IRGC NEWS

INTERNATIONAL RESEARCH GROUP ON CHAROPHYTES

ISSN 1834-6030

Edited by: K. Torn, M. Casanova, S. Schneider, A. Pukacz and E. Nat

29

March 2018

CONTENTS

EDITORIAL

We are happy to present the new issue of the IRGC news, filled with information which you will hopefully find interesting. Duringthe last year, we had a very nice and interesting GEC meeting, excellently organized in Valencia by Maria Rodrigo, with the help of Carmen Rojo, Sara Calero, Eric Puche, and Mati Segura. Many thanks to all the organizers, for the fantastic location, the perfect organization, the very nice food and the interesting field trips!

Our organization is small but very active, and this means we have already plans for the forthcoming three meetings. These will be: (1) a GEC meeting in September 2018, inSicily (you will find more information about it in this issue of the News). (2) Then we will have an IRGC meeting in March 2020, in Tunisia: more information is available in this issue of the News. Please note that – contrary to what was our usual practice, the IRGC meeting will be held in March! The reason is the warm and dry summer in Tunisia, which generally causes the smaller water bodies (containing charophytes) to dry out. This is why a field trip in September would not make much sense. And then (3) we will have a GEC meeting in Latvia, in September 2021. Please note that we changed the schedule of the GEC in Latvia! The reason was that the original date (September 2019) would have been too close to the IRGC in Tunisia (only half a year between GEC and IRGC).

I warmly welcome our new members, and thank all of you who help to keep our association alive, by preparing information for the IRGC news and the website, streamlining the English, posting information on our Facebook group account, organizing and participating in meetings, and generally by staying enthusiastic about charophytes.

Susanne Schneider

WELCOME TO NEW IRGC MEMBERS

It is a great pleasure to welcome our new members : Angelo Troia (Italy), Arno Schwarzer (Switzerland), Eric Puche Franqueza (Spain), Strzałek Małgorzata (Poland), Michał Brzozowski (Poland), Anne Herbst (Germany), Ralf Becker (Germany), Nadia Abdelahad (Italy), and Ivana Trbojević are warmly welcomed.

REPORT ON PAST MEETINGS

21st Meeting of the Group of European Charophytologists (GEC)

Oral Presentations

The oral presentationsforthe 21st meeting of the Group of European Charophytologists occurred from 18-19 September 2017 in València, Spain. The meeting was organized by Maria A. Rodrigo and her organizing committee atthe Cavanilles Institute for Biodiversity and Evolutionary Biology. The Institute is located at the Scientific Park in the north part of the city where the oral presentations took place. 19 talks were given in seven lecture sessions: 1) Fossil charophytes, 2) Extant charophytes – Methodologies for taxonomy, 3) Experimentation, 4) Calcification: Relationships with key elements, 5) Charophytes *versus*angiosperms, 6) Diversity, distribution and conservation, and 7) Management. The presentations are summarized in the following sections.

Fossil charophytes

Roch-Alexandre Benoit started with a review of the Upper Jurassic and Lower Cretaceous charophyte assemblages from the northern part of the Aquitaine Basin in south-west France. Records of abundant porocharaceans, less abundant clavatoraceans and scarce characeans in Cherves-de-Cognac and Angeac-Charente indicate that brackish water environments were substituted by freshwater environments eastwards. Carles Martín-Closas provided evidence of a new charophyte refuge during the maximum post-paleaozoic sea-level when fossil charophytes were extremely rare. The refugium was detected in the Catalan Coastal Chain, within the city of Tarragona and was dominated by *Atopochara trivolvis multivolvis* (Peck). Brackish water charophyte community evolution was presented by Alba Vicente. Porocharaceans, particularly *Feistiella malladae* dominated the Upper Cretaceous. *Lamprothamnium* coexisted with *Feistiella malladae* ca. 4 MA and the latter became extinct at the beginning of the Cenozoic. *Lamprothamnium* became dominant in brackish environments during the remaining of the Palaeogene and Neogene until now. Fateh Mebrouk analysed six fossiliferous Charophyte-bearing localities, which are situated in the intermediate member of the Hammada formation (Algeria) from early in the late Eoceneto early in the middle Eocene. 18 species of 9 genera were identified, which represent two main families: the *Characeae* and the *Raskyellaceae*. Aizhan Zhamangara clarified the identity of charophytes from localities of the Eocene and the Oligocene from Kazakhstan: Zaisan Basin, Shynzhaly locality and Turgay region. Taxonomical clarification was based on species morphology (diversity of gyrogonite shapes, presence of ornamented and non-ornamental gyrogonites).

Extant charophytes – Methodologies for taxonomy

The lecture session continued with the presentations of extant charophytes – methodologies for taxonomy. Sara Calero proposed a methodological approach to identify a size threshold to differentiate unripe from ripe gametangia throughout the year. She tested this method with different charophytes: *Chara hispida* (monoecious), *C. aspera* (dioecious), and *C. canescens* (dioecious and parthenogenetic). Susanne Schneider studied European *Tolypella* specimens by analysing the plastid genes psbC and rbcL. The results supported the monophyly of the sections Rothia and Tolypella. Within the genus *Tolypella* determination of species were discussed.

Experimentation

Eric Puche presented the role of charophytes as indicators of the interactive effects of the global change. Microcosms were used to study the interactive effect of UV-radiation with temperature and nitrate concentrations of *C. hispida* and *C. vulgaris*. Temperature and nitrate concentration modulated the effect of UV-radiation on charophytes. This effect also depends on the origin of the charophytes, as mentioned by Maria A. Rodrigo. She showed preliminary results of the first mesocosm experiment based on the microcosm experiments of Eric Puche. In the mesocosm approach the effect of two combinations of selected factors (temperature and UVR:PAR ratio) on the horizontal food-web was analysed.

Calcification: Relationships with key elements

Anne Herbst studied the precipitation of calcium carbonate by charophytes in waters with extreme ion concentrations of calcium, potassium, magnesium, sodium, chloride and sulphate. Incrustation potential was species-, site- and age-specific and correlated negatively with magnesium concentrations of the habitats. Irmgard Blindow presented information about incrustation of charophytes from freshwater and brackish sites finding that there was more pronounced incrustation in freshwater. Also species-specific differences in carbonate content and especially potassium content were detected which may be explained by differences in turgor regulation. Andrzej Pukacz analysed the phosphorus fraction in charophyte biomass of three littoral sites. Seasonal variability in dry weight and carbonate content was observed. The total phosphorus concentration in charophyte biomass differed season-to-season and the fraction with the lowest/highest share in charophyte biomass was soluble reactive P (NaOH-SRP)/calcium-bound P (HCl-P). The results suggested that charophyte dry mass is capable of accumulating large amounts of phosphorus (mostly calcium-bound P) in littoral sediments.

Charophytes versus angiosperms

Kaire Torn talked about environmental niche separation between charophytes and angiosperms of Estonian sea area. Angiosperms showed a higher separation in niche position and variability of environmental niche breadth compared to charophytes. Depth, salinity and duration of ice cover had the most influence on this. Michał Brzozowski showed that *Lychnothamnus barbatus* co-occurs with eutrophic bioindicators (*Nitellopsis obtusa*, *Ceratophyllum demersum* and *Myriophyllum spicatum*) in Lake Kuźnickie, a moderately eutrophic water body in western Poland. Furthermore *L. barbatus* overwintered in Lake Kuźnickie in the form of extensive meadows and produced fully developed gyrogonites.

Diversity, distribution and conversation

Roman E. Romanov characterized the species richness, distribution and ecology of *Tolypella* from western, central and northern Asia. New records were found for *T. prolifera* in Israel and Turkey, *T. glomerata* in Northern and Central Asia (Russia – Southern Siberia, Kazakhstan), and *T. hispanica* in Northern Asia (Russia – Western Siberia) and Mongolia. Egita Zviedre presented the distribution and ecology of the genus *Nitella* in Latvia. Four species of *Nitella* were recorded in Latvia. The most common species is *N. confervacea*, *N. flexilis* is alsocommon, mainly in south-east part of Latvia, and *N. mucronata* and *N. syncarpa* are both rare species. Angelo Troia gave a talk about charophytes of inland waters of the island of Sicily. Only few monitoring data are available (19 charophyte species of 4 genera). An updated list of the species occurrence and distribution of Sicily is currently lacking. Ralf Becker reported on the high species diversity of charophytes of Sardinia and found numerous hotspots especially for brackish species. In his investigations, several charophyte species are new records for Sardinia and even for Italy. He showed the threats to charophytes of Sardinia and proposed an action plan for conservation measures focussing on the most endangered species.

Management

Aurélie Boissezon talked about charophyte management practices. She raised questions regarding which species and actions need to be managed, consideration of protocols, and research needs. The goal of her presentation was to open a discussion and review available information with interested people from different parts of Europe. The lecture session ended with questions and a discussion about management of charophytes.

Thanks to all speakers and chairpersons for their very interesting contributions.

Anne Herbst (Germany)

Field trip 1: Visit to interdunal ponds and rice fields

After 2 days of very interesting presentations and debates, Maria Rodrigo and her team took us for a trip through their favourite research sites: The Albufera de València Park, close to Valencia city, on the east coast of Spain. Between nature and human activities, they introduced us to this beautiful landscape during a very pleasant sunny day.

We started with a quick stop at Albufera lagoon, a hypereutrophic, turbid, cyanobacteria-dominated system. This is the perfect example of how discharge of untreated sewage water within few years can degrade a clear aquatic system sheltering dense charophyte meadows and other macrophytes. The situation now is slightly better than in the 70's thanks to treatment of urban wastewater. However, the water quality is still not good because of a very high anthropogenic pressure and strong economic interests: water is drained directly from rice fields, the lagoon water renews very slowly because farmers use a large amount of water from rivers, and a lot of industrial activities are still present.

