

SZN-MARBEF  
8<sup>th</sup> Advanced Phytoplankton Course on  
Taxonomy and Systematics  
APC8

with the support of IOC, ISSHA, UNEP, NOAA and ZEISS s.r.l.

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Marine Botany Laboratory  
Stazione Zoologica “A. Dohrn” di Napoli  
2-23 April 2005

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## ABSTRACT

The SZN-MARBEF 8<sup>th</sup> Advanced Phytoplankton Course (APC8) was held in Naples, at the Stazione Zoologica "A. Dohrn", from 2 to 23 April 2005. The Course belongs to a series started in 1976 upon recommendation of the SCOR-WG on Phytoplankton Methods (WG 33), whose main goal is to train and upgrade qualified students in the identification of phytoplankton species. The organising committee of the 2005 course was formed by Marina Montresor, Diana Sarno and Adriana Zingone, of the Marine Botany Laboratory, Stazione Zoologica 'A. Dohrn' (SZN), Naples, Italy, under the scientific responsibility of Adriana Zingone. The faculty included G.R. Hasle (Honorary Director, diatoms), M.-J. Chrétiennot-Dinet (coccolithophorids), C.B. Lange and D. Sarno (diatoms), J. Larsen (naked dinoflagellates and heterotrophic flagellates), M. Montresor (thecate dinoflagellate and resting stages), K.A. Steidinger (dinoflagellates), C. R. Tomas (raphidophytes and cultivation), J. Throndsen (other flagellates), W. Kooistra (molecular taxonomy and phylogeny) and A. Zingone (coccolithophorids and other flagellates). Additional lectures were given by PhD students of the Marine Botany Laboratory (F. Cerino, A. Amato and S. Mc Donald) and by some of the participants to the course.

Twenty-one students from 15 countries were selected out of 112 applicants from 46 countries, based on their experience in different fields of phytoplankton research. Ten participants were European and seven of them belonged to Institutions involved in MARBEF. The role of participants in monitoring and research projects was also taken into account, together with their potentiality to train other people and contribute to the diffusion of the information acquired during the course.

The Course consisted of a theory, including lectures on the general taxonomy and morphology of the different marine phytoplankton groups. All lectures were illustrated by power-point presentations. Practical sessions consisted of direct observations of a broad collection of fixed, live and slide material provided by the faculty. Relevant techniques were presented aimed at displaying taxonomic characters essential for identification in light and electron microscopy and cultivating microalgal organisms. Special sessions included TEM and SEM observations. The last week of the course consisted of exercise sessions based on mixed material provided by both the faculty and students. Serial dilution cultures set up at the beginning of the course with natural samples were also examined by the students, and the most probable number (MPN) method to estimate species abundance was demonstrated. Harmful or nuisance species received particular attention in both general and special sessions. A day and a half of the Course were devoted to molecular methods for taxonomy and phylogeny, with theoretical lessons, seminars and practical demonstrations of the whole process from DNA extraction to phylogenetic trees.

The manual on phytoplankton identification (Tomas C.R. ed., 1997) was used as the main textbook. A very comprehensive collection of reprints and identification literature was available for consultation, with all titles included in a searchable database. Handouts with details of methods illustrated were distributed. At the end of the course the students were given CD-roms with the theoretical presentations, the relevant literature for each algal class and a collection of species pictures taken with the digital camera during the observation sessions.

An evaluation of the Course was given by the participants through an anonymous questionnaire and during an open discussion in the closure session of the Course. All students declared their appreciation and acknowledged the faculty, the organisers and the secretary for their contribution to a successful Course. A general comment was that the Course greatly improved the taxonomic skills of participants, providing a means to increase the resolution in their taxonomic work. 'After this course biodiversity will increase in my area', was the comment of one of the participants.

Financial support for the Course was mainly provided by the SZN and the EU- FP6 Network of Excellence MARBEF (Marine Biodiversity and Ecosystem Functioning). Students received support by MARBEF, the UNESCO-IOC, NOAA, UNEP-MAP and ISSHA (International Society for the study of Harmful Algae) Carl Zeiss S.p.A. kindly lent 22 microscopes for the practical sessions.

Course information, report and pictures are available at <http://www.szn.it/~apc8/home.htm>.

