The Pollinator Information Network Newsletter

Editorial

May 1, 2022. Vol. 5, Issue 1

Welcome to the first issue of volume 5 of the Pollinator Information Network *Newsletter*!

The *Pollinator Information Network Newsletter* is one of the projected outputs of an ongoing project of the JRS Biodiversity Foundation, *i.e.* "The Pollinator Information Network for Two-Winged Insects" or simply PINDIP. The PINDIP project has its own website: https://www.pindip.org/.

In this *Newsletter*, we give a brief report on a SYNTHESYS visit of Dr Radenković and Dr Vujić (University of Novi Sad, Serbia) to the Royal Museum for Central Africa (Belgium) (pages 2-3). We report on our latest training course in general entomology and collection management in November 2021 in Morogoro (Tanzania) (pages 4-6) and give an update on a new training course that will take place in South Africa and specifically focusses on young and emerging South African entomologists (page 7). Further, you will find a report on fieldwork in South Africa and Lesotho to collect pollinating Diptera and conducted by the KwaZulu-Natal Museum, the Albany Museum and the Royal Museum for Central Africa (pages 8-11).

In this issue, we also put the PhD work of Nadia Toukem in the spotlight (pages 12-13). Read more on the upcoming 12th International Symposium on Pollination (ISPXII) on page 14 and on the 11th International Symposium on Syrphidae (ISS11) on page 15.

As usual, the issue ends with a list of new, although incomplete, published research related to pollination biology in its broadest sense (pages 16-21). We invite everyone concerned to submit relevant information for the *Newsletter*, including summaries of their own research and projects on pollination biology – or publications that they want to see highlighted, relevant literature, upcoming conferences and symposia, possibilities for cooperation and grant applications related to plant-pollinator networks, *etc.*, before the 1st of August 2022.

Enjoy reading!

Kurt Jordaens
on behalf of the PINDIP team

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Visit

SYNTHESYS visit of Dr Snezana Radenković and Ante Vujić of the University of Novi Sad (Serbia) to the Royal Museum for Central Africa (Belgium)

SYNTHESYS+ is a pan-European collections infrastructure project and the fourth iteration of the SYNTHESYS programme funded by the European Commission. SYNTHESYS+ will commence on 1 February 2019 and will run until 31 January 2023. SYNTHESYS project funding is available to provide researchers to undertake short visits to utilise a 'Taxonomic Access Facility' (TAF). Collections, staff expertise and analytical facilities are available for users, at any one of the 21 partner institutions for the purposes of their research. From 23 August till 6 September 2021 Dr Snezana Radenković and Dr Ante Vujić of the University of Serbia visited the Royal Museum for Central Africa (Belgium) to study the Syrphidae (hoverfly) collection, more specifically that of the genus *Eumerus*.

The hoverfly genus *Eumerus* Meigen, 1822 is widely distributed in the Palaearctic, Afrotropical, Oriental, and Australian regions, with 300 described species (https://www.gbif.org/species/1534472). Although the Afrotropical region harbours more than 600 hoverfly species, the species diversity and taxonomy of this large genus is still insufficiently known. The Royal Museum for Central Africa has a large collection, both of old museum material as well as recently collected material suitable for taxonomic and systematic studies. The main objectives of this project are to re-evaluate the taxonomy of the Afrotropical species from the *Eumerus ornatus* and *E. triangularis* groups, to describe new species, reveal diagnostic morphological characters and to produce identification keys.

From left to right: Dr Marc De Meyer, Dr Kurt Jordaens (hosts at the RMCA) with Dr Snezana Radenković and Dr Ante Vujić of the University of Novi Sad, Serbia).

During their visit, Dr Radenković and Dr Vujić identified several hundreds of Afrotropical *Eumerus*. A selection of these specimens are now being characterized by molecular techniques to reveal their species boundaries and phylogenetic relationships. Several new species to science were discovered (see pictures on next page).

Some of the newly discovered *Eumerus* species of the Afrotropical Region.

