



# International School on Foraminifera

## 12<sup>th</sup> Course

### Urbino

9<sup>th</sup> – 28<sup>th</sup> June, 2019

### First Circular

#### Course Description

The 12<sup>th</sup> Course on Foraminifera is designed to provide an overview of the Taxonomy, Ecology, Biodiversity, and Geological History of Benthic and Planktonic Foraminifera. This intensive course is intended for students interested in Micropalaeontology, Palaeoceanography, Palaeoecology, Climate History, Biology, and Environmental applications. The aim is to provide a primer on the study of foraminifera and examples of how foraminifera can be used as (paleo)environmental and (paleo)oceanographical proxies. We review the current classification schemes of the foraminifera, discuss their ecology and life history, review their usefulness for biostratigraphical applications, and use case studies to investigate the geological history of the group with lab and practical sessions. The entire course consists of approximately 60 hours of lectures and 60 hours of practical work.

#### Course Structure

Four distinct courses are planned: Foraminiferal Introduction (10-14 June), Larger Benthic Foraminiferal Course (15-18 June), Smaller Benthic Foraminiferal Course (20-24 June) and Planktonic Foraminiferal Course (25-28 June).

#### Teaching Format

The course consists of lectures and practical classes covering the taxonomy, distribution, ecology, and paleoecology of foraminifera. Microscope lab sessions provide the opportunity for participants to learn the foraminiferal genera and species, and view Cretaceous to Neogene foraminiferal assemblages from Petroleum Exploration areas and ODP sites as well as Quaternary and modern assemblages. At the end of each lecture session, different tasks will be assigned to participants to reinforce the knowledge learned. Course materials include the pdf lectures and numerous pdf reprints of classic papers.

#### Courses Outline

*9 June Sunday Icebreaker Party*

#### **Foraminiferal Introduction**

*Day 1 (10 June Monday) Kaminski & Frontalini*

Welcoming speech and course presentation

Famous Names and Milestones in the Study of Foraminifera  
Introduction to Foraminifera & Review of Foraminiferal Suborders  
Sample Preparation Techniques  
Lab Task 1: Identification of foraminiferal wall composition, coiling, chamber arrangement, and apertures of benthic foraminifera  
Lab Task 2: Dividing forms by wall structure, coiling and chamber arrangement  
Material: Nova Scotia Agglutinated Foraminifera & Mediterranean Sea

Day 2 (11 June Tuesday) **Kaminski, Cetaan & Frontalini**

Morphology and Classification of Benthic Foraminifera  
Miliolids, Buliminids and small Rotaliids  
Collecting modern foraminifera  
Lab Task 1: Identification of benthic foraminiferal genera: wall composition, coiling, chamber arrangement and shape, and apertures  
Material: Arabian Gulf and Adriatic Sea

Day 3 (12 June Wednesday) **Kaminski & Cetaan**

Introduction to Planktonic Foraminifera and their Classification  
Morphology and Classification of Planktonic Foraminifera  
Lab task 1: Identification of wall structures, coiling and chamber morphology  
Material: Sargasso Sea and South Atlantic

Day 4 (13 June Thursday) **Hohenegger & Gooday**

Biology of foraminifera  
Ecology and taphonomy of foraminifera  
Lab 1: Statistical analyses for ecological and paleoecological studies  
Lab Task 1: Using statistical program packages

Day 5 (14 June Friday) **Pawlowski & Gooday**

Introduction to molecular genetics of Foraminifera  
Taxonomy, distribution and ecology of monothalamous foraminifera including deep-sea, freshwater and terrestrial species  
Lab 1: Observations of living foraminifera  
Lab 2: Samples preparation for DNA extraction  
Lab 3: Sampling methods for living foraminifera

### **Larger Benthic Foraminifera**

Day 6 (15 June Saturday) **Hohenegger, Papazzoni & Briguglio**

Biology, bauplan and functional morphology, carbonate production (recent)  
Most important groups of LBF in the Phanerozoic  
Carbonate production and taphonomy (biostratinomy and diagenesis), accumulation (inclusive nummulite banks)  
LBF morphology using loose specimens, thin sections, microCT (Lab 1)  
Upper Palaeozoic shallow water Fauna: the Fusulinina Suborder  
Lab 1: Fusulinina in thin sections