We then proceeded to some interdunal ponds located on the sand bar that separates the Albufera lagoon from the sea. We spent much more time visiting those charophyte habitats: *Parador, Canescens* and *Cullera* ponds. According to their distance from the coast, the ponds are more or less brackish leading to a very interesting diversity of species. These shallow habitats also were more or less overgrown by helophytes; we were lucky to observe the following species: *Chara aspera*, *Chara hispida*, *Nitella hyalina*, *Chara canescens* (only in the more brackish pond, 70m from one with *Nitella hyalina*!).

Next in Palamar village we visited a charming typical Valencia house « *Barraca* » that was once home to farmers and fishermen. The discovery of Valencian culture continued with an impressive ballet of delicious local dishes (and wine…) in the Mornel restaurant.

Just after the lunch, we took some time to search for charophytes in rice fields. Unfortunately, the water level had decreased too much during the previous weeks (required for rice harvesting) and aquatic plants had already disappeared except few individuals of *Chara vulgaris* and *Lemna gibba*.

We finished the day with a cultural stop at *Muntanyeta dels Sants*, a limestone promontory in the Natural park. It gave us a panoramic view of rice fields, the most important economic and traditional activity of the region, under a declining and beautiful light.

Aurélie Boissezon (Switzerland)

Field trip 2: Lagunas de Ruidera Natural Park

Our second well-organized post-conference field trip led us on the21-22th September to the marvellous Ruidera Natural Park in Central Spain (Ciudad Real and Albacete provinces). The 15 chain-connected lakes of the Ruidera Park are fed by a karst aquifer. They are small (0.1 to 103 ha), 0.5 -21 m deep, rich in calcium-bicarbonate and predominantly oligo- or mesotrophic. Depending mainly on rainfall the water level is very variable. Some lakes are affected by tourism and by eutrophication. According to the literature 9

charophyte species and 12 additional hydrophyte taxa are known.

Starting in the afternoon we went by bus from Cavanilles Institut in Valencia.We passed the impressive La Mancha Plain and arrived after a short coffee break about 19:30 at San Pedro Lake, just in time for the first investigations along the shoreline and by snorkelling. The beautiful landscape was highlighted by the incipient sunset. The water level of the lake was very low due to the season (end of summer). *Chara polyacantha*, *Nitella* c.f. *hyalina* and some other water plants have been collected. All records during our excursion are summarized in table 1 (see below). Heading to Lengua lake we passed Redondilla lake, which hadalready dried out. Because of the increasing twilight a quick investigation along the shoreline at Lengua lake allowed the collection of *Chara contraria*, *Chara* c.f. *polyacantha* and *Nitella hyalina*.

Arriving at our nice Hotel Matias in Ruidera at the end of the day a delicious dinnerwas waiting for us, accompanied by scientific discussions and personal conversation. Despite of the late hour a small group took the opportunity to join a very nice local festivity at the plaza in the center of Ruidera with live Spanish music and open air dancing.

The next morning the Colgada lake with its extended submerged meadows of *Charapolyacantha* and other water plants was waiting for us for a short stopover. After that a longer stay at Santos Morcillo lake provided space and time for investigations of charophytes by swimming, snorkeling and by kayaks. Some of us did additional investigations on the adjacent Batana and Salvadora lakes, too. All results are presented in table 1. A last stop-over on our way back to Hotel Matias allowed a fantastic view at the turquoise water and the extended charophyte meadows of Lengua lake from above.

Having enjoyed an extensive and tasty lunch we were well prepared for the final determination session, excellently organized by Maria and her crew. Accompanied by a lively discussion and different opinions, especially concerning the *Chara hispida*-group, the collected specimens were verified by microscopes and loupes. Some specimens need to be studied more closely later on. Boarding thebus again in the afternoon, we headed back to Valencia where we arrived about 21:00.

I would like to thank Maria Rodrigo and her fantastic organization team for making this fieldtrip very pleasant and interesting.

Ralf Becker (Germany)

15th International Symposium of Aquatic Plants

In February there was an Aquatic Plant Congress in Queenstown, New Zealand, attended by three charophytologists from other countries, as well as the usual New Zealand people from NIWA in Hamilton on the North Island. John Clayton, Mary de Winton, Paul Champion and others have been using charophyte occurrence and depth limits for assessment of lake condition for many years, and they are real champions of both charophyte ecological research and taxonomic research. It was great to be at a conference where charophytes did not need an introduction! About half of the papers were about getting rid of water plants (usually exotic weeds) and half were about enhancing their occurrence. There was a plant identification workshop that included endemic New Zealand charophytes (*Nitella claytonii, N. conformis = N. pseudoflabellata* var. *conformis*), along with some species that also occur in Australia (*Chara australis, Nitella hyalina*). The conference venue was very scenic (with a fall of snow on the mountains during the week), the excursions good (jet boating on the river was exciting), and the food at the conference dinner was amazing!

Michelle Casanova (Australia)

Table 1: Species records from Ruidera lakes during the second post-conference field trip

Species / Lake	San Pedro	Redondilla	Lengua	Colgada	Santos Morcillo	Salvadora	Batana
Date	21.09.17	21.09.17	21.09.17	22.09.17	22.09.17	22.09.17	22.09.17
Water level	low	dry	low	low	low	low	low
Collector	various	various	various	various	various	A.Pukacz	R.Romanov
Chara contraria			+		+	+	
Chara intermedia					+ (c.f.)		
Chara polyacantha	+		+ (c.f.)	+	+		+ (c.f.)
Nitella hyalina	+ (c.f.)		+			+	+
Myriophyllum spicatum	+			+	+		
Myriophyllum			+				
Najas marina	+				+		
Scirpus litoralis	+		+		+		
Stuckenia pectinata	+		+				

GEC 2017: Assembled participants of the second field trip to Ruidera lakes.

GEC 2017: Snorkelling in Santos Morcillo lake.

GEC 2017: Charophyte collection at Colgada lake.

GEC 2017: Determination session.

Meeting of the German Charophytologists 2017

The annual meeting of the German Charophytologists 2017 took place from 15th to 18th of June in the "Europäische Naturerlebnisstätte Oderberge-Lebus", not only giving easy access to a number of interesting charophyte lakes, but also providing a spectacular view into the river Odra valley. The meeting was co-organized by Andrzej Pukacz (Slubice) and Hendrik Schubert (Rostock) and consisted of field work, a determination workshop, a series of 6 presentations and a marvellous excursion to Lake Łagowskie and Lake Jasne on the Polish part of the Lubuskie region. Altogether 40 participants used the opportunity to share their findings and results of the work done the last year, to discuss problems of taxonomy and opinions about ecology and threats of the species, and also to debate new targets for the group. During field work a number of charophyte lakes in Brandenburg were sampled, some of them being classical sites known from the work of famous charophytologists, e.g. Alexander Braun, and exhibiting a rich charophyte flora. Comparing them with the lakes on the Polish side, which are far less impacted by anthropogenic influence, was an interesting experience raising numerous discussions about protection strategies as well as knowledge gaps.

Hendrik Schubert (Germany)

FORTHCOMING MEETINGS

GEC and IRGC meetings

17– 21 September 2018
22nd Meeting of the Group of European Charophytologists
Palermo, Sicily, Italy. Organizer: Angelo Troia
Please find first circular below. Pre-registration deadline **10 April 2018.**

23– 26 March 2020
8th International Symposium on Extant and Fossil Charophytes
Gammarth, Tunisia. Organizer: Khaled Trabelsi
Please find more information and inquiry below. **Feedback needed** for organizers.

September 2021
23rd Meeting of the Group of European Charophytologists
Latvia, Riga. Organizer: Egita Zviedre

German meeting 2017: Listening to the presentations eagerly – after field work, excursions and discussions, the presentations meet an interested audience and many participants delayed departure because there was so much still to be discussed afterwards.

German meeting 2017: A flotilla of boats left to find *Lychnothamnus barbatus* in Lake Łagowskie – finally successful thanks to Andrzej Pukacz, who hit the onlyremaining spot exactly.



22nd Meeting of the Group of European Charophytologists (GEC)

17-21 September 2018

Palermo, Sicily, Italy

First Circular

DIPARTIMENTO DI SCIENZE E TECNOLOGIE BIOLOGICHE CHIMICHE E FARMACEUTICHE (STEBICEF)

Organised by
Dipartimento STEBICEF - Università degli Studi di Palermo
in collaboration with: *CIRITA - Università degli Studi di Palermo*
Organizing Committee: Angelo Troia, Rossella Barone, Anna Geraci, Riccardo Guarino, Anna Maria Mannino, Elisabetta Oddo, Rosario Schicchi
Scientific Committee: Angelo Troia, Luigi Naselli-Flores, Susanne Claudia Schneider, Maria Antonia Rodrigo Alacreu

PRELIMINARY PROGRAM:
16 September (Sunday): informal meeting in Palermo Old Town.
17-18 September (Monday and Tuesday): registration, oral and poster sessions at the Botanical Garden of the University of Palermo.
19-20 September (Wednesday and Thursday): 1-dayfield trip to "Lago Preola & Gorghi Tondi" Nature Reserve (W Sicily), charophyte collection and (in the next day) determination at the University of Palermo.
20-21 September (Thursday and Friday): a second field trip to Nebrodi Mts (NE Sicily) could be organized depending on the interest of the participants.

Registration fees for the meeting (field trips not included):
IRGC-Members: 60 €
Non IRGC-Members: 100 €
Students: 40 €

These prices include conference material, coffee breaks and lunches, and conference dinner

IMPORTANT DATES:

10 April 2018	Deadline for pre-registration. It will help us to estimate the cost of the field trips
15 June 2018	Deadline for final registration **AND** abstract submission

CONTACT PERSON: Please send pre-registration by e-mail to Angelo Troia:
angelo.troia@unipa.it (+39 091 23891260)

The 22nd GEC meeting will be organised by the Department STEBICEF (Biological, Chemical and Pharmaceutical Sciences and Technologies) of the University of Palermo, in collaboration with the CIRITA (Interdepartmental Research Center on Technology-Environment Interaction) of the same University. The lectures and poster presentations will be held in the Botanical Garden which belongs to the same University (address: via Lincoln 2, Palermo - details of how to reach the venue will be provided in the second circular).

