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MarBEF



Marine Biodiversity and Ecosystem Functioning

EU Network of Excellence

Sustainable development, global change and ecosystems

D-7-CSP-5.1 Report on training course Marine Invertebrates

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Organisation name of lead contractor for this deliverable

| | | |
|---------------------------------|---|---|
| Framework Programme (2002-2006) | | |
| Dissemination Level | | |
| PU | Public | X |
| PP | Restricted to other programme participants (including the Commission Services) | |
| RE | Restricted to a group specified by the consortium (including the Commission Services) | |
| CO | Confidential, only for members of the consortium (including the Commission Services) | |

Report: MarBEF Training Course 2008

TITLE: The Volker Schmid Training Course on Experimental Developmental Biology of Marine Invertebrates

THE MarBEF-endorsed training course “Experimental Developmental Biology on Marine Invertebrates” was held in Roscoff (France) at the Station Biologique from the 19th of May to the 30th of May. There was a total of 34 applications for this course. 19 students were selected according to the following criteria: 1) affiliation to organizing Universities or to MarBEF institutions, 2) priority of registration, 3) affinity of CV. Students from nine countries, namely Austria (1), France (4), Italy (7), Russia (1) Germany (1), Switzerland (3), Poland (2), attended the course. The MarBEF endorsement supported the course with €5000 from the central budget, and five fellowships (total amount = €2500) were provided to students from Russia and Italy.

The topics covered by lectures and/or practical sessions during the two weeks included:

- 1) Evolution of multicellularity and evolution of Metazoa
- 2) Introduction to sponges and self-recognition systems in invertebrate. The Haploscleromorpha model (sponges as Eumetazoa).
- 3) Introduction to evolutionary developmental biology of marine invertebrates, conservation of common genetic toolkit, analysis of the UrMetazoa and the Urbilateria ancestor.
- 4) Introduction to Cnidaria and to the evolution of triploblasty and bilateral organization in basal animals (ancestral genomic complexity in cnidarians, levels of conservation of regulatory genes), life cycle reversal, cnidaria and metamorphosis, nematogenesis in cnidaria.
- 5) Introduction to acoelomorph flatworms: *Symsagittifera roscoffensis*.
- 6) Introduction to Crustacea.
- 7) Embryology of different invertebrate groups: cnidarians, ctenophores, annelids, echinoderms, tunicates
- 8) Investigation on cell cycle and oocyte maturation in sea urchin.
- 9) Immunostaining protocols, localization of nerve cells, stem cells.
- 10) Regeneration in cnidaria and acoela.
- 11) Localization of cell lineages by istochemical and immunological protocols: the myoplasm determinants in ascidian development by localization of AChE
- 12) Evolution of the nervous system
- 13) Journal club session: relevant scientific articles (2005-2008) were assigned to students, who presented the papers to the class (powerpoint presentations).

Organizers and main lecturers of the training course:

Prof. Stefano Piraino – University of Lecce, (MarBEF member), Italy

Prof. Patrick Cormier – CNRS/UPMC Paris VI - Station Biologique de Roscoff, France

Prof. Daniela Candia Carnevali – Università di Milano, Italy

Prof. Heinrich Reichert – University of Basel

Dr. Bertrand Cosson - CNRS/UPMC Paris VI - Station Biologique de Roscoff, France

Dr Cristiano Di Benedetto, Università di Milano, Italy

Invited Lecturers:

Dr Bernard Kloareg, Director Station Biologique Roscoff

Dr. Christian Sardet- CNRS/UPMC Paris VI - Villefranche, France

Dr. Nicolas Rabet - UPMC Paris VI

Dr Xavier Bailly – Station Biologique de Roscoff, France

List of course participants (Roscoff course 2008)

| | | | |
|---------------|------------|--|---|
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| Kotenko | Oiga | <i>okotena@yahoo.com</i> | Zoological Institute ZIN-RAS and Department of Invertebrate Zoology, St. Petersburg State University |

