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# ROSTRUM

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Cover image: Blue Emperor Dragonfly, *Anax imperator* Photo by Tania Pogue

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# News from the Editor

From Asia to Africa - the next edition of the International Congress of Entomology is much closer to home.

After a challenging period in Finland due to the aftereffects of the COVID-19 pandemic, the International Congress of Entomology was in full swing in Kyoto, Japan in August 2024. This marked the second time the congress was held in Kyoto, as the city hosted the first ICE in Asia in 1980. Without the lingering threat of the pandemic, the delegates were free to mingle and interact. With a meeting starting off with a visit from Their Imperial Highnesses Crown Prince and Crown Princess Akishino.

It is therefore unsurprising that the meeting was a resounding success. A total of 4041 registered delegates from 82 countries and territories. Over the 205 sessions, there were 2817 presentations. Not only did the conference include a range of academic delegates, but there was also remarkable public input. There was a public art and photography exhibition, as well as sessions open to the public. The ancient Japanese capital made for such an excellent setting that not even the looming threat of Typhoon no. 10 could dampen the enthusiasm at the event. Fortunately, Kyoto was largely spared from the effects of the storm.

The cherry on the cake, however, was the fact that months of hard work culminated in South Africa winning the bid to host the next congress. Congratulations must go to the society president Chris Weldon and the team for their outstanding work. A report back from the lead bid presenter, African Entomology editor Iain Paterson is included in this issue, as are report backs from Emma Stirk and Tayla Swanepoel, recipients of a travel grant.

As it is the end of the year, we need to congratulate our competition winners. For the photography competition, congratulations go to Sam McCarren (April), Torsten Dikow (August) and Tania Pogue (December). Further congratulations to Chia-Yu Chen for winning the Young Entomologists Essay Prize for 2024.

Please do not forget that contributions to Rostrum are welcome all year round.

Shüné Oliver
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# The Entomological Society of Southern Africa Wins the ICE2028 Bid


The XXVII International Congress of Entomology was held in Kyoto, Japan, from 25 – 30 April 2024. It was an amazing congress, with the best that global entomology has to offer. After a plenary address each day, the congress split into 20 scientific sessions which were divided into 175 symposia! On average there were 19 symposia running as parallel sessions every day for 5 days, so there was plenty of choice.

The theme of the congress was New Discoveries through Consilience (the linking together of principles into a comprehensive idea). To encourage linkages between disciplines, the conference app had a function where you could scan the barcode on the nametag of people who you interacted with at the congress, and it would tell you how many sub-disciplines of entomology you interacted with. There were so many great talks, but I enjoyed the Filippo Silvestri Memorial Lecture which was awarded to Dr Goerge Heimpel who talked about biocontrol interventions to save Darwin's finches in the Galapagos from brood parasites. There were also several great talks, including one plenary, about insect diversity, all concluding that Diptera and Hymenoptera are much more diverse than previously thought, and way more diverse than the Coleoptera. I then spent some time in a session dedicated to galling with a heavy focus on Cecidomyiidae, the most hyperdiverse family of the Diptera. Who knew that some cecids specialize in galling the galls of other cecids? Amazing!

The talks were great, but the main reason for my attendance at ICE2024 was to bid for ICE2028 to be hosted by our EntSoc in Cape Town. Over the previous year, members of the EntSoc, led by the President of the society, Prof Chris Weldon, had put together an excellent bid to host the next congress. We were up against some stiff competition, with two other countries bidding for the same congress. On the Wednesday of the congress the South African delegation (Shune Oliver, James Pryke, Des Conlong and I from EntSoc and Adriaan Fourie from WesGrow) presented our bid to the ICE Council. We were grilled with questions and then waited for what seemed like hours outside the meeting room before we heard the outcome. It was so great to hear that we won the bid and I wish that everybody who had worked so hard to put the bid together could have been there. It was such a privilege to represent EntSoc winning the bid.

The XXVIII International Congress of Entomology will be held in Cape Town from **17th – 21st July 2028** at the International Convention Centre. The theme of the congress is **Entomology for a Better Future**. The African Association of Insect Scientists is joining our EntSoc in hosting the congress as we want this to be a congress put on by the whole of Africa for the world. By 2050, a full quarter of the world's population will be in Africa, and we need entomologists to solve the problems of feeding this growing population, protecting crops against pests, reducing the burden of insect borne diseases and protecting biodiversity. ICE2028 will help us achieve this.

It is a very daunting task to organize a congress of this scale and importance. ICE2024 got over 4500 delegates, and we would love to match this. So, it is a huge congress. It will be an opportunity to interact with the best entomologists in the world and showcase the best entomology that Africa has to offer, so save the date now and keep your eyes on EntSoc social media for opportunities for funding.


**Fig. 1:** Iain Paterson, Shune Oliver and Adriaan Fourie very happy after winning the bid for ICE2028.

**Fig. 2:** Origami insects on display at ICE2024 in Kyoto, Japan.

# Report Back on ICE 2024

**Emma Stirk**
River Biosciences and Stellenbosch University

Attending the International Congress of Entomology (ICE) this year in Kyoto, Japan was a transformative experience for me. As a first-time presenter, I had the unique opportunity to share my research while also immersing myself in the broader world of entomology, discovering new areas that I had not encountered before.

The congress brought together experts from diverse fields within entomology, showcasing a wide range of topics in this field. I was amazed by the variety of sessions available, which not only deepened my understanding of my own area of study but also exposed me to fascinating new fields. This experience reinforced my belief that collaboration among different fields of entomology is essential for propelling all disciplines in this subject forward. By interacting and sharing knowledge, entomologists can develop innovative solutions to complex challenges, whether it be addressing biodiversity loss or improving pest management strategies. The insights gained from these diverse perspectives can enhance our collective efforts and drive meaningful progress in the field.

