



In this issue:

Editorial	1
President's Report	1
IBCC/SASB Student Prizes	2
Hypothetically Speaking	3
Caption competition	5
PG Training Workshop Review	5
Nomenclature symposium	6
SA Herbarium publications	8
Inkscape Tutorial Part II	9
About the Society	13

Editorial

At the combined New Zealand and Australian Entomological societies conference in August 2011, I was interested to hear the developments in some of the online taxonomic databases now being developed. Specifically, the initiatives of interest include the **Australian Faunal Directory**, **PaDIL**, and **IdentifyLife**. These projects are exciting and it will be great to see what they turn into. However, they need taxonomic input, which begs the question: what reward systems are in place to encourage taxonomists to take part? Money is certainly one aspect of this, but recognition by peers and funding bodies is also very important; and in my view has not yet been adequately addressed. Until it is clear how activity on online databases can appear on funding applications, CVs and obituaries, I suspect online databases will have trouble recruiting third party taxonomic expertise.

Samuel Brown

Outgoing President's Report

The past two years have been fairly quiet ones for SASB.

They began with a rebuilding of the SASB website. The site now includes separate pages for:

- Job and scholarship notices,
- Tertiary-level systematics courses and training workshops,
- Journals which publish taxonomic and systematic papers, and
- Upcoming conferences of interest to the SASB membership.

The website thus acts as a bulletin board for SASB members and others, and supplements the announcements emailed directly to members by the Secretary. Contributions welcome!

The SASB domain, 'sasb.org', is still registered with MelbourneIT, but our name-servers and webpages were moved in 2009 from bur.st in WA to DeCompression in

Queensland. Free hosting with DeCompression was arranged for us by Tristan Claridge, whom many SASB members will have met as the IT and audio-visual officer at conferences organised by Sally Brown over the past 10+ years.

The SASB newsletter *Banksia* continues to be very ably edited by Samuel Brown, with five issues produced since the last general meeting (November 2009, July and December 2010, June 2011 and January 2012). *Banksia* is sent directly to members as a PDF and is also available for download from the SASB website.

One of the many interesting items in *Banksia* was the outcome of a self-reporting survey of SASB member activities in 2010. I was impressed that nearly 80% of respondents had identified specimens on request during the year, and 50% had published a Code-compliant taxonomic work.

At the request of a number of systematists, SASB strongly objected in 2010 to the low journal rankings for systematics journals given by the Australian Research Council in its Excellence in Research for Australia (ERA) initiative. A full record of SASB correspondence with the ARC is on the SASB website. The ARC announced in 2011 that it was abandoning the journal ranking system.

The journal ranking debate was the only one over the last two years in which SASB took a position publicly. Through Vice-President Penny Mills, we also participated in a Taxonomy Australia (TaxA) meeting in May 2010.

I will be stepping down as President at the general meeting in December 2011, and would like to thank our Secretary, Andrew Thornhill, for his support over the past two years.

Bob Mesibov

Student Prizes at the 10th IBCC/SASB combined conference

At the combined 10th Invertebrate Biodiversity and Conservation/Society of Australian Systematic Biologists Conference recently held in Melbourne, four prizes were awarded to the best student presentations. The prizes were donated by the CSIRO Publishing journal *Invertebrate Systematics* and consisted of two book prizes (*Australia, New Zealand, Antarctica and New Guinea Photographer of the Year*) and two \$100 vouchers for use for titles at CSIRO Publishing.

The judging committee for the prizes was comprised of two members of the conference organising committee (Robin Wilson and Tim New), as well as outgoing SASB President, Bob Mesibov. Oral and poster presentations were treated identically (i.e. there were no separate oral or poster categories, it is coincidental that in the end all prizes were awarded to oral presentations). We judged the best presentations as follows:

- 1st Kathryn Sparks (The University of Adelaide)—*Morphology, molecules and Monomorium: surprising or suspect species diversity in a large and taxonomically difficult genus of ants* [\$100 voucher].
- 2nd Sophie Harrison (The University of Adelaide)—*Exploring new species diversity among troglobitic pseudoscorpions of the Yilgarn and Pilbara Regions, Western Australia* [\$100 voucher].

3rd Penelope Mills (The University of Queensland)—*Chromosomal evolution in a karyotypically diverse group of scale insects* [book prize].

4th Andrew Heaver (The University of Melbourne)—*Insects and incendiaries: The ecology of invertebrates inhabiting flammable bark* [book prize].

