heavy promotion by the City Council, BowerBird had over 1,000 records posted from people photographing animals and plants in their local CBD surrounds. We even recorded the worldwide cruciferous pest, the Diamond Back Moth, *Plutella xylostella*, from a 16th floor roof top garden in the CBD. A resounding biodiversity success involving the Melbourne CBD community.

Directed and Serendipitous citizen science projects offer much value to both researchers and amateurs. Each project pathway can contribute significantly to scientific and community endeavours. My preference is for the serendipitous approach but BowerBird has proved to be a useful data repository for either pathway.

BowerBird – www.bowerbird.org.au A product of ALA.

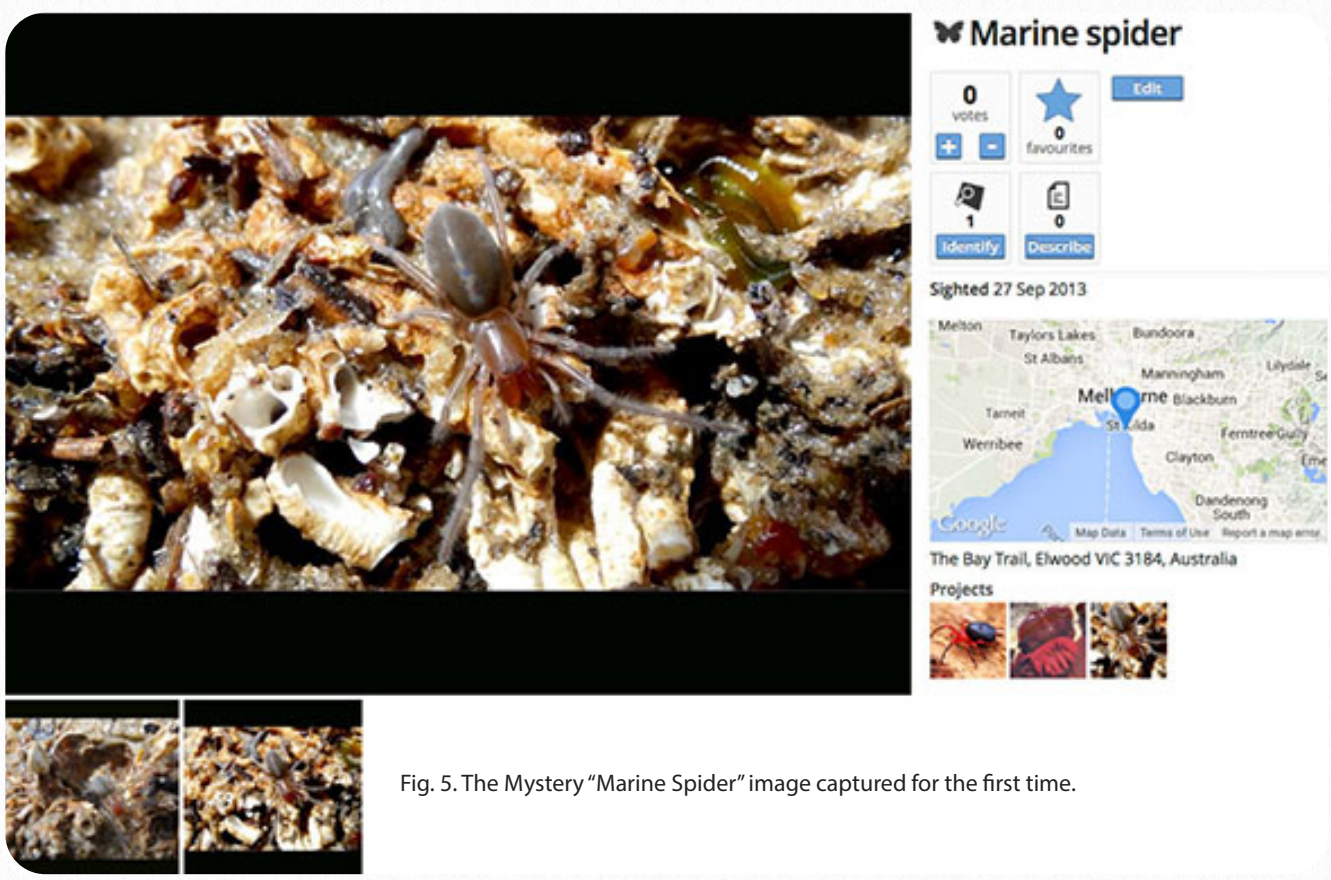


Fig. 5. The Mystery "Marine Spider" image captured for the first time.