The networking opportunities at the congress were invaluable. I connected with fellow researchers and industry professionals during lunches, commutes, and various sessions. Engaging in meaningful conversations broadened my understanding of different areas within entomology and provided new directions for my own research. These discussions not only illuminated potential avenues to explore but also highlighted the challenges faced by my peers, enhancing the quality of our interactions. I believe that approaching a conference with an awareness of these challenges can significantly enrich conversations and make presentations more impactful. Meeting individuals from diverse fields of entomology expanded my perspective and revealed exciting possibilities for my own work.

**Fig. 3:** The plenary hall at ICE 2024.


**Fig. 4:** Thank you to everyone who had a part in getting me to ICE2024.

Presenting my research on “The Effects of Host Size on Parasitism by *Trichogrammatoidea cryptophlebiae*” for the first time was both nerve-wracking and immensely rewarding. I am deeply grateful for the support I received from ESSA and River Bioscience, which made this opportunity possible. The preparation process pushed me to refine my ideas, enabling me to communicate my research clearly. Standing before my peers—many of whom have years of experience—was humbling. The feedback I received was not only encouraging but also offered fresh perspectives on my work, reigniting my enthusiasm for contributing to the field of biological pest control in agriculture. This interaction reaffirmed my passion for research and motivated me to delve deeper into my topic with renewed energy. As researchers, we often face moments of doubt and fatigue, but attending this conference has truly revitalized my drive.

My time at the International Congress of Entomology was truly transformative. I left feeling inspired and motivated, with a renewed commitment to my research and a deeper understanding of the diverse field of entomology. I look forward to applying what I’ve learned and continuing to engage with the entomology community as I progress in my journey. Thank you, ESSA, for this incredible opportunity that supports the development of many of us young researchers through exposure to the greater world of entomology.



**Fig. 5:** Emma Stirk at ICE2024.

# Report on the International Congress of Entomology (ICE 2024) in Kyoto, Japan from the 25th to the 30th of August

**Tayla Swanepoel**

North-West University

It was an amazing experience to attend the International Congress of Entomology (ICE 2024) in Kyoto, Japan from the 25th to the 30th of August with the theme “New Discoveries through Consilience”. Four thousand participants, researchers, and industry professionals from around the world coming together to share their work from different fields of entomology. I had the privilege to present my work regarding the control of *Phthorimaea operculella*, the potato tuber moth, using selected insecticides in South Africa on an international platform. These results were well received and was highly relevant to potato researchers and entomologists with an interest in agricultural entomology. I had multiple conversations and discussions with some of the attendees regarding my results, as it can be used as an indication of how the susceptibility levels of the potato tuber moth can differ between locations within a country. Some also had some questions and feedback regarding the methodology used for my research. Overall, the feedback was positive, and I have learned from these discussions which is valuable for my future research and to share with my colleagues.

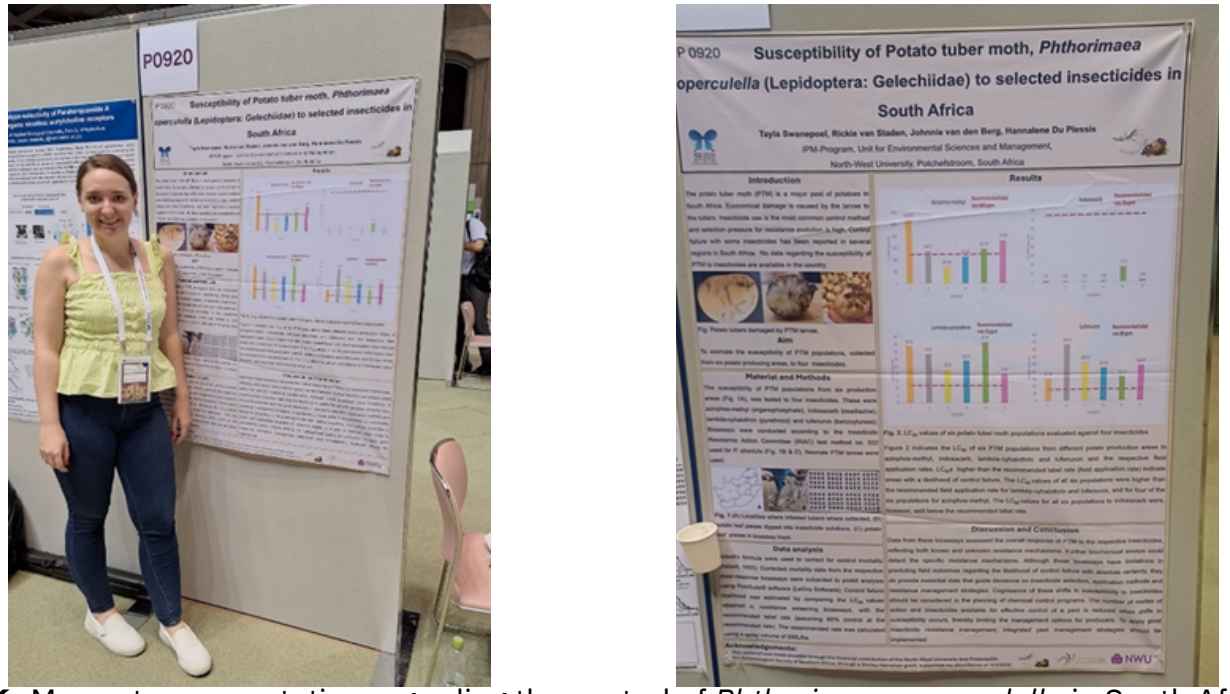



**Fig. 6.** My poster presentation regarding the control of *Phthorimaea operculella* in South Africa.

The congress featured a variety of different sessions, including interesting keynote addresses from renowned experts in entomology. I attended some interesting talks regarding the control of economically important agricultural insects in other countries. From these talks, I have learnt how other researchers rear insects as well as conduct experiments. I will evaluate some of this information and may apply it to my research. I also had the opportunity to meet and talk with a few highly respected researchers in the field of agricultural pests.

