



August 2026

Issue

No. 647

CIRCULAR OF THE ENTOMOLOGICAL SOCIETY OF NEW SOUTH WALES Inc

Hello Members,

This edition includes a contribution from a young amateur entomologist and from a professional. Mike Bouffard has provided an endearing story of his grand-daughter and her interest in rainbows and entomology. Bernie Dominak recently retired from NSW DPI where in his later years he helped other entomologists and agricultural scientists put some words around many entomological stories. Bernie has put together a snapshot of what goes into a scientific paper and some traps for young (and old) players. Maybe this might be useful for members struggling to put together stories for either General and Applied Entomology or Tarsus.

Once again, we can ensure that each edition of Tarsus is of maximum interest to members if we have members contributing articles or simple observations and photos. My wife and I recently visited Carnarvon Gorge in Queensland. Here are a few happy snaps from that trip.

Kind Regards

Garry Webb

Circular editor

The Rainbow Box

Mike Bouffard

My 11-year old granddaughter, Indigo Igbinosun, has always had a fascination for the rainbows that appear over the Derwent River near Hobart. Recently, she asked if I could put together a display case of beetles in the shape of a rainbow. Not only did she produce a design for the project, but she also helped to construct the different coloured arches along the way. During this project, we received sound advice from both her mother, Danielle Bouffard, and my colleague, Jocelyn Bornemissza.



Components of a science manuscript and their purpose.

Dr Bernie Dominiak

Many science writers learn on the job and may not fully grasp the function of each component of a scientific manuscript. Certainly, for at least half my career, I received little guidance. I looked at how others wrote and tried to understand what was required. Many university students are instructed in scientific writing and they are fortunate. Fortunately, I became aware of a book “Scientific writing = thinking in words” authored by David Lindsay and published by CSIRO. The second edition was published in 2020 and available online. The text is easy to read and contains 165 pages of guidance. We recommended this text when I was the *Scientific Publication Coach* in the last five years of my career in DPIRD. The following text is a crystallization of that book, along with some of my experiences. Just to be picky, remember that we write a “manuscript” (inferring a handwritten text) and this is what my text is about. Once your manuscript is finalised, it is submitted to a journal, and if it is accepted, it becomes a published “paper”. The words “manuscript” and “paper” are not interchangeable. The process of publication and negotiation with the journal is an entire subject to itself.

For now, I will address the issue of writing manuscripts. But scientists and authors (they are not necessarily the same) need to embrace why they write in the first place. We can hang all sorts of fancy-pants words to describe science writing but basically I see it as a *knowledge transfer document*. What use is it if we acquire knowledge but do not share it. The work or science might as well not be done.

So, who are we writers sharing our newly acquired knowledge with? I am advised that there are at least five billion people in the world with a computer and access to the internet. Only a small percentage of that world readership has English as a first language. That is your potential readership and we need to write appropriately. Many years ago, the science world adopted a standard presentation for manuscripts and papers, and that is the subject of my text. The standardisation of format allows reader to follow a logical sequence for knowledge transfer – there are no surprises in the flow of scientific transfer. So, let’s look at standard structure.

Manuscript structure

Title

Authors

Affiliations

Abstract or summary

Key words

Introduction

Materials and methods

Results

Discussion

Acknowledgement

References

Tables and figures

Conversely, review papers are increasingly common. After the materials section, authors can make up their own sections to lead the reader through the revision in an orderly and logic flow. However, these reviews still need to draw the reader to your final summation in a discussion and conclusion.

Title

Our scientific knowledge is doubling about every decade – certainly, it is in the fruit fly world. There were 3,600 items of fruit fly knowledge in 2010. Likely, there were 7,200 items by 2020. Google search engines are delivering an ever increasing number of fruit fly alerts to my email. But my time is finite. How does an author cut through all those titles (alerts) to be my attention – me as a potential reader and consumer of their knowledge. The first filter I use is a scan of the titles. So, writers need to get my attention in the title. One technique is to give the results in the title. Perhaps “Fruit flies disperse less than 400 metres in a lifetime” might be better than “The impact of dispersal distance on quarantine measures”. My preferred approach is giving the answer in the title.