Contact::

Left:
Dr Snezana Radenković, University of Novi Sad, Servia, snezana.radenkovic[at]dbe.uns.ac.rs

Right:

Dr Ante Vujic, University of Novi Sad, Servia, ante.vujic[at]dbe.uns.ac.rs

Financial support:

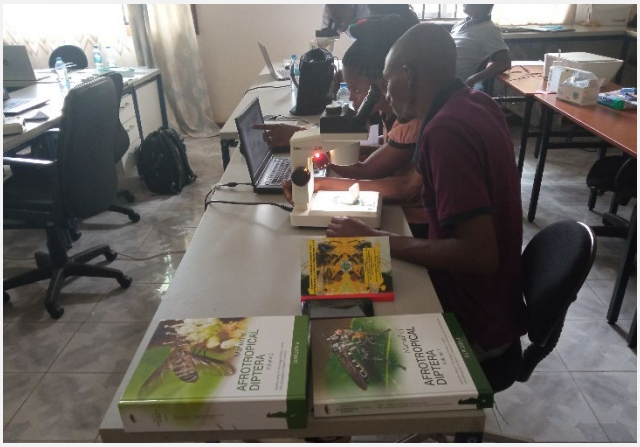
SYNTHESYS+
Synthesis of Systematic Resources
a DiSSCo project

Training

Training course in taxonomy and systematics of African pollinating flies

18–29 November 2021, Tanzania

The third training course in taxonomy and systematics of African pollinating flies took place at the Sokoine University of Agriculture (Tanzania) from 18-29 November 2021.



Practical sessions in the lab: participants received training in the morphology, classification and identification of Diptera. The first two volumes of the *Manual of Afrotropical Diptera* are the main teaching tool during the training.

The objective of our group trainings are to ensure, for the sake of the African scientists or the persons confronted with the problem, a basic training on the identification and ecology of African Diptera, with special emphasis on those (sub)families (*e.g.*, Bombyliidae, Calliphoridae, Nemestrinidae, Rhiniinae, Syrphidae, and pangonine Tabanidae) that have a significant role in plant-pollinator networks. Participants will be asked to bring their own material which then will be identified up to family or genus level.

The training consisted of ex-cathedra courses on morphology, classification, identification, identification methods, collection methods, and conservation methods of Diptera, with a focus on the target families listed above. Practical exercises were used to comment on, and test, the topics presented in the courses.

Practical session in the field: participants were trained in different trapping techniques such as the use of Malaise traps (left) and hand netting (right).

Participants at the 2021 training:

The following 12 persons, from five different countries, participated in the training course :

Lin MIZERO (Burundi): Researcher at the Natural Sciences and Environment Research Center (CRSNE), University of Burundi.

Beatriz DANIEL (Mozambique) : MSc student at the Eduardo Mondlane University.

Mirene MUSSUMBE (Mozambique): MSc student at the Eduardo Mondlane University.

Venuste NSENGIMANA (Rwanda): Lecturer at the University of Rwanda.

Elvillah RWEYEMAMU (Tanzania): MSc Student at the Tanzania Agricultural Research Institute.

Patroba MASATU (Tanzania): PhD student at the Sokoine University of Agriculture

Jackline BAKENGESA (Tanzania): Lecturer at the University of Dodoma.

Goodluck MASSAWE (Tanzania): Research Assistant at the Tanzania Wildlife Research Institute.

Nanyika KINGAZI (Tanzania): Research Officer at the Tanzania Forestry Research Institution (TAFORI).

Cesilia KIJALO (Tanzania): Field assistant at the Sokoine University of Agriculture.

Gugulethu TARAKINI (Zimbabwe): PhD student at the Chinhoyi University of Technology, Research and Education for Sustainable Actions (R.E.S.A).

Annabel BANDA (Zimbabwe): Lecturer at the Zimbabwe, Gwanda State University.

You will read more about some of the participants in the upcoming issues of the *Newsletter*.

Practical sessions in the lab: apart from identification sessions, participants also received training in insect conservation methods (direct pinning, middle: micro-pinning and staging).