## **1. BACKGROUND, ORGANIZATION AND GOALS**

### **1.1. Background**

Phytoplankton taxonomy is an open and actively developing field of research, which is based on morphological observations in light microscopy coupled with modern and sophisticated techniques, such as TEM, SEM and molecular biology. Over the last decades, quickly evolving knowledge in the field has led to the discovery of new classes, the establishment of new genera and species and to the redefinition of already known taxa. On the other hand taxonomy is also a tool for other disciplines, such as physiology, ecology, biogeography and molecular biology. In addition, knowledge of phytoplankton species is also essential in practical issues, e.g. in biotechnology applications, monitoring and seafood control. It is therefore essential to keep a constant flux of information between taxonomists and taxonomy users.

The SCOR-Working Group of Phytoplankton Methods (WG 33), established in 1969, suggested a tentative plan for a "Phytoplankton Course for Experienced Participants", along with a list of contents for a manual including methods and literature for the identification of marine phytoplankton. The Marine Botany Section of the University of Oslo was chosen to be responsible for the teaching programme of the Course, which was held for the first time in 1976 in Oslo. After the first Course, two other advanced Courses were held at the Biological Station in Drøbak, in 1980 and 1983, with the teaching faculty basically including the same teachers (G.R. Hasle, J. Throndsen, K. Tangen, B. Heimdal and, from 1983, K.A. Steidinger). From 1985, four advanced Courses, still under the direction of G.R. Hasle, were organized at the Marine Botany Laboratory of the Stazione Zoologica "A. Dohrn" of Naples (SZN).

Most of the teaching programme has not substantially varied over the year (Annex I), yet recent developments in the field and insights brought in by new technologies have been integrated over the years. In the APC8, an entirely new session has been added dealing with the molecular identification and phylogeny tools. A total number of 143 participants, representing 48 countries, have so far attended the eight Advanced Phytoplankton Courses. This rather special community includes several well known scientists engaged, at times in leading positions, in the field of phytoplankton research all over the world. The handouts used by the students during the courses provided the ground for a multi-author manual for taxonomy and identification, with contribution from several teachers of the course. The manual was initially published in two parts (C.R. Tomas ed., 1993, 1996), but recently a unified, revised version has been published (C. R. Tomas ed., 1997).

### **1.2. Organization**

The 8<sup>th</sup> Advanced Phytoplankton Course - Taxonomy and Systematics was announced on 30.09.2004. The announcement was published on the Course web page opened at the Stazione Zoologica Website ([www.szn.it/~apc8](http://www.szn.it/~apc8)) and posted to the MARBEF WEBSITE (<http://www.marbef.org/modules.php?op=modload&name=Calendar&file=index&type=view&eid=114>). The announcement was also posted to the main mailing lists attended by scientists in the field of marine phytoplankton (Algae-L, Marine Phycotoxins and Diatom-L) and sent by e-mail to a list of marine institutions around the world, and to selected key scientists. A poster was sent as attached file for printing and displaying at the institute boards. The announcement, the poster and the website include all the relevant information concerning the Course venue, dates, aims and faculty. In addition, instructions and deadline for applications (10th November 2004), application forms and criteria for selection were also provided.

We received a total number of 112 applications from 46 different world countries. After careful examination of the applications, 21 applicants were selected (Annex IV) and a waiting list of 30 applicants was also prepared. Criteria for selection included previous experience with phytoplankton, relevance to the present position of the applicant and to its future involvement in monitoring and scientific projects, chances for participants to further spread information acquired during the course in their respective country. The country and institution of applicants was also considered (7 participants were from MARBEF institutions), and we avoided selecting people from institutes where people who have recently participated in the course presently work.

The Course was held at the Stazione Zoologica, in the recently opened wing of the building. The classroom included the students' benches, each equipped with a light microscope, the desk with the microscope connected to a digital camera, three computers, two video-projectors with two screens and a transparency projector. A library holding the reprint collection and taxonomic books was also

arranged in the classroom. The classroom was located in the foyer of the new seminar room, which was used for the opening, the theoretical classrooms and some of the seminars. Other seminars were held in the old seminar room. Three rooms adjacent to the foyer were used as secretary, laboratory and teachers' office. Laboratory equipment consisted of a small growth chamber for cultures, a centrifuge, and a number of laboratory devices and disposable material for culture maintenance and sample preparations. The secretary office was equipped with telephone, xerox-copy machine and two computers. Three computers connected to internet were available to the students for e-mail and literature database.