Day 7 (16 June Sunday) **Papazzoni & Briguglio**

Shallow water K/T boundary and Palaeocene LBF associations  
The Eocene biodiversity (I): the genus Nummulites  
The Eocene biodiversity (II): the genus Alveolina  
Lab 1: Palaeocene, Alveolina & Nummulites

Day 8 (17 June Monday) **Hohenegger, Papazzoni & Briguglio**

The Eocene biodiversity (III): the Orthophragminids  
Oligo-Miocene LBF associations  
Lab 1: Orthophragminids, Lepidocyclinids and Miogypsinids  
LBF biostratigraphy, Opper zones and applications  
Modern LBF: ecology, distribution (now and future), applications

Lab 2: Paleodepths estimation by means of LBF Evening Session: "Foraminiferal Party".  
Slide presentations by ISF participants - five minutes each: five photos, five PowerPoint slides

Day 9 (18 June Tuesday) Hughes

- Early Carboniferous foraminifera and their use for paleoenvironmental interpretation
- Lab and Task 1: Asbian foraminiferal identification using thin sections (paleoenvironment study)
- Late Permian foraminifera of the Middle East and their biosteering application
- Triassic micropalaeontology of the Middle East: age application
- Lab and Task 2: Triassic foraminiferal identification using photomicrographs (age determination)
- Jurassic foraminifera of the Middle East: age, paleoenvironment and implications for cycle definition
- Lab & Task 3: Jurassic foraminiferal identification using thin sections (age determination)
- Jurassic foraminifera of the Middle East (Oxfordian): age and paleoenvironment
- Lab & Task 4: Jurassic (Oxfordian) foraminiferal identification using photomicrographs: paleoenvironment exercise
- Late Jurassic hypersalinity events: foraminiferal & associated microfaunal/floral responses
- Lab & Task 5: Jurassic hypersaline foraminiferal identification using photomicrographs: paleoenvironment study
- Cretaceous foraminifera of the Middle East: age, paleoenvironment and implications for cycle definition
- Lab & Task 6: Cretaceous (Aptian) foraminiferal identification using photomicrographs: age and paleoenvironment exercise
- Neogene foraminiferal applications in the Red Sea hypersaline-associated succession

Day 10 (19 June Wednesday) Day off

**Smaller Benthic Foraminifera**

Day 11 (20 June Thursday) Kaminski

- Morphogroups and functional morphology of smaller benthic foraminifera
- Ecology and distribution of benthic Foraminifera
- Lab: Databases, Taxonomy of benthic foraminiferal suborders
- Task 1: Water depth estimation based on SBF
- Task 2: Identification of SBF morphogroups

Day 12 (21 June Friday) Kaminski & Frontalini

- Community Structure, Life History, and Reproduction
- Oceanographic proxies, benthic foraminiferal microhabitats, and productivity/oxygenation
- Benthic foraminifera and water mass properties
- Atlantic and Mediterranean shallow water benthic Foraminifera
- Lab: Modern smaller benthic foraminifera: Foraminiferal genera and assemblages
- Task 1: Productivity/oxygen estimation based on SBF
- Task 2: Environmental Interpretation
- Keynote lecture by Laia Alegret: Deep-sea drilling and the JOIDES Resolution

Day 13 (22 June Saturday) Cetaan & Alegret

- Biostratigraphy and Paleoecology of benthic foraminifera
- The ODP record, Cretaceous/Paleogene boundary, Paleocene-Eocene Thermal Maximum, Eocene hyperthermals and late Eocene
- Lab: A review of late Cretaceous to Paleogene faunas and index taxa
- Task 1: Paleodepth estimation based on upper depth limits of SBF
- Task 2: Paleoproductivity/paleoxygen estimation based on SBF

Day 14 (23 June Sunday) Kaminski & Foy

- Cenozoic Paleooceanographic events and SBF
- Neogene of West Africa, and Gulf of Mexico: The ACEX Arctic Drilling Expedition
- Lab: The Paleogene record; North Sea, Trinidad, Angola, Carpathians, Gubbio
- A review of Jurassic to late Cretaceous faunas, Bering Sea Pleistocene faunas

