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The 5th International Congress on Parasites of Wildlife parasitology talks in the African bush

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Trends in
Parasitology

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TrendsTalk

The 5th International Congress on Parasites of Wildlife: parasitology talks in the African bush

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The 5th International Congress on Parasites of Wildlife, hosted by the Parasitological Society of Southern Africa in the iconic Kruger National Park, South Africa, brought together parasitologists from across the globe to share the latest advances in wildlife parasitology against the backdrop of Africa's rich biodiversity. Through keynote lectures and oral and poster presentations, delegates were exposed to innovative approaches to parasite research and their implications for biodiversity and conservation. A total of 138 delegates from 14 countries attended the conference, which featured 79 oral and 41 poster presentations. In this TrendsTalk, we invited respected researchers from various fields to share their insights and reflections on the key themes and discussions that emerged across the different conference sessions.



Kerry A. Hadfield

ICPOW2025 overview

In the lead-up to the conference, four preconference webinars were hosted online and made freely accessible to all interested parasitologists. Participants could register to attend live or watch the recordings until the start of the conference. The webinars covered a range of topics that set the stage for the diverse themes explored during the conference itself. The following sections discuss these webinars, the conference sessions presented in alphabetical order by theme, and the 'African Parasite Network' meeting and conclude with a summary of the workshops held at the end of the congress.

Preconference webinars

Boris Krasnov (Ben-Gurion University, Israel) examined host–parasite interactions using zeta diversity to study ectoparasite communities. His work on fleas and gamasid mites showed that zeta diversity uncovers patterns missed by traditional beta diversity, distinguishing rare and widespread species. Case studies in Siberia and the Palearctic revealed host turnover as the main driver of parasite community structure, while environmental factors had taxon- and region-specific effects. These findings demonstrate zeta diversity's value in revealing species turnover patterns often hidden by traditional measures.

Oriel Thekisoe (North-West University, South Africa) presented on zoonoses and ethical dilemmas within the One Health framework. He examined how diseases transmissible between animals and humans impact global health, focusing on transmission, prevention, and control. Oriel also discussed reverse zoonoses and recommended strategies from hygiene and vector control to vaccination and environmental management. While exploring ethical challenges within One Health, he emphasised the need to balance human, animal, and environmental interests through equitable and ethically informed decision-making.

Chris Selbach (UiT The Arctic University of Norway, Norway) discussed 'Parasites in a warming world,' examining how climate change reshapes parasite ecology. Using



Mamohale E. Chaisi



Courtney A. Cook



Edward C. Netherlands

trematodes as models, he showed that warming can enhance infection success through increased activity but also can reduce survival, leading to complex, context-dependent outcomes. Field and experimental data from freshwater and marine systems revealed mixed patterns, with some parasite groups persisting while others decline. Chris highlighted the unpredictable ways parasites respond to climate change and how research continues to reveal important patterns in host–parasite interactions.

Robert Poulin (University of Otago, New Zealand) addressed parasite biodiversity and species discrimination, exposing inconsistencies in taxonomic practices. Through a global audit of trematode taxonomy, he showed how expert judgments vary widely, creating 'noise' in biodiversity estimates. Robert advocated for standardised guidelines, independent evaluation of evidence, and consensus-based taxonomic approaches to strengthen the reliability of parasite biodiversity research.

Evolution and molecular ecology of parasites

The session opened with an invited talk by Conrad Matthee (Stellenbosch University, South Africa), who used the evolution and taxonomy of lice to demonstrate that, even in relatively well-studied parasites, there remains an urgent need to better understand the mechanisms driving species diversity. Using a multigene approach to study the evolution of parasitic lice on rodents, Conrad showed that, although host association and geographic distribution are important factors shaping diversification among lice taxa, ancestral introgression among lineages and host switching among co-occurring hosts are equally significant drivers of speciation. The evolutionary tree of *Hoplopleura* and *Polyplax* lineages highlighted the critical need for taxonomic revision in this group, which is confounded by morphological convergence and cryptic diversity.

At a deeper evolutionary timescale, Tomas Najer (Czech University of Life Sciences, Czech Republic) demonstrated that mitochondrial genomes of parasitic lice differ markedly in gene organisation across groups, highlighting the need for further research to elucidate the mechanisms underlying these patterns. Roman Kuchta's (Institute of Parasitology, Czech Republic) presentation on the diversity and biology of *Spirometra* tapeworms in wildlife, together with Andeliza Smit's (University of Pretoria, South Africa) study on morphologically distinct but genetically similar *Amblyomma splendidum* populations, both emphasised the limitations of applying a one-size-fits-all species concept in parasitology. This point was further reinforced by Jesús Hernández-Orts (Natural History Museum, UK), who used molecular data to uncover a complex of cryptic species within *Corynosoma australe*, a parasite of pinnipeds distributed worldwide. By exploring the diversity and evolutionary history of *Pneumocystis* fungi in New Guinean rodent hosts, Nona Moradpoor (Czech Academy of Sciences, Czech Republic) revealed clear biogeographic structuring among lineages. Collectively, these presentations highlighted the persistent challenges posed by incomplete taxonomic sampling and limited publicly available molecular data, both of which constrain advances in understanding parasite evolution and taxonomy.