Post-conference field trip 1

Presentations will be followed by a one day field trip with charophyte collection and identification on the next day. The excursion is planned in the Nature Reserve "Lago Preola e Gorghi Tondi" (Trapani province, W-Sicily), an interesting karst area with several small lakes not far from the coast. Charophyte determination will be arranged in one of the laboratories of our Department.
Costs of the field trip are depending on the number of participants and will be given in the next circular. Thus, your pre-registration will help us in estimating the costs, which are expected not to exceed 60 € (including lunch).

Post-conference field trip 2

A second field trip to the Nebrodi Mountains (a Regional Park in NE-Sicily) could be organized depending on the interest of the participants. In detail, we would visit a small mountain lake in the most forested area of the island, in a beech-forest at about 1400 m a.s.l. (about 150 km from Palermo). We would leave Palermo on Thursday 20 in the afternoon and spend one night in the Park. On Friday 21, after the field trip, we will drive back to Palermo (arrival to Palermo approx. 18:00). The price for this second field trip will be also given in the next circular; we will try to keep it below 120 € (incl. transports, dinner, accomodationand packed lunch).

About Palermo

Palermo is the capital of the Italian autonomous region of Sicily and one of the most important cities in the Mediterranean. Palermo was established by the Phoenicians in the 8th century B.C., nearly 3,000 years ago. Since then it has enjoyed an immensely colourful history being occupied or influenced in turn by the Greeks, the Carthaginians, the Romans, the Arabs, the Normans, the Swabians (Friedrich II's tomb is in the Cathedral of Palermo), the Spanish, the Austrians and finally the Bourbons. These many influences have helped to create a truly cosmopolitan culture which is reflected in the art, architecture, music and cuisine of Palermo and Sicily in general. In 2015 Arab-Norman Palermo has been included in the World Heritage List.
Recently, "The Guardian" included Palermo in the hotlist of the places "Where to go on holiday in 2018": "The Sicilian capital may have been named **Italy's capital of culture for 2018** but its credentials as a cultural melting pot stretch back almost a millennium. A memorial stone on display in the city's Moorish Zisa palace records the interment of a noble lady's remains in four languages: Latin, Greek, Arabic and Hebrew. Such openness to other traditions is typical of this city, often referred to as a mosaic – a pattern weaving in Spanish, Norman, Bourbon and British influences, too".

How to get to Palermo

The main way to get to Palermo is by plane:
Palermo has an international airport called "Aeroporto Falcone Borsellino" or Aeroporto di Palermo (PMO). It is located 35 km (to the west) from the city centre and is connected to the city centre by taxi and by public transports (buses every 30 minutes).

Another possible alternative is the Airport "Vincenzo Florio" of Trapani Birgi, which is about 112 km west from Palermo. You may consider, as well, to fly to the international Airport "Vincenzo Bellini" of Catania, which is about 200 km east from Palermo.

Additional information

Details on how to reach the conference venue, on the hotels etc. will be given in the second circular.

Currency

The currency in Italy is Euros. Credit cards are widely accepted, ATMs are widely available throughout the city.

Passport and Visa

All the members of the European Union, the European Economic Area and holders of the "Schengen agreement" do not need a visa. If you're not a citizen of the listed structures or you are not sure if you need a visa, please contact the Italian Embassy or Consulate in your country.

Weather

Palermo has a Mediterranean climate with mild (rainy) winters and warm and sunny summers. The weather is usually nice in September: Av. Temperature 25°C - Min. Temperature 22°C - Max. Temperature 27°C; Sunshine Hours 8 hrs/day - Av. rainfall 40mm - Rainfall days: 9 - Sea Temperature 25°C.

LOOKING FORWARD TO SEEING YOU IN PALERMO!

23– 26 March 2020
8th International Symposium on Extant and Fossil Charophytes
Gammarth, Tunisia

For the first time, the quadrennial International Charophyte Symposium will take place in Africa. The project was presented and positively received by our membership during the past IRGC in Astana, 2016. Because of the weather conditions in North Africa (hot and dry), the meeting shall be held in spring and not, as usual, in autumn.

The meeting is being organised by:
Dr. Khaled Trabelsi, University of Sfax, Prof. Mohamed Soussi and Dr. Amina Daoud-Bouattour, University of Tunis El Manar. In collaboration with Yassine Houla and Amine Hanini from the National Office of Mining (ONM) and Ahmed Nasri, Faycel Ferhi and Ahmed Skanji from the Tunisian National Oil Company (ETAP).

Provisional schedule of the meeting :

- 1-day **pre-congress excursion**to localities with living charophytes and Mediterranean flora (i.e Lake Ichkeul as well as freshwater and brackish water temporary ponds)
- Three days of scientific sessions
- 3-day **post-congress excursion** to geological highlights in the South of Tunisia.

The geological excursion will lead to the Saharan Platform (Tataouine Basin) and the Central Tunisian Atlas (Kasserine paleo-island) where charophyte-rich continental and marginal deposits were recently discovered and globally integrated within northern Gondwana supercontinent context. Wonderful landscapes and archaeological sites are also scheduled.

The town of Gammarth (at 20 km distance from Tunis airport) is considered for the venue of the meeting; grouped transfer by cars or minibus will be organized.
Accommodation in Tunisia is usually cheaper than in Europe. Detailed cost information will be given in the 1st circular. In order to facilitate the organisation and to negotiate a good price at the conference hotel,

Please reply to the inquiry below.

(**subject: IRGC 2020**)
Your Name

I will **certainly** attend the meeting.
I will **probably** attend the meeting.
I will **probably not** attend the meeting but I wish to receive further information

Just send an E-mail with one of these options to:
Khaled Trabelsi <trabkhalfss@yahoo.fr>

Other meetings

First meeting of the European Charophyte Monograph group in Vienna

The idea of renewed European monograph was suggested during the IRGC in Kazakhstan, and also as a result of repeated complains about the language of the recent German monograph (2016), raised by colleagues as well as the publisher. After contacting publishers and colleagues in December 2016 a group of enthusiasts met in Berlin to check whether it was worthwhile, and indeed, possible to compile, a real Pan-European Monograph of charophytes. It took another two meetings, held in Scotland and in Leiden, to get a clear understanding of the targets and the structure of the book. In parallel, a little group was active in recruiting responsible lead authors of the individual parts of the project, and drafted a first version of taxa ranks as starting point for discussions. The idea behind the project was not only to fully incorporate the eastern half of Europe, but also to compile a monograph based on a common opinion about taxa ranks, hierarchy of characters for discrimination and species delineation. For this, it is planned to have discussions and debates as much as possible before the release of the book instead of afterwards, as it is often the case for publications based on a single experts' opinion. The book of course is based on the numerous national and regional monographs which appeared the last two decades. Their authors must and will be honoured and acknowledged, but the monograph also will go beyond those treatments, not only because of the consistent and agreed taxonomic concept, but also by incorporating all information available with respect to distribution, niche dimensions and oospores. Moreover, it will not just be a compilation of data, but also a critical analysis of the database, necessary because of the many inconsistencies in species delineation between the regions of Europe. This will definitely become a long-term project, taking some years to be finalized – a good reason not to decide upon the publisher nor to sign any kind of contract yet. However, some of the working groups – especially the distribution group, led by Heiko Korsch, and the species description group are already installed and very active; nomenclatural aspects, taken care of by Thomas Gregor, has also started and the first results keep the lead authors of the taxa busy now. Therefore, in summer 2017 the group felt the need for a physical meeting prior the field season in 2018 to present and discuss the opinions and knowledge gaps about species delineation, and also to coordinate exchange of material, preparation of drawings and photographs and many more details. Prof. Karl Georg Bernhardt was kind enough to organise a location in Vienna, a marvellous place to meet because of a dense network of flight connections. After the meeting there will be an excursion to the Lacken area south of Lake Neusiedl as a kind of reward to all participants, because there is still no decision about the COST-application thought to at least partly support the project. About 30 participants, most of the species' lead authors, are expected for the meeting. The oospore group, the photographers, and the distribution group will meet in parallel, allowing for fruitful and direct exchange.

For information about the project contact Prof. Dr. Hendrik Schubert, hendrik.schubert@uni-rostock.de

Hendrik Schubert (Germany)

23– 24 April 2018

20th International Conference on Limnology, Aquatic ecology and Freshwater Fisheries, Boston, USA

https://waset.org/conference/2018/04/boston/ICLAEFF

9– 13 June 2018

5th International Palaeontological Congress «The Fossil Week», Paris, France

With session on Palaeoflora and Palaeoenvironment and interesting fieldtrips.
https://ipc5.sciencesconf.org/

10– 15 June 2018

The summer meeting of the Association for Sciences of Limnology and Oceanography (ASLO), Victoria, British Columbia, Canada

https://aslo.org/p/cm/ld/fid=1227

European Charophyte Monograph. The five enthusiasts being still optimistic: Roman Romanov, Nick Stuart, Uwe Raabe, Hendrik Schubert and Emile Nat at the Leiden meeting after agreeing upon a first draft of taxa ranks – however, the gradient in optimism versus knowledge about the amount of work to be done is clearly visible.