Organisation and more information:

The training course was organized by the Royal Museum for Central Africa (Kurt Jordaens – Marc De Meyer, RMCA, Belgium), the Sokoine University of Agriculture (Christopher Sabuni, SOI, Tanzania), the KwaZulu-Natal Museum (John Midgley, KZNM, South Africa) and the Natural History Museum, London (Ashley Kirk-Spriggs, NHM, UK). A full program and training materials can be found on the PINDIP-website: www.pindip.org. More information on trainings organized by the RMCA can be found at: http://www.africamuseum.be/research/collaborations/training

During the weekend there was plenty of time for a walk in the hills surrounding Morogoro.

Upcoming training in 2023:

The call for our next training (two weeks in November 2023 will be launched in the first half of 2023 and will be announced in the forthcoming issues of the *Newsletter*. Keep an eye on the trainings-page on the PINDIP website.

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kurt.jordaens[at]africamuseum.be

Financial support:

JRS Biodiversity Foundation

Belgium partner in development

AFRICA museum

Training

Training course in entomology and collection management for South African entomologists 28 April – 8 May 2022, South Africa

While our training in Tanzania has only just ended, we have already planned a new training. The new training will take place in South Africa and will specifically focus on young South African entomologists !

Background:

The aim of this training is to stimulate entomological (taxonomic and ecological) research in South Africa, specifically in students and young researchers and to increase sustainability of taxonomic expertise in Dipterology in South Africa. The training is part of the planned outcomes of the project DIPTATEACH [DIPtera Museum collections as a source for TAxonomic research and TEACHing activities] and is funded by the Belgian Science Policy, the National Research Foundation of South Africa and the JRS Biodiversity Foundation.

Organisation and venue:

The training will be organized by the Royal Museum for Central Africa (Kurt Jordaens, RMCA, Belgium), the KwaZulu-Natal Museum (John Midgley, KZNM, South Africa) and the University of KwaZulu-Natal (Timo van der Niet, UKZN, South Africa). We will receive assistance from Burgert Muller of the Bloemfontein Museum of South Africa and Terence Bellingan of the Albany Museum at Makhanda. The training will take place at Shawswood (http://www.shawswood.co.za/), a self-catering accommodation within the Karkloof area, which a one of the biodiversity hotspots in the province of KwaZulu-Natal. The training will take place from 28 April till 8 May 2022.

We have now ended our selection and are happy to announce that the following people will attend to the training:

Akhona Mbatyoti (Agricultural Research Council) - Mandisa Ndlovu (KwaZulu-Natal Museum) - Cassandra Barker (Stellenbosch University) - Arjan Engelen (Stellenbosch University) -Carly Vlotman (Stellenbosch University) - Jacomien Zaayman (University of Pretoria) - Oageng Modise (University of KwaZulu-Natal) - Bonolo Mosime (University of KwaZulu-Natal) - Luhlumelo Mva (University of KwaZulu-Natal) - Viren Thupsie (University of KwaZulu-Natal) - Wilmari Uys (University of Cape Town) - Grace Tshivhandekano (University of Fort Hare)

You will read more on this training in the next issue of the *Newsletter* !

Financial support:

Report
s

Fieldwork: Austral summer 2021-2022 (South Africa)

The DIPoDIP project partners have been involved in several field trips during the 2021/22 field season, which is slowing down as we enter autumn in the southern hemisphere. This report covers fieldwork conducted in southern Africa for the austral summer season and includes two short trips by Terence Bellingan in the Eastern Cape from his home base at the Albany Museum in Makhanda to the Katberg Pass in September, and again in December, 2021; a trip by John Midgley and Burgert Muller (National Museum, Bloemfontein) to Lesotho; and four joint fieldtrips by Terence Bellingan, John Midgley and Kurt Jordaens - three into iSimangaliso Wetland Park in October 2021, January and March 2022 and a BioBlitz in the high altitude grasslands of the southern Drakensberg in February of 2022 facilitated by the South African National Biodiversity Institute (SANBI).