Freshwater parasitology

The four freshwater parasite sessions (three oral and one poster) highlighted innovative research linking parasite biology, ecosystem health, and One Health perspectives. The first session opened with a thought-provoking keynote by Maarten Vanhove (University of Hasselt, Belgium) on the underexplored role of helminths as powerful tools in invasion biology. He demonstrated how parasite data (particularly from monogeneans) can trace



Scott P. Lawton



Wilmien J. Luus-Powell



Conrad A. Matthee

host origins, reveal invasion pathways, and provide valuable insights into aquatic ecosystem health within a One Health context.

Building on this keynote's theme of integration and innovation, subsequent presentations delved deeper into parasite diversity, host dynamics, and the broader implications for freshwater ecosystem health. Annemarie Avenant-Oldewage (University of Johannesburg, South Africa) demonstrated how microhabitat specialisation among three nematodes species in *Clarias gariepinus* enhances reproductive success, linking parasite morphology to host pathology. Michal Benovics (North-West University and Comenius University, Slovakia) highlighted the often-overlooked role of non-host predation by fish in structuring trematode communities. In a second presentation, Michal further revealed that generalist monogeneans exhibit population genetic structures shaped by host phylogeography and anthropogenic impacts. Lutfiyya Latief (University of Johannesburg, South Africa) explored the potential of ionic and nanosilver to control the opportunistic monogenean *Macrogyrodactylus congolensis*, showing microhabitat selection and tegument disruption. Ketumile Thobejane (University of Limpopo, South Africa) reported the first South African occurrence of *Macrobilharzia* sp. in white-breasted cormorants at Loskop Dam, highlighting the remarkable diversity and zoonotic potential of trematodes. Esmey Moema (Sefako Makgatho Health Sciences University, South Africa) examined protozoan gill parasites of *Oreochromis mossambicus* during a mass mortality event, emphasising their role in fish health dynamics. Francois Coetzee (North-West University, South Africa) expanded the known parasite diversity of *Xenopus poweri*, identifying eight parasite species and host–parasite overlaps. Annabell Hüsken (University of Duisburg-Essen, Germany) demonstrated that trematode communities in rehabilitating streams reflect environmental drivers, with land use emerging as the dominant driver of species richness and prevalence. Willie Landman (North-West University, South Africa) reviewed African polystomatid flatworms, emphasising strict host specificity and taxonomic gaps requiring revision. Jessica Schwelm (University of Duisburg-Essen, Germany) connected trematode life stages across freshwater snails and fish, revealing novel transmission pathways that enhance understanding of aquatic parasitic biodiversity.

The accompanying poster session reinforced these themes, with studies spanning parasite morphology, molecular systematics, and life cycle studies. Nehemiah Rindoria (University of Limpopo, South Africa) presented scanning electron microscopy and molecular data for *Capillaria pterophylli* from ornamental cichlids. Marliese Truter (North-West University, South Africa) described a new *Paradiplozoon* species from endemic cyprinids in the Cape Fold freshwater ecoregion. Roman Kuchta (Institute of Parasitology, Czech Republic) characterised the secretome of *Pomphorhynchus laevis*, identifying proteins involved in host immune modulation. Nichole Donough (North-West University, South Africa) elucidated a partial life cycle belonging to the family Echinochasmidae, identifying intermediate hosts from temporary pans in Mozambique. January Seabela (University of Limpopo, South Africa) reported parasite diversity in *Clarias gariepinus* from Tzaneen Dam, linking it to environmental parasitology; Collins Mashilwane (University of Limpopo, South Africa) documented metazoan parasites of *Oreochromis mossambicus* from Loskop Dam; and Dillon Croshaw (North-West University, South Africa) conducted a holistic parasite survey of juvenile *Enteromius trimaculatus* from the Mooi River.

Collectively, these sessions illustrated how combining traditional taxonomy with molecular tools embeds freshwater parasite research within broader ecosystem and



Banie L. Penzhorn



Luther van der Mescht



Robyn L. van Zyl

conservation frameworks. Parasites emerged not only as components of biodiversity but also as sensitive indicators of environmental change, warranting continued interdisciplinary investigation.

