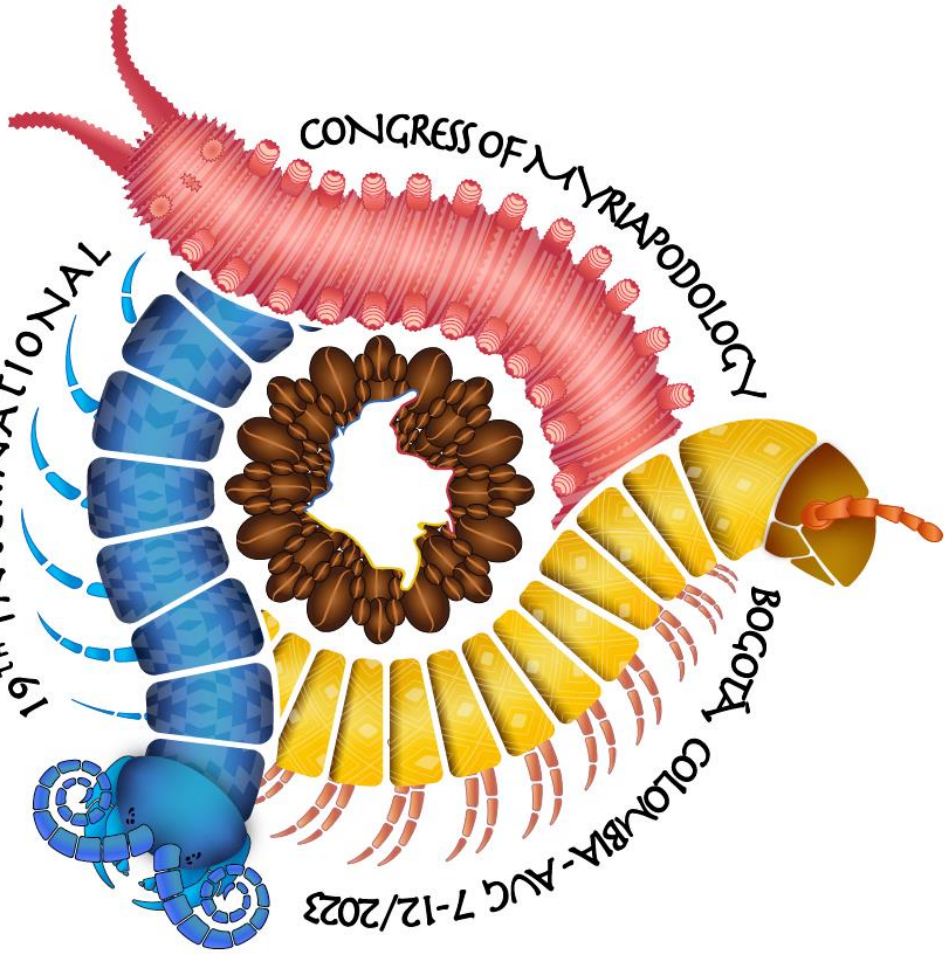
19th INTERNATIONAL CONGRESS OF MYRIAPODOLOGY

AUGUST, 7th to 12th, 2023
UNIVERSIDAD NACIONAL DE COLOMBIA
BOGOTÁ, COLOMBIA



PROGRAM AND ABSTRACTS

19icm.unal.edu.co 19icm_fcbog@unal.edu.co 19icm2023

19th International Congress Of Myriapodology

August, 7th to 12th, 2023
UNIVERSIDAD NACIONAL DE COLOMBIA
Bogotá, Colombia

PROGRAM AND ABSTRACTS

Compiladora:
Daniela Martínez-Torres

Diseño de portada:
Alejandro Novoa
Daniela Martínez-Torres

Editores:
Daniela Martínez-Torres
Julián Bueno-Villegas

Diagramación:
Alejandro Novoa
Daniela Martínez-Torres

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19th ICM Organizer:

Grupo de Investigación en Aracnología y Miriapodología
Universidad Nacional de Colombia

GCM
GRUPO COLOMBIANO DE MIRIAPODOLOGÍA

Instituto de Ciencias Naturales
Universidad Nacional de Colombia
Sede Bogotá

UNIVERSIDAD NACIONAL DE COLOMBIA

With the support of:

cim

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TABLE OF CONTENT

SOCIETY OF CENTRE INTERNATIONAL DE MYRIAPODOLOGIE (CIM) 2019-2023

President:	**Peter Decker (Germany)** E-mail: decker@myriapoden-info.de
Vice-President:	**Nesrine Akkari (Austria)** E-mail: nesrine.akkari@nhm-wien.ac.at
General-Secretary:	**Stylianos Simaiakis (Greece)** E-mail: ssimaiakis@yahoo.com
Associate-Secretary:	**Jean-Jacques Geoffroy (France)** E-mail: geoffroy@mnhn.fr
Treasurer:	**Hans S. Reip (Germany)** E-mail: reip@myriapoden-info.de
Council Members:	Dragan Ž. Antić (Serbia) Lucio Bonato (Italy) Amazonas Chagas-Junior (Brazil) Lázló Dányi (Hungary) Carsten H. G. Müller (Germany) Piyatida Pimvichai (Thailand) Petra Sierwald (USA) Varpu Vahtera (Finland)
Webmaster:	Peter Decker (Germany)

Official Website http://www.myriapodology.org/

Welcome from the Centre International de Myriapodology (CIM)

On behalf of the Executive Committee of the CIM I wish a warm welcome to the 19th International Congress of Myriapodology, to be held at Universidad Nacional de Colombia, Bogotá, Colombia, 7-12 August 2023.

The CIM aims to bring together beginners, advanced and professionals in myriapodology and Onychophorology to share their knowledge. The congresses, which have been taking place since 1968, play an important role here for an intensive and also personal exchange. After many congresses in Europe, congresses in North America (Radford, USA, 1981), Africa (Mtuzini, South Africa, 2022), Australia (Brisbane, 2011) and Asia (Krabi, Thailand, 2017), Colombia in South America is the last continent in this series inhabited by myriapods or onychophorans to be the current venue, a grand premiere and encouraging sign for this part of the world. The COVID pandemic has delayed this congress from the originally planned year 2021 to 2023. It was a pity but necessary to ensure a great and safe event.

As can be seen from this year's contributions, myriapods and onychophorans offer a wide spectrum of research fields, constant growth in knowledge and interesting surprises. Researchers worldwide are investigating distribution, morphology, ecology, physiology, taxonomy, systematics and evolution in time and space. The methods used are evolving, becoming more accurate, more diverse, more integrative and offering new possibilities that the grandfathers of myriapodology and onychophorology could only dream of. There is still much to discover and understand and more results lead to more questions. It is therefore important to see that many talented students as well as the old hands from different parts of the world are making an valuable contribution that is visible in a special way here in Bogotá.

On Behalf of the CIM, I thank the 19th ICM Academic and Organizing Committee – Eduardo Flórez Daza, Daniela Martínez Torres, Julian Bueno-Villegas and team – for generously offering to host this congress and preparing this volume. Special thanks to all the contributors and participants who bring this booklet and congress to life, and to the Scientific Committee for their efforts. We wish all participants exciting days, many insights and inspiration.

Peter Decker
President, CIM

Welcome from the Organizing Committee (CIM)

Dear lovers of myriapods and onychophorans, welcome to the 19th International Congress of Myriapodology, welcome to Bogotá, Colombia.

Fourteen years ago, I embarked on this adventure: the study of myriapods, especially Colombian millipedes. It all began when a wandering garden captivated me with its beauty: *Psammodesmus bryophorus,* the only species of millipede known to carry several small plants on its back. After introducing this species to the world, I couldn't have imagined that more and more people would become interested in learning and studying this group in Colombia. Thanks to our effort and perseverance, our passion grew, and we joined forces to work on this great and long-awaited event: the 19th International Congress of Myriapodology.

The first time Colombia was proposed to host the International Congress of Myriapodology was during the 15th ICM in Brisbane, Australia in 2011. However, the Czech Republic was chosen. Eight years later, with the growing number of researchers in Myriapodology and Onychophorology throughout Latin America, we once again proposed Colombia's candidacy at the 18th ICM in Hungary in 2019. This time, Colombia successfully secured the opportunity to host the nighteenth ICM in 2021. Nevertheless, nobody anticipated the COVID-19 pandemic, which had a worldwide impact, forcing us to postpone the congress until this year.

The 19th edition of this Congress is not only the first to be held in South America, but also the first version after the Covid-19 pandemic. Additionally, it marks the first time it's being conducted in a hybrid manner, with both in-person and virtual participants. Making this decision wasn't easy: "Will most of our colleagues choose not to attend in-person this congress?" This was our major concern and the subject of lengthy discussions. I even heard the remark, "If we offer a virtual option, we'll end up with only a handful of in-person participants". Finally, without regrets, we opted for this path, providing the virtual option as well, to give those who wish to participate but couldn't do so in person due to various circumstances, the opportunity to join.

Numerous hours, days, weeks, and even years have been dedicated to organizing this Congress. We've faced various challenging moments along the way. However, today, on Monday, August 7th, 2023, we are pleased to be able to enjoy this event with all of you here in Colombia – one of the most biodiverse countries in the world.

We find ourselves in Bogotá, at the Universidad Nacional de Colombia, within the Instituto de Ciencias Naturales (ICN), the home of Colombian myriapodology. This institution marks the birthplace of the country's myriapod school and houses the largest and most representative collection of myriapods in Colombia.

Today, we are delighted to announce that we are not a mere handful of in-person attendees. Even as a hybrid event, the most of our colleagues have been able to join us physically.

On behalf of the entire organizing committee of the 19th ICM, we are pleased to announce that the 19th ICM has a total of 75 participants: 65 in-person and 10 virtually. Participants come from 27 countries and are from 29 nationalities. We are prepared to relish the 76 presentations offered by 59 speakers, encompassing oral, video, and poster modalities. These works have undergone review by 13 evaluators from the scientific committee, to whom we express our immense gratitude for ensuring the high quality of the work presented at this congress.

We're honored to have the participation of seven keynote speakers, and we extend our heartfelt thanks to them for their effort, commitment, and dedication: Piyatida Pimvichai from Thailand, Lucio Bonato from Italy, Paul Marek and Gonzalo Giribet from USA, are here in-person. Nesrine Akkari from Vienna, Ligia Benavides from Colombia, and Julián Monge Nájera from Costa Rica are with us virtually. Activities such as the Onychophora Symposium and the Myriapod and Velvet Worm Photography Contest are still in place.

In addition to enjoying and exchanging knowledge through the presentation of works, we're excited about the opportunity to connect with all of you during our integration excursion. We will visit one of Colombia's most emblematic ecosystems, the "Páramo", taking advantage of the fact that this country harbors approximately 50% of the world's páramos. We will be more than 3000 meters closer to the stars, in a location that is less than an hour away from the University. We will venture to Matarredonda Park to walk amidst frailejones and clouds. Among the unique characteristics of this ecosystem is its highly variable and extreme temperature and weather conditions, so we must be prepared for the possibility of strong sunlight, cold weather, or rain.

Lastly, I want to express my gratitude to all the institutions and individuals who have contributed to the realization of the 19th ICM, especially to the University, the Faculty of Sciences, and the ICN, and the 19th ICM Organizing committee. This includes each and every attendee, who has made a significant effort to come to this event and our home.

We are excited to share Colombia's biodiversity, culture, food, music, and beauty with you.

I thank each and every one of you for being part of this gathering that brings together passion and knowledge. I hope we make the most of these days and return to our places of origin inspired and with a strengthened network of collaboration.

Enjoy this congress, enjoy our country, and again, welcome to our house.

Daniela Martínez-Torres,
Chair of the Organizing Committee
19th ICM

19th INTERNATIONAL CONGRESS OF MYRIAPODOLOGY (19thICM) ORGANIZING TEAM

ORGANIZING COMMITTEE

President:

Daniela Martínez-Torres
Grupo de Investigación en Aracnología y Miriapodología, Instituto de Ciencias Naturales, Facultad de Ciencias, Universidad Nacional de Colombia
sdmartinezt@unal.edu.co

Vice-Presidents:

Eduardo Flórez-D.
Instituto de Ciencias Naturales, Facultad de Ciencias, Universidad Nacional de Colombia
aeflorezd@unal.edu.co

Jaime Aguirre Ceballos
Instituto de Ciencias Naturales, Facultad de Ciencias, Universidad Nacional de Colombia
jaceballosc@unal.edu.co

Secretary:

Julian Homez-Alvarez
Grupo de Investigación en Aracnología y Miriapodología, Instituto de Ciencias Naturales, Facultad de Ciencias, Universidad Nacional de Colombia.
sjhomeza@unal.edu.co

Santiago Alvear
Departamento de Biología, Facultad de Ciencias Naturales, Exactas y de la Educación, Universidad del Cauca

Elisa Chaparro
Scientylab

Jossian Díaz Melo
Grupo de Investigación en Aracnología y Miriapodología, Instituto de Ciencias Naturales, Facultad de Ciencias, Universidad Nacional de Colombia.

Sebastián Galvis-Jiménez
Laboratory of systematics and taxonomy of terrestrial arthropods, Institute of Biosciences, Federal University of Mato Grosso, Cuiabá, Brazil.

Yesenia Morales-Cárdenas
Grupo de investigación en Biodiversidad y educación ambiental, Universidad del Quindío.

Alejandro Novoa
Grupo de Investigación en Aracnología y Miriapodología, Instituto de Ciencias Naturales, Facultad de Ciencias, Universidad Nacional de Colombia.
ArthropodaTV

Brayan Rodriguez-Anillo
Grupo de Investigación en Aracnología y Miriapodología, Instituto de Ciencias Naturales, Facultad de Ciencias, Universidad Nacional de Colombia.

Fernanda Vásquez-Valverde
Department of Entomology, Virginia Tech, 216A Price Hall, Blacksburg, VA 24061, USA.

STAFF

Tatiana Aguas Daza
Nicolás Caicedo
Sarah León-Ortíz
Pedro Leyton
Mauricio Mahecha Serrato
Sara Ramírez Rodríguez
Camilo Róbles
Juan Carlos Romero-Rincón
Alan Dante Torres Jaramillo

ACADEMIC COMMITTEE

Daniela Martínez-Torres
Grupo de Investigación en Aracnología y Miriapodología, Instituto de Ciencias Naturales, Facultad de Ciencias, Universidad Nacional de Colombia

Julián Bueno-Villegas
Área Académica de Biología, Centro de Investigaciones Biológicas, Universidad Autónoma del Estado Hidalgo. México

Eduardo Flórez-D.
Instituto de Ciencias Naturales, Facultad de Ciencias, Universidad Nacional de Colombia

SCIENTIFIC COMMITTEE

Rodrigo Bouzan
Universidade de Sao Paulo, Brazil

Julián Bueno Villegas
Universidad Autónoma del Estado de Hidalgo, México

Fabio Cupul-Magaña
Universidad de Guadalajara, Mexico

Peter Decker
Senckenber Museum für Naturkunde, Germany

Gregory Edgecombe
Natural History Museum, London

Eduardo Flórez
Universidad Nacional de Colombia

Gonzalo Giribet
Harvard University, USA

Derek Hennen
Field Zoologist with Virginia Department of Conservation and Recreation, USA

Zoltan Kórsos
Állatorvostudományi Egyetem, Hungary

Julian Monge-Nágera
Universidad Estatal a Distancia, Costa Rica

Griselda Montiel Parra
Universidad Nacional Autónoma de México

William Shear
Hampden-Sydney, United States

Bruce Snyder
Georgia College & State University, USA

Edison Torrado León
Universidad Nacional de Colombia

LOGO DESCRIPTION

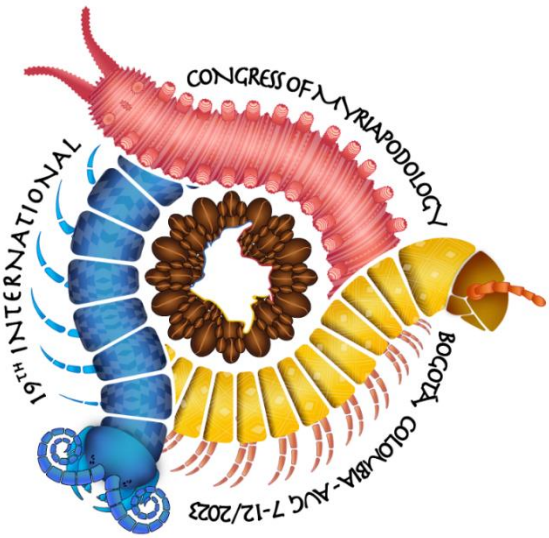
The logo of the 19th International Congress of Myriapodology was designed to highlight some of the most relevant cultural and biological aspects of Colombia.

The center of the logo is the silhouette of Colombia's map circle by coffee beans. Coffee is one of the more important and representative products of the country. The characteristic growing climate and 100% Arabica variety of the Colombian coffee make it one of the worlds favorites for its flavor and rich aroma.

Due to its geographical localization in and its geological configuration, Colombia has a huge variety of ecosystems, and is considered a biodiversity hotspot in the world. In our logo this diversity is represented by three specimens a millipede, a centipede and a velvet worm, which are also the focus groups of our congress.

The yellow Millipede, blue centipede and red onychophoran are a representation of the Colombian flag and they correspond with the colorations of the species founded in our country. At the same time, they represent the three branches of the Andes Mountain Ridge that give our country its diverse geological and environmental configuration.

Finally, the pluricultural and multiethnic nature of Colombia is emphasized, wherein over 100 indigenous, black or Afro-Colombian, raizal, palenquera, and various other communities coexist. This profound diversity is depicted through the textures integrated into the logo, which not only reflect the vast array of artisanal traditions but also constitute a significant aspect of our history and intangible heritage. These textures, serving as a poignant reminder of our nation's cultural mosaic, stand as a testament to the vast array of crafts present within Colombia, making them a significant aspect to be showcased at this esteemed scientific event.



Designer: Alejandro Novoa baleytonn@unal.edu.co

General information

Which is the way to go at the venue buildings?

There are two pedestrian entrances on Calle 26. Choose the one closest to your hotel.

Here we show you how to get from the entrance that is close to the Transmilenio station 'Ciudad Universitaria' to (The main entrance of the university):

- Building 564, Aulas de Ciencias, Gloria Galeano Garcés: Ac. 26 #34a-72 a 34a-98, Bogotá a Edificio 564 - Aulas de Ciencias, Gloria Galeano Garcés. - Google Maps
- Building 564, Instituto de Ciencias Naturales: Acevedo Tejada, Bogotá a Instituto De Ciencias Naturales - Google Maps

Here we show you how to get from the entrance that is close to the Transmilenio station 'Recinto Ferial' to (The secondary entrance of the university, but you could see some 19thICM flyer):

- Building 564, Aulas de Ciencias, Gloria Galeano Garcés: Teusaquillo, Bogotá a Edificio 564 - Aulas de Ciencias, Gloria Galeano Garcés. - Google Maps
- Building 564, Instituto de Ciencias Naturales: Teusaquillo, Bogotá a Instituto De Ciencias Naturales - Google Maps

Registration desk

The registration desk will be open on Monday, August 7th between 10:00–12:00 and 14:00–14:40 and it will be in the *Instituto de Ciencias Naturales (Auditorio Enrique Pérez Arbeláez, Universidad Nacional de Colombia, Bogotá)*. There will be three options for late register: on August the 7th, 8th, and 9th between 7:30–8:30 in the building *"Edificio Aulas de Ciencias - Gloria Galeano" (Auditorio 1, Universidad Nacional de Colombia*, *Bogotá*). Staff at the registration desks will offer information and receive payments, we do accept cash payments (only in COP). Any other extra payment such as the congress excursion, lunch, and the farewell party will be received by the staff at the registration desk between 7:30 to 8:30. For fees see the

Wireless internet connection will be available in the venue building during the congress using the guest Wi-Fi network; however, speed may decrease due to the high number of people connected.

Presentations

The **oral presentations** are limited to 15 minutes plus 5 minutes for Q&A (keynote lectures are 45 minutes plus 15 minutes for Q&A). Please hand your presentation files to the staff in the lecture hall in good time before your lecture, *i.e.,* on the first day, or at the latest, in the morning of the day of your lecture. You could sent it to 19icm_fcbog@unal.edu.co taken account that the **file name should follow this format:** "presentation day_session_LastName", e.g., 8_session3_Martinez-Torres.

All **video presentations** are limited to 8 minutes plus 2 minutes for Q&A. This must be sent to the email address 19icm_fcbog@unal.edu.co **before August 7th**, 2023 taken account that the **file name should follow this format** "presentation day_session_LastName", e.g., 7_session3_Martinez-Torres.

At the end of each day, there are scheduled sessions for the broadcasting of the video presentations, prior to the poster session. The primary author must be present during the transmission of their work, and after the video presentation, they will be given two minutes to answer questions.

Posters will be displayed in the hall for temporary exhibitions throughout the congress. Please hand your posters to the registration desk staff, who will help you place them.

Do you want to print your poster here?

One of the recommended places to print it charges around 10 USD for a banner-type print or approximately 7 USD for paper.

You can send your poster to 19icm_fcbog@unal.edu.co **before August 2nd**, and we will coordinate to have them printed. At the time of your registration, you can claim your poster by paying the mentioned fee.

Social programs, coffee breaks, and lunch

- The Opening Ceremony will take place in the *Instituto de Ciencias Naturales (Auditorio Enrique Pérez Arbeláez, Universidad Nacional de Colombia, Bogotá)* on Monday, August 7th from 14:40 to 20:00
- Coffee/tea breaks will be served in the lecture hall in the scheduled moments (see program overview). The Coffee table will be available even outside of the scheduled hours.
- The Farewell lunch and closing ceremony will be held on Saturday, August 12th in the *Instituto de Ciencias Naturales (Auditorio Enrique Pérez Arbeláez, Universidad Nacional de Colombia, Bogotá)* from 12:50 to 22:00.

Congress excursion

Date: Thursday, August 10th.

Meeting time and point: 8:00 at the main entrance of "Edificio Aulas de Ciencias - Gloria Galeano" (Universidad Nacional de Colombia, Bogotá). Buses will take us on a guided field trip to the Parque Ecológico Matarredonda for around 1 hour. Some snacks, water, and lunch will be provided. Arrival back to the Universidad Nacional de Colombia is expected around 18:00.

Destination: We will visit "Parque Matarredonda". The park is located inside the Paramo ecosystem, this type of ecosystem is a high-altitude ecosystem. Paramos are highly important due to their biodiversity and for their role in water regulation, capturing and storing water from fog and rain, and slowly releasing it to lower-altitude regions.

Recommendations from Matarredonda's team.

1. Travel along the designated trails and be accompanied by a guide.
2. Do not separate from your group and keep an eye on your companions.
3. Individuals with heart or lung problems should not enter long and very high tours.
4. Due to the fragility of the ecosystems found in Matarredonda and in accordance with the purpose of their conservation, it is forbidden to collect animal, plant, or mineral material from Matarredonda. Likewise, you should not bring in foreign animals or plants.
5. Do not carry aerosols or other polluting elements.
6. No smoking, or consuming intoxicating or hallucinogenic drinks.
7. Do not carry any type of explosive substances or fuels that can cause fires.
8. It is forbidden to make bonfires, therefore do not take firewood from the Forest.
9. Refrain from littering on the trails and during your stay in Matarredonda.

Clothing recommendations

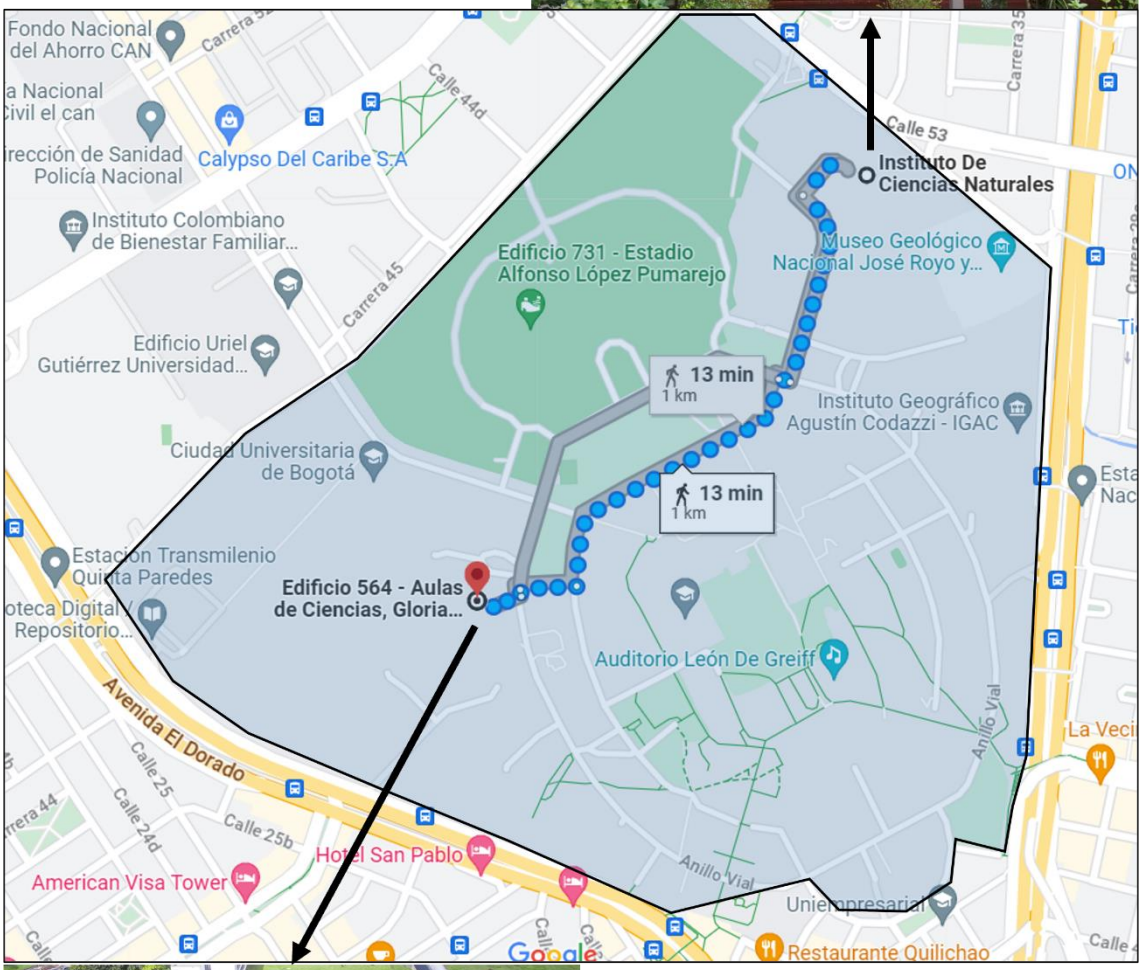
1. Boots
2. Raincoat
3. Jacket
4. Gloves
5. Cap or hat
6. Change of clothes
7. Sunscreen
8. Plastic bags for wet clothes and for trash.

Myriapodological photography contest at the 19th ICM

Rules:

1. The contest will have two categories: mobile phones and photographic camera.
2. The participants can submit their pictures in one of said categories.
3. To participate in the contest, you should submit pictures of alive myriapods or onychophorans, preferable in their natural habitat.
4. Any technique can be used for the pictures, but not retouching or modification of the pictures is allowed.
5. Pictures must be sent in JPG, TIF, RAW or BMP format. Pictures must have a minimum of 300 dpi, and maximum size of 15MB.
6. Participants must send their pictures by AUGUST 8TH to the following form:
   - ✓ Pictures should be identified with the name of the author, picture title and a description text of maximum 200 characters.
   - ✓ Pictures should be original and never received any awards before.
   - ✓ The participant must be the owner of all the rights of the pictures submitted to the contest. The participant is responsible for guarantying there won't be any legal claims.
7. Each participant is allowed to submit up to two pictures.
8. There will be a price for the first place of each category, and second and third places will get honorable mentions. All the winners will get a printed certification of their participation.
9. To participate in this contest, you must be register and attending the 19th ICM.
10. The evaluation committee will be formed by: 1. an expert in photography (attending the congress),2. a person from the CIM council and 3. a person from the 19th ICM Organizing committee.
11. Images will be judged according to their naturalness, degree of complexity, composition and aesthetic achievement. Each judge will be assigning a score from 1 to 10, and the average of the evaluations will give the winner.
12. The awards will be given out during the closing act of the 19th International congress of Myriapodology.
13. Am author cannot be the winner of both categories.

CONGRESS VENUE



UNIVERSIDAD NACIONAL DE COLOMBIA

CONGRESS PROGRAM

PROGRAM OVERVIEW

Date, time	Activities	Venue
Monday, August 7th, 2023		
10:00-12:00	**Registration**	Instituto de Ciencias Naturales – ICN
12:00-14:00	*Lunch*	
14:00-14:40	**Registration**	
14:40-20:00	**Opening Ceremony**	Instituto de Ciencias Naturales – ICN
Tuesday, August 8th, 2023		
7:30 – 8:30	**Registration**	Aulas de Ciencias – Gloria Galeano
8:30 – 9:30	**Keynote Lecture**	Aulas de Ciencias – Gloria Galeano
9:30-10:10	**Session 1 – Oral presentation**	Aulas de Ciencias – Gloria Galeano
10:10-10:30	*Coffee/Tea break*	Aulas de Ciencias – Gloria Galeano
10:30-11:50	**Session 2 – Oral presentation**	Aulas de Ciencias – Gloria Galeano
11:50-13:50	*Lunch*	
13:50-14:50	**Keynote Lecture**	Aulas de Ciencias – Gloria Galeano
14:50-15:50	**Session 3 – Oral presentation**	Aulas de Ciencias – Gloria Galeano
15:50-16:00	*Coffee/Tea break*	Aulas de Ciencias – Gloria Galeano
16:00-17:00	**Session 4 – Video presentation**	Aulas de Ciencias – Gloria Galeano
17:00-18:00	**Poster session**	Aulas de Ciencias – Gloria Galeano
Wednesday, August 9th, 2023		
7:30 – 8:30	**Registration**	Aulas de Ciencias – Gloria Galeano
8:30 – 9:30	**Keynote Lecture**	Aulas de Ciencias – Gloria Galeano
9:30-10:10	**Session 5 – Oral presentation**	Aulas de Ciencias – Gloria Galeano
10:10-10:30	*Coffee/Tea break*	Aulas de Ciencias – Gloria Galeano
10:30-11:50	**Session 6 – Oral presentation**	Aulas de Ciencias – Gloria Galeano
11:50-13:50	*Lunch*	
13:50-14:50	**Keynote Lecture**	Aulas de Ciencias – Gloria Galeano
14:50-15:50	**Session 7 – Onychophora Symposium – Oral presentation**	Aulas de Ciencias – Gloria Galeano
15:50-16:00	*Coffee/Tea break*	Aulas de Ciencias – Gloria Galeano
16:00-17:00	**Session 8 – Onychophora Symposium – Oral presentation**	Aulas de Ciencias – Gloria Galeano
17:00-18:00	**Video presentation and Poster session – Onychophora Symposium**	Aulas de Ciencias – Gloria Galeano
Thursday, August 10th, 2023		
8:00 - 18:00	*Excursion*	
Friday, August 11th 2023		
8:30 - 9:30	**Keynote Lecture**	Aulas de Ciencias - Gloria Galeano
9:30-10:10	**Session 9 - Oral presentation**	Aulas de Ciencias - Gloria Galeano
10:10-10:30	*Coffee/Tea break*	Aulas de Ciencias - Gloria Galeano
10:30-11:50	**Session 10 - Oral presentation**	Aulas de Ciencias - Gloria Galeano
11:50-13:50	*Lunch*	
13:50-14:50	**Keynote Lecture**	Aulas de Ciencias - Gloria Galeano
14:50-15:50	**Session 11 - Oral presentation**	Aulas de Ciencias - Gloria Galeano
15:50-16:00	*Coffee/Tea break*	Aulas de Ciencias - Gloria Galeano
16:00-17:00	**Session 12 - Video presentation**	Aulas de Ciencias - Gloria Galeano
17:00-18:00	**Poster session**	Aulas de Ciencias - Gloria Galeano

Saturday, August 12th, 2023		
8:30 - 9:30	**Keynote Lecture**	Aulas de Ciencias - Gloria Galeano
9:30-10:20	**Session 13 - Oral presentation**	Aulas de Ciencias - Gloria Galeano
10:20-10:30	*Coffee/Tea break*	Aulas de Ciencias - Gloria Galeano
10:30-12:30	**CIM-General Assembly**	Aulas de Ciencias - Gloria Galeano
12:30-14:30	***Farewell Lunch***	Instituto de Ciencias Naturales - ICN
14:30-16:30	**Closing Ceremony**	Instituto de Ciencias Naturales - ICN
16:30-22:00	***Farewell party***	Instituto de Ciencias Naturales - ICN

Aulas de Ciencias - Gloria Galeano: Auditorio 1.

Instituto de Ciencias Naturales – ICN: Auditorio Enrique Pérez Arbeláez.