Fieldwork in South Africa for the summer period between 2021 and 2022 was exciting in all the usual ways, and in some unusual ways too! Some important considerations facing entomologists conducting fieldwork in Northeastern Zululand are featured here!

The Katberg Pass lies approximately 90 km to the Northeast of Makhanda and is the type-locality for the diminutive hover fly *Chrysogaster africana*, along with many other insect and plant species. The trips to this locality were for the purpose of obtaining specimens of this seldom seen species. The area was very dry and hot for the September outing, but, by December good rains had fallen and all the streams along the pass that were trickles two months previous were flowing again strongly. Both trips to the Katberg were generally successful and produced important contributions of hoverfly specimens from the genera *Syritta* and *Eumerus* during the September trip, and *Syritta* during the December trip. However, *C. africana* from its type locality remains elusive for now and further visits in 2022 are warranted!

The Katberg Pass in September (left) and December (right) 2021 – the change in vegetation condition was spectacular between the two trips, as the Eastern Cape. province begins to emerge from a devastating period of drought over the past years.

A field trip was planned for December 2021 to Lesotho but derailed by the emergence of the Omicron variant a week before the planned departure. Neither Terence Bellingan nor Kurt Jordaens could make the trip, leaving John Midgley and Burgert Muller to venture into the Mountain Kingdom. Weather conditions were challenging, with Malaise traps being washed away in storms and several days where collecting was rained out, but at least one undescribed species of *Coenosia* (Muscidae) has been confirmed from the collections, as well as a fascinating wingless Atherimorpha (Rhagionidae) (possibly an adaptation for the strong winds at high altitudes).

The field trips into the iSimangaliso Wetland Park were conducted for general collecting of pollinating flies from the area, but also specifically for acquiring hover fly specimens of the species *Syritta rufa* and *Spheginobaccha pamela*, the wetland park being the type locality for each of these species. Collecting in the park is challenging because of the considerations of dangerous wildlife near the water's edge (see plate above) and from Buffalo, Rhino and Elephant within the Park. In spite of this, and always remaining as close to the vehicle as possible, we managed to make very important collections of Rhiniinae (nose flies) and Syrphidae from within the fenced part of the Park and surrounding areas.

A lunch break at the entrance to the uMthoma aerial boardwalk in the western shores section of the iSimangaliso Wetland Park (left), and John servicing a Malaise trap in the swamp forest near St Lucia (right).

Several specimens of *Spheginobaccha pamela* were collected, more than doubling the number of known specimens, including the undescribed females. Each trip presents new opportunities, even if the targets are only partially met. For example, while *Syritta rufa* continues to evade us, we collected many other rare and unexpected taxa, furthering and deepening our understanding of the hover flies and nose-flies of the region. The larvae of *Monoceromyia* sp. and *Meromacroides meromacriformis* were collected for the first time and will be described in due course.

Male *Monoceromyia* sp (Syrphidae) photographed near St Lucia, iSimangaliso Wetland Park. These hover flies are extremely accurate wasp mimics, even imitating certain specific wasp behaviors as part of their charade.

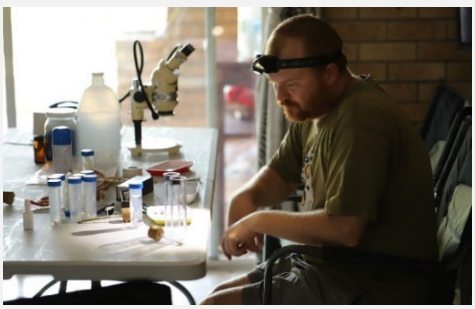
The idea behind a "BioBlitz" is to gather as many taxonomic experts as possible and to survey an area of land as extensively as possible towards the goal of generating foundational taxonomic biodiversity information about that area. Terence Bellingan, John Midgley and Kurt Jordaens were able to coordinate their schedules and joined forces once again to collect hover flies, nose flies and tangle-veined (Nemestrinidae) flies as part of the high-altitude grasslands BioBlitz, in the southern Drakensberg, South Africa. Five localities were surveyed over five days across an area that is designated to be declared a South African National Park in the near future.

