IPC13

RMS Queen Mary • 4–9 August 2019

Program & Abstracts

Table of Contents

Welcome from IPC13 Organizing Committee

Greetings Polychaete Colleagues,

On behalf of the Organizing Committee, welcome to sunny Southern California, the RMS *Queen Mary*, and the 13th International Polychaete Conference! We hope that your travel to Long Beach was pleasant and that you are ready for five days of enlightening programs and time spent with friends and colleagues.

In 1989, IPC3 took place in Long Beach, organized by Dr. Donald Reish. In 2015, Don approached us to ask if it might be possible to bring IPC13 back to Long Beach, thirty years later. We agreed to work towards that goal, and in 2016 the attendees of IPC12 in Wales selected Long Beach as the venue for the next meeting. Unfortunately, Don did not live to see his dream become a reality, but his passion for all facets of polychaete biology is represented in this conference through the broad diversity of presentations that are offered. We know that he would be very pleased and honored by your participation in this meeting.

The conference would not have been possible without your support and participation. In addition, we would like to express sincere thanks to those organizations that have supported the conference, either financially or by other critical means. Among other things, this support has allowed us to waive registration fees for 11 student participants from around the globe (support from the American Microscopical Society and SCAMIT), to offer substantial cash awards for best student presentations (support from *The Biological Bulletin* and an anonymous donor), and to make the proceedings open access online (support from USC Sea Grant). Sponsors include:

- American Microscopical Society
- *The Biological Bulletin*
- California State University at Long Beach
- Natural History Museum of Los Angeles County
- Orange County Sanitation District
- Southern California Association of Marine Invertebrate Taxonomists (SCAMIT)
- USC Sea Grant
- Wood Environment & Infrastructure

In addition, a number of individuals have donated to support the conference. We thank all of you!

With ~115 attendees from 22 countries giving a diverse set of presentations on the biology of polychaetes, we wish everyone a productive and enjoyable meeting!

The IPC13 Organizing Committee
Bruno Pernet (Chair)
Kirk Fitzhugh
Leslie Harris
Larry Lovell
Christine Whitcraft

IPC13 Sponsors

Biological
BULLETIN

Sea Grant
University of Southern California

wood.

Meeting Code of Conduct

This Meeting Code of Conduct is intended to prevent incidents of harassment, discrimination, and violence, and to maintain the high quality of scientific discourse that our members have come to expect from the International Polychaetology Association (IPA) and its meeting, the International Polychaete Conference.

The International Polychaetology Association (IPA) is a nonprofit international organization whose purpose, according to the IPA Constitution, is to "encourage research on Polychaeta and stimulate others to participate and cooperate through informal meetings and correspondence; to provide a forum for exchange of ideas; to establish a means and an opportunity for personal contact and interaction in aiming for better mutual understanding; to serve as a liaison body among polychaetologists; and to introduce new students to the workers in this field." The International Polychaete Conference (IPC) is the regular (every three years) meeting of the IPA.

IPA is committed to creating an environment in which all attendees can participate without harassment, discrimination, or violence of any kind. All meeting participants, irrespective of race, sexual orientation, gender identity/expression, ethnicity, ability, religion, language, professional status, or age, must be treated with respect. All meeting participants including, but not limited to, attendees, speakers, volunteers, exhibitors, service providers and others are expected to abide by this IPA Meeting Code of Conduct. This Code of Conduct applies to all IPC meeting-related events including those sponsored by organizations other than IPA but held in conjunction with IPC events, in public or private facilities.

The expected behavior is as follows. All participants, attendees, and suppliers/vendors will:

- Be treated with respect and consideration, valuing the diversity of views and opinions.
- Be considerate, respectful, and collaborative.
- Communicate openly with respect for others, critiquing ideas rather than individuals.
- Avoid personal attacks directed at other attendees, participants, and suppliers/vendors.
- Be mindful of their surroundings and their fellow participants.
- Alert a member of the IPC organizing committee if they notice a dangerous situation or someone in distress.
- Respect the rules and policies of the meeting venue, hotels, IPC-contracted facility, or any other venue.

Harassment of any meeting participant (attendee, speaker, volunteer, exhibitor, staff member, service provider, organizer, or meeting guest) will not be tolerated. Discrimination of any meeting attendee on the basis of race, sexual orientation, gender or gender identity, ethnicity, ability, religion, language, national origin, physical appearance, or age will not be tolerated. Unacceptable behavior includes (but is not limited to):

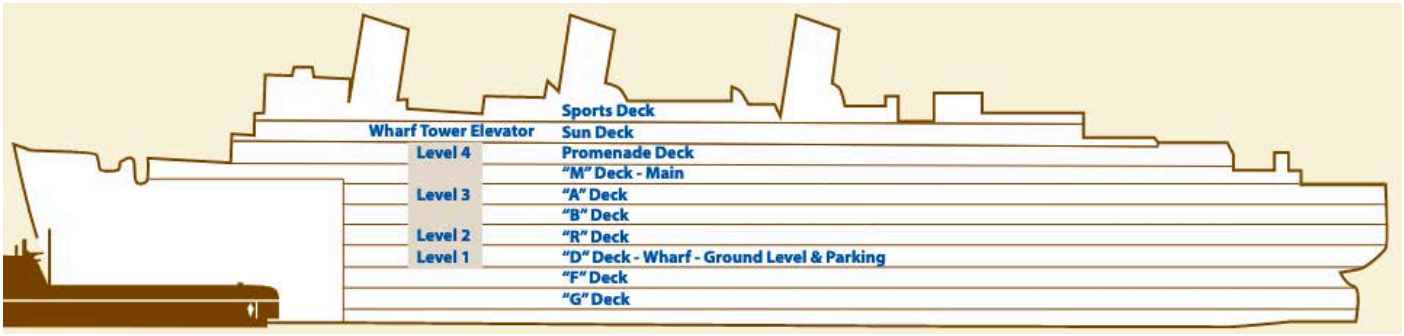
- Unwanted verbal attention
- Unwanted touching
- Intimidation
- Stalking
- Shaming
- Bullying
- Harassment (note that harassment presented in a joking manner is still harassment and constitutes unacceptable behavior)
- Retaliation for reporting harassment
- Reporting an incident in bad faith

People wishing to report a violation of this code of conduct should immediately contact a member of the IPC organizing committee. Incidents of harassment and discrimination will be taken extremely seriously. Confidentiality will be maintained unless disclosure is legally required. The meeting organizers reserve the right to enforce this code of conduct in any manner deemed appropriate. Anyone violating the code of conduct may be: (a) asked to stop, (b) expelled from the meeting (without refund), (c) prohibited from attending future meetings, and/or (d) have membership revoked or banned for the future.

Meeting Venue – The RMS *Queen Mary*

The meeting will be held on board the RMS *Queen Mary*, a 310 m long ocean liner built in 1936 and retired from service in 1967. During that time she had a rich history of trans-Atlantic service for the Cunard Line, as well as service as a troopship during World War II. She has been permanently moored in Long Beach since 1967, undoubtedly developing a diverse community including native and non-native polychaetes on her hull. Enjoy learning about her history from the many displays on board during the conference!

Except for the mid-conference excursion, all IPC13 activities will take place on board the *Queen Mary*. As her deck naming system is somewhat non-intuitive, we provide a sagittal section and a guide to some relevant locations below.



Hotel registration – A Deck (Elevator Level 3). IPC13 registration will be set up in this area from 1600-2000 on Sunday 4 August.

Guest rooms – M, A, and B Decks (Elevator Level 3). All guest rooms for IPC13 participants are on one of these three decks.

Grand/Windsor Salons – R Deck (Elevator Level 2). Almost all conference activities will happen in these adjacent areas: IPC13 registration on Monday 5 August, talks and poster presentations, and breakfast and lunch for all days except the mid-conference excursion day.

Verandah Grill/Deck – Sun Deck. Chat with your colleagues at the wine and cheese social on the evening of Monday 5 August!

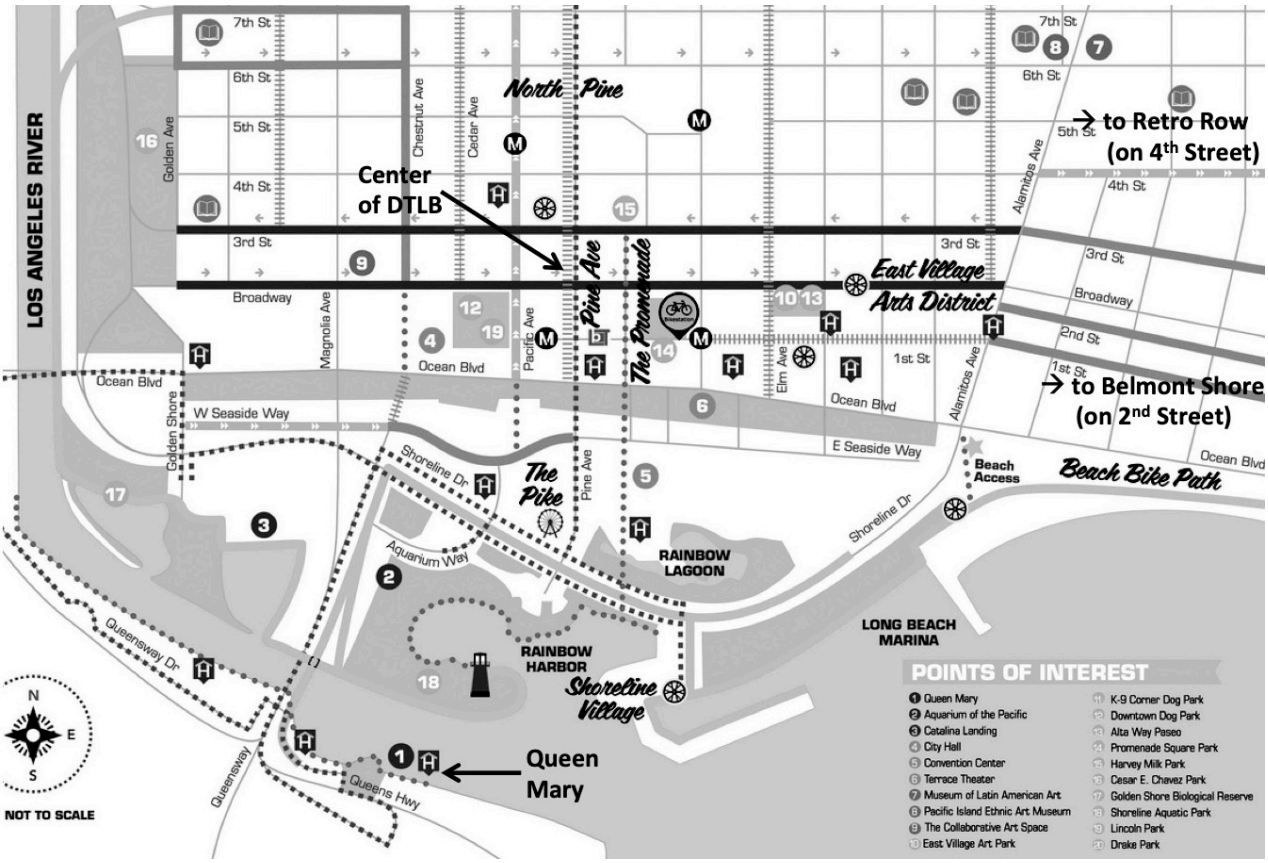
Queen's Salon – Promenade Deck (Elevator Level 4). This is the site of the banquet on the evening of Friday 9 August.

Observation Bar and Art Deco Lounge – Promenade Deck (Elevator Level 4). Each IPC13 guest room is allotted a single complimentary drink coupon redeemable at the Observation Bar during the conference.

Dining options on board – Most are located on the Promenade Deck (Elevator Level 4). These include the Midship Marketplace (a source for coffee and snacks), the Promenade Café, and the Chelsea Chowder House & Bar. Sir Winston's restaurant, a more deluxe option, is located on the Sports Deck.

Restaurants

There are several dining/drinking options on board the *Queen Mary* or just a few steps away (Fuego at the Hotel Maya, The Reef), but most are in Downtown Long Beach (DTLB), centered roughly at the intersection of Pine Avenue and Broadway (map below). DTLB dining options are concentrated in four areas, all quite close to each other. Other good dining neighborhoods easily reached by public transport (buses) or ride share include Retro Row and Belmont Shore, both to the east of DTLB.



A few of the many options in each area

Rainbow Harbor/Shoreline Village
Bubba Gump Shrimp Co.
Chili's Grill and Bar
Outback Steakhouse
P.F. Chang's
Gladstone's
Famous Dave's Bar-B-Que
Yard House
Parker's Lighthouse

The Promenade
Beachwood BBQ & Brewing
Michael's Downtown Italian Kitchen
The Ordinarie
Beer Belly
Ammatoli Mediterranean Bites

Pine Avenue
Gu Ramen
Taco Beach
King's Fish House
George's Greek Cafe
Alegria Cocina Latina
Pier 76 Fish Grill
Rock Bottom Restaurant & Brewing

East Village Arts District
James Republic
Thai District
District Wine
555 East American Steakhouse
Modica's Deli
Crème de la Crepe

The nearest **supermarket/pharmacy** is a Vons at 600 E Broadway; another nearby **pharmacy** is the RiteAid at 601 Pine Avenue.

Getting to and from Downtown Long Beach

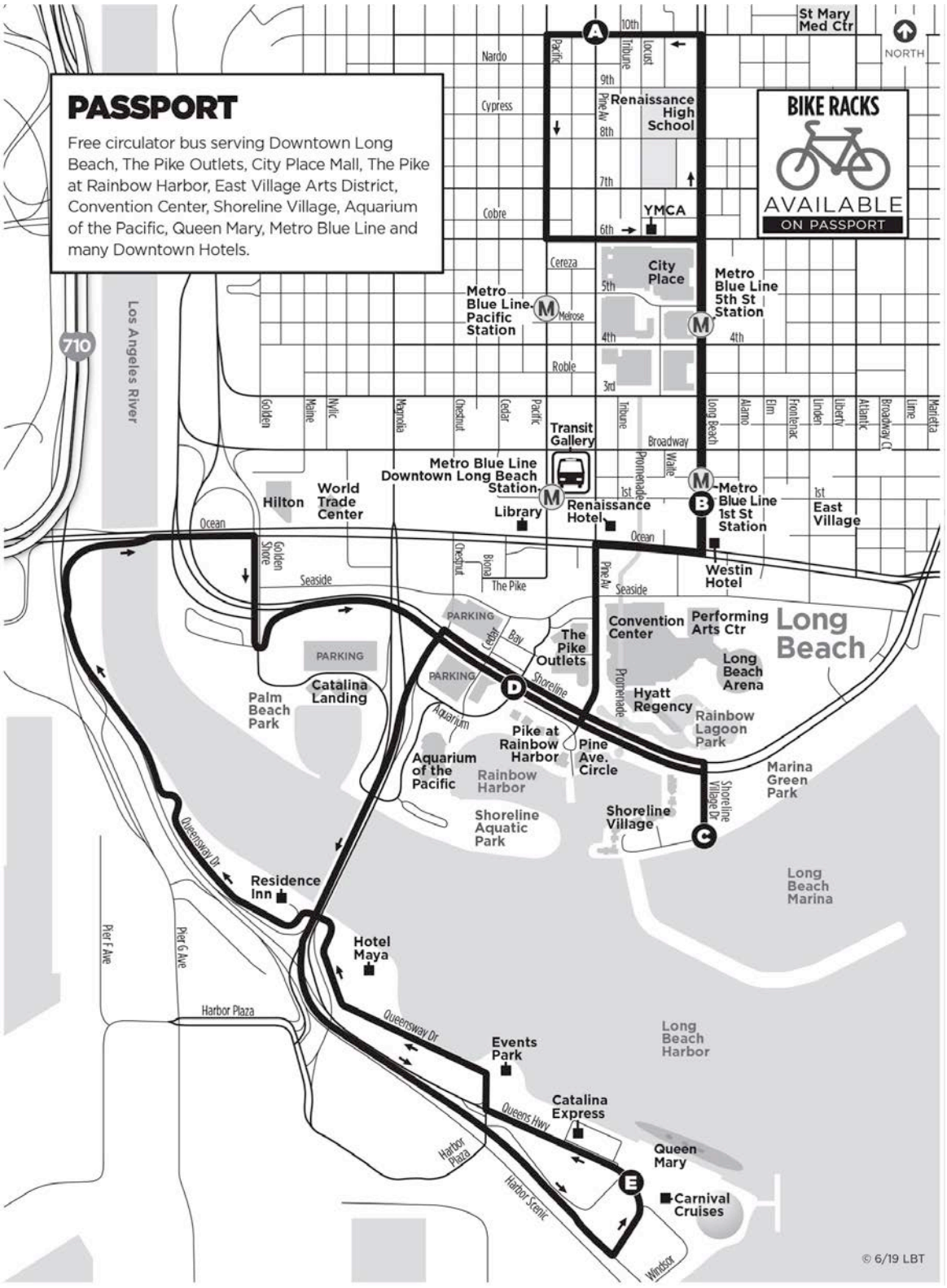
On foot – The center of DTLB (~Pine and Broadway) is just under 2 miles (3.2 km) from the *Queen Mary*; if the weather is pleasant, you may wish to simply walk.

