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Cover image: Surrounded by a glowing halo of spines and photosymbionts, planktonic Foraminifera live at the centre of their own personal universe. *Orbulina universa* in particular would make an excellent solar system. Drawing made using soft pastels on black paper. It is based on a live *Orbulina universa* studied during a workshop on culturing planktonic Foraminifera on Catalina Island in 2015.

Image by Anieke Brombacher, National Oceanography Centre, UK (Anieke.Brombacher@soton.ac.uk).

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Selected Extracts!

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*this file only contains the parts of the TMS Newsletter dealing with
coccolithophores and the micropalaeontologists who work on them -
you can download the rest from the TMS website*

Jeremy

be valid for taxonomical or nomenclatural purposes—see International Codes of Botanical and Zoological Nomenclature.

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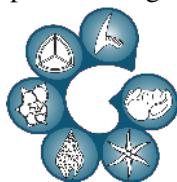
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The International Nannoplankton Association



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Nanno News—updates from the TMS Nannofossil Group and the INA

Jeremy Young¹, Amy Jones², and Sarah Alvarez³; ¹University College London (UK), ²University of Birminham (UK), University of Gibraltar (BOT)

TMS Foram–Nannofossil group meeting in Fribourg, 1–4 July

In Early July, during the European heatwave, we had the TMS Foram–Nannofossil group meeting in July, hosted in fine style by Silvia Spezzaferri and her team. This was really good meeting and if benthic Foraminifera proved the main focus (see separate report) there was a useful attendance of nannofossil workers. The meeting started with a day of workshops and for this we organized an afternoon on Neogene nannofossil taxonomy and biostratigraphic advancements lead by Eric de Kaenel. This session was inspired by the remarkable work of the BP biostratigraphic group who have undertaken a 15 year review and synthesis of Neogene biostratigraphy and taxonomy. The main taxonomic papers were published in the *Journal of Nannoplankton Research* in late 2017 and the biostrati-

graphic scheme this year (Bergen et al. 2019) in the *GSA Bulletin*. The stratigraphic scheme has an average resolution of 144 kyrs, representing a 5- to 8-fold improvement on the classic schemes! Obviously it was impossible to go into this thoroughly in only half a day but Eric provided a fascinating, if slightly daunting, overview. In the main session, a highlight for the nannofossil aficionados was a keynote talk by Francesca Lozar on the perennially fascinating Messinian salinity crisis and particularly on the distinctive nannofossil assemblages that develop immediately below the main evaporites.

Strati 2019 Conference, Milan , 2–5 July

Strati 2019 was the ‘3rd International Congress on Stratigraphy’, and it was a big meeting with hundreds of delegates and multiple parallel sessions, but still a nice friendly feeling as stratigraphy is rather a well-defined community. Nannofos-



Figure 2: Lecturers, students, and *Cyclagelosphaera* at the INA Summer School.

sils are a key group in Mesozoic and Cenozoic stratigraphy; Italy is a centre of nannofossil studies and the meeting was co-convened by nannofossil palaeontologist Elisabetta Erba of the Università degli Studi di Milano. So, it is not surprising that this meeting was well attended by nannofossil experts who gave many presentations, including a keynote by Claudia Agnini.

Second INA summer School—Mesozoic Nannofossils, 7–13 July, Lyon

Last year saw the first INA Summer School on Evolution and taxonomy, focussing on the Cenozoic, and it was followed this year by a second one on the Mesozoic. The workshop was again hosted by Emanuela Mattioli who co-organized it with

INA President Giuliana Villa, assisted by Matt Hampton and Jeremy Young. Lecturers also included David Watkins, Elisabetta Erba, and Jörg Mutterlose. The workshop proved very popular and the places were rapidly taken, including many by students who had attended the previous year and wanted to develop both their knowledge of nannofossils and the friendship made at the first workshop. This was helped by sponsorship from a range of sources including the TMS Education Trust.

INA 17—Santos, Brazil, 15–20 September 2019

As the newsletter deadline looms, many of us are about to end our summers by travelling to Brazil for the next International Nannoplankton Association conference.

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Bolivar M, and Clark K (2019) BP Gulf of Mexico Neogene astronomically-tuned time scale (BP GNATTS). *GSA Bulletin*. doi:[10.1130/B35062.1](https://doi.org/10.1130/B35062.1).