Some hover flies (*Phytomia incisa* on Cape mint - left; *Asarkina* sp. on Ivy – right) imaged by Terence Bellingan at two separate sites where plants were found in bloom that hover flies find particularly attractive!

For "Team Hover Fly", as we were designated by the SANBI BioBlitz organizers, the trip was extremely successful recovering representative samples of all the high-altitude species known to be endemic to the area and collecting several other taxa which are considered to be extremely rare! We were fortunate enough to collect *Pelloloma nigrifacies*, *Graptomyza summa*, *Syritta stuckenbergi* and *Syritta fusca*, all of which are restricted to high altitudes in Southern Africa. Confirming the presence of these taxa within the area, and in almost all cases each one being from their type localities, adds considerable value to the goal of SANParks for designating the area as a National Park providing protected status for them and countless other high altitude restricted endemics.

Overall, the 2021–2022 season was a great success, with multiple new discoveries and many specimens added to museum collections for future research. From 2-21 October 2021, Dr John Midgley, along with Dr Terence Bellingan from the Albany Museum and Dr Kurt Jordaens of the Royal Museum of Central Africa, undertook a field trip to the iSimangaliso Wetland Park in KwaZulu-Natal to collect Diptera with a special focus on the collection of Syrphidae (hoverflies) and Rhiniinae (noseflies).

Terence Bellingan and John Midgley



Left: Dr John Midgley (KwaZulu-Natal Museum, South Africa) sorting hover flies collected in the field.
Right: Dr Terence Bellingan (Albany Museum, South Africa) taking live pictures of *Monoceromyia* sp. at a rot hole.

The expeditions were funded by JRS Biodiversity Foundation (PINDIP project) and the Belgian Development Cooperation (DIPoDIP project).

Contact:

John Midgley: jmidgley[at]nmsa.org.za - Terence Bellingan: t.bellingan[at]am.org.za

Financial support:

SPOTLIGHT

PhD: An integrated pest and pollinator management approach for smallholder avocado (*Persea americana* Mill.) farms under different landscape contexts

Nadia Toukem

Nadia Toukem (left) performed her PhD at the International Centre of Insect Physiology and Ecology (*icipe*) in Nairobi (Kenya) and obtained her PhD at the Department of Zoology and Entomology, University of Pretoria in Pretoria (South Africa).

Thesis abstract:

Insect pest infestation is one of the common threats in cropping systems that reduces yield and endangers food security worldwide. Adoption of an environmentally friendly pest management approach is being widely encouraged to suppress pests with minimum negative effects on the environment and biodiversity. Besides, concerns for adequate crop pollination have recently increased because of the current global pollinator crisis. However, these two services (pest control and pollination enhancement) that support crop production have been studied in isolation, with little investigations into their potential interaction on crop yield.

This thesis explores ways of enhancing pollination for integration with pest management practices to increase the productivity of avocado (*Persea americana* Mill.) (Lauraceae) within smallholder farms, and the use of flower strips to support pollinators in a commercial avocado orchard in Kenya. Specifically, the spatial distribution of major avocado pests; the oriental fruit fly *Bactrocera dorsalis* (Hendel) (Diptera: Tephritidae) and false codling moth *Thaumatotibia leucotreta* (Meyrick) (Lepidoptera: Tortricidae), and associated parasitoids were investigated across landscape vegetation productivity classes, using the normalised difference vegetation index (NDVI) from Sentinel-2 satellite data.

Left: Nadia and co-workers transporting a bee hive into an avocado orchard. Middle: insect trap to collect avocado pest species. Right: avocado flower panicle.