Task 1: Flysch type fauna identification – index taxa  
Task 2: Oxygen minimum zone fauna  
Rigs and Stuff  
Wellsite Micropaleontology

Day 15 (24 June Monday) Kaminski & Frontalini

Morning field excursion to the Gubbio area

Cretaceous-Paleogene sequence at Contessa Highway and Contessa Road  
Paleocene-Eocene Thermal Maximum and other hyperthermals at Contessa Road  
Oceanic Anoxic Event 2 “Bonarelli” at Contessa Quarry  
K/Pg boundary at Bottaccione  
Oceanic Anoxic Event 1a “Selli” at Gorgo a Cerbara  
Afternoon tourist visit to Gubbio  
Social Dinner

**Planktonic Foraminifera**

Day 16 (25 June Tuesday) Kucera

Modern Planktonic Foraminifera  
Taxonomy of modern planktonic foraminifera  
Structure of cytoplasm, Feeding, Symbionts, Ontogeny  
Reproductive and seasonal cycles, Depth habitats  
Origin of Planktonic Foraminifera  
Biogeography of Planktonic Foraminifera  
Faunal Provinces, Climatic Zones and Water Masses  
Lab 1: Recent assemblages - wall texture - shell morphology  
Task 1: Identification of latitudinal zones based on PF

Day 17 (26 June Wednesday) Wade

Neogene Planktonic Foraminifera  
Miocene and Pliocene Planktonic Foraminifera  
Pleistocene Planktonic Foraminifera  
Biochronology and Zonal schemes  
Lab 1: Miocene index species - Pliocene-Pleistocene index species  
Task 1: Identification of biozones  
Task 2: Identification of glacial and interglacial assemblages

Day 18 (27 June Thursday) Wade & Petrizzo

Paleogene Planktonic Foraminifera  
Biostratigraphy  
Notes on Paleooceanography  
Lab 1: Paleogene index species  
Task 1: Morphology of Paleogene PF  
Task 2: Identification of biozones  
Aperitif

Day 19 (28 June Friday) Petrizzo

Mesozoic Planktonic Foraminifera  
Biostratigraphy  
Notes on Paleooceanography  
Lab 1: Upper Jurassic to Maastrichtian index species  
Task 1: Morphology of Cretaceous PF  
Task 2: Identification of biozones

**Min number of participants: 20**

**Final deadline May 5<sup>th</sup>, 2019**

**Registration fees**

Early registration (registration and payment before February 3<sup>rd</sup>, 2019)

PhD/MSc Students:

One module	Euro 390
Two modules	Euro 600
Three modules	Euro 760
Full course	Euro 870

Academic/Industrial staff:

One module	Euro 570
Two modules	Euro 860
Three modules	Euro 1060
Full course	Euro 1190

Late registration (registration and payment after February 3<sup>rd</sup>, 2019)

PhD/MSc Students:

One module	Euro 450
Two modules	Euro 730
Three modules	Euro 930
Full course	Euro 1000

Academic/Industrial staff:

One module	Euro 640
Two modules	Euro 1020
Three modules	Euro 1210
Full courses	Euro 1300

The fee includes:

- lectures 4-day course)
- lecture notes, handouts, PowerPoint, pdf of reprints
- icebreaker party
- refreshments
- aperitifs
- excursion
- social dinner

**How to register**

Registration must be done by submitting the registration form that can be download from <http://isf.tmsoc.org> website, or by sending an email to [isf@tmsoc.org](mailto:isf@tmsoc.org)

The course fee must be paid to the following bank account:

Registration is upon receipt of payment in Euro (€) by direct bank transfer to:

Account name: Fundacja Mikropaleontologiczna Micropress Europe

Bank address: Raiffeisen Bank Polska S.A., ul. Piekna 20, 00-549 Warszawa

SWIFT: RCBWPLPW

IBAN: PL91 1750 0012 0000 0000 2841 0832

Currency of account: Euro (€). (Please contact us for further instructions if you wish to pay in Pounds Sterling, in US Dollars, or by Credit Card).

