



SCOR WG157

MetaZooGene

Toward a new global view of marine zooplankton biodiversity based on DNA metabarcoding and reference DNA sequence databases.

2019 Annual Meeting Report
MetaZooGene SCOR Working Group 157
Saturday, September 14, 2019

Gothenburg Global Biodiversity Centre
University of Gothenburg
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Report of the MetaZooGene SCOR WG157 Annual Meeting
Saturday, September 14, 2019
Gothenburg Global Biodiversity Center,
University of Gothenburg, Gothenburg, Sweden

Agenda: The first annual WG157 meeting agenda (see Appendix 1) was designed around several primary goals: 1) overviews of SCOR and WG157; 2) introductions of WG157 members; and 3) examination of WG157 terms of reference, deliverables, and time-line.

Participation: The first annual meeting of MetaZooGene SCOR WG157 was attended by 15 members (including associate members) and 13 invited guests (see Appendix 2). There was no public announcement of the meeting; WG157 members were encouraged to invite colleagues and collaborators with closely-related interests, with priority given to early career, postdoctoral fellows, and students. The guests were invited for the morning session (09:00 – 12:00), which focused on background information about SCOR and an overview of goals, deliverables, and time-line for WG157.

Venue: The WG157 meeting was held at the Gothenburg Global Biodiversity Center, University of Gothenburg, Gothenburg Sweden. Our local hosts were Björn Källström (GGBC) and Erik Selander (Dept. Marine Sciences, University of Gothenburg). The center provided outstanding meeting space and the ambiance was both casual and conducive to open discussion (see photos in Appendix 3).

Presentations: All participants, including members and guests, were encouraged to present overviews of their research interests and expertise, expected contributions to MetaZooGene, and summaries of ongoing and future activities. The series of short presentations was designed to allow WG157 members and guests to get to know each other or – in many cases – catch up on recent activities of well-known colleagues and friends.

WG157 Terms of Reference and Deliverables: After wrapping up the introductory presentations, the afternoon session was a “down-to-business” discussion of the WG157 activities to date, with careful examination and evaluation of plans and time-lines for future activities. A summary of the discussion is included here, based in part on notes by Katja Peijnenburg (WG157 Vice Co-chair).

I. TERMS OF REFERENCE (TOR)

TOR 1) Create an open-access web portal for DNA barcodes for marine zooplankton

Todd O’Brien has led efforts to mine DNA sequence data for the mitochondrial cytochrome oxidase I (COI) barcode region. Data held in public repositories, including NCBI GenBank and BOLD, can be accessed and added to the MetaZooGene Database (MZGdb). All WG157 members are encouraged to ensure any COI barcode data from their laboratories are accessible, help identify gaps and errors, and to consider how the MZGdb data portal can be used to provide a foundation for DNA barcoding and metabarcoding analysis of marine zooplankton diversity. The MZGdb is a work in progress, and progress to date has been very good.

One new element of the website was requested: a members-only, password-protected “logged work area”, with various folders for posting files from meetings, background documents, and documents in preparation.

The group agreed that the maps of collection locations of barcoded specimens can be made publicly available, and the DNA barcode data summarized in MZGdb can be used for any and all purposes, including the DNA barcoding review paper.

An important topic raised here (and discussed throughout the afternoon) was the scope of MetaZooGene. The stated focus of WG157 is restricted to holozooplankton, which the group agreed is necessary in order to keep the scope of work realistic and likely of success. An exception was agreed upon for meroplanktonic Cnidaria for which the planktonic phase is the adult life stage. Aino Hosia will provide Todd with a list of such species (estimated ~1,000) to be included in MZGdb and the DNA barcoding review paper.

TOR 2) Design an optimal DNA barcoding pipeline for marine zooplankton

The discussion focused on summarizing best practices of DNA barcoding, rather than consideration or comparison of technologies and protocols, which are changing and improving with remarkable speed – probably too fast to allow summarization of the best approaches in a published document. Key issues discussed included:

- specimens must be accurately identified by taxonomic experts
- specimen vouchers should be stored for long-term preservation, ideally in museums
- DNA vouchers should be stored for long-term preservation: dried, liquid nitrogen, -80 °C
- High-quality tubes with good sealing ability are recommended for long-term storage
- specimen and DNA vouchers should be made available to other researchers
- photograph should be taken of each barcoded specimen
- metadata must be complete (as much information as possible) and accurate, including:
 - search term "zooplankton"
 - name of person who identified the specimen
 - reference for taxonomic identification guide, if applicable
 - environmental conditions and variables (all available)
- specific instructions should be provided for the various taxonomic groups of zooplankton

Important issues or shortfalls of the current databases were discussed, in order to help formulate plans for design of MZGdb, which can address these issue:

- identification of errors, either in DNA sequence or species attribution
- quality scores to call attention to mis-identifications and errors in taxonomic hierarchy
- clarification that barcodes must identify species; genus sp. does not count as a barcode
- notification of data submitter of errors, with request for correction
- should evidence of COI divergence and geographic clades be included?
- how should evidence of cryptic species be handled?
- can new species be described from barcode data?