There were many excellent student presentations at the conference so it was a particular credit to the four winners that there was a high degree of agreement among the judges as to the placings. At the conclusion of the conference Robin Wilson announced the prizes and congratulated the winners and Prof. Andy Austin, as Editor in Chief of *Invertebrate Systematics*, made the presentations.

Robin Wilson

Hypothetically Speaking

Lyn Cook (University of Queensland) gave a wonderfully original talk at the recent SASB/IBCC conference in Melbourne. She made several challenging points, one of which I might paraphrase this way:

Taxonomy suffers from a shortage of testable hypotheses. Suppose a taxonomist publishes a paper and says that there's such a thing as species A and it's different from species B. How can anyone test this claim to see if it's true?

Lyn argued that no test is possible unless the taxonomist explicitly designates A and B according to a particular species concept. Since many taxonomists delimit species without being explicit in this way, taxonomy risks being seen as 'science Lite'. If no explicit hypothesis is offered, then no refutation is possible within a hypothetico-deductive framework.

For a very long time (think of Aristotle's *History of Animals*), descriptive taxonomy was descriptive and not much more. Species A was different from species B because the two were described as different. No explicit species concept was necessary. If there was an hypothesis lurking somewhere in the descriptions and differential diagnoses, it was that any specimen collected in the A and B ranges would be assignable to A or B. If a specimen clearly wasn't A or B, we might have species C, for which another description and revised diagnoses would be necessary. There is no *hypothesis* that A was different from B, so the finding of C cannot invalidate this non-existent hypothesis.

(If you've been thinking this applies only to morphological taxonomy, read that last paragraph again with barcodes or 28S in mind. Same story.)

During the first half of the 19th century, taxonomists came to accept the idea that the classification system in which species were organised needed to reflect evolutionary history. The taxonomic hierarchy should, ideally, map the historical hierarchy. That way of thinking has underlain systematics for ca. 150 years now, and it imposes very strong constraints on classification. Whether it also imposes constraints on species delimitation has been the subject of many papers and a great deal of argument.

Some systematists, for example, like the idea of 'species thresholds'. If genetic differences between similar-looking individuals segregate neatly into 1–5% and 15–20% classes, many systematists will quite reasonably assume that 1–5% is intraspecies vari-

ation and 15–20% is interspecies variation. In this case, 15% becomes a threshold figure for delimiting species. Is there an explicit species concept here? No, because lineage divergence is a fact of life, not a species concept. Species thresholds are operational definitions for species, and almost theory-free. It's true that most such thresholds have been empirically calibrated using species delimited by other means, and you might argue that they inherit a species concept that way. My response is that the same threshold could work equally well for a wide range of species concepts.

Back to the descriptive species-delimiting protocol I mentioned above. Some authors regard this as based on a Diagnosable Species Concept, which to my mind is like saying that a green car is different from a red car according to a Motoring Fashion Concept. Diagnosis is an operation, and we use it to delimit species operationally.

It's possible to load a diagnosis with evolutionary theory, of course, but you don't have to. You can delimit species without having a clue how they're related, then follow up the diagnoses and descriptions with analyses that infer a pattern of evolutionary relationships, leading (we hope) to a more natural classification.

But 'pattern of relationships' between what? Not 'species', because that isn't how phylogenetic inference works. Inference starts with a set of characters and a model of evolution, and then generates a plausible hierarchical pattern showing how the *characters* might be historically related. A different tree might appear after a different analysis of the same set of characters, or after the same analysis of an expanded set of characters from the same exemplars or 'species'. But the tips of the tree don't change—only the nodes. To change the 'species' grouping of the tips requires applying a species concept *after* the analysis. Phylogenetic inference itself is not an operational way to delimit species.

If you like Lyn Cook's approach to species-as-hypotheses, you have a wide range of explicit species concepts to choose from. For a concise overview I highly recommend John Wilkins' excellent 2006 blog posting: [A list of 26 species concepts](#).

Finally, for a particularly good example of how to be explicit when delimiting species, see:

Palmer, C.M., Trueman, J.H. & Yeates, D.K. 2007. Systematics of the Apteropanorpidae (Insecta : Mecoptera) based on morphological and molecular evidence. *Invertebrate Systematics* 21(6): 589-612.