Passport Bus (free) – The red Passport bus departs from the *Queen Mary* every 15-30 minutes, headed for DTLB, from 0630-just after midnight.

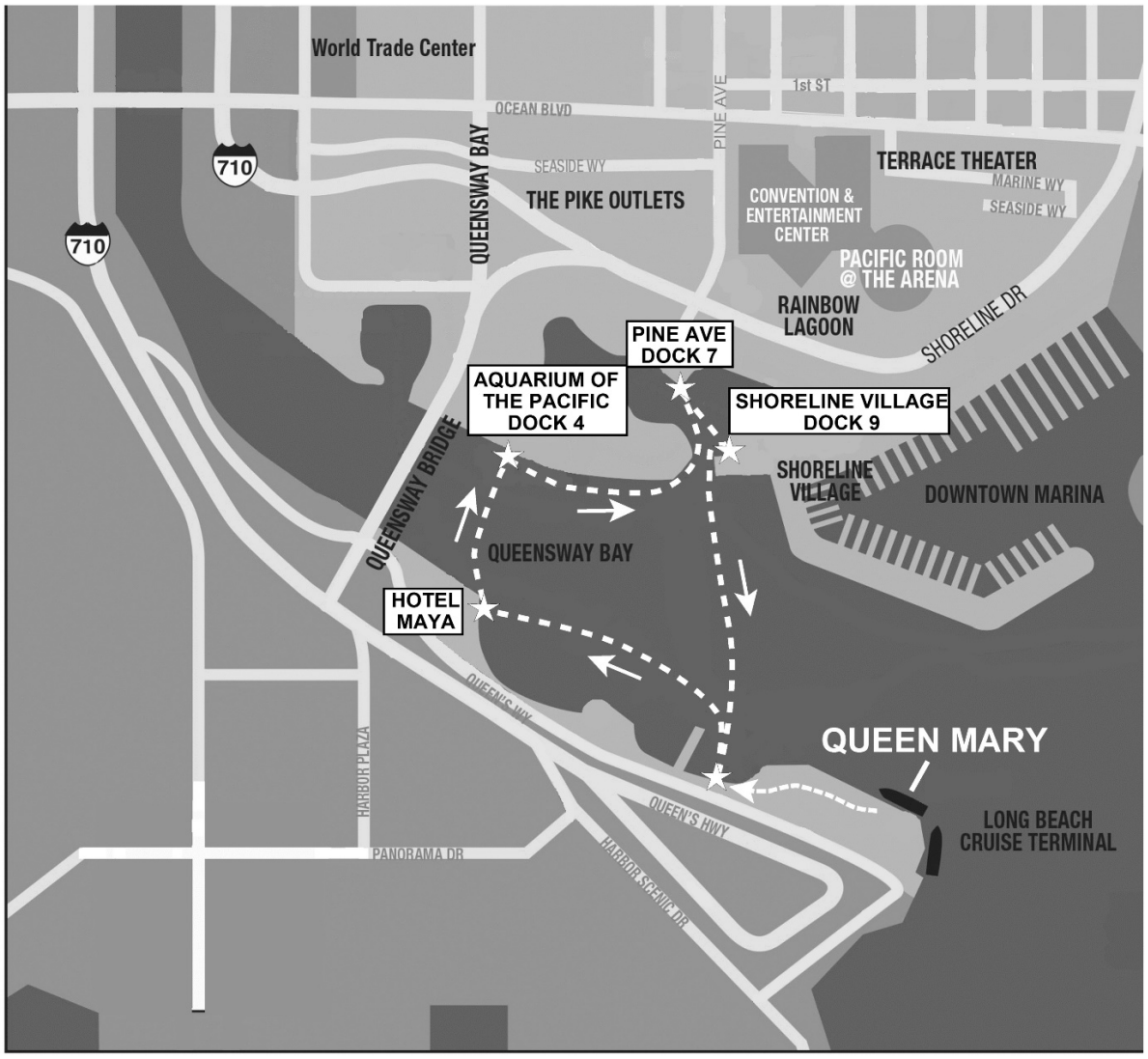
Aquabus ($1 each way) – This water taxi departs from a dock a few hundred meters in front of the *Queen Mary*. See map and schedule on the next page.

Rideshare services (cost varies) – e.g., Lyft, Uber, taxis.

Parking – Self-parking is $15 for 24 hr (with in and out privileges). When you leave, tell the parking attendant you are part of the conference to get this special rate.



Long Beach AQUABUS



7-Day Service May 26–Sept. 4				
QUEEN MARY	HOTEL MAYA	AQUARIUM DOCK 4	PINE AVE. CIRCLE DOCK 7	SHORELINE VILLAGE DOCK 9
11:00	11:05	11:20	11:30	11:35
11:50	11:55	12:20	12:30	12:35
12:30	12:35	12:50	1:00	1:05
12:50	12:55	1:20	1:30	1:35
1:20	1:25	1:50	2:00	2:05
1:50	1:55	2:50	3:00	3:05
2:20	2:25	3:30	3:35	3:40
3:20	3:25	3:50	4:00	4:05
3:55	4:00	4:20	4:30	4:35
4:20	4:25	4:50	5:00	5:05
4:50	4:55	5:20	5:30	5:35
5:20	5:25	5:50	6:00	6:05*
5:50	5:55	6:20	6:30	6:35
6:50	6:55	7:20	7:30	7:35**

* Last departure to all docks Sunday – Thursday

** Last departure to all docks Friday - Sunday

Shaded times for Friday - Sunday only

Presentation Information

Oral presentations
Oral presentations are a total of 20 minutes long (including any time the presenter leaves for questions).

All presentations files (.ppt, .pptx, or .pdf) should be loaded on to the computer at the registration desk well in advance of your oral presentation, so that they can be checked during a break before your presentation. Presentation files should be brought in on USB flashdrives. Please try to have your files loaded on to conference computers by the day before your presentation. We would prefer that all speakers use the conference computer for their presentation, but if necessary it will be possible to use your own computer. Audio patch cables will be available if needed.

The projection screen aspect ratio is 16:9.

Poster presentations
Posters should be designed so as to occupy a space no larger than 48x48 inches (122x122 cm). They can, of course, be smaller than this size. Posters are numbered in this program book; spaces on boards will also be numbered, and your poster should be mounted in the appropriately numbered space. We will provide pushpins for mounting posters on boards. Posters can be mounted on boards on Monday afternoon or anytime during the day on Tuesday. The poster session is Thursday afternoon 1540-1800; authors should stand by their posters during this time. Posters should be taken down by midday on Friday.

Social media policy
We encourage all conference attendees to discuss IPC13 on social media! You can live Tweet, post to Facebook, or even blog about the presentations. However, posting of photographs, video, or audio recordings of oral or poster presentations ***are not allowed*** unless you receive permission from the presenter(s). Some presenters will wish to withhold audiovisual material from being recorded or posted on social media.

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Wi-fi Access
In the Grand/Windsor Salons, connect to the network *Convention Services*, and use the password *IPC2019*.

Overview of the Schedule

Sunday 4 August (*Hotel check-in area*)

1600–2000	Registration

Monday 5 August (*Grand/Windsor Salons*)

0700–1700	Registration
0730–0850	*Breakfast*
0850–0910	Welcome address
0910–1030	Systematics & Evolution I (4 talks)
1030–1100	*Break*
1100–1220	Systematics & Evolution II (4 talks)
1220–1340	*Lunch*
1340–1500	Ecology I (4 talks)
1500–1530	*Break*
1530–1630	Ecology II (3 talks)
1630–1700	Remembrance of Dr. Donald Reish
1700–1900	*Welcome wine & cheese social* (*Verandah Grill/Deck*)

Tuesday 6 August (*Grand/Windsor Salons*)

0730–0850	*Breakfast*
0850–1030	Morphology I (5 talks)
1030–1100	*Break*
1100–1220	Morphology II (4 talks)
1220–1340	*Lunch*
1340–1500	Systematics & Evolution III (4 talks)
1500–1530	*Break*
1530–1630	Systematics & Evolution IV (3 talks)
1630–1700	History of the Allan Hancock Foundation

Wednesday 7 August *(Optional mid-conference excursion)*

0800	Bus departs *Queen Mary*, to Exposition Park (meet in front of QM at 0745)
0930–1200	Exposition Park Rose Garden, California Science Center, Natural History Museum (on your own)
1200	Meet at Rose Garden Fountain; walk to Wallis Annenberg Building
1215–1330	Lunch in Muses Room
1330	Walk to Allan Hancock Foundation at University of Southern California
1530	Bus departs Exposition Park, to *Queen Mary*

Thursday, 8 August (*Grand/Windsor Salons*)

0730–0850	*Breakfast*
0850–1030	Development & Regeneration (5 talks)
1030–1050	*Break*
1050–1230	Physiology (5 talks)
1230–1340	*Lunch*
1340–1510	Diversity & Biogeography I (4 talks)
1510–1540	Remembrance of Drs. Fred Grassle, Eugene Ruff, & Alexander Rzhavsky
1540–1800	Poster session

Friday 9 August (*Grand/Windsor Salons*)

0730–0910	*Breakfast*
0910–1030	Diversity & Biogeography II (4 talks)
1030–1100	*Break*
1100–1220	Diversity & Biogeography III (4 talks)
1220–1400	*Lunch* [IPC Advisory Council Meeting, *Victoria Room*]
1400–1500	IPA business meeting
1500–1510	Closing remarks
1800–2300	*Banquet* (*Queen's Salon*)

DETAILED SCHEDULE OF EVENTS: Monday 5 August

All events in Grand/Windsor Salons unless otherwise noted

0730-0850 Breakfast (provided)

0850-0910 **Welcome Addresses**
Daniel Dauer (IPA President) & Bruno Pernet (Local Organizing Committee)

SYSTEMATICS & EVOLUTION I Chair: Kirk Fitzhugh

0910-0930 **Phylogenetic information on Nereididae (Annelida: Phyllodocida) mitochondrial genomes: the status of Nereidinae and the use of mitochondrial gene order to establish groups in the subfamily level**
Paulo R. Alves, Kenneth M. Halanych, & Cinthya S. G. Santos

0930-0950 **Phylogeny of Terebelliformia – combining transcriptomes, broad sampling and morphology**
Josefin Stiller, Vincent Rousset, Ekin Tilic, Fredrik Pleijel, & Greg Rouse

0950-1010 **On the complex diversity of *Eurythoe* (Amphinomida: Amphinomidae)**
Elizabeth Borda, Beatriz Yanez Rivera, Romulo Barros, Mirandia Johnson, Andres Arias, Jerry Kudenov, Paolo Paiva, Anja Schulze, & Greg Rouse

1010-1030 **Phylogenetic inference and the misplaced premise of substitution rates**
Kirk Fitzhugh

1030-1100 Break

SYSTEMATICS & EVOLUTION II Chair: Ekin Tilic

1100-1120 **A targeted exon-capture phylogenomic approach to investigate the evolution of functional traits in Chaetopteridae (Annelida)**
Jenna M. Moore & Karen J. Osborn

1120-1140 **Phylogeny of Lumbrineridae (Annelida): a first molecular approach**
Polina Borisova & Nataliya Budaeva

1140-1200 **New insights into the evolution of the Charlie Chaplin worms (Histriobdellidae)**
Conrad Helm, Katrine Worsaae, Irma Vila, & Nataliya Budaeva

1200-1220 **Phylogeny and life-history evolution of Sabellidae (Annelida)**
Ekin Tilic, Erfan Sayyari, Josefin Stiller, Siavash Mirarab, & Greg Rouse

1220-1340 Lunch (provided)

ECOLOGY I Chair: Sara Lindsay

1340-1400 **Burrow dimensions and network properties in heterogeneous habitats**
Rachel Hale, Camilla Cassidy, Sharif Ahmed, Ernesto Estrada, Jasmin A. Godbold, & Martin Solan

1400-1420 **Nuchal organs and navigation: assessing polychaete responses to subsurface chemical cues**
Sara Lindsay & Katelyn Hunt

1420-1440 ***Hypomyzostoma jasoni* Summers and Rouse 2014 (Myzostomida, Myzostomatidae): behavioral patterns and coloration in worms of different ages**
Glafira Kolbasova, Tatiana Neretina, & Elena Mekhova

1440-1500 **Palatability and defensive strategies in polychaetes**
Marina Cyrino Leal Coutinho, Valéria Laneuville Teixeira, & Cinthya Simone Gomes Santos

1500-1530 Break

ECOLOGY II Chair: Anja Schulze

1530-1550 **A new perspective on aggregation and aggregative settlement of *Spirobranchus cariniferus* (Gray 1843) (Serpulida)**
Robert Paul Wolf

1550-1610 **What limits the distribution of the non-native serpulid *Ficopomatus enigmaticus* in California?**
Alison K. Yee, Jessica Peria, & Bruno Pernet

1600-1630 **Sex on the reef: swarming polychaetes of Timor-Leste**
Anja Schulze, Joana Zanol, & Christopher J. Glasby

1630-1700 **Remembrance of Dr. Donald Reish**
Dr. Ken Schiff

1700-1900 **Welcome Wine & Cheese Social** (Verandah Grill/Deck)

DETAILED SCHEDULE OF EVENTS: Tuesday 6 August

All events in Grand/Windsor Salons unless otherwise noted

0730-0850 Breakfast (provided)

MORPHOLOGY I Chair: Katrine Worsaae

0850-0910 **Transition of metanephridial systems into protonephridial systems in species with reduced coelom and blood vascular system**
Günter Purschke, Julian Escher, & Leonard Breitsprecher

0910-0930 **The evolution of the central nervous system in Annelida**
Patrick Beckers & Conrad Helm