Another approach is a catchy title. A paper with a title “It’s raining men” was a paper on the aerial dispersal of sterile male insects. This title is from a famous song when my daughters were all doing dance. However, the more conservative writers may not embrace this approach. And certainly, some journal editors will not accept catchy titles. The main take home message is that title is an important tool to get the potential reader’s attention to your paper – and hence to facilitate knowledge transfer. The title is the first hook to get a potential reader to look further.

Authors

There are national guidelines for what entitles a contributor to be invited to coauthorship. Basically, it must be a “significant” contribution but there is not clear definition. Those with a lesser contribution are recorded in the “acknowledgements”. Disputes about authorship are the most common issue requiring dispute resolution. So get this sorted very early – this is important! My approach is to write an email to the likely contributors briefly outline the project – and identifying the lead author, submitting author and all likely coauthors. Ask for agreement by return email. This can be changed by agreement if coauthor circumstances change. One’s relative position in the author order may influence how much time you commit to the project.

Traditionally, the lead author is the most desirable position. Notionally, this is the person who does most of the work and can defend the science. Second position in the author order used to be desirable when citations included the first two authors. However, I am not aware of any journal that still uses the two-author format. Last position is traditionally for the mentor of the project, or the primary writer. I view this as a desirable position in the author order.

Some recent articles suggest that the best author is the *submitting author* as they must (on behalf of all the coauthors) defend the manuscript to the journal editor and their reviewers. The submitting author must address every comment by each anonymous reviewer. One of my manuscripts had five reviewers, some with contradictory guidance. This is a time consuming function.

The submitting author can be any of the authors. Be aware that there is not such creature as a “submitting acknowledgement”. I have been given data to write up on behalf of several scientists, too busy to “write it up”. But I was advised that I was not to be a coauthor and that my efforts only warranted an acknowledgement. I invested my time accordingly. Often, the email address of the submitting author is provided in the paper if a potential reader wants to reach out for discussions.

In summary, authorship can be contentious so sort it out early. Of course, if you are the sole author, then life is sweet. Finally, my perception is that the first, last and submitting positions in the author order are preferable. However, I am a pragmatist – for me, any coauthorship is a good location in the author order.

Affiliation

This information is usually the organisation that you work for and who have paid for your time to write. Coauthors can have multiple affiliations. Now that I am no longer working for an organisation, I provide my home town and postcode – I have no affiliation.

Abstract or Summary

The second hook (to get a potential reader to read on) is the abstract. If you can’t maintain the reader’s interest past here, then you have lost the reader. It does not matter how earth shattering your science is, you have lost the reader.

Generally, the summary is 200-600 words. I use a sentence for each component (introduction, methods, results, etc) and try to highlight the learning outcomes (results) and how these might be used. I write this section last because everything is sorted in my head by now. Unfortunately, not all research provides the results you expected so write this section last.

Key words

“Key words” are NOT the key words in your manuscript. These words are additional information (words) not in the title and these additional words are designed to help search engines to find your paper and better inform readers when they do searches on a particular subject. Therefore, none of the words in the title should appear in “key words”.

Introduction

This section is to provide a background to why your science was done. It *introduces* the reader to the general subject and often leads into what you did. Writing instructors talk about a funnel shaped approach for the introduction. The first paragraph might detail the world situation. The second paragraph will likely provide an Australian context. The third paragraph might focus on the NSW position. Providing financial implications in any of these is usually an attention getter and demonstrate the gravity of the information that you are sharing. There may be other paragraphs to flesh out some concerns. The last sentence in my introductions usually starts – “Here, we” which focuses the reader to the point of what was done and why.

There is disquiet about the use of large language models (LLM) in science writing. It took me a while but now I use LLMs to write the first three paragraphs. I specify different lengths (number of words) for each enquiry, often 600 words, 400 word and 200 word for the first three paragraphs. We all know LLMs are imperfect and they provide false citations. LLMs

“scrap” (or trawl) the internet for information and LLMs have no idea what is fact and what is fiction. So, I review the LLM text, correct and modify. The references must be checked for reality. I usually add other references (from my e-library) if I am familiar with the subject. LLMs are not for everyone but it does shorten writing time. Importantly, any use of LLM needs to be reported in the methods or in the acknowledgements. I have a standard line such as “*Copilot* was used to construct some text; this text was modified by the authors and references were provided from my library or *google scholar*.”