Bootstrap Camp

by Marg Stimpson (UNE)

BSC2014 group in front of our cabins and a stunning angophora (photo: Tom Semple).
L-R: Meredith Cosgrove, Penny Mills, Bokyung Choi, Lyn Cook, Tom Semple, Mike Crisp, Alicia Toon, Paul Lin, Marg Stimpson

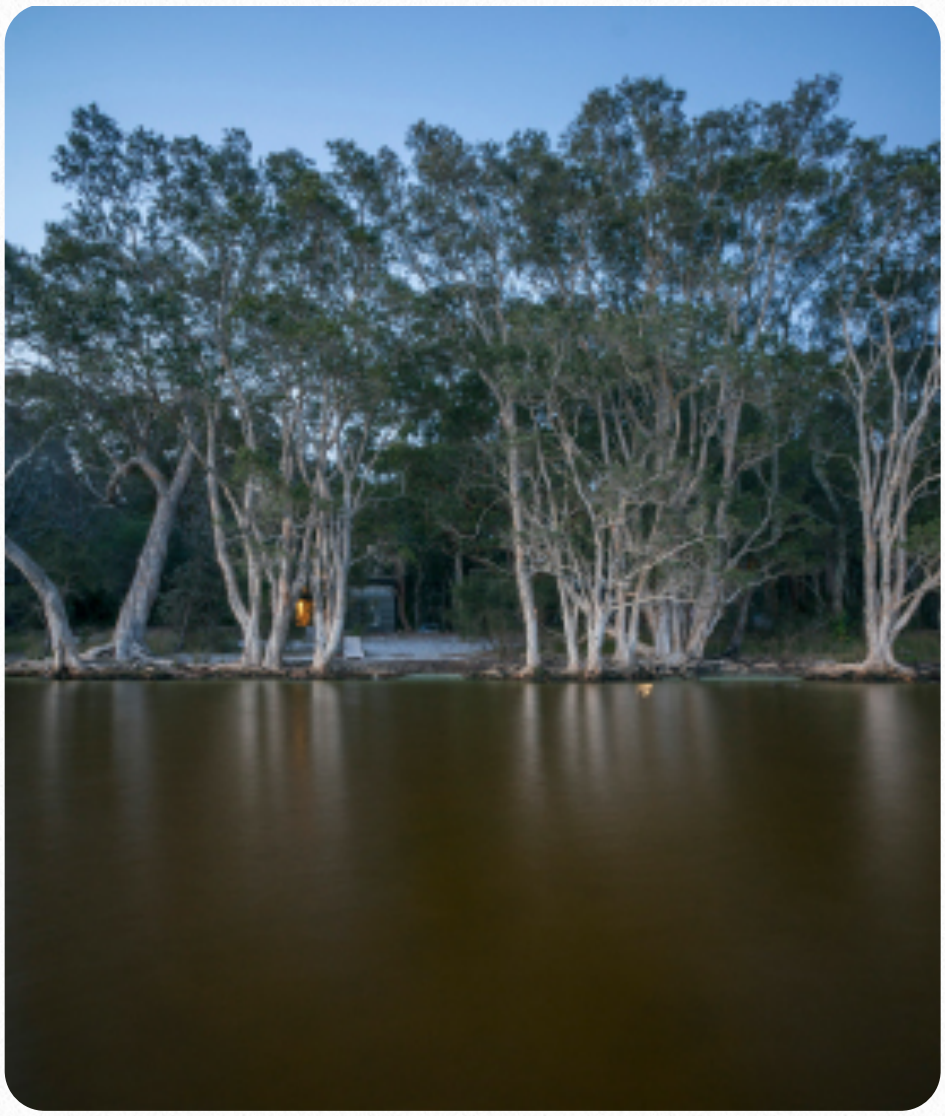
For those of you who do not know what Bootstrap Camp is, let me enlighten you. Bootstrap Camp is the brainchild of Lyn Cook and Mike Crisp; it involves supervisors and students from UQ, ANU and, for the last three years, UNE. Each lab group takes turns annually to pick a location and run the Bootstrap camp. The name "Bootstrap Camp" (coined by Andrew Thornhill) gives the theme away - it is essentially an intense (intense being the operative word) week-long workshop for biologists with the emphasis on phylogenetic analysis. One of the great things about Bootstrap Camp is that both supervisors and students mix it up so you find yourself sharing a cabin and/or cooking group with someone you don't know and finding out about what other people are doing in the scientific world. It is a very good way to broaden your outlook and improve your social skills, we can all get a bit myopic about our projects (just ask anyone who is not a biologist or a scientist)