7– 10 June 2018

Meeting of German-speaking charophytologists

Since their first meeting in 2004 the German charophytologists met annually at different locations of interest for discussion and practical work. Colleagues from neighbouring countries participated in these meetings too and one of the meetings, organised by John Bruinsma, was held abroad in the Netherlands. This tradition will be continued in 2018, when the annual meeting will be held from 07.06. to 10.06. at the station of the "WasserCluster" in Lunz, Austria, strengthening also the contacts to the Austrian colleagues. The meeting is organised by Univ.Prof. Dipl.Geograph Dr. KarlGeorg Bernhardt from the Universität für Bodenkultur Wien and will consist of excursions, a determination workshop and plenty of room for discussions and short presentations.The list of participants is already filling up, 35 active participants have booked already, but registration is still possible for everybody interested in the charophyte flora of the alpine lakes and not fearing the difficulties of the German language. For more information please contact Prof. Dr. Hendrik Schubert, hendrik.schubert@uni-rostock.de

18– 21 June 2018

The Joint meeting of the International Paleolimnology Association and the International Association of Limnogeology, Stockholm, Sweden

https://ipa-ial.geo.su.se/

30July – 5 August 2018
XVII Argentine Symposium of Paleobotany and Palynology (SAPP 2018), Paranà, Argentina
http://fcyt.uader.edu.ar/web/sapp2018

12– 17 August 2018
10th European Palaeobotany & Palynology Conference**, Dublin, Ireland**
http://eppc2018.ie/

19– 24 August 2018
34th Congress of International Society of Limnology, Nanjing, China
http://www.sil2018.com
29 sessions have been selected, such as:
S5. Ecological impacts of water-level fluctuations (WLF)
S12. Lake Taihu in China: identifying consensus and future research priorities for one of the world's best studied polluted lakes. *The lake where diverse Chara species and Nitellopsis were collected during the 3rd IRGC meeting in 2000.*
S14. Macrophyte vegetations of the future
S27. Temporary freshwater ecosystems in the face of climate change

23– 28 August 2020
35th Congress of International Society of Limnology, Gwangju, Republic of Korea

NEW ELECTRONIC KEY

A new electronic key will be soon published in French and German in order to allow the recognition of Swiss charophyte species.

This key will be for professional botanists as well as nature lovers. It will reflect the state of knowledge about charophyte taxonomy in Europe. Given the level of complexity in the determination of certain species, this key will aim to provide information attwo levels of expertise: the first level with 'species complexes' and species easily recognizable in the field for non-specialists; the second level with difficult species and subspecies or varieties requiring a higher level of knowledge and more sophisticated equipment (binocular loupe and microscope).

For more information please contact: aurelie.boissezon@hesge.ch

Aurélie Boissezon, Dominique Auderset Joye, Arno Schwarzer, et al.

SPECIAL ISSUE

A Special Issue on charophytes, based on studies presented in our last IRGC meeting in Astana (Kazakhstan) as well as other papers related to living and fossil charophytes, is published. This is the 8th Special Issue on charophytes published by our association. The Special Issue can be found in Botany Letters (2018), Volume 165, Issue 1. https://tandfonline.com/toc/tabg21/165/1

IRGC HOMEPAGE

IRGC homepage is available: http://www.sea.ee/irgcharophytes/ Members are welcome to send relevant information to Kaire Torn (kaire.torn@ut.ee).

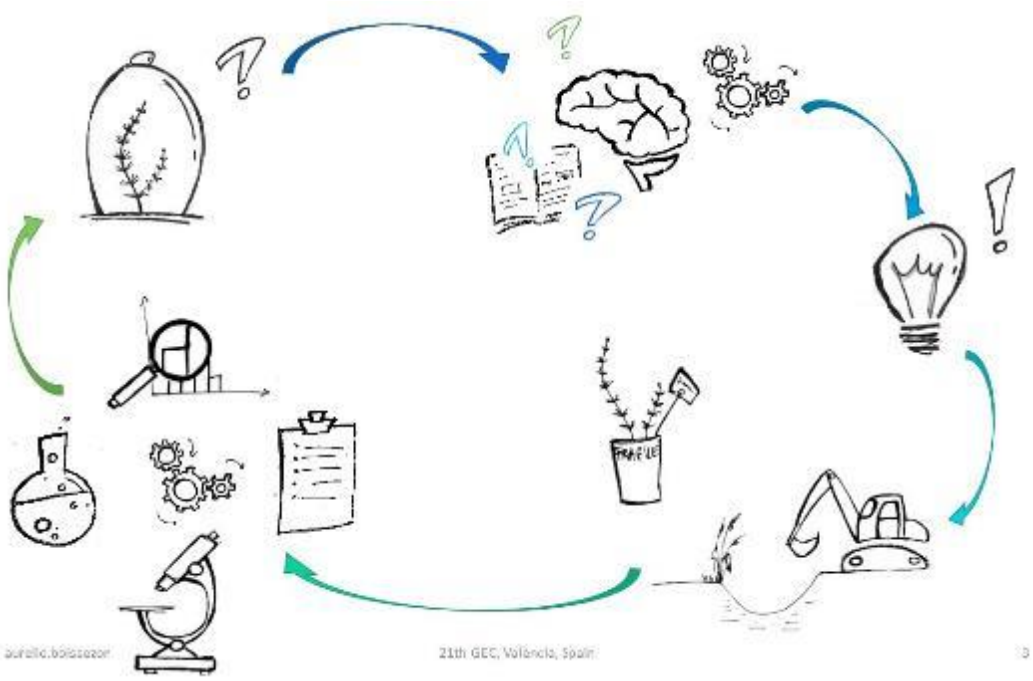
IRGC IN FACEBOOK

We have created group in Facebook – International Research Group on Charophytes. This is an unofficial group for IRGC members to share information. The group is closed, so only IRGC members can see the posts.

You are welcome to share your photos, field works, research questions etc. among our community. We are looking forward to see your photos from the past meetings or getting information/photos about your current activities.

We created a shared account for members who are not interested to have their own personal account in Facebook, but would like to visit the IRGC group. Please contact Kaire Torn (kaire.torn@ut.ee) for details.

CONSERVATION OF CHAROPHYTES: THE DEBATE HAS OPENED



Preventing the extinction of stonewort species is a real challenge, for researchers and practitioners. Taxonomy, physiology, biogeography and ecology of charophytes have been studied intensively for many years. Consequently, there is a relatively abundant literature on these subjects. However, this is not the case for in situ and ex situ conservation techniques.

Several of us have been asked to design and conduct efficient management plans for stoneworts. People (not many) are doing this in different places, in different ways but there was little exchange of information on the successes and failures.Hence, to improve stonewort conservation, there is an urgent need to share and gather our practical charophyte management experience (in situ and ex situ).

Several topics have to be addressed: basic questions (e.g. criteria helping to define species that need to be "managed" and actions that need to be done); best practice considerations (e.g., is it better to transplant live material, or sediment?; Should vulnerable species be taken into culture? Should propagules be stored?); research needs (e.g. oospore dispersal and viability, genetic variability).

During the 21th GEC meetingthese topics were discussed, and some initial information was assembled from interested charophytologists from different parts of Europe.

The debate turned rapidly away from practical issues, towards basic (sometimes provocative!) considerations:

What should we protect?

This question looks simple, but several sub-questions arose, forcing each participant to "think outside their own box"…

<u>Response 1: The government decides…</u>

For practical conservation issues, the political situation in a country appeared to be very important: some countries just have to cope with the law no matter what, while other countries consult experts in order to find out if the law has to be adjusted.

We have to explain to the public WHY we want to protect a species. Only referring to the law is not enough, we must explain why the law makes sense.

Moreover, the role of experts in raising public awareness is fundamental to legitimize the study and the protection of charophytes and their habitats: this is the role of experts to communicate.

Response 2: In situ > ex situ conservation

The discussion rapidly turned to "when should we consider ex-situ conservation?" Most people agreed that the goal must be to protect the 'elephant in nature' not the 'elephant in the zoo'. Nevertheless, one should consider ex situ conservation as a temporary stage prior toreintroduction. For instance when "in extremis" saving of populations is required (destruction of habitat sheltering important species and/or diversity).

Response 3: genetic diversity (species) and functionality (habitat)

For protection of species, genetic diversity is important (prevent loss of biodiversity); for protection of habitat, functionality may be important (ensure 'proper' ecosystem functioning).

The paleolimnologists raised the question of genetic diversity of charophytes with the example of *Lamprothamnium papulosum*: Is it more important to protect *Lamprothamnium papulosum* than e.g. *Chara hispida* (because many taxa are genetically similar to *Chara hispida*, while *Lamprothamnium papulosum* is the last of its lineage)?*Nitellopsis obtusa*, a meso-eutrophic species, is the last species of its genus and – in that sense - deserves special protection. Moreover, should we create a «genbank» of charophytes or do we accept some «natural extinction»? This provocative but very important question needs to be considered in further discussions.

When we protect habitats, is the point to protect the species in the habitats, the environmental conditions in the habitat, or the community in the habitat? The problem is that current European typology of habitats for charophytes has not been updated, hence it is incomplete and unsatisfactory.

Response 4: Metapopulation or metacommunity

Generally, action plans aim at conserving species. The main criteria for why a species should be protected generally are its rarity, and sometimes also its degree of threat according tothe IUCN system. Howeverit is important to considerthe natural distribution of the species,and rarity alone is not a sufficient criterion for conservation. For example, if the reason a species is rare in a particular region is not a consequence of anthropogenic pressure,but because of natural habitat availability, does protection make sense?

Some argued that we have to protect METApopulations (a set of local populations of a single species that are linked by dispersal) or METAcommunities (a set of local communities connected by dispersal of multiple potentially interacting species). Related to this, we discussed ifthe countries where a species is commonshould have a special responsibility for these species, in order to protect their genetic diversity? E.g. should Norway be responsible for *Lobelia dortmanna*, because it is common there? And Germany or other countries for *Potamogeton pectinatus*, because it is common there? For examples, a majority of GEC participants were against red-listing *Potamogeton pectinatus* in Norway (*Potamogeton pectinatus* is rare in Norway but common in Germany). On the other hand, the majority of GEC participants was for red-listing *Lobelia dortmanna* in Germany (*Lobelia dortmanna* is rare in Germany but common in Norway)! This clearly showed that opinions differed, often based on which kind of habitat a species prefers (oligotrophic species like *Lobelia dortmanna* are more "famous" than eutrophic species like *Potamogeton pectinatus*), independent of their natural distribution or rarity in a specific country.