Some journals do not abide the use of LLMs. LLMs are just tool in my view; we no longer have typing tool (usually female) to type up our handwritten manuscript; we don’t use wet photocopiers anymore; we no longer use facsimiles; we use email – not snail mail; we use spatial mapping programs (not Letraset and clear acetate as from my lucerne aphid days); etc. LLMs are just a tool but need to be recognised in the manuscript. Often, I find LLMs claim stuff that I had not considered so they can provide another perspective.

Materials and methods

This is the basis of your entire work so write this first. The methods must be written so that they can be given to anyone in any country. Those people should be able to perform the same experiments (given the same resources) and get the same result. Therefore, methods are often very detailed. If you use a google search or LLM, then this should also be detailed in this section.

Results

Write this section second. The writer should present only their results. Generally, there is no discussion with other work in this section. Results includes tables and figures. I stack tables and figures at the end of the manuscript after the references. This allows the journal production team to place tables and figures where they best fit on the journal’s page. Personally, I don’t like tables and figures in the middle of text because they interrupt the flow of text. Some journals do not like text to duplicate information that is in tables. However, I believe that data in tables and figures needs some explanation. The writer needs to be creative to disguise this “duplication”.

Discussion

This is where the writer puts their results in context to other published science. There are some pitfalls in language. Your results do not support other results – the language should be “...results consistent with ...”. It is just as important to report negative or unanticipated results as it is to report favourable or expected results. I always like to provide to the reader with the benefits of my learnings so I use: “we speculate that ...” to help point the reader in more valuable avenues of experimentation.

Conclusions

This is the final nub or crystallisation of all your work. In shorter sentences, summarise the good points of your work. Equally important, point out negative results so that other researchers will not waste their time in exploring those options. My final sentence always points to what such be done next. You might not get to do that next step but others might. Remember, your paper is about sharing knowledge because knowledge is power.

Acknowledgements

This is where we acknowledge those who helped us reach the finalisation of the science but whose contribution is regarded as not a significant contribution. Again, there is a national guideline for this section. Usually, I am generous with acknowledgements as it costs nothing to give. I view it as a scientific “thank you”. Acknowledged contributors are more likely to help in the future if their contribution is recorded. Some people use acknowledgements to support their claim for progression interviews and similar. Acknowledgements demonstrate an ability to be a team player which is important in most careers.

Statements

Many journals want a “no conflict of interest” statement. Some journals want a specific funding statement or project number. If there was no specific funding, this is plainly stated. Some journals want to know each author’s contribution in about six categories – I suspect that this is designed to eliminate “authors” who really didn’t contribute enough to be an author. There may be some negotiation between authors to prevent offence and to gain a balance and acceptable breakdown of contributions.

Also, I include the LLM statement here. DPIRD supported *Copilot* because it forgets everything when the session is closed. Some LLMs retain your information which might become available to anyone anywhere who might ask similar questions, or so we are advised. Many organisations sign and pay for open access agreements (eg CAUL) – these arrangements should be stated here.

References

This is list of citations from within your text. It is not a list of further general reading. There are about three main formats. Each journal has their own requirements. I am very familiar of this society’s format so usually I write in that format and convert if I pick a journal with a different format. Some purists advocate that the writer should pick the journal first and write in that format. However, if this journal rejects the manuscript, the writer is likely to be up for a reformat anyway. Choose what suits you best.

One difference is that research papers have about 20 references. Review articles have about 60 references. References are how we show respect or recognition to those who were pioneers in the field. Some scientists have a thing about self-citation and there is software to identify the level of self-citation. However, if a writer works in a particularly narrow field for decades, and other scientists in the same field do not publish, then the writer’s self-citation increases. I recognise there is a balance – I raise this issue so that you are aware of it.