0930-0950 **The broadest distribution, the tiniest males, the smallest genome – going for a record, Dinos?**
K. Worsaae, A. Kerbl, B. C. Gonzalez, F. Marlétaz, A. Hejnol, & J. M. Martin Duran

0950-1010 **One (nerve) ring to rule them all – structure-function relationships in the copulatory organ of *Dinophilus gyrociliatus* dwarf males (Dinophilidae)**
Alexandra Kerbl, Réza Shahidi, Gáspár Jékely, & Katrine Worsaae

1010-1030 **Integrative anatomical study of *Ramisyllis multicaudata* reveals the evolutionary origins of its novel body plan**
Guillermo Ponz Segrelles, Christopher J. Glasby, Conrad Helm, Patrick Beckers, Jörg U. Hammel, Rannyele P. Ribeiro, Christian Fischer, Christoph Bleidorn, & M. Teresa Aguado

1030-1100 Break

MORPHOLOGY II Chair: Maria Dean

1100-1120 ***Histriobdella homari* (Beneden 1858), Histriobdellidae: fine structure of ventral pharynx and jaws**
Alexander Tzetlin, Nataliya Budaeva, Elena Vortsepneva, & Conrad Helm

1120-1140 **Why to bury the head in the sand? The functional morphology of *Sternaspis scutata* (Sternaspidae)**
J. Müller, S. Seeck, & T. Bartolomaeus

1140-1200 **Tube architecture of sand-castle sabellariid worms from the Mediterranean Sea**
Rossana Sanfilippo, Adriano Guido, Agatino Reitano, Gianni Insacco, & Antonietta Rosso

1200-1220 **A study of *Pectinaria gouldii* and *Phragmatopoma lapidosa* biocement proteins**
Maria A. Dean

1220-1340 Lunch (provided)

SYSTEMATICS & EVOLUTION III Chair: Pat Hutchings

1340-1400 **Who's that guy? What happens when worms use someone else's name?**
Pat Hutchings & Nicolas Lavesque

1400-1420 **New scaleworms (Polynoidae, Annelida) from seeps, vents and whalefalls, with a tribute to the contributions of Marian Pettibone**
Greg Rouse, Avery Hiley, Sigrid Katz, & Johanna Lindgren

1420-1440 **Complexities within Macellicephalinae (Polynoidae, Annelida)**
Brett C. Gonzalez, Katrine Worsaae, & Karen Osborn

1440-1500 **Molecular and morphological placement of an enigmatic deep-sea taxon (Chrysopetalidae: Annelida) instigates deeper investigation into chrysopetalid plesiomorphic notochaetal forms**
Charlotte Watson, Ekin Tilic, & Greg Rouse

1500-1530 Break

SYSTEMATICS & EVOLUTION IV Chair: Carol Simon

1530-1550 **Molecular and morphometric analyses reveal highly underestimated diversity in *Eteone* (Phyllodocidae, Annelida)**
Martha Williams Everett, Nataliya Budaeva, Glafira Kolbasova, & Tatyana Neretina

1550-1610 **Establishing taxonomic research priorities for polychaetes in southern Africa**
Carol Simon, Jyothi Kara, Dylan Clarke, & Safiyya Sedick

1610-1630 **Resolving the identities of two cosmopolitan *Platynereis* Kinberg, 1865 species in South Africa**
Jyothi Kara, Angus H.H. Macdonald, Kerry Sink, & Carol A. Simon

1630-1700 **History of the Allan Hancock Foundation**
Leslie Harris

DETAILED SCHEDULE OF EVENTS: Wednesday 7 August

No meals will be provided today, except for lunch for those participating in the mid-conference excursion.

Mid-conference excursion (optional)

Because of limited bus capacity and because the lunch order had to be finalized prior to the conference, only those who have preregistered for the mid-conference excursion can take part in it. For questions about the mid-conference tour, see Kirk Fitzhugh.

0800	Bus departs *Queen Mary*, to Exposition Park (meet in front of QM at 0745)
0930–1200	Exposition Park Rose Garden, California Science Center, Natural History Museum (see map) (on your own)
1200	Meet at Rose Garden Fountain; walk to Wallis Annenberg Building
1215–1330	Lunch in Muses Room
1330	Walk to Allan Hancock Foundation at University of Southern California
1530	Bus departs Exposition Park, to *Queen Mary*

Alternative activities

For those who did not preregister for the mid-conference excursion, there are plenty of activities you might enjoy in and around Long Beach! Below are a few suggestions. Feel free to ask any of the local organizers for advice about any of those, or about any other activities you might be interested in for the mid-conference day.

Visit a museum or aquarium!

Three museums are located within ~3 miles of the Queen Mary. The Museum of Latin American Art is large, but the other two are quite small. The Aquarium of the Pacific is just over 1 mile from the Queen Mary.

Museum of Latin American Art, molaa.org
Long Beach Museum of Art, lbma.org
Pacific Island Ethnic Art Museum, pieam.org
Aquarium of the Pacific, aquariumofpacific.org

Tour Long Beach breweries!

Like most large southern California cities, Long Beach has an excellent craft brewing scene. A few particularly notable breweries/pubs, each with their own specialities, are:

Ballast Point Brewing Long Beach, www.ballastpoint.com/location/ballast-point-long-beach/
Long Beach Beer Lab, lbbeer.com
Beachwood Blendery, beachwoodbrewing.com/blendery.html
Beachwood Brewing and BBQ, beachwoodbrewing.com/menu_lb_classics.html

Bike, run, or walk on the Shoreline Beach Path

This path runs from downtown Long Beach ~6 miles east to the mouth of Alamitos Bay. If one leaves the path near its eastern end one can visit the Belmont Shores neighborhood (on 2nd Street), which is full of restaurants and shops. With a bit more distance (~2 miles) one can reach the charming beach town of Seal Beach.

Kayak or stand-up paddleboard in Alamitos Bay!

You can rent kayaks or stand-up paddleboards inexpensively at Kayaks On the Water, located about 5 miles east of the Queen Mary. That is a pleasant walk on the Shoreline Beach Path, or it can be reached by city bus, electric scooter, rideshare service, or taxi. Alamitos Bay is a very protected bay. www.kayakrentals.net

Take a daytrip to Catalina Island!

You would want to reserve a place on the Catalina Express ahead of time. Boats leave from downtown Long Beach (to Avalon) several times in the morning, starting at 0600, and return every ~1.5-2 hours in the afternoon. www.catalinaexpress.com

DETAILED SCHEDULE OF EVENTS: Thursday 8 August

All events in Grand/Windsor Salons unless otherwise noted

0730-0850 Breakfast (provided)

DEVELOPMENT AND REGENERATION Chair: Glenys Gibson

0850-0910 **Larval development of *Pseudopolydora paucibranchiata* (Spionidae, Annelida) from Florida**
Viktoria E. Bogantes, Kenneth M. Halanych, & Michael J. Boyle

0910-0930 **Epigenetics, methionine and developmental plasticity in the spionid *Polydora cornuta***
Gina MacDonald, Marlene Snyder, & Glenys Gibson

0930-0950 **Uncovering the hidden dynamics in the development of ciliary bands in *Platynereis dumerilii***
Sabrina Kuhl, Jörn von Döhren, & Thomas Bartolomaeus

0950-1010 **Genome editing sheds 'light' on larval swimming behavior**
Elaine C. Seaver

1010-1030 **Making heads and tails of syllids: a summary of their regenerative abilities**
Rannyele Passos Ribeiro, Bernhard Egger, Guillermo Ponz-Segrelles, Conrad Helm, Christoph Bleidorn, & M. Teresa Aguado

1030-1050 Break

PHYSIOLOGY Chair: Ken Halanych

1050-1110 **The role of temperature and photoperiod in regulating oocyte growth of the polychaete *Hediste diversicolor***
Haiqing Wang, Andreas Hagemann, Marianne Uhre, Arne Malzahn, Aleksander Handå, & Kjell Inge Reitan

1110-1130 **You CAN have fire without oxygen! How the bearded fireworm, *Hermodice carunculata*, reacts to hypoxic conditions**
Candace Grimes, Lene Petersen, & Anja Schulze

1130-1150 **The euryhaline *Alitta succinea* (Annelida; Nereididae) expresses aquaporin water channels**
Serena Mucciolo, Carmela Gissi, Marika Salonna, Viviane Prodocimo, Carolina Arruda de Oliveira Freire, Maikon Di Domenico, Maria Mastrodonato, Francesco Mastrototaro, Paulo Da Cunha Lana, & Giuseppe Calamita

1150-1210 **The genome of deep-sea seep-dwelling *Lamellibrachia luymesi* (Siboglinidae) and clues on chemosynthetic symbiosis**
Yuanning Li, Michael G. Tassia, Damien S. Waits, Viktoria E. Bogantes, Kyle T. David, & Kenneth M. Halanych

1210-1230 **Swimming of the midwater polychaete *Tomopteris***
Joost Daniels, Karen Osborn, Nadège Aoki, Josh Havassy, Natalia Mushegian, and Kakani Katija

1230-1340 Lunch (provided)

DIVERSITY & BIOGEOGRAPHY I Chair: Daniel Dauer

1340-1400 **Population genetics of two Japanese maldanid species based on mitochondrial DNA and nuclear single nucleotide polymorphisms**
Genki Kobayashi, Hajime Itoh, Yoshihiro Tsunamoto, Chika Mitsuyuki, Ayumi Matsuo,Yoshihisa Suyama, Waka Sato-Okoshi, Hirokazu Abe, Kimiaki Naiki, & Shigeaki Kojima

1400-1420 **Detection of the exotic shell-boring species *Polydora onagawaensis* on shellfish farms in the northeastern United States**
Paul Rawson, Samantha Silverbrand, & Sara Lindsay

1420-1440 **The recent spread of the non-indigenous species, *Hermundura americana* (Polychaete: Pilargidae) throughout the Chesapeake Bay**
Daniel Dauer, Anthony J. Rodi, Roberto J. Llansã, & Suzanne Arcuri

1440-1510 **In living color: underwater videography of annelids**
Nannette Van Antwerp

1510-1540 **Remembrances of Drs. Frederick Grassle, Eugene Ruff, and Alexander Rzhavsky**
James Blake & Elena Kupriyanova

1540-1800 Poster session

DETAILED SCHEDULE OF EVENTS: Friday 9 August

All events in Grand/Windsor Salons unless otherwise noted

0730-0910 Breakfast (provided)

DIVERSITY & BIOGEOGRAPHY II Chair: Torkild Bakken

0910-0930 **Biogeography and diversity of Falkland Islands Polychaeta**
Teresa Darbyshire

0930-0950 **The polychaete assemblage pattern in the seagrass habitat of South Andaman Islands, India**
Raj Kiran Lakra, Jawed Equbal, Muthulingam Savurirajan, Kunal Satyam, & Thiruchitrambalam Ganesh

0950-1010 **Worms from the abyss: annelid diversity and species distribution from Australia's eastern lower bathyal and abyssal environments**
Laetitia Gunton, Elena Kupriyanova, Tom Alvestad, Nataliya Budaeva, Ingo Burghardt, Magdalena Georgieva, Pat Hutchings, Jon. Konsgrud, Anna Murray, Hannelore Paxton, Robin Wilson, & Jinghuai Zhang

1010-1030 **New insights in diversity of deep-sea serpulid polychaetes**
Elena Kupriyanova, Ingo Burghardt, & Greg Rouse

1030-1100 Break

DIVERSITY & BIOGEOGRAPHY III Chair: Elena Kupriyanova

1100-1120 **Polychaetes associated with the bryozoan *Bugula neritina* in marinas of the Iberian Peninsula and northern Morocco**
Alejandro Fernández-Romero, Juan Moreira da Rocha, & José Manual Guerra-García

1120-1140 **Polychaetes inhabiting massive sponges from shallow and mesophotic habitats along the Israeli Mediterranean coast**
Liron Goren & Micha Ilan

1140-1200 **Integrating DNA barcoding with traditional morphology-based taxonomy: assessment of species diversity in marine bristle worms (Annelida)**
Torkild Bakken, Jon A Kongsrud, Eivind Oug, Tom Alvestad, Arne Nygren, Katrine Kongshavn, Nataliya Budaeva, Maria Capa, Thomas Dahlgren, & Endre Willassen

1200-1220 **Cryptic diversity and genetic connectivity in the deep-sea annelids across the Greenland-Iceland-Scotland Ridge**
Nataliya Budaeva, Maria Capa, Arne Nygren, Tom Alvestad, Karin Meißner, Miriam Götting, Luis Felipe, Martell Hernández, Torkild Bakken, Eivind Oug, & Jon Kongsrud

1220-1400 Lunch (provided) [IPC Advisory Council Meeting, Victoria Room]

1400-1500 IPA Business Meeting

1500-1510 Closing remarks

1800-2300 Banquet and dancing (Queen's Salon)

List of Poster Presentations

Presentations are listed alphabetically by presenter last name.

1) **Molecular evidence for the existance of cryptic species within the polychaete worms known as 'Iwa-mushi' in Japan (Annelida: Eunicidae: *Marphysa*)**
Hirokazu Abe[1], Masaatsu Tanaka[2], Masanori Taru[3], Satoshi Abe[3], & Atsuko Nishigaki[3]
[1]Iwate Medical University; [2]Kagoshima University; [3]Toho University

2) **A novel symbiotic relationship between ascidians and an undescribed tunic boring polychaete (Annelida: Spionidae: *Polydora*)**
Hirokazu Abe[1], Kazuyuki Yamada[2], Osamu Hoshino[3], Tetsuya Ogino[4], Shun Kawaida[5], & Waka Sato-Okoshi[6]
[1]Iwate Medical University; [2]Freelance benthic worker; [3]Diving Service Chap; [4]Kyoto University; [5]Shimane University; [6]Tohoku University

3) **Temporal functional changes in polychaetes from the northwestern coast of Baja California, Mexico**
A. Alvarez-Aguilar[1], L.V. Rodríguez-Villanueva[2], J.V. Macías-Zamora[1], N. Ramírez-Álvarez[1], & F.A. Hernández-Gúzman[1]
[1]Facultad de Ciencias Marinas, Instituto de Investigaciones Oceanológicas, Universidad Autónoma de Baja California; [2]Marine Biology Laboratory, Public Utilities Department City of San Diego Ocean Monitoring Program

4) **Spatial distribution of Cirratulidae and its relationship with environmental variables on the west coast of Tijuana-Ensenada, Baja California Mexico**
A. Alvarez-Aguilar[1], L.V. Rodríguez-Villanueva[2], J.V. Macías-Zamora[1], N. Ramírez-Álvarez[1], & F.A. Hernández-Gúzman[1]
[1]Facultad de Ciencias Marinas, Instituto de Investigaciones Oceanológicas, Universidad Autónoma de Baja California; [2]Marine Biology Laboratory, Public Utilities Department City of San Diego Ocean Monitoring Program

5) **Ampharetidae (Annelida) from deep Nordic Seas**
Tom Alvestad, Nataliya Budaeva, Katrine Kongshavn, & Jon Anders Kongsrud
University Museum of Bergen

6) **Biodiversity of polychaetous annelids in Bahía de Todos Santos, Baja California, México.**
Osmar Araujo-Leyva[1], Verónica Rodríguez-Villanueva[2], & Vinicio Macías Zamora[1]
[1]Instituto de Investigaciones Ocenológicas, Universidad Autónoma de Baja California; [2]Marine Biology Laboratory, City of San Diego Public Utilities