Some of the locations are stunning – this year Bootstrap camp was held at a private camping ground (Myall Shores Holiday Park) nestled in Myall Lakes National Park – it was very luxurious and a glorious vista. We also had a very interesting Kookaburra who was a voracious raider of food and had no fear of humans. If we put a foot outside of the cabins with what looked like food, look out because our Kookaburra would take a perfectly aimed dive and your lunch was gone. Ask Penny and Meredith – they both lost their lunch.

One very bold Kookaburra
(photo: Tom Semple)

A typical day at Bootstrap camp consists of getting up about 7am, have breakfast (self-catered) and be ready by 8 am, if UNE is running Bootstrap camp, or 9 am if ANU or UQ runs the camp - a much more civilized hour. We all then load up with cameras, water and munchies and head off for a walk. The walks range from 4k to 14k and terrain is variable. The interests of the students and supervisors are so diverse – you all know what a tribe of biologists are like on a field trip – they scatter in all directions and sit for hours to take exquisite photos, or find some delightful critters or some rare and endangered species of plant or gall. It makes no difference: there is something of interest for everyone. After drooling over nature in general, students and supervisors head back to base camp for a well-deserved lunch.

On a good day, if you are lucky, or walk fast, you get about 2 hours for lunch. After lunch, get your brain into gear because presentations start, and it might be your turn. Each student and supervisor has to give a presentation on their current work. Presentations are very interesting and they usually last about 1.5 hours - this includes intense questioning by both students and supervisors in a friendly and constructive manner. This interaction is perfect for work-shopping ideas and is beneficial for all concerned. We usually do 2 of these presentations before dinner then, whose ever turn it is to cook provides us all with some delightful cuisine. Now comes the not so great part because the cooking group also gets to be the cleaning group. Next comes another presentation, again about 1.5 hours and numerous questions then a coffee and some chocolate and head to bed, by which time it is about 10.30 pm. After a week of this you are left with an abundance of ideas to chew on for the homeward journey and a little regretful that Bootstrap Camp is over till next year.



Our cabins behind the paperbarks (*Melaleuca quinquenervia*) at Myall Lakes. Tom stood knee deep in water waiting for the perfect moment for this shot. (photo: Tom Semple)

In Memory of Lyn A. Craven

September 3, 1945 - July 11, 2014

We mourn the loss of Lyndley Alan Craven (Lyn), eminent botanist, taxonomist, mentor, and generous friend to many.

Lyn came from a horticultural family in Melbourne and began a long career with CSIRO in 1964 as a technical officer with the New Guinea land survey group, graduating to staff taxonomist on completion of a Masters of Science from Macquarie University in 1984. Over the next 50 years, Lyn worked in various incarnations of the Australian National Herbarium as a passionate advocate for Australasian plants with an attraction to large and difficult taxonomic groups including the Myrtaceae (*Melaleuca*, *Syzygium*), Malvaceae (*Gossypium*, *Hibiscus*), Boraginaceae and Ericaceae (*Rhododendron*), producing over 150 scientific publications. Many specimens, especially rhododendrons, could be found lovingly tended to in his beautiful backyard glasshouse. Other interesting plants spilled out into the large garden where a vegetable plot was used for numerous horticultural experiments including systematic comparison of the hardiness and yield for all available tomato varieties, resulting in a deluge of seedlings and fruit that probably still live on in preserved form.

Lyn's passion was also clear in the incredible generosity with which he gave both time and knowledge, especially to young taxonomists, and I was lucky enough to spend many happy hours in the stacks while Lyn pulled out sheet after sheet of exotic unnamed New Guinean material known from single localities and with weird and wonderful morphologies. This energy and enthusiasm was often hidden behind a quiet and attentive exterior, which also belied a deeply incisive mind and wickedly mischievous sense of humour. Meetings with Lyn would generally take place over a cup of tea: Lyn leaned back with eyes half closed and conversation wandering smoothly from the botanical topic at hand to popular culture of the day and back again. He was invariably better informed on any subject than I was, and his text messages would have shamed most teenagers for their grasp of current slang. This easy-going approachability was much loved by all who knew him, and fostered a large eclectic network of amateur and professional plant collectors who would gladly provide required specimens from far flung corners of the region.