Title and scientific content of the training course

**EXPERIMENTAL DEVELOPMENTAL BIOLOGY COURSE ON MARINE
INVERTEBRATES**

Time and location of the training course

18 May – 30 May 2008

STATION BIOLOGIQUE DE ROSCOFF (F)

www.sb-roscoff.fr

Description and program of the training course

This international course is currently held on a yearly basis, and it gathers 4 organizing universities from 3 different European countries (Basel, Switzerland ; Lecce and Milano, Italy ; Paris VI, France). The course is addressed to graduate students having successfully achieved their first three years in Biology and to doctoral students. English is the main spoken language. The scientific themes include comparative analysis of basic developmental processes in a variety of invertebrate taxa (sponges, cnidarians, ctenophores, annelids, echinoderms, tunicates). Aim of the course is to raise interest in modern approaches of invertebrate developmental biology, life cycles, and evolution. During the course, students make observations on invertebrate anatomy and reproductive patterns, larval ecology and life cycles, do experimental bench work on topics ranging from cell cycle analysis, fertilization, embryogenesis and larval development, tissue differentiation and morphogenesis, regeneration, reverse development. Active participation in the course is requested. A *Journal Club* session is devoted to discussion of relevant breakthrough articles in the field to promote critical reading of the scientific literature and to open discussion for broader interpretation. The participant students will lead the journal club. Students' communication skills are promoted, including informal interactions with instructors, collaborative work with other participants, oral presentation of current interests, written reports commenting performed experiments and their results, and final debriefing of the course. This international inter-university course provides the framework for exchanges between students of different European universities. Upon agreement between the 4 partner Universities, this course is credited as a « Master Course Program » and provides 6 ECTS credits.

EXPERIMENTAL BENCH WORK is organized as follows :

- Common experiments will be performed by each student individually or in small groups. Those are described in the handout and concern developmental processes of species from selected phyla (sponges, cnidarians, ctenophores, echinoderms, tunicates, annelids). New experiments will be started almost every day.
- In parallel more specific team projects will be performed by groups of 2 students. The projects will cover descriptive and experimental work, often with research character and undetermined result. Own initiative is required/encouraged. Organizers will advise where necessary. These groups will be formed on the 1st day and the selected projects proposed by the organizers will be carried out over the course. All participants will be informed by email not later than end of March about the envisaged projects. Participants are asked to read carefully the projects and name their 1st, 2nd and 3rd priorities to the organizers. They will form the groups of two and beforehand prepare the equipment for the projects. At the end of the course each team will prepare a poster about their work and give a short oral presentation.

Proposed experiments:

- Observations of feeding, gametogenesis, fertilisation, embryogenesis, larval development and metamorphosis in a large variety of species
- Cnidarian dissociation, regeneration experiments, cellular determination (DAPI + phalloïdin-FITC staining)
- Chemical induction/inhibition of metamorphosis of larvae
- Grafting experiments on medusae, depending on available material
- Body axis and tissue differentiation: peroxidase, phosphatase, acetylcholinesterase stainings
- Cell cycle analysis: BrdU staining, anti-phosphoHistone H3, inhibition of DNA synthesis (aphidicolin)
- Nerve cell analysis: Immunohistochemistry with neuronal-specific antibodies
- Sea urchins: polyspermy experiments, induction of animalised and vegetalised eggs, protein

THE VOLKER SCHMID * TRAINING COURSE

Experimental Developmental Biology
of Marine Invertebrates

Station Biologique de Roscoff
Roscoff 19-30 May 2008

Work programme

* Prof. Volker Schmid died peacefully on April 1, 2008, after long severe illness. He was the main organizer of this course since long time. The course was dedicated to his memory, and it will appear under his name in the future years, as the Volker Schmid Training Course.



*With best regards
Alan Levine*

Prof. Volker Schmid (1939-2008), University of Basel

Work Program (P: Practical Work, T: Theory, S: Seminar, D: Discussion

Meal times: Breakfast 08.00-8.30, Lunch 13.00 , Dinner at 18:45.