Some experts and conservationists from different regions of Europe already contribute to management plans for charophytes in their countries. The debate during the 21th GEC meeting showed that there is a need for further discussions prior to practical decisions. It would therefore be timely and helpful to gather and summarize the outcomes of

conservation projects in a common publication such as “action sheets”.

If you want to provide reports or data that could help, or participate in the discussion, please contact Dr Aurélie Boissezon : Aurelie.boissezon@hesge.ch

Aurélie Boissezon (Switzerland), Susanne Schneider (Norway)

REFERENCE ARTICLE

What’s new about Chara? A short overview over some interesting charophyte studies published in 2017

When I searched Web of Science on January 19 using the search criteria “Chara” and “2017”, I got an amazing 105 hits. Although some of them of course referred to that funny stellar phenomenon which also is called Chara, most of them actually dealt with “our” *Chara*. And very many of these publications were really interesting! The drawback was of course, that I not only spent a lot of time on trying to summarize the results, but it also was impossible for me to summarise all which were interesting. So, what you will read now is only a selection of what I think was most interesting. Also, to save some space in the NEWS, I only mentioned the first author in the reference list. Please check Web of Science if you want to have the full details of each reference.

Quite a few publications were on ecology, or on processes affecting ecology. Particularly in warmer climates, many charophytes occur in pools that may dry out in summer. These charophytes are exposed to salt stress, because salinity rises when a pool is drying. Absolonova et al. studied how *Chara australis* copes with salt stress. They found that salinity inhibits the proton pump and opens H^+/OH^- channels, leading to alkaline spots on the cell surface. However, we still have a long way to go before we fully understand the effects of salt stress.

Rojo et al. (2017a) studied the effects of an increase in temperature and salinity (both are forecasted to occur in the Mediterranean as a result of climate change) on several *Chara* species. They found that the species reacted differently, and that the combination of both stressors was not easy to predict from the reaction to each single stressor alone. For example, *C. aspera* growth was enhanced by the increased temperature alone (from 23 to 27 degrees C) and also by the increased salinity alone (from 0.4 to 4.0 PSU). But when they were exposed to both stressors at the same time (i.e. a multiple stressor situation), the growth rate was not different from the control. This is called an antagonistic interaction. Unfortunately, this means that it is very difficult to predict what really will happen with climate change, because so many stressors will act concomitantly, and it is difficult to predict which species will react in which way to which combination of stressors. There is a lot of work to be done for ecologists.

Ferriol et al. had a closer look at the eutrophication of Mediterranean wetlands and their possible recovery. They fertilized mesocosms in a shallow coastal lake in Spain, which had dense *Chara* meadows (unfortunately they do not say which species). Maybe not so surprising, they found that in the highly fertilized mesocosms the macrophytes disappeared within 4 weeks, and the ecosystem shifted to a turbid status. A bit later they removed the macrophytes from the **not** fertilized mesocosms, and noticed that phosphate and ammonium was released from the sediment, after the macrophytes were removed. Nutrient concentrations generally continued to be high, even after the fertilization was stopped, and decreased only slowly. This shows that recovery is slow, that previous eutrophication can hamper restoration, and that you have to reduce nutrient input if you seriously want to restore these ecosystems.

Townsend et al. described the recovery of vegetation in a river in the Australian tropical savannah. The river gets regularly flooded in the austral summer (January to March), and these floods remove practically all plants and algae (including the *Chara* and *Nitella* species which regularly grow there). When the water

level falls (April, May), regrowth occurs quickly: first appear the microscopic algae, then *Spirogyra*, then *Chara* and *Nitella* and finally *Vallisneria*. This paper provides a nice example for the fact that charophytes rapidly can return after disturbances.

Calero et al. compared phenology of *Chara hispida* between a pond in Spain and one in Switzerland. They found that all phenological events occurred around 40 days earlier in Spain than in Switzerland. In Spain, *C. hispida* sexually reproduced in a daily mean temperature range of 10-25 degrees C, and for producing ripe gametangia, 600 growing degree-days (GDD) were needed. Surprisingly (at least for me), the Swiss population required a higher daily mean temperature (15 degrees) to begin to reproduce, and 700 GDD (i.e. 100 more than in Spain) to initiate gametangia ripening. I would have assumed that the Swiss population would be adjusted to cold temperatures, and therefore would be able to reproduce at colder temperatures than the Spanish population. But well, it seems these charophytes continue to surprise. So, this is an interesting study to follow up.

In the Laurentian Great Lakes, charophytes can attain high abundances in shallow waters, and after their death they become detached and are deposited on the shore where they contribute to beach fouling. Francoeur tested what actually limits photosynthesis of these charophytes, and found that it was – indeed – phosphorus (and not generally light). This means that a slight (!) increase in phosphorus input can lead to a better growth of charophytes. This may be interpreted as another sign that the dense charophyte meadows which we all love to see, in fact may not reflect fully natural conditions, but instead are a sign of a slightly increased P-input.

An interesting little study was published by Medeiros & Henry-Silva in Brazil. They wanted to know if an invasive snail would preferentially feed on *Egeria densa* or *Chara indica*. Despite the well-known characteristic *Chara* smell, the snail actually seemed to prefer the *Chara*! So, our charophytes are in danger of being eaten by snails. Rojo et al. (2017b) studied the algal and cyanobacterial assemblages on charophytes. Although the paper is not easy to read, I understand that they found different periphyton composition and diversity among different charophyte species. The mechanisms how charophytes influence periphyton composition and diversity probably are allelopathy, competition and host substrate-attachment processes.

Several manuscripts were on the distribution of charophytes in different habitats: Trajanovska et al. describe the distribution and morphologic variability of *C. globularis* in lake Ohrid, a large ancient lake situated between Macedonia and Albania on the Balkan. Muller et al. published an extensive study on charophytes in the Maghreb (Morocco, Algeria, Tunisia). The study provides a Maghreb-wide synthesis of all collections made since 1784 (570 observations distributed over 464 sites). Each of the 31 reported species is described in detail with its diagnostic features, ecology and distribution in the 3 Maghrebian countries, and also conservation issues are discussed.

Sinkeviciene et al. studied changes in the charophyte assemblages of the Curonian lagoon, the largest estuarine lagoon of the Baltic Sea, since 1949. They found that in the 1950s, typical brackish water species, which nowadays are regularly observed (*Chara baltica*, *C. canescens* and *Tolypella nidifica*), were absent. In the 1960s and 70s, when eutrophication was most severe, relatively few charophyte species were found. The authors conclude that, although of course different intensity of surveys and/or density of study sites may have played a role, the changes in the charophyte species composition, abundance and distribution could be explained by the increased exposure to brackish waters since 1980s and recently reduced eutrophication.

There also were quite many studies dealing with the question how charophytes can cope with heavy metals, or toxic substances. Liu & Wu investigated the effects of linear alkylbenzene sulfonate, which seems to be a common organic pollutant in freshwater environments, on *Chara vulgaris*. They found

that concentrations of up to 5 mg/l did not kill the plant, but that some enzymes, for example superoxide dismutase, were affected, and the carotenoid concentration also changed, although not consistently. They conclude that *Chara vulgaris* indeed seems to have some resistance to this chemical. From my own background on the effect of organic chemicals on *Chara*, I do wonder whether also this alkylbenzene sulfonate managed to get into the *Chara* cell, and whether the *Chara* (or the microorganisms living on the *Chara* surface) actually can degrade the chemical.

Also Manusadzianas et al. exposed our beloved charopytes to toxins. They compared the effect of $CuSO_4$ with that of CuO nanoparticles on *Nitellopsis obtusa*. As we know, Cu generally is toxic for algae. But $CuSO_4$ is dissolved in water, while CuO was in form of particles (nanoparticles, i.e. the particles were very small, but they were particles, which means the Cu is not dissolved). However, in both cases, the major part of Cu accumulated in the cell walls. While the $CuSO_4$ induced fast depolarization of the cell membrane potential (which is harmful to our poor *Nitellopsis*), this did not occur with the CuO nanoparticles. However, they observed a delayed effect of the nanoparticles on cell survival. This means that CuO nanoparticles also are toxic to charophyte cells, but their toxicity is delayed compared to $CuSO_4$.

Rybak et al. published two studies, one on the effect of iron sulphate, and the other on the effect of poly aluminium chloride on *Chara hispida*. Both chemicals are used in the restoration of highly eutrophic lakes. The authors found that both chemicals negatively affected the growth of *C. hispida*. This is maybe not so surprising, because both chemicals are acidic, and *C. hispida* certainly does not tolerate acidic conditions. I have to admit that I am a bit uncertain about the practical applicability of these results … personally I would not expect *C. hispida* to occur in a lake which is so severely eutrophic that one has to apply large amounts of iron or aluminium in order to reduce P concentrations. And who would apply iron or aluminium to a lake with high abundance of the – often red listed – *C. hispida*, a species which is known to reduce P from lake water and deposit it in the sediment? Actually, the *Chara* may well remove at least as much P from the lake water as iron or aluminium would do … and in addition, the *Chara* will provide this ecosystem service at no cost, and as long as it is living (in contrast to chemical treatment, which is expensive and only helps for a short period in time). So why should you want to use chemicals for something which is done by the *Chara* anyway?

Sooksawat et al. investigated the efficiency of packed bed column using *Chara aculeolata* and *Nitella opaca* for removal of Pb and Cd from wastewater. They dried and crushed the charophytes, and packed the material into columns. Then they pumped contaminated water through the columns, and measured how much Cd and Pb was removed. *C. aculeolata* was more efficient than *Nitella* (this is not so strange since calcification probably plays a role, and *C. aculeolata* often is more calcified than *Nitella*). Generally, the authors write that the *Chara* biomass can easily be harvested, because they have nuisance problems in some areas. Also, the *Chara* is effective in removing Pb and Cd from wastewaters which have relatively low concentrations in these metals. Low concentrations seem otherwise to be difficult to remove. What really surprised me was that they washed the columns with HCl afterwards, removed the heavy metals from the column, and could re-use the columns a second and a third time after washing, with only slightly less efficiency. Although it of course is a pity to use dried and crushed charophytes, this may be a technique which may turn out to be useful in some cases.

