Experimental Developmental Biology Course on Marine Invertebrates

Station Biologique de Roscoff
www.sb-roscoff.fr

19 - 30 May 2008

STC

Schmid Training Course

Practical course co-organized by:

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Title and scientific content of the training course
EXPERIMENTAL DEVELOPMENTAL BIOLOGY COURSE ON MARINE INVERTEBRATES

Time and location of the training course
19 May – 30 May 2008
STATION BIOLOGIQUE DE ROSCOFF (F)
www.sb-roscoff.fr

Organizers and main lecturers of the training corse:

Prof. Stefano Piraino – University of Lecce, (MarBEF member), Italy
Prof. Patrick Cormier -University Pierre et Marie Curie, - Station Biologique de Roscoff, France
Dr. Bertrand Cosson - - University Pierre et Marie Curie, Station Biologique de Roscoff, France
Prof. Daniela Candia Carnevali – Università di Milano, Italy
Prof. Heinrich Reichert – University of Basel, CH
Prof. Volker Schmid – University of Basel, CH

Invited Lecturers (Provisional List)
Prof. Ferdinando Boero – University of Lecce
Prof. Hervé Le Guyader – University Pierre et Marie Curie, France
Prof. Bernard Kloareg – University Pierre et Marie Curie, Director, Station Biologique de Roscoff
Dr Xavier Bailly – University of Copenaghen, Denmark

Description and program of the training course
This international course, which associates 4 universities from 3 different european countries (Basel, Switzerland ; Lecce and Milano, Italy ; Paris VI, France), is open to 16 graduate students having successfully achieved their first three years in Biology. The course is also accessible for doctoral students. Lectures and practicals are given in english. The scientific themes cover comparative analysis of basic developmental processes in a variety of invertebrate taxa (sponges, cnidarians, ctenophores, annelids, echinoderms, tunicates). The organizers expect that the course raises interest in developmental biology, cell biology, life cycles, and evolution. During the course, students will make observations on invertebrate anatomy and reproductive patterns, larval ecology and life cycles, do experimental bench work on topics ranging from cell cycle analysis, fertilisation, embryogenesis and larval development, tissue differentiation and morphogenesis, regeneration, reverse development. Active participation in the course will be requested. A Journal Club session will be 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. Communication skills will be developed, including informal interactions with instructors, collaborative work with other participants, oral presentation of their current interests, written report describing the performed experiments and analysing their results, debriefing of the course. Finally, this international inter-university course will provide the framework for exchanges between students of different european universities.

Upon agreement between the 4 partner Universities, this course will be credited as a « Master Course Program » and provide 6 ECTS credits.

Experimental bench work will be organized as follows :

- Each student, individually or in groups of two, will carry out common experiments, described in the handout (provided at the beginning of the course) and concerning relevant developmental processes of key 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 (tentative list):

- 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), chromosomes cell cycle (Hoechst staining)
- Nerve cell analysis: Immunohistochemistry with neuronal-specific antibodies

Work Program (can be changed according to animals, weather condition, tide hours)
P: Practical Work, T: Theory, S: Seminar, D: Discussion

Breakfast is at 08.00-8.30, Lunch at 13.00, Dinner at 19:00.

Monday, 19.5.08

Early animal evolution / Porifera

09.00 T: Introduction to the course (Piraino, Cormier)
10.00 S: Evolution of multicellularity (B. Kloareg, Director of SBR)
12.15 LUNCH
14.00 Guided visit of the SBR
14:30 T: Introduction to Porifera (Piraino)
16.00 P: Introduction to the sorting out experiments
17.30 D: Discussion about group work, handling of sponge experiment
19.00 DINNER
21.00 P: Sponge experiment: changing medium
S: JOURNAL CLUB

Tuesday, 20.5.08

Basal groups: Porifera/Cnidaria/Placozoa/Acoela

09.00 P: Handling of sponge experiments
10.00 T: Introduction to Cnidaria, basic anatomy and life cycles (Piraino)
10.45 S: JOURNAL CLUB
11.00 P: Identification of cnidarian material/ anatomy/ cnidocysts
13.00 LUNCH
14.00 T: Introduction to embryonic development. Life cycles and metamorphoses of cnidarian larvae (Piraino)
15.00 P: Starting metamorphoses experiments – collection of larvae, incubation
16.30 S: JOURNAL CLUB
18.00 P: Changing medium (washing), again after dinner
D/P: START TEAM PROJECTS
19.00 DINNER
21.00 P: Changing medium (washing), TEAM PROJECTS