You can see the venue map here: de Instituto De Ciencias Naturales a Edificio 564 - Aulas de Ciencias, Gloria Galeano Garcés. - Google Maps

CONGRESS SCHEDULE

Monday, August 7th, 2023
Instituto de Ciencias Naturales (ICN), Auditorio Enrique Pérez Arbeláez

10:00-12:00	**Registration**
12:00-14:00	*Lunch*
14:00-14:40	**Registration**
14:40-20:00	**Opening Ceremony**

Tuesday, August 8th, 2023
Aulas de Ciencias - Gloria Galeano, Auditorio 1

7:30 – 8:30	**Registration**
8:30 – 9:30	**Keynote Lecture** **Paul Marek:** Glow-in-the-dark millipedes, mimicry rings, and the 1,306-legged millipede
9:30-10:10	**Session 1 – Oral presentation** *Chairpersons: Peter Decker & Alan Torres Jaramillo*
9:30-9:50	**Ivan Hadrián Tuf, Lucie Novotná & Karel Tajovský:** Pitfall traps do not measure activity-density of millipedes and centipedes
9:50-10:10	**Irina Semenyuk & Van Nguyen Thi:** Pulsar in the jungle – Long-term millipede species' coexisting in a tropical forest
10:10-10:30	*Coffee/Tea break*
10:30-11:50	**Session 2 – Oral presentation** *Chairpersons: Peter Decker & Alan Torres Jaramillo*
10:30-10:50	**Julian Homez-Alvarez & Daniela Martínez-Torres:** Study of the diversity and specificity of mites associated with millipedes of the genus *Psammodesmus* Cook, 1896 (Diplopoda: Polydesmida: Platyrhacidae)
10:50-11:10	**Carolina Rojas-Buffet, Petra Sierwald & Miguel Simó:** Ecoregional diversity of millipedes in riparian forests of Uruguay
11:10-11:30	**Juan Romero-Rincon, Daniela Martínez-Torres & Jairo Robles-Piñeros:** Diversity patterns of millipedes community (Myriapoda: Diplopoda) in two cloud forest vegetation covers at Parque Natural Chicaque, Cundinamarca, Colombia
11:30-11:50	**Bojan M. Mitić, Jelena S. Vranković, Dalibor Z. Stojanović, Slađan Z. Pavlović & Slavica S. Borković-Mitić:** Antioxidant defences in centipedes (Chilopoda): a question of sex
11:50-13:50	*Lunch*
13:50-14:50	**Keynote Lecture** **Lucio Bonato:** Myriapod species: what are they and how to delimit them
14:50-15:50	**Session 3 – Oral presentation** *Chairpersons: Fernanda Vásquez-Valverde & Sebastian Galvis-Jiménez*
14:50-15:10	**Esteban Tulande-M:** A new species of *Schendylops* Cook, 1899 from Colombia: Demographic data and morphological variation associated with sex and leg pair number (Chilopoda: Geophilomorpha)
15:10-15:30	**Dragan Antić, Henrik Enghoff & Nesrine Akkari:** Adaptive evolution in caves: a review of hydrophilous cave millipedes (Myriapoda: Diplopoda) with modified mouthparts
15:30-15:50	**Leon Ruhmich, Hans S. Reip & Benjamin Naumann:** Functional morphology of the copulatory organs of *Megaphyllum projectum* (Diplopoda, Julida, Julidea)

15:50-16:00	*Coffee/Tea break*
16:00-17:00	**Session 4 – Video presentation** *Chairpersons: Fernanda Vásquez-Valverde & Sebastian Galvis-Jiménez*
16:00-16:10	**Daniela Martínez-Torres, Edgar L. Linares:** Walking gardens in the Neotropics: new reports of millipedes and bryophytes growing on their cuticle
16:10-16:20	**Jossian Díaz-Melo, Daniela Martínez-Torres:** A hidden world on millipede gonopods: the first report of sessile ciliate epibionts (Sessilida) on Platyrhacidae (Polydesmida) found in tropical humid forests of northwestern South America
16:20-16:30	**Liseth Alejandra Reyes-Peñata & Alexander García-García:** Ecological aspects of millipedes Cryptodesmidae (Polydesmida) and Glomeridesmidae (Glomeridesmida) from Cafrería municipality, Icononzo, Tolima, Colombia
16:30-16:40	**Mathieu Coulis, Meryem El Jaouhari, Maeva Pastoret & Gaelle Damour:** Impact of geophagy on litter consumption rate by diplopods in a tropical agroecosystem
16:40-16:50	**Liseth Alejandra Reyes-Peñata & Alexander García-García:** The Cryptodesmidae (Polydesmida) and Glomeridesmidae (Glomeridesmida) millipedes from Cafrería municipality, Icononzo, Tolima, Colombia
16:50-17:00	**Daniela Martínez-Torres & Thaís Melo de Almeida:** New records of teratologies in millipedes of Platyrhacoidea Pocock, 1895 (Diplopoda: Polydesmida) from Neotropical region
17:00-18:00	**Poster session**
	1. Carlos Suriel, Ángel Pimentel & Julián Bueno-Villegas: Ecology of edaphic millipedes (Diplopoda: Myriapoda) in four ecosystems in Valle Nuevo National Park, Dominican Republic
	2. Jaime Andrés Morales Morales, Aura Yesenia Morales-Cárdenas: Millipedes (Diplopoda, Myriapoda) associated to bamboo forests in Circasia, Quindío, Colombia
	3. Karel Tajovský & Ivan H. Tuf: Monitoring of millipede and centipede assemblages in restored grasslands of the karst plateaus of the Moravian Karst PLA, Czech Republic
	4. Lance Andrew, Elena Cruz, & Bruce A. Snyder: A preliminary life history study on the millipede *Cherokia georgiana* (Bollman, 1889)
	5. Sebastián Herrán, Tatiana Buitrago & Aura Yesenia Morales-Cárdenas: Characterization of millipedes (Diplopoda, Myriapoda) associated with decomposing logs in a low premontane rainforest in the department of Quindío
	6. Ștefan Cătălin Baba, Andrei Giurginca, Raluca Băncilă, Rodica Plăiașu & Marius Skolka: Diplopoda and Chilopoda in degraded habitats to be restored and in unrestored reference areas from southern carpathians, Romania
	7. Dragan Antić, Michaela Bodner, Ljubodrag Vujisić, Gordana Krstić, Felix Anderl, Günther Raspotnig, Boyan Vagalinski, Aleksandr Evsyukov, Zvezdana Jovanović, Luka Lučić & Slobodan Makarov: Strong odour – well protected? The strange case of ketones in the defensive secretion of Pachyiulinine millipedes (Diplopoda, Julida, Julidae)
	8. Michaela Bodner, Günther Raspotnig, Slobodan Makarov & Dragan Antić: Into the dark – The chemical repertoire of troglobiotic millipedes of the genus *Leucogeorgia* Verhoeff, 1930
	9. Bojan M. Mitić, Amna M. Gedged, Ljubodrag V. Vujisić, Marina M. Todosijević, Dalibor Z. Stojanović, Vele V. Tešević: Defensive chemicals in *Geophilus serbicus* (Chilopoda: Geophilomorpha)

	10. Anuwat Tummanam, Waraporn Sutthisa, Widchaya Radchatawedchakoon, Thierry Backeljau & Piyatida Pimvichai: The defensive secretions of the giant millipede *Anurostreptus sculptus* (Spirostreptida, Harpagophoridae): their chemical composition and antimicrobial activity

Wednesday, August 9th, 2023
Aulas de Ciencias - Gloria Galeano, Auditorio 1

7:30 – 8:30	**Registration**
8:30 – 9:30	**Keynote Lecture** **Piyatida Pimvichai & Thierry Backeljau:** What did DNA Barcoding do for millipede taxonomy?
9:30-10:10	**Session 5 – Oral presentation** *Chairpersons: Santiago Alvear & Sara Ramírez*
9:30-9:50	**Luis A. Arteaga-Figueroa, Diego A. Salazar-Moncada & J. Correa-Álvarez:** Mining for gold: characterization of mitogenomes and barcode genes from novel and legacy transcriptomic libraries enhances taxonomic resolution in edafopoda (Myriapoda)
9:50-10:10	**Luisa Fernanda Vasquez-Valverde & Paul Marek:** Phylogenetics of the order Polydesmida Pocock, 1887 (Myriapoda: Diplopoda)
10:10-10:30	*Coffee/Tea break*
10:30-11:50	**Session 6 – Oral presentation** *Chairpersons: Santiago Alvear & Sara Ramírez*
10:30-10:50	**Seunghun Jung & Seunggwan Shin:** Multi-tissue transcriptomic profiling of *Thereuonema tuberculata* (Wood, 1862) (Chilopoda: Scutigeromorpha: Scutigeridae)
10:50-11:10	**Vladimír Šustr, Puspendu Sardar, Alica Chroňáková, Roey Angel, Julius E. Nweze & František Lorenc:** Microbial fermentation in the gut of the millipede *Telodeinopus aoutii* (Demange, 1971) (Spirostreptidae) in light of holobiont metatranscriptomics
11:10-11:30	**Hans S. Reip:** Who am I? And if so, how many? The rediscovery of the forgotten giant european *Pachyiulus varius* (Fabricius, 1781) (Diplopoda, Julida) using modern faunistic internet platforms
11:30–11:50	**Antonio Parra-Gómez:** Recent advances in chilean myriapodology: millipedes, forgotten but diverse soil invertebrates
11:50-13:50	*Lunch*
13:50-18:00	**ONYCHOPHORA SYMPOSIUM**
13:50-14:50	**Keynote Lecture** **Julián Monge-Nájera:** Why velvet worms survived all mayor extinctions?
14:50-15:50	**Session 7 – Oral presentation** *Chairpersons: Gregory Edgecombe & Daniela Martínez-Torres*
14:50-15:10	**Cristiano Sampaio Costa:** Brazilian onychophorans: an overview of 85 years of contributions to the systematics and biology of this enigmatic phylum
15:10-15:30	**Ivo de Sena Oliveira & Georg Mayer:** Structure and development of the tracheal system in Onychophora (velvet worms)
15:30-15:50	**José Pablo Barquero-González, Ivo de Sena Oliveira & Georg Mayer:** Filling the gaps: the first velvet worm species from Honduras enhances our knowledge on the diversity of Neopatida (Onychophora: Peripatidae)
15:50-16:00	*Coffee/Tea break*

16:00-17:00	**Session 8 – Oral presentation** *Chairpersons: Gregory Edgecombe & Daniela Martínez-Torres*
16:00-16:20	**Pooja Avinipully Anilkumar, Gonzalo Giribet & Gustavo Hormiga:** Onychophora in Jamaica: an integrated phylogenomic approach half a century later
16:20-16:40	**Shoyo Sato, Shahan Derkarabetian, Arianna Lord & Gonzalo Giribet:** Worms and baits: an ultra-conserved element probe set for velvet worms (Onychophora)
16:40-17:00	**Gonzalo Giribet, Gustavo Hormiga, Pooja Avinipully Anilkumar, Cristiano Sampaio Costa, Shahan Derkarabetian, Niklas Dreyer, Arianna Lord & Shoyo Sato:** Pursuit: Understanding the Neotropical velvet worms (Onychophora, Peripatidae, Neopatida), A Cretaceous radiation of terrestrial Panarthropods
17:00-18:00	**Video presentation and Poster session**
17:00-17:10	**Video presentation** **Julián Monge-Nájera:** Two centuries of velvet worms: a brief illustrated history of onychophorology
17:20-17:30	**Julián Monge-Nájera & José Guerrero Casado:** Velvet worm knowledge: How much information are we missing?
17:20-17:30	**POSTERS** **1. Heloisa Fernandes B., Cristiano Sampaio Costa & Amazonas Chagas-Jr.:** Taxonomic study and natural history of velvet-worms of the Chapada dos Guimarães (Mato Grosso, Brazil)
	2. Heloisa Fernandes B. & Amazonas Chagas-Jr.: Marking with different inks for monitoring studies of onychophorans in the field and laboratory
	3. Elena Cruz, William Wittstock, Bruce A. Snyder, & Arnab Sengupta: Whole genome sequencing for the millipede Cherokia georgiana (Bollman, 1889)
	4. Miklós Bálint, Jens Bast, Gemma Collins, Cyrille D'Haese, Peter Decker, Miklós Dombos, Carola Greve, Nadège Guiglielmoni, Karin Hohberg, Kamil S. Jaron, Odile Lecompte, Ricarda Lehmitz, Dorine Merlat, Karen Meusemann, Leonie Schardt, Philipp H. Schiffer, Clément Schneider & Nikolaus Szucsich: The Soil Invertebrate Genome Initiative (SIGI)
	5. Claudia P. Avila-Gaxiola, Marcos Bucio-Pacheco, Samuel Campista-León & Luz I. Peinado-Guevara: Bibliometric analysis of the Diplopoda group using the Bibliometrix tool

Thursday, August 10th, 2023

8:00-18:00	**Congress Excursion** Meeting time 8:00 at the Aulas de Ciencias - Gloria Galeano, from where buses will take us to a guided field trip to the Parque Ecológico Matarredonda for around 1 hour. Some snacks, water and lunch will be provided. Arrival back to the Universidad Nacional de Colombia is expected around 18:00.

Friday, August 11th, 2023
Aulas de Ciencias - Gloria Galeano, Auditorio 1

8:30 – 9:30	**Keynote Lecture** **Nesrine Akkari:** Taxonomy – from an endangered discipline towards an integrative future: examples from myriapodological research
9:30-10:10	**Session 9 – Oral presentation** *Chairpersons: Paul Marek & Mauricio Mahecha*
9:30-9:50	**Santiago Alvear, Daniela Martínez-Torres, María Cristina Gallego Ropero:** Unveiling Colombia's hidden diversity: at least 49 new species of "long-eared millipedes" (Polydesmida-Cyrtodesmidae) and new morphological insights
9:50-10:10	**Zoltán Korsós:** Biogeography of the millipedes of the Ryukyu Archipelago, Japan.
10:10-10:30	*Coffee/Tea break*
10:30-11:50	**Session 10 – Oral presentation** *Chairpersons: Paul Marek & Mauricio Mahecha*
10:30-10:50	**Magnolini Roberto & Bonato Lucio:** The geophilid centipedes of the genus *Henia* C.L. Koch, 1847: A revised overview of a Western Palearctic Lineage and first insights on its evolutionary history
10:50-11:10	**Luca Gregnanin & Lucio Bonato:** Gathering, harmonizing and releasing old and new occurrence records of myriapods: an example for a regional fauna of Geophilidae
11:10-11:30	**Emiliano Peretti & Lucio Bonato:** Characterization of neglected and small *Geophilus* species belonging to a well-investigated centipede fauna in southern Europe
11:30–11:50	**Gregory D. Edgecombe, Susan E. Strange, George Popovici & Varpu Vahtera:** An Eocene plutoniumid centipede: *Theatops* from baltic amber sheds light on a disjunct biogeographic distribution
11:50-13:50	*Lunch*
13:50-14:50	**Keynote Lecture** **Gonzalo Giribet:** Centipede phylogenetics and molecular data: A quarter Century of studies
14:50-15:50	**Session 11 – Video presentation** *Chairpersons: Dragan Antić & Tatiana Aguas*
14:50-15:00	**Elisavet Georgopoulou, Konstantinos Kougioumoutzis & Stylianos Simaiakis:** Centipede distribution patterns and biodiversity hotspots in Greece
15:20-15:30	**Emerson M. de Souza & Amazonas Chagas-Jr.:** A review of the types of 11 species and one subspecies of *Otostigmus* (Parotostigmus) (Scolopendromorpha, Scolopendridae, Otostigminae)
15:30-15:40	**Walter Aparecido Arruda De Oliveira, Emerson M. de Souza & Amazonas Chagas-Jr.:** Taxonomic revision of some species of the genus *Cormocephalus* Newport, 1844 (Scolopendromorpha, Scolopendridae) from South America
15:40-15:50	**Malgorzata Lesniewska:** Jadwiga Kaczmarek (1923–1991) – scientific achievements and profile of the polish research pioneer on Chilopoda on the 100th anniversary of her birth
15:50-16:00	*Coffee/Tea break*

16:00-17:00	**Session 12 – Video presentation** *Chairpersons: Dragan Antić & Tatiana Aguas*
16:00-16:10	**Daniela Martínez-Torres, Fernanda Vásquez-Valverde, Sarah León-Ortíz & Eduardo Flórez D.:** Three decades of millipede's history deposited in the myriapodological collection of the Instituto De Ciencias Naturales, Universidad Nacional De Colombia
16:10-16:20	**Julian Homez-Alvarez, Santiago Alvear, Daniela Martínez-Torres:** Symphylans (Myriapoda: Symphyla) of the myriapod collection of the Instituto de Ciencias Naturales of the Universidad Nacional de Colombia: contributions to diversity and distribution
16:20-16:30	**Jackson C. Means; Rodrigo S. Bouzan; Luiz F. M. Iniesta; Daniela Martínez-Torres; Luisa Fernanda Vasquez-Valverde; Antonio D. Brescovit; Kaloyan Ivanov**: The Chelodesmidae (Polydesmida) from tropical andes: a review of the monotypic tribe Dibolostethini with description of new species, a curious case of a paradoxosomatid-like group
16:30-16:40	**Malgorzata Lesniewska & Przemyslaw Piekarczyk:** Chilopoda and Diplopoda of the city of Szczecin (Poland) – preliminary results
16:40-16:50	**Julian Homez-Alvarez, Santiago Alvear & Luisa Fernanda Vasquez-Valverde:** An inventory of millipedes from Finca Merenberg natural reserve, Huila, Colombia
16:50-17:00	**Thomas Wesener:** Rare and (almost) forgotten pill millipedes in Central Europe (Diplopoda, Glomerida)
17:00-18:00	**Poster session**
	1. Bruce A. Snyder & Lance Andrew: The millipede diversity of the state of Georgia, USA: towards a checklist and key
	2. Carolina Rojas-Buffet, Petra Sierwald & Miguel Simó: A preliminary catalogue of Diplopoda from Uruguay
	3. Jose Alexander Hernandez-Dosman & Aura Yesenia Morales-Cardenas: First record of centipede families (Myriapoda-Chilopoda) on the "Cerro Rosado" trail at the Universidad del Quindío
	4. Juan Romero-Rincon, Daniela Martínez-Torres, Santiago Alvear & Jairo Robles-Piñeros: First record of the family Haplodesmidae (Diplopoda, Polydesmida) in Colombia: a new species from a cloud forest in the northern Andes Range
	5. Manuela Salazar Castrillón, Nathalyen Dayana Echeverri Agudelo & Aura Yesenia Morales-Cárdenas: Preliminary record of millipede families (Myriapoda-Diplopoda) present in the Jardín Botánico del Quindío, Calarcá, Colombia
	6. Sarah León-Ortíz & Daniela Martínez-Torres: The millipedes in the Orinoquia region of Colombia
	7. Sebastian Galvis-Jiménez & Amazonas Chagas-Jr: Taxonomic recognition of centipedes (Chilopoda - Myriapoda) from Mainland Ecuador
	8. Andrei Giurginca, Cezara Tudose, Stefan Baba, Geta Rasnoveanu: *Rumaniulus mammosus* Attems, 1927 – A new reappraisal
	9. Boyan Vagalinski, Aleksandr Evsyukov, Simeon Borissov, Georgi Hristov, Igor Zabiyaka & Evgeniy Sadyrin: The enigmatic Caucasian genus *Armeniophyllum* Lohmander, revisited, with the description of a second species and notes on the systematic position of the genus (Diplopoda: Julida: Julidae)
	10. Diva María Borges, Heloisa Fernandes B. & Amazonas Chagas-Jr.: Taxonomic revision of centipedes of the genus *Cryptops* Leach, 1814 (Scolopendromorpha, Cryptopidae) from Brazilian caves

	11. Sebastian Galvis-Jiménez & Eduardo Florez, D.: Current status of the centipede (Myriapoda, Chilopoda) collection of the Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Bogotá
	12. Luisa Fernanda Payares, Liseth Alejandra Reyes-Peñata & Alexander García García: Current status of the myriapodological collection (Arthropoda) of the Universidad Distrital Francisco José de Caldas

Saturday, August 12th, 2023
Aulas de Ciencias - Gloria Galeano, Auditorio 1

8:30 – 9:30	**Keynote Lecture** **Ligia Benavides:** Phylogenomic tools and their application on the systematics and evolution of Myriapoda
9:30-10:20	**Session 13 – Oral presentation** *Chairpersons: Julian Homez-Alvarez & Sarah León-Ortíz*
9:30-9:50	**Daniela Martínez-Torres, Santiago Alvear & Luisa Fernanda Vásquez-Valverde:** New light to the enigmatic family Dorsoporidae (Diplopoda: Polydesmida) 65 years after its description: new records of this small and fluorecent neotropical millipedes
9:50-10:10	**Liseth Alejandra Reyes-Peñata & Daniela Martínez-Torres:** Small and sticky: first approach to the distribution of the "slug millipedes" (Glomeridesmida: Glomeridesmidae) in Colombia
10:10-10:20	**Video-Presentation** **Alejandro Novoa & Daniela Martínez-Torres:** Advancements in the Inclusion of arthropods in ecotourism programs: Myriapods in three communities of Colombia
10:20-10:30	*Coffee/Tea break*
10:30-12:30	**CIM-General Assembly**
	INSTITUTO DE CIENCIAS NATURALES
12:30-14:30	***Farewell Lunch***
14:30-16:30	***Closing Ceremony* (photo contest winners)**
16:30-22:00	***Farewell party***

KEYNOTE LECTURES

Glow-in-the-dark millipedes, mimicry rings, and the 1,306-legged millipede

Paul MAREK

Department of Entomology, Virginia Tech, Blacksburg, VA, USA
pmarek@vt.edu

A myriapod is a many-legged arthropod in the subphylum Myriapoda. They include centipedes, millipedes, and the poorly known symphylans and pauropods. They are an ancient group, and the first evidence of land animals are late Silurian fossil millipedes from 425 million years ago. Among the notable species of myriapods are those that glow in the dark, are walking gardens of mosses and liverworts, and some that roll up into a baseball-sized sphere for defense against predators. In this talk, I will present highlights of my laboratory's research on myriapods, which includes studies of bioluminescent millipedes and the animal with the greatest number of legs—a millipede discovered in Australia with 1306 legs. Details will include collaborative projects with graduate students in my lab and colleagues across the world. I hope to show the significance of myriapods, and the importance of international collaboration and open science.

Myriapod species: what are they and how to delimit them

Lucio BONATO

Dipartimento di Biologia, Università di Padova, Italy
lucio.bonato@unipd.it

Myriapods, like all other living organisms, show an overwhelming diversity. Such variety, however, is not continuous and, as consequence, myriapods and all other organisms have been classified into "species" since long.

In recent decades, evolutionary biology has elaborated refined views on the nature of "species" and on the process of "speciation" that generated the extant biodiversity. These theoretical advances have been accompanied by the ongoing refinement of approaches and methods for detecting and circumscribing species, which are among the major aims of taxonomy since centuries. These novel views and approaches have already spread in the current practice of taxonomists working on the most popular and most investigated groups of organisms like vertebrates. On the contrary, they are only slowly creeping in the taxonomy of terrestrial arthropods and especially myriapods.

I will summarize how some major conceptual advances of evolutionary biology are reshaping our view of the biodiversity, and of the myriapod diversity in particular. I will focus on the current view of speciation events as gradual and idiosyncratic processes, on the emerging evidence for frequent hybridization among species, and the rampant geographical differentiation expected for poorly dispersive organisms like many myriapods. I will also summarize some methodological tools and challenges for dissecting and describing biodiversity, especially within the framework of the so called "integrative taxonomy". I will focus on the task of detecting and delimiting species in myriapods, and I will highlight examples of applications on these animals.

What did DNA barcoding do for millipede taxonomy?

Piyatida PIMVICHAI[1,2] & Thierry BACKELJAU[2,3]

[1] Department of Biology, Faculty of Science, Mahasarakham University, Maha Sarakham 44150, Thailand; email: piyatida.p@msu.ac.th
[2] Royal Belgian Institute of Natural Sciences, Vautierstraat 29, 1000 Brussels, Belgium
[3] Evolutionary Ecology Group, University of Antwerp, Universiteitsplein 1, B-2610 Antwerp, Belgium

With the invention of the Polymerase Chain Reaction in the 1980ies (for which Kary B. Mullis received the Nobel Prize Chemistry in 1993), DNA sequences became readily accessible for taxonomic and phylogenetic research. This lead Paul D.N. Hebert to coin in 2003 the term "DNA barcoding" for a system of species identification and discovery using a short section of DNA from a standardized region of the genome (https://ibol.org/about/dna-barcoding/). For animals this standardized DNA fragment is part of the mitochondrial cytochrome c oxidase subunit I, commonly refered to as COI (= CO1 or cox1). The application of DNA barcoding has boosted animal taxonomic research and provided the foundation of a dynamic international community gathered around the "iBOL" initiative (International Barcode of Life Consortium: https://ibol.org/). It also fostered the establishment of a new international database specifically for DNA barcodes, i.e. the "Barcode of Life Data System" (BOLD: https://www.boldsystems.org/), that is complementary to the more comprehensive, but taxonomically less standardized NCBI GenBank (https://www.ncbi.nlm.nih.gov/genbank/) sequence database.

The present contribution provides a brief overview of how DNA barcoding has contributed to millipede (Diplopoda) taxonomy. It is based on a compilation of the literature on the subject, including the authors' own research, and a brief survey of the available barcodes in GenBank and BOLD.

Millipedes are with >11,000 species a taxonomically megadiverse group. As in many other animal groups, DNA barcoding has been instrumental in uncovering and delimiting many morphologically similar and/or cryptic millipede species. In this way DNA barcoding confirmed that hitherto millipede diversity has been largely underestimated, amongst others because in some millipedes the gonopod-based taxonomy may show too limited species specific differentiation. Nevertheless, the joint analysis of gonopod morphology and DNA barcodes often leads to more solid taxonomic conclusions and new insights, because DNA barcodes provide an independent assessment of the reproductive isolation and phylogenetic relationships of the taxa considered. Conversely, using DNA barcoding as a practical millipede species identification tool is still hampered by the incompleteness of the GenBank and BOLD reference sequence databases, which contain some 2300 millipede COI sequences (accessed on 30/04/2023), about 12% of which involve only three species. As such, less than 10% of the currently known millipede species is represented in GenBank or BOLD, and for most species only few sequences are available, so that geographic variation is not or poorly covered.

Besides illustrating these issues, this overview also briefly discusses some taxonomic practices involving DNA barcoding and reflects on future perspectives. Yet, it is safe to conclude that the added value of DNA barcoding for millipede taxonomy is beyond doubt.

Why velvet worms survived all mayor extinctions?

Julián MONGE-NÁJERA

Laboratorio de Ecología Urbana, Universidad Estatal a Distancia, Sabanillla M.O., Código Postal 11502, San José, Costa Rica

julianmonge@gmail.com

Velvet worms (Onychophora) are small, predatory worms that have existed for over 500 million years, since Cambrian times. They currently live only on land, but formerly inhabited submerged mud in tropical marine ecosystems of what currently are China and Canada. Onychophorans have survived all major extinction events, including the devastating Permian-Triassic extinction, which killed over 90% of marine species and over 70% of terrestrial species.

Why did these rare, small, soft and weak worms survived, while animals as diversified and abundant as trilobites, or as powerful and dominant as dinosaurs, did not?

Apparently, no one has tried to answer this question.

Drawing on my personal experience with the eruption that nearly wiped out the onychophorans of the Irazú Volcano in the midle of the previous century, I will critically analyze the current situation of the phylum, which still exists in the form of several hundred species throughout the world.

Onychophorans face unprecedented threats from climate change and habitat loss, so I will discuss if the so-called "Sixth Extinction" could kill onychophorans, and the likelihood of their survival in the face of the next mass extinction event.

Taxonomy – from an endangered discipline towards an integrative future: examples from myriapodological research

Nesrine AKKARI

3rd Zoological Department, Natural History Museum Vienna, Burgring 7, 1010 Vienna, Austria.
nesrine.akkari@nhm-wien.ac.at

The decline of biodiversity, paralleled with an unpreceded extinction rate, continues to impact the humanity and represents a major concern, which renders exploring and understanding the systematic diversity of taxa of a prime importance. A role mainly carried by taxonomists, who themselves have become an "endangered species". The core task of a taxonomist is to discover, describe and name taxa, document their diversity, and understand their phylogenetic relationships. This constitutes the groundwork for any subsequent fundamental or applied research and procures profound insights into the evolution of taxa. Descriptive taxonomy continues however to face numerous challenges, such as the lack of prestige and resources, which undeniably cripples the progress of cataloguing diversity. Here, based on examples from myriapodological research, I demonstrate how the practice of taxonomy-based science may prove not as quaint and old fashioned but as a discipline that reflects the ways knowledge is produced, shared, and used in our modern era. New endeavours and current technologies will certainly continue to play an important role in reinventing the taxonomic research as an active discipline, and the novel multidisciplinary integrative approaches will pave the way for its future sustainability.

Centipede phylogenetics and molecular data: A quarter Century of studies

Gonzalo GIRIBET

Museum of Comparative Zoology, Department of Organismic and Evolutionary Biology, Harvard University, Cambridge, MA, USA
ggiribet@g.harvard.edu

The myriapod class Chilopoda constitutes a major clade of predatory terrestrial arthropods. In addition to zoologists, centipedes are of broad cultural and medical interest, due to their venom and varied modes of development. Centipedes have also played a role since the dawn of animal cladistics, both with early studies about their morphology as well as being one of the first animal groups where molecular data were produced broadly. In this talk I will review advances since the early days of centipede molecular phylogenetics through the sequence of the first myriapod nuclear genome in 2014, until today, when generating whole genomes is at the fingertips of many researchers. Through these years, centipede phylogeny has been in flux, showing that evolution has not proceeded as parsimoniously as many of us thought.

Phylogenomic tools and their application on the systematics and evolution of Myriapoda

Ligia BENAVIDES

United States Department of Agriculture/Oak Ridge Institute for Science and Education.
tarantuligia@gmail.com

Resolving the phylogenetic status and relationships of Myriapoda has played a pivotal role in understanding arthropod evolution. Molecular and evolutionary studies on myriapods were traditionally hindered by the limited genomic and transcriptomic information available. The introduction of pyrosequencing in the late nineties and the subsequent development of additional, ever progressing sequencing technologies, have led to substantial improvements in quality and yield of data, facilitating the cost-effective generation of an abundance of genomic and transcriptomic data for non-model organisms. The widespread adoption of these sequencing technologies has transformed the way data are not only gathered, but also analyzed and stored, posing important computational challenges and opportunities. In this talk, I will review and discuss some of the major contributions of the new sequencing technologies to our current understanding of the tree of life of Myriapoda and how by using dense taxon sampling and critical fossil calibrations in a phylotranscriptomic framework, a well-supported phylogenetic hypothesis with stable nodes and a comprehensive evolutionary framework for myriapods can be achieved.

ORAL PRESENTATIONS*

* All oral presentations (except for the works about onychophorans) are listed in alphabetical order according to the first author.

Unveiling Colombia's hidden diversity: at least 49 new species of "long-eared millipedes" (Polydesmida-Cyrtodesmidae) and new morphological insights

Santiago ALVEAR[1,4], Daniela MARTÍNEZ-TORRES[2,3], María Cristina GALLEGO ROPERO[1]

[1] Departamento de Biología, Facultad de Ciencias Naturales, Exactas y de la Educación, Universidad del Cauca.
[2] Grupo de Investigación en Aracnología y Miriapodología (GAM-UN), Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Edificio 425, Oficina 105, Bogotá, Colombia.
[3] Departamento de Biología, Facultad de Ciencias, Universidad Nacional de Colombia, Bogotá, Colombia.
[4] alexs.alvear@gmail.com

The family Cyrtodesmidae is a group of polydesmid millipedes in the Neotropical region from Costa Rica to Peru and Brazil. Cyrtodesmids are small, soil-dwelling organisms, the paranota of their second segment are enlarged and point downward, which allows them to roll into a sphere or disk when threatened. The distinctive enlarged keels on their second ring have given these animals the common name "long-eared millipedes". This family remains among the least explored groups, with published works typically providing only cursory descriptions of species. In Colombia, only seven species of the genera *Agnurodesmus* and *Cyrtodesmus* are known so far, from both the Andean and Caribbean regions.

To help address the knowledge gap around this family, a comprehensive study to identify and describe the species of Cyrtodesmidae found in Colombia was conducted, delimiting their morphospecies based on specimens deposited in biological collections. A total of 273 individuals from two collections were examined: the Instituto de Ciencias Naturales (Universidad Nacional de Colombia), and the Grupo de Estudios Ambientales (Universidad del Cauca). Five sexual morphological characters of male gonopods as well as seven somatic characters for both sexes were examined.

This work revealed a strikingly high diversity of Cyrtodesmidae in Colombia, with 248 specimens from 44 previously unknown morphospecies of the genus *Cyrtodesmus*, and 25 specimens belonging to five new morphospecies of the genus *Oncodesmella,* alongside the seven previously described species.

These findings establish Colombia as the country with the greatest known diversity of Cyrtodesmidae species. Most species were found along the Andes Mountain Range, which shows a striking diversity and a very high rate of endemism. Additionally, we also found new records of the family for the Amazon and Pacific regions. This study represents the first record of the genus *Oncodesmella* in Colombia and the first comprehensive exploration of the Cyrtodesmidae, shedding new light on this underappreciated group of millipedes.