Monday, 19th May

Low tide: 12:39 AM (2.18 m)

- 09.00 **T:** Introduction to the course, staff presentation
09.15 Commemoration of Prof. Volker Schmid, Basel
09.30 Guided visit of the SBR
10:30 : **T** Early axis formation: comparing ascidians oocytes and embryos with others (Sardet) –
Movies and lecture.

13:00 **LUNCH**

14:30 **P:** Working with ascidians: opening animals, collecting gametes. Training on fertilization and early development in *Ciona intestinalis* and *Phallusia mamillata*. Mitochondria labelling, myoplasm segregation and fate of blastomeres.

18:45 **DINNER**

20.30 **D:** Discussion about team projects.

Tuesday, 20th May

Low tide: 1:26 PM (2.10 m)

09.00 **P:** Handling and monitoring embryo development. Protocol of localization of myoplasm by Acetylcholinesterase staining.

11.00 **S:** Exploring the living cell Movie/DVD

13:00 **LUNCH**

14:30 **P:** Observations on larvae, synthesis of experiments.

16.30 **D:** Discussion on fertilization

17.30 **S:** (Tape: the story of sperm and egg)

18:45 **DINNER**

20.30 **S:** Journal club: first session (reports by three students).

Wednesday, 21st May

Low tide: 1:58 PM (2.11 m)

09.00 **S:** Evolution of multicellularity (Dr. B. Kloareg, director of the SBR)

10:30 **T** Origin and evolution of Metazoa

12.45 **PICNIC LUNCH – Excursion at low tide.**

Collection of macrobenthos and meiobenthos

15.30 **P:** Back to the lab. Sorting and analysis of material.

17.00 **T:** Introduction to sponges (structure, development, evolution, phylogeny)

18:45 **DINNER**

20.30 **S:** Journal club (second session, reports by three students)

Thursday, 22nd May

Low tide: 2:31 PM (2.21 m)

09.00 **T:** Introduction to Cnidaria (structure, development, evolution, phylogeny) and the origin of Bilateria.

12.00 **P:** Sponge sorting out: dissociation/reassociation experiments

13.00 **LUNCH**

14:45 **P:** Sponge reassociation experiment: changing medium

15.00 **T:** Introduction to the Crustacea (structure, development, evolution, phylogeny)

17.30 **TEAM PROJECTS**

18:45 **DINNER**

20:30 **P:** Sponge re-aggregation experiment: changing medium

20.45 **S:** Journal club (third session, reports by three students)

Friday, 23rd May

Low tide: 3:06 PM (2.36 m)

08:45 **P:** Sponge re-aggregation experiment: changing medium

09.00 **T:** Introduction to Acoela (Bailly)

10.00 **P:** Analysis of *Symsagittifera roscoffensis*

11.30 **TEAM PROJECTS**

13.00 **LUNCH**

14:45 **P:** Sponge re-aggregation experiment: changing medium

15.00 **T:** Introduction to the Annelida and Sabellaria embryology/experiments

15.30 **P:** Fertilization experiment, protocol of early development.

16.30 **S:** Journal club (fourth session, report by two students)

18.00 **P:** End of annelid fertilization experiment: results.

18:45 **DINNER**

20:15 **P:** Sponge re-aggregation experiment: changing medium

20:30 **S:** Evolution of the Brain (Reichert)

Saturday, 24th May

Low tide: 3:42 PM (2.57 m)

08:45 **P:** End of sponge re-aggregation experiment: protocol of results

09.00 **T:** Introduction to echinoderm embryology

10.30 **P:** Handling animals, gametes and embryos of sea urchins, protocol of fertilisation, fertilization membrane and division cycles

11.00 **T:** Regulation of gene expression at the translational level. A lesson from the sea urchin early embryo

12.15 **P:** Post transcriptional regulation analysis during first mitotic divisions in sea urchins: description of the experiment