Here the authors report what seems to be a routine systematic exercise. It's a cladistic analysis of a 36-character morphology dataset, COI sequence data, and a combined morphological/molecular dataset, from 21 sampled populations of a genus with two described species. What the authors do next is review their results in the light of at least six different species concepts. For example, cladistic analysis identifies a lowland clade of a mainly mountain-dwelling taxon. These lowland populations have a distinct genitalic morphology, which:

“agrees with the potentially interbreeding biological species criterion of de Queiroz (1988). . . As members of this clade also form a distinct cluster of haplotypes, and form a diagnosable monophyletic group, this clade also conforms to the genotypic cluster species definition of Mallet (1995), and the autapomorphic (Donoghue 1985) and diagnosable phylogenetic (Eldredge and Cracraft 1980; Cracraft 1983; Nixon and Wheeler 1990) species concepts. These populations also inhabit a different altitudinal range from all other members of the family, and are therefore congruent with the

ecological species concept of Van Valen (1976), and the adaptive zone criterion of de Queiroz (1998). These populations are therefore regarded as a distinct, undescribed species...

which the authors go on to describe in the formal taxonomic section of their paper. They also describe a second new species because

“Adults of the population from Hartz Peak possess a unique combination of morphological characters... Males from Hartz Peak also possess distinct, readily diagnosable, genitalic autapomorphies... These features of the genitalia indicate that this population is reproductively isolated from all others. The haplotype of the Hartz Peak population is also different from that of all other members of the family, and constitutes its own, well-supported clade. The Hartz Peak population therefore meets the biological species concept, autapomorphic and diagnosable phylogenetic species concepts, and genotypic species definition, and is regarded as a separate, undescribed species.”

Bob Mesibov

Caption competition

The following picture is a scene from the recent 10th IBCC/SASB conference held in Melbourne in December. Speculate as to what is happening in the image. What profound insights are being discussed between the figures in the centre? Alternatively, what are the characters on the left and right thinking?



Image courtesy of the [Medieval Woodcuts Clipart Collection](#).

Please send your answers to the newsletter editor: sam.brown@lincoln.ac.nz. A selection of the most humorous, geeky and accurate answers will be published in the next issue.

Samuel Brown

2nd National Systematics Postgraduate Workshop: a student's perspective

What else could have brought 32 students from every corner of Australia, whose combined taxa of interest covers the entire tree of life, to Adelaide?

Over five days we had the luxury of stepping back from our respective labs and computers to enjoy the feeling of being taught cutting edge science by experts, whether systematics was our major focus or an add-on to our respective projects.

Dr Mike Lee opened the festivities by refreshing the basics of phylogenetics and, after a quick reminder of maximum likelihood vs bayesian modeling, unleashed the BEAST (tamed by BEAUti); Dr Michelle Guzik introduced the user-friendly and visually attractive Geneious genetic data analysis software; Dr Hugh Cross gave a thorough update on the situation of barcoding and associated internet-based resources; Dr Steve Donnellan unravelled the prospects behind next-generation sequencing; Dr Ian Whittington pointed out how museum collections can and should be used for best data storage and accessibility; Drs Mark Harvey and Judy West accomplished the big task of clarifying the taxonomic process; Dr Donald Hobern introduced the concept of cyber-systematics via the Atlas of living Australia, and, last but not least, coordinator Prof. Andy Austin provided precious tips for successful publishing (or how to woo an editor!) and a useful update on available research funding resources.

Another highlight of the week was a thrilling 5 min/5 slide marathon organised on two successive evenings in order to give each participant a chance to present their research. Congratulations to S. N. Phoon (James Cook University), C. Puente-Lelievre (James Cook University), V. D. Racero (Adelaide University) and A. Wiewel (Adelaide University), who received a bottle of wine (each) for the best presentations!

Fieldtrips to the herbarium and the science centre on the rainiest day of the week satisfied even the most adventurous of us; however most of the actual sampling was done on food, and included Asian, Australian and Italian lineages.

In the evenings the workshop continued, often around a bottle of wine, for one of the most valuable assets of this course was to bring together early career scientists with many different backgrounds and origins, all sharing the same enthusiasm for their work and eager to learn from one another.

What a great week!

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Nomenclature symposium online

On 28 October 2011, the International Symposium for Zoological Nomenclature (ICZN) hosted a symposium “*Anchoring Biodiversity Information: From Sherborn to the 21st century and beyond*” honouring 150 years since the birth of Charles Davis Sherborn, who compiled the *Index Animalium*, a key text in zoological nomenclature and the history of taxonomy. The symposium featured talks discussing Sherborn’s life, work and influence, the history of taxonomic indexing, the digitisation of heritage literature, and perspectives on how technological advances will influence the way taxonomy is practised and published.