The ability of charophytes to purify water is probably related to their surface area, since phosphorus is co-bound to calciumcarbonate, and – as described in some of the above publications, also metals accumulate in the cell wall. However, estimating the surface area of charophytes – or other water plants – is not so easy. Jamoneau et al. tried to establish relationships between biomass and surface area of five macrophytes, among them *Chara fragifera*. They found a significant

correlation between surface area and biomass for all species, suggesting that biomass – which is much easier to measure than surface area - could be a good surrogate for surface area. However, the correlations were different for different species, and for some species – including *Chara fragifera* - the nature of this relationship also varied among seasons. This means that biomass in principle can be used as a proxy for surface area, but calibration of models should be made for each species, and each sampling season.

Probably, calcification also plays a role in the ability of charophytes to purify water. However, there is quite some speculation how the calcification in *Chara* actually works. Some say that calcification on alkaline surfaces of *Chara* is a by-product of bicarbonate assimilation (in other words: of photosynthesis), and light therefore promotes calcification. But others think that calcification results from an exchange of Ca^{2+} by two H^+. This would mean that calcification functions as a proton generator and does not require light. Wang et al. had a closer look on *Chara* calcification, and found that calcification in calcareous *C. vulgaris* in their experiments was mainly restrained by HCO_3^- alkalinity. In the authors interpretation, this indicates that calcification is a by-product of bicarbonate assimilation. I have to admit that I do not fully understand their argumentation (they only used two different HCO_3^- concentrations, and if HCO_3^- was limiting in the low HCO_3^- treatment, then of course photosynthesis (and coupled calcification) would increase with increasing HCO_3^-concentration; that only says that HCO_3^- was limiting, and provides no information on the mechanism of calcification; and my second argument is: the Ca^{2+}-H^+ pump would also need energy … and energy in the long run depends on photosynthesis and therefore on light … so no matter which mechanism of calcification occurs, in the long run light should have some importance; but maybe I simply did not understand everything correctly.). But even if I am not perfectly happy with the explanation yet, their result was that calcification increases with HCO_3^- concentration. This certainly is a hint that calcification of charophytes depends on habitat (water chemistry), and should not be used in *Chara* determination keys.

I am particularly happy to see that several phylogenetic studies on charophytes were published in 2017. Borges & Necchi analyzed rbcL, ITS2, and matK from 12 *Chara* populations in Brazil. They found that *C. foliolosa*, *C. haitensis*, *C. hydropitys* and *C. rusbyana*, which previously were considered as varieties and forms of *C. zeylanica*, were consistently distinguished with the three phylogenetic markers. These results greatly support the finding that rbcL, ITS2, and matK are very useful genetic markers for *Chara*, and indeed are able to distinguish among «species». And this in my view also should mean that «species» which **cannot** be distinguished by these markers maybe should not be viewed as «species» any longer.

Urbaniak & Sakayama analysed oospore wall ornamentation, as well as matK and atpB DNA sequences from five *Chara* species of the section Hartmannia, and confirmed our own earlier studies that these «species» cannot be differentiated from each other. Urbaniak & Combik (2017a) did AFLP analyses, a genetic fingerprinting technique which is supposed to be able to distinguish even small differences among taxa, on *C. tenuispina*, *C. globularis*, *C. virgata*, *C. aspera*, *C. strigosa*, *C. intermedia* and *C. hispida* from Poland. Their results generally support earlier studies using various techniques, which found that *C. tenuispina*, *C. globularis* and *C. virgata* are different (see Schneider et al., 2016). However, they found no difference between *C. aspera* and *C. strigosa*. I have a tendency to believe that this is a mistake, because there are quite many results which show that *C. strigosa* actually forms one cluster with *C. virgata*, not with *C. aspera* (see Schneider et al. 2016 and references therein). Also Beate Mannschreck got this result in her PhD using AFLP many years ago. In a related study, the same authors (2017b) examined the relationship between *C. globularis* and C. *tenuispina*closer, using atpB, matK, rbcL gene sequences, and also this study confirmed earlier studies which found that these two species form separate clades. But I cannot help commenting on one

thing: please always check the title of your papers carefully! It just it not nice to have a spelling error in the title …

A very interesting study was published by Heineke et al. They analysed sedimentary ancient DNA in Lake Karakul, Pamir Mountains (Tajikistan), and searched for *Stuckenia* and *Chara* remains. The authors could demonstrate several changes in the macrophyte composition and biomass over several thousand years (showing that there occurred more *Stuckenia* and/or *Chara* during some periods, and less in others). These changes were associated with lake level changes. It is very interesting that it actually is possible to extract and analyse DNA in lake sediments, even if they are several thousand years old. This also means that it is possible to reconstruct the overall vegetation of a lake, even if we do not find gyrogonites. Maybe we should think about a project combining the «classical» charophyte paleoecology with «modern» genetic methods. That way we could also find out to which degree gyrogonite morphology coincides with changes in the DNA sequence.

Mähnert et al. did a study which I would have liked to do myself for many years (but never managed to do, mostly because of a lack of funding). They analysed the allelopathic activity of *C. aspera*, *C. globularis*, *C. tomentosa* and *C. rudis* (which in reality of course is *C. hispida*) on several single-celled green algae, cyanobacteria and one proteobacterium. Not surprisingly (for us who «always» have known that charophytes are great), they found only a minor growth inhibition on the green algae, but strong effects on the cyanobacteria and the proteobacterium! This means that there may be a potential to use charophytes for antibiotic treatments. Check out the picture of the inhibition in their paper, it is nice to look at!

Finally, somebody started trying to bridge extant and fossil charophytology! Sanjuan et al. tested how light and water temperature affected gyrogonite production of *Chara vulgaris* and *C. globularis*. They found that gyrogonites tended to increase in size with increasing irradiance and temperature. However, at extreme conditions (very high irradiance, 35 degrees C water temperature) gyrogonites became smaller again. Frankly, I was surprised that these species consistently produced gyrogonites in the first place! In our colder Norwegian waters (and also from my earlier experience in Germany), these two species by no means always produce gyrogonites! Anyway, these results are very important for the interpretation of historic data, because gyrogonite size obviously contains information on what type of environment (warm / light contra cold / dark) they grew in.

Susanne Schneider (Norway)

References

Absolonova, M., et al. (2017). Surface pH changes suggest a role for H+/OH- channels in salinity response of *Chara australis*. Protoplasma. DOI:10.1007/s00709-017-1191-z.

Borges, F.R., Necchi, O. (2017). Taxonomy and phylogeny of *Chara* (Charophyceae, Characeae) from Brazil with emphasis on the midwest and southeast regions. Phytotaxa 302: 101-121.

Calero, S., et al. (2017). Time and heat for sexual reproduction: comparing the phenology of *Chara hispida* of two populations at different latitudes. Aquatic Botany 136: 71-81.

Ferriol, C., et al. (2017). Effects of nutrient addition, recovery thereafter and the role of macrophytes in nutrient dynamics of a Mediterranean shallow lake: a mesocosm experiment. Marine and Freshwater Research 68: 506-518.

Francoeur, S.N. (2017). Stimulation of Saginaw Bay charophyte photosynthesis by phosphorus. Journal of Great Lakes Research 43: 192-197.

Heinecke, L., et al. (2017). Aquatic macrophyte dynamics in Lake Karakul (Eastern Pamir) over the last 29 cal ka revealed by sedimentary ancient DNA and geochemical analyses of macrofossil remains. Journal of Paleolimnology 58: 403-417.

Jamoneau, A., et al. (2017). Biomass as a proxy for available surface area in freshwater macrophytes: Influence of seasonality. Aquatic Botany 142: 91-95.

Liu, N., Wu, Z. (2017). Toxic effects of linear alkylbenzene sulfonate on *Chara vulgaris* L. Environmental Science and Pollution Research International. DOI:10.1007/s11356-017-0883-4.

Manusadzianas, L., et al. (2017). Accumulation of copper in the cell compartments of charophyte

Nitellopsis obtusa after its exposure to copper oxide nanoparticle suspension. Environmental Science and Pollution Research 24: 27653-27661.

Medeiros, E.L., Henry-Silva, G. G. (2017). Evaluation of the feeding preference between the aquatic macrophytes Egeria densa and *Chara indica* by the invasive mollusk *Melanoides tuberculata*. Brazilian Journal of Biology 77: 234-239.

Muller, S., et al. (2017). Diversity and distribution of Characeae in the Maghreb (Algeria, Morocco, Tunisia). Cryptogamie Algologie 38: 201-251.

Mähnert, B., et al. (2017). Allelopathic potential of stoneworts. Fottea 17: 137-149.

Rojo, C., et al. (2017a). Different responses of coexisting *Chara* species to foreseeable Mediterranean temperature and salinity increases. Aquatic Botany 138: 53-63.

Rojo, C., et al. (2017b). Microalgal and cyanobacterial assemblages on charophytes: a metacommunity perspective. Fundamental and Applied Limnology 190: 97-115.

Rybak, M., et al. (2017). Bioaccumulation and toxicity studies of macroalgae (Charophyceae) treated with aluminium: Experimental studies in the context of lake restoration. Ecotoxicology and Environmental Safety 145: 359-366.

Rybak, M., et al. (2017). The inhibition of growth and oospores production in *Chara hispida* L. as an effect of iron sulphate addition: Conclusions for the use of iron coagulants in lake restoration. Ecological Engineering 105: 1-6.

