



Report on the MARBEF Course “The Role of Flow Cytometry in Marine Biodiversity and Ecosystem Functioning”

Stazione Zoologica A. Dohrn of Napoli, Italy, 3 to 6 November 2004. (Poster: <http://www.marbef.org/training/FlowCytometry/posters/FCMposter.jpg>)



Stazione Zoologica  
Anton Dohrn



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Local organization: Italia Canettieri  
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Sponsors: MARBEF  
Stazione Zoologica A. Dohrn  
Società Italiana di Citometria (GIC).

Supporting companies: Beckman-Coulter  
Becton-Dickinson  
CytoBuoy  
DAKO Cytomation  
Fluid Imaging Technologies

Lecturers: Dr. Isabelle Biegala  
Dr Raffaella Casotti  
Dr Christophe Brunet  
Ing. George Dubelaar  
Dr Josep Gasol  
Dr. Gérald Grégori  
Dr. William Li  
Dr. Mike Sieracki  
Dr. Glen Tarran  
Dr Marcel Veldhuis

### ***Aims***

The main aim of the course was to introduce graduate students and young researchers to the application of flow cytometry to marine biodiversity and ecosystem functioning. Flow cytometry itself is a very powerful generic technique which allows marine scientists to obtain information about particles in sea water, from plankton community information to cellular process information. This ability enables marine scientists to study a wide range of research topics related to marine biodiversity and ecosystem function.

Specifically, the aims of the course were to:

- present a series of lectures and practical sessions by experts in the field to inform students of the state of the art of flow cytometry and its use with respect to marine biodiversity and ecosystem functioning.
- expose students to the latest flow cytometry technology through the participation of leading flow cytometer manufacturers.
- enable students to present their current research in poster papers as an aid to stimulating discussion.
- enable students to discuss topics of interest with experts and manufacturers as an aid to formulating new lines of research and helping with current research. To ensure this, all lecturers and manufacturers were present for the whole course.
- provide a platform for the creation of a new network of young researchers involved in the use of flow cytometry to study marine biodiversity and ecosystem function.
- disseminate information from the course as outlined below.

As the philosophy of MARBEF network is to spread excellence within the network and beyond, the organizers, with the support of the teachers and some of the participants, agreed to make all presentations and tutorial material available on the MARBEF website (Lectures: <http://www.marbef.org/documents/training/FlowCytometry/index.php#Lectures>). E-mail addresses of teachers and participants are also available, for people interested in contacting them. (<http://www.marbef.org/documents/training/FlowCytometry/FCMNaplesParticipants.pdf>)

We believe that the aims of the course have been successfully met, based upon the appreciation by the participants and also external evaluations by auditors. The long-term impact of this course will also be evaluated. We already anticipate that it will have been of value in helping young researchers make choices with respect to future instrumentation, analysis of current data and planning of future research in institutes across Europe.

### ***Participants***

(<http://www.marbef.org/documents/training/FlowCytometry/FCMNaplesParticipants.pdf>) 35 participants participated in the course. Three auditors were also appointed to attend the oral sessions. A variable number of researchers and students from the Stazione Zoologica also attended the oral presentations.

As the course was co-sponsored by the Stazione Zoologica di Napoli, non-MARBEF members were also allowed to apply. Participation for these students was subject to a fee of 300 euros.

The number of participants from MARBEF institutes was 18 (51%).

The gender ratio was, women (60%): men (40%)

Participants were distributed, according to their working affiliation as follows:

Italy: 30% (11), Spain: 13% (5), Germany: 3% (1), Greece: 9% (3), Croatia: 9% (3), Sweden: 9% (3), France: 6% (2), Finland: 3% (1), UK: 6% (2), The Netherlands: 6% (2), Poland : 3% (1), Mexico: 3% (1).

Applicants were selected based upon their CV, science interests and applicability of flow cytometry for their science. On this basis, 40% of students were selected who were novices in flow cytometry.

All participants were asked to bring a poster illustrating their own research and they were all given the opportunity to present and discuss their science during an informal presentation on the first day of the course. Posters remained up for the duration of the course and acted as a useful platform to discuss science techniques and ideas during coffee breaks. Some students kindly agreed to make available their poster as .pdf files on the MARBEF website (Posters:

<http://www.marbef.org/documents/training/FlowCytometry/index.php#Posters>).