Left: Subset of participants after the “mid-course barbie” organised at the University (from left to right, by taxon of interest: horse flies, ants, bees, crayfish, sharks, isopods, pseudoscorpions, polychaetes, wasps, coccids). Right: Subset of participants sampling Italian food at Amalfi’s (from left to right: crayfish, ants, isopods, sponges, polychaetes, birds, plants (Loganieae), plants (lilies)). Photos: Maïa Berman.



Some of the workshop facilitators after the closing lunch at the Adelaide University Club (from left to right: Prof. Andy Austin, Dr. Michelle Guzik, Dr. Ian Whittington, Dr. Mike Lee). Photos: A. Bentley

For those of us who couldn't duck over to London for the symposium, we are in luck. The ICZN has made all the talks available for our listening and viewing pleasure (<http://iczn.org/sherborn>). Currently, however, only two of the presentations are available as full videos; but all talks have slides and audio available for downloading.

The talks are interesting and enjoyable, and seemed to have been fairly informal, with many of the presenters sounding laid back, interacting and joking with the audience. The speakers included well-known figures who are deeply involved in such aspects as the digitisation of heritage literature and databasing initiatives. Hearing the subtleties and the challenges involved in their work and their view on the importance of it makes one appreciate the effort that is involved, and why it may not be moving as quickly as some of us think it should be. The cataloging of life is a big project, involving a large number of people and organisations, and operating in a very rapidly changing technological environment. The people involved are ambitious, but also forward-thinking; intending to create a system that will serve the taxonomic community for several decades, as the *Index Animalium* has.

Samuel Brown

State Herbarium of South Australia publications now online

The new "Publications" web-page of the State Herbarium of South Australia has been online since 26 October 2011 (<http://www.flora.sa.gov.au/publications>). Users can view information on all books published by the State Herbarium and its staff, the Board of the Botanic Gardens & State Herbarium (Adelaide), and botanical books published by the 'Flora and Fauna of South Australia Handbooks Committee'. If in-print these can be ordered via email. Some out-of-print books are available for download, e.g. Womersley's *Marine benthic flora of southern Australia* or Bates & Weber's *Orchids of South Australia*. More scanned books will be added over time.





The complete back-issues of the *Journal of the Adelaide Botanic Gardens* covering volumes 1 (1976) to 24 (2010) are also freely available. (<http://www.flora.sa.gov.au/jabg>). The journal mainly publishes research papers and articles on botanical taxonomy, systematics and nomenclature. It is one of five taxonomic journals published by Australian herbaria and botanic gardens. The next volume of the journal is scheduled for 2012.

Finally, the first chapters of the new, 5th edition of *Flora of South Australia* were launched in October as well (<http://www.flora.sa.gov.au/ed5>). These include an introduction, glossary and revised treatments for 17 families or larger groups, such as Amaranthaceae (amaranths), Droseraceae (sundews), Ranunculaceae (buttercups), and part of Fabaceae (legumes). For people who want to bind these chapters into a folder, cover pages are also provided for print-out. More than 60 botanists are contributing to the new flora. We anticipate to release more treatments every 4 to 6 months.

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Adding setae to Inkscape drawings

In the [last](#) issue of *Banksia*, I wrote a tutorial giving an introduction to creating line drawings using the free vector-graphics program Inkscape (<http://www.inkscape.org>). The following builds on that tutorial presenting a method to easily create and manipulate representations of setae, as part of giving extra detail to the drawing.

1. Load previously made vector graphic image.
2. Show gridlines over the image by going `View > Grid (#)`.
3. Using the pencil tool  (**P**), create an elongate isosceles triangle with the base to the right and the tip to the left. Make it perfectly straight, as any curves will be distorted later. Make it off to the side of the image (Figure 1).
4. Make the seta a bit more realistic by curving the base of the triangle and creating a circle around the base (Figure 2). Select the whole seta and combine both objects into a single object by using `Path > Combine (Ctrl + K)`. Once the objects have been combined, copy the resulting object. (`Edit > Copy (Ctrl + C)`).
5. Adjust the size of the seta by moving the handles that appear when the pointer tool is selected  (**F1**). The seta needs to be an appropriate size relative to the structure it will be placed.
6. With the pencil tool, create a straight line by clicking once where the base of the seta should start, and once where the seta should end (Figure 3).
7. Open the 'Path Effect Editor' by going `Path > Path Effect Editor (Ctrl + Shift + 7)`. In the 'Apply new effect' drop-down menu, select "Pattern Along Path" and click 'Add'. In the options that arise, click the  icon to place the pattern of the seta (copied in step 4) onto the path that was created in step 6 (Figure 4).
8. Using the nodes tool  (**F2**) the length and curve of the seta can be adjusted.
9. Continue steps 6 to 8 until all the setae required have been added.
10. The weight and fill of the setae can be changed via the 'Fill and Stroke' dialog box `Object > Fill and Stroke (Ctrl + Shift + F)` (Figure 5). Changing the fill of setae to white gives the image perceptual depth.