Grzybowski Foundation news (gf.tmsoc.org)

Mike Kaminski, King Fahd University of Petroleum & Minerals (Saudi Arabia)

During the spring of 2019, the Grzybowski Foundation (GF) has been a hub of activity. At the European Micropalaeontological Reference Centre (EMRC), we took possession of another wooden microscope slide cabinet, and work continued with the curation of the D. G. Jenkins collection of microscope slides. As I take time to look through the collection, I encounter more and more surprises. This summer, I opened up a small cardboard box labelled 'Contents of the Green Microslide Cabinet', which Graham had evidently brought from New Zealand. The box contained slides that were obviously valuable to him, including several slides of planktonic foraminiferal paratypes and topotypes that were sent to him by various colleagues, several slides from his paper 'Planktonic Foraminifera from the lakes entrance oil

shaft, Victoria, Australia' published in *Micropaleontology* in 1960, and the remaining type material from his paper 'Guembelitra samwelli Jenkins, a new species from the Oligocene of the Southern Hemisphere', published in the *Journal of Foraminiferal Research* in 1978. However, many of the slides in the box are poorly labelled, and it will take time to figure out if they can be assigned to particular publications. Other acquisitions to the type collections include the type specimens of the new species *Agglutinella kaminskii* Garrison, 2019, published in the current issue of *Micropaleontology*, and the slides relating to my study with Andreas Wetzel (2004) 'An agglutinated protozoan predator: A burrow filled with tubular agglutinated protozoans in the abyssal South China Sea' published in the *Proceedings of the Sixth Interna-*

Reports

Meeting reports

Report on the INA (International Nannoplankton Association) Summer School on Evolution and Taxonomy

Majd Homaidan Shmeit, Université Grenoble Alpes (France)

The INA held its 2nd summer school on ‘Evolution and Taxonomy of Calcareous Nannofossils’ at the Université de Lyon 1, specifically at the ‘Laboratory of Geology of Lyon: Earth, Planets and Environments’. Including the ice breaker evening and field day, the summer school extended for seven days from the 7 to 13 July. This year involved Mesozoic calcareous nannofossils and was an extension to the 1st summer school of last year, that dealt with the Cenozoic.

Over the course of the week, eight speakers provided lectures not only on calcareous nannofossil evolution and taxonomy, as the summer school’s name suggests, but also on palaeoceanography and biostratigraphy. We paired up in a classroom with microscopes, such that the lectures and coccoliths ‘hunting’ were interchangeable. Speaking of pair-

ing up, sharing the microscope with a colleague from different background and expertise is noteworthy as we further got to know each other and went through the struggle of finding the sought marker taxa together. In the following section I will try to be as concise as possible, trusting you understand the difficulty of this task under a profusion of calcareous nannofossil research assorted with cheerful and friendly moments.



Figure 9: Classroom where lectures and microscopic sessions were held.

On the first day, Emanuella Mat-
tioli (Université de Lyon 1), who
is also an organizer of the summer
school and head of the ‘Laboratory
of Geology of Lyon’, covered the
evolution of calcareous nannofossils
during the late Triassic and early Jur-
assic. It was beyond interesting to
have a look at the earliest nannoliths
and muroliths to have ever evolved!
It is interesting only if you think of it
this way, because the preservation
of these old specimens . . . let us
skip this part; and move to the un-
skippable ‘Mid Mesozoic Revolu-
tion’ that Emanuella discussed, and
how the nanno-world considerably
altered Earth’s climate along with
the carbon cycle and oceans’ chem-
istry. Fabienne Giraud (Université
Grenoble Alpes) presented on the
second day calcareous nannofossils
of the middle and late Jurassic. That
morning was packed with morpho-
types of different *Watznaueria* spe-
cies; additionally, she revealed the
use of statistical morphometric ana-
lysis to validate the morphometric
divisions and their application in
biozonation.

If we can have a small break
and remind ourselves that all these
talks included some palaeoceanog-

raphy, palaeogeography, taxonomy,
and of course microscopic nanno-
fossil hunting. Moving on to the
third day, Elisabetta Erba (Università
degli Studi di Milano) gave a lengthy
talk on the Jurassic–Cretaceous
boundary and the lower Cretaceous
oceanic anoxic events (OAE); of
course one cannot pass by the Creta-
ceous without speaking of OAEs.
The lower Cretaceous was also a
period of nannofossil diversification
and a prosperous time for highly-
calcified genera such as the Nanno-
conids, as Elisabetta stated. Jörg Mut-
terlose (Ruhr-Universität Bochum)
took the floor later that afternoon and
guided us to the Boreal realm, since
many of the aforementioned stud-
ies were Tethyan. Clearly, as geo-
graphy implies, he discussed glaci-
ation episodes during a greenhouse-
Earth, and how the resulting eu-
static sea-level changes affected pro-
vincialism versus cosmopolitan dis-
tributions of the calcareous nanno-
floras.