13.00 **LUNCH**

15:00 **P:** Post transcriptional regulation analysis during first mitotic divisions in sea urchins

17.30 **D:** summarizing results of experiments

18:45 **DINNER**

20:30 **S:** Journal club (fifth session, report by three students)

Sunday, 25th May

Low Tide: 4:22 PM (2.81 m)

FREE DAY (NO MEALS AT THE STATION)/

(Suggested trip: Excursion to Ile de Baz)

Monday, 26th May

Low Tide: 5:07 PM (3.05 m)

09.00 **T:** Functional anatomy of Echinoderms

11.00 **T:** Introduction to practical work on MCT (mutable collagenous tissue)

11.15 **P:** Handling animals and incubation with anaesthetics

12:00 **P:** Response/recovery after different treatments (anaesthetics etc)

13.00 **LUNCH**

15.00 **T:** Exploring the biomechanical potential of MTC

17.30 **D:** Discussion of experiments

18:45 **DINNER**

20.30 **S:** Journal club (sixth session, reports by two students)

Tuesday, 27th May

Low tide: 6:00 PM CEST / 3.24 m

09.00 **T:** Regeneration in Echinoderm

11.00 **T:** Regeneration: BrdU work, introduction to experiment

11:15 **P:** Regeneration: arm and test regeneration (whole animals versus explants) evaluated with microscopic and statistical analysis

13.00 **LUNCH**

15:00 **P:** Regeneration: BrdU work (analysis in group of two) (observation at fluorescence microscope) in groups of two

P: standby groups: continuation of TEAM PROJECTS

17:30 **T:** Reverse development and cell transdifferentiation in Cnidaria

18:45 **DINNER**

20.30 **S:** Journal club (seventh session, reports by two students)

Wednesday, 28th May

Low tide: 7:02 PM CEST / 3.32 m

09.00 **P:** Protocol/discussion of results of sponge experiments

09.30 **T:** Introduction to antibody experiments

P: Start with Immunostaining and BrdU experiments with cnidarians and ctenophores.

Collection of animals, incubation. During incubation time:

11.00 **S:** The first Brain

12.15 **S:** Journal club (eighth session, reports by two students)

13.00 **LUNCH**

14.30 **P:** Continuation of staining protocol (washing) and TEAM PROJECTS

16.00 **P:** Protocol of immunohistology (observation at fluorescence microscope) in groups of two

16.00 **P:** standby groups: TEAM PROJECTS

18:45 **DINNER**

20.00 **P:** If needed, protocol of immunohistology in groups of two

Thursday, 29th May

Low Tide: 8:12 PM CEST / 3.23 m

TEAM PROJECTS – FULL DAY.

13.00 **LUNCH**

18:45 **DINNER**

Friday, 30th May

Low tide: 8:50 AM CEST / 2.89 m

09.00-12.00

P: Finishing up team projects experiments

Clean up the laboratory

13.00 **LUNCH**

14.30 **D:** Presentation of posters

Final Discussion – evaluation of the course.

18:45 **DINNER**

21.00 Farewell party

Saturday, 31.5.08

Good-bye and travel well

FEEDBACK QUESTIONNAIRE

Course participants were given a questionnaire with six questions to which we received the following feedbacks:

1) How satisfied are you with the course content?

Very satisfied (**79%**) satisfied (**19 %**) not satisfied

2) How satisfied are you with the course organization?

Very satisfied (**68 %**) satisfied (**32%**) not satisfied

3) Do you think that attending the course will be useful for your future work/studies?

Yes (**84%**) Maybe (**16%**) No

4) Would you recommend attending this course to your colleagues?

Yes (**95 %**) Maybe (**5%**) No

5) Is there something you would recommend to improve the organization of future courses?

Shorter lectures, more breaks, more time for team projects, add one-two days to the course in order to avoid night work.

6) How did you know about this course?

Supervisors, Internet, University, MarBEF website

Posted by Stefano Piraino