The SVG file used as the example in this tutorial and shown in Figure 5 (right) can be downloaded from [GitHub](#). Please note that Windows has poor support for SVG files. To avoid frustration, it's a good idea to install Inkscape prior to trying to view SVG files.

Samuel Brown

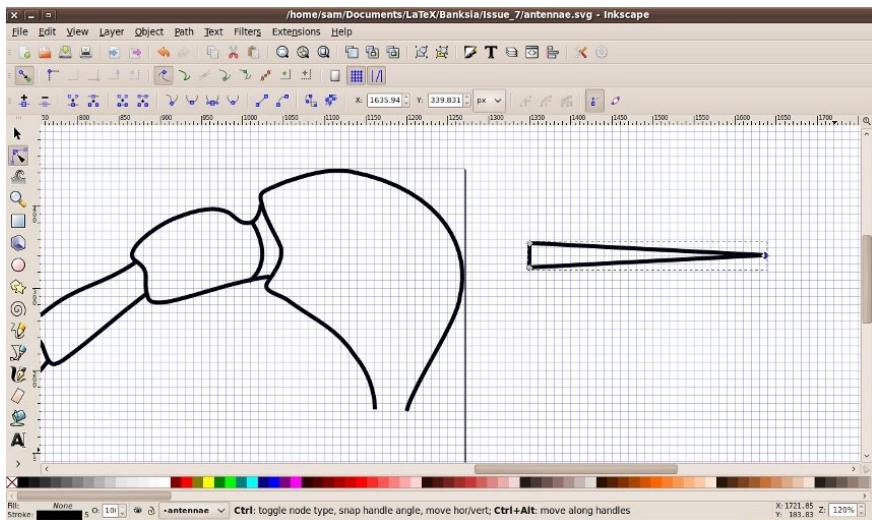


Figure 1. Vector graphic drawing of a beetle antenna. To the right is the isocoles triangle that will form the template for the setae.

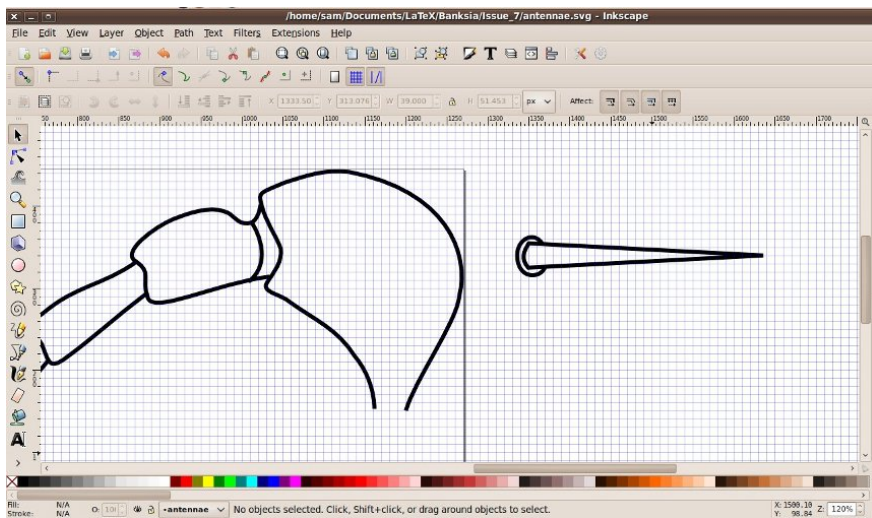


Figure 2. Seta with base added.