MetaZooGene should work toward a description of best practices for DNA barcoding (bug-to-database) as one of the WG157 deliverables. This may or may not be a published paper in the peer-reviewed literature. First steps are to request that any existing available documents describing such protocols or pipelines be submitted to a private WG157 “online work space”. These might include published papers and documents from museums. All WG157 members will agree not to share or distribute further any documents placed in the work space.

TOR 3) Best practices for DNA metabarcoding

This goal will be a focus of WG157 effort after completion of the above TORs. One reason is the rapid development of metabarcoding, including molecular approaches and protocols, sequencing platforms, bioinformatics pipelines, and reference databases. At this time, the group agreed that we are unlikely to come up with one solution (i.e., “standardization” is unlikely), but we should discuss the many different

aspects and approaches of this question. This topic will be a focus of the WG157 2020 Annual Meeting in San Diego. These discussions should eventually lead to a review paper (or perhaps another special issue of research papers) to be published during the term of WG157.

II. DELIVERABLES AND TIME-LINE

1) Special issue of research papers focused on DNA barcoding and metabarcoding of marine zooplankton

The group agreed that a special issue focused only on zooplankton is a good goal for WG157. The members present agreed that the ICES Journal of Marine Science is the preferred journal for the special issue (subject to comment by all members). Ann commented that the editor-in-chief Howard Browman (IMR, Norway) expressed interest, noted that 5-8 papers are typical for special issues, and that the editorial staff has been reliable and conscientious in her dealings with the journal. Browman did caution that the current manuscript rejection rate is 40%. ICES JMS articles are published online as they are accepted. Preferred journal of members. Ann volunteered to serve as Guest Editor, and asked for other volunteers among WG157 members. (Ryuji Machida volunteered after the meeting; Ann gratefully accepted his offer.) The tentative title of the special issue is: "DNA barcoding and metabarcoding of marine zooplankton". All 15 WG157 members present initially expressed interest in submitting papers to the special issue. On further discussion, 10 members thought they would be willing and able to meet a manuscript submission due date of April 1, 2020. In January 2020, Ann will send another request to WG157 members for planned manuscript submissions, with tentative titles and co-authors.

2) Review paper on COI barcoding of marine zooplankton (Marine Biology Reviews)

Work is underway on this review paper. Ann is lead author, with a number of WG157 co-authors and several others. The editor for Marine Biology Reviews has guaranteed acceptance. All WG157 members are urged to submit any unpublished DNA barcode data to GenBank or BOLD. If public release of the data will be delayed, the submitters are asked to give Todd O'Brien access, so the data can be included in the analyses for the review paper. Timeline agreed upon was December 1st for Ann to distribute a complete outline and draft of the Introduction and Methods sections of the review. All co-authors are asked to provide feedback and contributions by February 1, 2020. The status and next steps for review preparation and finalization would be discussed during the WG157 2020 Annual Meeting in San Diego. Video conferencing would be arranged for co-authors who will not be present at the meeting.

3) Capacity building workshops

A) Hands-on 'DNA to data' training workshop on DNA barcoding and metabarcoding

Ryuji Machida is planning to host a workshop at Academia Sinica (Taipei, Taiwan) during 2021. The workshop would be intended for students and early-career researchers, and would include molecular benchwork, data analysis and bioinformatics, and interpretation of results. Ann agreed to ask SCOR about sources of funding and to consider any and all approaches to providing necessary resources.

B) Bioinformatics for metabarcoding

Ann has been exploring options for bioinformatics workshops. One possible approach might be an online course offered by faculty and staff at the Computational Biology Core, University of Connecticut (see <https://bioinformatics.uconn.edu/>). This would require funding and resources that have not yet been identified, but Ann is exploring this with colleagues and collaborators at UConn.

C) Another MetaZooGene public symposium

WG157 members thought it might be possible and desirable to plan for a second public symposium focused on MetaZooGene research in association with the 2022 Ocean Sciences Meeting in Hawaii. This could also encourage and give priority to students and early-career researchers, and include a discussion specifically devoted to their needs. In addition, or instead, a half-day tutorial for students and early career scientists could be organized and led by WG157 members.

III. NEXT WG157 MEETINGS

A) 2020 Ocean Sciences meeting in San Diego (Feb 16-21, 2020)

The WG157 members present agreed on a 1-day meeting on Sunday (February 15, 2020) before the scheduled events of the 2020 Ocean Sciences Meeting. There will not be a public symposium, and the focus of the meeting will be on discussion and updated on progress toward MetaZooGene deliverables. In principle, only WG157 members should plan to attend.