Haemoparasite detection and diversity

Talks in this session focused on the epidemiology, diversity, and diagnosis of vector-borne pathogens. These included the development of a multiplex qPCR for simultaneous detection of *Theileria bicornis* and *Babesia bicornis* in rhinos (Naledi Sekgobela; University of Pretoria, South Africa), high prevalence of vector-borne pathogens in Namibian herbivores (Gábor Czirják; Leibniz Institute for Zoo and Wildlife Research, Germany), evidence of buffalo-specific *Anaplasma marginale* strains in buffaloes (Marche Duarte; University of Pretoria, South Africa), and a novel method for extracting DNA from a novel *Anaplasma* species in impala for whole-genome sequencing (Karabo Aphane; University of Pretoria, South Africa). A literature review highlighted the occurrence of *Anaplasma platys* in different species of wildlife, domestic animals, ticks, and in humans (Zamantungwa Mnisi; University of Limpopo, South Africa), and mathematical modelling indicated a strong link between heartwater outbreaks and tick host-finding efficiency, underscoring the importance of tick life history over enzootic stability (Adam Fisher, University of Liverpool, UK). Additional findings included identification of novel *Mycoplasma* and *Anaplasma* strains in black-footed cats in South Africa (Erin Davis; University of Pretoria, South Africa) and *Hepatozoon* spp. and *Cytauxzoon europaeus* in wild carnivores in Italy (Marika Grillini; University of Padova, Italy).

Posters highlighted the hidden costs of haemoparasite infections in wildlife and livestock. Lilla Jordán (Leibniz Institute for Zoo and Wildlife Research, Germany) showed that in Namibian cheetahs, *Babesia lengau*–like infections affected movement, particularly in females. Nicola Collins (University of Pretoria, South Africa) identified a novel canine *Anaplasma* ('SA Dog') complicating diagnoses; Kgomotso Sibeko-Matjila (University of Pretoria, South Africa) reported high genetic diversity in buffalo-derived *Theileria parva* in Zambia; and Virginie Rougeron (National Centre for Scientific Research, France) linked *Plasmodium vivax* and *Plasmodium simium* host shifts to zoonotic malaria risks.

This session highlighted the complex epidemiology, diversity, and diagnostic challenges of vector-borne pathogens across wildlife and domestic species. Findings emphasised the hidden impacts of haemoparasites on host health and movement, the risk of zoonotic spillover, and the need for continued surveillance to inform conservation, veterinary, and public health strategies.

Marine parasitology

Two full sessions and five posters were dedicated to marine parasitology, with topics encompassing taxonomy, ecology, systematics, and conservation. Under the theme of trematodes, Scott Lawton (Scotland's Rural University College, UK) examined brachycladiid liver flukes of cetaceans, integrating morphological and molecular data to clarify host specificity and conservation relevance. Russell Yong (North-West University, South Africa) presented the first records of marine fish blood flukes (Aporocotylidae) from Africa, describing three new species from seabreams (*Sparidae)* and proposing a new genus. Thomas Cribb (Queensland Museum, Australia) explored monorchiid trematodes (*Hurleytrematoides*) in Indo-Pacific butterflyfishes, revealing contrasting distributional patterns and providing a framework for regional biogeography. Helen Armstrong


Nico J. Smit

(Murdoch University, Australia) concluded the trematode theme by exploring the evolutionary history of the Cryptogonimidae, tracing transitions between aquatic systems and vertebrate hosts.

Within the themes of marine parasite ecology and conservation, Erica Marchiori (University of Padova, Italy) analysed gastrointestinal helminths of loggerhead sea turtles (*Caretta caretta*), linking helminth diversity to ecological and environmental drivers, while Anja Vermaak (North-West University, South Africa) compared metazoan parasites of the Cape white seabream (*Diplodus capensis*) between protected and unprotected areas, suggesting that conservation measures may also sustain parasite diversity.

Courtney Cook (North-West University, South Africa) advanced the taxonomy of fish haemogregarines, revealing that *Haemogregarina bigemina*, likely transmitted by gnathiid isopods, may represent a lineage distinct from the true *Haemogregarina* clade. Complementing this, Zandile Dhlamini (North-West University, South Africa) provided new molecular and phylogenetic data for three marine haemogregarines, extending understanding of their diversity and evolutionary relationships. Chandra le Roux (North-West University, South Africa) expanded the knowledge of marine fish leeches, identifying three species – two likely new to science – through integrated morphological and molecular analyses.