Pest abundances were found to vary among landscape classes, with higher abundances in the low and medium vegetation productivity classes than in the high class. Parasitoids reared from infested fruits provided some insights on their potential use in biological pest control programs. The impacts and potential interactions between integrated pest management (IPM) and the introduction of managed honey bee colonies under a strategy called integrated pest and pollinator management (IPPM), were assessed on avocado pests, pollinators and productivity across landscape vegetation productivity classes. The abundance of *Apis mellifera* L. (Hymenoptera: Apidae) was shown to be influenced by the interactions between landscape vegetation productivity and IPM. Neither IPM nor the introduction of managed honey bee colonies represented a threat to non-*Apis* flower visitors. In addition, the IPPM strategy resulted in a 941% of fruit set increase and up to 97% of fruit abscission within the high vegetation productivity class. The abundance of *B. dorsalis* and *T. leucotreta* significantly decreased on the farms with IPM, resulting in a 6% increase of final fruit weight compared with the farms without IPM.

To support avocado pollinators other than *A. mellifera*, the effectiveness of the flower strip mixture in increasing pollinator abundance and fruit set was investigated. Results revealed lower abundances of *A. mellifera* and syrphid pollinators on plots with flower strips compared with plots without, resulting in a comparable fruit set between the treatments.

Overall, this thesis supported the hypothesis that IPM reduced pest abundances, increased fruit weight, and did not negatively affect avocado pollinators. However, the IPPM strategy did not significantly increase yield but could provide additional incomes through beekeeping products, or provision of pollinator resources and pest biological control when combining the IPPM strategy with flower strips. Future studies on ecological mechanisms that shape the effects of IPPM strategy will help provide better tools to farmers and policymakers on sustainable and cost-effective farming practices that increase qualitative and quantitative avocado yield.

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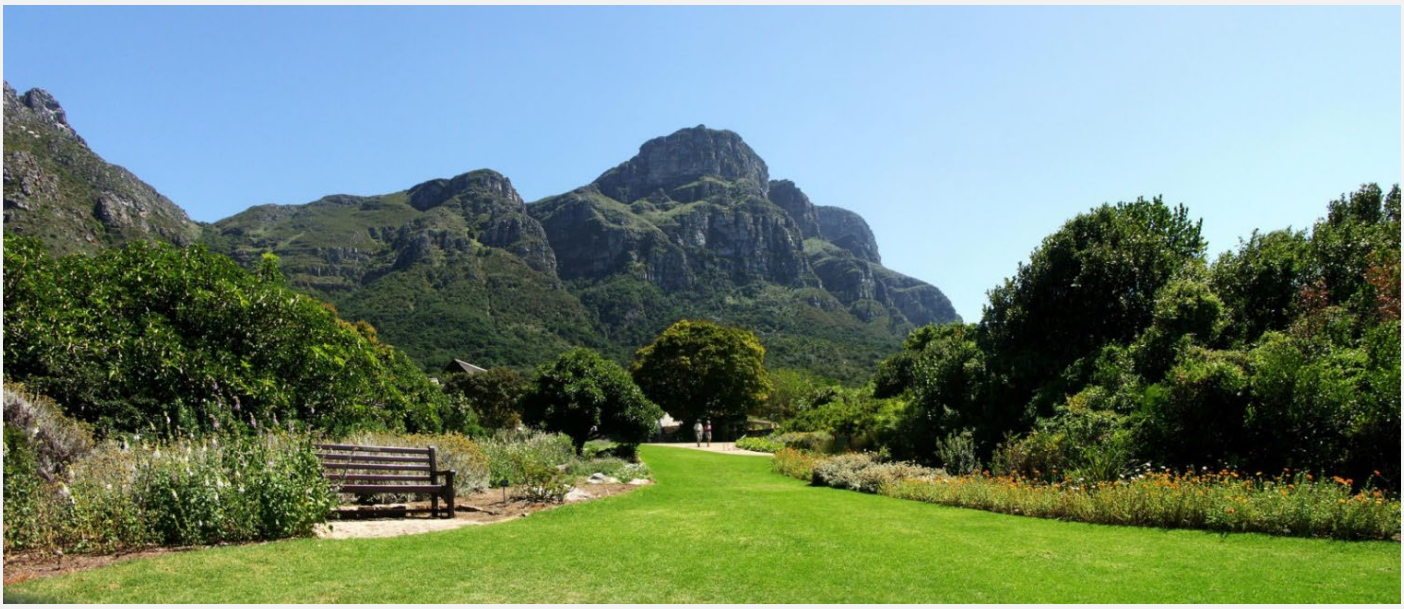
Congress