Financial support for the Course was provided by the SZN and the EU- FP6 Network of Excellence MARBEF (Marine Biodiversity and Ecosystem Functioning) which covered living and travel expenses for the teachers, as well as funds for the organization and secretariat. In addition, participants from MARBEF Institutes were supported with MARBEF funds available at the respective Institutes. The UNESCO-IOC contributed travel and subsistence expenses for 6 participants from developing countries. NOAA contributed travel and subsistence expenses for 1 participant from USA. UNEP-MAP provided funds for a participant from Tunisia while ISSHA provide support for two participants from developing countries active in the field of HAB monitoring. Carl Zeiss S.p.A. kindly lent 22 microscopes for the practical sessions.

### **1.3. Goals**

The Course was meant for already experienced researchers actively working in fields of research that require species identification such as phytoplankton ecology and monitoring, and for experts in taxonomy and systematics who need to upgrade their expertise. The aim of the course was to increase and update the expertise of the students in the identification of diatoms, dinoflagellates, coccolithophorids and other flagellate species. Special attention was given to species implicated in the formation of exceptional or harmful blooms. Basic information was provided on methods used in molecular taxonomy and phylogeny.

The objectives of the Course were:

- To provide an updated theoretical background for the morphology, taxonomy, classification and phylogeny of the most important phytoplankton groups.
- To teach methods and criteria for correct species identification.
- To train on methods of molecular and morphological phylogeny
- To disseminate updated information on specialized literature.
- To diffuse information and awareness on toxic and potentially toxic species.
- To create a forum for discussion of general and specific aspects of biodiversity and biogeography of phytoplankton species.

## **2. CONTENT**

The Course included the following activities:

- Theoretical classrooms on general taxonomic features of marine phytoplankton
- Practical classrooms on light microscopy (LM) identification
- Special LM techniques such as acid frustule cleaning for diatoms, squashing and theca staining for dinoflagellates.
- Scanning (SEM) and Transmission Electron Microscope (TEM) techniques and observations
- Phytoplankton isolation and cultivation techniques
- Serial dilution technique
- Techniques for DNA extraction, sequence alignment and phylogenetic tree construction
- Integrative seminars and sessions on specific issues (HABs, heterotrophic flagellates, etc.).

## **2.1. Opening and Introduction**

On Saturday 2 April the participants registered at the Course desk at the Stazione Zoologica. The course was officially opened on Sunday 3 April, in the new seminar room of the Stazione Zoologica, by the Scientist Responsible for the Course Dr. Adriana Zingone. On behalf of the Organizing Committee, Adriana Zingone welcomed the students and introduced the course explaining the aims, illustrating the scientific and social program and introducing the faculty. Adriana Zingone explained that the knowledge on phytoplankton taxonomy has notably increased since the first course. Clearly, this huge amount of information cannot be all conveyed in three weeks. The main aim of the course will be the provision of taxonomic skill and updated tools, which will enable the participants to approach phytoplankton identification in a more effective way. Adriana Zingone also stressed that the Course has always been conceived as a long workshop, where an exchange of knowledge was expected between the faculty and the students and among the students.

As the result of a common agreement of the faculty, the course was dedicated to the memory of the late Donato Marino (1947-2002), former Head of the Marine Botany Laboratory, founder of phytoplankton taxonomy studies at SZN and good friend of all people of the faculty who had the chance to cooperate with him over the years. Adriana Zingone recalled that Donato had been himself student of the Advanced Phytoplankton Course in Oslo, and that, together with Carmelo Tomas, had organised the 4th Phytoplankton Course, for the first time in Naples. Donato Marino supervised the organisation of the following three courses in Naples, in 1990, 1995 and 1998. Donato was a strong supporter of the Course as well as of any activity implying the communication and sharing of knowledge.

Adriana Zingone concluded her welcome speech by expressing, on behalf of the faculty, her thanks to the Institutions that generously supported the Course.

The introductory presentation was followed by a historical overview of the Advanced Phytoplankton Course, presented by Jahn Thronsen, who has been part of the faculty at all eight courses. Pictures of previous students and members of the faculty were presented, illustrating the first three sessions of the course in Drobak, the two courses held in Naples in 1985 and 1990 and the courses in Casamicciola (Ischia, Naples) of 1995 and in Vico Equense (Naples) in 1998. The images showed many of the previous participants who are nowadays of primary importance in the field of phytoplankton research. Among the others, Barrie Dale, Trevor Platt, Gustaaf Hallegraeff, Victor Smetacek, Linda Medlin, Marta Estrada, Ojvind Moestrup and Malte Elbrachter. Also, almost all the members of the present faculty (C. Lange, C. Tomas, A. Zingone, M.J. Chretiennot Dinet, J. Larsen and D. Sarno) have been past students at the Phytoplankton Course.