7) **Living in an alga: a preliminary comparison of organisms associated with shallow-water red algae from Antarctica and the Mediterranean**
Júlia Sardà-Avila[1], Rafael Sardà[2], & Conxita Avila[1]
[1]University of Barcelona; [2]CEAB-CSIC

8) **Living in a sponge: a preliminary study of the fauna associated with the Antarctic sponge *Kirkpatrickia variolosa***
Conxita Avila[1], Eduard Giralt[1], João Gil[2], Rafael Sardà[3], Carlos Angulo-Preckler[1]
[1]University of Barcelona; [2]CCMAR; [3]CEAB-CSIC

9) **Molecular study of *Chaetozone* (Annelida, Cirratulidae) reveals hidden diversity in common benthic polychaetes**
Maël Grosse[1], Maria Capa[1, 2], Jon A. Kongsrud[3], Arne Nygren[4], & Torkild Bakken[1]
[1]Norwegian University of Science and Technology, NTNU University Museum; [2]University of the Balearic Island, Department of Biology; [3]Department of Natural History, University Museum of Bergen; [4]Department of Marine Sciences, University of Gothenburg

10) **A new deep sea species of *Chloeia* (Annelida: Amphinomidae) from a pockmark field of southwestern Atlantic**
Rômulo Barroso[1], Jerry D. Kudenov[2], Victor Seixas[3], Orlemir Carrerette[4], Mauricio Shimabukuro[4], Paulo Sumida[4], & Paulo Paiva[3]
[1]Universidade Federal Rural do Rio de Janeiro; [2]University of Alaska Anchorage; [3]Universidade Federal do Rio de Janeiro; [4]Instituto Oceanográfico da Universidade de São Paulo

11) **A new species of *Atherospio* (Polychaeta, Spionidae) from a deep-water continental slope site off Turkey in the eastern Mediterranean Sea**
James A. Blake[1] & Patricia A. Ramey-Balci[2]
[1]Aquatic Research & Consulting; [2]Koç University

12) ***Meiodorvillea* (Dorvilleidae) new to taxonomic and phyllogenetic perspectives**
Rafael de O. Bonaldo, Tatiana M. Steiner, André R.S. Garraffoni, & Antonia C.Z. Amaral
Instituto de Biologia, Universidade Estadual de Campinas

13) **Phylogeography of *Aglaophamus malmgreni* (Nephtyidae) in the Arctic and northeastern Atlantic**
Polina Borisova[1], Nataliya Budaeva[2], & Tom Alvestad[2]
[1]P.P. Shirshov Institute of Oceanology, Russian Academy of Sciences; [2]Department of Natural History, University Museum of Bergen, University of Bergen

14) **Species delineation of *Sabellastarte* (Sabellidae: Polychaeta) around the Arabian Penensula using morphometrics and DNA barcoding**
Shannon D. Brown[1], Katherine Rowe[1], Laura Gajdzik[1], John A. Burt[2], Alyssa Marshell[3], Gustav Paulay[4], & Michael L. Berumen[1]
[1]King Abdullah University of Science and Technology; [2]New York University Abu Dhabi; [3]Sultan Qaboos University; [4]University of Florida, Florida Natural History Museum

15) **Natural radiole damage and regeneration of the feather duster worm *Schizobranchia insignis***
Shannon D. Brown[1, 2] & Richard B. Emlet[1]
[1]Oregon Institute of Marine Biology; [2]King Abdullah University of Science and Technology

16) **Contributions to the knowledge of littoral polychaete annelids from Tunisia**
Marwa Chaibi[1], Daniel Martin[2], & Atf Azzouna[1]
[1]Université de Tunis El Manar; [2]Centred'Estudis Avançats de Blanes (CEAB-CSIC)

17) **Cumulative impacts of hypoxia and trawling on Northeast Pacific benthos**
Alessia C. Ciraolo & Paul V.R. Snelgrove
Department of Ocean Sciences, Memorial University of Newfoundland

18) ***Myxicola infundibulum* (Montagu, 1808) in the UK –More than one species?**
Teresa Darbyshire
Amgueddfa Cymru-National Museum Wales

19) **Redescription of *Nereis (Neanthes) micromma* Harper, 1979 (Polychaeta: Nereididae) based on type material and additional material from Tampa Bay, Florida, USA, with a discussion of the ontogenetic changes in parapodial morphology and inclusion in the genus *Neanthes* Kinberg, 1865**
Jennifer S. Davenport[1], Christopher J. Glasby[2], & David J. Karlen[3]
[1]Wood Environment & Infrastructure Solutions, Inc; [2]The Museum and Art Gallery of the Northern Territory; [3]Hillsborough County Environmental Protection Commission

20) **DNA barcoding of polychaetes collected during the 2018 Rapid Assessment Survey of Marine Species at New England floating docks.**
Andrew David & Michael Krick
Biology Department, Clarkson University

21) **The structure characterization of biocement proteins from *Phragmatopoma lapidosa***
Maria A. Dean, Kris Curtis, & Jake Van Oort
Coe College

22) **Syllids from Brazil – a Lilliputian perspective**
Marcelo V. Fukuda[1], Maikon di Domenico[2], & Rômulo Barroso[3]
[1]Museu de Zoologia, Universidade de São Paulo; [2]Centro de Estudos do Mar, Universidade Federal do Paraná; [3]Instituto de Biologia, Universidade Federal Rural do Rio de Janeiro

23) **Exogoninae (Annelida; Syllidae) from Southwestern Atlantic oceanic islands: Four new species and new records**
Rodolfo L. Nascimento[1, 2], Marcelo V. Fukuda[3], & Paulo C. Paiva[1, 2]
[1]Laboratório de Polychaeta, Departamento de Zoologia, Instituto de Biologia, Universidade Federal do Rio de Janeiro; [2]Programa de Pós-graduação em Biodiversidade e Biologia Evolutiva, Instituto de Biologia, Universidade Federal do Rio de Janeiro; [3]Museu de Zoologia, Universidade de São Paulo

24) **Levels of infestation by an undescribed polychaete (*Polydora*: Spionidae) in populations of the clam *Nodipecten subnodosus* in Ojo de Liebre Lagoon, Baja California Sur, Mexico**
Laura González-Ortiz[1], Pablo Hernández-Alcántara[2], & Verónica Rodríguez-Villanueva[3]
[1] Universidad Autónoma de Nuevo León, Facultad de Ciencias Biológicas; [2]Unidad Académica de Ecología y Biodiversidad Acuática, Instituto de Ciencias del Mar y Limnología, Universidad Nacional Autónoma de México; [3]Facultad de Ciencias Marinas, Instituto de Investigaciones Oceanológicas, Universidad Autónoma de Baja California

25) **First report of the non-native freshwater nereidid polychaete *Namalycastis hawaiiensis* (Johnson, 1903) in a freshwater spring in Israel, and possible route of introduction**
Liron Goren[1, 2] & Yaron Hershkowitz[2]
[1]School of Zoology, Tel Aviv University; [2]Israel's Aquatic Ecology Center, Steinhardt Museum of Natural History, Tel Aviv University

26) **Diversity of sponge-associated polychaetes across the Mediterranean Sea**
Liron Goren[1,2] & Micha Ilan[1]
[1]School of Zoology, Tel Aviv University; [2]Steinhardt Museum of Natural History, Tel Aviv University

27) **Investigating the arrival of an alien *Leonnates* (Annelida: Nereididae) in New Zealand**
Fiona Gower[1], Geoffrey B Read[2], Barry Greenfield[2], & Joseph Marlow[1]
[1]Cawthron Institute; *[2]NIWA*

28) **Small morphological differences help to discern cryptic species of southern California orbiniids**
Brent Haggin
Los Angeles County Sanitation Districts

29) **Role of spatial and temporal heterogeneity in moderating temperate shelf sea carbon and macronutrient stocks**
Rachel Hale[1, 2], Karen Tait[3], Jasmin A. Godbold[2, 4], & Martin Solan[2]
[1]National Institute of Water and Atmospheric Research; [2]Ocean and Earth Science, National Oceanography Centre Southampton; [3]Plymouth Marine Laboratory; [4]Biological Sciences, University of Southampton

30) **Shedding light on annelid bioluminescence**
Mary Colleen Hannon[1], Anderson Garbuglio de Oliveira[2], & Anja Schulze[1]
[1]Texas A&M University, Galveston; [2]University of São Paulo

31) **Adaptative convergencies led to similar morphologies in planktonic annelid stages**
Maria Teresa Aguado Molina[1], Guillermo Ponz[2], & Conrad Helm[1]
[1]Georg-August University Goettingen; [2]Universidad Autónoma de Madrid

32) **Co-occuring two undescribed species of the genus *Stygpcapitella* (Parergodrilidae)**
Natsumi Hookabe[1], Naoto Jimi[2], Shinta Fujimoto[3], & Hiroshi Kajihara[1]
[1]Graduate School/Faculty of Science, Hokkaido University; [2]Bioscience Group, National Institute of Polar Research; [3]Research Center for Marine Biology, Graduate School of Life Sciences, Tohoku University

33) **Spicules in an undescribed species of *Thoracophelia* (Opheliidae)**
Naoto Jimi[1], Shinta Fujimoto[2], & Satoshi Imura[1]
[1]Bioscience Group, National Institute of Polar Research; [2]Research Center for Marine Biology, Graduate School of Life Sciences, Tohoku University

34) **An undescribed species of interstitial acrocirrid *Macrochaeta* (Acrocirridae)**
Naoto Jimi[1], Shinta Fujimoto[2], & Satoshi Imura[1]
[1]Bioscience Group, National Institute of Polar Research; [2]Research Center for Marine Biology, Graduate School of Life Sciences, Tohoku University

35) **Historical phylogeography and cryptic evolution of three (pseudo)cryptic nereidid polychaetes from South Africa**
Jyothi Kara[1], Angus H.H. Macdonald[2], Kerry Sink[3], & Carol A. Simon[1]
[1]Department of Botany and Zoology, Stellenbosch University; [2]School of Life Sciences, University of KwaZulu-Natal; [3]South African National Biodiversity Institute

36) **Phylogeography of Japanese arenicolids**
Genki Kobayashi[1], Naoto Jimi[2], & Shigeaki Kojima[3]
[1]Kyoto University; [2]National Institute of Polar Research; [3]The University of Tokyo

37) **Redescripton of three lesser known genera and species of Archinominae Kudenov, 1991 (Annelida: Amphinomidae)**
Jerry D. Kudenov[1] & Elizabeth Borda[2]
[1]University of Alaska Anchorage; [2]Texas A&M University, San Antonio

38) **A new species of the *Spirobranchus kraussii* complex (Annelida, Serpulidae) from the Persian Gulf and Gulf of Oman**
Samaneh Pazoki[1], Hassan Rahimian[1], Torsten H. Struck[2], Ahmad R. Katouzian[1], & Elena Kupriyanova[3]
[1]Department of Animal Biology, Faculty of Biology, School of Biology and Centre of Excellence in Phylogeny of Living Organisms, College of Sciences, University of Tehran; [2]Natural History Museum, University of Oslo; [3]Australian Museum Research Institute, Australian Museum

39) **Host-specificity in corals-associated Christmas tree worms of the genus *Spirobranchus* Blainville, 1818 (Serpulidae, Annelida).**
Elena Kupriyanova[1], Maria J. Schreider[2], Johathan Kool[2], Richard Yu[2], & William Leggat[2]
[1]Australian Museum Research Institute, Australian Museum; [2]School of Environmental and Life Sciences, University of Newcastle

40) **Functional redundancy in polychaete assemblages from a tropical Large Marine Ecosystem (LME)**
Paulo da Cunha Lana & Barbara Carolina Garcia Gimenez
Benthos Lab, Center for Marine Studies, Federal University of Paraná

41) **Revision of Thelepodidae and Telothelepodidae (Polychaeta) from French waters**
Nicolas Lavesque[1], Pat Hutchings[2], & Mario H. Londoño-Mesa[3]
[1]CNRS, University of Bordeaux; *[2]Australian Museum*; *[3]Universidad de Antioquia*

42) **First records and northernmost distribution of two spionid species (NE Atlantic, Bay of Biscay)**
Nicolas Lavesque[1], Jérôme Jourde[2], Suzie Humbert[1], Bastien Lamarque[1], Pierre-Guy Sauriau[2], & Karin Meißner[3]
[1]CNRS, University of Bordeaux; [2]University of La Rochelle; [3]Forschungsinstitut Senckenberg, DZMB

43) **A new *Poecilochaetus* (Annelida: Poecilochaetidae) from Rodrigues, southwest Indian Ocean, a redescription of *P. serpens honiarae* Gibbs, 1971, and a phylogeny of the family**
Andrew S.Y. Mackie[1] & Cinthya S.G. Santos[2]
[1]Amgueddfa Cymru, National Museum Wales; [2]Universidade Federal Fluminense

44) **Using Autonomous Reef Monitoring Structures (ARMS) and DNA barcoding to assess polychaete diversity on Pacific coral reefs**
D. McHugh[1] & M. Timmers[2]
[1]Department of Biology, Colgate University; [2]National Oceanic and Atmospheric Administration - CREP/University of Hawaii - JIMAR

45) **Revision of the "*Marphysa sanguinea*" species complex (Annelida: Eunicidae)**
Isabel C. Molina-Acevedo
Estructura y Función del Bentos, Depto. Sistemática y Ecología Acuática, El Colegio de la Frontera Sur

46) **Morphological studies of some closely related genera of *Marphysa* De Quatrefages, 1865 (Annelida: Eunicidae)**
Isabel C. Molina-Acevedo
Estructura y Función del Bentos, Depto. Sistemática y Ecología Acuática, El Colegio de la Frontera Sur

47) **The Magelonidae of West Africa**
Kate Mortimer[1], Jon Anders Kongsrud[2], & Endre Willassen[2]
[1]Amgueddfa Cymru, National Museum Wales; [2]Department of Natural History, University Museum of Bergen

48) **New identification tools for scaleworms (Annelida: Aphroditiformia)**
Robin Wilson[1], Mark Nikolic[1], Anna Murray[2], & Kristian Fauchald[†]
[1]Museums Victoria; [2]Australian Museum

49) **On a new species of Polycirrus (Annelida: Terebelliformia: Polycirridae) from the southwestern Atlantic**
João M.M. Nogueira[1], Plínio F. van Deuren[1], Natália Ranauro[1], & Orlemir Carrerette[1,2]
[1]Instituto de Biociências, Universidade de São Paulo, São Paulo, Brazil; [2]Instituto Oceanográfico, Universidade de São Paulo, São Paulo, Brazil

50) **A new species of *Terebellides* Sars, 1835 (Annelida, Trichobranchidae) from French Frigate Shoals, north-western Hawaiian Islands, with a discussion on the morphological characters of members of *Terebellides***
João M.M. Nogueira[1], Leslie H. Harris[2], & Orlemir Carrerette[1,3]
[1]Instituto de Biociências, Universidade de São Paulo; [2]Natural History Museum of Los Angeles County; [3]Instituto Oceanográfico, Universidade de São Paulo

51) **Multibranchiate *Prionospio* species from southeastern Brazil**
Antônio João Malafaia Peixoto & Paulo Cesar de Paiva
Universidade Federal do Rio de Janeiro

52) **A new host for the parasitic genus *Veneriserva* (Annelida: Dorvilleidae) from Antarctica waters**
Antônio João Malafaia Peixoto & Paulo Cesar de Paiva
Universidade Federal do Rio de Janeiro

53) **First record of protodrilid polychaete from Korea**
Jiseon Park[1], Taeseo Park[2], & Jongwoo Jung[1,3]
[1]Interdisciplinary program of Ecocreative, Ewha Womans University; [2]Animal Resources Division, National Institute of Biological Resources; [3]Department of Science Education, Ewha Womans University