Congress: Twelfth International Symposium on Pollination (ISPXII)

12 – 16 September 2022, South Africa



The 12th International Symposium on Pollination will take place from 12 – 16 September 2022, at the Kirstenbosch National Botanical

More information: https://www.turnersconferences.com/conferences/2021/Pollination2021/

Kirstenbosch National Botanical Garden is acclaimed as one of the great botanic gardens of the world. Few gardens can match the sheer grandeur of the setting of Kirstenbosch, against the eastern slopes of Cape Town's Table Mountain. More information can be found on the website of the International Commission for Plant-Pollinator Relationships (ICPPR) (www.icppr.com). ICPPR was founded in 1950 as the International Commission for Bee Botany (ICBB). Its objectives are to promote & coordinate research on relationships between plants and pollinators of all types. That mandate includes studies of insect pollinated plants, pollinator foraging behaviour, effects of pollinator visits on plants, management and protection of insect pollinators, bee collected materials (e.g. nectar and pollen), and of products derived from plants and modified by bees. Further, the ICPPR organizes meetings, colloquia or symposia related to the above topics and publishes and distribute the proceedings. The ICPPR collaborates closely with national and international institutions and is one of the 82 scientific commissions of the International Union for Biological Sciences.

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ICPPR International Commission for Plant-Pollinator Relationships

Congress

Congress: 11th International Symposium on Syrphidae

5 – 10 September 2022, France

The 11th International Symposium on Syrphidae will take place in Barcelonette (Alpes de Haute Provence, France) from Monday 5 to Saturday 10 September 2022.You can find more information on the symposium at https://syrphidae11.sciencesconf.org/

The provisional **schedule** is as follows :
Arrival : Monday 5 September 2022
Symposium : Tuesday 6 to Thursday 8 September 2022
Excursion : Friday 9 September 2022
Departure : Saturday 10 September 2022

Access : A bus will be available from and to Marseilles (railway and bus station Saint-Charles) on Monday 5, departure around 15:00, and on Saturday 10 September, departure around 09:00. The Marseille Saint-Charles railway station is easily accessible by high speed train from neighbouring countries, including London (via Paris), or by bus from Marseille Marignanne International airport.

Accommodation will be available on the congress venue : Seolane center (https://seolane.org/) or at local hotels in Barcelonette, ca. 10 min walk from the venue. During the Symposium a room with binocular microscopes will be available to delegates.

The excursion will be in the nearby Mercantour National Park (http://www.mercantour-parcnational.fr/fr).

At this time, we would like interested entomologists to complete their **registration** online at https://syrphidae11.sciencesconf.org. Further details about accommodation, prices and booking are now announced online. If you have any question or suggestion regarding the Symposium, feel free to contact us at syrphidae11[at]imbe.fr

We are looking forward to welcoming you in beautiful Provence !

The 11ISS local Organizing Committee :

Gabriel Neve - Benoit Geslin - Arne Saatkamp - Jean-Yves Meunier - Marine Berro - Alrick Dias - Vanina Beauchamps-Assali - Delphine Reverbel - Camille Ruel

Literature: Below you will find a selection of plant-pollinator related publications that have been published in the last year with a focus on, but not limited to, Diptera, the Afrotropical Region and plant-pollinator networks.

Arroyo-Correa, B.; Bartomeus, I. & Jordano, P. (2021). Individual-based plant-pollinator networks are structured by phenotypic and microsite plant traits. Journal of Ecology, 109: 2832-2844. DOI: 10.1111/1365-2745.13694

Arstingstall, K.A.; De Bano, S.J.; Li, X.P.; Wooster, D.E.; Rowland, M.M.; Burrows, S. & Frost, K. (2021). Capabilities and limitations of using DNA metabarcoding to study plant-pollinator interactions. Molecular Ecology, 30: 5266-5297. DOI: 10.1111/mec.1611

