

CIAC 2018 Workshop Proposal Description #1

Title: Workshop on Genetic Tools and Live Imaging in Cephalopods.

Workshop lead(s): Eric Edsinger (very open to additional leads but have not yet made arrangements)

Expected # participants: 10-20

3-5 sentence goal and description of workshop:

This 2-day workshop will cover 1) identifying genes of interest in annotated genomes (discussion and hands-on with computer software), 2) designing transgenic reporters, biosensors, and CRISPR-Cas9 guide RNAs (discussion and hands-on with computer software), 3) injection of mRNA/constructs/CRISPR-Cas9 in one or more cephalopod species (hands-on injection of pygmy squid and/or other species), 4) live imaging approaches for light-based genetic tools (discussion and hands-on live imaging of fluorescent dyes, proteins, and/or biosensors), and 5) applications of genomic resources and genetic tools to cephalopod biology, emerging genetic models, and other future prospects (discussions).

Prior to the course and if funding permits, participants can identify a gene of interest for knockout and the guide RNAs can be provided for injection, and submit a short abstract on why the gene is interesting for gene editing. Based on submissions and funding, one or more genes can then be selected and tested for the first time as part of the workshop. Equipment, mRNAs/constructs/genome editing materials, and animals will be provided (by workshop lead and local university/regional labs for imaging and injection equipment?) so that participants can do their own and/or pre-designed experiments during the workshop, including the inject of embryos with mRNA, constructs, or CRISPR-Cas9 (depending on what is the most exciting yet robust method given the constraints of the workshop at the time). Embryos can be assessed the next day and/or later during the meeting.

How will the mechanics of the workshop look?

Prior to the workshop, participants will have access to the pygmy squid (and/or other species) genome via a genome browser, and can use it to identify genes of interest for knock-out by CRISPR-Cas9. Participants can then submit a short write-up on their gene of interest, and select genes will have guides designed by the organizer prior to the workshop, with the guides made available to the students for injection. Thus, a new gene or genes will be tested for CRISPR-Cas9 knockout by all students, providing replicates and new data as part of the workshop, in addition to genes already known to work well for knockout or knock-in.

The morning of Day 1 will open with an overview of current genomic resources, genetic tools, and imaging technologies used in cephalopods and model organisms, followed by a tutorial on how to build CRISPR-Cas9 guide RNAs. The afternoon and evening will involve hands-on training to do injections of embryos in pygmy squid and/or other species.

The morning of Day 2 will open with an overview of genotyping and phenotyping CRISPR-Cas embryos, and a tutorial on live imaging embryos and hatchlings with fluorescent dyes, proteins, and biosensors. The afternoon and evening will focus on live imaging of embryos and hatchlings using one or more of the fluorescent tools introduced in the morning tutorial. Finally, the workshop will end with an open discussion about future tools, applications, and lines of research, including genetic models and emerging genetic tools and technologies in development, physiology, and neuroscience.

Please check one: hands-on discussion based other (please explain)

Please check one: pre-work by participants needed
 participants to bring/ship samples for workshop

Expected product from workshop and anticipated timeline if post-workshop time is needed:

The workshop will produce a number of embryos and hatchlings expressing injected mRNAs, transgenic constructs, or genome edited genes. The animals can be monitored during the subsequent meeting, and fixed for later genotyping or other post-workshop analyses by the participants, when there is interest, or by the organizers. New genes that are successfully tested can be followed up on and potentially published as an outcome of the workshop, with all participants as co-authors.

CIAC 2018 Workshop Proposal Description #2

Title: "Paralarval and juvenile cephalopods: an updated identification guide"

Workshop lead(s): Erica A G Vidal, Liz Shea

Expected # participants: 30

3-5 sentence goal and description of workshop:

The "Larval" and juvenile cephalopods: A manual for their identification, was published in 1992 and is outdated, as several recent publications have broaden our knowledge of the taxonomic status of cephalopods early life stages. The provisional identification key provided in that manual has several problems and badly needs a revision. Thus, the goal of this workshop is to compile and synthesize existing taxonomic information to create an update identification guide of cephalopods early life stages. Currently, the identification of early stages of many species is problematic and any improvement in this regard will promote a better understanding of the life cycles and population dynamics of these species. This workshop also would be an excellent opportunity to disseminate knowledge on the identification of cephalopods early life stages among the participants with a "hands on" approach.

How will the mechanics of the workshop look?

Please check one: hands- on discussion based other (please explain)

Please check one: pre-work by participants needed

participants to bring/ship samples for workshop

Expected product from workshop and anticipated timeline if post-workshop time is needed:

The publication of an identification guide for paralarval and juvenile cephalopods. This accomplishment will require the expertise of many researchers working on different families. Participants should form groups according to their interest in a particular family. Each research group would identify the weaknesses of each family and prepare a working plan to be executed during the workshop with a "hands on" approach. Communication among participants is needed pre-workshop to organize which samples should be taken to the workshop. A reasonable timeline to expect for the publication of the guide would be within two years of the workshop.