54) **Comparative transcriptomic analysis offers insight into genetic control of syllid reproduction**
Guillermo Ponz Segrelles[1], Rannyele P. Ribeiro[1], Christoph Bleidorn[2], & M. Teresa Aguado[2]
[1]Departmento de Biologia (Zoología), Facultad de Ciencias, Universidad Autónoma de Madrid; [2]Department of Animal Evolution and Biodiversity, Georg-August-University Göttingen

55) **Stress-associated gene expression in two marine invertebrates (*Hediste diversicolor* and *Littorina littorea*) exposed to metal contamination at the Callahan Copper Mine Superfund site (Maine, USA)**
Nancy Prentiss & Timothy Breton
University of Maine at Farmington

56) **Nocturnally swarming Caribbean polychaetes from St. John, U.S. Virgin Islands, USA**
Nancy Prentiss
University of Maine at Farmington

57) **Polychaetes of Bocas del Toro, Panama: updates and new records**
Nancy K. Prentiss[1], Leslie H. Harris[2], Sergio Salazar-Vallejo[3], & Students of the Smithsonian Tropical Field Institute course: Systematics and Ecology of Caribbean Polychaetes
[1]University of Maine at Farmington; [2]Natural History Museum of Los Angeles County; [3]El Colegio de la Frontera Sur

58) **Eye ultrastructure in basal annelid lineages and their importance for eye evolution in Annelida**
Günter Purschke[1], Anjilie Baller[1], Stepan Vodopyanov[1,2], Tim von Palubitzki[1], & Patrick Beckers[3]
[1]Department of Zoology and Developmental Biology, University of Osnabrück; [2]Department of Invertebrate Zoology, Lomonosov Moscow State University; [3]Institutue of Evolutionary Biology and Ecology, University of Bonn

59) **Distribution patterns of Glyceriformia (Annelida) around Iceland**
Günter Purschke[1], Jana S. Buhre[1], & Markus Böggemann[2]
[1]Department of Zoology and Developmental Biology, University of Osnabrück; [2]Department of Zoology, University of Vechta

60) **First record for the genus *Sabidius* Strelzov, 1973 (Annelida: Paraonidae) for the southern Atlantic Ocean, with a redescription of the type species and description of a new species**
Natália Ranauro[1], Rômulo Barroso[2], Paulo Cesar Paiva[2], & João Miguel de Matos Nogueira[1]
[1]Laboratório de Poliquetologia (LaPol), Departamento de Zoologia, Universidade de São Paulo; [2]Laboratório de Polychaeta, Departamento de Zoologia, Universidade Federal do Rio de Janeiro

61) **Describing a new species of *Syllis* as a promising organism for developmental studies (Syllidae, Annelida)**
Rannyele P. Ribeiro[1], Guillermo Ponz-Segrelles[1], Conrad Helm[2], Bernhard Egger[3], & M. Teresa Aguado[1, 2]
[1]Universidad Autónoma de Madrid; [2]Georg-August-Universität Göttingen; [3]Universität Innsbruck

62) **Threadlike casts in the tube wall of *Protula* (Serpulidae, Polychaeta) from bathyal coral mounds in the Caribbean Sea**
Rossana Sanfilippo[1], Antonietta Rosso[1], Agostina Vertino[2], Lydia Beuck[3], Andrè Freiwald[3, 4], & Adriano Guido[5]
[1]Department of Biological, Geological and Environmental Sciences, University of Catania; [2]Department of Geology, Ghent University; [3]Senckenberg am Meer, Marine Research Department, University of Wilhelmshavenany; [4]MARUM, University of Bremen; [5]Department of Biology, Ecology and Earth Sciences, University of Calabria

63) **Polydorid species (Annelida: Spionidae) associated with calcareous substrates from Normandy, France**
Waka Sato-Okoshi[1], Kenji Okoshi[2], Jean-Claude Dauvin[3], & Hirokazu Abe[4]
[1]Laboratory of Biological Oceanography, Graduate School of Agricultural Science, Tohoku University; [2]Department of Environmental Science, Toho University; [3]University of Caen Normandy University, Laboratoire Morphodynamique Continentale et Côtière; [4]Department of Biology, Iwate Medical University

64) **Identification, distribution and abundance of an invasive worm used as bait in the Knysna estuary, South Africa**
Hendré van Rensburg[1], Conrad Matthee[2], & Carol Simon[1]
[1]Department of Botany and Zoology, University of Stellenbosch; [2]Anchor Environmental Consultants, Cape Town

65) **Composition and diversity of polychaete assemblages in the continental shelf of the southern Mexican Pacific**
Pablo Hernández-Alcántara[1], Francisco F. Velasco-López[1], Vivianne Solís-Weiss[2], & León F. Álvarez-Sánchez[3]
[1]Unidad Académica de Ecología y Biodiversidad Acuática, Universidad Nacional Autónoma de México; [2]Unidad Académica de Sistemas Arrecifales, Universidad Nacional Autónoma de México; [3]Unidad de Informática Marina, Universidad Nacional Autónoma de México

66) **Spatial and bathymetric trends in polychaete assemblages from deep-sea of the southern Gulf of California, eastern Pacific**
Araceli Jaquelín Mercado-Santiago[1], Pablo Hernández-Alcántara[2], & Vivianne Solís-Weiss[3]
[1]Facultad de Ciencias, Universidad Nacional Autónoma de México; [2]Unidad Académica de Ecología y Biodiversidad Acuática, Universidad Nacional Autónoma de México; [3]Unidad Académica de Sistemas Arrecifales, Universidad Nacional Autónoma de México

67) **Polychaetes from underwater marine caves near Marseille (France, Mediterranean)**
Alexander Tzetlin[1], Anna Zhadan[1], Elena Vortsepneva[1], Laurent Vanbostal[2], Thierry Perez[2], Alexander Ereskovsky[2], & Pierre Chevaldonné[2]
[1]M.V. Lomonosov Moscow State University; [2]IMBE, Aix-Marseille Universite

68) **Comprehensive study of the head region and tentacle apparatus in *Owenia borealis* (Annelida: Oweniidae)**
Elena Temereva[1], Alexander Tzetlin[1], & Vyacheslav Dyachuk[2]
[1]M.V. Lomonosov Moscow State University; [2]National Scientific Center of Marine Biology, Vladivostok

69) **Revision of three nereidid species complexes (Nereididae): reinstatement of two genera, and description of one new genus and six new species**
Tulio F. Villalobos-Guerrero
Departamento de Sistemática y Ecología Acuática, El Colegio de la Frontera Sur

70) **A remarkable new deep-sea nereidid with branchiae**
Tulio F. Villalobos-Guerrero[1] & Greg W. Rouse[2]
[1]*Departamento de Sistemática y Ecología Acuática, El Colegio de la Frontera Sur;* [2]*Scripps Institution of Oceanography*

71) **Developmental stages of notochaetae and anterior segments in nectochaete larvae during metamorphosis in *Chrysopetalum* species (Chrysopetalidae: Annelida)**
Charlotte Watson
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72) **Confirmation of the mudworm *Polydora websteri* (Polychaeta: Spionidae) in oysters from Washington State, USA**
Jason Williams[1], Heather Lopes[2], Julieta Martinelli[2], Lorenz Hauser[2], Isadora Jimenez-Hidalgo[2], Teri King[3], Jaqueline Padilla-Gamiño[2], Paul Rawson[4], Laura Spencer[2], & Chelsea Wood[2]
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73) **Interstitial nerillids gone swimming in the dark**
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74) **Coral reef-associated infaunal polychaetes in the western Gulf of Thailand**
Thamasak Yeemin, Makamas Sutthacheep, Sittiporn Pengsakun, Wanlaya Klinthong, Laongdown Jungrak, & Rattanawadee Niamsiri
Ramkhamhaeng University

Abstracts: Oral Presentations

Presentations are listed alphabetically by presenter last name.

Phylogenetic information on Nereididae (Annelida: Phyllodocida) mitochondrial genomes: the status of Nereidinae and the use of mitochondrial gene order to establish groups at the subfamily level

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Nereididae is one of the most studied Annelid lineages, but even so, the phylogenetic relationships within the group are not understood. Previous studies have disagreed on the membership of the recognized subfamilies and current taxonomy lacks a phylogenetic underpinning. This study uses complete mtDNA genome and transcriptome data to evaluate the relationships within the family. Our results suggest that Nereidinae is not a monophyletic group although Gymnonereidinae and Namanereidinae still have to be tested. On the other hand, at least one higher-level group recovered in the analyses possesses a unique mitochondrial gene order, a synapomorphy for the clade. Our results suggest that the utility of traditionally used nereidid characters (such as paragnaths, chaetal morphology, etc) need to be reevaluated in light of phylogenetic relationships. Sequencing of mtDNA genome from more Nereididae species is suggested to enhance phylogenetic information and establish groups at the subfamily level.

Integrating DNA barcoding with traditional morphology-based taxonomy: assessment of species diversity in marine bristle worms (Annelida)

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Assessing species diversity with DNA barcoding of polychaetes in Norwegian waters has provided considerable data of diversity, and demonstrated lack of knowledge and methodological problems. DNA barcoding has indicated a considerably underestimated diversity among polychaetes. About 730 named species are known from the area. Spanning a large range of habitats, 4000 sequenced specimens of 500 morpho species yielded 1700 barcodes which group in 700 Barcode Index Numbers (BINs). An average success rate of 50% indicate methodological challenges. Nevertheless, a varying success rate of 40-100%, analyses have revealed unknown diversity in all families represented. From this it is possible to estimate diversity for each polychaete family. DNA barcoding has contributed to build a reference library for identification of species diversity. Underestimated diversity underpins lack of knowledge of polychaete worms in vast geographic areas. A major challenge for taxonomic work is to assign present species names to BINs. According to basic principles for taxonomic work, the best solution is to affiliate the name to topotypic material, implying a need to sample at type localities. A reference library from DNA barcodes will serve as a backbone when genomic techniques will bring the molecular characterization of species diversity forward, but also linked to morphological taxonomy.

The evolution of the central nervous system in Annelida

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In textbooks, the central nervous system of Annelida is described as to consist of a dorsal brain, in most taxa located in the prostomium, and nerves that encircle the mouth and connect the brain to the ventral ganglionic nervous system. This statement, however, is challenged by the results of current phylogenomic investigations to unravel the evolution of Annelida. Recent neuroanatomical studies of the basally branching taxa Magelonidae and Oweniidae show that the anatomy of the nervous system differs significantly from the text book annelid's nervous system. In order to shed light on the evolution of the central nervous system in Annelida, the nervous systems of 49 species representing annelid diversity were investigated using different morphological approaches. Results of the investigation suggest that a complex brain with different tracts, a nuchal organ, complex eyes and a ganglionic nervous system are not part of the annelid ground pattern and that a rope ladder like nervous system is a rare exception.

Larval development of *Pseudopolydora paucibranchiata* (Spionidae, Annelida) from Florida

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Given the diversity of annelid forms, relatively little is known about the developmental processes that transform a larva into an adult. Here, we describe development of musculature, serotonergic elements of the nervous system and ciliation during larval formation in *Pseudopolydora paucibranchiata* using confocal laser scanning microscopy (CLSM). There is a simultaneous development of muscles associated with the body wall and digestive system, and muscles associated with chaetal sacs are the most prominent in early stages. First serotonergic cells appear to be associated with the tip of each chaetal sac, similar to sabellarids. Ciliation is extensive and includes multiple ciliary cells around the head, stomodeum and gut, and on the pygidium. Completely circularized trochal bands were not observed. Interestingly, no apical tuft is distinguished. Comparative studies using CLSM with understudied groups will broaden our understanding of evolutionary developmental patterns across Annelida.

On the complex diversity of *Eurythoe* (Amphinomida: Amphinomidae)

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Mitochondrial (mt) gene data has shown that the cosmopolitan fireworm *Eurythoe complanata* is a complex of highly divergent genetic lineages. Genetic and morphological evaluations of representatives from the Caribbean coast, South Atlantic (SA) islands and the Gulf of Panama, supported the presence of at least three cryptic species. *Eurythoe laevisetis* was resurrected for the SA island populations and distinguished from *E. complanata* due to the absence of harpoon chaetae, with a third Pacific species recognized but in need of further study. Both *E. complanata* and *E. laevisetis* have been recently recorded in the Mediterranean Sea. Here we build on previous work and evaluate the diversity of the *E. complanata* complex. The phylogenetic relationships are inferred from mt and nuclear gene data and sampled populations from the eastern and western Pacific Ocean, Gulf of California, and Mediterranean Sea.

Phylogeny of Lumbrineridae (Annelida): a first molecular approach

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Lumbrineridae comprise over 200 described species grouped in 19 genera. The most important diagnostic characters for genera and species are found in the maxillary structures. To date, no molecular studies specifically on lumbrinerid phylogeny have been conducted, and many genera completely lack molecular data. In the present study, were constructed phylogeny of the family and test the monophyly of currently accepted genera based on a combination of nuclear 18S and 28S rDNA and mitochondrial 16S rDNA and COI genes. We also studied morphology of jaw apparatuses in eight species using micro-CT. Our results contradict the previously published morphology-based phylogeny in relationships between the genera. Type genus, *Lumbrineris*, appeared paraphyletic, while *Ninoe* and *Gallardoneris* were monophyletic. Several characters of jaw morphology previously seen as synapomorphies of large clades were shown to be homoplastic.

Cryptic diversity and genetic connectivity in the deep-sea annelids across the Greenland-Iceland-Scotland Ridge

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Greenland-Scotland Ridge (GSR) acts as a topographical barrier separating the Nordic Seas from the North Atlantic, with a maximum threshold depth of 840 m in the Faroe Bank Channel. The GSR has been shown to affect the distribution of various deep-sea benthic organisms such as crustaceans and mollusks. We aim to estimate the role of GSR in genetic connectivity in annelid fauna between the deep Nordic basins and the deep areas in the Northern Atlantic south to GSR and to identify the degree of bias in assessing distribution of annelid morpho-species in comparison to species delimited based on genetic information. We assess morphological and genetic diversity in seven genera of annelids, representing the families Ampharetidae, Lumbrineridae, Scalibregmatidae, Opheliidae, Sphaerodoridae, Spionidae, and Terebellidae. Species are delimited based on single or multiple loci analyses of mitochondrial (COI, 16S rDNA) and nuclear (ITS, 28S rDNA) markers. Identification of species based on exclusively morphological data significantly affect correct assessment of geographical and

vertical ranges in the deep-sea annelid species. DNA barcodes based of COI sequences are, in most cases, effective indicators of putative species, however additional nuclear markers are needed for robust species delimitation analysis. In each studied genus of the deep-sea annelids, multiple cryptic lineages are detected after applying molecular species delimitation tools. Distribution of several molecular-delimited species inhabiting bathyal and abyssal depths across GSR is confirmed, posing a question on the mechanisms of the deep-sea species dispersal across topographic barriers.