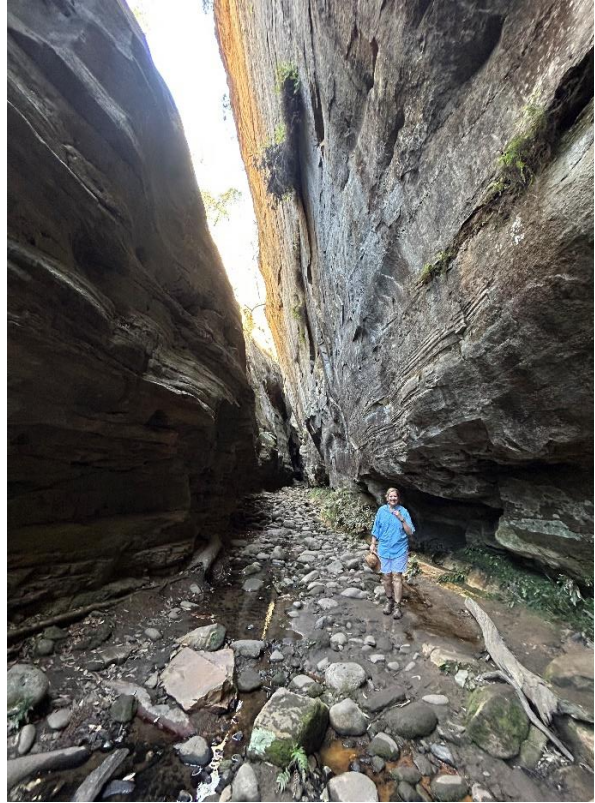
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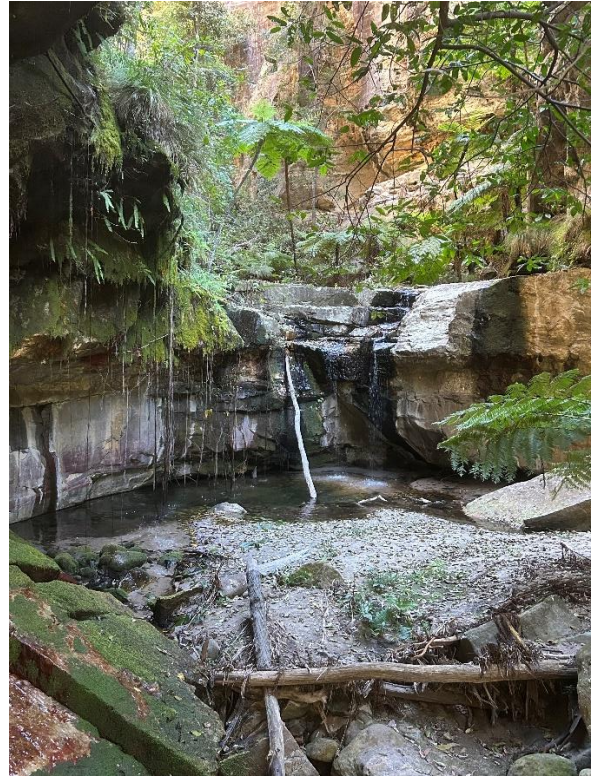
Each journal has their format requirements. I stack my tables and figures at the end of the manuscript.