Adaptive evolution in caves: a review of hydrophilous cave millipedes (Myriapoda: Diplopoda) with modified mouthparts

Dragan ANTIĆ[1*], Henrik ENGHOFF[2] & Nesrine AKKARI[3]

[1] University of Belgrade – Faculty of Biology, Institute of Zoology, Studentski trg 16, 11 000 Belgrade, Serbia
[2] Natural History Museum of Denmark, University of Copenhagen, Universitetsparken 15, DK-2100 Copenhagen Ø, Denmark
[3] 3rd Zoological Department, Natural History Museum Vienna, Burgring 7, 1010 Vienna, Austria
* dragan.antic@bio.bg.ac.rs

Caves are unique ecosystems dominated by abiotic factors like darkness, relatively constant humidity and temperature procuring a stable environment, at the same time as low oxygen levels and scarcity of nutrients that render them extremely harsh places to live. Many organisms have however managed to prevail under these severe underground conditions and evolve a number of morphological, physiological and behavioural traits by undergoing a number of adaptive genetic changes. The morphological modifications reflect a series of evolutionary changes to adapt to a subterranean life and are perhaps the easiest to assess. These include depigmentation of the cuticle, partial or complete reduction of visual perception, and elongation of appendages. Some arthropod species, including millipedes, have gone a step further and have become capable of leading an amphibious lifestyle and having a filtering diet due to specific modifications of their mouthparts.

Here, we review all hydrophilous cave millipedes and compare them with their "normal" relatives. This rare phenomenon is so far only known in 20 described millipede species from caves in the Pyrenees, the Alps, the Balkan Peninsula and the Caucasus. The largest number is from the family Julidae, 16 species from five genera, viz., *Leucogeorgia* Verhoeff, 1930 (seven, Georgia and Russia), *Martvilia* Antić & Reip, 2020 (monospecific, Georgia), *Stygiiulus* Verhoeff, 1929 (three, Italy and Slovenia), *Trogloiulus* Manfredi, 1931 (two, Italy) and *Typhloiulus* Latzel, 1884 (three, Bosnia and Herzegovina, Croatia, Montenegro, Romania and Serbia). From the family Trichopolydesmidae, two species from the monospecific genera *Balkanodesmus* Antić & Reip, 2014 and *Velebitodesmus* Antić & Reip, 2014 from Croatia were described. Each of the Polydesmidae and Blaniulidae enclose one species with these modifications, from the genera *Serradium* Verhoeff, 1941 (Italy) and *Vascoblaniulus* Mauriès, 1967 (France), respectively.

All these species differ from their "normal" relatives mainly in the structure of the head, including reduced biting parts of the mandibles, hypertrophied pectinate lamellae, reduction of three labral teeth or gnathochilarium modifications. In addition, the hydrophilous cave julidans have shorter bodies with fewer body rings, while the polydesmidans have more robust bodies. The occasional entry of these organisms in water in a cave or living in hygropetric habitats paralleled with the modifications of their mouthparts, suggest a filtering diet, unlike most other millipedes, which are detritivores. This research represents a first step towards a better understanding of this evolutionary process, which could be complemented by studies on the changes in the respiratory system and gut but also the reproduction and ecology of these millipedes, which could be a model system to study the evolution and adaptations in subterranean habitats.

Mining for gold: characterization of mitogenomes and barcode genes from novel and legacy transcriptomic libraries enhances taxonomic resolution in Edafopoda (Myriapoda)

Luis A. ARTEAGA-FIGUEROA[1]*, Diego A. SALAZAR-MONCADA[2], J. CORREA-ÁLVAREZ[1].

[1] Research Group in Biodiversity, Evolution and Conservation (BEC), School of Applied Sciences and Engineering, EAFIT University, Medellín, Colombia.
[2] Ph.D. Biología, Lecturer, Universidad de Antioquia
* B.Sc Biology, Young Researcher Fellowship program, larteag7@eafit.edu.co

The phylogenetic relationships of myriapods have been in constant discussion, even before the debut of molecular systematics. Nowadays, based on phylotranscriptomic analysis, Myriapoda is divided into Pectinopoda (which includes Chilopoda and Diplopoda) and Edafopoda (Symphyla and Pauropoda). Nonetheless, little is known about the relationships between symphylans; which are practically unknown, especially in the neotropics. Currently, the identification of symphylans is based on morphological characteristics hard to discern without microscopic equipment, which makes its identification challenging. In Colombia, there are very few studies characterizing the diversity of the group, only one symphylan species has been properly described (*Hanseniella colombiana*) and recently found genera (*Scopolliella* and *Symphylella*) suggest a latent diversity. Moreover, to characterize a symphylan infestation on a flower plantation in La Ceja, Antioquia (6°1'0" N, 75°25'0" W, 2180 m.a.s.l.) in 2015, a barcoding study led to the establishment of the NCBI accession: Scutigerellidae "FRL-2015", which featured diagnostic morphological traits from different genera across the family. However, legacy libraries (NGS libraries from previous studies deposited in a public database) and barcoding databases present a great opportunity to address unexplored questions and obtain reference sequences. To date, phylogenetic analysis of the group has been restricted by a heterogeneous sampling in databases and many sequences identified up to class level. Thus, in order to characterize conventional barcode sequences and its potential to unveil relationships in Edafopoda, we sequenced Scutigerellidae "FRL-2015" transcriptome and developed a bioinformatic pipeline to extract mitochondrial transcripts, as well as, conventional nuclear barcodes such as nuclear ribosomal genes, RNA polymerases, BUSCO markers, and other orthologs. Then, along with the "FRL-2015" transcriptome, amplicon sequences from BOLD and NCBI databases, and legacy transcriptomes from aforementioned phylogenetic studies were analyzed. Furthermore, we performed phylogenetic and distance analyses over the recovered sequences. Additionally, we calculated the mitogenome compositions and characterized their rearrangements. As a result, tRNA translocations were found in *Pauropus* and *Symphylella*, novel nucleotide composition in *Hanseniella* genus, and novel genic orders in *Hanseniella* and *Acopauropus* genera with TD-RL evidence. Furthermore, it was possible to affiliate Scutigerellidae "FRL-2015" to *Hanseniella* sp. with great support, which boosts our understanding of Symphyla in Colombia. Also, COX1 phylogenetic results provided insights into global sampling and identification accuracy. Finally, it was possible to recover barcodes from all transcriptomes analyzed, extending the number of reference sequences, and making it possible to take the first steps towards the molecularization of Edafopoda systematics.

An Eocene plutoniumid centipede: *Theatops* from baltic amber sheds light on a disjunct biogeographic distribution

Gregory D. EDGECOMBE[1], Susan E. STRANGE[2], George POPOVICI[2] & Varpu VAHTERA[3]

[1] The Natural History Museum, Cromwell Road, London SW7 5BD, UK. g.dgecombe@nhm.ac.uk
[2] Department of Life Sciences, Imperial College London, London SW7 2AZ.
[3] Zoological Museum, Biodiversity Unit, University of Turku, Turku, FI-20014 Finland.

Among the five families of the order Scolopendromorpha, Plutoniumidae is the second smallest, known from seven species – six in the genus Theatops Newport, 1844, and one in the monotypic Plutonium Cavanna, 1881. The clade, robustly supported by morphology and sequence data, is intriguing for its morphological conservatism, species being distinguished by few diagnostic characters despite a geographically widespread but markedly disjunct distribution in temperate North America, southern Europe and central China. Four specimens of the same species of Plutoniumidae from Eocene Baltic amber provide the first fossil occurrence of the family. Light microscopic study of the fossils allows them to be coded for many of the morphological characters used in phylogenetic analysis of the blind scolopendromorph clade Tykhepoda. These morphological data, supplemented by those for other crown-group scolopendromorph fossils, are analysed together with molecular sequence data for three loci (18S rRNA, 16S rRNA, COI) using maximum likelihood as an optimality criterion. The dataset includes four of the seven extant Theatops and Plutonium species. The Eocene species is diagnostically distinct from extant congeners, and nests within crown-group Plutoniumidae in the phylogenetic analysis. The discovery of a late Eocene (Priabonian) species of Theatops constrains the minimal divergence date for crown-group Plutoniumidae to 33.9 Ma and is consistent with hypotheses regarding the extent and nature of tropical to warm temperate European forests during the Eocene; dispersal implied by affinities with extant North American species was facilitated by land connections between North America and Europe through Greenland. The fossil reinforces the hypothesis that the distribution of Plutoniumidae, once more globally widespread, has been pruned by extinction.

Gathering, harmonizing and releasing old and new occurrence records of myriapods: an example for a regional fauna of Geophilidae

Luca GREGNANIN[1,2] & Lucio BONATO[1]

[1] Department of Biology, University of Padova, Italy
[2] luca.gregnanin@phd.unipd.it

A proper mapping of species distributions, crucial for many taxonomic and ecological studies, relies on accurate distributional data (i.e.: occurrence records) integrated into exhaustive datasets. In myriapods, the gathering of new records is hampered by the little interest by most field researchers. In addition, even the already published records are sometimes hardly accessible. Most of them are scattered throughout many national or regional journals, which are neither available in digital archives, nor indexed in bibliographic catalogues.

As a case study, here we report on the assembly of a comprehensive dataset of occurrence records of all geophilid centipedes (Geophilidae s.l.) from the South-Eastern European Alps. This region, of about 35,000 km^2, has been intensely visited since long for collecting centipedes, and shows a high biodiversity in comparison with other European regions. We gathered more than 2,500 records for nearly 40 species currently considered valid. We included all the published records and many unpublished records from digital catalogues of scientific collections.

We highlight some methodological options that are rarely implemented in myriapod datasets of occurrence records: (i) we included both all the already published records and a comparable amount of new unpublished records; (ii) we estimated the geographic coordinates and their uncertainty for all records, instead of mapping them on a coarse grid; (iii) we re-evaluated the taxonomic identity of the recorded specimens, based on the original and subsequently published identifications and all morphological information available in publications and unpublished catalogues; (iv) we are going to release the dataset as a public, open access resource.

We stress the usefulness of integrating similar datasets for other regions and other myriapod taxa.

Study of the diversity and specificity of mites associated with millipedes of the genus *Psammodesmus* Cook, 1896 (Diplopoda: Polydesmida: Platyrhacidae)

Julian HOMEZ-ALVAREZ[1,3] & Daniela MARTÍNEZ-TORRES[1,2]

[1] Grupo de Investigación en Aracnología y Miriapodología, Instituto de Ciencias Naturales, Facultad de Ciencias, Universidad Nacional de Colombia. [2]Departamento de Biología, Facultad de Ciencias, Universidad Nacional de Colombia, Bogotá, Colombia. [3]sjhomeza@unal.edu.co

Mites, belonging to the class Arachnida, are an extraordinary group of arthropods that exhibit remarkable adaptability to new environments, despite their small size. They have evolved into a mesodiverse group with unique and highly variable survival strategies, creating intricate interactions with other animals, including millipedes, which are the most diverse group in the Diplopoda class and exhibit a greater variety of size ranges compared to mites. The Plathyrhacidae family, belonging to the order Polydesmida, is one of the most abundant families in the Neotropics, with the genus *Psammodesmus* distributed across northern Panama to southern Peru.

This study aims to identify the diversity of mites associated with millipedes of the *Psammodesmus* genus and evaluate the type and degree of interaction. The material from thirteen preserved collections, on loan in the Myriapodology Collection of the Institute of Natural Sciences at the National University of Colombia, as well as specimens collected in the field, were reviewed. A total of 698 millipede individuals, including 497 individuals of *Psammodesmus* and 201 individuals of other sympatric polydesmids with *Psammodesmus* species, were analyzed.

The review uncovered 377 mites associated with millipedes, distributed among 15 morphospecies belonging to 8 familes. Prevalence indices, mean abundance, and mean intensity were applied at a specific level, differentiating between females and males. Distribution maps of *Psammodesmus* species and the found mites were also presented. This study sheds light on the intricate interactions between mites and millipedes and highlights the importance of understanding the relationships between different arthropod groups for ecological and evolutionary studies.

They were extracted a total of 203 mites from ten species of *Psammodesmus* in a range between 0 and 132 mites per individual, as well as from six species in the *Barydesmus* genus and two species in the Chelodesmidae family. Remarkably, all organisms exhibited phoretic relationships, indicating a possible unique coexistence. Our findings highlight the significance of exploring the associations between diverse groups of arthropods and their potential ecological implications.

Additionally, we observed that the morphospecies diversity of associated mites varied across different millipede species. Notably, *P. fasciolatus* and *P.* n. sp. 3 were the only species with more than one morphospecies of associated mites. Our results suggest that the relationship between millipedes and mites is more complex and warrants further investigation, also in males we found a higher abundance of mites with up to 96 mites per individual compared to females with up to 36 mites per individual.

In conclusion, our study contributes to the knowledge of these arthropod groups' biodiversity and ecological interactions and highlights the importance of understanding the intricate relationships within ecosystems.

Multi-tissue transcriptomic profiling of *Thereuonema tuberculata* (Wood, 1862) (Chilopoda: Scutigeromorpha: Scutigeridae)

Seunghun JUNG[1] & Seunggwan SHIN[12]

[1] School of Biological Sciences, Seoul National University, Seoul, 08826, South Korea.
wdm137@snu.ac.kr
[2] Comparative Medicine Disease Research Center, Seoul National University, Seoul 08826, South Korea.

Members of the order Scutigeromorpha, commonly known as house centipedes, are characterized by 15 pairs of walking legs, soft body, and a single row of dorsally placed spiracles. Within the current well-received classification system for chilopods, Scutigeromorpha is the sole member of the Notostigmophora as a sister group to the four other chilopod orders, which are grouped together as Pleurostigmophora due to their laterally located spiracles. Like other cryptozoic centipedes, scutigeromorphs are voracious predators of small invertebrates and prefer moist soil surfaces as a habitat. However, there are some noticeable differences between Scutigeromorpha and other centipedes, including unique morphological characters, such as long, multi-annulated antennal flagella, lateral compound eyes analogous to those of Crustacea or Hexapoda, and modified tarsi of walking legs with hyper-annulations. Moreover, there exists behavioral and ecological differences that are also supported by morphological adaptations. While many centipedes burrow into plant litter or soil to avoid heat and to prevent water loss, scutigeromorphs hunt on open surfaces with high running speeds. Their weakly sclerotized exoskeleton allows them to squeeze through crevices. Previous electrophysiological studies on *Scutigera coleoptrata* (Linnaeus, 1758) suggested that their compound eyes are fully functional and can detect two different wavelengths of light. Although histological and ultrastructural studies have enhanced our comprehension of the scutigeromorph biology, our understanding of its genetic basis remains scarce. Recent comparative studies on myriapod genomes provided a background to investigate their molecular evolution and genetic pathways dynamics. In this study, we perform a tissue-specific RNA-seq analysis of the East Asian scutigeromorph species, *Thereuonema tuberculata* (Wood, 1862), to identify transcriptional phenotypic differences among three distinct modified appendages and the whole head against body segments to enhance our knowledge of their morphological and physiological aspects. Multi-dimensional scaling analysis focused on appendages demonstrated that the transcriptome profile of the terminal leg and antenna had a shorter distance than that between the walking leg and antenna, which corroborate with previous morphological studies. In addition, we inferred phylogenetic relationships between extant myriapod clades based on the matrix of genomic and transcriptomic data covering 86 taxa with high gene occupancy to reconstruct the evolutionary history via phylogenomic methods. Our analysis recovered the monophyly of Pectinopoda, a recently defined grouping of Chilopoda and Diplopoda.

Biogeography of the millipedes of the Ryukyu Archipelago, Japan

Zoltán KORSÓS

University of Veterinary Medicine Budapest, Rottenbiller u. 50, H-1077 Budapest, Hungary
zkorsos@gmail.com

The Ryukyu Archipelago is an approximately 1000 km long chain of subtropical islands in the southernmost part of Japan, along the East Asian continental shelf at the western margin of the Pacific Ocean. The islands are grouped into three clusters (northern, central, and southern island groups), separated from each other by two main oceanic trenches, the Tokara and Kerama Gaps. Based on previous studies of different terrestrial animals (e.g. amphibians and reptiles), the Archipelago represents a connection between the Palearctic, Oriental, and Indomalayan faunal realms. The aim of the study was to investigate where the line between these biological realms is drawn in the Ryuku Archipelago.

Between 2009 and 2012 I had the opportunity to spend three years in Okinawa studying the millipede fauna. My objectives were to compile a complete Japanese literature survey, to establish a reference collection, and to carry out taxonomical and systematic research. I visited 55 islands in the Archipelago (containing a total of 86 islands, 65 of them inhabited), and collected millipedes in 522 localities, and also worked in 11 museum and university collections. As a result of the literature survey, I found that 50 listed millipede species of the 58 certain ones are native to the Ryukyus, whereas 8 are invasive or cosmopolitan. With my newly collected material, ten of the known 16 Diplopoda orders have been proven to occur on the islands, yet three remain with probable occurrence. I recorded 226 new faunistic data of 92 species from the 55 islands. Twenty-two species from the 92 were proven as new to the Ryukyu Islands. In addition I described (with co-authors) 5 millipede species new to science, and prepared 6 more for publication.

Considering only the 52 native, indigenous millipede genera on the different islands, I applied phenetic and cladistic classifications with selected similarity indices and clustering methods. They concluded the same result: the southern Kerama Gap acts as a true geographical barrier to isolate the central and southern island groups, whereas the same – with respect to millipedes – can only be said with reservations about the northern Tokara Gap. The situation can be clarified only with further collection and analyses taking into consideration other geographical properties of the islands.

There are two important, possibly well-established statements deriving from all of my results and after consulting with other theories: (1) the border between the Palearctic and Oriental biogeographical realms is situated in the northern island groups of the Ryukyu Archipelago, dividing the Tokara Island Groups into a northern and southern part as well as defining the Northern and Central Ryukyu Island Groups; and (2) the division of the Palearctic and Indomalayan realms is located between the Southern Ryukyus and Taiwan, with the observation that the mountain fauna of Taiwan may hint at a strong palearctic origin.

The geophilid centipedes of the genus *Henia* C.L. Koch, 1847: a revised overview of a western palearctic lineage and first insights on its evolutionary history

Roberto MAGNOLINI[1,2] & Lucio BONATO[1]

[1] Department of Biology, University of Padua, Italy
[2] Roberto.Magnolini@phd.unipd.it

The current taxonomy of Chilopoda Geophilomorpha is largely inadequate for most of its lineages. This holds also for many genera inhabiting the Western Palearctic, including Southern Europe, even though the fauna of this biogeographic region has been more studied than others.

Henia C.L. Koch, 1847 is a geophilid genus distributed mainly around the Mediterranean Basin, i.e., in Southern Europe, Northern Africa, and Middle East. At difference with other geophilids, it stands out as a well-diagnosable lineage, especially for the variously modified mouth parts, the shape of forcipules, the body silhouette, and the shape of the ultimate pair of legs. It includes 20 nominal species currently recognized as valid, but only 10-11 of them are described adequately. However, the number and the delimitation of *Henia* species have never been revised since the early '80s.

We will present an updated and revised synthesis of the morphology and geographical distribution of the known species of *Henia*. In addition, we will show preliminary evidence for the possible existence of a still ignored additional species from the Southern Alps. Furthermore, we will discuss preliminary insights on the phylogenetic relationships between the species, based on morphological evidence (mainly from the diversity of mouth parts, the number of body segments, the pattern of ventral pores along the trunk, and the structure of the ultimate legs).

New light to the enigmatic family Dorsoporidae (Diplopoda: Polydesmida) 65 years after its description: new records of this small and fluorecent neotropical millipedes

Daniela MARTÍNEZ-TORRES[1,2], Santiago ALVEAR[3], Luisa Fernanda VASQUEZ-VALVERDE[4]

[1] Grupo de Investigación en Aracnología y Miriapodología (GAM-UN), Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Edificio 425, Oficina 105, Bogotá, Colombia. sdmartinezt@unal.edu.co
[2] Departamento de Biología, Facultad de Ciencias, Universidad Nacional de Colombia, Bogotá, Colombia.
[3] Departamento de Biología, Universidad del Cauca
[4] Virginia Tech Department of Entomology, Blacksburg, VA

The family Dorsoporidae is one of the most enigmatic ones within the order Polydesmida. Currently this family is composed solely by its type species: *Dorsoporus barroensis* Loomis, 1958. To this date, *D. barroensis* is described from a female and two juveniles that were found at Barro Colorado Island, Panama. Despite the efforts of H.F. Loomis in finding more individuals from the type locality, nearby localities and other places of the country, he did not had any success, and ended up describing the family in 1958 without any other support material.

Dorsoporids' bodies are small (~6mm in length), smooth, shiny, strongly convex and with the ability of curl into an almost perfect sphere. The keels of their second segment is enlarged and covers their head laterally. Their most distinctive feature is the placement of their ozopores on the dorsal part of the tergites instead of the paranota. This characteristic, among others, distinguishes them from families like Sphaeriodesmidae, Oniscodesmidae, and Cyrtodesmidae. Several researchers have questioned the family's validity, making Dorsoporidae one of the most mysterious families in the order Polydesmida, especially since the males remain unknown.

This study aims to present new reports of specimens of Dorsoporidae, discovered through the review of Myriapodology collections at the Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Bogotá, and the Museu Nacional do Rio de Janeiro, Brazil, as well as during a field trip to Reserva La Meseta (Santander, Colombia). The material was collected from 2005 onwards, totaling 27 specimens, including five males, 16 females, and six juveniles. The specimens were found in the Pacific (3) and Andean regions (23) of Colombia, and the Amazonian region of Ecuador (1). Their altitudinal distribution ranges between 0 and 2200 masl. Some of the females measure up to 14mm in length. The specimens were collected in well-preserved forests and some disturbed areas, often associated with fallen logs, mainly oak trees (*Quercus humboldtii*). During the fieldwork, dorsoporids displayed a bright, translucent yellowish color, and fluorescence was observed under ultraviolet light. This coloration and fluorescence were also seen in all specimens preserved in ethanol. Due to their coloration, small size, and difficulty in observing the ozopore, it is possible that these individuals might be mistaken for immature specimens from other families during field trips or collection reviews. Considering the wide distribution and altitudinal range of the reviewed material, it is likely that they represent several new species. This study show illustrations of the family's representative gonopod and molecular barcode data (COI) for the first time, and extends the known distribution of the family.

Antioxidant defences in centipedes (Chilopoda): a question of sex

Bojan M. MITIĆ[1,2], Jelena S. VRANKOVIĆ[3], Dalibor Z. STOJANOVIĆ[1], Slađan Z. PAVLOVIĆ[3] & Slavica S. BORKOVIĆ-MITIĆ[3]

[1] Institute of Zoology, University of Belgrade – Faculty of Biology, Studentski Trg 16, 11000 Belgrade, Serbia, bojan@bio.bg.ac.rs
[2] Faculty of Technology Zvornik, University of East Sarajevo, Karakaj 34a, 75400 Zvornik, Republic of Srpska, Bosnia and Herzegovina
[3] Institute for Biological Research "Siniša Stanković" – National Institute of the Republic of Serbia, University of Belgrade, Bulevar Despota Stefana 142, 11060 Belgrade, Serbia

Sex-specific physiology includes a set of physiological traits that differ markedly between males and females of the same species. In addition to the most obvious differences between the sexes, such as reproductive roles controlled by sex-specific endocrine systems, it has been demonstrated that the sexes may also differ in their oxidative physiology. Centipedes, like other animals, possess a suite of antioxidant enzymes (AOEs) and non-enzymatic antioxidants that delay, prevent, or remove oxidative damage to target molecules. The aim of the present study was to investigate sex-specific differences in the antioxidant defence system in three centipede species from the Balkan Peninsula.

Here, we measured the activity of the following AOEs: superoxide dismutase (SOD), catalase (CAT), glutathione peroxidase (GSH-Px), glutathione reductase (GR), and glutathione S-transferase (GST), as well as the concentrations of sulfhydryl (SH) groups and glutathione (GSH) in males and females of *Eupolybothrus transsylvanicus*, *Cryptops anomalans*, and *Clinopodes flavidus*. In addition, we measured lipid peroxidation (LPO) and protein carbonyl (PCO) concentrations in the species studied to investigate whether sex-specific trends in the activity of AOEs may lead to the occurrence of oxidative damage.

E. transsylvanicus, *C. anomalans* and *C. flavidus* were collected by hand from under stones and bark on Ada Ciganlija Island (Belgrade, Serbia) in October 2022. The sexes were distinguished by external characteristics or by dissection of genital appendages. The biochemical and statistical analyses were performed following our previous work in the field.

Overall, the most significant differences were found between *E. transsylvanicus* and *C. anomalans* in the following parameters: SOD, CAT, GR, SH groups, LPO, and PCO; then between *C. anomalans* and *C. flavidus* (GSH-Px, GR, SH groups, LPO, and PCO), whereas the least significant differences were between *E. transsylvanicus* and *C. flavidus* (GSH-Px only). Besides, SOD, GSH-Px and GSH showed significant differences between males and females of *E. transsylvanicus*. In *C. anomalans*, GSH-Px and GSH were significantly divided by sex, while in *C. flavidus* this was true only for GST. Moreover, all measured AOEs in *E. transsylvanicus* had higher values in males, while in the other two species the situation was reversed – the studied parameters were higher in females.

Thus, the level of antioxidant defences depends on the species and sex of the centipedes studied. Our results also suggest that females of centipedes that exhibit parental care, such as *C. anomalans* and *C. flavidus*, have better antioxidant status than males. This provides a starting point for future research on the evolutionary causes of sex specificity in the oxidative physiology of centipedes.

Recent advances in chilean myriapodology: millipedes, forgotten but diverse soil invertebrates

Antonio PARRA-GÓMEZ

Facultad de Ciencias, Universidad Austral de Chile. Av. Rector Eduardo Morales Miranda 23, Valdivia, Región de Los Ríos, Chile. parragomez.antonio@hotmail.com.
Student in Licenciatura en Ciencias con Mención en Biología.

Chile is a long but narrow country, characterized by its endemic and peculiar biodiversity, that inhabit isolated from the rest of South America by natural barriers such as the Andes Mountains and the Atacama Desert. However, much of Chilean biodiversity remains unknown, especially in terms of invertebrate diversity richness, and as recent evidence suggest, millipedes are not the exception. A series of studies carried out in the last five years, derived from a renewed interest for these organisms are changing our view of the Diplopoda fauna from Chile. An updated catalogue has compiled the knowledge about millipedes of the last 65 years, accounting to a total of 75 species in the country. Likewise, a biogeographic study has determined the distributional patterns of millipedes in relation to environmental variables. Moreover, new works are in the way such as the first record of the order Siphonophorida in Chile, with an undescribed genus and species, and a total of around +40 undescribed species and new records of other millipede taxa on areas never explored before in Chile. Now, estimates show that in less than a decade the total number of known species can be doubled. But as new studies are accomplished, several gaps in our knowledge have become evident, for instance, the lack of studies about phylogeny, ecology, and physiology or the enormous amount of land that remains unsampled, along with it, new questions arise, especially, how millipedes will respond to climate change in Chile, how to preserve their habitat and what species are on danger of extinction.

Characterization of neglected and small *Geophilus* species belonging to a well-investigated centipede fauna in southern Europe

Emiliano PERETTI[1,2] & Lucio BONATO[1]

[1] Department of Biology, University of Padova, Italy
[2] emiliano.peretti@unipd.it

The diversity of geophilid centipedes in northern Italy has been intensively investigated in the last one and a half century. Between the second half of the 19th and the first half of the 20th century, dozens of species-level and infra-specific taxa were described from this area. More recently, many of these taxa were included in broader taxonomic revisions addressing some major lineages, by means of morphological or molecular methods, sometimes even by the integration of these two. As a result, the geophilid fauna of northern Italy stands out as one of the most well-known among those of Southern Europe.

Despite this, we are gathering evidence that a number of small species (<1.5 cm in the adults) have remained unnoticed or poorly known up to date. This has generated gaps and uncertainties in species inventories, potentially affecting ecological, biogeographical and evolutionary studies.

We started to investigate small geophilids from northern Italy, focussing on four neglected species belonging to the widespread and species-rich genus *Geophilus* Leach, 1814. In detail, we aimed to characterise their morphology, to assess their taxonomic identity and to provide first data on their geographic distribution. Whenever possible, we characterised each species by examining multiple specimens from different localities to account for intraspecific variation.

Our preliminary results prompt further investigations on other poorly known small geophilid centipedes occurring in other areas of Southern Europe, especially those harbouring a high diversity of species, such as the Balkan and the Iberian Peninsulas, as well as the peninsular part of Italy. In fact, from a literature survey, these three areas harbour altogether more than 15 nominal species of small geophilids of uncertain validity and with an insufficiently known morphology.

Who am i? and if so, How many? The rediscovery of the forgotten giant european *Pachyiulus varius* (Fabricius, 1781) (Diplopoda, Julida) using modern faunistic internet platforms

Hans S. REIP

Senckenberg Museum of Natural History Görlitz, Görlitz, Germany
Reip@Myriapoden-Info.de

The genus *Pachyiulus* includes the largest European millipedes of the order Julida. It is widely distributed in the Mediterranean region from Mallorca Island in the West to the Cilician Plain/Turkey in the East. The genus was initially based on *Iulus varius* Fabricius (1781) and received considerable attention between approximately 1880 and 1940, mainly by Verhoeff with 16 papers but also a lot of other authors. During this time, the common species seemed to be well-defined.

Later only a few species were regularly recorded: *P. flavipes* (C. L. Koch, 1847) (Italy, Greece), *cattarensis* (Latzel, 1884), *hungaricus* (Karsch, 1881) (both Balkans) and *krivoluystkyi* Golovatch, 1977 (Caucasus). However, no reliable records of the type species *P. varius* have been made since then.

In 1997, Mauriès et al. provided the only significant study of the genus, focusing on Albania. However, this effort led to the mixing of several good species under *P. varius*. In 2012, Frederiksen et al. resurrected three species - *P. flavipes*, *oenologus* (Berlese, 1886), and *apfelbecki* Verhoeff, 1901 - from synonymity. This raised questions about the true identity of *P. varius*, suggesting that *P. flavipes* may still be a junior synonym.

Recently, internet-based tools for recording species and specimens have emerged, including social networks and platforms like Facebook. These platforms allow people to share observations and seek identification from specialists. Machine learning-based image recognition platforms have also gained popularity, with iNaturalist.org becoming the major tool.

A review of in the Internet recorded Julidae from Italy revealed a distinct *Pachyiulus* species at the southern border of the Italian Alps. These specimens closely matched the original description of *P. varius* and were distinct from *P. oenologus* and *P. flavipes*.

Excursions to the iNaturalist-recorded locations resulted in the rediscovery of *P. varius* across various spots from Lago di Garda to the Venezian shore. Additionally, other valid species of the genus *Pachyiulus* could be rediscovered (e.g., *P. marmoratus* Verhoeff, 1901, *lobifer* Attems, 1939) or even recollected (e.g., *P. asiaeminoris* (Verhoeff, 1898), *apfelbecki* Verhoeff, 1901, *venetus* Verhoeff, 1926). Even new species could be recognized or collected based on iNaturalist records.

However, internet records face challenges like misidentification, inaccurate locations, poor photo quality, and incorrect colour balance. Reliable results require careful control and verification. The shift from records in paper publications to internet and digital databases raises the question of whether these later records can alter the precedence of names, preserving - according to Art. 23.9 of the ICZN Code - the younger synonyms as valid names (e.g., for *P. flavipes* or *krivoluystkyi*).

In summary, the internet and associated platforms facilitate the (re)discovery of valid and new species.

Small and sticky: first approach to the distribution of the "slug millipedes" (Glomeridesmida: Glomeridesmidae) in Colombia

Liseth A. REYES-PEÑATA[1,3] & Daniela MARTÍNEZ-TORRES[2,3]

[1] Grupo de Investigación en Artrópodos y Otros Invertebrados Kumangui - Universidad Distrital Francisco José de Caldas - lareyesp@udistrital.edu.co
[2] Grupo de Investigación en Aracnología y Miriapodología (GAM-UN), Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Edificio 425, Oficina 105, Bogotá, Colombia.
[3] Departamento de Biología, Facultad de Ciencias, Universidad Nacional de Colombia, Bogotá, Colombia.

The Glomeridesmida are small millipedes characterized by their small sizes between 4 and 15 mm in length, and their trunk made up of 19 males and 20 females dome shaped segments. They are agile animals and when moving sometimes release mucus. This order is made up of the families Glomeridesmidae and Termitodesmidae; Glomeridesmidae has the largest number of species (31) and the largest area of distribution globally. They are found in the northern half of South America, Caribbean, Central America, India, Southeast Asia and Oceania. However, it is known that the species have small areas of distribution. Glomeridesmidae individuals are commonly known in Colombia as "milpiés babosa" or "milpiés cochinilla" because they are often confused with "slugs" (Mollusca) or "woodlouse" (Isopoda). Up to now, only the first described species for the order has been reported for Colombia: *Glomeridesmus porcellus* Gervais and Goudout (1844), recorded for two departments: Antioquia and Magdalena. Considering the few records in the country for this group, this work was developed in order to make the first approximation to the knowledge of the distribution of Glomeridesmidae in Colombia. The material preserved in the myriapodology collections of the Instituto de Ciencias Naturales of the Universidad Nacional de Colombia and of Artrópodos y Otros Invertebrados of the Universidad Distrital Francisco José de Caldas were revised. A total of 416 individuals from the genus *Glomeridesmus* (three males, 361 females and 52 juveniles) were found, with localities of 14 departments of the country, and ranging from sea level to 3500 MASL. The most represented region was the Andean with 66.34%, followed by the Pacific and the Amazon regions with 27.64% and 6% respectively. No records were found in these collections for the Caribbean, Orinoquía and Insular regions. Although only three males were detected in this review, characters such as color pattern, tergal striation and location of coxal pores allowed us to recognize four morphospecies, their sizes are between 5 mm and 16 mm in length. The males were not determined to species, due to the absence of morphological and taxonomic bases for the group in Colombia. Considering the previous information, this work expands the knowledge of the distribution of Glomeridesmidae for the country. Colombia is one of the most megadiverse countries in the world, and it is highly probable that there are several species of "slug millipedes" new to science. Finally, the probability of the existence of cryptic species is highlighted due to the distant and very different biotic conditions where the same morphospecies. Thus the same possibility can be applied for the individuals from *G. porcellus* that were reported in two different locations may be different species. Further research is required to clarify this possibility.