This time a real breather, as we
are more than half-way through; and
allow me to show you how, so far,
the summer school has been practic-
ally significant. My Ph.D. project
concerns the Weissert oceanic an-

oxic event of the Valanginian (lower Cretaceous). First, I mention the value of knowing the ancestry of nannofossil genera I have been observing in my samples, additional to the lineages surviving on to the younger stages. Second, it was beneficial to have a step backwards and view all these environmental perturbations and OAEs occurring above and below the Valanginian. Last but not least, I arrived to the summer school with questions on palaeoceanographic interpretations and images of coccoliths I doubtfully identified, because I knew that the researchers we were going to meet are amongst the capacities concerning these scientific problematics.

Catching up with the fourth day, David Watkins (University of Nebraska—Lincoln) presented the late Cretaceous nannofossil orders, their large diversification and its impact on chalk production. He made a point linking the chalk production with the period's name. If you have previously met David, then you surely know his humour. He asked for our help to uncover the biozones to which some of his samples belonged; he said, he lost the age tags! Finally, the last day was at-

tributed to the statistical treatment of calcareous nannofossil data. This was a well-needed session where I was capable of testing statistical tools on my data and have advice from Baptiste Suchéras (CEREGE) and Jorge Ferreira (Universidade de Lisboa). They also introduced a log-ratio transformation on relative abundances to apply before principal component analysis (PCA), for example.

When the course-days ended, the summer school still had one more day . . . the field excursion day. On Saturday, we hit the road for three hours (actually four hours!) to the village of La Charce. The striking geological sections we visited were worth the time we spent on the road. One of them is the proposed stratotype boundary for the base of the Hauterivian stage and showed appealing marl–limestone alternations. Everyone collected samples of their own!

To conclude, the summer school was a remarkable opportunity to meet Ph.D. students, researchers, and people working in the industry, and to share thoughts together. We discussed scientific knowledge and experiences on calcareous nanno-



Figure 10: Group photo with the proposed GSSP boundary for the base of the Hauterivian.

fossil research. Moreover, we shared amusing times and laughter, especially during the evenings. We continuously went out after the sessions for a drink, or a meal, or both at the park. Some of the colleagues, or friends shall I say, we have previously met during last year's summer school, and it was a pleasant occa-

sion to catch up after a year. Lastly, I would like to express my appreciation to the TMS and the doctoral school 'Earth, Universe and Environment' of the Université Grenoble Alpes for funding my participation in this tremendous summer school experience.

The Micropalaeontological Society's Joint Foraminifera and Nannofossil Meeting, University of Fribourg, Switzerland 1–4 July 2019: From normal marine to extreme environments—a micropaleontological perspective

Amy Jones, University of Birmingham (UK)

It was a great privilege to be the recipient of The Micropalaeontological Society's (TMS) Grant-in-Aid award which helped support my attendance and present my most recent research at the Joint Foraminifera and Nannofossil Meeting during the summer of 2019 in Switzerland. I am currently a third year Ph.D. at the University of Birmingham researching the macroevolutionary drivers, diversity, and disparity of tropical calcareous nannoplankton through the Palaeogene and Neogene periods; specifically focusing on cooling events of these periods including: the Eocene–Oligocene transition and the middle Miocene to Pleistocene nannofossil records of the Indo–Pacific warm pool.

The TMS Foram–Nanno Meeting is run annually and brings together students and researchers of varying micropalaeontological disciplines from around the world for this specialized conference. From 1–4 July 2019, the stunning city of

Fribourg hosted over 80 participants for this year's conference. Fribourg, founded in 1157, is situated in the heart of Switzerland and is at the base of the Prealps. With historic bridges, cobbled roads through the old town, and stunning landscape valleys it was easy to fall in love with this picturesque city. Over the three days: three workshops, 27 oral presentations, and 44 posters were showcased to delegates. The conference was locally organised by Silvia Spezzaferri, Stephanie Hayman, and Valentina Beccari; and Silvia Spezzaferri, Martin Langer, and Roberto Rettori were part of the scientific committee.

The meeting took place at the university campus Pérolles, with the workshops hosted within the Department of Geosciences with presentations on the following days, hosted within the modern facilities of the universities' conference venue. Keynote speakers for the workshops held on the first day of the meet-



(a) Workshop 3.



(b) My poster.



(c) Nannotax update.



(d) Fribourg.



(e) Fribourg.



(f) Field trip.

Figure 21: Impressions from the TMS Foram-Nanno Meeting.

ing were: Guillem Mateu Vicens and Patrick Schwing on biomonitoring with benthic Foraminifera during workshops 1 & 2; and Eric de Kaenel for workshop 3, on Neogene nannofossil taxonomy and biostratigraphic advancements. I personally attended workshop 3 as this best suited my research focus area. The research presented within this workshop was outstanding, with new advancements and some intriguing finds being revealed. Eric de Kaenel posed some interesting biostratigraphic implications for the Neogene period while proposing the coccosphere arrangement for *Discoaster*, a long-time enigma in nanopalaeontology. Jeremy Young gave the second half of the workshop, which complimented the first half of the workshop, comprising discussions on taxonomy of newly named species, their validity, and new data entries into Nannotax.