The President of the Stazione Zoologica Prof. Giorgio Bernardi visited the Course in one of the following days. He welcomed the participants and expressed his satisfaction for this important and intensive training activity organised by the Institute. Prof. Bernardi said to be very pleased to be able to host the Course in the renewed wing of the main building of the Institute. In fact, during the past years when refurbishing was going on, two courses had to take place outside the Stazione. The dates for the present Course were also delayed to wait for the new rooms to be ready. The President expressed his wish to host again the Advanced Phytoplankton Course in the near future.

## **2.2. Materials**

Materials for the Course consisted of fixed samples and cultures provided by the faculty as well as from the students. Some cultures were bought or provided free from Culture collections. In addition, live natural samples collected from the Gulf of Naples were provided in the days when observations were planned.

The book 'Identifying Marine Diatoms and dinoflagellates', edited by C.R. Tomas, was used as general textbook for all taxa whose taxonomic status has not changed since the publication of the book. A collection of ca 2000 taxonomic papers and several books was available to the student and searchable through a reference manager program. This material includes almost all published material needed for the identification of marine planktonic microalgae. For the methods, handouts on the techniques illustrated were distributed.

At the end of the course the participants were given cd-roms containing all the power-point lessons, compilations of literature for each class and a collection of LM and EM species pictures taken during the lessons.

### **2.3. Theoretical Classrooms**

The course included a total number of 160 hours of theoretical and practical classrooms, exercises and seminars (see Annex 1). Theoretical classrooms were given on the taxonomy of the different algal groups and on the characters that are important for identification in light and electron microscope. General features of diatoms, dinoflagellates, coccolithophorids and other flagellates were illustrated during the different sessions. Morphological characters of taxonomic groups and species as seen in light and electron microscopy were presented and their distinctive features were stressed using power-point presentations. For coccolithophorids and dinoflagellates having complex life-cycles, special classrooms illustrated the morphology of different life-stages.

Throughout the lessons, the different sections of the manuals were referred to and commented, drawing attention to schemes and illustrations useful for species identification. Participants were informed of recent taxonomic changes not included in the manual, which will require a revision in the near future. Updated literature references were illustrated and discussed. The Honorary Director, Prof. Grethe Hasle, visited the Course during some of the classes on diatoms and on mixed sample observations in the light and electron microscope, participating in the teaching activities and EM and LM exercises and discussing specific topics with some of the participants. Members of the Faculty alternated in teaching during the days. In addition, some of the teachers decided to stay more days at their own expenses, participating to other classrooms and being available for discussion with participants.

### **2.4. Practical Classrooms**

#### **2.4.1 Species observation**

Species observations were made on material selected beforehand, including permanent slides, live unialgal cultures and fixed samples. The material was distributed to each participant for observation at the light microscope. The same material was also shown on a screen through a digital video camera connected to a microscope. At the same time, additional information and/or iconographic material was shown as power point presentation on a second screen and relevant literature was mentioned. The use of different light set-ups, fixatives and special staining or manipulation techniques was recalled whenever required. Ultrastructural features not visible in light microscopy were often displayed on the screen during species observation. Bloom species and harmful species belonging to the different groups were given special attention and shown in comparison to related non-harmful species. Pictures were taken for most of the material shown during the practical classrooms. During the session on heterotrophic nanoflagellates, material was shown which was obtained from mud samples collected in Denmark and incubated at SZN in Petri dishes.

#### **2.4.2. Techniques**

The course included a number of methodological lessons, spanning from special techniques for observations in light and electron microscopy to single cell isolation, serial dilution techniques, cultivation and molecular methods. Practical exercises were organised where the students themselves prepared the material for observations using their own samples.

Over the last few courses, some theoretical lessons were given on molecular phylogeny. Following specific comments of previous participants, the need was identified of giving more space to these techniques, which are largely used nowadays as new tools in taxonomy. To this end, a day and a half were devoted to theoretical lessons and seminars, followed by practical classrooms where molecular methods – from DNA extraction to alignment and construction of phylogenetic trees- were demonstrated to participants in small groups. This section of the course ended with a general discussion.