A strong theme centred on marine parasitic crustaceans. Susan Dippenaar (University of Limpopo, South Africa) revisited the '*Caligus* stumble block,' illustrating how overlapping morphology complicates species delimitation within this diverse copepod genus. Kelsey Longstaff (North-West University, South Africa) described new corallanid isopod species from Indonesian elasmobranchs, and Hesmarie Botha and Anja Erasmus (North-West University, South Africa) investigated gnathiid isopods from South African elasmobranchs and Caribbean teleosts, revealing novel host associations and morphological diversity. Kerry Hadfield (North-West University, South Africa) demonstrated that *Gnathia africana* functions as a vector for fish haemogregarines and, in a separate poster, presented the remarkable case of the tongue-replacing isopod *Ceratothoa famosa*, highlighting its biology, ecological impacts, and unusual route from internet fame to scientific recognition.

Collectively, these studies across taxa, from trematodes and haemogregarines to parasitic crustaceans, highlighted molecular and ecological integration as a defining feature of modern marine parasitology.

Medical parasitology

This ICPOW2025 session highlighted the diversity within medical parasitology, spanning *Plasmodium*, *Trypanosoma,* and *Entamoeba* protozoa; *Strongyloides* helminths; and microsporidia (formerly classified as protozoa). Findings underscored the importance of understanding and monitoring the potential zoonotic risk of *Strongyloides fuelleborni*, *Trypanosoma congolense*, and *Plasmodium* transmission. Russell Stothard's (Liverpool School of Tropical Medicine, UK) team introduced a species-specific diagnostic assay for *Strongyloides*, enabling refined epidemiological tracking. Vervet monkeys in Malawi and baboons in the UK were implicated as reservoirs of *S. fuelleborni*, reinforcing the importance of wildlife monitoring. In KwaZulu-Natal, Mmatlala Nkosi (University of South Africa, South Africa) revealed high *T. congolense*

prevalence in livestock, posing direct threats to rural livelihoods, food security, and human well-being, calling for targeted interventions to protect vulnerable communities. Also, in Limpopo, Boitumelo Mashatola (University of Venda, South Africa) reported a shift in *Entamoeba* species distribution, with nonpathogenic strains increasingly associated with diarrhoea in children, challenging established assumptions and prompting deeper investigation. Amidou Samie (University of Venda, South Africa) presented on the epidemiology and growth impact of microsporidia infections on children from low-resource settings.

Virginie Rougeron's (National Centre for Scientific Research, France) genetic analysis traced *P. simium* to a reverse zoonotic event, likely linked to *P. vivax* migration from Mexico to Brazil, thus advocating for primate inclusion in malaria control programs. Amid rising insecticide and drug resistance, Robyn van Zyl's (University of the Witwatersrand, South Africa) team conducted research to identify novel malaria control approaches and lead molecules, revealing that monoterpenoids possess promising mosquitocidal and antiplasmodial properties, thereby offering dual-action alternatives. Collectively, these findings highlight the dynamic nature of parasitic and vector-borne diseases and the necessity for implementing the One Health approach, alongside innovative diagnostics, surveillance, and therapeutics. A paradigm shift embracing molecular tools, ecological insights, and traditional knowledge is essential to mitigate the public health burden of parasitic diseases across Africa and beyond.

Microbiomes, vectors, and the environment

The presentations in this session explored diverse aspects of tick ecology, microbiomes, and parasite–host interactions, highlighting their implications for animal and human health. Alice Iddon (University of Liverpool, UK) presented a survey of ticks across Botswana, examining how tick microbiomes and environmental variables influence pathogen transmission at wildlife–livestock interfaces. Tapiwanashe Mhlanga (University of KwaZulu-Natal, South Africa) provided a global review of ixodid tick microbiomes, revealing a limited core bacterial community dominated by Proteobacteria, Bacteroidetes, Firmicutes, and Actinobacteria and identifying endosymbionts such as *Coxiella*, *Francisella*, and *Rickettsia*. Marina García-del Río (Spanish National Research Council, Spain) investigated how temperature and humidity affect the microbiome and ectoparasite dynamics in blue tit nests, finding that alterations in the microclimate influenced the interactions between microbes, ectoparasites, and nestling body condition. Rethabile Motloung (South African National Biodiversity Institute, South Africa) modelled tick distributions under changing climate conditions, predicting range expansions for several native and alien tick species, particularly *Rhipicephalus microplus*, which could disrupt ecosystems and increase disease risk.

In the posters, Nkululeko Nyangiwe (University of South Africa, South Africa) assessed acaricide resistance in *Rhipicephalus decoloratus* from communal grazing cattle, reporting varying susceptibility to amidines, organophosphates, and pyrethroids, and emphasising the need for continuous resistance monitoring. Similarly, Sindisile Goni (Döhne Agricultural Development Institute, South Africa) examined the population dynamics of cattle ticks in the Eastern Cape, identifying ten species and noting the absence of the invasive *R. microplus*, a finding with epidemiological significance for regional tick management.