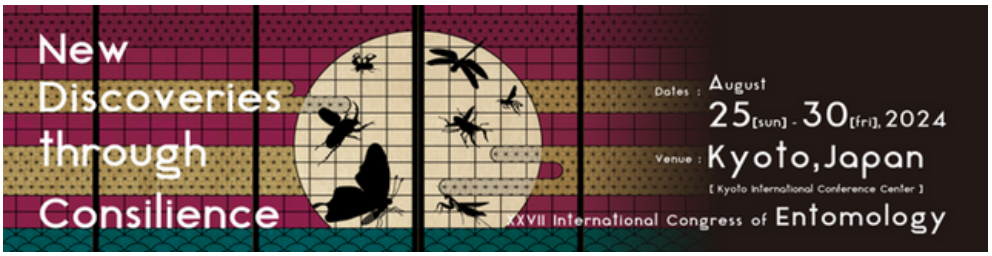
The Committee of ICE2024 also made sure that we had the best time in Japan and experienced some of their culture. Each day, there were exhibitions and sessions where Japanese culture was displayed including original Japanese bamboo crafts, edible insects, and I learnt some Japanese calligraphy and origami.

**Fig. 7**. Origami display and Japanese word for moth.

We had some time to explore the city of Kyoto. On the Saturday, we explored the bamboo forest and the small villages in the surrounding areas. There, we tried some Japanese style foods. We visited a few temples and went to the famous Fushimi Inari shrine and learnt a lot regarding their culture and beliefs. We also saw Kyoto City in the evening from above at 100m high when we visited the Kyoto Tower.

**Fig. 8.** Picture of Higashi-Honganji temple with the Kyoto Tower in the back and our day in the bamboo forest.

Overall, my experience of ICE2024 was great. As this was my first international congress, I have learnt and experienced so much. From meeting industry professionals, learning from other researchers, discovering all the different fields of entomology, experiencing Japanese culture and making new connections, it was an absolute honour and privilege to be invited and present my work. I am very thankful for ICE2008 and the Shirley Hanrahan memorial grant which provided this opportunity for me. I am already looking forward to ICE2028 which will be held in Cape Town.






**Junior art winners**

**Kyoto International Convention Centre**

**Fushimi Inari Shrine**

**Kinkaku-ji: the golden temple**

# Thank you, Kyoto.
# See everyone in Cape Town!

# Secret residents of the Camel Thorn Hotel

**Elleunorah Allsop**

Agricultural Research Council- retired

The camel thorn tree, *Vachellia erioloba*, is an iconic sight in the Kalahari Desert regions. Many of us are familiar with some of its obvious residents, particularly the sociable weavers whose nests can sometimes engulf a whole tree. But the camel thorn has other, more secretive residents that few people are aware of.

If you dig down to the roots of a camel thorn tree, you may just find one of its elusive residents – the ground pearl *Margarodes prieskaensis* (Jakubski). *Margarodes* (Hemiptera: Sternorrhyncha: Margarodidae) are soil-dwelling scale insects. Their larvae feed on plant roots and are protected by characteristic cysts made up of exuviae and waxy secretions. Many species produce cysts with shiny, pearl-like surfaces, hence the common name ground pearls. In the Bahamas these cysts are used to make necklaces. The cysts of *M. prieskaensis*, however, look more like small stones or clumps of clay attached to the roots of their host plants.

**Fig. 9:** Cysts of *M. prieskaensis* attached to host roots.

During winter, mostly between May and August, wingless females and male pre-pupae emerge from the cysts and move to the soil surface with the aid of strong fossorial legs.

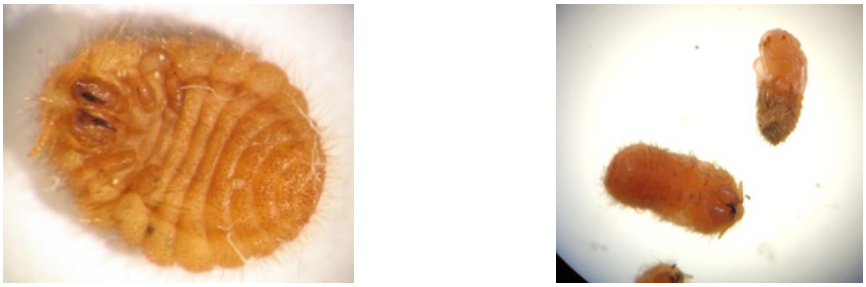


**Fig 10:** Bright yellow female (L) *M. prieskaensis* is larger than the pinkish-orange male pre-pupa (R).

Male pre-pupae emerge first and move close to the soil surface where a pupal cell is formed. They moult into pupae from which winged males will emerge. This whole process takes about eight to ten weeks, depending on temperature.

**Fig. 11:** Pupa and pupal cell.

The females position themselves at the soil surface with the tips of their abdomens protruding above the surface during the day when conditions are optimal for mating, usually between 09:30 and 15:00, where they secrete a pheromone that attracts the males. Where there are high densities of females, the abdomens protruding from the soil look rather like maize kernels stuck in the soil.

**Fig. 12:** Females waiting on the soil surface.

Males have prominent long, waxy filaments at the tips of their abdomens. They are not strong fliers; they move about in a series of hops and short flights close to the ground until they find the females. Adult margarodes do not have functional mouthparts.

**Fig. 13:** *M. prieskaensis* mating.

**Fig. 14:** Female with egg strings.

Mated females move down to the root zone of the host plant and proceed to lay their eggs in strings protected by fine waxy filaments. First instar larvae are free moving but once they attach to a host root, they become sessile and the cysts begin to form. The second larval stage has two phases: during the first phase the larvae feed actively and the cysts increase in size; during the second phase the mouthparts are retracted and the cysts do not increase in size any further. These mature cysts can survive in the soil for up to four years, but possibly even longer, before male pre-pupae and females emerge – clearly an adaptive trait to ensure survival in a desert environment.