Sanjuan, J., et al. (2017). Effects of light and temperature on *Chara vulgaris* (Charophyceae) gyrogonite productivity and polymorphism - palaeoenvironmental implications. Phycologia 56: 204-212.

Schneider, S.C., Nowak, P., Von Ammon, U., Ballot, A. (2016): Species differentiation in the genus Chara (Charophyceae): considerable phenotypic plasticity occurs within homogenous genetic groups, European Journal of Phycology 51: 282-293.

Sinkeviciene, Z., et al. (2017). Charophytes in the estuarine Curonian Lagoon: Have the changes in diversity, abundance and distribution occurred since the late 1940s? Oceanological and Hydrobiological Studies 46: 186-198.

Sooksawat, N., et al. (2017). Performance of packed bed column using *Chara aculeolata* biomass for removal of Pb and Cd ions from wastewater. Journal of Environmental Science and Health Part A-Toxic/Hazardous Substances & Environmental Engineering 52: 539-546.

Townsend, S., et al. (2017). Recovery of benthic primary producers from flood disturbance and its implications for an altered flow regime in a tropical savannah river (Australia). Aquatic Botany 136: 9-20.

Trajanovska, S., et al. (2017). Distribution, ecology and morphological variability of *Chara globularis* Thuillier, 1799 from lake Ohrid. International Journal of Ecosystems and Ecology Science-IJEES 7: 731-736.

Urbaniak, J., Combik, M. (2017). Taxonomic status of *Chara tenuspina* A. BR. (Streptophyta: Charales) based on LM morphology, matK, atpB and rbcL of cpDNA sequences. Fottea 17: 20-33.

Urbaniak, J., Combik, M. (2017a). Amplified fragment length polymorphism (AFLP)-based differentiation of selected Chara species. Oceanological And Hydrobiological Studies 46: 74-84.

Urbaniak, J., Sakayama, H. (2017). Taxonomical analysis of closely related species of *Chara* L. section Hartmania (Streptophyta: Charales) based on morphological and molecular data. Fottea 17: 222-239.

Wang, H.Y., et al. (2017). Significance of HCO3- alkalinity in calcification and utilization of dissolved inorganic carbon in *Chara vulgaris*. Aquatic Biology 26: 169-178.

CHAROPHYTES IN AUSTRALIA

It has been very interesting to hear about the recent research and workshops on charophytes in the Northern Hemisphere. I thought I'd let you know how things are progressing atthe bottom end of the world.

Charophytes are still not well known in this region. Although there is a high occurrence and diversity there are few specialists that study them. We are still undertaking alpha-taxonomy (i.e. first descriptions of species) for many regions. Work by William Perez (with Ken Karol) has shown that the species of *Tolypella* recorded for Australia are all different from those in North America. To improve the status of charophyte knowledge in Australia I am working on a treatment on the Northern Territory charophytes (a northern state of Australia), and will likely describe in excess of 10 new species, along with extended ranges of Asian species. In my

investigations I have also found a new record of *Lychnothamnus barbatus* from Timor Leste.

Charophytes disappeared from Great Lake in Tasmania a few years ago when the water-levels dropped to record lows. They had formerly been the basis of a food web supporting critically endangered invertebrates as well as a famous trout fishery. The lake managers instigated a project to examine the recovery of the charophyte community, and the latest samples I've seen indicate that the community (of 10-13 species) is returning and starting to reproduce. This is a very positive sign that charophytes can retain some resilience even when catastrophic droughts occur.

In Australia we have fairly mature endangered species legislation, and this is getting updated right now. We are developing an alignment with the IUCN red list process, assessing species in the same categories (Critically endangered, Endangered, Threatened/Vulnerable). Two charophytes are listed under various state and federal acts (*Lychnothamnus barbatus* and *Nitella parooensis*). As well, we have the capacity to list ecological communities, and within that section several undescribed species of charophytes are protected (in Seasonal Herbaceous Wetlands and Mound Springs of central Australia).

Michelle Casanova (Australia)

PhD THESIS COMPLETION

Alba Vicente Rodríguez, Earth Science Department, University of Barcelona
Supervisor : Carles Martín-Closas
PhD thesis title: ***Charophytes from the Cretaceous-Palaeogene boundary in the South-Pyrenean basins.***

On June 28, 2017, Alba Vicente Rodríguez defended her thesis at the University of Barcelona in front of the examinators: Prof. Ferran Colombo Piñol (Earth Sciences Barcelona), Bernat Vila Ginestí (Institut Català de Paleontologia, Sabadell), Ingeborg Soulié-Märsche (CNRS, Montpellier).

The thesis presents a synthetic overview and new results about the much-debated Cretaceous–Palaeogene(K/Pg) boundary (66 million years ago) and develops new ideas about the importance of ecological adaptation of the charophytes.

The thesis is based on intensive fieldwork in three South-Pyrenean basins. 16 outcrop sections were investigated; up to 200 sediment samples were prepared for micropalaeontological analyses. The investigations present successively:

- The systematics of the charophytes studied: 19 species belonging to 7 genera and three different families were identified. Three new species were described. The descriptions were conducted at population level of mostly 100 gyrogonites so as to take in account the morphological polymorphism. High magnification Scanning electron microscope photographs depict the gyrogonite's morphology for every species.

- Sedimentology, taphonomy and palaeoecology were investigated. The sedimentological criteria allow defining the depositional conditions (brackish water, freshwater and fluvial deposits) from which the different species are found. These investigations are a pre-requisite for establishing the relationship of particular charophyte species as indicators for a given palaeo-environment.

- The evolution of the Cretaceous/Palaeogene charophytes is revised by introducing the taxonomic concept of evolutionary species. This allowed establishing gradualistic linages of species of the genus *Peckichara*.

- The chapterPalaeobiogeography points to the importance of distinguishing cosmopolitan and endemic species among the fossil material.

- The interrelationships of the detailed studies exposed in the previous chapters led the author to propose a new charophyte biozonation for the K/Pg boundary spanning from the Maastrichtian to the Danian.

The original title is "Els caròfits del límit Cretaci–Paleogen a les conques sud-pirenenques". The volume of 161 pages (in

Catalan) includes an Abridged English Version of 30 pages; all figure captions are bilingual,Catalan and English. Theindex makes it easy to find the 32 figures when reading the English summary.The volume has a clear structure and leads to significant results in the fields of taxonomy, biostratigraphy palaeo-ecology and the evolution of the charophytes as can be inferred from the fossil gyrogonites at the K/Pg boundary in the South-Pyrenean basins. The results lead to the consideration that the changes of the flora are due to progressive environmental changes rather than to the global biotic crisis. Five publications in indexed journals expose the results to a large readership and can be obtained as a pdf from the author. The thesis can be downloaded from the following website:
http://www.tdx.cat/handle/10803/436897.

Ingeborg Soulié-Märsche (France)

MEMBERSHIP FEES

Please do not forget to send your membership fee for 2018. Multiple year payment is encouraged to reduce banking costs.

INTERNATIONAL RESEARCH GROUP ON CHAROPHYTES

Membership fee annual amount – € 20
Multiple-year payment is encouraged to reduce mailing and banking costs.
Any questions about membership fees should be addressed to:
IRGC Treasurer Emile Nat, e.nat@kranswieren.nl

Bank to bank transfer
Please pay to the IRGC account at Banque La Poste, France, and then send the receipt of your payment to Dr Emile Nat (The Netherlands), IRGC Treasurer, for our records (e-mail address: e.nat@kranswieren.nl)
When doing the bank transfer please ensure that your name and years of membership paid are included in the payment form.
To do the bank transfer, please give the following information to your bank:

Account-holder: Int Research Grp on Charophytes
Dr Emile Nat
Grote Ruwenberg 17
1083 BS Amsterdam
Netherland
Name of bank: BANQUE LA POSTE
Address of Bank: Centre Financier, 13900 Marseille Cedex 20, France
BIC (International ID of Bank): PSSTFRPPMON
IBAN: FR 76 20041 01009 0350328M030 21