Palatability and defensive strategies in polychaetes

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The information about defensive strategies in polychaetes is scarce. The aim of this study was to investigate the relationship of palatability with defensive strategies and biological characteristics of *Branchiomma luctuosum* (Sabellidae) and *Phragmatopoma caudata* (Sabelariidae), collected in regions more and less impacted by excess of organic matter (Boa Viagem and Itaipu, respectively). Bioassays were performed by offering body parts of species to the general consumer *Calcinus tibicen*. Different body parts may possess structural and chemical defense, so the crowns were macerated and offered to consumers. A total of 85 replicates were used for *B. luctuosum* and 106 replicates for *P. caudata*. The body of *B. luctuosum* presented 100% of rejection and after maceration, about 95% of the branchial crown was rejected in both sites, and the species considered unpalatable. The body of *P. caudata* presented 56.38% of rejection, considered palatable, and the opercular crown presented 86.40% of rejection after maceration, being considered unpalatable. The greater exposure, dark or aposematic coloration and mobility are related to unpalatability, that is probably associated with both structural and chemical defenses in species of the two places.

Swimming of the midwater polychaete *Tomopteris*

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Tomopterids are a family of highly-derived, holopelagic, gelatinous polychaetes found throughout the world's oceans. Tomopterids propel themselves through the water with a speed and maneuverability that are visually distinct from other swimming polychaetes such as nereids. We used high-speed video recordings of tomopterids in the lab to study their swimming motion (kinematics), which includes a forward-traveling body wave and movement of the elongate bifid parapodia. We present an analysis of the swimming kinematics of regular forward motion. We found that active paddling of the parapodia generates forward thrust which augments the thrust derived from the body wave. Furthermore, the body wave allows for increased range of motion of the parapodia, resulting in an increased displacement of the body per stroke. The characteristics of the recovery stroke deviate from other metachronal simplified models, and metrics are presented for this new mode. Our results provide insight in the kinematics of tomopterids and could have applications in biomimetics and soft robotics.

Biogeography and diversity of Falkland Islands Polychaeta

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Large scale investigation of intertidal and nearshore polychaetes around the Falkland Islands, from 2011–2015, found a large number of new species, some completely unknown but others that had previously been mis-identified, many under northern hemisphere names. The known species list has increased by 18% with 21 new records and 4 new taxa but taxa originally described from the northern hemisphere still make up 14% of the list. Biogeographically, the Falkland Islands polychaete fauna fall within the Magellan region and more than 85% of the taxa that were identified are found elsewhere in the region also. However, the fauna is also closely linked with South Georgia to the east (45% shared taxa) and Antarctica to the south (48% shared taxa) despite these regions being separated from the Islands not just by distance but also by the Polar Front. Explanations for faunal exchange between the separate regions are discussed. Potential environmental drivers of polychaete distribution and composition around the Islands were determined through cluster analyses and multi-dimensional scaling plots. Cluster analyses and MDS plots showed depth to have the most influence on species composition with shore height and sediment type having limited effect. Taxonomic distinctness indices highlight those stations where species list swere dominated by particular taxa. Microhabitats such as biogenic encrustations and algal and epifaunal turfs harboured the greatest numbers and diversity of taxa, particularly Syllidae, Terebellidae and Sabellidae. Syllidae were the most diverse family overall, constituting 12% of the named taxa.

The recent spread of the non-indigenous species, *Hermundura americana* (Polychaete: Pilargidae) throughout the Chesapeake Bay

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In 2009 the pilargid polychaete, *Hermundura americana*, was first recorded in the Chesapeake Bay at a single location in the Southern Branch of the Elizabeth River. Previously known only from the Gulf of Mexico, it became well established throughout the Southern Branch. In 2012 *H. americana* was found at a single location in the James River. By 2014 it had spread to much of the James River from the polyhaline to oligohaline salinity zones in both muddy and sandy sediment. This species is now often one of three to four most abundant macrobenthic species in the James River. Through 2017 it was not found outside the James River and we previously speculated about unique hydrodynamic circulation barriers and possible salinity tolerance limitations in high salinities of the Bay. 2018 was one of the wettest years in the history of the Chesapeake Bay watershed and this species was found at three locations in the upper Chesapeake Bay outside of the James River. Now that it has been found beyond the presumed barrier of the Bay mouth, *H. americana* is likely to become established throughout the Chesapeake Bay. The feeding and reproduction of this species is unknown. Indeed, little is known of the biology of any species of Pilargidae. There are presently no known negative ecological effects of the non-indigenous species, *H. americana*. This is the first reported non-indigenous infaunal polychaete species of Chesapeake Bay.

A study of *Pectinaria gouldii* and *Phragmatopoma lapidosa* biocement proteins

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Coe College

Phagmatopoma lapidosa is a polychaetae worm that lives in intertidal zone along the Atlantic coast of North America. This worm produces and secretes a biocement to adhere grains of sand together, forming a protective tube. The worms live in large colonies and build on existing tubes to form large reef-like structures which are important for the coastline ecosystem. *Pectinaria gouldii* are larger, benthic worms that also reside in intertidal regions, but live as individuals. The worms select grains of sand and adhere them to create an ice cream cone shaped enclosure. We found that biocement proteins from both species have a high percentage of repeating amino acids such as serine and tyrosine. We also found that about a third of tyrosines in the biocements are converted to DOPA, which then form cross bridges and strengthen the biocement. Serine can also be modified by phosphorylation, making the proteins highly acidic and contributing to the adhesive nature of the biocement. The study of which amino acids attach to mineral surfaces is important for understanding the mechanism of bio-adhesion. The specific amino acids and proteins present in the biocement could explain its organization on a molecular level and give more insight into future studies for exploring bio-adhesion.

Molecular and morphometric analyses reveal highly underestimated diversity in *Eteone* (Phyllodocidae, Annelida)

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Genetic diversity of the genus *Eteone*, Savigny, 1820 (Phyllodocidae) was studied using mitochondrial (COI, 16S) and nuclear (28S) markers. The material was obtained mostly from the White Sea but also included specimens from the Sea of Okhotsk, the Barents Sea, the Norwegian Sea, the North Sea, the Greenland Sea and the West coast of Africa. The study discovered six monophyletic clades of *Eteone* from the White Sea and more than 19 clades altogether among the examined material. Morphological study revealed five morphotypes in the White Sea differing in the shape of the prostomium, parapodia, dorsal and ventral cirri and in the structure of the proboscis. Previously only two species of *Eteone* (*E. flava* and *E. longa*) were reported from the White Sea. The obtained results suggest that the genus *Eteone* requires further revision including the use of genetic data in the study area and worldwide. The Russian Fund for Basic Researches supports this study (19-04-00501, 18-05-60158).

Polychaetes associated with the bryozoan *Bugula neritina* in marinas of the Iberian Peninsula and northern Morocco

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The increase of marine infrastructures results in significant impact to adjacent ecosystems. In fact, the presence of marinas modifies the original environmental conditions and ends up disturbing the faunal community. However, despite the essential role displayed by macrofauna on marinas' fouling biota, certain taxa such as polychaetes have been poorly studied. The present study provides the first spatial characterization of the epibiont polychaete fauna associated with the bryozoan *Bugula neritina* in marinas along the Iberian Peninsula and the north of Morocco. A total of 32 polychaete species were identified, with Syllidae being the most diverse family. Furthermore, the environmental factors involved in the occurrence

and abundance of the dominant species *Salvatoria clavata* were also analyzed by Generalized Linear Models; results showed that the highest predicted values of *S. clavata* abundance appeared at marinas with high levels of nutrient enrichment and of heavy metals concentration.

Phylogenetic inference and the misplaced premise of subtitiution rates

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Three 'methods' have been endorsed for inferring phylogenetic hypotheses: parsimony, likelihood, and Bayesianism. The latter two are regarded as superior because they consider rates of sequence evolution, whereas it is said 'parsimony' lacks evolutionary 'models' altogether. Are rates of substitution justified in inferences of explanatory hypotheses? Four issues need to be addressed: 1) the aim of scientific inquiry, 2) the nature of why-questions, 3) inferences of explanatory hypotheses as answers to why-questions, and 4) acknowledging that parsimony, likelihood, or Bayesianism are not inferential actions leading to explanatory hypotheses. The aim of scientific inquiry, including systematics, is to acquire causal understanding of effects. Observation statements of organismal characters lead to implicit or explicit why-questions. Conveyed in data matrices, questions assume the truth of observation statements, which is contrary to invoking substitution rates within inferences to phylogenetic hypotheses. Inferences of explanatory hypotheses are abductive, such that an evolutionary theory(ies) is/are included or implied. Phylogenetic inferences cannot be distinguished as 'parsimony,' 'likelihood,' or 'Bayesian'; they are just abductive. Rates of sequence evolution must be considered prior to, rather than within abduction. The question then becomes whether or not it is realistic to attempt to rename putatively-shared nucleotides per the background assumption of rates of substitution, or attempt to explain modified observation statements. There appear to be no epistemic grounds for renaming shared characters to accommodate rates. This, coupled with problems associated with downward causation described by Fitzhugh [2016, Acta Biotheoretica 64(2): 133–160], limit opportunities to causally account for sequence data via phylogenetic hypotheses.

Epigenetics, methionine and developmental plasticity in the spionid *Polydora cornuta*

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Acadia University

We tested the effects of methionine, limited in the diets of marine detritivores, on plasticity in larval development in *Polydora cornuta*, and also, potential epigenetic effects of methionine on DNA methylation. Control broods had the expected pattern of development with three morphs of offspring in equal proportions. Parental exposure to methionine altered development with the highest exposure (10^{-5} M) increasing the production of small larvae, and the lowest exposure (10^{-9} M) producing a range of larval morphs similar to controls. Differences in maternal methylation were demonstrated through total genome digestion with methyl-sensitive enzymes and analysis of DNA smears with Image J. Exposure of females to all three concentrations of methionine significantly reduced DNA methylation relative to the controls. These results indicate that developmental plasticity in *P. cornuta* is epigenetic and is influenced by a potentially limiting nutrient (methionine) in the parental environment.

Complexities within Macellicephalinae (Polynoidae, Annelida)

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Within Aphroditiformia, Polynoidae is the largest and most diverse group, having colonized all marine habitats and ecological extremes. Among those strictly bound to the deep sea, Macellicephalinae are one of the most abundant groups and are prevalent among abyssal muds, whale falls, chemosynthetic vents/seeps, and are remarkably one of the few annelid groups known from hadal depths. Their complex evolutionary history is reflected across their numerous and wide-ranging habitat colonizations. However, due to restricted access, few studies have assessed Macellicephalinae evolution into, or origin within, these habitats. As a result, longstanding uncertainties persist in the interpretation of Macellicephalinae evolution due to lack of phylogenetic resolution and representation. While recent phylogenetic analyses, including those integrating mitochondrial genomes have continued to integrate few macellicephalinid representatives, including branchiate deep sea species and those found in anchialine caves, the largest and most prevalent genus, *Macellicephala*, has never been investigated using genetic data. Herein we present findings of our ongoing phylogenetic analyses into the paraphyly within Macellicephalinae, being the first analyses to include *Macellicephala* from both the Atlantic and Pacific Oceans. Furthermore, we comment on the previously undocumented commensal relationship between *Macellicephala* species and torquaratorid acorn worms (Hemichordata, Enteropneusta). Together, these systematic investigations aim to identify relationships and adaptations among the macellicephalinid genera, inevitably helping guide our ongoing phylogenomic investigations into the underlying functional and molecular mechanisms of adaptation across extreme environments.

Polychaetes inhabiting massive sponges from shallow and mesophotic habitats along the Israeli Mediterranean coast

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Sponges host diverse assemblages of invertebrates, which are usually dominated by polychaetes, providing them with shelter and constant food supply. This study investigates the endobiotic polychaete community of 10 sponge species from shallow (1-30 m) and, recently discovered, mesophotic (90-120 m) habitats along the Israeli coast. Seventy-one sponge specimens were collected by SCUBA diving in the shallow water or by Remotely Operated Vehicle in the mesophotic sponge grounds between the years 2016-2018. Older specimens deposited in the Steinhardt Museum of Natural History (Tel-Aviv, Israel) were examined as well. A total of 35 polychaete taxa were found, including species reported for the first time from the Israeli coast. Total richness, mean richness and mean abundance, were similar in both habitats ($p>0.1$). However, the community composition differed significantly (ANOSIM, $R=0.48$, $P<0.001$). Only a third of the polychaete taxa were found to inhabit both habitats. Two nereidid species dominated the fauna (*Ceratonereis costae* in the mesophotic habitat, and *Leonnates indicus* in the shallow habitat), and they contributed the most to the differences between the two habitats (SIMPER). No correlation was found between sponge volume and species richness/abundance. This is the first study to sponge-associated communities in the eastern-most part of the Mediterranean. The findings suggest that sponges maintaining their functional role as ecosystem engineers for polychaete fauna in the Israeli coast. Moreover, sponge-inhabiting polychaete assemblages in both habitats constitute unique communities, probably due of the difference in environmental conditions between the dynamic shallow and more stable mesophotic habitats.

You CAN have fire without oxygen! How the bearded fireworm, *Hermodice carunculata*, reacts to hypoxic conditions

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Bearded fireworms, *Hermodice carunculata* (Annelida: Amphinomidae), occur throughout the Atlantic Ocean basin, and portray a wide range of tolerances to abiotic factors, such as temperature, salinity, and dissolved oxygen (DO). Since the species is commonly occurring and robust to changes, it may prove to be a promising model organism for hypoxia studies, which are increasingly important with the projected escalation of hypoxia zones in the future. Molecular responses of *H. carunculata* to chronic and intermittent hypoxic conditions were investigated to estimate the dissolved oxygen (DO) level at which they are affected. For chronic hypoxia, five bearded fireworms were exposed to one of three levels of DO in 40-liter tanks for seven days: 2.5 (± 0.25) mg/l, 4.5 (± 0.25) mg/1, and 7 (± 0.25) mg/1 (normal DO). To investigate intermittent hypoxia responses, 16 worms were subjected to intermittent hypoxia (6 hours of hypoxia and 18 hours of normoxia) for 2 days and sampled for tissues at 6, 18, 24, and 42 hours. No reference genome exists for the species, so a combined reference transcriptome was assembled from sequences and utilized to align the RNAseq data from individuals for differential gene expression analysis. Pairwise comparisons of transcriptomes revealed up-regulation of key hypoxia and stress response genes and down-regulation of metabolic pathway genes in the worms under chronic hypoxia. Following chronic hypoxia exposure, differences in gene regulation were noted between the two experimental groups, indicating the DO levels chosen were distinct enough to invoke differing responses. Similar responses were found under pairwise comparison after normoxic and hypoxic time spans during the intermittent hypoxia. Noting differential gene expression responses in this marine invertebrate provide useful oxygen limits and hypoxia response levels to inform future studies on other marine species.

Worms from the abyss: annelid diversity and species distribution from Australia's eastern lower bathyal and abyssal environments

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The pioneering 2017 expedition "Sampling the Abyss" on RV Investigator, was the first Australian research cruise focused on investigating the eastern abyssal environment from Tasmania to southern Queensland. Forty-nine beam trawl and 27 Brenke sled samples were collected from 13 sites at both lower bathyal (~2500 m) and abyssal (~4000 m) depths. A total of about 3200 annelid specimens (Polychaeta, Sipuncula and Echiura) were collected. Polychaetes, the most abundant group (2988 individuals), were composed of 32 families and 114 species/OTUs. Serpulidae, Aphroditidae and Ampharetidae were the most abundant families. Eighty-one species may be new to science, including 5 species of *Nothria* (Onuphidae), 4 ampharetids and 2 *Petta* (Pectinariidae). This project has vastly increased the understanding of annelid abundance, diversity and species distribution in the Australian deep-sea environment.