The females are highly conspicuous at the soil surface and seem like a great food source, yet during four years of field work none of the numerous birds, including Karoo chats, or other animals like mongooses attempted to catch them. When crushed, the milky yellow fluid oozing from the females has a distinctly unpleasant odour. This supports the conclusion that the bright yellow colour of the females is aposematic.

So why the interest in such an obscure camel thorn resident, you may ask? It is all thanks to the expansion of grape production in the Lower Orange River Valley and in certain parts of Limpopo. Wherever camel thorns were removed to clear land for vineyards, this margarodes happily transferred to grapevine roots. Grapevines, particularly table grapes, are intensively irrigated and fertilized, resulting in a margarodes explosion. Although margarodes infestations tend to be patchy, largely corresponding to areas in vineyards where camel thorns have been removed, they can be spread to uninfested areas with soil and heavy infestations can be devastating. Larvae or nymphs feeding on grapevine roots weaken the root system and shorten the productive lifespan of vines. In some cases where infestations were particularly heavy, grapevines died within four years.

There are four other indigenous margarodes species (*M. trimeni*, *M. greeni*, *M. capensis* and *M. vredendalensis*) that also occur on grapevines roots in South Africa, but they are not of significant economic importance. What makes *M. prieskaensis* unique amongst these is the fact that it is the only species that produces both males and females – the others all produce only females that lay eggs parthenogenetically.

Of course, not every camel thorn tree is infested (I have scouted many trees) but if you are lucky, you may spot the females under the trees during winter.

# Yebo Gogga Yebo amaBlomo 2024 Report

**Ashley Burke**
University of the Witwatersrand

The Yebo Gogga exhibition, held annually at the University of the Witwatersrand (Wits), has become a key event on the ESSA calendar—one we hope to maintain for years to come. This year marked the 23rd edition of this environmentally themed showcase, hosted by the School of Animal, Plant & Environmental Sciences (AP&ES) and funded by the Faculty of Science at Wits. ESSA participated in the exhibition, which took place from 15–19 May 2024.

The theme for this year was “Cycles,” highlighting the importance of sustainability within our planet’s delicate systems. It also emphasized the interconnectedness and appreciation for the often-unseen processes that sustain life on Earth. Insects play crucial roles in ecosystems, including pollination, decomposition, nutrient recycling, and promoting soil health. Without these tiny ecosystem engineers, the planet would be vastly diminished—a concept perfectly suited to the ESSA stand's theme: “From pollinators to decomposers: how insects run the world.”

Our display featured live Madagascan hissing cockroaches, marula fruit flies, and slug moth caterpillars, which captivated visitors (and elicited a few screeches). We also included educational entomology games and quizzes that the learners thoroughly enjoyed. A special thank-you goes to the University of Pretoria for lending us their live hissing cockroaches and marula fruit flies, which caused simultaneous wonder and chaos.

This year’s event saw a record attendance of 1,725 learners on Friday alone, with strong attendance on other weekdays as well. Nearly 3,800 learners and 222 teachers visited the exhibition, bringing the total attendance to about 5,000 people. To say our stand was inundated by enthusiastic and curious visitors would be an understatement. It drew fascination from a broad audience: from Grade 1 learners to matric students, undergraduates, and even parents. Insects are inherently fascinating to all age groups—a fact entomologists know well!

Special thanks go to our president, Chris Weldon, and volunteers Nerissa Bloch and Nompumelelo Baso, for assisting me at the ESSA stand throughout Yebo Gogga this year. We hope to welcome even more volunteers next year to help share the enthusiasm for entomology and manage the workload during this week-long event.

The annual exhibition offers an excellent opportunity to engage with learners, inspire excitement about entomology, and share our research and knowledge with the broader community. It was also a valuable occasion to connect with other societies and organisations, sparking promising discussions with the Lepidopteran Society and SANParks Honorary Rangers—an exciting avenue for future outreach activities.

For those in Gauteng, save the dates for Yebo Gogga 2025, happening from 11–15 May. Next year’s theme, “Connections,” explores the interlinked nature of the natural world.

“Realize that everything connects to everything else.” – Leonardo da Vinci

Donald McCallum, the event organiser, shared this foreword on the 2025 theme:
“The natural world is deeply connected, often in ways we never imagined. Ongoing research continues to uncover new links and sometimes challenges long-held assumptions. Understanding these connections is essential to avoiding unintended consequences and achieving desired outcomes.”

We are already looking forward to planning a bigger and brighter ESSA stand for Yebo Gogga 2025. Contributions from society members are warmly welcomed, whether in the form of volunteer time during the exhibition, insect collection boxes or display items, research posters, banners, or other entomology-themed materials. We particularly encourage students to volunteer, as it offers a valuable opportunity to gain confidence and experience in community engagement.

**Fig. 15:** Early career entomologist represenative Ashley Burke engaging with students at the ESSA stand.

**Fig. 16:** The Madagascan Hissing Cockroach , one of the biggest stars of the show.

**Fig. 17:** ESSA president Chris Weldon hosting the stand.

# ON THE CAUSE OF METAMORPHOSIS OF THE INSECTS ACCORDING TO LAMARCK

**Rob B. Tomms**

Formerly at: Transvaal Museum (Ditsong National Museum of Natural History), now retired. Ashburton, New Zealand

As a postgraduate Zoology student at Wits in the 1980's, I undertook some research on the origin of insects (Toms 1984). With the knowledge that Lamarck had worked on arthropods, I established that there was a copy of his major work at the National Library of South Africa in Cape Town. The next time I was there, I discovered that he had written a chapter on the causes of insect metamorphosis. To the best of my knowledge, this had never been translated into English, so I brought a copy back with me. I asked Pascale Cheselet (Marcelle) if she would help me to translate it, and Christian Peeters if he would check it, and they both agreed. I decided to send our translation to Rostrum and it was published (Toms 1985). Forty years later, I have seen no other translation of this work.