These studies highlight the intricate relationships among ticks, their microbiomes, hosts, and environmental factors. They demonstrated how climate change, habitat

interactions, and resistance development shape tick ecology and pathogen transmission, reinforcing the importance of integrated, multidisciplinary approaches to tick and disease management across ecosystems.

Parasites and pathogens of carnivores

In two consecutive presentations, Elisabetta Ferraro (University of Padua, Italy) reported her team's research on risks to humans and domestic animals by range expansion of grey wolves and golden jackals in Europe. Wolf faecal samples in Foreste Casentinesi National Park revealed a high prevalence of *Eucoleus* spp., Ancylostomatidae and Taeniidae, shared with domestic dogs, but an absence of *Echinococcus multilocularis* and *Echinococcus granulosus*. Although the latter zoonotic parasite circulates in central Italy's sheep flocks, wolves appear uninvolved in its transmission. In another presentation, Elisabetta reported four cardiovascular nematodes in golden jackals, identifying jackals as potential secondary reservoirs for *Angiostrongylus vasorum* and carriers of the other species. As part of the same research team, Paola Beraldo (University of Udine, Italy) reported that *Uncinaria stenocephala*, *Toxocara canis*, and *Trichuris vulpis* were the most prevalent intestinal nematodes in road-killed golden jackals in northeastern Italy, and, after unlocking natural history collections, *Taenia hydatigena* was the most prevalent cestode. Rudi Cassini (University of Padua, Italy) and colleagues assessed the efficacy of standard faecal flotation (FT) against scraping, filtration, and counting technique and lung inspection. Thirteen intestinal parasite taxa were found by necropsy, but only six were detected by FT, underscoring its low sensitivity for light infections. Bettina Wachter (Leibniz Institute for Zoo and Wildlife Research, Germany) targeted vector-borne parasites in brown and spotted hyenas from Namibia and Tanzania. Filaroid infections were common, with phylograms indicating the presence of several undescribed *Acanthocheilonema* species. In contrast to *B. lengau* from cheetahs, the detected piroplasms exhibited high sequence variability. Moreover, *Hepatozoon felis*–like sequences clustered outside the main *H. felis* group, suggesting possible novel lineages.

Together, these studies demonstrate the ecological complexity and zoonotic significance of carnivore parasites, revealing evolving host–parasite networks. They highlight the need for integrative surveillance to anticipate and mitigate parasite emergence at the wildlife–domestic interface.

Parasite conservation and management

The theme of parasite conservation was introduced by Nico Smit (North-West University, South Africa), outlining the concept's scope and implications. He asked why parasites should be conserved, introducing the idea of 'positive parasitology' – promoting their beneficial ecological role. He then discussed how parasite conservation might be achieved and the challenges preventing parasite inclusion in formal conservation frameworks. Continuing the theme, Nikol Kmentová (Hasselt University, Belgium) presented the World Archives of Species Perception on Parasites, which collects global views on parasite traits. Preliminary findings show the public recognises parasites as ecologically important, informing future conservation and policy development.

Focussing on parasite management, Khanyisani Ndwandwe (University of Pretoria, South Africa) and colleagues surveyed 384 communal goat farmers in uMkhanyakude District, South Africa, to assess perceptions of anthelmintic resistance. Elderly, female, and illiterate farmers were more likely to underdose and use expired drugs, highlighting

the need for improved education and awareness campaigns. Karien Labuschagne (Agricultural Research Council – Onderstepoort Veterinary Research Institute, South Africa) presented long-term research on *Culicoides* biting midges, major vectors of livestock, wildlife, and human diseases. Over three decades of sampling at more than 500 sites have built a unique database to inform future studies on midge ecology and control.

Management-focused posters featured the South African Living Collections Cluster (Mamohale Chaisi; South African National Biodiversity Institute, South Africa) and animal husbandry practices (Sindile Magoda; Department of Agriculture, South Africa). Eunice Jamesboy (National Institute for Communicable Diseases, South Africa) presented posters on the role of *Toxorhynchites* mosquitoes in integrated pest management and on the Medical Entomology Museum's role in advancing vector and parasite research.

Collectively, these presentations emphasised the growing recognition of parasites as integral components of ecosystems rather than mere pathogens. From conceptual discussions on parasite conservation and public perceptions to practical approaches in parasite and vector management, the session bridged fundamental and applied parasitology.