Borchardt, K.E.; Morales, C.L.; Aizen, M.A. & Toth, A.L. (2021). Plant-pollinator conservation from the perspective of systems-ecology. Current Opinion in Insect Science, 47: 154-161. DOI: 10.1016/j.cois.2021.07.003

Chakraborty, P.; Chatterjee, S.; Smith, B.M. & Basu, P. (2021). Seasonal dynamics of plant pollinator networks in agricultural landscapes: how important is connector species identity in the network? Oecologia, 196: 825-837. DOI: 10.1007/s00442-021-04975-y

Chakraborty, P.; Mukherjee, P.A.; Laha, S. & Gupta, S.K. (2021). The influence of floral traits on insect foraging behaviour on medicinal plants in an urban garden of eastern India. Journal of Tropical Ecology, 37: 200-207. DOI: 10.1017/S0266467421000341

Cheptou, P.O. (2021). Pollination strategies in the face of pollinator decline. Botany Letters, 168: 316-323. DOI: 10.1080/23818107.2021.1884900

Chikowore, G.; Steenhuisen, S.L.; Mutamiswa, R.; Martin, G.D. & Chidawanyika, F. (2021). Integration of invasive tree, black locust, Into agro-ecological flower visitor networks induces competition for pollination services. Arthropod-Plant Interactions, 15: 787-796. DOI: 10.1007/s11829-021-09851-3

Deeksha, M.G.; Khan, M.S. & Kumaranag, K.M. (early access). Plant- pollinator interaction network among the scrubland weed flora from foothills of north-western Indian Himalaya. International Journal of Tropical Insect Science, early access. DOI: 10.1007/s42690-021-00681-7.

Drager, A.P.; Chuyong, G.B.; Kenfack, D.; Nkomo, W.A.; Thomas, D.W.; Wandji, R.T. & Dunham, A.E. (early access). What structures diurnal visitation rates to flowering trees in an Afrotropical lowland rainforest understory ? Insect Conservation and Diversity, early access. DOI: 10.1111/icad.12530

Egonyu, J.P.; Sisye, S.E.; Baguma, J.; Otema, M. & Ddamulira, G. (2021). Insect flower-visitors of African oil palm *Elaeis guineensis* at different sites and distances from natural vegetation in Uganda. International Journal of Tropical Insect Science, 41: 2477-2487. DOI: 10.1007/s42690-021-00426-6

Ellis, A.G.; Anderson, B. & Kemp, J.E. (2021). Geographic mosaics of fly pollinators with divergent color preferences drive landscape-scale structuring of flower color in daisy communities. Frontiers in Plant Science, 12: 617761. DOI: 10.3389/fpls.2021.617761

Erickson, E.; Patch, H.M. & Grozinger, C.M. (2021). Herbaceous perennial ornamental plants can support complex pollinator communities. Scientific Reports, 11: 17352. DOI: 10.1038/s41598-021-95892-w

Fernandez, F.J.; Garay, J.; Mori, T.F.; Csiszar, V.; Varga, Z.; Lopez, I.; Gamez, M. & Cabello, T. (2021). Theoretical foundation of the control of pollination by hoverflies in a greenhouse. Agronomy, 11:167. DOI: 10.3390/agronomy11010167

Fisogni, A.; Massol, F.; de Manincor, N.; Quaranta, M.; Bogo, G.; Bortolotti, L. & Galloni, M. (2021). Network analysis highlights increased generalisation and evenness of plant-pollinator interactions after conservation measures. Acta Oecologia, 110: 103689. 10.1016/ j.actao.2020.103689

Gaiarsa, M.P.; Kremen, C. & Ponisio, L.C. (2021). Pollinator interaction flexibility across scales affects patch colonization and occupancy. Nature Ecology & Evolution, 5: 787-793. DOI: 10.1038/s41559-021-01434-y

Gegear, R.J.; Heath, K.N. & Ryder, E.F. (2021). Modeling scale up of anthropogenic impacts from individual pollinator behavior to pollination systems. Conservation Biology, 35: 1519-1529. DOI: 10.1111/cobi.13754

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