Lamarck clearly anticipated the importance of hormones in metamorphosis, suggesting that insect metamorphosis was comparable with sexual maturation in humans. He clearly proposed that the purpose of the adult insect was for procreation. In his Philosophie Zoologique, first published in 1809, he suggested that among the aquatic worms, were those that afterwards became accustomed to exposure to the air and have probably produced the amphibian insects such as gnats, mayflies etc. Lamarck was possibly the first to suggest that the ancestors of insects were aquatic, and we now know that they were Crustacea. In saying this, he also suggested that the ancestors of Pterygota were amphibiotic, not terrestrial as most Entomologists have argued for the last 150 years. This is definitely worthy of mention in the history of ideas about the origin of metamorphosis. Accumulating evidence suggests that he was correct (Toms 2023), and it has been suggested that metamorphoses arose as a consequence of adaptation to amphibiotic life (Toms 1985, 2023).

I am working on two new papers, one already submitted to SAJS, and found that although the 1985 translation was published, it was not available on the internet, so the possibility of getting it republished electronically was explored. After discussion with the editor, it was decided that the best way to proceed would be to republish it in *Rostrum*.

**Translation:**

One of the most curious and interesting problems of natural history, but also one of the most difficult to resolve, is to know the cause which originally gave rise to insect metamorphosis.

No doubt, one has difficulty in convincing oneself that one could find the causes capable of operating, in the course of the life of an individual, changes as great as those offered by metamorphosis in the insects.

Yet if one pays attention on the one hand to the nature of teguments which the insects must have in their perfect state, and on the other, to the singular changes experienced, while becoming adults, by all animals whose reproduction requires copulation (sexual fertilization), it would seem to me that one would easily find, in the examination and reconciliation of both of these considerations, all that one might wish for to solve the problem in question.

By the first consideration, I remark that it is the nature of all insects having reached the perfect state to have corneous teguments. I have already given the reason for this and have shown that the insects, being articulated animals whose organs of movement are attached to the undersurface of the skin, nature had therefore to solidify their tegument, most (insects) having to move with vivacity and speed, even soaring into the bosom of the air and hovering there. But any living creature, from the first instant of its birth, having to grow until a certain stage in its life, and consequently augment the dimensions of its body and parts, how to operate the growth of an animal if, already in its youth, its tegument is solid and corneous!

Nature was therefore obliged, particularly for those insects which have, in their larval stage, a small amount of growth to undergo, to maintain the body and the parts of the animal in a softened state, with a skin only membranous and extensible. It is also what nature did with respect to the insects which, following their first state, have large transformations to undergo as do the Diptera, Lepidoptera, Hymenoptera, and Coleoptera, of which indeed, the larvae generally have a very soft skin. As nature only operates gradually, it has prepared step by step, in these larvae, the new body and new parts which the animal must have in its final state. This has been accomplished by a series of modifications in the already existing parts of the animal's body, thanks to its softness. This concerns the first consideration: let us now see what belongs to the second, and how nature gets rid of this larval body to produce in the new body which the first already contains in outline, the last developments and the freedom which it must have to fulfil its destiny.

I have already said that all animals which regenerate themselves sexually, as man himself does, of which reproduction requires sexual copulation, undergo peculiar changes in their beings, at the time of adulthood, a time approaching the end of their growth period. One knows that at this time they undergo a remarkable crisis which produces in them a veritably new state.* As this fact is well known, let us examine its source and the results which it can bring, with particular reference to insects.

In imperfect animals which do not regenerate by copulation, reproduction of individuals is simply an extension from their powers of growth, giving rise to the separation of parts which themselves extend to take the form of the individual from which they arose: from this results regeneration by division, and that by gemmules of Infusoria, Polyps and Radiates. For this order of things, nature has no need for any particular regenerating organ; as soon as an individual has acquired its principal development, it has no need to undergo any transformation to regenerate itself.

Things differ greatly with regard to animals which generate by means of sexual reproduction. Effectively, in animals for which reproduction occurs only following fecundation, there is always some mutation, a great or small transformation occurring at a certain stage, because nature only works at perfecting the sexual organs once the principal developments of the individual have occurred.

One knows that nature's work then exerts a real influence on the general state of the individual, submitting it to a sort of crisis. But the influence of this work of nature is not futile; it becomes significant in animals whose internal parts are very sort, particularly if it is favoured by the torpidity to which these animals can be subjected. This is precisely the almost unique case, of the insects.

During the course of their lives, those animals which have a soft skin and great transformations to undergo, fail into a son of torpor greater than that which they experience during their moults; they lose all activity, no longer eat, and remain in this perilous state, although natural, for quite a considerable length of time.

In this state, nature stops feeding the parts of the old larval body which no longer need to be conserved. They have fulfilled their function, by favouring the modification of those parts which developed the elements of the new body. From that time, the old body gets thinner, tightens and consumes itself bit by bit, supplying its own substance to the nutrition of the new body, that is to say, the sort of fact accumulated during its larval state. Nature therefore gives a new direction to nutrition, and in fact tends only towards completing the development of a new body and new parts.

We observe more or less the same thing in the flowers of plants which regenerate sexually. The calyx and corolla of these flowers serve initially to protect the preparation of the essential organs of these same flowers (the pistil and stamens); but at a certain time these envelopes which protected the sexual organs, becoming useless, hindering even (further development) by the complete closure which they initialiy formed, nature gradually stops feeding them and directs the nutrition towards the stamens and pistil, which then acquire their final developments; whilst their common envelopes open, and most of them fall off or desiccate.

In this way, at the time of the animal's life at which the body reaches the end of its own developments, nature having no other objective than the regeneration of the individual to continue the species, then works to complete the development of the sexual organs which were rudimentary up to this point. As this is a significant operation, nature is concerned more than just with the conservation of the individual which is destined to reproduce, occupying itself with new organs, it brings on a crisis, great or small according to the races; a crisis which in the Diptera, Lepidoptera, Hymenoptera and even in the Coleoptera. is much greater than in other known animals. This crisis however generally shows itself in all animals which reproduce sexually by remarkable changes which then occur within their bodies.