Ecoregional diversity of millipedes in Riparian Forests of Uruguay

Carolina ROJAS-BUFFET[1,3], Petra SIERWALD[2] & Miguel SIMÓ[1]

[1] Facultad de Ciencias, Universidad de la República, Montevideo, Uruguay.
[2] The Field Museum, Chicago, USA.
[3] crojas@fcien.edu.uy

The Riparian Forests occupy the low-lying areas on the banks of watercourses, have high biodiversity and act as wildlife corridors, thus constituting environments of interest for their conservation. Uruguay presents seven ecoregions proposed based on environmental variables and distribution of woody plants and vertebrates. A proposal for information on the diversity of megadiverse invertebrate groups such as arthropods has not yet been incorporated. Millipedes are recognized for their importance in understanding biodiversity and as environmental indicators applied to conservation. Despite this, in Uruguay there were no studies at an ecological and faunal level in this group. The objective of the work was to know the diversity of millipedes associated with riparian forests of the Uruguayan ecoregions. Seasonal field collections were carried out in Riparian Forests associated with the seven ecoregions between 2018 and 2020. Manual collection was carried out and litter samples were extracted and then processed in Berlese-Tullgren funnels and Winkler extractors. Environmental measurements of soil temperature, soil humidity, soil heterogeneity, soil pH and luminosity were taken. We collected 1806 specimens belonging to the orders Julida, Polydesmida and Spirostreptida. The families Julidae, Blaniulidae, Chelodesmidae, Dalodesmidae, Fuhrmannodesmidae, Paradoxosomatidae, Pseudonannolenidae and Spirostreptidae were found. We identified 10 genera with 12 species. Several forests presented same richness, but there were differences in their diversities. The most diverse were those of the ecoregions to the east and northwest of the country (Sierras del Este and Cuesta Basáltica ecoregions). The least diverse were those of the ecoregions to the northeast and west of the country (Cuenca Sedimentaria Gondwánica and Escudo Cristalino ecoregions). The influence of environmental variables on millipede assemblages will be presented. This study constitutes a significant advance in the knowledge of the diversity of millipedes in riparian forests of Uruguay. In addition, it provides information on the regionalization of this group within the framework of the biogeographic proposal made for Uruguay. The results constitute important inputs for the implementation of conservation plans for natural environments in the country.

Diversity patterns of millipedes community (Myriapoda: Diplopoda) in two cloud forest vegetation covers at Parque Natural Chicaque, Cundinamarca, Colombia

Juan ROMERO-RINCON[1], Daniela MARTÍNEZ-TORRES[2,3] & Jairo ROBLES-PIÑEROS[4]

[1] Universidad Pedagógica Nacional, Bogotá, Colombia. romerorjuanc@gmail.com
[2] Grupo de Investigación en Aracnología y Miriapodología (GAM-UN), Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Edificio 425, Oficina 105, Bogotá, Colombia.
[3] Departamento de Biología, Facultad de Ciencias, Universidad Nacional de Colombia, Bogotá, Colombia.
[4] Departamento de Biología, Universidad Pedagógica Nacional, Bogotá, Colombia.

Compared with other faunistic groups, the millipede's ecology and behavior studies are scarce. This has led to significant gaps in the knowledge of these organisms worldwide. In Colombia, taxonomic and geographic studies, especially of the Diplopoda fauna, are more prevalent than the ones focusing on ecology and behavior. For this reason, and with the aim of contributing to the millipede ecology knowledge in Colombia, it was developed a study in the Parque Natural Chicaque (PNC). The park is located in the Cundinamarca department inside a cloud forest area, at an altitude gradient of 2,000 to 2,700 masl. The monthly temperatures of the park oscillate between 14.6ºC and 15.3ºC, and the relative humidity is high fluctuating between 75% and 86% with a bimodal rainfall regime. The months of March-April-May and October-November are the rainiest. In this study, the diversity patterns of soil millipede communities in two different vegetation covers were analyzed: i). *Quercus humboldtii* Bonpl. oak forests (QhF) and ii) Secondary forests (SF). Both areas were sampled with the methodologies: day and night manual collection, and the soil core with a sampling intensity of 36 hours. For the last one, the litter housed in 48 m2 was processed by means of Winkler traps, drying the sample for 15 days. Additionally, one 60 x 60 x 70 cm test pit was made per each area with the aim of identifying soil parameters and determining how diversity varies between those two vegetation covers. Millipedes from the locality of interest deposited in the Colección Miriapodológica at the Instituto de Ciencias Naturales were reviewed and a photographic review was made of them. In total for this study, six field trips were performed, each one with two days of effective sampling. As results, seven orders, 17 families, and 46 millipede morphospecies were recorded for the PNC. The alpha diversity, according to the values of the diversity orders (q = 0, q = 1 and 1= a 2) for the QhF was: 32 for species richness, 17 common morphspecies, and 11 exclusive morphspecies, while for the SF were 29, 17, and 12 respectively. Thirteen millipede-associated microhabitats were identified, of which 12 were for the SF and 10 for the QhF. Even though fewer microhabitats were detected in the QhF, higher levels of species richness and exclusive species were observed compared to the SF, however, the results are very similar between these two vegetation covers.

Functional morphology of the copulatory organs of *Megaphyllum projectum* (Diplopoda, Julida, Julidea)

Leon RUHMICH[1], Hans S. REIP[1] & Benjamin NAUMANN[1,2]

[1] Universität Rostock, Institut für Biowissenschaften, Allgemeine & Spezielle Zoologie
[2] Benjamin.Naumann@Uni-Rostock.de

The copulatory organs of Diplopoda (millipedes) show an immense disparity among species and are equally important for their taxonomic distinction. Especially the male gonopods of the Helminthomorpha have been extensively examined on their functional morphology. Yet, there is still a debate which mechanisms of selection influence the evolutions of the morphological diversity of gonopods. To address this question soundly, knowledge of the function of all the sub-parts of the complex gonopods is indispensable.

This study examines the copulatory organs of *Megaphyllum projectum* in their copulated and un-copulated states using micro-computed tomography (µCT) based on propagation-based phase contrast in combination with confocal laser scanning microscopy (CLSM). Three-dimensional (3D)-reconstructions of the copulatory organs were prepared from the µCT-data to test functional hypotheses of gonopodal sub-parts. Suggestions on the selective forces acting on the copulatory organs and thus shaping their form are made based on the detailed functional data. Intrasexual competition by flagellum-based sperm removal seems unlikely in *Megaphyllum projectum*, as does the presence of a lock-and-key mechanism. The most favourable mechanisms of sexual selection driving gonopodal evolution among the Julida seem to be female choice as well as mate-guarding.

Two new hypotheses are proposed, based on the investigation of *Megaphyllum projectum*: (1) The promere has a complex function: (a) as a shield for the opisthomere when in resting position, (b) as well as a speculum and pincer or hold-fast device to initiate and prolong the copula. (2) The movement of the gonopods is realised by the movement of their corresponding tracheal apodemes to which all muscles attach.

Pulsar in the jungle – long-term millipede species' coexisting in a tropical forest

Irina SEMENYUK[1,2] & Van NGUYEN THI[1]

[1] Joint Russian-Vietnamese Tropical Center, Street 3 Thang 2, 3, Q10, Ho Chi Minh City, Vietnam
[2] ktor.in.jungle@gmail.com

Vietnam is a part of the Indo-Burmese biodiversity hotspot with diverse millipede fauna. Local faunas could be as rich as 40 and more coexisting species. Our recent studies revealed complex and multidimensional niche separation among coexisting millipede species, including different trophic and spatial preferences, activity time separating and various foraging strategies. Many of millipede species have several years life cycle. Some of them, like *Parafontaria laminata armigera* Verhoeff, 1936 (Polydesmida: Xystodesmidae), are visible only once per 8 years, but many of Polydesmidae species have similar strategy. South Asia climate is affected by El Nino phenomenon with 6-7 years period, altering the abiotic parameters important for millipedes. We aimed to study the long-term dynamic of the millipede community to indicate potential mechanisms of niche separation in the large time scale.

The project is running in Southern Vietnam, Nam Cat Tien National Park, covered with tropical lowland monsoon forest. We chose 9 model routes in various types of forest typical for the area, the length of each route is 1-2 km. Routes are checked monthly in daytime as well as in nighttime. Recorded millipedes are identified to species level and classified into age categories, also the microhabitat is noted. 31 model species are included into the recording. The project was started in 2015.

We found 3 types of long-term strategies of millipede species:
1) Regular species. The peak of visible activity is prolonged and happens in the start, end, or middle of rainy season regularly every year at the same period. Area of maximal abundance changes from year to year (e.g. *Orthomorpha rotundicollis* (Attems, 1937)). 2) Ephemeral species. Short and local peaks of visible activity are happening every year in different areas of forest while the rest territory completely lacks the species (e.g. *Nedyopus dawydoffiae* (Attems, 1953)). 3) Chaotic species. Very high and short peaks of visible activity are happening in some years with unknown regularity. Peaks are usually restricted to local territory (swarming also occurs) (e.g. *Antheromorpha festiva* (Brölemann, 1896)).

Differences in the long-term spatial and seasonal strategies are resulting in a maximum of 12 species practically coexisting locally at a time. Diverse abundance dynamic leads to changing a dominant species in community every year. In conclusion, the long-term community dynamic is corresponding with the Intermediate Disturbance Hypothesis. Several factors could drive the community dynamic with overlapping effects. Long-term climatic cycles like El Nino are creating different sets of abiotic conditions every year, favouring different species at different seasons. Life cycles of millipedes by itself are affecting their periodical appearance. Long-term spatial circulation of species could address the mechanisms regulating the grazing ecosystems with large herbivores migrating to new lands after devastating the present one.

Microbial fermentation in the gut of the millipede *Telodeinopus aoutii* (Demange, 1971) (Spirostreptidae) in light of holobiont metatranscriptomics

Vladimír ŠUSTR[1,4], Puspendu SARDAR[1,2], Alica CHROŇÁKOVÁ[1], Roey ANGEL[1], Julius E. NWEZE[1], František LORENC[1,3]

[1] ISBB, Biology Centre AS CR, České Budějovice, Czech Republic.
[2] Cambridge Inst. of Therapeutic Immunology and Infectious Disease (CITIID), Dep. of Medicine, Univ. of Cambridge, UK.
[3] Dep. of Food Biotechnologies and Agricultural Products' Quality, Fac. of Agriculture and Technology, Univ. of South Bohemia in České Budějovice, Czech Republic.
[4] sustr@upb.cas.cz

Millipedes are keystone detritivores that affect leaf litter decomposition rates and soil organic matter quality. Transformation of plant structural polysaccharides during food processing results from the interaction between hydrolysis by autochthonous enzymes, and the more significant activity of gut microorganisms, which then also ferment the products. Metatranscriptomic data of the tropical millipede *Telodeinopus aoutii* were analysed in quadruplicate at the holobiont level, considering the role of the host and its gut microbiome. The expression of genes in the foregut (FG), midgut (MG), hindgut (HG), the rest of the millipede body (NG), and genes of different taxonomic origin (autochthonous millipede genes, genes from ciliates, nematodes, fungi, bacteria, and archaea), were analysed separately. Based on the functional annotation of the expressed genes (using KEGG KO terms, enzyme commission numbers - EC, and gene ontology terms - GO), enzymes involved in fermentation metabolic pathways were tracked. The expression data were projected into metabolic maps to assess the metabolic potential of the microbiome in different gut sections and to map the functional distribution of fermentation processes in the holobiont. Almost all the fermentative processes that could be detected by GO terms were mediated by intestinal bacteria. Their full spectrum was detected in the HGt, and only some types of fermentation were found in the MG. Methanogenic archaea were active only in the hindgut. A more detailed analysis at the level of detected EC numbers and KEGG KO terms revealed the activity of genes encoding enzymes of fermentation metabolic pathways such as lactic, acetic, propionate, and mixed acid fermentation, with higher diversity of transcribed genes in the HG than in the MG. Methanogenesis was driven by archaea in the hindgut using CO_2, hydrogen, methyl compounds, and probably formate as substrates. The active genes of the bacterial community in the hindgut also cover the entire metabolic pathway for acetogenesis, including genes encoding some nitrogen transformation and fixation enzymes. Eukaryotic anaerobic pathways are partially covered by active genes detected in Ciliophora and Nematoda in the HG. These results are compared with available data on expressed enzymes that degrade polysaccharides or are involved in fermentation in other millipede species.

Pitfall traps do not measure activity-density of millipedes and centipedes

Ivan Hadrián TUF[1], Lucie NOVOTNÁ[1] & Karel TAJOVSKÝ[2]

[1] Department of Ecology and Environmental Sciences, Faculty of Science, Palacký University Olomouc, Šlechtitelů 27, 779 00 Olomouc, Czech Republic; ivan.tuf@upol.cz
[2] Institute of Soil Biology and Biogeochemistry, Biological Center of the Academy of Sciences of the Czech Republic, v.v.i., Na Sádkách 7, 370 05 České Budějovice, Czech Republic

Since 1930, when Henry Specter Barber published the first ecological paper on the use of pitfall traps to sample cave-dwelling arthropods, scientists have incorporated this method into sampling protocols. Literally oodles of traps (= Barber traps) were set, and the specimens caught were used to study communities of soil invertebrates. Although in Barber's first paper the traps were baited for beetles, it is generally assumed that traps without bait measure the activity density of epigean species. Under this assumption, we compare communities sampled with traps across biotopes, seasons, and regions. This assumption is based on the notion that an animal falls into a trap only because its trajectory happens to collide with the opening of the trap. Hundreds of methodological studies have been published on the attraction or repulsion of individual fixatives. However, few of them considered myriapods. In this study, we tested the effect of formaldehyde compared to two control types.

The experiment was conducted in a floodplain forest near the city of Olomouc (Czech Republic). A total of 90 traps (plastic pots embedded in buried jars with the same opening diameter) were distributed at a distance of 10 m. Thirty of them were filled with a 4% formaldehyde solution, 30 were well filled with water, and 30 were without solution. To prevent small trapped animals in dry traps from being consumed by larger ones, a handful of wood-shavings was placed in the pot. The traps were covered with metal shields. Traps were checked twice a week in April and May 2022. The dry traps served as a control for random animal movement, larger counts in water and formaldehyde traps were considered evidence of their attractiveness, and vice versa.

A total of 2735 millipedes and 334 centipedes were captured. Of the seven centipede species captured, *Lithobius mutabilis* was by far the dominant species, while *Glomeris tetrasticha* provided more individuals than the other eight millipede species combined. Formaldehyde traps were much more attractive for centipedes as well as for *Polydesmus denticulatus* and *Brachydesmus superus*. On the other hand, Glomerida and Julida species were attracted to water in the traps, while all Julida species were deterred by formaldehyde.

It can be concluded that formaldehyde traps overestimate the activity density of centipedes and polydesmids relative to other millipedes. Comparison of abundance of myriapods, even of similar size, based on trapped specimens is biased. Further studies comparing the effect of other media used are needed.

A new species of *Schendylops* Cook, 1899 from Colombia: Demographic data and morphological variation associated with sex and leg pair number (Chilopoda: Geophilomorpha)

Esteban TULANDE-M

Museo Javeriano de Historia Natural, Grupo de Sistemática Molecular, Laboratorio de Entomología, Pontificia Universidad Javeriana, Bogotá, Colombia. etulande@javeriana.edu.co

The genus *Schendylops* is one of the most common centipede genera in South America, however in Colombia, the genus is represented as far as known solely by *S. colombianus* recorded in the Magdalena Valley. In this research, I describe the first species of *Schendylops* from the Colombian Andes. The new species is distinguished by having sternal pores only in the anterior region of the body, and completely armed forcipules, with small teeth on the forcipular trochanteroprefemur, femur and tibia and a large pale tooth at the tarsungulum. The species exhibits different ranges of variation in the number of leg pairs between males and females, with males having 41 or 49 leg pairs and females having 43 and 51. Based on the analysis of 201 specimens, I examine the proportions between these forms and morphological variations associated with sex and leg number. Males with 41 leg pairs were twice as frequent as females with 43 leg pairs, but males with 49 leg pairs were less frequent than females with 51 leg pairs. The 51 leg pair females also showed the highest broadest range of variation of important morphological characters, including the number of sternal pores per segment and the anterior and posterior limits of these pores on the trunk.

Phylogenetics of the order Polydesmida Pocock, 1887 (Myriapoda: Diplopoda)

Fernanda VASQUEZ-VALVERDE[1,2] & Paul MAREK[1]

[1] Department of Entomology, Virginia Tech, Blacksburg, VA, USA.
[2] luisafvv@vt.edu

Of the 16 orders in Diplopoda, the Polydesmida Pocock, 1887 is the most species diverse order with more than 5,000 described species. The monophyly of the order, commonly known as the "flat-back millipedes", has been previously demonstrated based on morphological characters such as the absence of eyes, lateral projections of the posterior metazonite known as paranota, a fixed number of body rings, and others. More recently, and within the context of testing ordinal relationships of the class, some molecular phylogenetics have supported its monophyly, but no phylogenetic systematic analysis has been accomplished for the entire order. As a result, the relationships between its five suborders and 29 families are not understood, causing uncertainty in the classification of Polydesmida. In order to shed light on the internal relationships of Polydesmida, we estimated a molecular phylogeny of the order. We used an exemplar approach to select representative samples of families, and extracted genomic DNA from them, for subsequent sequencing with Illumina short reads. The time-consuming process of *de novo* genome assembly and annotation for phylogenetic analysis was avoided, and instead a set of 312 orthologous genes were used to reconstruct an evolutionary tree. The software aTRAM was used to assemble these ortholog genes, directly from sequencing reads. The genes were aligned, and used as individual partitions to estimate a phylogenetic tree for the order in IQTREE. So far, our results support the monophyly of the order Polydesmida, and that the order Stemmiulida is its sister group. Four out of the five suborders for Polydesmida were recovered as monophyletic groups: Strongylosomatidea, Leptodesmidea, Dalodesmidea, and Polydesmidea. Similarly, the several families were recovered as monophyletic branches on the tree. More samples of highly diverse families Paradoxosomatidae, Chelodesmidae, Furhmannodesmidae, and Trichopolydesmidae, are needed to resolve their position and further resolve relationships inside the order. We show that the use of genome sequencing and assembly-free bioinformatic tools, such as aTRAM, are powerful resources in the phylogenetic analysis of highly diverse groups.

VIDEO-PRESENTATIONS*

* All video-presentations (except for the works about onychophorans) are listed in alphabetical order according to the first author

Impact of geophagy on litter consumption rate by diplopods in a tropical agroecosystem

Mathieu COULIS[1,2,4], Meryem EL JAOUHARI[1,2], Maeva PASTORET[1,2], Gaelle DAMOUR[3,2]

[1] CIRAD, UPR GECO, F-97285 Le Lamentin, Martinique, France
[2] GECO, Univ Montpellier, CIRAD, Montpellier, France
[3] CIRAD, UPR GECO, F-34398 Montpellier, France
[4] mathieu.coulis@cirad.fr

Diplopods play a crucial role in litter decomposition via their transformation into fecal pellets, a process that contributes to the physical and chemical breakdown of organic matter. At the same time, different diplopod species may exhibit contrasting consumption strategies depending on the quality of the litter but also on the amount of soil ingested. Most of the experiments were conducted on a limited number of model species and without soil, which strongly limits our understanding of this process. Although geophagy is considered uncommon in diplopods, some studies show that diplopods can consume large amounts of soil. The objective of this study was to investigate the importance of geophagy in diplopods and its consequences on the feeding strategy of diplopods the main decomposer in the banana agroecosystems of Martinique. To this end, we conducted two different monospecific experiments in microcosms with 10 diplopod species from the island of Martinique, representing the three most common morphotypes (glomeroid, polydesmoid and juloid). In the first experiment, assimilation efficiency and specific litter consumption rate were measured in the absence of soil. In the second experiment, the proportion of soil in the diplopod diet (percentage of geophagy) and specific litter consumption in the presence of soil were measured. Our results showed a significant relationship between specific litter consumption and fresh biomass of diplopods in the absence of soil but no significant relationship in the presence of soil, showing the importance of considering soil in estimating litter consumption. We also found that decomposer macrofauna compensate for their consumption by having a higher specific litter consumption when soil is not available. This suggests an important nutritional role of soil in the diet of diplopods. In addition, we found that the proportion of soil in the diet ranged from 38% to 96% (66% on average for all species), higher rates than previously assumed. These results suggest that diplopods may have a generally important effect on soil processes such as soil structuring and bioturbation and that they are not only "litter transformer" but may also act as "soil engineers" to some extent.

A hidden world on millipede gonopods: the first report of sessile ciliate epibionts (Sessilida) on Platyrhacidae (Polydesmida) found in tropical humid forests of northwestern South America

Jossian DÍAZ-MELO[1,3], Daniela MARTÍNEZ-TORRES[1,2]

[1] Grupo de Investigación en Aracnología y Miriapodología (GAM-UN), Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Edificio 425, Oficina 105, Bogotá, Colombia.
[2] Departamento de Biología, Facultad de Ciencias, Universidad Nacional de Colombia, Bogotá, Colombia.
[3] jejdiazme@unal.edu.co

The ciliates belonging to the order Sessilida are microscopic unicellular organisms mainly associated with aquatic environments or moist substrates. They can be mobile, sessile, or both, depending on the phase of the life cycle they are in. When interacting with other organisms, ciliates can form mutualistic, endo- or ectosymbiotic relationships, and some may even become obligate parasites. The type of relationship may depend on the prevailing environmental conditions. Epibiotic protozoa have been documented on plants, certain aquatic vertebrates, and invertebrates such as insects, crustaceans, rotifers, and mollusks. Endocommensal protozoa have been observed in millipedes, inhabiting the digestive tract of specific groups. However, cases of epibiotic protozoa in Diplopoda have not been published. This study aims to provide the first report of epibiotic protozoa on millipedes of the family Platyrhacidae, discovered by reviewing preserved material from nine biological collections in Brazil, Colombia, Ecuador, Italy, Peru, and the United States.

A total of 454 individuals (264 males and 191 females) belonging to the family Platyrhacidae were examined, distributed across 17 morphospecies of *Psammodesmus* and 23 morphospecies of *Barydesmus*. Several colonies of ciliate protozoa belonging to the genus *Epistylis* (Sessilida: Epistylididae) were found inhabiting 57 individuals from five species of the genus *Psammodesmus* (54 males) and two species of the genus *Barydesmus* (two males). No females with this type of association were found in this study. The protozoa were mainly observed on the tibiotarsal plate and the opening of the gonopods. Millipedes hosting these epibionts were distributed from sea level to 1800 m in altitude, in tropical humid forests of Colombia and Ecuador, suggesting the possibility of different protozoan species being involved.

This finding could represent a facultative relationship between these two groups of organisms, where the protozoa may benefit from finding protection and food sources on the gonopods. However, it is possible that this substrate does not provide a consistent water flow, which is crucial for the protozoa to obtain the necessary oxygen. On the other hand, the millipedes would benefit from the cleaning service provided by the protozoa, removing bacteria and detritus. Nevertheless, they could also be negatively affected if the density of protozoa colonies were to disrupt the surface of these structures and interfere with reproductive function. This study not only represents the first record of epibiotic protozoa on millipedes but also the first on a terrestrial arthropod.

Centipede distribution patterns and biodiversity hotspots in Greece

Elisavet GEORGOPOULOU[1], Konstantinos KOUGIOUMOUTZIS[2] & Stylianos SIMAIAKIS[1,3]

[1] Natural History Museum of Crete, University of Crete.
[2] Laboratory of Botany, Department of Biology, University of Patras
[3] *ssimaiakis@yahoo.com*

The Mediterranean Basin, a world area covering 2.3 million km^2 and 23 different countries, is well known for its globally important biodiversity with high levels of species richness and endemism. While the Mediterranean region is one of the original 25 biodiversity hotspots, global environmental and climate change is considered as one of the most crucial threats to living organisms. Even though Greece, a regional hotspot in the Mediterranean Basin, is one of the most species-rich European countries, the impact of climate change on biodiversity still remains unaddressed. For this study we used the most updated species occurrence database for centipedes in Greece comprising 3325 entities, which had been revised and mapped, covering 12% of the country when plotted on a grid of 2 x 2 km resolution. In total, 109 centipede species are recorded from 829 unique grid cells, of which 20 species are endemic (ca. 18%). This relatively high diversity and endemism are due to geographical characteristics of Greece (ca. 8000 islands and islets and ca. 4800 mountain-tops), as well as to its complex palaeogeographical history. Our first aim is to locate the areas constituting current diversity hotspots in mainland and insular Greece, and, to assess how climate change might affect populations. Further analyses were based on a species distribution modelling framework to underline whether species ranges might experience spatiotemporal shifts in the future due to climate change and to explore the effectiveness of the Natura 2000 network in protecting species-rich areas over time. Species richness hotspots are currently located along the main backbone of Greek mountains stretching from north (e.g. Pindos Mt., Timfristos Mt. and Parnassos Mt.) to south (e.g. Taygetos Mt., Parnonas Mt. and Mainalo Mt. in Peloponnese, as well as, Lefka Ori Mt. and Idi Mt. in Crete). Based on the modelling technique species range contractions are predicted for most taxa, with these contractions gradually becoming more prominent over time. Species ranges will experience shift both altitudinally and latitudinally and an extinction debt is predicted for the Greek centipede species in the future. A proportion of these hotspots are currently included in the Natura 2000 protected areas network and this proportion is projected to decrease in the coming decades. There is a substantial conservation gap in Greece regarding centipedes on areas identified as diversity hotspots, suggesting a critical re-assessment of the Greek protected areas network to suspend the predicted biodiversity declines.

Symphylans (Myriapoda: Symphyla) of the myriapod collection of the Instituto de Ciencias Naturales of the Universidad Nacional de Colombia: contributions to diversity and distribution

Julian HOMEZ-ALVAREZ[1], Santiago ALVEAR[2], Daniela MARTÍNEZ-TORRES[3]

[1] Grupo de Investigación en Aracnología y Miriapodología, Instituto de Ciencias Naturales, Facultad de Ciencias, Universidad Nacional de Colombia. sjhomeza@unal.edu.co
[2] Departamento de Biología, Facultad de Ciencias Naturales, Exactas y de la Educación, Universidad del Cauca.
[3] Grupo de Investigación en Aracnología y Miriapodología, Instituto de Ciencias Naturales, Facultad de Ciencias, Universidad Nacional de Colombia.

Symphylans are small myriapods that range in size from 1 to 8 mm in length. The class Symphyla currently consists of two families, thirteen genera, and approximately 196 species. Some of these species are considered pests in crops, as they feed on the living tissue of plants, causing significant damage. These species have a wide distribution thanks to global plant trade. To date, in Colombia, only *Scutigerella immaculata* (Newport, 1845) has been recorded in the Bogotá Savanna and a few unidentified species of the family Scutigerellidae have been found in Antioquia, Bolívar, and Cundinamarca departments. In order to increase knowledge about the diversity and distribution of symphylans in Colombia, this study aimed to review the material deposited in the Myriapod Collection of the Instituto de Ciencias Naturales at the Universidad Nacional de Colombia. A total of 56 individuals collected since 2011, preserved in 75% ethanol, were found belonging to the families Scolopendrellidae and Scutigerellidae. These specimens were recorded in ten out of the 32 departments of Colombia, distributed in the Amazon, Andean, and Pacific regions, ranging from 10 to 3625 mamsl. The majority of the specimens (45) belong to the family Scutigerellidae, with 25 of them belonging to the genus *Hanseniella* and 24 to the genus *Scutigerella*. Eleven individuals of the family Scolopendrellidae belonging to the genus *Symphylella* were also detected. It is worth noting that the preserved material comes from both intervened areas and highly preserved forests, and no samples were found from cultivated areas. In addition to increasing knowledge about the distribution of these organisms, this study reports the genera *Hanseniella* and *Symphylella* for the first time in Colombia.

An inventory of millipedes from Finca Merenberg natural reserve, Huila, Colombia

Julian HOMEZ-ALVAREZ[1], Santiago ALVEAR[2] & Fernanda VASQUEZ-VALVERDE[3]

[1] Grupo de Investigación en Aracnología y Miriapodología, Instituto de Ciencias Naturales, Facultad de Ciencias, Universidad Nacional de Colombia. sjhomeza@unal.edu.co
[2] Departamento de Biología, Universidad del Cauca.
[3] Department of Entomology, Virginia Tech, Blacksburg, VA, USA.

The cloud forests of southwestern Colombia are renowned for their high biodiversity and unique ecosystems, yet millipede diversity in these areas remains poorly understood. Diplopoda is the largest and most diverse group of the subphylum Myriapoda, and they play a crucial role in the ecosystem contributing to soil formation and the cycling of resources. Despite their significance, comprehensive studies on millipede diversity in the cloud forests of Colombia have not been done. This study presents an inventory of the millipede fauna in Finca Merenberg, a privately-owned natural reserve, in La Plata, Huila, Colombia. Merenberg is the first private natural reserve in the country, created in 1930. Encompassing and area of 300 hectares, the main goal of this natural reserve is the protection of several cloud forest fragments along the eastern slope of the central Andes, and consequently preserve the flora and fauna unique to this ecosystem. The principal aim of this study was to do a first survey of the millipedes in the reserve, identify and document the diversity of these organisms in the area. Millipedes samples collected in January of 2021, using diurnal and nocturnal manual collection. Leaflitter was also sampled and processed in Winkler traps for three days. Collected millipedes were preserved in 75% or 90% ethanol, for posterior morphological and molecular analysis. A total of 125 specimens were collected, corresponding to 6 orders, 13 families and 18 morphospecies. The family Sipirobolellidae (Spirobolida) was the most abundant, while the most diverse family was Cyrtodesmidae. Preserved specimens will be deposited in the Collections or the Universidad del Cauca, Instituto de Ciencias Naturales and Virginia Tech. Here we provide a baseline for future research on the millipede fauna of the Finca Merenberg natural reserve, and the Colombian cloud forests in general. This study also highlights the importance of conservation efforts for this unique and diverse ecosystem, as well as the need to increase and promote the research on understudied groups.

Jadwiga Kaczmarek (1923–1991) – Scientific achievements and profile of the polish research pioneer on Chilopoda on the 100th anniversary of her birth

Malgorzata LESNIEWSKA

Department of General Zoology, Adam Mickiewicz University, Poznan, Poland
malgorzata.lesniewska@amu.edu.pl

May 24, 2023 marks the 100th anniversary of the birth of Jadwiga Kaczmarek, founder of myriapodological research in Poland. My aim is to present the scientific profile of Dr. Kaczmarek who initiated systematic research on centipedes in Poland and then made a great contribution to its development.

Jadwiga Kaczmarek was born in Poznan. The outbreak of World War II interrupted her high school education and forced her to work as a seamstress in a factory. After the end of the war, she passed her high school final exam and began studying biology at the University of Poznan in 1946. While still a student, from March 1950, she was employed at the zoology department of the University of Poznan as a deputy assistant, and then as an assistant. After that, for 41 years, until her premature death in 1991, she was associated with this university. She received the PhD in natural sciences in 1960 on the basis of the dissertation "Centipedes (Chilopoda) of the Ojcowski National Park". In 1977, she received a post-doctoral degree.

Achievements of Dr. Kaczmarek include original articles and monographs in the field of myriapodology (mainly faunistics and taxonomy) as well as chapters on Myriapoda for a famous Polish academic textbook of zoology. The most significant works by Dr. Kaczmarek include the monograph "Centipedes (Chilopoda) of Poland" and „The Catalog of Centipedes of Poland”. Thanks to Dr. Kaczmarek, Poland was at that time one of the best-studied European countries in terms of Chilopoda. We owe her the development of the Polish nomenclature of centipede morphology, which is still used today. Dr. Kaczmarek also conducted research outside Poland, on the Balkan Peninsula. She described 15 new taxa (species and subspecies) of centipedes from Poland and Bulgaria. She also participated in many scientific conventions and conferences, where she gave papers and reports on the group of animals she studied. However, Dr. Kaczmarek never participated in the International Congress of Myriapodology. She applied for the First Congress in 1968 in Paris, but the political situation meant that her trip was suspended. Dr. Kaczmarek was a great academic teacher. She conducted various classes, mainly in zoology and zoogeography, including *inter alia* lectures, seminars, laboratory classes and field classes. 32 Master's theses were written under her supervision. For her scientific and didactic merits, she was awarded high distinctions: the Gold Cross of Merit and the Knight's Cross of the Order of Polonia Restituta.

Jadwiga Kaczmarek was a kind person with an excellent sense of humor and a sensitive heart. She did not start her own family, yet helped many people in various ways. She deserves to have a permanent place in our memory.