Following the workshops, was the ice-breaker party, held in Pavillion Vert which resided in the stunning botanical gardens behind the workshop venue. The weather was kinder towards the evening, with the hot temperatures from the heat-wave sweeping across Europe, the

afternoon bought a gentle cooling breeze; perfect for conversing with old friends and new. The food platters were plenty and heartedly stocked with a great variety of nibbles, and of course, a good selection of wines! The botanical gardens bought a tranquil atmosphere to the ice-breaker, with bird-songs in the background and the sound of running water entering the ponds it was truly an exceptional location to host such an event.

The following days of the Foraminifera Meeting saw a great abundance of oral presentations focused on the theme of the conference 'From Normal Marine to Extreme Environments'. Keynote speakers on this first day during the oral presentations included: Giuliana Panieri and Francesca Lozar, offering different insights to the conference theme on Foraminifera in methane seep sites and measuring the impact of the Messinian salinity crisis on nannofossil assemblages, respectively. During coffee breaks in between each session, there was the chance to have further discussion with presenters from their session and the opportunity to have a first look at the posters on display at this

years' conference whilst engaging with the poster presenters and their research in fulfilling conversation. The first day of the conference concluded with a guided poster session. As there were many posters to judge, each side of the room was divided into two and the first half of poster presenters were given minutes to explain their poster in detail to the judges.

On Wednesday the 3rd of July, the final day of oral and poster presentations, a profusion of captivating research was presented once again across the sessions of the day. Joachim Schönfeld was the keynote speaker for the day and started the morning session by presenting 'Sequencing Biostratigraphy for Transcribing Past Environments', this was a truly incredible presentation. As the day continued, with enthralling research ideas, discussions, and debates, the coffee breaks became ever more an excellent chance to hear more from presenters. The afternoon concluded with the final remaining posters being judged during the guided poster session. This was when I got my opportunity to showcase my recent research to the judges and other delegates that were

interested in my work. My poster focused on the Miocene–Pliocene transition in calcareous nannofossil assemblages; highlighting the significance of the Indo–Pacific warm pool across this transition period and an initial look at how the nanoplankton assemblages react with such changing environments.

On this evening came the conference dinner, which was held at the Pinte des Trois Carnard in the Gotteron Valley. Some of the delegates walked from the institution where the conference concluded into the Gotteron Valley and others took a local bus. I decided from all the glorious Swiss food I had been gorging myself on, that the walk would be good for me. Those that also chose to walk to the restaurant, embarked on a scenic and insightful geology 4 km-walk. We descended down the valley from the institution to the Lac de Pérolles, which is formed by the Maigrage dam; built in 1857 it is a reservoir to the Sarine river which runs through Fribourg. As we ventured down the valley, demonstrations and explanations on the local regional geology and the formation of the Fribourg valleys were demonstrated by look-

ing at the sandstones and via diagrams shown to our group. After passing the dam, we went through the old town of Fribourg with many of the authentic houses, some over 200 years old! This picturesque route also took us across three authentic wooden bridges and into the superb gorge where we found the Pinte des Trois Canards. A joyous evening meal with many enjoying

the women's football between The Netherlands and Sweden!

An incredibly enjoyable end to the Foram–Nanno Meeting with the event as a whole being filled with exciting and inspiring new research, fabulous workshops, and beautiful scenery. A massive thank you once again to the TMS for funding my attendance.

Third International Congress on Stratigraphy, Milan (Italy), 2–5 July 2019. ST4.1—high-resolution stratigraphy of carbonate platforms: Unlocking the shallow-water archive of extreme palaeoenvironmental events

Cemile Solak, Mersin Üniversitesi (Turkey)

The International Congress on Stratigraphy (STRATI 2019), which is held every two years since 2013, was organized in Milan (Italy) between 2 and 5 July this year. The third edition of STRATI was hosted by the Università degli Studi di Milano, Via Festa del Perdono 7, located in the old ‘Ca’ Granda’ (literally ‘the big house’). It is a historical complex in the heart of Milan, located only a seven-minute walk from the famous Piazza del Duomo and easily reachable. This congress provided

the opportunity to discuss the recent developments in the studies of stratigraphy ranging in age from the Precambrian to the Holocene, including also all the stratigraphic techniques.

The ‘ST4.1 High-Resolution Stratigraphy of Carbonate Platforms: Unlocking the Shallow-Water Archive of Extreme Palaeoenvironmental Events in the T4. Stratigraphy of Carbonates and Carbonate Platforms’ session was held in Room 109. Convener Mariano Parente and co-conveners Stephane Bodin, Gi-