In this way, insect metamorphosis, which seems so surprising to us, because we do not consider the products of the circumstances which I have just cited, is but a particular event pertaining to the particular circumstances of these animals, and which is of course related, as all the other facts of organization, to the principles which I have exposed.

The torpidity which these animals undergo at the end of the development of their bodies, the new direction which nature gives to its work while preparing the individual to reproduce sexually, and finally the necessity to maintain the insect larvae in a soft state while they undergo great transformations bringing their internal organs to a kind of fusion: such are the principal causes which seem to operate the spectacular metamorphosis of the insects, and which have for a long time, by habit of execution, traced and prepared in the development of these animals, the course of these great changes.

But all the races of insects are not in exactly the same circumstances; not all have an entirely soft skin in their larval state, not all live habitually in the same manner; finally, one knows that in this respect, there is great diversity amongst them. There is also considerable diversity in the organizational state and in the nature of the metamorphosis of insects.

In fact, in incomplete metamorphosis, nature does not have old bodies to get rid of, but only a few new parts to add to the existing body. In this way, this body having no transformation to undergo, needs neither a great state of softness nor a proper torpor which facilitates an unnecessary transformation. It therefore conserves activity and the need to take food till the end of its life, and during this time of activity nature develops in it, at adulthood, the new parts which it needs, as an insect. at the same time as those which enable it to reproduce.

*****"Amongst the known changes that individuals undergo on reaching adulthood, I will only cite the voice which takes on a particular character, it becomes stronger, lower, and shows that a slight mutation has occurred in the entire body. One knows that other traits if mutation were then observed in the physical state of the individual, also expressed in his perception, inclinations and even his character".

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# ESSA Competitions and prizes

# ESSA Young Entomologists' TRAVEL GRANTS

As part of its aim to promote all aspects of entomology, the Entomological Society of Southern Africa (ESSA) initiated the Young Entomologists' Travel Grants scheme in 2018. The grants are to support young ESSA members from southern Africa to (i) present research results at international scientific meetings or workshops with entomological relevance, or (ii) gain valuable entomological skills and experience by visiting an international research group. By doing so, the ESSA hopes to support the development of professional entomologists, and to broaden the range of skills and global relevance of research undertaken in southern Africa. Each year, a number of ESSA Young Entomologists' Travel Grants, each to the value of up to R25,000, may be awarded.

**ELIGIBILITY AND CONDITIONS**

To be eligible for an ESSA Young Entomologists' Travel Grant, applicants must satisfy ALL of the following criteria:

• Paid student or ordinary member of the ESSA for a minimum of two consecutive calendar years

• Resident and/or registered as a student or postdoctoral associate/fellow in a country within the Southern African Development Community (SADC; i.e., Angola, Botswana, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia, Zimbabwe)

• Thirty-five (35) years of age or younger, or within five years of completing a PhD (if older than 35) on the closing date for entries

• Accepted to give an oral presentation at an international conference or workshop outside of the applicant's country of residence and/or received notification of willingness to be hosted by an international researcher

The amount awarded will be determined based on a detailed budget provided by the applicant. Return international economy airfares and accommodation are the only allowable expenses in the budget. Conference registration fees and daily allowances must be paid by the applicant.

Applicants awarded an ESSA Young Entomologists' Travel Grant must submit a two-page report, including appropriate documentary photographs, to the ESSA within one month of their return to their country of residence. The report will will be published in *Rostrum*, the newsletter of the ESSA.

**HOW TO APPLY**

Applicants must complete the application form here, attach the required documents, and provide a cover letter of no more than one page explaining how receipt of an ESSA Young Entomologists' Travel Grant will benefit their development as a professional entomologist and the discipline of entomology in southern Africa.

Applications must be received no less than two months prior to the proposed date of departure.
Submit entries to the ESSA President, Prof. Chris Weldon,

by email: cwweldon@zoology.up.ac.za

Applications will be assessed by the ESSA Executive Committee based on the following criteria:

• Fulfilment of all eligibility criteria

• Quoted budget realistic and justified

• Quality and persuasiveness of cover letter

**ENTRY CLOSING DATE**

There is no closing date for applications to the ESSA Young Entomologists' Travel Grants scheme. All applications received no less than two months prior to the proposed date of departure will be carefully considered in each calendar year and grants will be awarded based on the availability of funds.

# ESSA Competitions and prizes

## ROSTRUM PHOTOGRAPHIC COMPETITION

This is the first announcement of the 2025 photographic competition. Entries are to be sent to Shüné Oliver (shuneo@nicd.ac.za), and the entries will be judged by the *Rostrum* editorial committee as well as the ESSA executive committee and ESSA members. Four overall winners will be chosen, and each will be featured on a *Rostrum* cover. Each winner will receive a cash prize of R1000. Entrants are open all year round. By entering this competition, photographers automatically give permission to the ESSA to use their images in *Rostrum*, Neither the ESSA, nor *Rostrum* will use the image for financial gain and the image remains the property of the photographer. Please include your full name and organisational affiliation within the email body. A brief description of the subject matter of the image(s) should also be supplied, including insect identity where possible, to explain how they address the competition theme.Please save each submitted entry as follows: First name Surname_photo name, e.g., Jane Smith_ honey bee1.jpeg

**Fig. 18:** Photo by T. Bellingan.

# ESSA Young Entomologists' ESSAY PRIZE

As part of its aim to promote all aspects of entomology, the Entomological Society of Southern Africa (ESSA) initiated the Young Entomologists' Essay Prize in 2014. The prize is to encourage discussion and critical evaluation of entomological issues relevant to Southern Africa by upcoming amateur and professional entomologists.

In each year that the prize is made available, an essay topic on a current issue facing the entomological profession in southern Africa will be set. Essays should be original and thought provoking. Reference to published sources of information should be kept to a minimum but are necessary when claiming a fact or providing evidence and examples. The essays must be written in English and should be between 1000-1250 words in length. Numbered referencing should be used for in-text citations. A list of cited references should be included but does not contribute to the word limit.