The following methods were included:

- Serial dilution cultures established from natural samples for flagellate identification and enumeration.

- Concentration of heterotrophic flagellates and benthic diatoms from mud samples.
- Single cell isolation by micropipetting and cultivation techniques. Different recipes for preparation of culture media were distributed to the participants and discussed.
- Frustule cleaning with different acid mixtures and permanent slide preparations for diatoms.
- Permanent jelly mounts for coccolithophorids and dinoflagellates.
- Squashing and thecal plate staining for thecate dinoflagellates.
- Dinoflagellate resting cyst collection and treatment of cyst samples for observation.
- Preparation of TEM grids and SEM stubs using both culture material and mixed samples.
- DNA extraction and PCR.
- Sequence downloading from GenBank and alignment.
- Reconstruction of phylogenetic trees.

#### 2.4.3. Exercises

The last days were devoted to the observation of mixed natural samples including those specifically prepared by the teachers beforehand, those from different geographic areas provided by the students themselves and those collected from the Gulf of Naples during the Course. The latter samples were observed alive. Students worked together to compile species lists for each sample. Comparison exercises with the simultaneous observation of similar species were also organized to stress distinctive features and improve identification capabilities.

At the beginning of the course, the serial dilution culture techniques for flagellate identification and cultivation was introduced and demonstrated. Starting from live bottle samples collected at four different locations in the Gulf of Naples, five sets of dilution cultures were prepared, each consisting of five replicates of 1ml, 100  $\mu$ l, 10  $\mu$ l, 1  $\mu$ l and 100 nl inocula. The cultures were put on a rack equipped with lamps and allowed to grow. Each student was assigned one replicate consisting of a whole series of the five dilutions. In the last days of the course students observed their respective series, identified live flagellates as well as other microalgae growing in the culture tubes and filled a report form. For each initial sample, the logs were unified as to have the complete results and the concentration of the single species in the original sample was estimated as most probable number (MPN).

#### 2.5. Scanning (SEM) and Transmission Electron Microscope (TEM) demonstrations

Many phytoplankton species and genera belonging to different algal groups require electron microscopy to be correctly identified. Ultrastructural features underlying their classification were presented during the lessons and techniques required to observe these features were illustrated in practical sessions.

The electron microscopy session aimed at showing the potential of the EM techniques rather than training students on EM species identification, which would require a separate course. Students divided into subgroups alternated at the SEM and TEM to observe material under the guide of some of the teachers. For each algal group considered (diatoms, coccolithophorids, cryptophyceans, prasinophyceans, naked dinoflagellates), the specific morphological details visible in EM were illustrated through demonstrative samples.

#### 2.6. Harmful Algae

Harmful and nuisance species were pointed out to students' attention whenever encountered during the theoretical and practical sessions. In addition, a number of special sessions were devoted to Harmful Algae, their morphological features and their impact. The sessions were organised separately for dinoflagellates, diatoms and flagellates, respectively. The harmful flagellate session focused on presentations and observations of species of the genera *Prymnesium*, *Chrysochromulina* and raphidophytes. The new harmful Dictyochophyceae was also introduced. For dinoflagellates, *Alexandrium*, *Dinophysis* and benthic *Prorocentrum* were highlighted; large space was also given to a whole set of new species that have been established in naked dinoflagellate genera, including e.g.

*Karenia* and *Karodinium*. For harmful diatoms, a number of *Pseudo-nitzschia* species were observed and discussed. Problems caused by all these species were recalled, along with information on their geographic distribution. Samples and culture of relevant species were observed in the light microscope and additional slide material was shown to illustrate other species not available as samples.

## **2.7. Seminars**

Several seminars on specific topics were included in the program. Some of these seminars were given by members of the faculty and by students and fellows at the Marine Botany Laboratory. Some of the Course participants were also invited to give seminars on either specific taxonomic issues or on the phytoplankton of their respective areas. The seminars were followed by questions and discussion among teachers and participants. Most seminars took place in the after-dinner sessions (Annex I).

## **3. SOCIAL ACTIVITIES**

A number of social events were organised to allow student and faculty to relax from the very intensive work programme and reach a better integration. These included an ice-breaking party, pizzas at the restaurants nearby the Stazione, a guided tour to the Island of Capri and a social dinner. In addition, seminars were given on the history of the Stazione Zoologica and on the Library, and guided tours to the Aquarium and to the Fresco room were organised.