Chilopoda and Diplopoda of the city of Szczecin (Poland) – preliminary results

Malgorzata LESNIEWSKA[1,2] & Przemyslaw PIEKARCZYK[1]

[1] Department of General Zoology, Adam Mickiewicz University, Poznan, Poland
[2] malgorzata.lesniewska@amu.edu.pl

Cities are an important area for studying myriapods. They allow tracking changes that occur in communities of these animals under the influence of various factors – anthropogenic, climatic or historical. So far, only a few cities in Poland have been examined in this respect. Szczecin is the third largest city in Poland with an area of approximately 300 km^2 (around 400,000 inhabitants). It is located in north-western Poland, close to the western border and near the coast of the Baltic Sea. The aim of the current study is to present the preliminary results of the research carried out since 2022 in Szczecin. Research was conducted in many habitats (in forests, parks, cemeteries, gardens, squares, roadsides, wastelands, lawns, etc.) in all seasons. Direct capture from under branches, stones, pieces of bark, and other accessible micro-habitats in which myriapods live was used.

As a result, we have so far caught over 600 specimens of Chilopoda and Diplopoda belonging to 27 species, including 12 species of centipedes and 15 species of millipedes. The myriapod fauna of Szczecin is rich and diverse, reflecting the mosaic of the city's habitats and geographical location. There are species found only in the northern Poland (e.g. *Cylindroiulus punctatus*) alien species introduced to our country (e.g. *Stigmatogaster subterranea*) rare species (e.g. *Allajulus nitidus*) as well as species typical of other Polish and European cities. We also found the occurrence of a new record for Poland – *Cylindroiulus vulnerarius.*

Synanthropic and eurytopic species dominate among the collected myriapods. In its structure, the myriapod fauna of Szczecin resembles the Myriapoda fauna of other large Polish cities (e.g. Poznan). Changes that have taken place in recent years as a result of climate warming and the opening of Poland's borders are also visible.

In the next stage of research, we plan to extend the methods of collection of the myriapods in selected, particularly interesting environments.

Three decades of millipede's history deposited in the myriapodological collection of the Instituto de Ciencias Naturales, Universidad Nacional de Colombia

Daniela MARTÍNEZ-TORRES[1,2,5], Fernanda VÁSQUEZ-VALVERDE[3], Sarah LEÓN-ORTÍZ[1,2] & Eduardo FLÓREZ D.[4]

[1] Grupo de Investigación en Aracnología y Miriapodología, Instituto de Ciencias Naturales, Facultad de Ciencias, Universidad Nacional de Colombia.
[2] Departamento de Biología, Facultad de Ciencias, Universidad Nacional de Colombia, Bogotá, Colombia.
[3] Department of Entomology, Virginia Tech, Blacksburg, VA, USA. [3] Departamento de Biología, Facultad de Ciencias, Universidad Nacional de Colombia, Bogotá.
[4] Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Edificio 425, Oficina 105, Bogotá, Colombia.
[5] sdmartinezt@unal.edu.co

The Instituto de Ciencias Naturales (ICN) at the Universidad Nacional de Colombia was founded in 1940, and houses important botanical and zoological natural history collections that have representative national and international samples. However, the Myriapoda collection was not started until 1990, with mainly Diplopoda and Chilopoda samples, and only in 2009 the codification and systematization of the samples started, to get them to the current state. This study is focused on showing the history and current status of the ICN Diplopoda Collection, which is the most representative in the country. Nowadays, the collection has a high level of curatorial work: the samples are preserved in 75% ethanol and have been codified and systematized. It houses a total of 7,826 specimens (2,730 males, 3,268 females, 1,396 juveniles and 431 non sexed individuals), that correspond to 14 orders and at least 31 families. Most of the samples in the collection are form Colombia, but some samples from the United States, France, Madagascar, Mexico and Venezuela are also deposited here. The orders with the bigger number of samples are Polydesmida (4,667), Spirostreptida (924) and Spirobolida (681). On the other hand, the orders Sphaerotherida and Callipodida are the less numerous ones with only two and one specimens. The ICN Diplopoda collection has samples from all 32 departments in Colombia, and the oldest records are individuals from the families Chelodesmidae (Polydesmida), and Spirostreptidae (Spirostreptida), collected in the department of Atlantico in 1963. Out of the six natural regions of Colombia, the Andean, Pacific and Amazon regions are the most abundant with 4,310, 1,382 and 1,213 samples. In contrast, the Insular region is the less abundant with only twelve samples. Our data shows an important increment in the collection of diplopods since 2009, that reaches a total of three times the samples collected before this date. Said increase in sample number corresponds with the increase in interest of researchers and research projects focused on Diplopoda. So far, a single type species has been deposited in the ICN Diplopoda collection: *Psammodesmus bryophorus* Hoffman, Martínez & Flórez, 2011. However, the huge biodiversity in Colombia suggest that this collection has the potential to house multiple new species of millipedes.

Walking gardens in the neotropics: new reports of millipedes and bryophytes growing on their cuticle

Daniela MARTÍNEZ-TORRES[1,2], Edgar L. LINARES[3]

[1] Grupo de Investigación en Aracnología y Miriapodología, Instituto de Ciencias Naturales, Facultad de Ciencias, Universidad Nacional de Colombia. sdmartinezt@unal.edu.co
[2] Departamento de Biología, Facultad de Ciencias, Universidad Nacional de Colombia, Bogotá, Colombia.
[3] Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Edificio 425, Bogotá, Colombia.

In 2011, the first and only species of millipede published to date carrying bryophytes on its back was described: *Psammodesmus bryophorus* Hoffman, Martínez & Flórez, 2011. This species was discovered in the tropical rainforests of southwestern Colombia, and it was observed that several male individuals of this species carried a diverse assemblage of up to 10 bryophyte species, belonging to five families and seven genera. This study was conducted with the aim of revealing additional species of millipedes that host bryophytes on their bodies, based on the examination of new material preserved in the Myriapoda collection at Instituto de Ciencias Naturales de la Universidad Nacional de Colombia and the collection in the Museu Nacional de Rio de Janeiro of Universidade Federal do Rio de Janeiro in Brazil, and considering the photographic records published on social networks and websites. Based on the material preserved in these collections, seven male millipedes belonging to three species and two genera of Platyrhacidae were found transporting bryophytes on their backs in the Chocó biogeographic region of Colombia and Ecuador. In Colombia, four individuals of *Barydesmus* n. sp. were found, carrying *Bryum coronatum* (Bryaceae), *Callicostella rivularis* (Pilotrichaceae), *Fissidens steerei* (Fissidentaceae), and *Leucomium strumosum* (Hornsch.) Mitt. (Leucomiaceae), one individual of *P. bryophorus* was found with *Rhynchostegiopsis* aff. *flexuosa* (Sull.) Müll. Hal (Leucomiaceae) and *Bryum* sp. (Bryaceae) and one individual of *Psammodesmus atratus* (Chamberlin, 1947) with a specimen of *Dicranolejeunea axilliaris* (Nees et Mont.) Schiffn. (Lejeunaceae). In Ecuador, one individual of *Psammodesmus fascoilatus* Silvestri, 1898 was found with *Cyclolejeunea* sp. (Lejeunaceae). Based on photos from social networks and websites, a female of another Platyrhacidae, possibly *Tirodesmus fimbriatus* (Peters, 1864), carrying several bryophyte individuals was detected in Costa Rica. Finally, photos from the Chocó biogeographic region of Ecuador, had a female, a male, and an unsexed individual of a polydesmid millipede, possibly belonging to Pyrgodesmidae, with bryophytes. Although bryophytes are primarily found on the backs of the millipedes, some were also observed on antennae and legs. As a result, five additional species and one family of millipedes carrying bryophytes on their bodies are reported, as well as one family, four genera, and five species as new records of epizoic bryophytes on millipedes. Finally, the distribution of this ecological relationship is expanded, being recorded for the first time in Costa Rica, Ecuador, and a new locality in Colombia.

New records of teratologies in millipedes of Platyrhacoidea Pocock, 1895 (Diplopoda: Polydesmida) from Neotropical region

Daniela MARTÍNEZ-TORRES[1,2] & Thaís M. de ALMEIDA[3]

[1] Grupo de Investigación en Aracnología y Miriapodología, Instituto de Ciencias Naturales, Facultad de Ciencias, Universidad Nacional de Colombia. sdmartinezt@unal.edu.co
[2] Departamento de Biología, Facultad de Ciencias, Universidad Nacional de Colombia, Bogotá, Colombia.
[3] Instituto Nacional de Pesquisas da Amazônia – INPA, Laboratório de Sistemática e Ecologia de Invertebrados de Solo. Coordenação de Biodiversidade - COBIO, Campus II, Manaus, Amazonas, Brazil.

The term "teratology" originates from the Greek word "teratos", which means "monster", and refers to the study of congenital anomalies. These anomalies can be found in both vertebrate and invertebrate groups, including Diplopoda. They can be classified into three types: sexual anomalies, segmental anomalies, and anomalies of branched appendages. Some of these anomalies have been reported in Platyrhacoidea superfamily, *sensu* Shear (2011), which includes the Aphelidesmidae family with approximately 120 species and 17 genera, and Platyrhacidae family with approximately 250 species and 40 genera. These families are found in the Neotropical region, and the Platyrhacidae family can also be found in the Indo-Malayan region. Sexual anomalies have been documented on two species of Aphelidesmidae: *Pycnotropis taenia* (Peters, 1864) from Colombia and *Aphelidesmus hermaphroditus* Brölemann, 1898 from Venezuela. So far, there have been no records of any type of anomaly in individuals of the Platyrhacidae.

This study reports new cases of anomalies in the Platyrhacoidea that were found in preserved myriapod samples from the collections of the Instituto de Ciencias Naturales (ICN) of the Universidad Nacional de Colombia and the North Carolina Museum of Natural Sciences (NCMNS). In the Aphelidesmidae, sexual anomalies were found in five individuals from Colombia, belonging to *Aphelidesmus* sp., *Pycnotropis taenia* and *Pycnotropis sigma* Golovatch, Vohland and Hoffman, 1998, and in the last species another individual with segmental malformation was observed. Within the Platyrhacidae family, an individual of *Barydesmus* sp. from Brazil with a sexual malformation, an individual of *Psammodesmus* sp. from Peru with segmental malformation, and two individuals of *Barydesmus* sp. from Colombia with branched appendages anomalies were discovered. Detailed descriptions of these anomalies and a map of distribution of the anomalies records for Platyrhacoidea are provided. With this study, the three types of anomalies in Platyrhacoidea are reported, describing the segmental anomaly in Aphelidesmidae and the three anomalies in Neotropical Platyrhacidae for the first time.

The Chelodesmidae (Polydesmida) from Tropical Andes: A review of the monotypic tribe Dibolostethini with description of new species, a curious case of a paradoxosomatid-like group

Jackson C. MEANS[1,5]; Rodrigo S. BOUZAN[2,3]; Luiz F. M. INIESTA[2,3]; Daniela MARTÍNEZ-TORRES[4]; Luisa Fernanda VASQUEZ-VALVERDE[5]; Antonio D. BRESCOVIT[3]; Kaloyan IVANOV[1]

[1] Virginia Museum of Natural History, 21 Starling Ave., Martinsville, Virginia 24112, USA.[2] Pós-graduação em Zoologia, Instituto de Biociências, Universidade de São Paulo, São Paulo, Brazil. [3] Laboratório Especial de Coleções Zoológicas, Instituto Butantan, Avenida Vital Brasil, 1500, 05503-090, São Paulo, Brazil. [4] Grupo de Investigación en Aracnología y Miriapodología, Instituto de Ciencias Naturales, Facultad de Ciencias, Universidad Nacional de Colombia. [5] Department of Entomology, Virginia Tech, 216A Price Hall, Blacksburg, VA 24061, USA. [6] jackson.means@vmnh.virginia.gov.

With more than 750 described species and 176 extant genera, Chelodesmidae Cook, 1895 is the second largest family in the class Diplopoda. The family is divided into two geographical subfamilies: the New World Chelodesminae (139 genera) distributed across the Neotropical region, and the Old World Prepodesminae (37 genera) known from the Afrotropical and Palearctic regions. Currently, 21 tribes, 5 of which are monotypic, are recognized within the Chelodesmidae, the majority of which (19) are in the Chelodesminae. The monotypic genus *Dibolostethus* Hoffman, 2009 (*type species*, *D. sicarius* Hoffman, 2009) was described from the western and eastern foothills of the Andes Mountains of Ecuador. The autapomorphies displayed by *D. sicarius* warranted the erection of the new tribe Dibolostethini, with putative affinities with the Andean Batodesmini and Trichomorphini. While vertebrates are well documented throughout the Tropical Andes, the invertebrate communities, including Diplopoda, remain understudied and are poorly known. Andean chelodesmids often display morphological characters which makes placement into established tribes difficult and indicates a rich evolutionary history. However, there has been no synthesis of Andean representatives of Chelodesmidae, leaving us poorly equipped to disentangle hidden patterns of biodiversity and determine evolutionary relationships. Here, we provide brief results of a revision of the genus *Dibolostethus*, with descriptions of new species, highlighting the differences and similarities between the species of this tribe and some species of Paradoxosomatidae. The genus differs from all other chelodesmid genera by a combination of characters (eg. moniliform body outline, sternite of 4th body ring prominent, with a pair of acute projections curving anteriad, femora of 4th pair of legs with large acute process). The genus is composed of *D. sicarius*, and two new species: *Dibolostethus inopinatus* Means, Bouzan & Ivanov, 2023 (Morona-Santiago Province, Ecuador) and *Dibolostethus kattani* Means, Bouzan, Martínez-Torres & Ivanov, 2023 (Valle del Cauca, Colombia). Both species are diagnosed by a combination of gonopodal characteristics. Our findings considerably expand the distribution of *Dibolostethus* (~550 km), suggesting that this previously monotypic genus is likely more widely distributed across the Tropical Andes. Millipedes may represent one of the most endemic groups within the Tropical Andes, which is unsurprising given their evolutionary age and low rate of dispersal.

Advancements in the inclusion of arthropods in ecotourism programs: Myriapods in three communities of Colombia

Alejandro NOVOA[1,3] & Daniela MARTÍNEZ-TORRES[1,2]

[1] Grupo de Investigación en Aracnología y Miriapodología, Instituto de Ciencias Naturales, Facultad de Ciencias, Universidad Nacional de Colombia. ArthropodaTV.
[2] Departamento de Biología, Facultad de Ciencias, Universidad Nacional de Colombia, Bogotá, Colombia.
[3] baleytonn@unal.edu.co

Ecotourism is one of the main activities that contribute to the conservation of ecosystems, as it promotes the recognition and protection of natural areas through environmental education. These types of programs have typically focused on birdwatching, observing mammals, and more recently, amphibians and reptiles. However, despite arthropods being abundant, diverse, and often considered a vital component of ecosystems, they have been largely overlooked in ecotourism, with butterflies being one of the few exceptions as an interest group. Nevertheless, other arthropods, including myriapods, have recently been included in some ecotourism routes in the Río Ñambí Natural Reserve (Colombia) after guides received training on this diverse group.

Considering that some myriapods, especially millipedes, have considerable size, easy to handle and photograph, non-threatening to humans, and exhibit a wide diversity of forms, sizes, colors, smells, as well as interesting ecological and behavioral relationships, makes them a potential group for implementation in ecotourism routes. This study aims to present progress in the exploration of potential myriapods for ecotourism in three communities located in the Colombian departments of Risaralda, Putumayo, and Amazonas.

Based on observations made during three effective sampling days in each locality in 2023, which included both day and night excursions, certain millipede taxa have been identified as potential focal groups in these communities due to their abundance, size, and behavior: Rhinocricidae (Spirobolida), Spirostreptidae (Spirostreptida), and polydesmids as Aphelidesmidae, *Chondrodesmus* (Chelodesmidae), *Barydesmus* and *Psammodesmus* (Platyrhacidae).

In Putumayo, on one of the trails, several individuals of centipedes belonging to the order Scolopendromorpha were also observed. Due to their abundance, size, and coloration, they could also be considered as a focal group. However, considering that they may have medical importance, it is advised to approach them with caution and avoiding handling them.

Finally, it is important to highlight that incorporating this group of arthropods into ecotourism programs through a structured training process built in collaboration with the community not only contributes to the education and conservation of ecosystems but can also lead to increased economic benefits for the communities and foster social recognition of both traditional and scientific knowledge.

Taxonomic revision of some species of the genus *Cormocephalus* Newport, 1844 (Scolopendromorpha, Scolopendridae) from South America

Walter OLIVEIRA[1], Amazonas CHAGAS-JR.[1] & Emerson M. de SOUZA[1,2]

[1] Laboratório de Sistemática e Taxonomia de Artrópodes Terrestres, Departamento de Biologia e Zoologia, Instituto de Biociências, Universidade Federal de Mato Grosso.
[2] emersonesem@gmail.com

The genus *Cormocephalus* Newport, 1844 consists of approximately 100 species of centipedes that are widely distributed throughout the world, but mainly in tropical and subtropical regions. As it constitutes a diverse and cosmopolitan group, the taxonomy of *Cormocephalus* is questionable, and the relationship between the species is unknown, with a possible significant number of unrecognized synonyms. Despite major taxonomic revisions carried out in the 20th century and more recent revisions that proposed the division of the genus into supergroups and subgroups, its taxonomy remains uncertain and needs to be investigated. Therefore, the present study aimed to taxonomically review the species of the genus *Cormocephalus* from South America, verify the validity of the species, and identify and describe possible new species. The review was based on the morphological analysis of the type material and other specimens deposited in national and foreign collections, namely: the Coleção Zoológica da Universidade Federal de Mato Grosso - UFMT; the Instituto Butantan de São Paulo - IBSP; the Instituto de Pesquisa Nacional da Amazônia - INPA; the Museu de Zoologia da Universidade de São Paulo - MZUSP; the Museu Paraense Emílio Goeldi - MPEG; the Museum of Comparative Zoology – MCZ; and Museo de Zoología de la Pontificia Universidad Católica del Ecuador - QCAZ. Geographical distribution records and collection data were taken from the examined material labels and literature data. The plates and illustrations were made in the image editors Gimp and Inkscape, and the geographic distribution map in the QGIS software. So far, 105 specimens of Cormocephalus have been examined, identified as: *C. andinus* (Kraepelin, 1903) (n = 21), *C. brasiliensis* Humbert & Saussure, 1870 (n = 42), *C. guildingii* Newport, 1845 (n = 20), and the other specimens identified only at the genus level (n = 22) due to a young stage or lack of diagnostic taxonomic structures. We considered as juvenile individuals those that presented whitish coloration, weakly chitinized structures, cephalic plate, tergites, and sternites with poorly developed sutures, and a total length (measured from the anterior region of the head to the last tergite) usually less than 20mm. Preliminary results of this study allow updating and expanding the geographic distribution of *C. andinus*, *C. brasiliensis*, and *C. guildingii*, redescribe *C. brasiliensis* in detail for the first time and confirm its presence in the *guildingii* subgroup, and conclude that both *C. ungulatus* and *Cormocephalus* (*C.*) *impressus unimarginatus* Bücherl, 1942 are synonyms of *C. brasiliensis*. Furthermore, the relationships between *Cormocephalus amazonae* (Chamberlin, 1914) and *Cormocephalus edithae* González-Sponga, 2000, with the other species are being analyzed, and their validity verified.

Ecological aspects of millipedes Cryptodesmidae (Polydesmida) and Glomeridesmidae (Glomeridesmida) from Cafrería municipality, Icononzo, Tolima, Colombia

Liseth A. REYES-PEÑATA[1,2] & Alexander GARCÍA GARCÍA[1]

[1] Grupo de Investigación en Artrópodos y Otros Invertebrados Kumangui - Universidad Distrital Francisco José de Caldas
[2] lareyesp@udistrital.edu.co

Millipedes represent a fundamental and particularly important group in the nutrient recycling processes in the soil, especially they participate by releasing nitrogen-rich waste for the mineralization process. Despite the above, there are no detailed studies that report the contribution and preferences of these organisms in certain ecosystems, which is why it was proposed to compare the presence of millipedes belonging to Cryptodesmidae and Glomeridesmidae in three transects. For this purpose, two direct collection methods were used: Manual collection 1/h for a person in both day and night shifts and 25 x 25 cm monoliths to a depth of 30 cm in day shifts. The previous procedures were distributed in three transects each of 250 m for zone; the collections were made in three different vegetation covers (zones): Secondary Forest, riparian forest and agroforestry plantations of *Musa paradisiaca*, the above in order to generate an approximation to the ecological preferences of millipedes. In addition to this, a record of the plant component was made in each transect and of the invertebrate fauna found near each group of millipedes. A total of 236 individuals represented in two genera, *Chonodesmus* (Cryptodesmidae) and *Glomeridesmus* (Glomeridesmidae) were collected. Both families had representatives in the areas of riparian forest, secondary forest and agroforestry plantations of *Musa paradisiaca*, however, a preference for the area of agroforestry plantations stands out, possibly due to the high levels of organic matter produced by the plantain leaf, which could be linked to the generation of a large supply of food in addition to generating ideal hosting scenarios for organisms. This study records initial aspects of the ecology of these individuals.

The Cryptodesmidae (Polydesmida) and Glomeridesmidae (Glomeridesmida) millipedes from Cafrería municipality, Icononzo, Tolima, Colombia

Liseth A. REYES-PEÑATA[1,2] & Alexander GARCÍA GARCÍA[1]

[1] Grupo de Investigación en Artrópodos y Otros Invertebrados Kumangui - Universidad Distrital Francisco José de Caldas
[2] lareyesp@udistrital.edu.co

Diplopoda is one of the four classes among the subphylum Myriapoda, which includes what is commonly called "millipedes". Despite being the most diverse group within the myriapods and the fourth largest class within the Arthropoda, they represent poorly taxa; this is reflected in families such as Cryptodesmidae (Polydesmida) and Glomeridesmidae (Glomeridesmida). Cryptodesmidae includes four species for Colombia: *Caliodesmus phanus* Chamberlin, 1952; *Chonodesmus alatus* (Peters, 1864); C*. regularis* Cook, 1896 and *C. gervaisi* Hoffman, 1973. Glomeridesmidae has one described species for Colombian territory: *Glomeridesmus porcellus* Gervais and Goudot, 1844; for fifty years no description has been generated for these groups in Colombian territory. Based on the need to know these organisms and to update the reports for Colombia, the characterization of the Cryptodesmidae and Glomeridesmidae millipede fauna from Cafrería municipality, Icononzo - Tolima was carried out. For this purpose, two direct collection methods were performed: Manual collection 1/h for a person in both day and night shifts and 25 x 25 cm monoliths to a depth of 30 cm in day shifts. A total of 236 individuals represented in two morphotypes, 54 for *Chonodesmus* sp (Cryptodesmidae) and 182 for *Glomeridesmus* sp. nov (Glomeridesmidae) were collected, for the last a new species is reported; all species recorded in this study were dissected and analyzed by SEM. Micro and macroscopic photographic illustrations were generated in order to help the morphological identification of mainly structures, contributing to the knowledge and taxonomic determination of these poorly-known taxa.

A review of the types of 11 species and one subspecies of *Otostigmus* (*Parotostigmus*) (Scolopendromorpha, Scolopendridae, Otostigminae)

Emerson M. de SOUZA[1,2] & Amazonas CHAGAS-JR.[1]

[1] Laboratório de Sistemática e Taxonomia de Artrópodes Terrestres, Universidade Federal de Mato Grosso
[2] emersonesem@gmail.com

The species of the genus *Otostigmus*, subgenus *Parotostigmus* are reviewed using the external morphology. Before this study, *Otostigmus* was composed by 14 species and two subspecies from the Andes from Venezuela to Argentina, however the analysis of 11 types of the genus recorded to this biogeography region showed that only six species and one subspecies are valid. The types of *O. buergeri* Attems, 1903, *O. scabricauda* (Humbert & Saussure, 1869) and *O. silvestrii intermedius* Kraepelin, 1903 have not been examined, plus the species described by González-Sponga in early 2000. Three species, *O. scabricauda*, *O. rex* Chamberlin, 1914 and *O. amazonae* Chamberlin, 1914, species previously known to Colombia, Peru and Brazil, were exclude to the Andean region. Valid species are *Otostigmus insignis* Kraepelin, 1903, *Otostigmus mesethus* Chamberlin, 1957, *Otostigmus calcanus*, *Otostigmus muticus* Karsch, 1888, *Otostigmus pococki* Kraepelin, 1903 and *Otostigmus buergeri* Attems, 1903, and a subspecies *Otostigmus silvestri intermedius*. *Otostigmus silvestri* Kraepelin, 1903 and *O. lavanus* Chamberlin, 1957 are synonyms of *O. insignis*; *O. parvior* Chamberlin, 1957 are synonyms of *O. mesethus* Chamberlin, 1957; *O. leior* Chamberlin, 1957 and *O. volcanus* Chamberlin, 1955 are synonyms of *O. calcanus* Chamberlin, 1944, and *O. buergeri monsonus* are synonyms of *Rhysida celeris* (Humbert & Saussure, 1870).

Rare and (almost) forgotten pill millipedes in Central Europe (Diplopoda, Glomerida)

Thomas WESENER

Myriapoda, Zoological Research Museum A. Koenig, Leibniz Institute for the Analysis of Biodiversity Change (LIB), Adenauerallee 127, D-53113 Bonn, GERMANY.
twesener@uni-bonn.de

Pill millipedes of the genus Glomeris are often relatively large, colourful species and among the most iconic Central European millipedes. As the colour pattern is one of the most important taxonomic characters, a few variable species are the source of lots of taxonomic confusion only resolved in the last 25 years with the help of molecular methods. While most species are widespread, especially northern Italy is extraordinary rich in microendemic species, often only recorded once in the last 100 years. However, in numerous cases it is unclear if such microendemism is real or if it is the subject to historic oversplitting. After more than 15 years of fruitless search efforts by the author, four of the most enigmatic species belonging to the Glomeris aurita species-group could be rediscovered based on fresh collections by local researchers and citizen scientists at or close to their type localities allowing the evaluation of their taxonomic status based on morphological and molecular evidence. These microendemic Glomeris species seem to be adapted to a special habitat: steep, almost bare calcareous rocks where they can only be found at night.

POSTER PRESENTATIONS*

* All poster presentations (except for the works about onychophorans) are listed in alphabetical order according to the first author

A preliminary life history study on the millipede *Cherokia georgiana* (Bollman, 1889)

Lance ANDREW[1,2], Elena CRUZ[1] & Bruce A. SNYDER[1]

[1] Georgia College & State University, USA.
[2] Lance.andrew@bobcats.gcsu.edu

Of the more than 13,000 currently described millipede species, only a few have been the subjects of detailed, quantitative life history studies. This is particularly true in the Xystodesmidae, where even the most basic life history traits for almost all species (e.g., life span) are virtually unknown.The primary objective of this study was to investigate the life history of *Cherokia georgiana*, with a particular focus on its lifespan and reproduction. We chose *Cherokia* due to its ubiquity in the region, well established taxonomy and phylogenetic position, and its moderate size (length and width), which makes it easily observable.

A sample of 37 males and 11 females was collected from Bartram Forest Wildlife Management Area and Lake Laurel Biological Station (Georgia College East Campus) in Milledgeville, Georgia, USA between February 26 and April 2, 2022. These individuals were each separated into mesocosms made of 1 L deli containers filled with 7 cm of unsifted soil and 3 cm of red maple (*Acer rubrum)* leaf litter. Holes were poked through the lid to allow airflow. Color patterns of all individuals were recorded, and the females were moved into occupied male containers of a different color pattern to allow for mating. Aside from the initial handling, neither the soil nor the millipedes were disturbed to avoid stress.

Of the 11 females collected, 7 successfully reproduced. The incubation period lasted 4-6 weeks in the eggs that were laid in visible places. More than 100 stadium I offspring hatched from each clutch of eggs, though this number is uncertain as many burrowed into the soil and could not be counted. The offspring consumed the eggshells shortly after emerging. All offspring disappeared after an average of 31 days. The body structure of the stadium I offspring is consistent with previous studies on anamorphosis in Polydesmidan millipedes.

During the study period, only six clutches of eggs were produced, all of which apparently died before or during their first molt. Many became trapped and drowned in condensation on the sides of the mesocosms, though the exact timing and manner of most of their deaths is unknown. Additionally, it is unknown when exactly most of the females became gravid or laid their eggs. This led to uncertainty in the length of the gestation period and the incubation period. Additional studies are ongoing for both *Cherokia* and other local xystodesmid species.

Strong odour – well protected? The strange case of ketones in the defensive secretion of Pachyiulinine millipedes (Diplopoda, Julida, Julidae)

Dragan ANTIĆ[1,6], Michaela BODNER[2], Ljubodrag VUJISIĆ[3], Gordana KRSTIĆ[3], Felix ANDERL[2], Günther RASPOTNIG[2], Boyan VAGALINSKI[4], Aleksandr EVSYUKOV[5], Zvezdana JOVANOVIĆ[1], Luka LUČIĆ[1] & Slobodan MAKAROV[1]

[1] University of Belgrade – Faculty of Biology, Institute of Zoology, Studentski trg 16, 11 000 Belgrade, Serbia.
[2] University of Graz, Institute of Biology, Universitaetsplatz 2/1, 8010 Graz, Austria.
[3] University of Belgrade – Faculty of Chemistry, Studentski trg 12–16, 11 000 Belgrade, Serbia.
[4] Bulgarian Academy of Sciences, Institute of Biodiversity and Ecosystem Research, Department of Animal Diversity and Resources, 2 Gagarin Street, 1113 Sofia, Bulgaria.
[5] Don State Technical University, Department of biology and general pathology, Gagarin sq. 1, building 6, Rostov-on-Don 344000, Russia.
[6] dragan.antic@bio.bg.ac.rs

Millipedes are well prepared to defend themselves against predators with chemical weapons in the form of multiple pairs of defensive glands. An extraordinary richness of chemical compounds has been identified, that clearly characterize the different orders of millipedes. In case of juliformian millipedes, the defensive chemistry mainly includes various benzoquinones and hydroquinones. Recently, several non-quinones have been reported, such as alcohols, aldehydes, phenols and esters. Most of the studies on juliformians refer to the family Julidae and especially to the tribe Cylindroiulini. Here we want to shed light on another tribe of Julidae. We analyzed the defensive chemistry of several species of the tribe Pachyiulini by gas chromatography and mass spectrometry (GC-MS) and nuclear magnetic resonance (NMR). For GC-MS analysis we prepared individual whole-body extracts in dichloromethane, and for NMR spectroscopy we pooled a few individuals in deuterated chloroform. Most species showed the typical quinonic profile, with toluquinone and 2-methoxy-3-methyl-1,4-bezonquinone as main compounds. Two Caucasian species, on the other hand, were already conspicuous because of their unusual and pungent odour when collected in the field. It turned out, that the chemistry of *Pachyiulus krivolutskyi* Golovatch, 1977 and *Syrioiulus continentalis* (Attems, 1903) is based on a set of ketones. Interestingly, no quinone could be detected. The main compound in both species, comprising more than 80% of the secretion, appeared to be a vinyl ketone, namely 4-ethylhex-1-en-3-one. Furthermore, other ketones were found as minor constituents, as well as an array of unsaturated aliphatic hydrocarbons.

The main challenge for identification of compounds in millipede extracts was to identify the major compounds of the secretion. NMR spectroscopy revealed both the chemical structure of the major compound and connected this compound to data from GC-MS. To achieve maximum sensitivities of NMR experiments deuterated solvent ($CDCl_3$) was used for extraction.

To our knowledge, this is the first report of a ketone-dominated chemo-profile in julid millipedes. It is also the first finding of 4-ethylhex-1-en-3-one as a natural occurring compound. In general, our results contradict the picture of homogenous quinonic secretion in juliform millipedes. Up to now, ketones appear to be a highly derivative condition in *P. krivolutskyi* and *S. continentalis.* To clarify the phylogenetic status of ketone-predominated secretions in julids, further studies are necessary.

Bibliometric analysis of the Diplopoda group using the Bibliometrix tool

Claudia P. AVILA-GAXIOLA[1,2], Marcos BUCIO-PACHECO[1], Samuel CAMPISTA-LEÓN[1] & Luz I. PEINADO-GUEVARA[1]

[1] Facultad de Biología de la Universidad Autónoma de Sinaloa
[2] est.claudia.avila@uas.edu.mx

A bibliometric analysis is a tool that allows us to assess the state of science, whether it is on a specific topic or researcher. We have quantitative bibliometrics, which involves measurable data on scientific production, and qualitative bibliometrics, which focuses on the social and intellectual structures within different fields of study.

The study of diplopods is approached from various areas of knowledge and in different locations. Millipedes, as they are commonly known, are detritivorous arthropods with an important ecological role, as they contribute to the decomposition of organic matter in many ecosystems.

Therefore, this study aims to analyze the existing scientific production on the group Diplopoda. A literature search was conducted using the Web of Science database, using the following search profile in the title and keywords: (diplopod* OR millipede*). The results were downloaded in bibTeX format and loaded into the Bibliometrix software in RStudio for analysis.

A total of 2,442 published documents were found, with the earliest one dating back to 1903 and the most recent one in 2023. The author with the highest number of publications is Golovatch, S.I. with a total of 151 articles. However, the most cited article (with 608 citations) is by Vettiger, P. (2002), who has only published 7 documents. The country with the highest number of publications is the USA with 934 documents. Core journals were identified, where these works are predominantly published, with Zootaxa being the leading journal with 274 documents. Collaborations among authors were also identified, forming different research groups. Finally, among the most repeated keywords in the articles are "Diplopoda" and "taxonomy," with 442 and 297 occurrences, respectively.