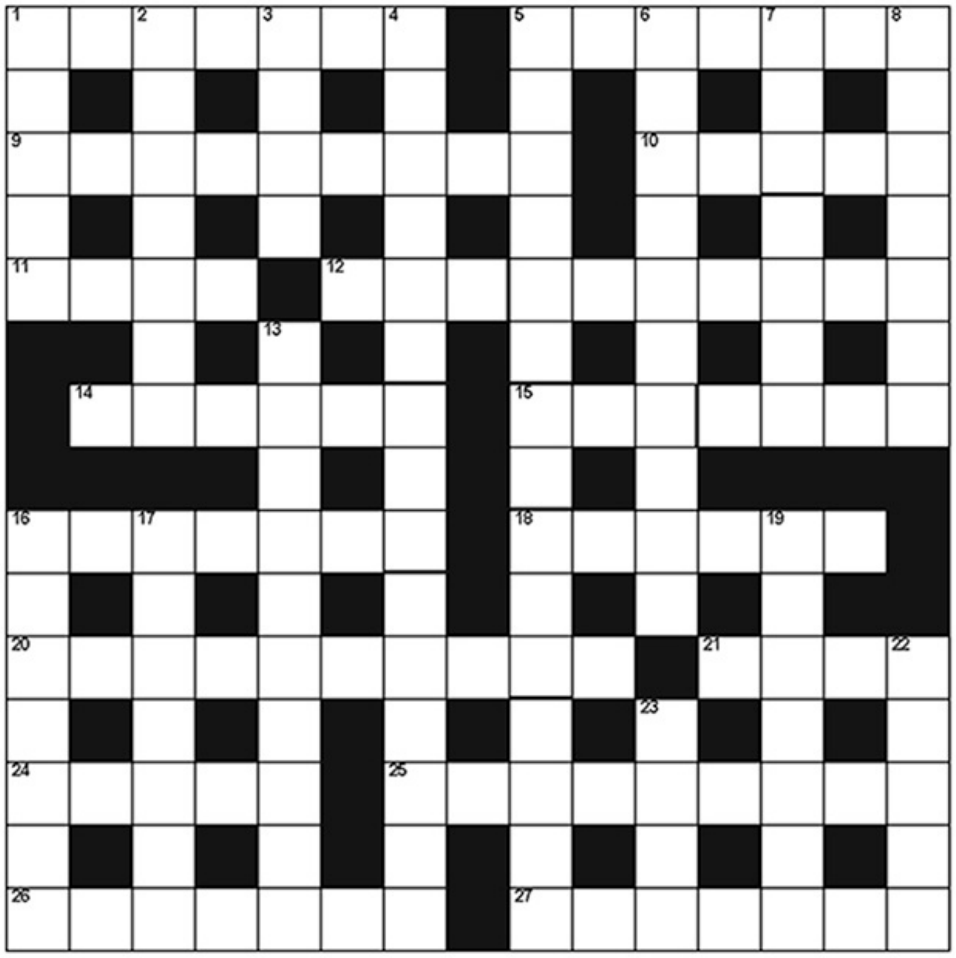
The greatest lesson Lyn taught me was that the pursuit of knowledge in science requires constant reassessment, and the ability to cheerfully contradict and disprove your own theories even after years of work. I feel privileged to have been mentored by not only a great taxonomist but a genuinely wonderful person, and I know that many, many, people who knew him better than I do will feel his absence even more profoundly. That Lyn had touched the lives of so many people was evidenced by the overwhelming turn-out of friends, family and colleagues at his funeral. He leaves behind his wife Kirsty and children, Cathy and Ross, and their families, as well as many happy memories and a large and important body of work that is the foundation for future systematics in many groups of Australian and South East Asian plants.