## **4. QUESTIONNAIRE AND CONCLUDING REMARKS**

### **4.1 Questionnaire**

During the last days, participants were requested to express comments on the Course through a questionnaire which included questions on both logistic and scientific aspects. The comments were overall very positive, as detailed in the following, yet in some cases good advices were given to improve the structure and content of the course where needed. At times contrasting views and suggestions emerged that reflect the heterogeneity and specific needs of the single participants.

All participants expressed very positive comments on the content of the course, on the organization and on the benefit for their professional career. Despite the different expertise, professional interests and duties of participants, apparently the APC8 format was a good compromise that offered everybody the possibility to gain more detailed knowledge in phytoplankton taxonomy.

Several participants would have liked to have more time during the whole course to talk individually with the teachers, to go through the literature or to re-observe specific samples. On the other hands, several other topics were suggested for future additions. These contradictory comments highlight the compromise of condensing a wide field of knowledge in only three weeks, whereby some important topics are discarded and yet a very intensive rhythm is kept over a long period of time. Several (ca. 50%) participants would like to have Cyanobacteria included in the program, some others would have devoted more time to the identification of species with conspicuous characters, such as non-armoured dinoflagellates, benthic dinoflagellates, pennate diatoms, or micro-ciliates, rather than spending much time on flagellates. One participant suggested not to put a lot of emphasis on harmful species, since they are already covered by specific courses. A few participants suggested the addition of other topics such as phytoplankton ecology, flow-cytometry, Fish, HPLC, chemtax, which are however outside the scope of APC and are covered by other *ad hoc* courses.

The inclusion of the session on molecular methods was greatly appreciated. It was suggested to place it at the beginning of the course, along with phytoplankton phylogeny, in order to start with the general picture of the evolutionary history and phylogenetic relationships among the groups.

The techniques illustrated were considered adequate. The only exception was the organization of the EM sessions, when observations were at times very slow due to poor quality of samples. In fact, the new SEM and TEM had started to work a few days before the course, while the old microscopes were broken for several months. Therefore, there had not been enough time before the course to select and preview the grids and stubs for demonstrations. Participants would have appreciated receiving handouts for the different species demonstrated in both LM and EM, in which the characters visible with the two approaches were outlined. For EM, demonstrations and exercises using micrographs were suggested. More time would have been appreciated for the examination of samples in epifluorescence

microscopy. Some participants suggested to add methods on sampling strategies, phytoplankton counting and biomass calculations.

The majority of participants stated that they will have the time and opportunity to do more detailed taxonomic work once back in their respective places. All participants promised to disseminate the knowledge gained during the Course. Especially, participants coming from places from which more than one application was received committed themselves to share the materials and the information with the other applicants.

Among other comments:

*'It is nice to see that there are people that are interested in teaching and transferring their knowledge'*

*'I can say that the APC8 was a kind of milestone in my phytoplankton career'.*

*'The direct effect of what I have learned is that the biodiversity of the phytoplankton of Galicia is going to increase after this course'.*

## **4.2 Conclusion**

On Saturday 23 April the closure session took place. On behalf of the Organising Committee, Adriana Zingone thanked the entire faculty, secretary and all people from the SZN who had collaborated towards a successful Course. Students also were thanked for their enthusiastic and warm participation, and commended for the deep interest and the capacity to work hard that they demonstrated over the three weeks. Adriana Zingone remarked the pleasant and friendly atmosphere of the Course, and the open communication during the lessons. Each student was distributed a participation certificate and the CD-roms with the material of the lessons. Thanks were expressed to the secretaries, Italia Canettieri, Margherita Groeben and Olimpia Colonna, for their continuous and invaluable assistance in the organization and during the whole course.

The Honorary Director, Prof. Grethe Hasle expressed her appreciation for the Course outcomes, recalled the initial scope of this series of courses and noticed with appreciation the changes occurred over the years in the structure of the course as well as in the composition and needs of participants.

An open discussion followed during which students expressed their positive comments on the Course, mainly along the lines emerging from the questionnaires, providing suggestions for further improvements. The different views were discussed until the session was closed.

A meeting among teachers and organizers followed the conclusive session, to review the whole course, including positive aspects and possible improvements, and to start organizing the next course.