Bibliometric analysis should be one of the first tools used when initiating a research project, as it allows us to understand the research landscape on our topic. It helps identify important documents (the most cited ones), prominent authors in the field, and potential research groups that we could contact and collaborate with.

Taxonomy within this group is one of the most extensively studied areas, indicating that there is still much work to be done in this field. It is worth mentioning that the document search for the analysis was conducted only in the Web of Science, which excludes many other works not published in this database but are known and important within the community of researchers studying this group of arthropods.

Diplopoda and Chilopoda in degraded habitats to be restored and in unrestored reference areas from southern carpathians, Romania

Ştefan Cătălin BABA[1,2], Andrei GIURGINCA[2], Raluca BĂNCILĂ[2], Rodica PLĂIAȘU[2], Marius SKOLKA[3]

[1] Faculty of Biology, University of Bucharest, Bucharest, Romania. b.stefan@bio.unibuc.ro
[2] "Emil Racoviţă" Institute of Speleology, Bucharest, Romania
[3] Faculty of Natural and Agricultural Sciences, Ovidius University, Constanţa, Romania

Diplopoda and Chilopoda are significant groups in terrestrial ecosystems. They play an important role as decomposers and predators, making them essential for assessing the conservation status of terrestrial habitats.

In the face of environmental damage due to human activities, ecological restoration is widely employed as a mitigation measure. The success of restoration projects is evaluated based on factors such as the vegetation cover and the recovery of native arthropod fauna, including myriapods.

The aim of our study is to establish baseline data on myriapods diversity in degraded habitats to be restored, as well in unrestored reference areas. The diversity of myriapod communities reflects habitat complexity and the development and recovery of forested and other habitats following natural and anthropogenic disturbances.

The study area spans 1207.4 km^2 and is located in the Southern Carpathians. It encompasses several locations in the Făgăraş, Piatra Craiului and Iezer Mountains comprising two habitats: spruce monoculture and riparian habitat. Sampling took place in 2019 and 2021 and used complementary sampling methods at each site: pitfall trapping and Winkler sifting.

The completeness of species inventory was examined by visual inspection of Mao Tau species accumulation curves of each habitat type and of pooled data of all sites. General linear mixed models (GLMM) were used to examine how the myriapods respond to intervention in both restored habitats. To analyse community patterns of myriapods in relation with restoration and habitat type a non-metric multidimensional scaling (NMDS) ordination with a Bray-Curtis similarity index was performed. Indicator Value method (IndVal) was used to identify myriapod species characteristic to the two habitats and intervention types.

A total of 17 species of millipedes and 19 species of centipedes were collected. The number of species detected was strongly correlated with sampling effort. Habitat type had a significant effect on myriapod abundance, richness and diversity index, whilst the intervention type had a significant effect only on species richness. Species richness was significantly higher in the restored area compared to reference area of spruce habitat. There was strong overlap in myriapod assemblage composition between the reference area and restored area, as well as between spruce and riparian habitats. Significant differences in myriapod communities were found between the two habitats. Indicator species analysis identified two characteristic species for restored area (*Polydesmus complanatus* and *Mastigona transsylvanica*) and one species for reference area (*P. montanus*) in the riparian habitat and two species for restored area in the spruce habitat (*Pachyiulus hungaricus* and *Lithobius muticus*).

Millipedes and centipedes showcase a high capacity to repopulate the reconstructed areas as long as adjacent low impacted areas are available although some rare species populations seem affected.

The Soil Invertebrate Genome Initiative (SIGI)

Miklós BÁLINT[1,2,3], Jens BAST[4], Gemma COLLINS[1,3,5], Cyrille D'HAESE[6], Peter DECKER[7,8], Miklós DOMBOS[9], Carola GREVE[3], Nadège GUIGLIELMONI[4], Karin HOHBERG[3,7], Kamil S. JARON[10], Odile LECOMPTE[11], Ricarda LEHMITZ[3,7], Dorine MERLAT[11], Karen MEUSEMANN[12], Leonie SCHARDT[1,3], Philipp H. SCHIFFER[4], Clément SCHNEIDER[3,7] & Nikolaus SZUCSICH[13]

[1]Senckenberg Biodiversity and Climate Research Centre, Frankfurt am Main, Germany. [2]Justus-Liebig University, Gießen, Germany. [3]LOEWE Centre for Translational Biodiversity Genomics, Frankfurt am Main, Germany. [4]Institute for Zoology, University of Cologne, Cologne, Germany. [5]Manaaki Whenua – Landcare Research, Lincoln, New Zealand. [6]Muséum National d'Histoire Naturelle, Paris, France. [7]Senckenberg Museum of Natural History Görlitz, Görlitz, Germany. [8]Blumenstr. 5, 02826 Görlitz, Germany; decker@myriapoden-info.de. [9]Institute for Soil Sciences and Agricultural Chemistry, Hungary. [10]Tree of Life, Wellcome Sanger Institute, Cambridgeshire, United Kingdom. [11]Université de Strasbourg, Strasbourg, France. [12]Leibniz Institute for the Analysis of Biodiversity Change, Bonn, Germany. [13]Central Research Facilities, Natural History Museum, Vienna, Austria.

Soils harbor a tremendous diversity of organisms. These play major roles in ecosystem services central for human well-being, e.g. food production and climate regulation. We initiated the Soil Invertebrate Genome Initiative (SIGI) to connect taxonomists, ecologists and genomicists to develop molecular solutions for biomonitoring as well as to study soil invertebrate ecology and evolution on the genome level. We target all soil invertebrate groups: mites, springtails, enchytraeids, nematodes, myriapods, water bears, earthworms, woodlice and others. Illumina genomes of ~232 Central-European species were sequenced so far, representing 14 common groups and 94 families, including 23 species of diplopods, 19 chilopods, two symphylans and one species of pauropod. We aim to shift efforts towards highly contiguous, annotated genomes, and explore opportunities to generate highly contiguous, reference-quality genomes from single soil invertebrate specimens of micro- and mesofauna. High quality genomes from single specimens were generated for eleven species of springtails and five oribatid mites. To solve phylogeny of major myriapod lineages a high-quality genome of *Acopauropus ornatus* has been generated, using PacBio HiFi, 3 SMRT cells and Hi-C. The genome is larger than 3 Gbase and shows arthropod BUSCO completeness of >85%. Our plans include complementing genome sequencing with automated imaging and machine learning, to improve specimen identifications and descriptions. All these soil invertebrate genomes will support the management of soil biodiversity through molecular monitoring of community composition and function, and the discovery of evolutionary adaptations to the challenges of soil conditions.

Into the dark – the chemical repertoire of troglobiotic millipedes of the genus *Leucogeorgia* Verhoeff, 1930

Michaela BODNER[1], Günther RASPOTNIG[1], Slobodan MAKAROV[2] & Dragan ANTIĆ[2,3]

[1] University of Graz, Institute of Biology, Universitaetsplatz 2, 8010 Graz, Austria
[2] University of Belgrade – Faculty of Biology, Institute of Zoology, Studentski trg 16, 11 000 Belgrade, Serbia
[3] dragan.antic@bio.bg.ac.rs

Chemical data on the defensive chemistry of millipedes are not only scarce, but also biassed, as most publications refer to epigean representatives of the family Julidae (Diplopoda). Only recently, the chemistry of several cave-dwelling species has been in the spotlight of chemical ecology research. We present here additional data on troglobiotic julids from the tribe Leucogeorgiini. Several species of *Leucogeorgia* Verhoeff, 1930 were collected in caves in Georgia (Caucasus): *Leucogeorgia longipes* Verhoeff, 1930 and *Leucogeorgia gioi* Antić & Reip, 2020 in Kotia Cave, *Leucogeorgia prometheus* Antić & Reip, 2020 in Prometheus Cave, and *Leucogeorgia* aff. *L. lobata* Antić & Reip, 2020 in Verdzistava II Cave. The defensive exudates were analyzed by gas chromatography - mass spectrometry (GC-MS).

Beside the "traditional" main compounds 2-methyl-1,4-benzoquinone (toluquinone) and 2-methoxy-3-methyl-1,4-benzoquinone, 2-methyl-3,4-methylenedioxyphenol arose as a new main compound in all analyzed *Leucogeorgia* species. Additionally, *L. prometheus* showed a fourth compound in larger amounts: 2,3-dimethoxy-5-methyl-1,4- benzoquinone made up to about 10% of the whole secretion. Furthermore, all extracts showed an array of different quinones as minor constituents as well as different esters.

The new main compound composition in the defense chemistry in genus *Leucogeorgia* probably represents an adaptation to a specific ecological condition like to predators or parasites, where compounds such as 2-methyl-1,4-benzoquinone and 2-methoxy-3-methyl-1,4-benzoquinone may not provide sufficient protection. Slight modifications in the "traditional" quinonic defensive repertoire were already observed in other julids. Also, first chemical data on other leucogeorgiinine species, such as *Pteridoiulus aspidiorum* Verhoeff, 1913, indicated changes or even reductions of the main compound composition. To get a clearer picture of the trend towards profile-modifications as well as the reduction of main compounds, we plan to extend our research to further leucogeorgiinine species and to combine the chemical results with genetic data.

Taxonomic revision of centipedes of the genus *Cryptops* Leach, 1814 (Scolopendromorpha, Cryptopidae) from brazilian caves

Diva María BORGES[1], Heloisa FERNANDES B.[1,2] & Amazonas CHAGAS-JR.[1]

[1] Laboratório de Sistemática e Taxonomia de Artrópodes Terrestres, Universidade Federal de Mato Grosso
[2] heloisa.fernandes@sou.ufmt.br

Cryptops includes epigean species and species adapted to subterranean life. The genus comprises about 180 species distributed throughout the world and nine species known from Brazil. There are 10 species of troglobitic *Cryptops* known in the world and two in Brazil, in addition to three epigean species also found inside caves, plus a series of specimens found inside caves of different lithologies in the Brazilian territory. The specimens examined in this study belong to four Brazilian collections: Coleção Zoológica da Universidade Federal de Mato Grosso (CZUFMT), Universidade Federal de São Carlos (LES-UFSCAR), Instituto Butatan (IBSP) and Museu de Zoologia da Universidade de São Paulo (MZSP). A total of 96 specimens have been examined to date. At least nine morphospecies of *Cryptops* were identified in the caves, they are: *Cryptops* (*Trigonocryptops*) *hephaestus*, *Cryptops* (*T.*) *galatheae*, *Cryptops* (*T.*) *iheringi*, *Cryptops (T.) iporangensis*, *Cryptops* (*Cryptops*) *heathi*, *Cryptops* (*C.*) *goiasus* and three new troglobitic species. A new troglobitic species was recorded from a ferruginous cave in Pará and the other two from limestone caves in Bahia and São Paulo. The species *Cryptops (T.) iporangensis*, the first troglobitic species described for Brazil, was recorded from three more caves in Parque Estadual Alto do Ribeira, São Paulo, suggesting the need for a reassessment of the rarity of the species and its conservation status, currently categorized as Endangered (EN). *Cryptops* (*C.*) *goiasus* and *Cryptops* (*C.*) *heathi* were recorded for the first time from the cave environment. *Cryptops* (*T.*) *galatheae* has its distribution expanded to caves in the north and northeast regions of Brazil, previously concentrated in the south and southeast of the country. Studies of the morphology of *Cryptops* (*T.*) *iporangensis* suggest that this species does not belong to the subgenus *Trigonocryptops*, but rather to the nominal subgenus, as mentioned in recent literature. So far there were only records of troglobitic species of the genus for limestone caves, however, this study showed that there are also troglobites in caves of different lithologies such as iron ore and sandstone. Preliminary data from this study reveal a much greater diversity of troglobitic species of the genus *Cryptops* in Brazilian caves, but this information is in progress.

Whole genome sequencing for the millipede *Cherokia georgiana* (Bollman, 1889)

Elena CRUZ[1,2], William WITTSTOCK[1], Bruce A. SNYDER[1], & Arnab SENGUPTA[1]

[1] Georgia College & State University, USA.
[2] Elena.cruz@bobcats.gcsu.edu

Out of thousands of known millipede species, only five sequenced genomes in Julida, Glomerida, Polydesmida, and Spirobolida are publicly available. No whole genomes and limited genetic information are available for incredibly diverse families such as Xystodesmidae. Our research goal is to sequence the whole genome of the millipede *Cherokia georgiana*. A *de novo* sequence of the complete genome of a North American species will facilitate future research in understanding gene expression under a variety of conditions. Many interesting biological processes in millipedes are poorly described, such as the production of a defensive hydrogen cyanide secretion found in the Polydesmida. While genes in this pathway have been identified, it is unclear how they differ between polydesmid families. Another research avenue this will facilitate is understanding how this cyanogenic pathway is regulated under stressed conditions. Additional sequencing data may also aid in understanding this species' importance in phylogeny and its relationship to other North American millipede species. Here, we present our research strategy for *de novo* sequencing using the next-generation sequencing platform Oxford Nanopore MinION. Millipedes were periodically collected from Baldwin County, Georgia, USA beginning in August 2022 and preserved in 95% ethanol at the time of extraction. Samples were prepared by removing legs, head, and body rings to avoid contamination from the digestive tract. Legs, head, and rings were extracted separately to assess extraction efficiency. We tested several DNA extraction kits to extract high-molecular weight (HMW) DNA to be used in sequencing. We have found the Omega Bio-tek E.Z.N.A Insect DNA Kit to be most effective in extracting HMW DNA from millipede tissue. We are still optimizing the manufacturer's protocol but have been able to extract as much as 5.9 µg DNA from a single specimen. We will evaluate NGS library quality using the Agilent TapeStation 4200 automated electrophoresis system. Long read sequencing data will be collected using multiple flow cells to enhance read-depth and accuracy. Genome assembly will be conducted using available millipede genome data and genomes of related species. In future experiments, we will conduct RNA-seq analysis to identify actively transcribed genes.

Current status of the centipede (Myriapoda, Chilopoda) collection of the Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Bogotá

Sebastian GALVIS-JIMÉNEZ[1], & Eduardo FLÓREZ, D.[2]

[1] Laboratory of systematics and taxonomy of terrestrial arthropods, Institute of Biosciences, Federal University of Mato Grosso, Cuiabá, Brazil. sgalvisj@unal.edu.co
[2] Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Bogotá.

The Instituto de Ciencias Naturales (ICN) of the Universidad Nacional de Colombia houses the most representative botanical and zoological collections in the country. Among these, the collection of chilopods stands out, containing nearly 2,500 specimens distributed in 1,296 lots. Thanks to the joint work of students, professors, and visiting specialists, the specimens preserved there have been cataloged at various taxonomic levels, making it possible to discover the diversity of orders, families, genera, and species contained in such a collection. Therefore, the objective of this work is to inform the scientific community of the diversity of chilopods deposited in the collection. The results show that 100% of the specimens are identified at the order level, 89% at the family, 80% at the genus and 35% at the species level. Of the 2,527 specimens, a total of 1,507 (60%) belong to the Order Scolopendromorpha, 734 (29%) to Geophilomorpha, 179 (7%) to Lithobiomorpha and 107 (4%) to Scutigeromorpha. The order Scolopendromorpha is represented by the families Scolopendridae, Scolopocryptopidae and Cryptopidae; Geophilomorpha by Schendylidae, Oryidae, Ballophilidae, Geophilidae, Macronicophilidae and Mecistocephalidae; Lithobiomorpha by Henicopidae and Lithobiidae; and Scutigeromorpha, by Scutigeridae and Pselliodae. The ICN collection of chilopods is the largest and most representative of Colombia, since it houses specimens collected in all geographic regions of the country from 0 to 4,000 m.a.s.l, thus managing to possess the majority of specific and supraspecific taxa, registered in the literature for the country.

Taxonomic recognition of centipedes (Chilopoda - Myriapoda) from mainland Ecuador

Sebastian GALVIS-JIMÉNEZ[1,2] & Amazonas CHAGAS-JR.[1]

[1] Laboratório de Sistemática e Taxonomia de Artrópodes Terrestres, Departamento de Biologia e Zoologia, Instituto de Biociências, Universidade Federal de Mato Grosso. Avenida Fernando Correa da Costa, 2367, Boa Esperança, CEP-78060-900, Cuiabá, MT, Brasil.
[2] sgalvisjimenez@gmail.com

Ecuador is located in the equatorial belt of South America and, thanks to factors such as its geographical location and altitude range, it is considered one of the most diverse regions in the world, housing biomes classified as conservation hotspots due to their high levels of diversity and endemism. Numerous studies agree that this country is one of the most biologically diverse in the world, hosting approximately 10% of the world's biological diversity. Despite this, many taxonomic groups, including centipedes, are still poorly known.

The present study aims to update the taxonomic knowledge of centipedes in Ecuador and is based on data from the literature, the global catalog of centipedes (CHILOBASE), specimens deposited in national and foreign collections, as well as specimens collected in Ecuador between 2010 and 2021 and deposited in the arthropod collection of the Federal University of Mato Grosso.

So far, according to the bibliography and the analyzed specimens, around 53 species of centipedes are known in Ecuador, divided into four orders. At least half of these species are endemic to Ecuador and are found exclusively in the Galapagos Islands or the continental region of the country. This figure may be underestimating the true diversity that this territory harbors.

In this sense, the elaboration of taxonomic inventories of centipedes from different regions of Ecuador will allow us to understand the diversity of these animals, which constitute an important component of the fauna associated with the soil of ecosystems. Moreover, knowing diversity (regardless of the taxonomic group) is a crucial tool that serves as a basis for other studies in different branches of biological knowledge, including those oriented towards the conservation of ecosystems, something of vital importance in regions as diverse as Ecuador.

Rumaniulus mammosus Attems, 1927 – a new reappraisal

Andrei GIURGINCA[1], Cezara TUDOSE[2], Ştefan Cătălin BABA[1,3] & Geta RÂŞNOVEANU[2]

[1] "Emil Racoviţă" Institute of Speleology, Bucharest, Romania
[2] Faculty of Biology, University of Bucharest, Bucharest, Romania
[3] b.stefan@bio.unibuc.ro

The millipede fauna of Romania is generally well-known: 171 species from 62 genera, 19 families and 7 orders. Among the orders of the Class Diplopoda recorded in Europe, the fauna of Romania does not contain the order Platydesmida, while the order Callipodida is represented by only two species. Of the seven orders of Diplopoda recorded in Romania, the order Julida contains the highest number of species.

The order Julida is represented by three families: the family Nemasomatidae is represented by only one species (*Nemasoma varicorne* C.L. Koch, 1847) while the Blaniulidae have 6 species and the Julidae have 62 species.

Among the Julidae, one of the least studied genera is *Rumaniulus* Attems, 1926. As in his description Attems provided only relatively small drawings with few details, herein we continue and try to complete his description of *R. mammosus* by providing larger, more detailed drawings and pictures which might help the species identification in case it might be collected in other locations than the original one, but also for systematic and taxonomic analyses like elucidating the relationship between the tribes Julini, Leptoiulini and Typhloiulini.

The material was collected by means of nine Barber pitfall traps in 18 sites along the middle basin of the Argeş River (South-Eastern Romania) between May and November 2018. After sampling, the Diplopoda were sorted and preserved in tubes filled with 70% concentrated alcohol. All taxonomically important structures were dissected and mounted in glycerine as temporary microscope preparations and observed with an Olympus CH2 microscope. For drawings we used an Olympus camera lucida. For the picture of the habitus we used a Canon EOS 2000D attached on an BestScope-2022B.

First record of centipede families (Myriapoda-Chilopoda) on the "Cerro Rosado" trail at the Universidad del Quindío, Colombia

Jose Alexander HERNANDEZ-DOSMAN[1] & Aura Yesenia MORALES-CARDENAS[2]

[1] Licenciatura en Ciencias Naturales y Educación Ambiental, Universidad del Quindío. Josea.hernandezd@uqvirtual.edu.co
[2] Grupo de Investigación en Biodiversidad y Educación Ambiental, Universidad del Quindío.

In the northern side of the city of Armenia there are important urban forest relicts, which constitute social and natural features of the landscape, and function as habitat for many faunal groups, such as centipedes. Currently, in Colombia there are records of four of the five orders of chilopods, mainly of the order Scolopendromorpha, which has a greater diversity in the territory: four families, nine genera, 37 species and four subspecies. The order Geophilomorpha includes records of three families, seven genera and nine species. Studies of Scutigeromorpha and Lithobiomorpha are scarce for Quindío and for the whole Colombian territory. The main objective of this research was to register the families belonging to the class Chilopoda inhabiting in the Cedro Rosado Relict at the Universidad del Quindío (4°33'9.91''N, 75°39'40.65W). A direct collection of the centipede specimens was implemented by searching and capturing in leaf litter, decomposing wood, and cryptozoic zone of the rocks. Collections were taken between 8:00 to 12:00 and 14:00 to 18:00 h. Searching walks were applied for 60 min for each sampling. The individuals collected were determined to the lowest possible taxon. A total of 144 individuals were collected, 68.05% corresponded to the order Scolopendromorpha, 31.25% to the order Geophilomorpha and 0.69% to the order Scutigeromorpha. In terms of families, we found that, for Geophilomorpha, the family Oryidae accounted for 57.77%, followed by Geophilidae with 22.22% and, finally Schendylidae with 20% of the total group. Likewise, for the order Scolopendromorpha, the families Cryptopidae with 67.34% was the most predominant within the Scolopendromorpha and Scolopendridae with 32.65% of individuals belonging to this order. Finally, only one specimen of family for the order Scutigeromorpha (Pselliodidae) was recorded in the entire sampling. In conclusion, the order Geophilomorpha presented a greater number of families for the area, but a lower number of individuals with relative to the order Scolopendromorpha.

Characterization of millipedes (Diplopoda, Myriapoda) associated with decomposing logs in a low premontane rainforest in the department of Quindío, Colombia

Sebastián HERRÁN[1,3], Tatiana BUITRAGO[1] & Aura Yesenia MORALES-CÁRDENAS[2]

[1] Licenciatura en Ciencias Naturales y educación ambiental. Universidad del Quindío.
[2] Grupo de investigación en Biodiversidad y educación ambiental, Universidad del Quindío.
[3] sebastian.herranc@uqvirtual.edu.co

Diplopods commonly known as millipedes, are the third largest group of terrestrial arthropods after insects and arachnids; this group has 13.622 described species, grouped in 16 orders, 140 families and 1868 genera worldwide. For the department of Quindío, there is a wide diversity of diplopods, with seven orders and 16 families. These organisms have been included as edaphic macroinvertebrates and are part of the fauna associated mainly with leaf litter substrates. However, studies of arthropofauna associated with decaying logs have gained momentum in recent times, since dead wood is not only a considerable source of food, but also provides habitat, shelter, and breeding sites for many species of animals, including millipedes. Therefore, the objective of the present work was to evaluate the composition of millipedes associated with decomposing logs in a premontane rainforest. Three sampling sites were established and chosen, which were found to have a significant number of logs in different stages of decomposition; likewise, in each log the individuals were recorded taking into account three cross sections: bark, sapwood and heartwood, the individuals were processed in the BIOEDUQ laboratory of the Universidad del Quindío. As results, 194 specimens were collected, grouped in four orders and eight families respectively, where the order Polydesmida was the most abundant with 76%, because it is the most numerous in the continent, with 300 species grouped in 29 families, of which 10 are part of Colombia, followed by Stemmiulida with 19%, and finally Spirobolida with 5%. As for the families, the most abundant was Platyrhacidae with 40%, followed by Stemmiulidae and Chelodesmidae with 18%, while the least abundant were Aphelidesmidae, Fuhrmannodesmidae, Pseudospirobolellidae and Paradoxosomatidae with less than 10%. As for the cross sections of the trunk, in the sapwood, 115 (60%) individuals were recorded corresponding to families of Stemmiulidae, Chelodesmidae, Aphelidesmidae, Fuhrmannodesmidae, Pseudospirobolellidae and Paradoxosomatidae, followed by 79 (40%) individuals corresponding to the Platyrhacidae family in the bark; finally, no organisms were recorded in the heartwood cross section. In conclusion, the decaying logs present a great variety of microhabitats (under the trunk, under the bark, in the heartwood, in the sapwood, at the base and apex of the trunk), as well as different conditions of temperature, humidity and organic matter, which provide the establishment of a specific group of millipede families.

The millipedes in the Orinoquia Region of Colombia

Sarah LEÓN-ORTÍZ[1,2,3] & Daniela MARTÍNEZ-TORRES[1,2]

[1] Departamento de Biología, Facultad de Ciencias, Universidad Nacional de Colombia, Bogotá, Colombia.
[2] Grupo de Investigación en Aracnología y Miriapodología, Instituto de Ciencias Naturales, Facultad de Ciencias, Universidad Nacional de Colombia.
[3] sfleono@unal.edu.co

The Orinoquia region, also known as Los Llanos Orientales, is one of the six natural regions of Colombia. It is situated in the eastern part of the country and encompasses four departments: Arauca, Casanare, Meta, and Vichada. Additionally, it includes some municipalities from neighboring departments like Boyacá, Cundinamarca, and Santander. Occupying approximately 35% of the national territory, the Orinoquia derives its name from the Orinoco River basin. Renowned for its vast expanses of intertropical savannahs, which cover around 30% of the country, the Orinoquia region, in combination with gallery forests, forms the most distinctive ecosystems within the Orinoquia. This region shares borders with the Andean region to the west, Venezuela to the east, and the Amazon region to the south. These neighboring regions boast a rich biodiversity index, thereby making the Orinoquia a convergence point for a diverse array of flora and fauna from adjacent biomes. Despite the significant potential for studying various faunal taxa, there is a lack of interest among researchers in exploring the diversity of different classes of myriapods in the region. This scarcity of research addressing this topic is a notable problem. Therefore, it becomes crucial to ascertain the presence of myriapods in remote and difficult-to-access areas in the central part of the country to facilitate future taxonomic studies. The objective of this study was to contribute to the knowledge of the families and orders of millipedes in the Colombian Orinoquia region providing information on their geographic distribution and diversity in the area. To achieve this, a review of the millipede specimens present in the Myriapodological Collection of the Instituto de Ciencias Naturales (ICN) of the Universidad Nacional de Colombia was conducted. A total of 799 individuals (264 males, 340 females, 153 juveniles and 22 unsexed individuals) belonging to 16 families and seven orders were found. The orders with the highest abundance were Polydesmida (546) and Spirostreptida (133), while Glomeridesmida was the least represented (5). Records from 80 m.a.s.l. to 2315 m.a.s.l. were found. The departments with the highest number of orders and families were Meta (133 reports) and Guaviare (69 reports); approximately 51% of the total number of samples were collected in the department of Meta, while less diversity of these taxa was detected in the department of Arauca. It is important to conduct further collections in the Colombian Orinoquia, especially in departments where there are few or very old records, in order to increase the number of families reported and, in the future, to identify new taxa from this area with great potential for diversity.

Defensive chemicals in *Geophilus serbicus* (Chilopoda: Geophilomorpha)

Bojan M. MITIĆ[1,2], Amna M. GEDGED[1], Ljubodrag V. VUJISIĆ[3], Marina M. TODOSIJEVIĆ[3], Dalibor Z. STOJANOVIĆ[1] & Vele V. TEŠEVIĆ[3]

[1] University of Belgrade – Faculty of Biology, Institute of Zoology, Studentski Trg 16, 11000 Belgrade, Serbia. bojan@bio.bg.ac.rs
[2] University of East Sarajevo, Faculty of Technology Zvornik, Karakaj 34a, 75400 Zvornik, Republic of Srpska, Bosnia and Herzegovina.
[3] University of Belgrade – Faculty of Chemistry, Studentski Trg 12-16, 11000 Belgrade, Serbia.

Centipedes of the order Geophilomorpha have long been known to be chemically protected. Most of them have ventral glands from which they discharge a defensive secretion when disturbed. Some of these compounds are unique products (e.g., himantarin, produced by *Himantarium gabrielis*) that act in different ways against a variety of invertebrate predators. Currently, information is available on the defence chemistry of nine geophilomorph species from the families Himantariidae, Dignathodontidae, Geophilidae, and Linotaeniidae.

In this study, we investigated the defensive chemicals of *Geophilus serbicus*, which is endemic to Serbia, and present our results here.

The specimens of *G. serbicus* were collected in June 2016 in the Stara Planina Mountains (eastern Serbia, Balkan Peninsula). Animals were extracted with dichloromethane (DCM) and analysed by gas chromatography/flame ionization detection (GC-FID) and gas chromatography/mass spectrometry (GC-MS). The presence of HCN was confirmed by GC-MS.

In *G. serbicus* the ventral pores are present on all leg-bearing segments except on the metasternite of the last segment. The secretion contains three volatile compounds: benzaldehyde (65.4%), methyl 2-phenylacetate (30.1%), and benzoyl nitrile (4.5%). In most cyanogenic myriapods, the production of benzaldehyde and hydrogen cyanide (HCN) occurs through the enzyme-catalysed dissociation of mandelonitrile or benzoyl nitrile. Benzoyl nitrile has a distinct and repellent odor of its own, which is noticeable when dealing with some of these geophilomorphs. There is no doubt that HCN is a potent toxin, but the stickiness of the secretion also plays a role in their defence. In addition, benzaldehyde has great selective value for geophilomorphs as an antifungal agent. The third defensive compound of the species studied, methyl 2-phenylacetate, is a non-cyanogenic compound that is also present in *Clinopodes flavidus*, but its role is not yet clear.

The cyanogen most commonly produced in myriapod defence glands, HCN, appears to be frequently derived from common aromatic precursors in both geophilomorphs and polydesmoid millipedes. We plan to continue the analysis of geophilomorph defences, not only in search of molecules that are new to science or new to arthropods, but also in anticipation that more data will lead to phylogenetic information in the future. Another important direction of research would be the study of pheromones, which are widely distributed, for example, in insects, spiders, and crustaceans, but have never been detected in centipedes, with the exception of the coxal pheromone of *Lithobius forficatus*.

Millipedes (Diplopoda, Myriapoda) associated to Bamboo Forests in Circasia, Quindío, Colombia

Jaime Andrés MORALES MORALES[1] & Aura Yesenia MORALES-CÁRDENAS[2]

[1] Licenciatura en Ciencias Naturales y Educación Ambiental, Universidad del Quindío. Jaimea.moralesm@uqvirtual.edu.co
[2] Grupo de Investigación en Biodiversidad y Educación Ambiental, Universidad del Quindío.

The genus *Guadua* is a giant bamboo which extends in tropical areas in Central and South America, with bigger coverage in countries such as Venezuela, Brazil, Ecuador and Colombia. In the area of Quindío, Colombia holds great extensions of bamboo forests, locally known as guaduales. These forests can house an important faunal diversity, including the edaphic invertebrates, many of them benefiting from the abundant bamboo leaf litter which rich lignin and siliceous content offers both food and refugee to the soil invertebrates. Edaphic animals such as millipedes find special conditions in rich leaf litter environment under these forests since they can hold a significant moisture which is crucial for their life cycle. Here we report the diplopod fauna associated with guaduals in the farm La Esperanza, located in Vereda Barcelona Alta, Circasia-Quindío (coordinates 40°45'36.00.00'' N 73°59'2.400'' W). The sampling was carried out on dates seven and eight of May 2023. Sampling was carried out in three topographic zones within the forest: high, medium and low, for which manual collections were applied, the organisms were identified down to the lowest possible taxon. A total of 126 individuals were collected, to the orders Polydesmida, Stemmiulida, Glomeridesmida y Siphonophorida, belonging to seven families: Paradoxomatidae, Chelodesmidae, Aphelodesmidae, Furhmannodesmidae, Stemmiulidae, Glomeridesmidae y Siphonophoridae. The lowest zone holds the most abundant (42,85% of all collected fauna), corresponding to the following abundances: Chelodesmidae 42,5%, Glomeridesmidae 25,9%, Stemmiulidae 9,2%, Paradoxomatidae 7,4%, Aphelidesmidae 5,5%, Siphonophoridae 5,5% y Furhmannodesmidae 3,7%. The 37.30% of individuals was collected in the middle, with composition percentages as follows: Stemmiulidae 27,6%, Paradoxomatidae 23,4%, Chelodesmidae 23,4% Glomeridesmidae 17,02% y Aphelidesmidae 8,5%. Finally, the upper zone of the guadual had 19.84% of millipedes associated with its litter and being the least representative of the sampling; millipede groups identified in this section were Chelodesmidae 52%, Paradoxomatidae 36% y Stemmiulidae 12%. The bamboo forest is of utmost importance in natural environments, since these ecosystems are reservoirs that benefit the diversity of millipedes, providing these organisms with suitable habitats for their survival.