CIAC 2018 Workshop Proposal Description #3

Title: Hard structures of cephalopods and their application in your field of study.

Workshop lead(s): Alexander I. Arkhipkin, Catalina Perales-Raya and Fedor Lischenko.

Expected # participants: 20-30

3-5 sentence goal and description of workshop: For several decades, hard structures of cephalopod mollusks have been used as practical and reliable tools in a wide variety of studies. Nowadays the age, growth and maturity rates could be estimated using increments on statoliths, beaks or vestigial shells, taxonomic or even population affiliation of individual could be determined by the shape of hard structures. Moreover, hard structures alone could provide enough data to describe the animal's life cycle. At the moment the amount of information about species biology which could be obtained using hard structures, is literally staggering. It is easy to get confused in such a variety of methods and approaches. To solve this problem, we are going to discuss at this working group the modern challenges of cephalopod's hard structures use and the latest achievements in this sphere. In addition to that, hands-on course of hard structure application for ageing and taxonomic studies is planned.

How will the mechanics of the workshop look?

Please check one: hands-on discussion based other (please explain)

The workshop will be composed of two major parts - practical course and discussion. At the first part we plan to teach the participants how to process different kinds of hard structures in order to estimate age or perform shape analysis. The second part is devoted to discussion of novel methods of hard structure use and the further development of existed ones.

Please check one: pre-work by participants needed

Participants are able to bring/ship samples for workshop

Expected product from workshop and anticipated timeline if post-workshop time is needed:

According to the structure of workshop, there will be two kinds of expected products. Expected product from discussion part of workshop is the article on modern methods of hard structures use, expected product from the second part of workshop - practical skills of age estimation and shape analysis obtained by participants.

CIAC 2018 Workshop Proposal Description #4

Title: **Cephalopod Karyology**

Workshop lead(s): Dr Mandy Reid

Expected # participants: 10-30.

3-5 sentence goal and description of workshop:

Few cephalopod species have been karyotyped. Comparison of chromosome counts may provide useful information for taxonomic and phylogenetic studies. In this workshop, participants will make and photograph chromosome preparations from their own tissue samples. The correct preservation method for transport will be provided to participants prior to the workshop. If tissue can be brought from a range of taxa, a post-workshop publication may follow. The success of this workshop depends on whether participants can collect and preserve fresh testis samples prior to the workshop.

How will the mechanics of the workshop look?

Please check one: hands- on discussion based other (please explain)

Please check one: pre-work by participants needed

participants to bring/ship samples for workshop

Expected product from workshop and anticipated timeline if post-workshop time is needed:

This workshop could be completed in 1 day. Expected product: publication of karyotypes from a range of cephalopod taxa. As this work is largely descriptive, the collation of results and preparation for publication should not require significant amounts of time post-workshop. The possibility exists for non-workshop attendees (perhaps people attending other workshops) to provide tissue samples that can be used by workshop participants.

CIAC 2018 Workshop Proposal Description #5

Title: ECO-EVO-DEVO OF CEPHALOPODS

Workshop lead(s): Co-leads: Laure Bonnaud-PONTICELLI¹/Atsushi OGURA²

1 Museum National d'Histoire Naturelle. UMR BOREA. Paris. France

2 Lab of Genomic Diversity, Nagahama Institute of Bioscience and Technology National. Nagahama. Japan

Expected # participants: 15

Goal and description of workshop:

This workshop aims to integrate research concerned with short term adaptation (ecology) as well as with evolutionary questions in cephalopods within the framework of evolutionary developmental biology. In recent years, comparative evolutionary developmental biology has become an important cornerstone of multiple disciplines of biological research. Environmental factors, biotic and abiotic are now considered as crucial elements that have an impact on organismal development and thus on the evolution of structures, functions, regulations. This new conceptual domain ("Eco-Evo-Devo") covers studies on i) developmental plasticity to deal with adaptive evolution ii) external and/or internal environment as cues impacting development (for induction or disruption) and iii) molecular mechanisms underlying developmental plasticity. Our goal is to address these following eco-evo-devo issues in basic research or applied (aquaculture) research field

Accordingly, we seek short presentations from our colleagues that use EvoDevo data in any of the contexts mentioned above. We expect expert from different species of cephalopods with different mode of life, history and characteristics.

How will the mechanics of the workshop look?

Please check one: _____ hands- on discussion based _____ other (please explain)

Please check one: pre-work by participants needed

_____ participants to bring/ship samples for workshop

Expected product from workshop and anticipated timeline if post-workshop time is needed:

Writing of a paper on the new developmental and evolutionary issues of cephalopods

CIAC 2018 Workshop Proposal Description #6

Title: **Simulations : how can simulations help us to better understand Cephalopod biology ?**

Workshop lead(s): Jean-Paul Robin (additional help welcome !)