In addition, there may be time for small group meetings, either on Sunday or during the following week (working around the OSM schedule) focused on the DNA Barcoding Review paper, DNA barcoding best-practices document, capacity-building workshops, and other topics.

B) 2021 Aquatic Sciences Meeting in Palma de Mallorca, Spain (February 28-March 5, 2021)

There was some discussion of whether a WG157 meeting might be useful in association with the 2021 ASLO meeting. Currently, no MetaZooGene meeting is planned for 2021, so this might be an additional opportunity to discuss WG157 progress and plans. Based on a show of hands, perhaps 5-8 WG157 members are currently planning to attend the conference.

C) 2022 Ocean Sciences meeting in Hawaii

The 2022 MetaZooGene meeting may offer opportunities for an associated Public Symposium. This may also be linked to another special journal issue of papers related to MetaZooGene goals.

IV. A FEW REMAINING QUESTIONS

A) Social media: Are there useful opportunities for MetaZooGene using social media? Are there interested WG157 members who would like to pursue this? Ann will check with Ed Urban about any SCOR policies.

B) WG157 Acknowledgments: In order for publications, presentations, reports, etc to be included as products of MetaZooGene, SCOR WG157 must be acknowledged in the document. Ann will ask whether there is a standard acknowledgement or recommended wording.

C) Additional WG157 members: Suggestions are welcome (to Ann) for people who would be useful and interested contributors – and potential new members – of WG157. Ann will confirm and remind everyone of SCOR rules for membership.

Appendix 1. Agenda for MetaZooGene SCOR Working Group 157 2019 Annual Meeting

**MetaZooGene SCOR Working Group 157
2019 Annual Meeting
Saturday, September 14, 2019
Gothenburg Global Biodiversity Center,
University of Gothenburg, Gothenburg, SWEDEN**

Agenda

- 0900 Welcome from local hosts, Björn Källström (GGBC) and Erik Selander (Dept. Marine Sciences)
- 0910 Welcome from Ann Bucklin (WG157 chair)
- 0920 Introduction to SCOR (Todd O'Brien)
- 0945 Overview of SCOR WG157 Terms of Reference and Deliverables (Ann Bucklin)
- 1015 Coffee Break
- 1030 Updates from MZG members and Guests
- 1200 Lunch at nearby restaurant in the Botanical Garden
- 1300 Updates from MZG members (continued)
- 1430 Coffee break
- 1445 WG157 Deliverables
 - MZGdb: Project website, web portal, and database (Todd O'Brien)
 - Best practices documents for DNA barcoding and metabarcoding
 - Special journal issue of papers by MZG members and colleagues
 - Review papers
 - DNA Barcoding of Marine Zooplankton
 - Future plans for additional review papers
 - Capacity Building
 - Workshops to address the key themes in MetaZooGene mission
- 1600 Plans for the 2020 Annual WG157 Meeting
 - Ocean Sciences Meeting (Feb. 16-21, San Diego, CA)
- 1630 Wrap-Up and Adjourn

Appendix 2. Attendees at MetaZooGene SCOR Working Group 157 2019 Annual Meeting

	<i>MetZooGene Members</i>	
1	Ann Bucklin	ann.bucklin@uconn.edu
2	Katja Peijnenburg	K.T.C.A.Peijnenburg@uva.nl
3	Leocadio Blanco-Bercial	leocadio@bios.edu
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7	Chaolun Li	lcl@qdio.ac.cn
8	Ryuji Machida	ryujimachida@gate.sinica.edu.tw
9	Todd O'Brien	Todd.OBrien@noaa.gov
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11	Ruben Escribano	ruben.escribano@imo-chile.cl
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13	Silke Laakmann	silke.laakmann@hifmb.de
14	Maria Grazia Mazzocchi	grazia.mazzocchi@szn.it
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	<i>Guests</i>	
16	Janna Peters	janna.peters@senckenberg.de
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27	David Stankovic	david.stankovic@nib.si
27	Sergio Stefanni	sergio.stefanni@szn.it

Appendix 3. WG157 members at the 2019 Annual Meeting at the Gothenburg Global Biodiversity Center, Gothenburg, Sweden (September 14, 2019).



WG157 members (left-to-right): Jenny Huggett, Silke Laakmann, Astrid Cornils, Ryuji Machida, Tone Falkenhaus, Junya Hirai, Agata Weydmann, Aino Hosia, Katja Peijnenburg, Todd O'Brien, Ann Bucklin, Leocadio Blanco-Bercial, Maria Grazia Mazzocchi, Chaolun Li, Ruben Escribano.



The Gothenburg Global Biodiversity Center offered outstanding facilities and a casual setting conducive to conversation among WG157 members and guests, shown here during coffee breaks.