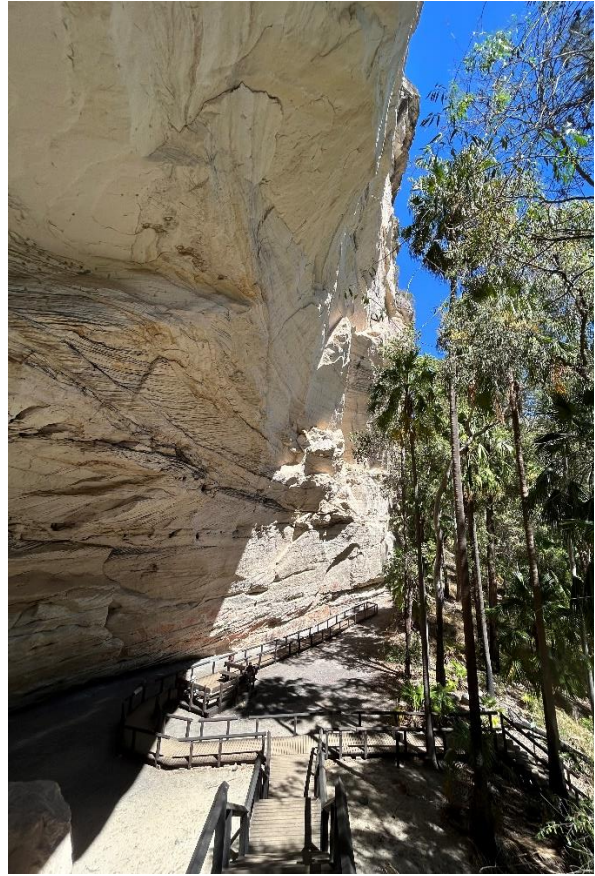
Final guidance

Much of my guidance is what I have worked out worked for me and how I operate mentally. But everyone has to find what works for them. Again, I recommend the book “Scientific writing = thinking in words” which explains all this much more eloquently than I have. So, get writing and I hope my words are beneficial to some.

Carnarvon Gorge







New Entomological Research

(Right Click on the titles (or CTRL Right Click) to see the full articles)

[How Insects Conquered Land Was Stranger Than Scientists Thought](#)

Before insects ruled the skies and reshaped life on land, some of their ancestors may have paddled through shallow coastal water on rows of abdominal limbs. Today, insects occupy nearly every terrestrial environment and account for more described species than any other animal group. Their rise helped transform early land ecosystems by moving nutrients, breaking down organic matter, and eventually forming complex relationships with plants. Yet the origins of this extraordinary success have remained difficult to trace because the earliest stages of insect evolution are poorly represented in the fossil record. A newly identified species from western Texas now offers a rare view of that missing history. Named *Chosha praecursor*, the animal lived about 324 million years ago during the Late Mississippian and combined the defining anatomy of an insect with paddle-shaped abdominal limbs suited to life in water.

[Ant Colonies Pulse Like a Physical System, And Scientists Are Beginning to Understand What Triggers Them](#)

An ant nest can appear to be a jumble of tiny bodies moving independently. But every so often, something remarkable happens: much of the colony springs into action almost at once. These sudden flurries, known as activity bursts, are followed by stretches of relative calm. Scientists compare these bursts to phase transitions of physical systems and have observed them for decades, but how so many ants synchronize without a leader remains unclear. A new mathematical model, described in a study published in *PRX Life*, suggests that ant colonies suddenly become synchronized after reaching a critical point.

[New Research Questions a Textbook Theory of How Insect Societies Evolve](#)

Inside an ant colony, queens reproduce while workers care for young and maintain a society built around shared labor. For more than six decades, evolutionary biologists have debated whether this extraordinary arrangement, known as eusociality, arose partly because ants, bees, and wasps share an unusual system of genetic inheritance. Research from Arizona State University now challenges the idea that this genetic system can explain the pattern on its own. The study, published in *Current Biology*, examined haplodiploidy, in which females carry two sets of chromosomes while males carry only one. Eusociality initially appeared to evolve more often among insects with this system, but nearly the entire association came from one evolutionary branch: the aculeate Hymenoptera, which includes ants, bees, and stinging wasps.

[A Home Made of Microplastics](#)

In the 1980s, French artist Hubert Duprat collaborated with an insect. Duprat lined an aquarium tank with gold flakes, diamonds, and pearls. Then he added caddisfly larvae and sat back to watch them work. Caddisflies (order Trichoptera) are nature's aquatic collagists. They live most of their lives as larvae on the beds of rivers and streams before emerging as winged insects and briefly taking flight. As larvae, caddisflies craft tiny apartments of sand, pebbles, and bits of wood, mortaring them together with a silk-like material they secrete

from their mouths. These cases, which camouflage and protect the juvenile insects inside and provide ballast in strong current, are remarkable little creations that can resemble a purse, a saddle, or a tube. In Duprat's aquarium, each caddisfly larva slowly built itself a sparkling, jewel-encrusted case. Today these "sculptures" reside in prestigious collections like those of the Centre Pompidou in Paris, France.