Expected # participants: According to the number of people interested the proposed output could be adapted (split).

3-5 sentence goal and description of workshop:

There is an increasing range of questions about Cephalopod biology which can hardly be answered via experimental designs or sampling in the wild. Animal ethics issues make laboratory experiments more and more complicated to carry out. In population biology age determination is often too much time consuming to be carried out routinely. At the ecosystem level global warming has positive and negative effects (boosted metabolism versus reduced size) which are difficult to disentangle. Simulations can provide a way to develop hypothesis, they can include different kinds of stochasticity and in the end allow to test different explanations of biological phenomenons. They need to be confronted to real observations although this can be organised at some more integrated level.

The objective of the workshop could be to review situations where simulations can be used to check hypothesis about Cephalopod biology that could not be tested in each detailed step via experiments or sampling.

It should emphasize the fact that simulations can be useful in a range of biological scales of Cephalopod studies (i.e. molecular scale / cell or tissue / organism / population / ecosystem)

How will the mechanics of the workshop look?

Please check one: hands- on discussion based other (please explain)

Please check one: pre-work by participants needed
 participants to bring/ship samples for workshop

Expected product from workshop and anticipated timeline if post-workshop time is needed:

Either

+ a review paper of situations where simulations "have been used" to better understand complex phenomenon in Cephalopod biology

or

+ a preparation of a "project" concerning Cephalopod biology at different scales and organizing the interaction between biologists and modelers in order to better understand complex situations (examples of interactions : "bioenergetics and cohort growth" / "behaviour and life-cycle variability").

An intermediate option could be to prepare a review paper describing applications of simulations in other species and commenting possible transfers to our species.

Submission of review paper within 6 month post-workshop.

CIAC 2018 Workshop Proposal Description #7

Title: The biogeochemical role of cephalopods in the world's oceans

Workshop lead(s): Henk-Jan Hoving

Expected # participants: 5-15

3-5 sentence goal and description of workshop:

Cephalopods perform extensive vertical and horizontal migrations, they are key organisms in the oceanic foodweb as predators and prey, they have high growth and metabolic rates and they typically are monocyclic which in combination with mating and spawning aggregations may result in mass mortality events. All these aspects of cephalopod behavior and life history suggest that they are significant components of the energy flow and biogeochemical cycle of the world oceans. This workshop aims to bring scientists together who have an interest in the role of cephalopods in ocean biogeochemistry. During this workshop we will discuss several topics related to energy transfer and biogeochemistry (e.g. migration, consumption, respiration and excretion, terminal spawning), and participants are invited to give a short presentation, followed by a discussion. This will form the basis for a peer reviewed review article on the biogeochemical role of cephalopods.

How will the mechanics of the workshop look?

Please check one: hands-on discussion based We will organize a series of presentations to introduce concepts related to the main topic of the workshop and discuss after each seminar the topic in more detail and how we plan to integrate this into the review article other (please explain)

Please check one: pre-work by participants needed

participants to bring/ship samples for workshop

Expected product from workshop and anticipated timeline if post-workshop time is needed:

Review on the biogeochemical role of cephalopods

CIAC 2018 Workshop Proposal Description #8

Title: Cephalopod Science – the direction of future research and the relevance of new policies

Workshop lead(s): G. Ponte, I. Gleadall, E. Vidal, G. Fiorito

Expected # participants: 30

3-5 sentence goal and description of workshop:

(1) A brainstorming session to identify likely avenues for novel ground-breaking research and their potential effects on and benefits to human society.

(2) A discussion on the changes in policy for, e.g. experimentation on (and fisheries of) cephalopods occurring in different regions of the world and the potential effects of these changes on cephalopod research in both global and local contexts.

(3) Preparations for a white-paper to summarize and report on (1) and (2).

How will the mechanics of the workshop look?

Please check one: _____ hands- on ___√___ discussion based ___√___ other (please explain)

- One or more public lectures around the time of the workshops and conference
- Setting up of dedicated special sections of the CIAC, CephRes and COST Action FA1301 websites to keep track of new developments and to publicize and explain them to the public at large

Please check one: ___√___ pre-work by participants needed (just reading a few key papers)

_____ participants to bring/ship samples for workshop

Expected product from workshop and anticipated timeline if post-workshop time is needed:

- A white-paper in the format of a perspective/opinion paper on the potential for ground-breaking research involving cephalopod science, its potential benefits to human society, and policies impacting the conduct of cephalopod research.

(Timeline: high-profile paper published within a year of the workshop)

- Web page (mentioned above) will represent a coordinated effort among different entities to keep the information widespread across a broad consensus of scientific and public dissemination

(Timeline: up and running around the time of the conference or soon after)