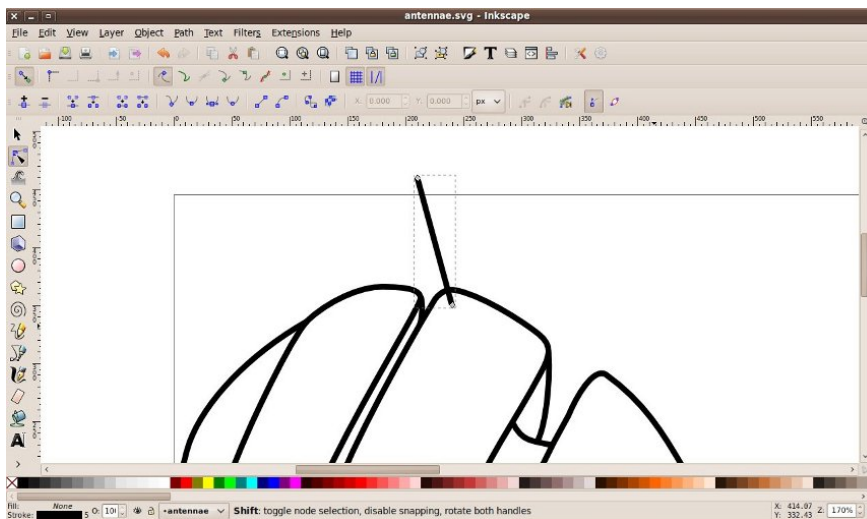


Figure 3. Line that forms the path for the seta.

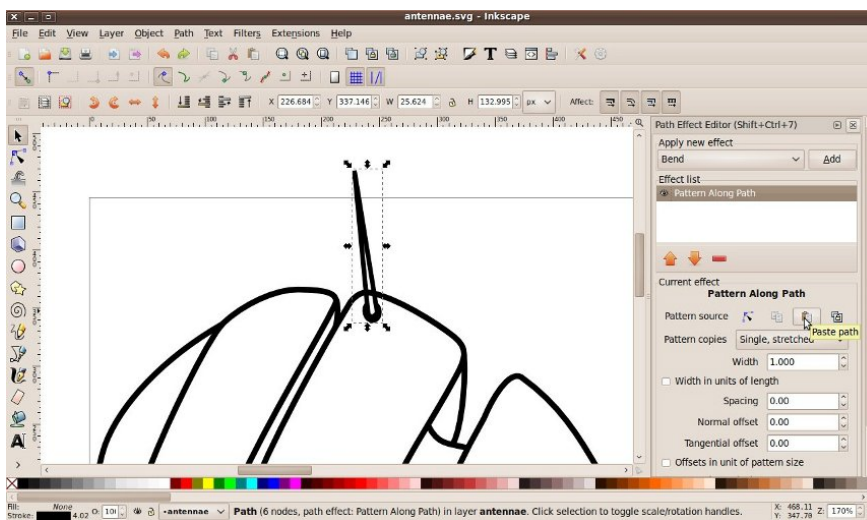


Figure 4. Seta template added onto path.

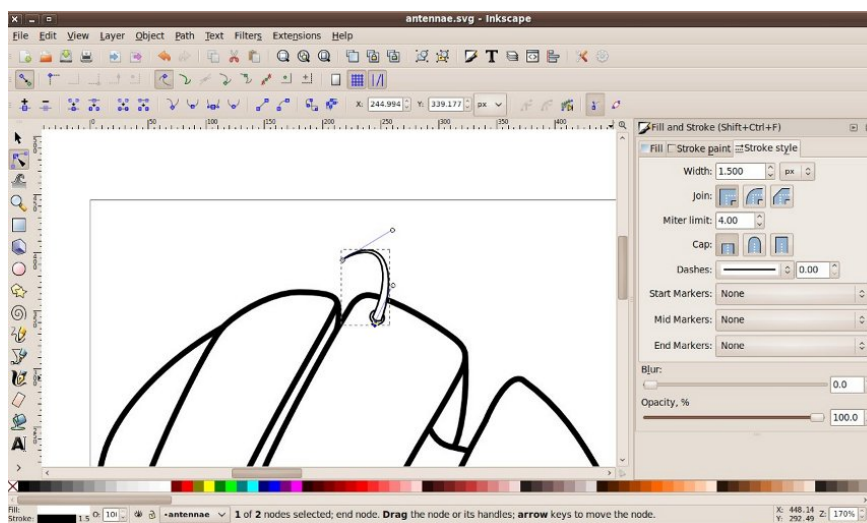


Figure 5. Modifying the line weight, fill colour and adding a curve to the seta.

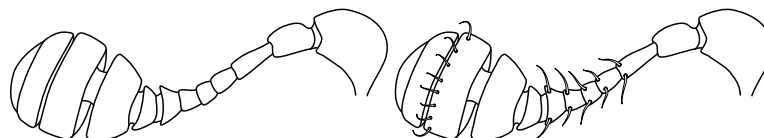


Figure 5. Drawing of antenna, showing the starting image (left) and the same image with added setae (right).

About the Society

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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.