The genome of deep-sea seep-dwelling *Lamellibrachia luymesi* (Siboglinidae) and clues on chemosynthetic symbiosis

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The long-lived gutless tubeworm *Lamellibrachia luymesi* (Siboglinidae) is found at deep-sea cold seeps in the Gulf of Mexico and has served as model to study chemosynthetic symbiosis and adaptation to extreme environments. However, the evolution of genomic and molecular mechanisms involved in such symbiosis is poorly understood. Here, we present and characterize the genome of *Lamellibrachia luymesi*. In relation to chemoautotrophy, we found evidence that symbionts compensate for the host's deficiency in amino acid biosynthesis and found a large expansion of hemoglobin B1 genes (these genes may function in sulfide-binding to help feed the endosymbionts). Comparative analyses suggest the Toll-like receptor pathway may be essential to host immunity and tolerance/sensitivity to symbionts and pathogens. Last, we identified several genes that potentially play an important role in organismal longevity.

Burrow dimensions and network properties in heterogeneous habitats

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The use of computed tomography for assessment of sediment bioturbation, through the differentiation of volumes of sediment with contrasting densities, has allowed the characterisation of bulk burrow metrics allowing statistical comparison of burrow surface area and volume across replicated treatments. Connected *Hediste diversicolor* burrow galleries show similar properties to network structures, with points in three-dimensional space, "nodes", connected by burrow tunnels. Here we show that by treating burrow galleries as a network they can be converted into a mathematical representation (adjacency matrix) and we can interrogate these matrics to make statistical comparisons on burrow structure. Individuals of *H. diversicolor* (n = 20) were allowed to burrow in soft sediment for 24 hours across in sediment enriched in 5 different configurations (n = 4); homogenous non-enriched, homogenous enriched, bottom half enriched, top half enriched and quartered. We find that the networks were mostly "trees" with no loops or repeated motifs. Burrow surface area, volume and node number of largest in the homogenous non-enriched treatment, and branching indices show that the most branching occurs in more heterogenous networks (half enriched). Environmental conditions therefore have the potential to fundamentally change how an organism interacts with and behaves in its environment with consequences for nutrient regeneration and carbon sequestration and other ecosystem functions.

Who's that guy? What happens when worms use someone else's name?

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Polychaetes are relatively well known in some areas with relevant identification keys available, elsewhere this is not true with ecologists using inappropriate keys leading to misidentifications. It is also becoming increasingly apparent that most species have discrete distributions. For example, *Marphysa sanguinea* has been reported from around the world. Studies have shown that *Marphysa* is a highly speciose genus with each species occupying slightly different habitats. Yet many continue to be described as *M. sanguinea* even though they represent discrete species each with different ecological requirements, which need to be incorporated into management plans. Also this so called cosmopolitan species is widely used in many pharmacological, physiological and ecological studies. This species complex is also widely collected for bait and shipped around the world so another good reason to ensure that the correct identification occurs and we are certain that many undescribed species still remain to be described. Within polychaetes there are many other examples of this taxonomic confusion. So the use of appropriate literature is critical for correct identifications and to reinforce that many species still need to be described based on both morphological and molecular data with vouchers being lodged.

Resolving the identities of two cosmopolitan *Platynereis* Kinberg, 1865 species in South Africa

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Two cosmopolitan species, *Platynereis dumerilii* and *P. australis*, recorded in South Africa were investigated to determine whether they are reciprocally monophyletic with nominal species from France and New Zealand, respectively, and to determine whether characters used to distinguish them are reliable. Molecular datasets (mtCOI and nDNA) confirm that *P. dumerilii* and *P. australis* do not occur in South Africa. Specimens identified as *P. australis* unexpectedly clustered with *P. massiliensis* (from the Mediterranean) which genetic data suggested is actually indigenous to South Africa. Since *P. massiliensis* is part of a cryptic species complex in the Mediterranean, we consider the name doubtful and instead refer to it

as *P. massiliensis* s.l. Phylogenetic analyses further revealed that the predefined morphological groupings (as *P. dumerilii* and *P. australis*) for the two South African species did not match the species clades with 100% accuracy. This was further demonstrated when principal component analyses of the diagnostic characters revealed no morphological groupings suggesting that characters used to identify them are not reliable. Nonetheless, the species differ in their temperature preferences and probably larval development modes as inferred from their distribution and genetic structuring patterns, respectively.

One (nerve) ring to rule them all – structure-function relationships in the copulatory organ of *Dinophilus gyrociliatus* dwarf males (Dinophilidae)

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Connectome studies (including mapping of neurotransmitters) grant a unique insight into the morphology and functionality of cells as well as of entire circuits. The majority of connectomes studied so far are from larval stages due to size and complexity of adult nervous systems, omitting the study of circuits related to "mature" functions, e.g. reproduction. We profiled the 68 neurons of adult *Dinophilus gyrociliatus* dwarf males by annotating immunoreactivity patterns against a range of pan-neural and specific neurotransmitter markers onto the ultrastructural connectome. In contrast to females, where the majority of tested neurotransmitters is found in the brain and ventral cords, most immunoreactivity was detected in the circumpenial fibre mass of dwarf males. These co-localization patterns suggest a complex neuromodulation relying on an intricate interplay of the neurotransmitters underlying the orchestration of glandomuscular activity during copulation.

Population genetics of two Japanese maldanid species based on mitochondrial DNA and nuclear single nucleotide polymorphisms

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Contrasting patterns of genetic diversity were revealed for two Japanese maldanid species, which differ in population dynamics after the 2011 tsunami and their geographical distributions, based on nucleotide sequences of the mitochondrial COI gene and nuclear single nucleotide polymorphisms, SNPs, analyzed by MIG-seq. The COI analysis of *Praxillella* cf. *pacifica* showed a clear population structure with several star-shaped clusters corresponding to its geographical distribution. On the other hand, *Clymenella collaris* showed a unique population structure in COI with low haplotype and nucleotide diversities in Iwate, northeastern Japan, the northern part of its distribution. The population structure of *C. collaris* in Iwate might have formed by the extension of the warm Kuroshio Current and/or warm water masses during past interglacial periods.

***Hypomyzostoma jasoni* Summers and Rouse 2014 (Myzostomida, Myzostomatidae): behavioral patterns and coloration in worms of different ages**

Glafira Kolbasova[1], Tatiana Neretina[1], & Elena Mekhova[2]
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Hypomyzostoma jasoni is an ectocommensal myzostome associated with feather star *Stephanometra indica* (Smith 1876). Worms steal food from ambulacral grooves and occur located on the host's arms and pinnules. One *S. indica* specimen may be inhabited by a group of up to 40 hypomysostomes of different ages. Coloration of *H. jasoni* matches the color pattern of the host. In small groups, up to 8–10 specimens of adult worms are usually white with 10–11 transverse dark-brown strips, and sit on the host with the body oriented along the arm of crinoid, whereas young worms are brown with single longitudinal mid-dorsal white strip, and occur on pinnules. Worms of middle size, having some intermediate coloration with pale transverse strips and single bright longitudinal one, occur mostly on arms or on large pinnules. In large groups with more then 10–15 specimens, *H. jasoni* have the same types of coloration, but without exact dependence on body size. Both small and large worms with one single strip are present. Perhaps the reason for this is that *S. indica* is a small crinoid with a small number of arms and thin pinnules, therefore, *H. jasoni* have to compete for feeding places with each other. If for some reason a worm cannot take a favorable food place on the host's arm, it may be forced to remain on the pinnule, and "young" coloring with a single longitudinal strip remains in the adult. The Russian Fund for Basic Researches supports this study (19-04-00501, 18-05-60158).

Uncovering the hidden dynamics in the development of ciliary bands in *Platynereis dumerilii*

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The spiralian phylum Annelida, together with Mollusca and possibly Entoprocta, belongs to Trochozoa, a clade that is characterized by a typical larva, the trochophora. The eponymous organ of the trochophora is the prototroch, a pre-oral circumferential belt of ciliated cells. Confined to the larval stage, it is used for swimming and feeding in the majority of polychaete species. Due to its stereotypic cell lineage and transitory fate, the prototroch has been considered homologous across Trochozoa. However, a survey of the available literature shows that the numbers of cells constituting the prototroch varies considerably between different lineages. To resolve this contradiction we investigated the development of the prototroch from its formation to its disappearance in the model organism *Platynereis dumerilii*. The result of our investigation shed light on the developmental dynamics of the prototroch and the alleged stereotypy of cellular composition of ciliated bands.

New insights in diversity of deep-sea serpulid polychaetes

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The Serpulidae are unusual polychaetes that are sessile epifaunal suspension-feeders constructing calcareous tubes on hard substrates. Tube secretion makes these animals important members of fouling communities and thus, best known taxa are from shallow-water habitats. Serpulidae are also found in deep-sea environments, including the periphery of hydrothermal vent communities. A review by Paterson et al. (2009) reported 26 serpulid species from the depths below 2000 m world-wide. Does this figure adequately reflect the known diversity of deep-sea serpulids ten years later? We provide an update on studies revealing undiscovered diversity of bathyal, abyssal and hadal serpulids during the last decade.

The polychaete assemblage pattern in the seagrass habitat of South Andaman Islands, India

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Seagrass-beds are acknowledged for their complex habitat and rich biodiversity accommodativeness. In the light of global threat on the seagrass habitat, the faunal community, especially polychaetes, has been less studied from Andamans, which was attempted in the present study. Sampling was carried out from 2013-15, covering different tropical-ecological seasons across five intertidal seagrass multi-species locations. A total of ~11,000 polychaete individuals represented by 25 families and 167 taxa were identified from the sediment samples (N=540; core 15 cm dia). Their density ranged between 316-4857 ind/m^2 with Spionidae (32 spp) being the most diverse family, followed by Capitellidae (17 spp), Syllidae (14 spp), and Glyceridae (10 spp). Species-wise, *Paradonis armata* (26.3 %) was the most dominant followed by *Capitella singularis* (4.8 %), *Orbinia* sp.1 (4 %), *Orbinia* sp.2 (3.6 %) and *Paraprionospio pinnata* (3.5 %). Univariate diversity indices viz., S, J´, 1-λ, ES (n) showed significant variation across the location, which was also supported by multivariate analysis. The sediment properties (sand, silt, clay, OM, MGS) and seagrass attributes (percentage cover, shoot density, above ground-AG/below ground-BG biomass) showed a significant spatial variation on polychaetes assemblage whereas; seasonal variation was insignificant. According to BEST-BIOENV analysis, shoot density, AG biomass, sand and silt percentage best defined the polychaete community patterns. The BG biomass, percentage cover, OM, sand and silt showed a significant relationship with species diversity.Overall, this study elucidates the polychaete assemblage from south Andamans seagrass habitat, which could be constructive for baseline insights and impact assessment.

Nuchal organs and navigation: assessing polychaete responses to subsurface chemical cues

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Polychaetes play a key role in marine benthic ecosystem dynamics as they burrow and feed, mixing sediments and influencing benthic-pelagic exchange of solutes. Chemoreception coordinates feeding by polychaetes above and on the sediment surface, but little is known about how polychaetes detect and respond to chemical cues below the sediment surface. We used novel methods to examine how nuchal organs might aid subsurface detection of chemical cues by polychaetes. Video observations suggest that burrowing behaviors allow polychaetes to “sniff” porewater with nuchal organs. Results from experiments using time-lapse photography and time-resolved, digital, particle-imaging velocimetry (PIV) to track subsurface movement of *Alitta virens* support the hypothesis that nuchal organs mediate subsurface responses to chemical cues. When nuchal organs were blocked with superglue, worms did not respond to a subsurface food cue injected into the sediment, but intact worms and worms with the 3rd chaetiger glued did. PIV data revealed subtle differences in burrowing paths and speed for worms responding to subsurface seawater versus subsurface food cues.

A targeted exon-capture phylogenomic approach to investigate the evolution of functional traits in Chaetopteridae (Annelida)

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Chaetopteridae have a remarkably tagmatized body plan, with morphological specialization for diverse mucus-net filter feeding strategies across the four genera. Recent phylogenomic analyses of Annelida have recovered Chaetopteridae as an early-diverging lineage. The current phylogenetic hypothesis for Chaetopteridae is limited by low taxon and gene sampling and poor support at key nodes. Here, we employ a target capture approach to better resolve the phylogeny of Chaetopteridae and examine the evolution of tagmosis and functional traits using phylogenetic comparative methods. Of 790 targeted regions, 604 exon loci were recovered. The phylogeny is highly congruent among analysis strategies and generally well-supported. The genera *Chaetopterus* and *Mesochaetopterus* are monophyletic sister groups, and paraphyly is confirmed in *Spiochaetopterus* and *Phyllochaetopterus*. Supertree analyses of morphological traits shed light on the evolution of feeding mode and tagmosis in the family.

The euryhaline *Alitta succinea* (Annelida; Nereididae) expresses aquaporin water channels

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Aquaporins (AQPs) are widespread membrane channels mediating the transport of water and small solutes into and out of cells. Multiple AQP isoforms, playing various functions, are displayed by animals according to their evolutionary pathway. Despite their known biological importance, few AQPs are annotated only in a few annelids. In this work we have searched for potential AQPs in public genomes and transcriptomes of annelids. Since most estuarine annelids are considered osmoconformers, the brackish water species *Alitta succinea* was chosen as a target-species for experimental AQPs searches. Roughly 8 putative AQP paralogs were found. Moreover, 6 distinct AQPs were assembled from *A. succinea* transcriptome and a cDNA fragment was also obtained by degenerate RT-PCR. Work is in progress to clone and assess the expression level, body localization and the potential role of AQPs in the osmoregulation of *A. succinea*. Novel and valuable insights into annelid biology are anticipated.

Why to bury the head in the sand? The functional morphology of *Sternaspis scutata* (Sternaspidae)

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The anatomy of the sedentary, sediment-feeding polychaete *Sternaspis scutata* (Ranzani, 1817) differs significantly from that of other annelids. Several morphological characters are derived, like a subdivision of the body into three parts or the lack of any internal segmentation. The most outstanding character, however, is the ventro-caudal cuticular shield, containing ferric phosphate. The shield as well as their sediment feeding life style hampers studying sternaspids with methods other than preparation and histology or ultrastructure of selected tissue pieces. To overcome these restrictions we analysed the internal organisation of *Sternaspis scutata* in a µCT scanner. The results provide new insights into the functional morphology of this species. They also improve our understanding of the ecology of sternaspids and their phylogenetic position within annelids.

What limits the distribution of the non-native serpulid *Ficopomatus enigmaticus* in California?

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Ficopomatus enigmaticus has been present in San Francisco Bay since at least 1921, but until the early 1990s it was not known from other locations in California. In the past 30 years, however, clusters of populations have been discovered in central and southern California, to nearly the US-Mexico border. Despite its recent range expansion, *F. enigmaticus* is absent from many apparently suitable sites in the state. We tested three hypotheses that might explain its patchy distribution. 1) Larvae have a short planktonic larval duration, limiting dispersal from established populations. Larvae reared with excess food reach metamorphic competence at 7 and 9 days post-fertilization at summer (22°C) and winter (16°C) temperatures, respectively. A particle dispersal model using ROMS current data suggests that larvae in the Los Angeles River population may routinely disperse 10s of km along the coast, especially in winter. 2) Larvae cannot survive at extreme salinities, limiting their distribution to sites of moderate salinity. Acute exposure experiments show that (like adults) larvae survive well across a broad range of salinites, from 3.5-35 psu. 3) Competent larvae settle only in response to cues from adults, limiting the establishment of new populations. Settlement experiments show that conspecific tube material is a potent metamorphic cue,

but other common biofilmed material (e.g., tubes of other serpulids and tubes of vermetid snails) also induce metamorphosis. As all of our hypotheses seem to be incorrect, we suggest some alternative explanations for the unexpectedly limited distribution of *F. enigmaticus* in California.