Entrants for the ESSA Young Entomologists' Essay Prize must satisfy ALL of the following criteria.
Entrants must be:
• Paid-up student or ordinary members of the ESSA.
• Residents, or registered as a student or postdoctoral associate/fellow, in a country within the Southern African Development Community (SADC; i.e., Angola, Botswana, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe).
• Thirty-five (35) years of age or younger on the closing date for entries.

Entries will be assessed by the ESSA Executive Committee, who may also call upon other members of the ESSA to contribute to the assessment.

Assessment will be based on the following criteria:
• Comprehension of the topic
• Clear placement of the argument within the context of southern Africa
• Originality of ideas
• Persuasiveness and coherency of the argument
• Appropriate and effective use of facts, evidence or examples
• Grammar and spelling

The winning entrant will receive a certificate and be awarded a cash prize of R2000. The winning essay will be featured in Rostrum, the newsletter of the ESSA. Readers of Rostrum will be invited to respond to the essay in the following issue. Only one prize will be made in each year that it is available.

It is understood that the winning entry contains the views and opinions of the winning entrant. These views and opinions will not necessarily reflect those of the ESSA.

The topic from 2024 is: "**New technologies to solve old entomological problems**". In this essay, we encourage engagement in a manner that would be of interest to the broader entomological community. Entries close on 30 November 2024. Entries must be sent directly to Shüné Oliver (shuneo@nicd.ac.za).

# Young Entomologists Essay Prize Winner 2024

## Driving Change: Gene Drive as a Possible Solution to Southern Africa's Entomological Challenges

**Chia-Yu Chen**
**University of the Witwatersrand**

Southern Africa faces persistent challenges from insect pests and disease vectors which negatively impact public health and agriculture. Mosquitoes transmitting malaria and agricultural pests such as the fall armyworm underscore the urgent need for innovative solutions. Conventional control methods often rely on chemical insecticides which can have adverse environmental impacts and can decrease in efficacy over time due to the development of resistance.

Gene drive technology offers a revolutionary approach to addressing these issues by harnessing genetic engineering to manipulate insect populations in a targeted and sustainable manner. Gene drive systems are designed to bias the inheritance of specific genes, enabling them to spread rapidly through wild populations. Unlike traditional Mendelian inheritance, where a gene has a 50% chance of being passed on, gene drives can increase this probability to nearly 100%, facilitating rapid dissemination throughout an insect population [1]. This capability has significant implications for controlling insect-borne diseases and suppressing pest populations.

Gene drive technology leverages gene-editing tools such as Clustered Regularly Interspaced Short Palindromic Repeats and CRISPR-associated protein 9 (CRISPR/Cas9, a specialised type of molecular scissors) to ensure a disproportionate number of offspring inherit the desired genetic trait. These traits can be used to either suppress or modify target insect populations. Suppressive gene drives aim to decrease population size by imposing significant fitness costs, such as disabling critical genes involved in sex-specific survival such as preventing female development, or reproduction (reducing offspring fertility or skewing the sex ratio toward males). Alternatively, genes that shorten the lifespan of the target insects can be introduced. These approaches are expected to lead to population declines or even collapse, potentially achieving global eradication of the target species. On the other hand, gene drives for population modification, particularly in disease vector control, focus on altering the genetic makeup of target populations to reduce their ability to transmit diseases. This can be achieved by introducing genes that either kill pathogens within the insects, produce molecules that block pathogen development, or disable genes essential for pathogen transmission [2].

One of the most promising applications of gene drive technology is for the control of malaria vectors. Malaria, a significant public health burden in southern Africa, is transmitted by *Anopheles* mosquitoes. Despite intensive efforts involving insecticide-treated nets, indoor residual spraying, and antimalarial drugs, achieving malaria elimination has been challenging. Gene drives can target *Anopheles* mosquitoes to significantly reduce their numbers through traits that induce sterility or collapse populations over generations.

For example, A CRISPR-Cas9-based approach targeting the *doublesex* (*Agdsx*) gene critical for female development resulted in female *Anopheles* mosquitoes exhibiting an intersex phenotype which made them completely sterile. When this gene drive was introduced into a caged mosquito population, it spread rapidly, achieving 100% prevalence within 7 to 11 generations where the gradual decline of egg production ultimately led to the total collapse of the population [3]. Alternatively, population modification approaches can introduce genes that confer resistance to *Plasmodium*, the malaria parasite, thereby preventing mosquitoes from transmitting malaria [4]. This strategy has the advantage of maintaining mosquito populations in their ecological roles while interrupting disease transmission.

In agriculture, gene drive technology could revolutionize pest management. However, while CRISPR/Cas9 systems have enabled many successful studies on gene function, a sustainable gene drive system remains technically challenging for agricultural pests. This is because many agricultural pests are polyphagous with more complex genomes. Gene drive systems rely on highly efficient regulatory elements for proper functioning. However, the regulatory elements commonly used in insect pests, such as the fall armyworm, show relatively low efficiency, limiting their practical application in gene drive technology. Moreover, delivering CRISPR/Cas9 components through embryonic microinjection is technically demanding and associated with high mortality rates in fall armyworm eggs. This limits the feasibility of creating a stable gene drive lineage [5].

While gene drive technology holds immense promise, its deployment raises ethical and ecological concerns that must be addressed [6]. The release of gene-drive organisms into the environment could have unintended consequences, such as disrupting food webs or enabling gene flow to non-target species. Comprehensive ecological risk assessments are essential to mitigate these risks. The highly mobile nature of insects also raises concerns about gene flow across borders, necessitating international cooperation and consent. Altering wild populations involves moral questions about human intervention in nature, emphasizing the need for inclusive stakeholder engagement and public consultation to ensure ethical deployment. Additionally, target populations may develop resistance to gene drives, reducing their long-term efficacy. Ongoing research is therefore needed to design robust and adaptive gene drive systems to overcome these challenges.