Reason for payment: participant's name and 12<sup>th</sup> I.S.F. (e.g. *John Smith – 12<sup>th</sup> I.S.F.*)

As soon as you have a copy of the bank transfer, please send it by e-mail to [isf@tmsoc.org](mailto:isf@tmsoc.org)

**Correspondence and Information:**

[isf@tmsoc.org](mailto:isf@tmsoc.org)

**Lectures**

Prof. Michael A. Kaminski, King Fahd University of Petroleum & Minerals (Saudi Arabia)

Dr. Fabrizio Frontalini, Urbino University (Italy)

Prof. Laia Alegret, University of Zaragoza (Spain)

Dr. Antonino Briguglio, University of Genova (Italy)

Dr. Claudia Ceteau, Robertson Ltd (UK)

Prof. Rodolfo Coccioni, Urbino University (Italy)

Dr. Danielle Foy, Blue Phoenix Geological Ltd. (UK)

Prof. Andrew Gooday, National Oceanography Centre (UK)  
Prof. Johann Hohenegger, University of Vienna (Austria)  
Prof. Geraint Wyn Hughes, King Fahd University of Petroleum & Minerals (Saudi Arabia)  
Prof. Michal Kucera, MARUM, University of Bremen (Germany)  
Prof. Cesare Andrea Papazzoni, University of Modena e Reggio Emilia (Italy)  
Prof. Jan Pawlowski, University of Geneva (Switzerland)  
Prof. Maria Rose Petrizzo, Milano University (Italy)  
Prof. Bridget Wade, University College London (UK)

#### **Scientific Directors & Coordinators**

Prof. Michael A. Kaminski, King Fahd University of Petroleum & Minerals Saudi Arabia)  
Dr. Fabrizio Frontalini, Urbino University (Italy)

#### **Requirements**

The course is primarily intended for young researchers at the PhD or MSc stages of their careers and industrial staff working with Foraminifera, Meiofauna, Micropaleontology, Paleooceanography, Paleocology, Climate History. Applicants will primarily be selected on the basis of the relevance of the course for their current work. Because the course is oversubscribed, places on the course are reserved in the order of payments received. Please register early in order to reserve your place.

#### **Location**

The course will be held in Urbino at the “Collegio Internazionale”. The “Collegio Internazionale” is in the historic center of Urbino, two blocks from the main square please visit, <http://www.collegiointernazionaleurbino.it/en/1/galleria-immagini.html>.

#### **Accommodation and meals**

It is possible for participants to book accommodation at the “Collegio Internazionale” University Hall). Most of the rooms are double-occupancy and have en-suite bathrooms, only a few single rooms are available and will be assigned in enrollment order. The rooms are furnished, air-conditioned, clean and comfortable. The cost of the accommodation is € 18 in double and € 25 in single per night including breakfast. The accommodation cost is paid upon your arrival in cash or by debit/credit card at the reception desk of Collegio Internazionale. Cafeteria meals may be obtained by a rechargeable debit card (each participant will receive a meal card at reception) at the nearby university residential block in the "Mensa del Duca" (1-minute walk from the Collegio Internazionale). The cost is € 10 for a complete meal (first course, second course, side dish, bread, fruit and water). Urbino City Tax € 7.50 for the entire stay.

#### **Insurance**

The registration fees do not include insurance of any kind. Participants are advised to take out appropriate insurance, including cover for travel, accommodation, medical assistance and personal possessions.

**The second circular** with detailed information about the course is scheduled to be distributed in early March 2019 and will be sent to people who replied to the first circular.

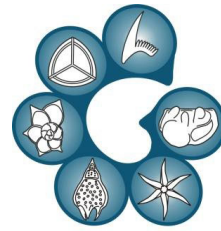
***We look forward to seeing you in Urbino!***

For more information, please visit our new website at [www.isf.tmsoc.org/](http://www.isf.tmsoc.org/)

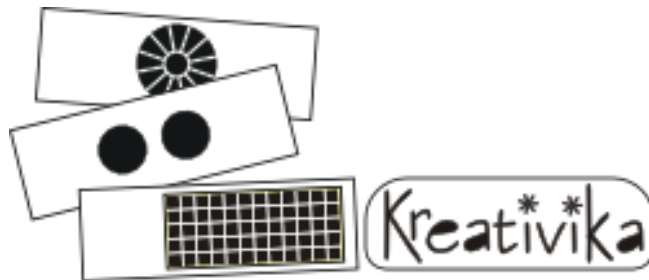
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