Rodent parasites and pathogens

Two sessions focused on the global and local ecology, as well as the diversity, of parasites and pathogens associated with rodents. Boris Krasnov (Ben-Gurion University of the Negev, Israel) opened by showing that clusters of regional flea and small mammal host assemblages are predominantly shaped by dispersal. This was followed by Inge Raubenheimer, Ernst Schlemmer, and Jessica Kipling (all from Stellenbosch University, South Africa), who described ecto- and endoparasite diversity in Smith's bush squirrel (*Paraxerus cepapi*), the four-striped grass mouse (*Rhabdomys pumilio*), the Namaqua rock mouse (*Micaelamys namaquensis*), and the Karoo bush rat (*Otomys unisulcatus*) in South Africa.

The second session opened with Alyssa Little (Stellenbosch University, South Africa), presenting how host sex and biome influence ectoparasite diversity on *M. namaquensis*. Lola Singo (Stellenbosch University, South Africa) described the ectoparasite diversity on *Rhabdomys* spp. in the Fynbos, Nama-, and Succulent Karoo biomes. Nina Kruse (University of Pretoria, South Africa) presented results on the prevalence and genetic diversity of *Anaplasma*, *Bartonella,* and *Mycoplasma* in rodents, showing how these medically and economically important bacteria vary across a land-use gradient at the western boundary of the Kruger National Park. Luther van der Mescht (University of the Free State, South Africa) examined global latitudinal distribution patterns of fleas and small mammal hosts, showing that these patterns do not follow classical latitudinal gradients and differ between diversity measures. Sonja Matthee (Stellenbosch University, South Africa) concluded by describing the ectoparasite assemblages of four sympatric rodent species in South Africa.

Poster contributions included a description of a new *Gastronodus* nematode species from *M. namaquensis* by Ernst Schlemmer (Stellenbosch University, South Africa), an inventory of rat ectoparasites from rural communities by Dina Fagir (University of Pretoria, South Africa), and a mitochondrial DNA phylogeography study of the

species-specific louse of *P. cepapi* by Inge Raubenheimer (Stellenbosch University, South Africa).

These studies highlight rodents as pivotal hosts for parasite diversity and zoonotic pathogens and emphasise how ecological context, host traits, and geography interact to shape parasite distribution and transmission risk.

Schistosomes and other trematodes

This session provided an insight into current research foci surrounding the trematodes and their snail intermediate hosts. There was a split between studies on trematode taxonomy and the biology of snails and their role in fluke transmission. Caroline Kibet (Czech Academy of Sciences, Czech Republic) started by highlighting the phylogenetic complexity of avian schistosomes, showing that molecular approaches were crucial to disentangle the interrelationships between species and that classical taxonomic identification is challenging and unclear. Ruben Schols (KU Leuven, Belgium) discussed the application of micro–computed tomography imaging for identifying amphistomes and unlocking natural history collections. By combining this approach with DNA barcoding, he illustrated the need for taxonomic revision of amphistomes by using novel diagnostic traits to better reflect species boundaries. Both Scott Lawton (Scotland's Rural University College, UK) and Samson Mukaratirwa (Ross University, West Indies) provided detailed accounts on the evolution and ecology of snails involved in transmission of the *Fasciola* species. Scott illustrated the link between the phylogeography of the snail *Galba truncatula* and the emergence of *Fasciola hepatica* in both South America and Africa. Samson described the need to develop molecular tools for the detection of infections of *Fasciola* in snails but also to distinguish between morphologically similar native and invasive snail species for disease surveillance in South Africa. Ruben closed the session exploring the role of snail microbiome on *Schistosoma–Biomphalaria* interactions. The work illustrated that the microbiome changed when snails were infected with different schistosome species and that the timing of these changes aligns with key parasite development stages, further highlighting the complexity of the trematode–snail interaction. It was a rare opportunity for researchers focused on the malacological components of trematode life cycles to present research on a platform that is frequently provided for other disease vectors, such as ticks and mosquitoes, further highlighting the need for more research in this area and opportunities to disseminate it.

Trypanosomes

The session started with Luis Neves's (University of Pretoria, South Africa) keynote reflecting on a career of over 25 years of research on tsetse flies, trypanosomes, and ticks in southern Africa. His studies used parasitological and molecular approaches to uncover trypanosome diversity, drug resistance, tick taxonomy, and the genetic structure of tsetse populations. The following session collectively focused on the understanding of trypanosome epidemiology and vector biology while emphasising the urgent need for innovative diagnostics, integrated disease control, and continued research on vector dynamics and drug resistance.