Wednesday, 21.5.08

Immunohistology with Cnidaria

09.00 P: Protocol of metamorphoses and sponge experiments

P: Plankton analysis. Sorting gelatinous zooplankters (to be used for immunostaining)
10.00 T: Introduction to antibody experiments (Piraino)
P: Start with Immunostaining and BrdU experiments, collection of larvae, polyps, medusae.
during incubation time:
S: JOURNAL CLUB
13.00 LUNCH
14.30 P: Continuation of staining (washing) and TEAM PROJECTS
15.00 S: JOURNAL CLUB
16.00 P: Protocol of immunohistology (observation at fluorescence microscope) in groups of two
16.00 P: standby groups: TEAM PROJECTS
19.00 DINNER
20.00 P: If needed, protocol of immunohistology in groups of two

Thursday, 22.5.08

09.00 T: Introduction to Acoela (Bailly)
10.00 P: Analysis of Symsagittifera roscoffensis
12.30 S MOLMORPH- Genes for A-P axis formation and regeneration in Symsagittifera
13.00 LUNCH
15.00 T: Introduction to the Annelida and Sabellaria embryology/experiments (Piraino)
15.45 P: Fertilization experiment, protocol of early development
17.00 S: JOURNAL CLUB
protocol of early development
17:30 S: JOURNAL CLUB
protocol of early development
18:00 S: JOURNAL CLUB
19.00 DINNER
21.00 Continuation of TEAM PROJECTS

Friday, 23.5.08

09.00 T: Introduction to tunicate anatomy and embryology (Piraino)
P: Tunicate fertilization – investigations on sperm/egg interactions
11.00 S: JOURNAL CLUB
12:00 P: Record of fertilization rate, different treatments
13.00 LUNCH
15.00 S: Evolution of the brain (Reichert)
16.00 P: TEAM PROJECTS. All afternoon.
19.00 DINNER

Saturday, 24.5.08

9.00 P: TEAM PROJECTS
10.30 S: Tides and Larval ecology (Piraino)

12.30 LUNCH
13.45 Excursion at low tide. Collection of macrobenthos, meiobenthos
15.45 P: Sorting and analysis of material.
17.00 S: JOURNAL CLUB
19.00 DINNER

Sunday, 25.5. 07

FREE DAY / Excursion to Ile de Baz ?
13.00 LUNCH (possibly take-away lunch)

Monday, 26.5. 08

Phylum: Echinodermata

09.00 T: Functional anatomy of Echinoderms (Candia)
11.00 T: Introduction to echinoderm embryology (Cormier)
12.00 P: Identification of material
13.00 LUNCH
14.00 P: How to handle sea urchin and induce spawning, follow fertilization.
15.00 P: Contribution of participants
15.30 P: Demonstration of microinjections in sea urchin eggs (Ouhlen)
(groups of two). Standby groups: TEAM PROJECTS (all afternoon)
18:00 Summary of experiments for tomorrow.
19.0 DINNER

Tuesday, 27.5. 08

Phylum Echinodermata

09.00 P: Handling animals, gametes and embryos of sea urchins
protocol of fertilisation, fertilization membrane and division cycles (cormier)
11.00 T: Post transcriptional regulation analysis during first mitotic divisions in sea urchins: description of the experiment (Cosson)
13.00 LUNCH (cold buffet)
15.00 S: Regeneration in Echinoderm – First part (Candia)
17.30 D: summarizing results of experiments and
T: Regulation of gene expression at the translational level. A lesson from the sea urchin early embryo (Cormier)
18.00 End of experiments
19.00 DINNER

Wednesday, 28.5. 08

Phylum: Echinodermata

09.00 T: Introduction to practical work on MCT (mutable collagenous tissue) (Candia)
09.15 P: Handling animals and incubation with anaesthetics
09.25: T: Exploring the biomechanical potential of MTC
09.55 P: Response/recovery after different treatments (anaesthetics etc)
11.00 T: Discussion of experiments
12.00 S: JOURNAL CLUB
13.00 LUNCH
14.30 T: Regeneration: BrdU work, introduction to experiment
15.30 P: Regeneration: arm and test regeneration (whole animals versus explants) evaluated
with microscopic and statistical analysis
17.30 P: Regeneration: BrdU work (analysis in group of two) (observation at fluorescence microscope) in groups of two
P: standby groups: continuation of TEAM PROJECTS
18:00 Discussion of regeneration experiments
19.00 DINNER

Thursday, 29.5.08
Phylum: Tunicata

09.00 P: Localization of myoplasm in tunicate embryos / larvae (Piraino) by enzymatic staining.
13.00 LUNCH
15.00 P: Fixation of tunicate embryos at different stages. Staining for myoplasm determinants.
16.00 S: Contribution of students (own research work)
Preparations of posters (group work)
19.00 DINNER
20.30 P: Fixation of tunicate embryos at different stages. Staining for myoplasm determinants.

Friday, 30.5.08
Last Day
09.00 P: Metamorphoses of tunicate larvae. Staining larvae.
11.30 D: Discussion of results.
12.00 P: Finishing up experiments
14.00 D: Presentation of posters
Final Discussion - evaluation
Clean up
19.0 DINNER
21.00 Farewell party

Saturday, 31.5.08
Good-bye and travel well

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