[You're Not Imagining It – Some People Really Are More Attractive to Mosquitoes](#)

For many of us, mosquitoes are mostly a source of irritation and annoyance – and if that's all they are to you, you might count yourself lucky. That's because the mosquito is actually the world's deadliest animal, thanks to its unrivaled ability to spread a swathe of harmful diseases, including malaria, dengue fever, West Nile virus, and more. It's estimated that over 1 million human deaths result from this vector every year, so understanding why and how mosquitoes seek us out is a hugely important field of science. In a new study reported in *iScience*, we just got a step closer to solving the mystery and figuring out why mosquitoes seem to be strangely more attracted to some people, while ignoring others.

[Tiny Divers Challenge a Major Theory About Ocean Insects](#)

Pressure-resistant air sacs allow lake fly larvae to dive hundreds of meters and complicate a long-standing theory about ocean insects. Each day, billions of lake fly larvae vanish into the oxygen-deprived depths of Lake Malawi, surviving pressures once thought capable of crushing an insect's respiratory system. Their unusual ability is challenging a long-held explanation for why insects are absent from the open ocean. The larvae (*Chaoborus edulis*) follow a demanding daily migration in the East African lake. During daylight, they descend more than 200 meters into an oxygen-starved "dead zone" to avoid predators. After dark, they return toward the surface to feed, passing through large groups of waiting fish along the way.

[A Wild Parasite Makes Ants Live 10x Longer And Tricks Others Into Worshipping Them](#)

Imagine a parasite that makes you live up to 10 times longer than you naturally would – while also inspiring others to treat you like royalty. It sure seems like a pretty good deal, but of course there's a catch. The parasite just wants to keep you lazy so you'll be easy pickings for a giant predator – the bowels of which are the parasite's preferred breeding ground. It might sound like an intriguing setup for an indie horror movie, but that's the reality for *Temnothorax nylander* ants. Now, thanks to a new study in the journal *BMC Genomics*, we know more about the biology of this bizarre story. When ant larvae of this species are fed woodpecker droppings, they can become infected with the tapeworm *Anomotaenia brevis* – and so begins an insidious cycle.

[Polyphagous Shot Hole Borer – A New Invasive Borer Found in WA](#)

The polyphagous shot hole borer (PSHB; *Euwallacea fornicatus*), an invasive pest, has been detected in Perth, Western Australia. The tiny beetle is part of the ambrosia group of beetles (bark beetles and pinhole borers). However, it is not a pest of timber in service, but rather a major threat to live trees and of particular concern to the nursery, fruit and nut tree industries. As it attacks a wide range of trees (as its polyphagous name suggests), if it becomes established it could affect general amenity trees and have a significant environmental impact. Although not a pest of timber in service, pest managers have a role to play in helping in its detection to prevent establishment in Australia. The polyphagous

shot hole borer was first detected in east Fremantle (WA) in August of 2021 when a member of the public reported symptoms of dieback and dead branches in their maple tree.

[A tiny pest has decimated WA trees, experts warn it could do the same in Qld](#)

An insidious pest the size of a sesame seed could destroy some of Brisbane's urban oases if it makes its way to the east coast, experts warn. The polyphagous shot-hole borer, just two millimetres long, has already decimated 4,800 trees in Perth. Urban greens like Brisbane's New Farm Park could be a target for the beetle due to its Moreton Bay fig trees which have been identified as having "very high" susceptibility as a host species. Experts also fear the insect would decimate north Queensland's \$175 million avocado industry.

[Scientists Ranked 258 Spider Species by Speed. The Fastest Can Outrun You](#)

If you already find spiders creepy enough, you might want to stop reading here.

A new study analyzes the sprinting pace of 258 different spider species, and the fastest of the bunch can easily catch a person walking. The researchers behind the study used a lab setup involving a camera and grid paper mounted on a plastic tray or metal sheet to see which spider species scampered between two points the quickest. It was a type of huntsman spider (genus *Heteropoda*), native to Queensland, Australia, that came out on top: It reached speeds of almost 3.6 meters per second. That's a little over 8 miles per hour, and comfortably ahead of the average human jogging speed of 4-6 miles per hour.

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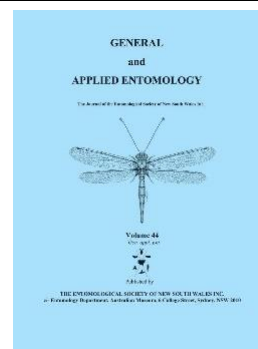
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ISSN 1037-3020