Fernando Mulandane (Universidade Eduardo Mondlane, Mozambique) highlighted the widespread distribution of tsetse flies across Mozambique, emphasising the need for a national atlas mapping tsetse fly and trypanosomiasis distribution, especially in regions lacking data. Denise Brito (Universidade Eduardo Mondlane, Mozambique) explored African trypanosomiasis (AT) within buffer zones, demonstrating how these

porous boundaries facilitate spillover of trypanosomes from wildlife reserves to agricultural lands. Nióbio Cossa (Universidade Eduardo Mondlane, Mozambique) provided experimental evidence of *Glossina brevipalpis*'s vectoral competence in transmitting *Trypanosoma congolense*–savanna type in Mozambique.

On the topic of vectors, Percy Moyaba (Agricultural Research Council – Onderstepoort Veterinary Research Institute, South Africa) examined trypanosome prevalence in *Stomoxys* flies in northeastern KwaZulu-Natal, highlighting their epidemiological role alongside tsetse flies and advocating their inclusion in control programs. Supporting this, Naledi Serage's (North-West University, South Africa) poster confirmed *T. congolense*–savanna type as the predominant cause of animal AT (AAT) in cattle in the region. Hermógenes Mucache (Universidade Eduardo Mondlane, Mozambique) studied trypanosome prevalence in cattle within Maputo National Park buffer zones, reinforcing the dominance of *T. congolense*–savanna type and the ongoing burden of AT on livestock.

Research also addressed sexually transmitted and non-mammalian trypanosomes, with Kamogelo Plank (North-West University, South Africa) presenting work on *Trypanosoma equiperdum*, and Tereza Dejmková (Charles University, Czech Republic) investigating the development of anuran trypanosomes in potential insect vectors. Collectively, these studies highlight the complex epidemiology of trypanosomes, the multifaceted roles of vectors, and the need for integrated, evidence-based control strategies.

Wildlife haemosporidia and closely related blood parasites

Wildlife haemosporidia and closely related blood parasites were well-represented at ICPOW2025, with multiple talks and posters contributing to this growing field. The conference was opened with a keynote by Jenny Dunn (Keele University, UK), who presented a 7-year study on community-level host–parasite associations in passerines. Jenny showed how avian haemosporidian lineages shift between generalist and specialist strategies across time and space, underscoring the importance of coordinated, long-term monitoring to understand changing host–parasite dynamics. The plenary was followed by a special session on wildlife haemosporidia and related blood parasites, reflecting the taxonomic and ecological diversity of current research. Misa Shimizu (State Scientific Research Institute Nature Research Centre, Lithuania) reported the first *Haemoproteus* records from Gambian vultures, revealing parasite diversity and host impacts, and Clark Mbou-Boutambe (Ecole Doctorale Régionale d'Afrique Centrale en Infectiologie Tropicale, Gabon) detected *Plasmodium yoelii* in invasive black rats from Gabon, expanding knowledge of rodent malaria ecology. Ana Rivero (University of Montpellier, France) discussed adaptive plasticity in *Plasmodium relictum* in response to mosquito bites and coinfections to understand how changing environments may affect parasite evolution. Regarding wildlife primate malaria, Russell Stothard (Liverpool School of Tropical Medicine, UK) discussed cryptic *Plasmodium* infections in semicaptive chimpanzees from Uganda's Ngamba Island Sanctuary, linking wildlife health and anthropozoonotic risk, and Virginie Rougeron (National Centre for Scientific Research, France) examined asymptomatic malaria in wild chimpanzees from Gabon, revealing immune modulation, renal stress, and hidden physiological costs with implications for malaria tolerance and conservation. Subsequently, Larson Boundenga (Ecole Doctorale Régionale d'Afrique Centrale en Infectiologie Tropicale, Gabon) then demonstrated cross-species transmission

of *Plasmodium* among humans, gorillas, and chimpanzees, highlighting One Health challenges. Edward Netherlands (University of the Free State, South Africa) presented new data on reptile haemosporidia from various hosts, including chelonians and squamates, supporting the revision of the genus *Haemocystidium*. Talks extending beyond haemosporidia included Banie Penzhorn (University of Pretoria, South Africa) addressing the 'dead names' dilemma in wildlife piroplasms and Monique Barnard (University of the Free State, South Africa) revealing cryptic *Haemogregarina* diversity in African terrapins. The session concluded with an invited talk by Mamohale Chaisi (South African National Biodiversity Institute, South Africa), who highlighted novel host–vector–pathogen relationships and the value of integrated biodiversity–health surveillance. Collectively, the contributions showcased the expanding scope of wildlife blood parasite research from community ecology and taxonomy to conservation health and zoonotic risk. This theme was further reinforced by the COST Action – Wildlife Malaria Network (WIMANET) miniworkshop and information session on why and how to become part of the network.