The successful deployment of gene drive technology in southern Africa requires robust regulatory frameworks and governance mechanisms. Laboratory and field trials should adhere to stringent biosafety protocols to minimize risks. Transparency and social acceptability can be enhanced through involving local communities, policymakers, scientists, and conservationists in decision-making processes. Regional collaboration is crucial for harmonizing regulations and monitoring gene drive impacts, given the transboundary nature of insects. Aligning with international guidelines ensures that gene drive research adheres to ethical and ecological standards. Establishing these frameworks will be instrumental in enabling the safe and effective application of this technology.

Gene-drive technology represents a transformative tool for addressing long-standing entomological challenges in southern Africa. By targeting disease vectors and agricultural pests, gene drives have the potential to improve public health, enhance food security, and support sustainable development. However, realising these benefits requires careful consideration of ethical, ecological, and regulatory factors. With robust governance and inclusive stakeholder engagement, southern Africa can harness the power of gene drive technology to build a resilient future. As the region confronts the dual challenges of climate change and population growth, innovative solutions like gene drive systems are not just desirable but necessary. By investing in research, capacity-building, and public dialogue, southern Africa can position itself as a leader in the responsible use of gene drive technology, setting a precedent for sustainable innovation in entomology.

# References


1 Naidoo K and Oliver SV, Gene drives: an alternative approach to malaria control?, Gene Ther:1–13, Nature Publishing Group (2024).

2 Devos Y, Mumford JD, Bonsall MB, Camargo AM, Firbank LG, Glandorf DCM, et al., Potential use of gene drive modified insects against disease vectors, agricultural pests and invasive species poses new challenges for risk assessment, Critical Reviews in Biotechnology 42:254–270, Taylor & Francis (2022).

3 Kyrou K, Hammond AM, Galizi R, Kranjc N, Burt A, Beaghton AK, et al., A CRISPR–Cas9 gene drive targeting doublesex causes complete population suppression in caged *Anopheles gambiae* mosquitoes, Nat Biotechnol 36:1062–1066, Nature Publishing Group (2018).

4 Gantz VM, Jasinskiene N, Tatarenkova O, Fazekas A, Macias VM, Bier E, et al., Highly efficient Cas9-mediated gene drive for population modification of the malaria vector mosquito *Anopheles stephensi*, Proceedings of the National Academy of Sciences 112:E6736–E6743, Proceedings of the National Academy of Sciences (2015).

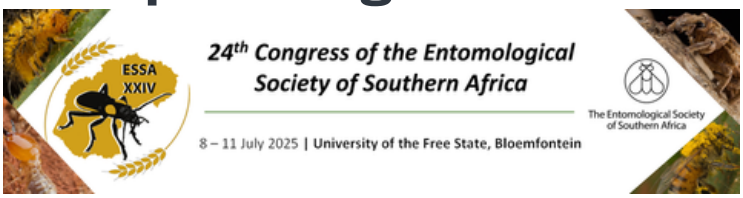
5 Salum YM, Yin A, Zaheer U, Liu Y, Guo Y, and He W, CRISPR/Cas9-Based Genome Editing of Fall Armyworm (*Spodoptera frugiperda)*: Progress and Prospects, Biomolecules 14:1074 (2024).
6 Champer J, Buchman A, and Akbari OS, Cheating evolution: engineering gene drives to manipulate the fate of wild populations, Nat Rev Genet 17:146–159, Nature Publishing Group (2016).

# New ESSA members

We would like to welcome the following new society members:

Marelize Faul - Private
Rudi Swart - Nelson Mandela university
Justine Hambelela - University of Namibia
Tshepiso Motolo - University of the Free State
Akhona Mbatyoti - Agricultural Research Council
Tristan Coetzee - Nelson Mandela University
Jeanelize van den Heever - Stellenbosch University

# Upcoming events




## THE 24th ESSA CONGRESS IS COMING

We are delighted to invite you to the 24th ESSA Congress, which will be held at the University of the Free State, Bloemfontein campus. We are particularly excited to welcome our fellow entomologists to this in-person event, with the conference running 9–11 July 2025.

Bloemfontein offers a unique setting for entomological research and exploration. The region's diverse habitats and ecosystems, spanning from grasslands to semi-arid environments, provide a fertile ground for studying various insect populations and their ecological interactions. This biodiversity, coupled with the economic importance of agriculture in the Free State, creates numerous opportunities for impactful research and collaboration. The National Museum in Bloemfontein has significant collections and exhibitions related to invertebrates. Many habitats alone could be visited via the Botanical Gardens and Naval Hill, which sets to highlight the "rich tapestry".

The facilities at the University of the Free State are equipped to host and provide an excellent environment conducive to academic exchange and networking.

Our logo, featuring the carabid ground beetle *Anthia thoracica* (commonly known as the oogpister), symbolises insect conservation and the unique entomological heritage of our host region. These beetles are known for their distinctive appearance and ecological importance. The inclusion of wheat in the logo highlights the intersection of entomology with agriculture, underscoring the critical role that our research plays in supporting and protecting vital industries.

We look forward to welcoming you to Bloemfontein, where you will have the opportunity to engage with leading entomologists, participate in stimulating discussions, and enjoy the vibrant social and academic atmosphere of the University of the Free State.
We hope to see you in Bloemfontein for an enriching and unforgettable ESSA XXIV in 2025!

For more information, keep up to date on the website:
**https://essaxxiv.carlamani.com/**


## Social Media to follow

Don't forget to follow us on social media:

Facebook: The Entomological Society of Southern Africa

X: @entsocsa

Instagram: @entsocsa

Website: www.entsocsa.co.za

The featured social media:

https://ucanr.edu/blogs/bugsquad/

Instagram: Entomology West (@entomology_west)

### Contributions to *Rostrum*

Send all contributions for the next issue of *Rostrum* by email to Shüné Oliver before **10 March 2025**: Shuneo@nicd.ac.za or contact the editor for details about the next issue.