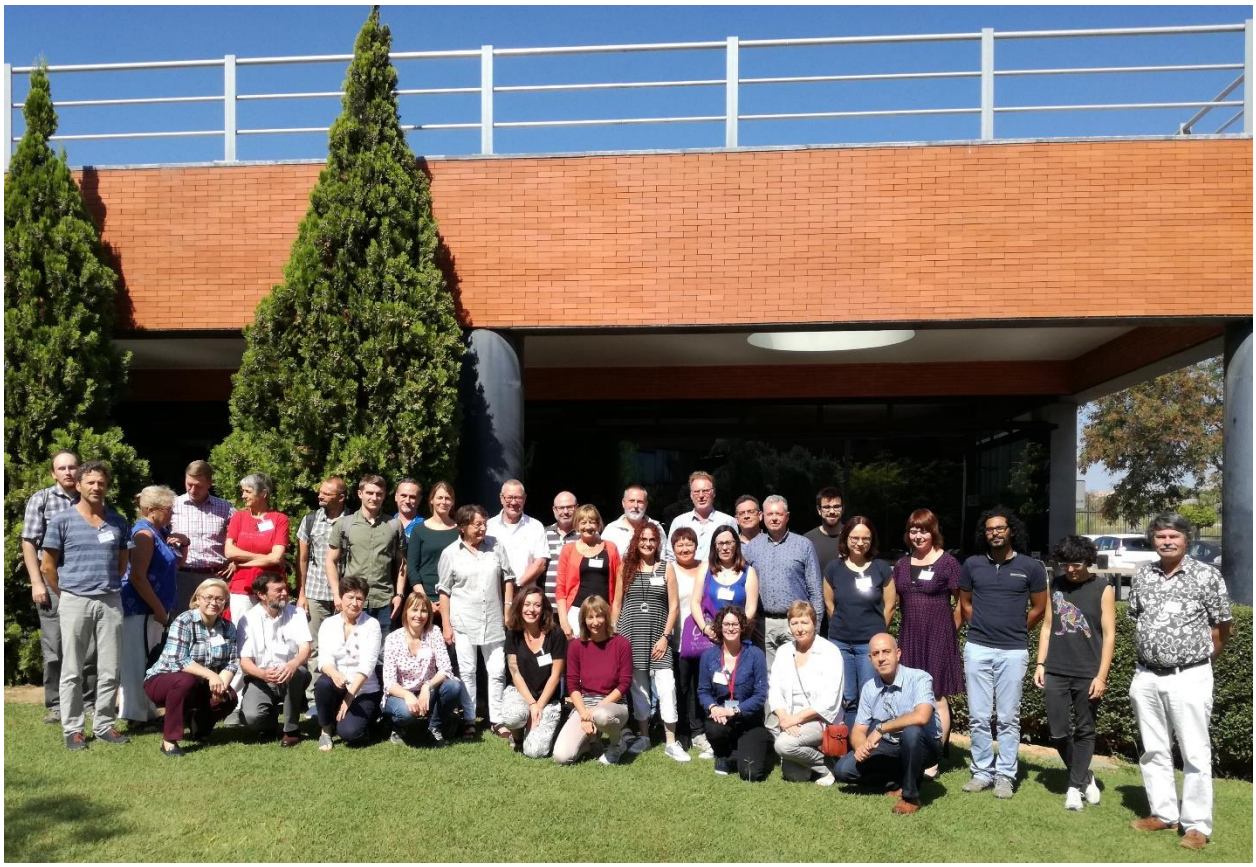
E-MAIL ADDRESSES OF IRGC MEMBERS

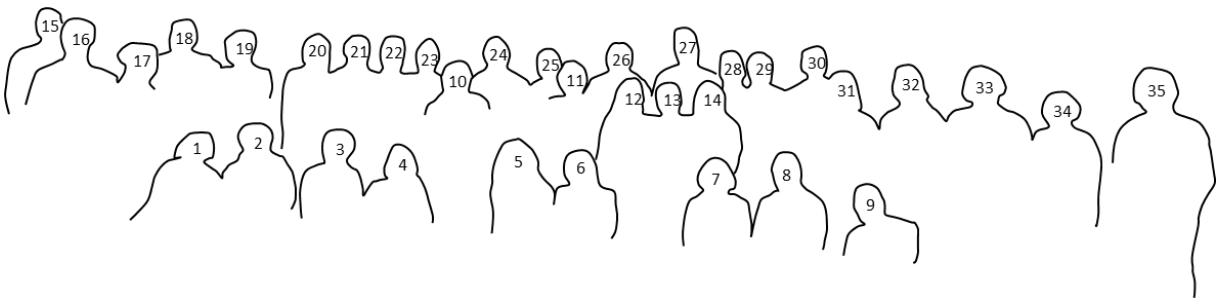
Please **send any address changes (both surface mail and e-mail)** to the IRGC-Secretary, Kaire Torn(kaire.torn@ut.ee) to ensure you receive forthcoming information. Updated March 2018.

Abdelahad, Nadia	nadia.abdelahad@uniroma1.it
Ahmadi, Akram	ahmadi2002fr@yahoo.com
Akbayeva, Lyailya	akbaeva659@mail.ru
Alix, Mitchell S.	malix@pnw.edu
Auderset Joye, Dominique	Dominique.Auderset@unige.ch
Azzella, Mattia M.	mattia.azzella@gmail.com
Barinova, Sophia	sophia@evo.haifa.ac.il
Båstrup-Spohr, Lars	lbaastrupspohr@bio.ku.dk
Becker, Ralf	becker.ra@web.de
Beilby, Mary Jane	m.j.beilby@unsw.edu.au
Beisenova, Raikhan	raihan-b-r@yandex.kz
Bengtsson, Roland	Roland.bengtsson@mikroalg.se
Benoit, Roch-Alexandre	roch-alexandre.benoit@laposte.net
Bernhardt, Karl Georg	karl-georg.bernhardt@boku.ac.at
Bisson, Mary A.	bisson@buffalo.edu
Blazencic, Jelena	jelenablazencic@gmail.com
Blindow, Irmgard	blindi@uni-greifswald.de
Boissezon , Aurélie	aurelie.boissezon@hesge.ch
Borysova, Olena	oborysova@yandex.ru
Breithaupt, Christian	Christian.breithaupt@gmx.de
Bruinsma, John	bruinsma@dse.nl
Brzozowski, Michał	mbrozozowski@gmail.com,
Bučas, Martynas	martynas.bucas@jmtc.ku.lt
Calero Cervera, Sara	sara.calero@uv.es
Casanova, Michelle T.	amcnova@netconnect.com.au
Chivas, Allan R.	toschi@uow.edu.au
De Sosa Tomas, Andrea	adesosatomas@gmail.com
Feist, M., Monique	mjcfeist@hotmail.fr
Flor-Arnau, Nuria	nurnu@yahoo.es
Foissner, Ilse	ilse.foissner@sbg.ac.at
Garcia, Adriana	adriana@uow.edu.au
Gottschalk, Stephen	stephen.gottschalk@gmail.com
Grillas, Patrick	grillas@tourduvalat.org
Grinberga, Laura	laura.grinberga@gmail.com
Haas, Jean Nicolas	Jean-Nicolas.Haas@uibk.ac.at
Hannibal, Joseph	jhannibal@cmnh.org
Herbst, Anne	anneherbst@gmx.de
Holzhausen, Anja	anja.holzhausen@uni-rostock.de
Hutorowicz, Andrzej	a.hutorowicz@infish.com.pl
Inkarova, Zhanslu	inkarzh@mail.ru
Kalin, Margarete	margarete.kalin@utoronto.ca
Karol, Ken	kkarol@nybg.org
Kirschey, Tom	Tom.Kirschey@NABU.de
Koistinen, Marja	marja.koistinen@helsinki.fi
Kovtun-Kante, Anastasiia	kovtun.kante@gmail.com
Kozlowski, Gregor	gregor.kozlowski@unifr.ch
Kyrkander, Tina	tina.kyrkander@biologiochmiljo.se
Lambert-Servien, Elisabeth	elambert@uco.fr
Li, Sha	shali@nigpas.ac.cn
Mann, Henry	hmann@grenfell.mun.ca
Martin, Georg	georg.martin@ut.ee
Martin-Closas, Carles	cmartinclosas@ub.edu
Mccourt, R M	rmccourt@gmail.com
Mebrouk, Fateh	mebrouk06@yahoo.fr
Meiers, Susan	ST-Meiers@wiu.edu
Nat, Emile	e.nat@kranswieren.nl
Nowak, Petra	petra.nowak@uni-rostock.de
Pełechaty, Mariusz	marpelhydro@poczta.onet.pl
Popłońska, Katarzyna	katarzyna.poplonska@biol.uni.lodz.pl
Pronin, Eugeniusz	gubu@o2.pl
Puche Franqueza, Eric	eric.puche@uv.es
Pukacz, Andrzej	pukacz@europa-uni.de
Raabe, Uwe	uraabe@yahoo.de
Ribaudo, Cristina	cristina.ribaudo@irstea.fr
Rodrigo, Maria	maria.a.rodrigo@uv.es
Romanov, Roman	Romanov_r_e@ngs.ru
Romo, Susana	susana.romo@uv.es
Sakayama, Hidetoshi	hsak@port.kobe-u.ac.jp
Sanjuan Girbau, Josep	josepst.juan@hotmail.com
Schneider, Susanne	susi.schneider@niva.no
Schubert, Hendrik	hendrik.schubert@uni-rostock.de
Schwarzer, Arno	arno.schwarzer@aschwarzer.net
Scribailo, Robin W.	rscrib@pnw.edu
Simons, Jan	Jan.Simons@gmx.com
Sinkevičienė, Zofija	zofijasin@gmail.com
Sleith, Robin	robinsleith@gmail.com
Soulié-Märsche, Ingeborg	insouma43@gmail.com
Stewart, Nick	nfstewart@freeuk.com
Strzałek, Małgorzata	malgorzata.stralek@uph.edu.pl
Sugier, Piotr	piotr.sugier@poczta.umcs.lublin.pl
Torn, Kaire	kaire.torn@ut.ee
Trbojević, Ivana	ivanatrbojevic@yahoo.com
Troia, Angelo	angelo.troia@unipa.it
Van de Weyer, Klaus	klaus.vdweyer@lanaplan.de
Vesić, Aleksandra	gmvalex@gmail.com
Vicente Rodríguez, Alba	albavicenterodriguez@ub.edu avicenro@gmail.com
Wang, Qi-Fei	qfwang@nigpas.ac.cn
Wojtczak, Agnieszka	agnieszka.wojtczak@biol.uni.lodz.pl
Zhamangara, Aizhan	kashagankizi@mail.ru
Zviedre, Egita	egita.zviedre@ldm.gov.lv

GROUP PHOTOGRAPH 2017

21st GEC Meeting, Valencia, Spain





1. Lyailya Akbayeva 2. Allan Chivas 3. Dominique Auderset Joye 4. Kaire Torn 5. Aurélie Boissezon 6. Susi Schneider 7. Sara Calero 8. Zofija Sinkeviciene 9. Fateh Mebrouk 10. Ingeborg Soulié-Märsche 11. Adriana García 12. Maria Rodrigo 13. Aizhan Zhamangara 14. Mati Segura 15. Roman Romanov 16. Arno Schwarzer 17. Sophia Barinova 18. Andrzej Pukacz 19. Irmgard Blindow 20. Mariusz Pełechaty 21. Michal Brzozowski 22. Angelo Troia 23. Anne Herbst 24. Volker Krautkrämer 25. Francisco José Guerrero 26. Fernando Ortega 27. Ralf Becker 28. Carles Martín-Closas 29. Emile Nat 30. Eric Puche 31. Laura Grinberga 32. Egita Zviedre 33. Roch-Alexandre Benoit 34. Alba Vicente 35. Jean Nicolas Haas