The African Parasite Network meeting: embracing and advancing interdisciplinary research in parasitology on the African continent

The 3rd African Parasite Network Meeting was held as part of the ICPOW event and this year highlighted the launch of the recently established African Network focus group of the World Association for the Advancement of Veterinary Parasitology, presented by Patrick Vudriko (Makerere University, Uganda). The program also featured an informative session on the global Wildlife Malaria Research Network, presented by Jenny Dunn (Keele University, UK) and Edward Netherlands (University of the Free State, South Africa). In addition, Maxwell Barson (University of Botswana) and Wilmien Luus-Powell (University of Limpopo, South Africa) delivered insightful talks showcasing successful Africa–Africa collaborations in parasite research. The meeting concluded with an informal networking session, where delegates explored opportunities for future collaboration over refreshments.

Workshop 1: what species do I have in my Eppendorf tube – a molecular approach

Recognising the lack of accurate reference data for many parasites in GenBank, and in particular the misidentification of sequences obtained for specific parasites, remains a common risk. Conrad Matthee (Stellenbosch University, South Africa) presented a step-by-step workshop emphasising the importance of correct parasite identification using DNA sequence data. The presentation addressed strategies for optimising PCR when universal primers fail to amplify the target taxon and highlighted the necessity of authenticating sequences to exclude pseudogenes. It was further emphasised that even apparently strong matches between a query sequence and GenBank entries may be misleading due to pitfalls such as short regions of overlap, misidentified taxa, and incomplete records in sequence repositories. To increase confidence in taxonomic assignments, the construction of accurate phylogenetic trees (using as much reliable sequence data from GenBank as possible) was shown to be essential. The lecture concluded with a hands-on exercise in which participants were provided with a novel nematode sequence absent from GenBank. Participants used BLASTn to identify potential matches, translated the sequence into protein reading frames to verify authenticity, selected trustworthy homologous sequences, and constructed a phylogenetic tree to strengthen confidence in their identification.

Workshop 2: the phenomena of radiation and coevolution in parasites – what are we looking for?

After days of exciting talks and new findings, Workshop 2 encouraged participants to step back and reflect on the deeper concepts shaping parasite diversity that underpin much of parasite evolutionary research. Led by Maarten Vanhove (Hasselt University, Belgium), the workshop tackled the ambiguous terminology of cospeciation, coevolution, cophylogeny, and adaptive radiation. While these terms are often used ardently by parasitologists, Maarten challenged the group to reflect critically on what they truly mean and how they should be applied. Through a blend of short theoretical lectures and interactive 'journal club' discussions, the workshop invited participants to test definitions against real case studies, many of them drawn from African host–parasite systems. This format encouraged lively debate about the evidence needed to demonstrate coevolution and how apparent host–parasite associations may be shaped by ecological context or transmission dynamics rather than strict cospeciation. The discussion around adaptive radiation was equally stimulating, asking whether parasites really fit the classic models of diversification or whether their trajectories demand new ways of thinking. By the end of the session, participants left with sharper conceptual tools, a shared awareness of the pitfalls of loosely applied terminology, and a stronger appreciation for the value of integrating evolutionary theory with ecological data. The workshop was a timely reminder that words shape the way we interpret parasite diversity and that careful, critical use of evolutionary concepts will allow parasitologists to better unravel the complexity of host–parasite systems.

Student prizes

Students were celebrated for their outstanding contributions across various categories. In the First-Time Poster category, recognising those presenting at their first conference, Inge Raubenheimer (Stellenbosch University, South Africa) took first place, and Linda de Klerk (North-West University, South Africa) secured the top prize for Senior Posters. In the First-Time Oral presentations, Marche Duarte (University of Pretoria, South Africa) was awarded first place, with Annabell Hüsken (University of Duisburg-Essen, Germany) winning the Senior Oral category. The hosting organisation, Parasitological Society of Southern Africa, also presented its annual awards: the 2025 Angela Davies Russell Award for the best parasitology publication went to Andeliza Smit (University of Pretoria, South Africa), the Junior Neitz Medal for an outstanding MSc in parasitology was awarded to Chandra le Roux (North-West University, South Africa), and the prestigious Senior Neitz Medal for the best PhD in parasitology was granted to Anja Vermaak (North-West University, South Africa).

Concluding remarks

The 5th ICPOW showcased how wildlife parasitology has evolved into a deeply integrative discipline linking molecular innovation, ecology, and conservation. From aquatic systems to terrestrial ecosystems, parasites emerged as sentinels of biodiversity, ecosystem function, and health risk. The congress highlighted the growing recognition of parasites not merely as pathogens but as essential components of ecological networks. Looking forward, strengthening collaborations across aquatic and terrestrial research, embracing open data sharing, and embedding parasites into global biodiversity and One Health frameworks will ensure the field continues to illuminate both wildlife conservation and planetary health.

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