**Course content and structure** (Programme:

<http://www.marbef.org/documents/training/FlowCytometry/FCMNaplesProgramme.pdf>)

Ten teachers were enrolled to cover different aspects of applications of flow cytometry to marine biodiversity and ecosystem functioning (Participants:

<http://www.marbef.org/documents/training/FlowCytometry/FCMNaplesParticipants.pdf>)

Five of them belong to MARBEF institutions. The first presentation was given by Dr. Adrianna Ianora. She belongs to the MARBEF Steering Committee and she introduced the aims and structure of MARBEF to the students

The course structure was organized into theoretical and practical sessions. Theoretical sessions were grouped into three major themes: “General flow cytometry”, which focused on the technical principles of this technique, “Biodiversity”, whose aim was to provide applications of flow cytometry to tackle problems of biodiversity, distribution and species recognition, particularly for marine algae and bacteria and thirdly, “Ecosystem Functioning”, which presented aspects of global species distribution, physiology and main processes which control marine ecosystem functioning. All speakers kindly agreed to make their presentations available on the MARBEF website (Lectures:

<http://www.marbef.org/documents/training/FlowCytometry/index.php#Lectures>).

CD-ROM with all presentations has already been distributed to participants at the course. Practical sessions provided an introduction to modern flow cytometers for standard and specialized analyses and also the applications of these instruments in marine research. In some cases, students were able to operate the instruments themselves, to analyse samples they had brought with them to the course. Five companies (Becton-Dickinson, Beckman-Coulter, DAKO Cytomation, Fluid Imaging Technologies and CytoBuoy) provided instruments to use during the course, giving the students a unique opportunity to compare different features offered by different models and to appreciate the features best suited for their own work.

Company specialists were also present for the whole course and offered very valuable support during the practical sessions.

The practical presentations were made possible thanks to the dedication of Francois Ribalet, from the Stazione Zoologica, who provided invaluable help with the organization of the labs and all the material needed for the course. We would also like to thank Alberto Amato, Federica Cerino, Celine Dimier, Gandi Forlani and Carmen Minucci, for providing phytoplankton cultures used during the course.

### ***Evaluation:***

The course was a success for the students, both in terms of expectations met and enjoyment.

Sixty percent of evaluations ranged from “excellent” to “very good”. Ninety-two percent of participants declared that their expectations were met, and eighty one percent judged the course excellent or very good when compared to other, similar courses attended. Thirty-four percent of total comments expressed the wish to have had longer or more focused practical sessions provided during the course. The focus of this particular course was to provide an introduction to using flow cytometry in research associated with marine biodiversity and ecosystem functioning. It was targeted to be applicable to a wide range of students from many backgrounds. A more intense training course, involving detailed training and practical work would need to involve fewer students as the scope would need to be more focused. Another factor to consider would be that flow cytometers are extremely expensive instruments (100-200k euro) and it would not be easy to obtain enough instruments (either by goodwill or hire) to provide sufficient experience for all the students. The comments received by the students are very useful for programming of similar and future training activities, and are available upon request to MARBEF participants.

### ***Logistics and acknowledgements***

The Stazione Zoologica A. Dohrn provided a unique site for the delivery of the course. The theoretical sessions were presented in a new 80 seat seminar room, equipped with the most up to date equipment for audio-visual presentations. The presentations profited from the valuable assistance of Giuseppe Gargiulo and Giampiero Lanzotti, who provided a timely and professional assistance to the speakers. The students’ posters and the coffee breaks were organized adjacent to the seminar room, to maximize coffee break time for relaxation and informal discussions around the posters.

This was the first course held in a newly renovated wing of the institute, which was made ready in time for the course by Raffaele Di Maio and the workers of EDEL Inc, who provided a great deal of the logistics for the course. Diego Castagna is also acknowledged for his help with the computing infrastructure, necessary for the course. The staff of the Ecophysiology Laboratory is acknowledged for the everyday contribution to the realization of this course, and especially Flora Palumbo and Massimo Perna. The coordinator, Antonio Miralto, together with Adrianna Ianora, have also offered their valuable practical and moral support.

Lunches were provided in the historical “Fresco room” of the Stazione Zoologica, painted by the German painter Hans von Marées in 1873. This setting allowed for the integration of science and art, which has been the inspiration for over 800 naturalists, including Anton Dohrn, the founder of the Stazione Zoologica (<http://www.szn.it/>).

Finally, we believe that all attendees of the course would join us to sincerely acknowledge the role of Italia Canettieri and Margherita Groeben in ensuring the smooth and efficient organisation of this event.

***PICTURES***

A photo-gallery with pictures from the course is also available (<http://www.marbef.org/modules.php?name=Photogallery>).