Current status of the myriapodological collection (Arthropoda) of the Universidad Distrital Francisco José de Caldas

Luisa Fernanda PAYARES[1,2], Liseth Alejandra REYES-PEÑATA[1] & Alexander GARCÍA GARCÍA[1]

[1] Universidad Distrital Francisco José de Caldas, Arthropod Research Group KUMANGUI, Carrera 7# 40b-53, Bogotá D.C.
[2] lfpayaresc@udistrital.edu.co

Myriapods are edaphic arthropods grouped into four classes, Chilopoda, Diplopoda, Pauropoda, and Symphyla. Their life habits have allowed them to successfully colonize many ecosystems, forming a group of great importance and diversity, with more than 16,000 described species. For the above, biological collections have become a mechanism that preserves their diversity and facilitates not only morphological study, but also phylogenetic, taxonomic, and ecological study of these organisms, contributing significantly to their conservation. The objective of this project was to systematize the myriapod fauna present in the Collection of Arthropods and Other Invertebrates CAUD-216, registered with the National Registry of Biological Collections (RNC); from the curatorship work framed in taxonomic determination, the standardization (Darwin core) and quantification of data. Within the review of the collection, 1300 individuals belonging to the class Chilopoda (11%) with 4 orders, Diplopoda (86%) with 9 orders, and Symphyla (3%) were reported. The most representative families belonging to Chilopoda correspond to Pselliodidae, Scolopendridae, Scolopocryptopidae, and Oryidae. Diplopoda includes Glomeridesmidae, Oniscodesmidae, Chelodesmidae, Aphelidesmidae, Paradoxosomatidae, Spirostreptidae, Pseudonannolenidae, and Rhinocricidae; lastly, Symphyla is represented by Scutigerellidae. The groups in general have reports for 15 of the 32 departments of Colombian national territory, with locations ranging from 2 masl to 2900 masl. The collection of specimens is mainly due to activities such as research projects and field trips carried out in different study halls of the Universidad Distrital FJC. In addition, all the material is preserved in 96% ethanol. This collection houses a significant number of specimens for different taxa, especially millipedes, positioning itself as an important safeguard of biological information for the Colombian myriapod fauna.

A preliminary catalogue of Diplopoda from Uruguay

Carolina ROJAS-BUFFET[1], Petra SIERWALD[2] & Miguel SIMÓ[1]

[1] Facultad de Ciencias, Universidad de la República, Montevideo, Uruguay. crojas@fcien.edu.uy
[2] The Field Museum, Chicago, USA.

The first records of diplopods for Uruguay were published at the end of the 19th century and the first decade of the 20th. These comprising six species belonging to the orders Spirostreptida and Polyxenida, and the families Spirostreptidae, Pseudonannolenidae, Polyxenidae and Synxenidae. The Entomology Collection of the Facultad de Ciencias, Montevideo, Uruguay (FCE) contains material of diplopods preserved in ethanol that come from Uruguay and other South American countries, as a product of punctual and non-standardized samplings. The collection dates range from 1939 to 1993, and until now no specialist in the group had reviewed it. These data showed the absence of recent records of the group for the country. Subsequently, pilot samplings began in natural environments in Uruguay, which gradually increased the millipede collection. In order to have a first approximation to the knowledge of Diplopoda from Uruguay, the objective of this work was to elaborate an updated list of diplopod species and their distribution in the country, with the inclusion of new records as well as the recognition of new taxa for the science. We examined the diplopod material deposited in the FCE. In addition, field collections were carried out in Riparian Forests in all the country between 2018 and 2020. Also, we did surveys in grasslands, agroecosystems and urban areas. Material was determined to the most precise taxonomic level possible using taxonomic keys and revisions of genera and species. The online global species catalog of diplopods (MilliBase) was also used as a reference for taxonomic knowledge and for the bibliographic search. Our study shows that Uruguayan millipedes are represented by five orders, 11 families, 17 genera and 27 species. Three orders, seven families, 11 genera and 17 species represent new records for the country. Nine new taxa to science were recorded: one new genus and four new species of Chelodesmidae; and four new species of the genus *Pseudonannolene*. The most diverse families were Chelodesmidae and Paradoxosomatidae. We elaborated the distribution maps of each species. This study allowed to increase almost five times the knowledge of the number of species of diplopods in Uruguay. This fact demonstrates that millipedes were undersampled and shows the poor knowledge that was available about this group in the country. Future studies will focus on sampling this group in other environments with the idea of finding more species not yet registered for the country.

First record of the family Haplodesmidae (Diplopoda, Polydesmida) in Colombia: a new species from a Cloud Forest in the northern Andes Range

Juan ROMERO-RINCON[1], Daniela MARTÍNEZ-TORRES[2,3], Santiago ALVEAR[4] & Jairo ROBLES-PIÑEROS[5]

[1] Universidad Pedagógica Nacional, Bogotá, Colombia. romerorjuanc@gmail.com
[2] Grupo de Investigación en Aracnología y Miriapodología, Instituto de Ciencias Naturales, Facultad de Ciencias, Universidad Nacional de Colombia.
[3] Departamento de Biología, Facultad de Ciencias, Universidad Nacional de Colombia, Bogotá, Colombia.
[4] Universidad del Cauca, Popayán, Colombia
[5] Departamento de Biología, Universidad Pedagógica Nacional, Bogotá, Colombia.

Millipedes of the family Haplodesmidae are small-sized organisms, no greater than 15 mm in length. These organisms are characterized by their subcylindrical shape, strongly convex back, often tuberculate and setose metaterga, and lack of paraterga. Most species have ozopores located near the middle of the metaterga, arranged in a normal formula. The gonopod structure is highly variable and may be simple, bi-, or tri-ramous, usually with a twist near the end of the femorite.

Haplodesmidae is a family belonging to the order Polydesmida, consisting of seven genera and more than 70 species. Its native distribution comprises South, East, and Southeast Asia, the Southewest Pacific region, and Australia. Some species, such as *Cylindrodesmus hirsutus* Pocock, 1889, *Prosopodesmus jacobsoni* Silvestri, 1910, and *Prosopodesmus panporus* Blower & Rundle, 1980, have been widely introduced outside of their native range.

On the other hand, species of the genus *Agathodesmus* Silvestri, 1910, are distributed in Australia, Jamaica and New Caledonia, although the family had been reported in South America, represented by the pantropical species *P. jacobsoni* Silvestri, 1910 in Brazil. This work aims to make the first record of Haplodesmidae in Colombia, represented by a new species of the genus *Agathodesmus* Silvestri, 1910. The record of ***Agathodesmus* sp. nov**. is based on 30 individuals (15 females, eleven males, and four juveniles) that were collected using the diurnal and nocturnal manual method from April through September 2022 and January 2023 in *Quercus humboldtii* Bonpl. oak forests and secondary forests at the Parque Natural Chicaque. This park is located in San Antonio del Tequendama, Cundinamarca, ranging in altitude from 2,000 to 2,700 masl. Based on this new record, the state of conservation of the park and the absence of introduced millipedes, we can infer that ***Agathodesmus* sp. nov**. is a native species of Colombia and could indicate the genus is ancient and possibly of Gondwanian origin, with likely more species awaiting discovery in the New World. However, due to its relatively small size and limited research on this fauna, the full extent of the genus has yet to be documented.

Preliminary record of millipede families (Myriapoda-Diplopoda) present in the Jardín Botánico del Quindío, Calarcá, Colombia

Manuela SALAZAR CASTRILLON[1,3], Nathalyen Dayana ECHEVERRI AGUDELO[2] & Aura Yesenia MORALES-CÁRDENAS[2]

[1] Licenciatura en Ciencias Naturales y Educación Ambiental Universidad del Quindío.
[2] Grupo de Investigación en Biodiversidad y Educación Ambiental, Universidad del Quindío.
[3] manuela.salazarc@uqvirtual.edu.co

The Jardín Botánico del Quindío (JBQ) has an extension of 13 hectares of forest, which houses a great variety of fauna and flora native to the region. Likewise, several species of palms, ferns, heliconias and exhibits such as aquatic plants, carnivorous plants, succulents and cacti have been documented and registered, as well as an important number of species of butterflies, birds, mammals, amphibians, and reptiles. This study aims to consolidate a solid database on the millipede groups present in the JBQ, since these organisms actively participate in the fragmentation of decomposing plant material and subsequently incorporate nutrients into the soil, contributing to the maintenance of ecosystem dynamics. Therefore, the first record of the millipede families present in the JBQ was carried out at coordinates 4°30'42 "N 75°38'00 "W, during April 16, 22 and 29 of the present year. Individuals were collected by direct sampling and manual search in the leaf litter, mainly in the vegetation cover of the understory. For the sampling design, three plots of 20 m by 20 m were implemented. The individuals were analyzed and identified at the facilities of the Universidad del Quindío. A total of 1116 specimens were collected, grouped into four orders and nine families. The order Polydesmida was the most predominant, representing 86.3% of the total sampling, with families such as Fuhrmannodesmidae representing 44.35%, Cryptodesmidae with 19.98%, Chelodesmidae with 12.90%, Paradoxosomatidae with 5.37%, Platyrhacidae with 2.32%, and Aphelidesmidae with 1.4%. The orders Stemmiulida, Glomeridesmida, and Spirobolida accounted for less than 5% of the total families sampled. In conclusion, the Jardín Botánico del Quindío can be classified as a place of high importance in relation to millipede fauna, since more than 50% of the orders and 56.25% of the families present in the department of Quindío were recorded.

The millipede diversity of the state of Georgia, USA: towards a checklist and key

Bruce A. SNYDER[1,2] & Lance ANDREW[1]

[1] Georgia College & State University
[2] bruce.snyder@gcsu.edu

Soil fauna biodiversity is poorly documented in general. Despite their relatively large size and importance to ecosystem processes and the soil food web, the soil macrofauna (including millipedes) also suffer from this dearth of data. Furthermore, preservation and conservation efforts cannot be undertaken without data to support those decisions. There is a serious need for baseline diversity and distribution data, especially in light of climate and land use change.

In addition, identification resources for millipedes are generally lacking, serving both as an impediment to new researchers to the field of myriapodology and to non-specialists who might need to identify species for conservation efforts. An order-level key was produced and made available through the Milli-PEET project, and recent taxonomic revisions have included keys, primarily at the species level. However, this leaves several gaps for diplopodologists, especially those new to the field, to overcome. First, there are limited resources to proceed from order to the correct key to species. The most recent key to North American families was published in 1990; no taxonomically broad keys to genus cover the region in question. Second, keys within specific taxa (e.g., families) to key to tribe or genus are scattered across the primary literature; no single document combines these for ease of use. Third, keys to species are generally based on gonopod morphology, as is necessary for species-level determination in most millipede taxa. The use of somatic characters in keys - to the extent possible - would allow identification of more specimens by more people. With these concerns in mind, we have undertaken the task of assembling a checklist and key to all species in Georgia.

The state of Georgia, USA, in southeastern North America, is understudied relative to other large East Coast states which have historically been home to myriapodologists (e.g., North Carolina - Shelley; Virginia - Hoffman, Shear, Marek). In addition, diversity in Georgia is expected to be relatively high. Georgia has the largest land area of any US state east of the Mississippi River, and contains diverse physiography from the Atlantic Ocean to the Blue Ridge Mountains. Georgia has never had a state or regional-level checklist. This project to summarize millipede biodiversity began in 2018 with a draft checklist. Likely species were gleaned from Hoffman's North and Middle America checklist and locality data were derived from published records. At the start of this project, less than half of Georgia's 159 counties had published records of any millipede species. We have added to these records through opportunistic collecting and focused sampling campaigns, and now at least 106 species are recorded and at least 101 counties (63%) have records. Updated status of known diversity and distribution of these species will be presented.

Ecology of edaphic millipedes (Diplopoda: Myriapoda) in four ecosystems in Valle Nuevo National Park, Dominican Republic

Carlos SURIEL[1], Ángel PIMENTEL[2], & Julián BUENO-VILLEGAS[3]

[1] Postgraduate Program in Environmental Sciences, Instituto Tecnológico de Santo Domingo (INTEC). Dominican Republic. csurielhernandez@outlook.com.
[2] Instituto Dominicano de Investigaciones Agropecuarias y Forestales (IDIAF). Dominican Republic. [3]Laboratorio de Sistemática Animal, Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Hidalgo, México.

Diplopods populations were ecologically characterized in four ecosystems: *Pinus* Forest (PNR), *Danthonia* savannah (SP), broadleaf forest (BL) and agrosystem (Agr). In this research, alpha and beta diversity, physicochemical conditions of the soil, vegetation cover and indicator species were analyzed. The field work was carried out within the Valle Nuevo National Park, between 2003-2384 a.s.l, during July-August and November-December 2020, and January 2021. Two 20 m long transects were delimited in each ecosystem. Four 1 m^2 quadrants in each transect were delimited (eight transects and 32 quadrants). A soil sample was taken at a point adjacent to each quadrant. The diplopods were collected manually, by three collectors for 21 min in each quadrant. Alpha diversity was approached by applying several indices: Margaleff, Simpson's dominance, Simpson's inverse, Shannon equity index, and Pielou equity index. Beta diversity was treated with the coefficients Jaccard similarity (IJ), Sorensen similarity (IS) and Sorensen quantitative (CS). The indicator value of the species for each ecosystem was determined with IndVal index (Aij x Bij) x 100. Results of the soil physicochemical variables were treated with Pearson's Correlation and diplopods with Spearman's Correlation. In both, the Principal Components Analysis, Multidimensional Scaling and Cluster tools were used. Four orders, six families, six genera and 13 species were identified. Chelodesmidae was the most abundant family and Stemmiulidae the one with the highest occurrence. BL was the ecosystem with the greatest variability of families and genera (5, 5), and SP the one with the highest abundance (64.1%). The highest equity was determined in BL, followed by PNR and SP. On the other hand, the Simpson's dominance highest value was in Agr. The highest similarity with IJ and IS was between BL and SP (0.8; 0.75 respectively), but with CS it was 0.37 between PNR and SP. The highest IndVal values were to *Achromoporus andujari* (55.44%) and *A. occultus* (43%) in SP; in BL, *Spirobolellus* sp. (50%) and *Prostemmiulus* sp. morph A (46.62%). At the same time, these species, had significant values ($p < 0.05$) in the variance analysis of their mean abundance in the same ecosystems. In BL, the greatest variability and the highest value of organic matter (OM) was presented and a strong positive association between OM, N, extractable acidity, sand, electrical conductivity, Fe, Al and Cu ($r > 0.70$, for levels of significance of $p < 0.05$ [one-tailed] and $p < 0.01$ [one-tailed] in different pairings), this is disadvantaged by the increase in pH and cation exchange

capacity (CICE). In SP ecosystem, the highest abundance of specimens, the second highest value of OM, and the lowest values for P and CICE were recorded. Agr was the ecosystem with lower values of variability, abundance, and vegetation cover, as well as showing greater human impact. Agr also appeared associated with a strong positive correlation of CICE, K, Ca, P, Pb, Mg, clay and silt.

Monitoring of millipede and centipede assemblages in restored grasslands of the karst plateaus of the Moravian Karst PLA, Czech Republic

Karel TAJOVSKÝ[1] & Ivan H. TUF[2]

[1] Institute of Soil Biology and Biogeochemistry, Biological Center of the Academy of Sciences of the Czech Republic, v.v.i., Na Sádkách 7, 370 05 České Budějovice, Czech Republic, e-mail: tajov@upb.cas.cz
[2] Department of Ecology and Environmental Sciences, Faculty of Science, Palacky University, Olomouc, Šlechtitelů 27, 77900 Olomouc, Czech Republic, e-mail: ivan.tuf@upol.cz

In 2019, there was a new announcement of the Moravian Karst Protected Landscape Area, when one of the reasons was a change in the definition of the nature protection zones. The precise mapping of the underground cave systems required modifying and improving the way of using the agriculturally intensively farmed areas located above these caves. In the first zone, the parts of the landscape above the caves were newly included, where previous agricultural practices negatively affected the quality of seepage water and thus the overall condition of the cave systems. In autumn 2019 and spring 2020, selected newly defined protection zones were gradually sown with two types of seed mixtures. A total of 8 localities in the northern part of the PLA were chosen for monitoring changes within newly grassed plots. At each locality, an area with the enriched clover-grass mixture was defined (variant A) and an adjacent control area with already existing older permanent grasses was selected as a control (variant B). *Bromion*-type seeding was available at the same time only at three monitored locations (variant C).

Regular collection of soil samples in the spring and autumn periods with subsequent heat extraction of invertebrates and pitfall trapping during the growing seasons provided data on the gradual colonization and development of the populations of millipede and centipede assemblages. In total, 23 species of millipedes and 11 species of centipedes were confirmed for all areas and variants. In addition to eurytopic and adaptable species, those that deserve attention with regard to the character of these open grass biotopes (e.g. millipedes *Brachychaeteuma bradeae* and *Julus terrestris*, centipedes *Clinopodes flavidus*, *Geophilus electricus* and *Lamyctes emarginatus*) were recorded repeatedly.

Populations of millipedes and centipedes developed dynamically on newly grassed areas. On average, the richest millipede communities were recorded in permanent grasslands (B, 40–69 ind.m^{-2}) with more dynamic development in sowing with enriched mixture (A). The epigeic activity of millipedes was comparable in all variants of the areas, higher values on the newly grassed areas could be related to the more open soil surface of the new lawns enabling easier migration. Similarly, rich centipede communities were confirmed for perennial grasses (B, 59–102 ind.m^{-2}), their onset in both sowing variants (A and C) was generally gradual over the years, however, even after three years their densities here were still low. The epigeic activity of centipedes increased relatively quickly on new sowings.

After cessation of agriculture practices, surrounding habitats in a mosaic-like landscape are important for the colonization of new areas. Diversification of habitats creates conditions for the diverse development of communities in otherwise still intensively agriculturally used terrains and thus contributes to the development of the overall diversity in the landscape of the Moravian Karst.

The defensive secretions of the giant millipede *Anurostreptus sculptus* (Spirostreptida, Harpagophoridae): their chemical composition and antimicrobial activity

Anuwat TUMMANAM[1], Waraporn SUTTHISA[1], Widchaya RADCHATAWEDCHAKOON[2], Thierry BACKELJAU[3,4] & Piyatida PIMVICHAI[1,3,5]

[1] Department of Biology, Faculty of Science, Mahasarakham University, Maha Sarakham 44150, THAILAND. [2] Department of Chemistry, Faculty of Science, Mahasarakham University, Maha Sarakham 44150, THAILAND. [3] Royal Belgian Institute of Natural Sciences, Vautierstraat 29, B-1000 Brussels, BELGIUM. [4] Evolutionary Ecology Group, University of Antwerp, Universiteitsplein 1, B-2610 Antwerp, BELGIUM. [5] piyatida.p@msu.ac.th

The largest Thai millipede species, *Anurostreptus sculptus*, is common in Northeastern Thailand. Because of its size and wide distribution, this species is a convenient experimental model organism. In this context, the present contribution reports on the chemical composition and antimicrobial activity of its defensive secretions. Gas chromatography-mass spectrometry (GC-MS) was used to analyze the chemical composition of the defensive secretions. At least 13 identifiable compounds were found. The two major ones of these were 2,3-dimethoxy-1,4-benzoquinone and 2-methyl-1,4-benzoquinone. The 11 remaining compounds involved 8 other quinone derivatives and 3 fatty acid esters. These compounds may enhance the defensive and repellent effects of the secretions. The antimicrobial activity of the secretions was tested with three gram-positive bacteria (*Bacillus cereus, Staphylococcus aureus*, and *Staphylococcus aureus* DMST2065), four gram-negative bacteria (*Escherichia coli, Escherichia coli* ATCC25922, *Pseudomonas aeruginosa*, and *Salmonella* ser. Typhi ATCC16122), and two yeasts (*Candida albicans* and *Candida albicans* ATCC10231). Streptomycin and fluconazole were used as positive controls for bacteria and yeast, respectively. Fresh secretions strongly inhibited the growth of all tested microorganisms in disc diffusion assays. The Minimum Inhibitory Concentrations (MIC) by broth microdilution analysis of fresh secretions ranged from 0.0019 to 0.2500% (v/v) and Minimum Bactericidal/Fungicidal Concentrations (MBC/MFC) ranged from 0.0039 to 0.5000% (v/v), indicating that fresh secretions were more effective in inhibiting yeast than the antifungal medicine, fluconazole. Three types of extracted secretions (hexane, ethyl acetate, and methanol) also inhitbited gram-positive bacteria (with MIC values in the range of 0.25 to 2.00 mg/ml and MBC values of 2.00 mg/ml) and *C. albicans*.

Further studies are needed to assess to what extent the antimicrobial activity of the secretions can perhaps be used for medicinal applications. From a taxonomic and phylogenetic point of view it will be interesting to explore the composition and function(s) of the defensive secretions of related millipede species.

The enigmatic Caucasian genus *Armeniophyllum* Lohmander revisited, with the description of a second species and notes on the systematic position of the genus (Diplopoda: Julida: Julidae)

Boyan VAGALINSKI[1,3], Aleksandr EVSYUKOV[2], Simeon BORISSOV[1], Georgi HRISTOV[1], Igor ZABIYAKA[2] & Evgeniy SADYRIN[2]

[1] Bulgarian Academy of Sciences, Institute of Biodiversity and Ecosystem Research, Department of Animal Diversity and Resources, 2 Gagarin Street, 1113 Sofia, Bulgaria.
[2] Don State Technical University, Gagarin sq. 1, Rostov-on-Don 344003, Russia.
[3] boyanv84@gmail.com

Armeniophyllum Lohmander, 1932 was introduced as a subgenus of the julid genus *Leptophyllum* Verhoeff, 1895 (currently recognized as a junior synonym of *Enantiulus* Attems, 1894), to include a single species, *Leptophyllum (Armeniophyllum) dissectum* Lohmander, 1932. Its description was based on a single male specimen from Armenian Lesser Caucasus collected in 1929, and the species has not been recorded ever since. Here we revise *Armeniophyllum* on the basis of abundant material from Armenia, Azerbaijan, and Georgia. We provide a redescription of *Armeniophyllum dissectum*, including SEM micrographs and micro-CT of both gonopod and external morphological structures. In addition, we describe a new, second species of the genus from the Georgian part of Lesser Caucasus. The description is accompanied by drawings and SEM micrographs, and a male and a female cybertypes are created via micro-CT imaging. In order to reveal the systematic position of *Armeniophyllum* within the family Julidae, we extracted DNA from one specimen of *A. dissectum*, and obtained fragments of the nuclear 28S rDNA and the mitochondrial 16S rDNA and COI. Our observations confirm that *Armeniophyllum* represents a separate, morphologically highly distinctive genus that cannot be reliably assigned to any of the currently existing julid tribes. In particular, the gonopods of *Armeniophyllum* show a unique combination of primitive and advanced characters which is in further support of its isolated systematic position. The results from the molecular analyses are somewhat equivocal: the phylogenetic reconstruction based on 28S rDNA and 16S rDNA sequences of a larger set of taxa places the genus within tribe Pachyiulini, while the analysis of a smaller (but yet representative) set of taxa for which sequences of all three gene fragments (including COI) are available leaves *Armeniophyllum* as an isolated clade. However, while some morphological features may suggest proximity to the Pachyiulini, others, viz. the penis structure and the gonopods considerably protruding outside the body cavity, do not fit in the characteristic of the tribe. The latter character is clearly primitive and is typical of the family Blaniulidae and a few other smaller families of Julida, whereas within Julidae it is only seen in some members of the tribe Brachyiulini. In conclusion, it seems most likely that *Armeniophyllum* represents the survivals of an ancient evolutionary lineage of Julidae. Its exact position within the family, including its possible close affinity with the Pachyiulini, needs further studies to be clarified.

ONYCHOPHORA SYMPOSIUM

ORAL PRESENTATIONS*

* All video-presentations are listed in alphabetical order according to the first author

Onychophora in Jamaica: an integrated phylogenomic approach half a century later

Pooja AVINIPULLY ANILKUMAR[1], Gonzalo GIRIBET[2] & Gustavo HORMIGA[1]

[1] Department of Biological Sciences, The George Washington University, Washington, D.C., USA
[2] Museum of Comparative Zoology, Department of Organismic and Evolutionary Biology, Harvard University, Cambridge, MA, USA
[3] pooja.anilkumar54@gmail.com

Onychophora (velvet worms) are slow-moving, exclusively terrestrial panarthropods with poor dispersal abilities. Onychophora comprises about 200 described species worldwide, in two families, Peripatidae (82+ species) and Peripatopsidae (115+ species). Peripatidae has a circumtropical distribution and is present in the Neotropics, West Africa, India, and Southeast Asia. A large number of Neotropical Peripatidae (Neopatida) belong to four genera: *Epiperipatus* (Clark, 1913) (~26 species), *Macroperipatus* (Clark, 1913) (7 species), *Peripatus* Guilding, 1826 (17 species), and *Oroperipatus* (Cockerell, 1908) (18 species) as well as some monotypic genera. The island of Jamaica is in the Caribbean region with the highest generic diversity of onychophorans harboring five species in five genera: *Epiperipatus lewisi* Arnett, 1961, *Macroperipatus clarki* Arnett, 1961, *Peripatus swainsonae* Cockerell, 1893, *Plicatoperipatus jamaicensis* (Grabham & Cockerell, 1892), and *Speleoperipatus spelaeus* Peck, 1975. It is difficult to distinguish the five aforementioned species at the genus-level and to identify specimens at the species-level due to old-outdated and insufficient taxonomic descriptions. In light of the highly conserved morphology of Onychophora, we intend to revise the taxonomy of Jamaican onychophorans through an integrative approach within the larger context of a collaborative project addressing the systematics of Neopatida. In order to accomplish this, we will (1) use dense taxon sampling incorporating both fresh and old museum specimens, (2) generate species hypotheses using Ultraconserved Elements (UCEs), (3) produce classical taxonomic descriptions incorporating scanning electron microscopy and micro-CT, (4) interpret phylogenetic relationships using the phylogenomic dataset (UCEs), and (5) analyze the inferred phylogenetic patterns to understand how they colonized Jamaica and when they began diversifying there across space and time, within the context of Caribbean biogeography.

Filling the gaps: the first velvet worm species from honduras enhances our knowledge on the diversity of neopatida (onychophora: peripatidae)

José Pablo BARQUERO-GONZÁLEZ[1,2], Ivo DE SENA OLIVEIRA[1] & Georg MAYER[1]

[1] Department of Zoology, Institute of Biology, University of Kassel, Heinrich-Plett-Straße 40, D-34312 Kassel, Germany.
[2] jopbgon@student.uni-kassel.de

The diversity of Onychophora, a group of terrestrial invertebrates known as velvet worms, is still poorly explored. To date, only 236 onychophoran species have been described and classified into two major subgroups, the Peripatopsidae and the Peripatidae, but records found in the literature and scientific collections suggest that this number constitutes a small fraction of the total expected diversity. This situation is exacerbated within Neopatida (Neotropical Peripatidae), which is believed to be particularly speciose but only holds about 80 nominal species described from scattered areas. For instance, a single species has been described for large countries such as French Guiana, Guyana, and Nicaragua, while none is described for Suriname, Belize, Guatemala and Honduras. This sampling bias is currently one of the main obstacles hampering phylogenetic and evolutionary assessment within Neopatida. To improve our knowledge of onychophoran diversity in unsampled areas, we present the first morphological, karyological, molecular, and behavioral data for a yet undescribed species from Guanaja Island, Honduras. Although this species is morphologically very similar to other neopatids, a screening approach using scanning electron microscopy showed that it can unambiguously be identified based on its flat interpedal structures, long and smooth embryonic foot projections, and type I crater-shaped papillae exhibiting a rudimentary apical piece. Furthermore, karyological analyses revealed a hitherto unique number of chromosomes within Neopatida: 2n=32 XY, including four pairs of metacentric, 12 pairs of acrocentric and one pair of heteromorphic sexual chromosomes. Our molecular phylogenetic analyses using four genes, three mitochondrial (*COI*, *12S rRNA*, *16S rRNA*) and one nuclear (*18S rRNA*) suggested this species as new to science and indicated a close relationship to an undescribed onychophoran species from Belize. These findings are in line with the previous assumption that geographically close species are likely to be phylogenetically related. Finally, we noticed that living specimens of this species coil in a spiral when disturbed. This behavior has previously been reported for peripatopsids but not yet been observed among peripatids. Our data on the first onychophoran species from Honduras arguably expand our knowledge of onychophorans in the Neotropics and reinforce the potential of integrative approaches for unravelling species diversity within Onychophora.

Brazilian onychophorans: an overview of 85 years of contributions to the systematics and biology of this enigmatic phylum

Cristiano Sampaio COSTA

Universidade Federal de Mato Grosso, Laboratório de Sistemática e Taxonomia de Artrópodes Terrestres, Brazil.
Museum of Comparative Zoology, Harvard University, USA.
csampaioc@gmail.com

Onychophorans have been a subject of interest among biologists since the 19th century. The first naturalists who studied Brazilian onychophorans and recorded the firsts specimens to the country were Moseley, Sedgwick, and Bouvier. In 1899, Bouvier described the first species for Brazil, *Peripatus brasiliensis*, based on specimens collected in Santarém, Pará State. Subsequent species from neighboring countries were recorded from Brazil, such as *Oroperipatus balzani* and *Peripatus simoni*, but these records could be misidentifications and require revision. Contrary to what happened in other Brazilian invertebrate groups, the majority of the taxonomic knowledge on Brazilian Onychophora was produced by Brazilian or local-based researchers.

The first of this contribution was the description of *Peripatus* (*Epiperipatus*) *evelinae* by the chair of zoology at of the Universidade de São Paulo, Ernst Marcus (1937). Later, *Peripatus acacioi* is the first species to receive widespread attention due to its broad applicability in various scientific fields, and which became the flagship species for a protected area in Brazil. Distinguished names in that early period included Ernesto Marcus, Eveline Marcus, Sylvia Campiglia, and Roger Lavallard, all professors at the Universidade de São Paulo. After that, for decades the studies on onychophoran taxonomy in Brazil were scarce. However, in the last two decades the study of onychophorans reflourished and novel methods were applied to the taxonomy of Peripatidae, resulting in the description of eleven species, including the iconic sympatric species *Epiperipatus lucerna*, *E. hypebolicus*, and *E. titanicus*, as well as the cryptic species *E. adenocryptus*, *E. diadenoproctus*, and *E. parougnostus*, which were resolved with the help of molecular data.

In terms of systematics, in the last decade, there have been at least three significant contributions, two dedicated to small populations and one to the larger Neopatida clade comprising a combined dataset and analysis. Scanning electron microscopy images and molecular data have offered many improvements for the phylogenetic and taxonomic analysis of *Epiperipatus*. However, the discussions around the validity of *Peripatus* and *Epiperipatus*, as such historical ambiguous descriptions keeps ongoing.

The introduction of molecular analyses has helped in the identification of cryptic species, the revision of *Epiperipatus* and in the definition of a monophyletic Peripatidae. Currently, *Epiperipatus,* with 37 valid species, is the most diverse genus of this family and is widespread in Brazil. All the evidence points to the necessity of an integrative taxonomic approach. The recent molecular data clearly improved the knowledge of Brazilian Neopatida and provided evidence against the traditional generic designations. These incongruences call attention to the urgent necessity of new and fine morphological studies for a new definition and taxonomy of the onychophoran genera.

PurSUiT: understanding the neotropical velvet worms (Onychophora, Peripatidae, Neopatida), a cretaceous radiation of terrestrial panarthropods

Gonzalo GIRIBET[1,4], Gustavo HORMIGA[2], Pooja Avinipully ANILKUMAR[2], Cristiano Sampaio COSTA[3], Shahan DERKARABETIAN[1], Niklas DREYER[1], Arianna LORD[1] & Shoyo SATO[1]

[1] Museum of Comparative Zoology, Department of Organismic and Evolutionary Biology, Harvard University, Cambridge, MA, USA
[2] Department of Biological Sciences, The George Washington University, Washington, D.C., USA
[3] Universidade Federal de Mato Grosso, Boa Esperança, Cuiabá - MT, Brazil
[4] ggiribet@g.harvard.edu

Velvet worms (Onychophora) are fascinating terrestrial invertebrates with a fossil record dating back to the Carboniferous. However, they have remained largely unchanged morphologically during 300 million years, a condition that has warranted to be labelled as "living fossils". Velvet worms are thus an ideal model to understand how animals colonize different environments and locations through long periods of geological time without the need of much morphological change. But this has been difficult to do because velvet worms are rare, inhabit remote forests, and remain poorly understood, and thus there is a lack of a clear picture of their evolutionary history. Here we present an NSF-funded project to research the least-understood group of Onychophora, the Neotropical Peripatidae, and their radiation around the Caribbean region. For this we have generated a contiguous velvet worm genome and a probeset for Ultraconserved elements (UCEs) and will use these genomic tools to identify and describe new species, assess their conservation status, and aim to understand how this group of placental invertebrates has been able to colonize the Caribbean region through geological time. The research team combines cutting-edge molecular approaches with modern anatomical methods to advance our knowledge of the diversity and evolutionary history of this under-studied group.