Bort Edwards
Postdoctoral Researcher
Presgraves Lab, University of Rochester

Systematics Crossword 2

By Cecidomyiidae

Solutions in next issue of Banksia



SIMPLE

ACROSS

1. Darwin's birds.
5. Middle result
9. Methods that focus on shared derived character states.
10. Relating to intestines.
11. Dermis
12. Of movement, stimulated by flow of water.
14. Long-legged birds.
15. Intermittently dry creek.
16. Slender fish.
18. Attract
20. (two words) Fruit, tripped.
21. Leg.
24. Ridge.
25. Incisively.
26. Stores.
27. Methods

DOWN

1. Point of convergence.
2. Approaching.
3. Mammalian characteristic.
4. Adjust to get the same acuity.
5. Short tandem repeats of DNA.
6. (two words) Sketched an uncommon thing.
7. Post-mortem.
8. Coniferous trees.
16. (two words) Metal mammal.
17. Pincers.
19. Eye through which to pass a rope.
22. His theorem uses priors and posteriors.
23. Nervous twitches.

CRYPTIC

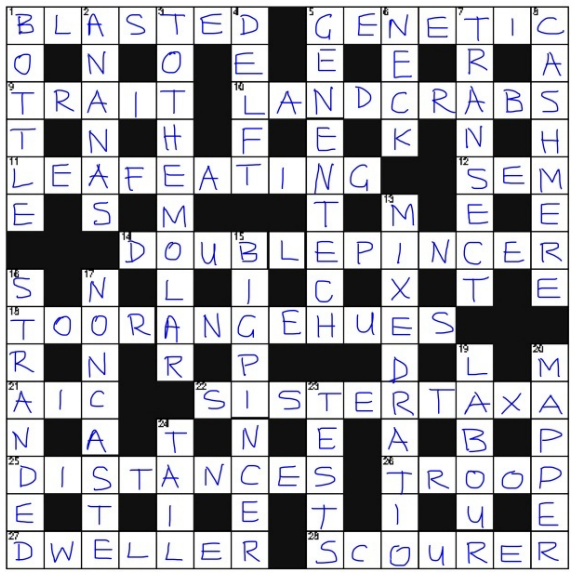
ACROSS

1. Angles with pole removed for no charge used to illustrate Darwin's theory. (7)
5. Press axis goes to central measures. (7)
9. Dressed, followed by a second twitch, leading to an approach to systematics. (9)
10. One short of ten square leave a nervous division to go in. (5)
11. A tail dissociates from the lizard leading to a relatively large organ. (4)
12. Sounds like south American city has led cancer, with the vegetation following the flow of the water. (10)
14. Birds, for example, dampen sulfur. (6)
15. No Rolls-Royce backing inside similar bean to give seasonally dry watercourses. (7)
16. Yearn to measure slender creature. (7)
18. Trainee loses her app and her last in order to lure. (6)
20. The motion of fruit in two legendary events, one involving hitting a head and the other involving avoiding doing so. (6,4)
21. Purported brain region a hundred short of being part of a tree and part of a vertebrate. (4)
24. A tree makes a ridge. (5)

DOWN

1. Set your sight for America holding a hundred but losing the right. (5)
2. Close call loses lisped sibilant, getting closer. (7)
3. Mammalian characteristic puts light gas over the atmosphere. (4)
4. Below badger's retreat he would get similar sharpness if he were to do this).
5. Seven by 157 brambles hold bill computing a direction while useful elucidating population assignment. (15)
6. From the European perspective, Cook's artists did this. (4,6)
7. Gold to Asian popster useful after his death. (7)
8. Trees enliven One Direction. (7)
16. According to Elizabethan proverb, a spinster might expect to do this in Hell with an alpha primate. (4, 3)
17. Haircutters lose their original direction, still capable of pinching. (7)
19. One of a pair of 17 down provides an eye for rope. (7)
22. Sounds like laurels work well with Scot to describe how to estimate another tree. (5)
23. Vitamin departs arachnids to leave several nervous last syllables of 9 across. (4)

Solution to Systematics Crossword 1



About the Society

Banksia spinulosa (Photo: Mike Crisp)

The Society

The Society of Australian Systematic Biologists is open to all people who use 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 interest.

Membership

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

2013-2015 SASB Officers

President: Andy Austin
Vice-President: Penny Mills
Secretary: Andrew Thornhill
Treasurer: Simon Tierney
Councillors: Shane Ayhong, Lyn Cook, Steve Cooper, Bob Mesibov, Andrew Mitchell, Michael Rix, Nerida Wilson

To circulate information to members or provide articles for the newsletter, please contact:

SASB E-alert editor: Rebecca Dew (rebecca.rmd@hotmail.com)

BANKSIA Newsletter editor: Lyn Cook (l.cook@uq.edu.au)