Structure and development of the tracheal system in onychophora (velvet worms)

Ivo DE SENA OLIVEIRA[1,2] & Georg MAYER[1]

[1] Department of Zoology, University of Kassel, Heinrich-Plett-Straße 40, 34132 Kassel, Germany.
[2] ivo.oliveira@uni-kassel.de

The water-to-land transition, or terrestrialisation, played a crucial role for animal evolution and required proper morphological and physiological adaptations. Among these, mechanisms enabling locomotion, control of water loss and especially air breathing had to evolve. In several lineages of Panarthropoda, a clade consisting of onychophorans (velvet worms), tardigrades (water bears) and arthropods (spiders, millipedes, insects, and allies), the evolution of an intricate array of air-filled internal tubes, called tracheae, allowed respiration on land. Tracheal systems occur in most major panarthropod groups, except for tardigrades and crustacean arthropods. While the tracheae of various arthropods have been extensively studied, only little is known about this organ system in onychophorans. In particular, comparative studies across onychophoran subgroups are missing, thus hampering conclusions about the evolution and diversification of the tracheal system in velvet worms. Hence, we analysed the structure and development of tracheae in distantly related species of Onychophora using scanning and transmission electron microscopy, histology, vibratome sectioning, and histochemistry. Our data from 18 species covering nearly all major geographic regions show that although the fine structure of tracheae is similar across the species, the distribution and arrangement of tracheal tubes do differ between subclades. For instance, the tracheal supply of the ovary occurs only in representatives of Neopatida, suggesting that the direct oxygenation of developing eggs is a potential synapomorphy of placentotrophic species. We further detected two types of atria (vent chambers) that show either an inverted bottle-like/single-ranked or sieve-like/double-ranked structure. The latter occurs exclusively in representatives of Peripatopsidae from Indonesia, Papua New Guinea, Australia, and New Zealand and provides morphological support for the Australasian clade, which was previously supported only by molecular data. Observations of life history further confirm postembryonic origin of tracheae in onychophorans, with atrial openings first appearing in one-day-old juveniles of a peripatid and four-day-old juveniles of a peripatopsid species. In summary, our study revealed that the tracheal system of onychophorans differs from that of arthropods in the following specific features: (i) there is no evidence of tracheoles; (ii) the tracheal tubes are unbranched; (iii) they are not moulted; (iv) their extracellular lining shows inverse arrangement, with taenidia rather than intima facing the lumen; (v) the atria possess no closing mechanism; (vi) their openings are distributed over the body; and (vii) the tracheae develop first after birth. Our findings suggest that this type of tracheal system is an autapomorphy of Onychophora, besides demonstrating that its organisation is more diverse than previously thought.

Worms and baits: an ultra-conserved element probe set for velvet worms (Onychophora)

Shoyo SATO[1,2], Shahan DERKARABETIAN[1], Arianna LORD[1] & Gonzalo GIRIBET[1]

[1] Museum of Comparative Zoology, Harvard University.
[2] shoyosato@g.harvard.edu

Molecular phylogenetics in Onychophora has proved incredibly difficult and has been limited to small scales due to peculiar aspects of their DNA, such as genome size, GC skew, and genetic variability. Resolving the internal relationships of the family Peripatidae has proved particularly difficult likely due to rapid cladogenesis in the Neopatida, the Neotropical clade of peripatids. In addition to these phylogenetic problems, Peripatidae has been plagued with taxonomic complications. The highly conserved morphology of Onychophora and the difficulty of taxonomy has been noted since the 1800s. The three most speciose genera in Neopatida– *Peripatus, Epiperipatus, Macroperipatus*– have been termed "catch-all" taxa with little to no support of monophyly from molecular data. Additionally, several monotypic genera have been found nested within these larger genera. To tackle these phylogenetic and taxonomic problems, we developed an ultra-conserved element (UCE) probeset for Onychophora. This new probeset targets 1,465 loci and I demonstrate its effectiveness using 66 specimens spanning all major lineages across both families of Onychophora. The recovered loci can be used to answer questions at multiple levels from deep divergences hundreds of millions of years old to population level relationships. The resulting phylogeny mostly corroborates our current understanding of the relationships among major onychophoran lineages but recovers a new, early diverging lineage of Peripatidae from Guyana. Morphological analysis of the specimen revealed characters not found in any studied onychophoran to date and some characters intermediate to those of Peripatidae and Peripatopsidae.

VIDEO-PRESENTATIONS*

* All video-presentations are listed in alphabetical order according to the first author

Two centuries of velvet worms: a brief illustrated history of onychophorology

Julián MONGE-NÁJERA

Laboratorio de Ecología Urbana, Universidad Estatal a Distancia, Sabanillla M.O., Código Postal 11502, San José, Costa Rica. julianmonge@gmail.com

The first velvet worm (phylum Onychophora) was discovered nearly two centuries ago by a British priest in the tiny Caribbean island of Saint Vincent. He thought it was a new type of mollusk, a slug with tiny feet. Here, I will summarize my previous articles on the history of velvet worm research with a more human touch, by presenting some anecdotes and images about the men and women who have contributed to our knowledge of these animals that hunted for prey much before the first dinosaur evolved. I will include French scientist Émile Blanchard's work on the Latin American species; German Adolf Eduard Grube's correction of Guilding's mistake; the work of Bouvier, who, working outside his field, made the most significant contribution of about onychophorans of the 20th century, and new subjects like "velvet worms as food" and "velvet worms in art". Finally, I will explain recent discoveries and tell about a forthcoming National Geographic documentary on these extraordinary worms.

Velvet worm knowledge: how much information are we missing?

Julián MONGE-NÁJERA[1] & José GUERRERO CASADO[2]

[1] Laboratorio de Ecología Urbana, Universidad Estatal a Distancia, Sabanillla M.O., Código Postal 11502, San José, Costa Rica. julianmonge@gmail.com

[2] Departamento de Zoología, Edificio Charles Darwin, Campus de Rabanales, Universidad de Córdoba, Código Postal 14071, Córdoba, España.

Scientific literature plays a crucial role in advancing knowledge and informing research in various fields. However, a significant problem arises when valuable scientific literature remains uncited due to its exclusion from widely used databases such as the Web of Science and Scopus. This issue is particularly pertinent in the context of velvet worms (Onychophora), where literature published in old and in non-indexed journals is overlooked by researchers. The omission of non-indexed literature undermines the completeness and accuracy of scientific knowledge about velvet worms: researchers overlook alternative viewpoints, novel findings, and diverse data that contribute to a comprehensive understanding of the Onychophora. By disregarding valuable studies published in less widely recognized journals, researchers also create barriers to interdisciplinary collaboration and miss out on the potential for cross-pollination of ideas and expertise. To measure the extent of the problem, we compared Ghiselin's Onychophora Bibliography (1826-1999) with the Web of Science. Results showed 49 years where the Onychophora Bibliography was more complete, 30 years where the Web of Science was more complete, and 21 years with the same number of articles. Researchers relying solely on these databases may miss out on critical studies, data, and insights from non-indexed journals. We believe that recognizing the importance of non-indexed journals and actively seeking their contributions would enhance scientific knowledge, foster interdisciplinary collaborations and support velvet worm conservation.

POSTER PRESENTATIONS*

* All video-presentations are listed in alphabetical order according to the first author

Taxonomic study and natural history of velvet-worms of the Chapada dos Guimarães (Mato Grosso, Brazil)

Heloisa FERNANDES B.[1,2], Cristiano Sampaio COSTA[1] & Amazonas CHAGAS-JR.[1]

[1] Universidade Federal de Mato Grosso (UFMT) - Laboratório de Sistemática e Taxonomia de Artrópodes Terrestres, Brazil.
[2] heloisa.fernandes@sou.ufmt.br

Most of the Onychophora species described in Brazil are from the Atlantic Forest regions. Therefore, studies on the taxonomy and natural history of onychophorans that inhabit forests and cerrado regions remain scarce; however, they are highly necessary. The present work aims to share information about the taxonomy and biology of a new velvet-worm species of the genus *Epiperipatus* found in the Brazilian Cerrado. We collected 48 specimens between 2014 and 2021. Thirty specimens were used for morphology examination, six for genetic material extraction, and 12 specimens were monitored in the field. The studies were conducted in a forest fragment in Chapada dos Guimarães, Mato Grosso, Brazil. The morphological characters examined included the number of leg pairs, dorsal impression pattern, antenna rings, and morphology of primary and secondary papillae. Molecular data from four markers (COI, 12S rRNA, 16S rRNA, and 18S rRNA) were obtained through PCR amplification and subsequent sequencing. Information related to natural history was obtained from direct field and laboratory observations between October 2022 and May 2023. Five field trips were carried out to obtain information on the biology of onychophorans. For this purpose, the specimens were photographed and subsequently marked in a region of the body with a commercial white or yellow Posca pen. Information about the sampling point location, marking, and biology of individuals was transcribed for data control. Six specimens were taken to the laboratory and mo nitored for six months, during which time information on parturition, molting, coloration, litter size, and behavior was recorded. Synapomorphies found in four molecular markers by Costa, C. S., and variations in the morphological characteristics of individuals support the occurrence of a new species within the genus *Epiperipatus*. Morphological analyses suggest sexual dimorphism, where females can measure up to 100 mm and males measure 60 mm. Additionally, the color and number of leg pairs differ between females and males. In the laboratory, ontogenetic variation of the offspring was observed in relation to the adults. The young are born lighter than the adults, with a salmon or beige tone, and darken with each molt. Through marking-recapture, the behavior of individuals at different times of the year can be observed, and their distribution in the region of occurrence can be determined. Out of the twelve tagged specimens, only three were recaptured within five hours of the initial tagging. Works like these can contribute to the study of the biology, ecology, and natural history of the group, as well as to public conservation policies.

Marking with different inks for monitoring studies of onychophorans in the field and laboratory

Heloisa FERNANDES B.[1,2] & Amazonas CHAGAS-JR.[1]

[1] Universidade Federal de Mato Grosso (UFMT) - Laboratório de Sistemática e Taxonomia de Artrópodes Terrestres, Brazil.
[2] heloisa.fernandes@sou.ufmt.br

Marking-recapture studies using non-toxic inks have been carried out with invertebrates, such as mollusks, arachnids, and Hymenoptera, to estimate abundance and population size, among others. Therefore, we tested different inks for monitoring studies in the laboratory and in the field with species of velvet worms from Chapada dos Guimarães, Mato Grosso. It is intended to find a viable ink for marking and monitoring these individuals in nature to know the characteristics of the population and the area they occupy. Six individuals were collected in Chapada Aventura, Chapada dos Guimarães, Mato Grosso, for testing. They were taken to the laboratory and placed in small glass jars. The tests were carried out over four months to observe for how long did the paint adhere to the animals' bodies, as well as the reaction and adaptation of the individuals to the marking. We tested ink from commercial *pilot* and *posca* pens, both in white, wax-based ink for marking pigs and cattle, in yellow, and ink from *Genipa americana*, extracted from fruits collected on the UFMT campus. The dyes were applied on the dorsal part of the individuals, only *Genipa americana* ink was applied on the ventral part. The marking with *Genipa americana* ink was not possible to visualize on the dorsal part due to the dark coloration of the specimens and the dye, on the ventral part remained visible for three days. The *pilot* pen ink remained visible for four days and the wax ink did not present good adherence to the animals' bodies, so it was diluted in water for better fixation and lasted for three days. The *posca* pen proved to be more effective as it remained visible for 14 days in their tegument. No adverse reaction was observed to the marking with *posca* ink, in addition, we also observed that after fixation in ethanol, the marking remained in the individuals. It is concluded that the *posca* pen ink is a viable tool for marking these individuals in the field and in the laboratory due to the time it remains visible in their tegument. This information enables mark-recapture studies with the group, contributing to the development of public policies for the conservation and preservation of endangered species and localities.

General Assembly of the Centre International de Myriapodologie

19th ICM BOGOTA, COLOMBIA
SATURDAY, 12 AUGUST 2023, AGENDA

1. Opening of the General Assembly – 2023 – by Peter Decker (President of the CIM)
2. A few words for our beloved colleagues Erwin Meyer, Alfred Ernst, Ulf Scheller, Bjarne Andreas Meidell, Jean-Paul Mauriès, and Pavel Kocourek - by Peter Decker (President of the CIM)
3. Activity Report - by Stelios Simaiakis (Secretary of the CIM)
4. Financial Report 2023 - Hans Reip (Treasurer of the CIM)
5. Newsletter n.8 (2023) - by Stelios Simaiakis (Secretary of the CIM)
6. CIM Webmaster - by Peter Decker (President of the CIM)
7. MyrNet - an initiative to exchange data between myriapodological databases - by Carlos A. Martínez-Muñoz (CIM Member)
8. Honorary Members and proposals for New Honorary Members - by Stelios Simaiakis (Secretary of the CIM)
9. CIM Membership 2023 - by Stelios Simaiakis (Secretary of the CIM)
10. Official Proposal for the 20th ICM in 2025 - by Dragan Antic (CIM Council Member)
11. Proposals for the 21st ICM in 2027 - by any active CIM Member
12. Reelection of the CIM Council - by Stelios Simaiakis (Secretary of the CIM)
13. Miscellaneous themes - by Stelios Simaiakis (Secretary of the CIM)
14. Closure of the General Assembly - by Stelios Simaiakis (Secretary of the CIM)

LIST OF PARTICIPANTS

Akkari, Nesrine
3rd Zoological Department, Natural History Museum Vienna, Burgring 7, 1010 Vienna, Austria.
nesrine.akkari@nhm-wien.ac.at

Alvear, Santiago
Departamento de Biología, Facultad de Ciencias Naturales, Exactas y de la Educación, Universidad del Cauca, Colombia.
alexs.alvear@gmail.com

Andrew, Andrew
Georgia College & State University, United States of America.
Lance.andrew@bobcats.gcsu.edu

Anilkumar, Pooja Avinipully
Department of Biological Sciences, The George Washington University, Washington, D.C., United States of America.
pooja.anilkumar54@gmail.com

Antić, Dragan
University of Belgrade, Faculty of Biology, Institute of Zoology, Studentski trg 16, 11 000 Belgrade, Serbia.
dragan.antic@bio.bg.ac.rs

Arteaga-Figueroa, Luis A.
Research Group in Biodiversity, Evolution and Conservation (BEC), School of Applied Sciences and Engineering, EAFIT University, Medellín, Colombia.
larteag7@eafit.edu.co

Avila-Gaxiola, Patricia
Facultad de Biología de la Universidad Autónoma de Sinaloa, Mexico.
est.claudia.avila@uas.edu.mx

Baba, Ştefan Cătălin
Faculty of Biology, University of Bucharest, Bucharest, Romania.
b.stefan@bio.unibuc.ro

Backeljau, Thierry
Royal Belgian Institute of Natural Sciences, Vautierstraat 29, 1000 Brussels, Belgium.
Evolutionary Ecology Group, University of Antwerp, Universiteitsplein 1, B-2610 Antwerp, Belgium.
Thierry.Backeljau@naturalsciences.be

Barquero-González, José Pablo
Department of Zoology, Institute of Biology, University of Kassel, Heinrich-Plett-Straße 40, D-34312 Kassel, Germany.
jopbgon@student.uni-kassel.de

Benavides, Ligia
United States Department of Agriculture/Oak Ridge Institute for Science and Education, United States of America.
tarantuligia@gmail.com

Bonato, Lucio
Dipartimento di Biologia, Università di Padova, Italy.
lucio.bonato@unipd.it

Bueno-Villegas, Julián
Laboratorio de Sistemática Animal, Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Hidalgo, México.
julian_bueno@uaeh.edu.mx

Costa, Cristiano Sampaio
Universidade Federal de Mato Grosso, Laboratório de Sistemática e Taxonomia de Artrópodes Terrestres, Brazil.
Museum of Comparative Zoology, Harvard University, United States of America.
csampaioc@gmail.com

Coulis, Mathew
CIRAD, UPR GECO, F-97285 Le Lamentin, Martinique, France.
GECO, Univ Montpellier, CIRAD, Montpellier, France.
mathieu.coulis@cirad.fr

De Sena Oliveira, Ivo
Department of Zoology, University of Kassel, Heinrich-Plett-Straße 40, 34132 Kassel, Germany.
ivo.oliveira@uni-kassel.de

Decker, Peter
Senckenberg Museum of Natural History Görlitz, Görlitz, Germany. Blumenstr. 5, 02826 Görlitz, Germany.
decker@myriapoden-info.de

Díaz-Melo, Jossian
Grupo de Investigación en Aracnología y Miriapodología (GAM-UN), Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Edificio 425, Oficina 105, Bogotá, Colombia.
jejdiazme@unal.edu.co

Edgecombe, Gregory D.
The Natural History Museum, Cromwell Road, London SW7 5BD, United Kingdom.
g.dgecombe@nhm.ac.uk

Fernandes B., Heloisa
Universidade Federal de Mato Grosso (UFMT) - Laboratório de Sistemática e Taxonomia de Artrópodes Terrestres, Brazil.
heloisa.fernandes@sou.ufmt.br

Flórez D., Eduardo
Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Edificio 425, Oficina 105, Bogotá, Colombia.
aeflorezd@unal.edu.co

Galvis-Jiménez, Sebastián
Laboratory of systematics and taxonomy of terrestrial arthropods, Institute of Biosciences, Federal University of Mato Grosso, Cuiabá, Brazil.
sgalvisj@unal.edu.co

Giribet, Gonzalo
Museum of Comparative Zoology, Department of Organismic and Evolutionary Biology, Harvard University, Cambridge, MA, United States of America.
ggiribet@g.harvard.edu

Giurginca, Andrei
"Emil Racoviță" Institute of Speleology, Bucharest, Romania
sankao2@yahoo.com

Gregnanin, Luca
Department of Biology, University of Padova, Italy.
luca.gregnanin@phd.unipd.it

Hennen, Derek
Field Zoologist with Virginia Department of Conservation and Recreation, United States of America.
derhennen@gmail.com

Hernandez-Dosman, Jose Alexander
Licenciatura en Ciencias Naturales y Educación Ambiental, Universidad del Quindío, Colombia.
Josea.hernandezd@uqvirtual.edu.co

Herrán, Sebastián
Licenciatura en Ciencias Naturales y educación ambiental. Universidad del Quindío, Colombia.
sebastian.herranc@uqvirtual.edu.co

Homez, Julian
Grupo de Investigación en Aracnología y Miriapodología, Instituto de Ciencias Naturales, Facultad de Ciencias, Universidad Nacional de Colombia.
sjhomeza@unal.edu.co

Hormiga, Gustavo
Department of Biological Sciences, The George Washington University, Washington, D.C., United States of America.
hormiga@gwu.edu

Jung, Seunghun
School of Biological Sciences, Seoul National University, Seoul, 08826, South Korea.
wdm137@snu.ac.kr

Korsós, Zoltán
University of Veterinary Medicine Budapest, Rottenbiller u. 50, H-1077 Budapest, Hungary.
zkorsos@gmail.com

Kos, Anja
Universa v Ljubljani, Biotehnišk fackultea, Slovenia
anja.kos@bf.uni-lj.si

León-Ortíz, Sarah
Grupo de Investigación en Aracnología y Miriapodología, Instituto de Ciencias Naturales, Facultad de Ciencias, Universidad Nacional de Colombia.
Departamento de Biología, Facultad de Ciencias, Universidad Nacional de Colombia, Bogotá, Colombia.
sfleono@unal.edu.co

Lesniewska, Malgorzata
Department of General Zoology, Adam Mickiewicz University, Poznan, Poland.
malgorzata.lesniewska@amu.edu.pl / rita.lesniewska@gmail.com

Lindner, Norman E.
Lazarusstraße 34, 4347 Leipzig, Germany
lindner@myriapoden-info.de

M. de Souza, Emerson
Laboratório de Sistemática e Taxonomia de Artrópodes Terrestres, Universidade Federal de Mato Grosso, Brazil.
emersonesem@gmail.com

Magnolini, Roberto
Department of Biology, University of Padua, Italy
Roberto.Magnolini@phd.unipd.it

Martínez-Torres, Daniela
Grupo de Investigación en Aracnología y Miriapodología, Instituto de Ciencias Naturales, Facultad de Ciencias, Universidad Nacional de Colombia.
Departamento de Biología, Facultad de Ciencias, Universidad Nacional de Colombia, Bogotá, Colombia.
sdmartinezt@unal.edu.co

Mitić, Bojan
Institute of Zoology, University of Belgrade – Faculty of Biology, Studentski Trg 16, 11000 Belgrade, Serbia.
Faculty of Technology Zvornik, University of East Sarajevo, Karakaj 34a, 75400 Zvornik, Republic of Srpska, Bosnia and Herzegovina.
bojan@bio.bg.ac.rs

Monge-Nájera, Julián
Laboratorio de Ecología Urbana, Universidad Estatal a Distancia, Sabanillla M.O., Código Postal 11502, San José, Costa Rica.
julianmonge@gmail.com

Morales Morales, Jaime Andrés
Licenciatura en Ciencias Naturales y Educación Ambiental, Universidad del Quindío, Colombia.
Jaimea.moralesm@uqvirtual.edu.co

Morales-Cárdenas, Yesenia
Grupo de Investigación en Biodiversidad y Educación Ambiental, Universidad del Quindío, Colombia.
aymoralesc@uqvirtual.edu.co

Novoa, Alejandro
Grupo de Investigación en Aracnología y Miriapodología, Instituto de Ciencias Naturales, Facultad de Ciencias, Universidad Nacional de Colombia.
ArthropodaTV.
baleytonn@unal.edu.co

Parra-Gómez, Antonio
Facultad de Ciencias, Universidad Austral de Chile. Av. Rector Eduardo Morales Miranda 23, Valdivia, Región de Los Ríos, Chile.
parragomez.antonio@hotmail.com

Payares, Luisa Fernanda
Universidad Distrital Francisco José de Caldas, Arthropod Research Group KUMANGUI, Carrera 7# 40b-53, Bogotá D.C, Colombia.
lfpayaresc@udistrital.edu.co

Peretti, Emiliano
Department of Biology, University of Padova, Italy.
emiliano.peretti@unipd.it

Pimvichai, Piyatida
Department of Biology, Faculty of Science, Mahasarakham University, Maha Sarakham 44150, Thailand.
Royal Belgian Institute of Natural Sciences, Vautierstraat 29, 1000 Brussels, Belgium.
piyatida.p@msu.ac.th

Reip, Hans S.
Senckenberg Museum of Natural History Görlitz, Görlitz, Germany.
Reip@Myriapoden-Info.de

Reyes-Peñata, Liseth Alejandra
Grupo de Investigación en Artrópodos y Otros Invertebrados Kumangui - Universidad Distrital Francisco José de Caldas, Colombia.
Departamento de Biología, Facultad de Ciencias, Universidad Nacional de Colombia, Bogotá, Colombia.
lareyesp@udistrital.edu.co

Rojas-Buffet, Carolina
Facultad de Ciencias, Universidad de la República, Montevideo, Uruguay.
crojas@fcien.edu.uy

Romero-Rincon, Juan
Universidad Pedagógica Nacional, Bogotá, Colombia.
romerorjuanc@gmail.com

Salazar Castrillón, Manuela
Licenciatura en Ciencias Naturales y Educación Ambiental Universidad del Quindío, Colombia.
manuela.salazarc@uqvirtual.edu.co

Sato, Shoyo
Museum of Comparative Zoology, Harvard University, United States of America.
shoyosato@g.harvard.edu

Semenyuk, Irina
Joint Russian-Vietnamese Tropical Center, Street 3 Thang 2, 3, Q10, Ho Chi Minh City, Vietnam.
ktor.in.jungle@gmail.com

Simaiakis, Stylianos
Natural History Museum of Crete, University of Crete, Greece.
ssimaiakis@yahoo.com

Snyder, Bruce A.
Georgia College & State University, United States of America.
bruce.snyder@gcsu.edu

Suriel, Carlos
Postgraduate Program in Environmental Sciences, Instituto Tecnológico de Santo Domingo (INTEC). Dominican Republic.
csurielhernandez@outlook.com.

Šustr, Vladimír
ISBB, Biology Centre AS CR, České Budějovice, Czech Republic.
sustr@upb.cas.cz

Tuf, Ivan Hadrian
Department of Ecology and Environmental Sciences, Faculty of Science, Palacký University Olomouc, Šlechtitelů 27, 779 00 Olomouc, Czech Republic.
ivan.tuf@upol.cz

Tulande-M
Museo Javeriano de Historia Natural, Grupo de Sistemática Molecular, Laboratorio de Entomología, Pontificia Universidad Javeriana, Bogotá, Colombia.
etulande@javeriana.edu.co

Vagalinski, Boyan Lyudmilov
Bulgarian Academy of Sciences, Institute of Biodiversity and Ecosystem Research, Department of Animal Diversity and Resources, 2 Gagarin Street, 1113 Sofia, Bulgaria.
boyanv84@gmail.com

Vahtera, Varpu
Zoological Museum, Biodiversity Unit, University of Turku, Turku, FI-20014 Finland.
varpu.vahtera@gmail.com

Vasquez-Valverde
Department of Entomology, Virginia Tech, Blacksburg, VA, United States of America.
luisafvv@vt.edu

Wesener, Thomas
Myriapoda, Zoological Research Museum A. Koenig, Leibniz Institute for the Analysis of Biodiversity Change (LIB), Adenauerallee 127, D-53113 Bonn, Germany.
twesener@uni-bonn.de

Accompanying persons

Alonso, Jair
Colombia

Bonato, Davide
Italy

Bettiol, Kattia
Italy

Bertić, Radoslav
Serbia

Galvis, William
Colombia

AUTHOR INDEX

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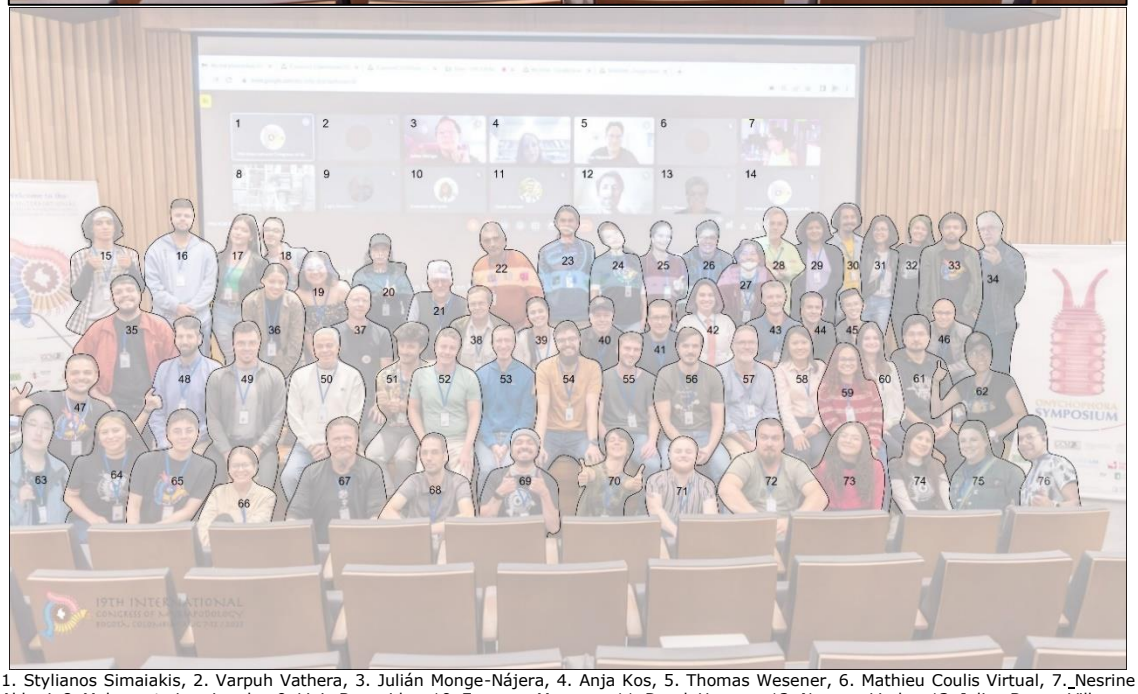
To all of you who attended in person and to those who will be virtually participating in the 19th ICM.

To the chairpersons of each 19ICM sessions and to the masters of ceremony…

To everyone, many, many thanks....!!!!



1. Stylianos Simaiakis, 2. Varpuh Vathera, 3. Julián Monge-Nájera, 4. Anja Kos, 5. Thomas Wesener, 6. Mathieu Coulis Virtual, 7. Nesrine Akkari, 8. Malgorzata Lesniewska, 9. Ligia Benavides, 10. Emerson Marques, 11. Derek Hennen, 12. Norman Linder, 13. Julian Bueno-Villegas, 14. Andrei Giurginca, 15. Jose Hernandez-Dosman, 16. Sebastián Herrán, 17. Tatiana Buitrago, 18. Jaime Andrés Morales, 19. Nathalyen Echeverri, 20. Esteban Tulande, 21. Zoltan Kórsos, 22. Bojan Mitić, 23. Juan Romero-Rincon, 24. Daniela Martínez-Torres, 25. Sarah León-Ortíz, 26. Mauricio Mahecha, 27. Alan Dante Torres, 28. Gustavo Hormiga, 29. Pooja Avinipully, 30. Cristiano Sampaio Costa, 31. Heloisa Barbosa, 32. Jossian Díaz, 33. Sebastian Galvis, 34. Eduardo Flórez, 35. Ángel González, 36. Manuela Salazar Castrillón, 37. Hans Reip, 38. Vladimír Šustr, 39. Carolina Rojas, 40. Thierry Backeljau, 41. Lucio Bonato, 42. Luisa Fernanda Vasquez, 43. Gonzalo Giribet, 44. José Pablo Barquero-González, 45. Shoyo Sato, 46. Ivo de Sena Oliveira, 47. Alejandro Novoa, 48. Bruce Snyder, 49. Ştefan Cătălin Baba, 50. Carlos Suriel, 51. Luis Arteaga-Figueroa, 52. Peter Decker, 53. Paul Marek, 54. Roberto Magnolini, 55. Luca Gregnanin, 56. Emiliano Peretti, 57. Greg Edgecombe, 58. Piyatida Pimvichai, 59. Liseth Reyes, 60. Elena Cruz, 61. Antonio Parra-Gómez, 62. Yesenia Morales, 63, Seunghun Jung, 64. Sara Rodríguez, 65. Santiago Alvear, 66. Claudia Avila, 67. Ivan Tuf, 68. Boyan Vagalinski, 69. Julian Homez, 70. Irina Semenyuk, 71. Lance Andrew, 72. Dragan Antić, 73. Luisa Fernanda Payares, 74. Tatiana Aguas, 75. Elisa Chaparro, 76. Brayan Rodríguez.

1. Bojan Mitić, 2. Zoltan Kórsos, 3. Juan Romero-Rincon, 4. Radoslav Bertić, 5. Antonio Parra-Gómez, 6. Boyan Vagalinski, 7. Dragan Antić, 8. Mauricio Mahecha, 9. Roberto Magnolini, 10. Luca Gregnanin, 11. Bruce Snyder, 12. Vladimír Šustr, 13. Ivan Tuf, 14. Esteban Tulande, 15. Emiliano Peretti, 16. Seunghun Jung, 17. Gonzalo Giribet, 18. Julian Homez, 19. Cristiano Sampaio Costa, 20. Ştefan Baba, 21. Luis Arteaga-Figueroa, 22. Ángel González, 23. Claudia Avila, 24. Thierry Backeljau, 25. Elena Cruz, 26. Peter Decker, 27. Luisa Fernanda Vasquez, 28. Piyatida Pimvichai, 29. Greg Edgecombe, 30. Gustavo Hormiga, 31. Shoyo Sato, 32. Kattia Bettiol, 33. Pooja Avinipully, 34. Davide Bonato, 35. Hans Reip, 36. Irina Semenyuk, 37. Sarah León-Ortíz, 38. Lucio Bonato, 39. Sara Rodríguez, 40. Carolina Rojas, 41. Alan Dante Torres, 42. Lance Andrew, 43. Heloisa Barbosa, 44. Liseth Reyes, 45. Santiago Alvear, 46. Daniela Martínez-Torres.

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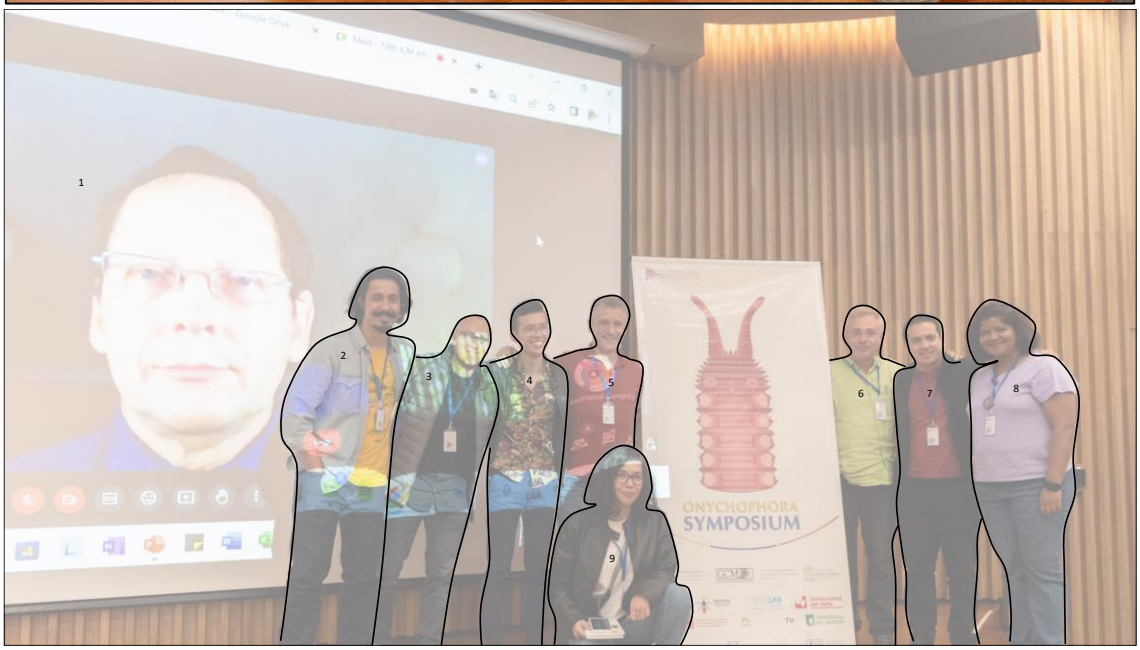

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Artistic expressions of our culture: Grupo Institucional de Música Andina, of the Universidad Nacional de Colombia (above). Llanera music group Sabana, Soga y Compás (below).

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