Integrative anatomical study of *Ramisyllis multicaudata* reveals the evolutionary origins of its novel body plan

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Ever since the description of *Syllis ramosa* in 1885, the existence of annelids with a permanently branched body has baffled the annelid community. However, the extreme rarity with which these animals have been found since, has made it difficult to study their bifurcating bodies in detail, thus limiting our understanding of how their anatomy and life history are, and how they may have arisen during evolution. Interestingly, the recent discovery of *Ramisyllis multicaudata*, which also has such branched body, has made it possible to study this most radical novelty. Here, we characterize the inner anatomy of *R. multicaudata* by using life imaging, histological sectioning, 3D immunohistochemistry, X-ray tomography, and Serial Block-Face SEM to study how its body plan is, how it is modified at the branching points, and how these changes might affect the life history of these unique animals. By doing so, we show that, although each branch conserves the general annelid scheme, the presence of the branches themselves is an evolutionary novelty that creates a new body plan. In addition, we also study the anatomy of the abnormally bifurcating posterior end of an individual of *Nudisyllis pulligera*, and show that the obtained results, together with the pre-existing knowledge about the development and phylogeny of Syllidae, point to competing but interesting hypotheses about the evolutionary origin of this morphological novelty.

Transition of metanephridial systems into protonephridial systems in species with reduced coelom and blood vascular system

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Adult annelids generally possess a well-developed coelom, blood vascular system and metanephridia as is typical of Metazoa. However, their larvae are acoelomate; excretion and osmoregulation is achieved by means of protonephridial systems. During ontogeny nephridial systems are replaced by metanephridial systems without loss of function. Within Annelida several lineages with small and sometimes interstitial members exist which are characterized by a reduced or absent coelom in adults. It has been shown that one of these lineages, Protodrilida, most likely evolved by miniaturization rather than by progenesis. Accordingly, members of this taxon show different levels of reduction of the blood vascular system and the coelom. Thus, they are ideal objects for studying transition of the excretory systems when the former structures become reduced and may lose part of their function. Investigation of excretory systems in all of the four lineages revealed that two of them, namely Polygordiidae and Saccocirridae still develop typical metanephridia whereas the other two lineages, Protodrilidae and Protodriloidae, possess protonephridia-like excretory organs although neither coelom nor blood vessels are completely lost. Interestingly, one clade possesses blood vessels lined by podocytes and separate protonephridia with complex terminal cells whereas in the other the terminal cells itself are part of the blood vessels forming cyrtopodocytes through which the primary urine directly enters the nephridium. Although these two clades form sister groups, the most probable explanation for this difference is that this transition most likely evolved by convergence.

Detection of the exotic shell-boring species *Polydora onagawaensis* on shellfish farms in the northeastern United States

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Recent expansion of the marine shellfish culture industry in the northeastern US has led to increasing concern about the impact of shell-boring polychaetes on shellfish health and marketability. Historically, it was assumed that most infestations in the region involved *Polydora websteri*. Using morphological and molecular approaches, we have recently identified two additional species, *P. neocaeca* and *P. onagawaensis* among cultured shellfish in Maine and neighboring states. Nuclear 18S rRNA sequence analysis indicates that *P. onagawaensis* populations in Maine are more genetically diverse than those in Japan and China where the species was first described. Further, genetic divergence among Maine populations of *P. onagawaensis* is an order of magnitude higher than we have observed for *P. websteri*, worldwide. We will discuss the implications of these findings with regard to the history of species introductions and pest management.

Making heads and tails of syllids: a summary of their regenerative abilities

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Syllids (Syllidae, Annelida) have remarkable regeneration abilities. Some species can regenerate complete individuals from short fragments of the body, i.e. they can perform whole-body regeneration (WBR); while others can easily regenerate the tails, but show limited anterior regeneration. Studies on cellular dynamics and gene expression in syllid regeneration are very scarce and none cover species capable of WBR. Here, we gathered data about regeneration in different species of Syllidae, including those that perform WBR. On the one hand, we used comparative transcriptomics to characterize and compare gene expression profiles of three developmental conditions in the species *Sphaerosyllis hystrix* and *Syllis gracilis*: anterior regeneration, posterior regeneration and no regeneration (adults in regular development). The observed gene expression patterns show that posterior regeneration and regular growth are indistinguishable, while anterior regeneration involves the up-regulation of several genes. On the other hand, we used EdU and BrdU labelling to track proliferating cells (S-phase) during WBR of *Syllis* sp., which is a new species formally being described, and that is able to regenerate posterior as well as anterior ends. Our results on cellular dynamics indicate that cells near the wound contribute to the blastema formation and probably undergo a process of dedifferentiation and redifferentiation to form new tissues. All in all, our data provide valuable information to understand the genetic and cellular machinery of WBR, reproduction, growth and segmentation in syllids, as well as annelids in general.

New scaleworms (Polynoidae, Annelida) from seeps, vents and whalefalls, with a tribute to the contributions of Marian Pettibone

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Marian Pettibone was responsible for many of the first descriptions of polynoids from chemosynthetic habitats. Her contributions underlie this presentation. Recent sampling across deep sea habitats ranging from methane seeps (Oregon, California, Mexico, Costa Rica), whale falls (California) and hydrothermal vents (Juan de Fuca, Gulf of California, EPR, Galapagos) has resulted in a remarkable diversity of undescribed polynoid scaleworms. We demonstrate this via DNA sequencing and morphology with respect to the range of already described chemosynthetic-habitat dwelling polynoids. However, a series of taxonomic problems cannot be resolved until specimens from their respective type localities are also sequenced. We highlight some of the resolved taxonomic issues, and new species, with respect to *Bathykurila*, *Branchipolynoe* and *Peinaleopolynoe*. While many of the scaleworm taxa show wide geographic ranges across thousands of kilometers, others were also only found at one site. While many were found at both seeps and whale fall habitats, very few were found to live across both seeps and vents.

Tube architecture of sand-castle sabellariid worms from the Mediterranean Sea

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Biogenic reefs produced by agglutinate sabellariid tube-worms are unusual mesolittoral and upper infralittoral bioconstructions. They are valuable marine habitats which are a focus for protection owing to their role in substrate stabilization and enhancing biodiversity. Because of the precise environmental requirements of these worms, i.e. rough waters and suspended sandy particles, sabellariid reefs are rare and localized in restricted coastal areas. Some new findings of *Sabellaria* reefs from the coasts of Sicily (Mediterranean) are here reported. The structure of the agglutinate tube wall, the gluing modality of grains, and the chemical composition of biocement are also described. The tube wall shows distinctively three layers, each of which characterized by different particles size, shape and arrangement. These data confirm that *Sabellaria* is selective in the choice of grains. SEM observations of the wall revealed a “popped bubble” feature for the biocement, which shows, through EDS analysis, the presence of calcium, magnesium, and phosphorous. The biocement ensures a certain persistence of the reefs in the high hydrodynamic settings where they develop, and allows their possible fossilization however very unlikely. Fossil record is therefore scant, with only one sabellariid-rich bed, deposited during the Upper Miocene of SE Spain, in palaoenvironmental conditions comparable to those where sabellariid reefs presently occur.

Sex on the reef: swarming polychaetes of Timor-Leste

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In several remote locations in Timor-Leste an annual swarming of "Meci" worms takes place. Similar to the better studied palolo rising in Samoa, the wawo and laor in Ambon or the nyale in Lombok, the Meci worms have great cultural significance. We documented the swarming on March 7 and 8, 2018 near the village of Loré I in Lautém Province and sampled benthic stages from a limestone reef substrate as well as swarming epitokes. On March 7, the swarming stages were almost exclusively *Palola* sp. and are morphologically similar to *P. viridis* from Samoa. The swarming on March 8 was dominated by nereidids but also included other eunicids (*Eunice* sp., *Lysidice* sp.), hesionids, phyllodocids and scalibregmatids, as well as various crustaceans. The swarming *Eunice* sp. shows close similarity to *E. fucata*, also known as the Atlantic palolo. Only *Palola* sp. are considered "Meci" worms and are consumed raw or cooked. Efforts to identify the epitokes and match them to the benthic stages are currently ongoing.

Genome editing sheds 'light' on larval swimming behavior

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Many annelids depend upon a larval phase of their life cycle to locate suitable adult habitat. Eyes often provide information about light intensity and direction, and light detection can influence larval swimming, dispersal and settlement behaviors. Light detection is mediated by the opsin genes, which encode light-sensitive transmembrane proteins. Larvae of the marine annelid *Capitella teleta* have simple eyespots and are positively phototactic. We determined the embryonic origin of the larval eyes in *C. teleta*, and used an infrared laser to delete to delete the eyespots to demonstrate the role of eyespots on the phototactic response. We also characterized the spatio-temporal expression of the rhabdomeric opsin genes in *C. teleta* and show that a single rhabdomeric opsin gene, Ct-r-opsin1, is expressed in the larval photoreceptor cells. To directly investigate the role of Ct-r-opsin1, we generated mutants using CRISPR/CAS9 mutagenesis. In Ct-r-opsin1 mutants, however, phototaxis was highly impaired, although the eyespot photoreceptor cell and associated pigment cell formed normally. The loss of phototaxis due to mutation in the Ct-r-opsin1 gene is identical to that observed when the entire photoreceptor and pigment cell are deleted, demonstrating that a single r-opsin gene is sufficient to mediate phototaxis in *C. teleta*. These results are one of few studies to utilize CRISPR/Cas9-mediated mutagenesis to study animal behavior.

Establishing taxonomic research priorities for polychaetes in southern Africa

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About 50% of the ~700 species of polychaetes reported in 'A Monograph of the Polychaeta of Southern Africa' are considered non-indigenous. Some of these have been redescribed as new indigenous species, and this may also apply to others. Furthermore, many indigenous species have unnaturally wide distributions that may signal the presence of species complexes. Since a complete revision of the monograph is not practicable, this study aims to identify taxa that should be prioritised for revision. Species will be assigned scores according to criteria including indigenous status, date and quality of descriptions, number of subjective synonyms, apparent local and global distribution, economic value, alien status, availability and reliability of genetic data and availability of material at IZIKO South African Museum. Taxa will be prioritised according to total and mean score per family and individual score per species. Prioritisation of taxa in Part I: Errantia will be presented.

Phylogeny of Terebelliformia — combining transcriptomes, broad sampling and morphology

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Terebelliformia are globally distributed annelids with diverse palps, branchiae and chaetae. The interpretation of the evolution of these structures is hampered by conflicting hypotheses about their phylogenetic relationships from morphological and sparse molecular sequence data. Here, we take a three-part strategy to investigate terebelliform relationships and character evolution. A phylogenomic dataset for the main lineages from 21 transcriptomes encompassed 10,746 orthologous loci and 3.9 million amino acids. The resulting phylogeny was confidently supported and robust to data subsetting. The backbone tree was supplemented by dense sampling of 121 species for five loci to investigate relationships within the main groups, in addition to 90 morphological characters to understand the transformation of key traits. At a broad scale, six major clades were delimited: Pectinariidae, Ampharetidae (was Ampharetinae), Alvinellidae, Trichobranchidae,

Terebellidae and Melinnidae (was Melinninae). The traditional Ampharetidae was paraphyletic with Ampharetinae as the sister group to Alvinellidae, while Melinninae was the sister group to Terebellidae. We further found Pectinariidae as sister to all other terebelliforms and Trichobranchidae as sister to Terebellidae plus Melinninae. The more densely sampled, multi-locus dataset provided no evidence for the proposed separation of Telothelepodidae, Polycirridae and Thelepodidae from Terebellidae. Within Terebellidae, Telothelepodidae were part of Thelepodinae and the morphologically simple Polycirridae grouped within Terebellinae. Terebelliform ancestral states were reconstructed for both branchiae and chaetae, and subsequent reductions occurred in several lineages. The robust phylogeny derives a new systematic system for Terebelliformia and enhances understanding of the evolution of their diverse morphologies.

Phylogeny and life-history evolution of Sabellidae (Annelida)

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Sabellidae display a plethora of life-history strategies and a wide range of body sizes making their biology fascinating to study in a phylogenetic context. However, the phylogeny of Sabellidae remains poorly understood, with the little available molecular sequence data conflicting with previous morphology-based studies. We present the results of our phylogenomic analyses with 17 new sabellid transcriptomes, and a targeted exon capture analysis, where we sequenced over 500 exons for ca. 100 additional sabellid species. We also conducted a thorough methodological analysis comparing species tree reconstruction from gene trees (ASTRAL) and concatenated analyses. The new and robust sabellid phylogeny will not only allow the necessary taxonomic revision of this group, but also provides a tool to explore the evolution of the diverse life-history strategies, body size and morphology within Sabellidae.

***Histriobdella homari* (Beneden 1858), Histriobdellidae: fine structure of ventral pharynx and jaws**

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The fine structure of the jaw apparatus and the ventral pharyngeal organ in *Histriobdella homari* - a tiny ectocommensal known from lobsters - has been studied by using routine morphological tools (SEM, TEM, CLSM). The *Histriobdella* jaw ultrastructure is highly comparable to those of Dorvilleidae and juvenile jaws of Onuphidae, and represents a sclerotized cuticle. In the process of development of the maxillary apparatus, mandibles, maxillae II and unpaired dorsal carriers are formed first, and later the remaining maxillae and transverse carriers appear. Notably, the general structure of the histriobdellid maxillary apparatus resembles the conditions known for Oenonidae. The pharyngeal muscular apparatus differs - not only due to the very small size of *Histriobdella*, but also because the histriobdellid maxillary protraction occurs due to straightening of the dorsal carriers (dorsal rod) and thus requires a differing muscular scaffold. Based on our investigations, the general muscular apparatus of the jaws and ventral pharyngeal organ is unique. At the same time, our ultrastructural data (TEM) show that the main components of the *Histriobdella* muscular system fit into the general scheme of the ventral pharyngeal organ in annelids. Nevertheless, our data provide new insights helping to understand the evolution of eunicid jaws in general. The Russian Fund for Basic Researches supports this study (19-04-00501, 18-05-60158).

The role of temperature and photoperiod in regulating oocyte growth of the polychaete *Hediste diversicolor*

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Experiments were conducted to test the effect of external factors photoperiod and temperature on oocyte development of the polychaete worm *Hediste diversicolor*, aim to find (1) the influence of an accelerated photoperiod transition (2.5 times fast-forward) on reproductive development, (2) effect of temperature on oocyte maturation, and (3) combined effects of photoperiod and temperature on oocyte growth. Experiment 1: Worms were cultivated at a constant temperature (8°C) with mimicked (MP) or sped-up (SP) photoperiods lasting 118 and 46 days, respectively. Experiment 2: To assess the effect of temperature on oocyte maturation, worms were collected in March and kept in the lab at low (2°C, "LT") and high (8°C, "HT") temperatures. In Experiment 1 and Experiment 2, treatments were compared to field samplings from natural populations on coinciding day lengths (NP). Experiment 3: Worms were cultivated over 85 d at long day length (16L:8D) at constant temperature (16°C, "ThPh"), or long day length at decreasing temperatures (13 to 7°C, "TlPh"), short daylength (8L:16D) at constant temperature (16°C, "ThPl"), and short daylength at decreasing temperatures ("TlPl"). Experiment 1: The results showed that the oocytes in the SP treatment matured significantly less than the oocytes in the MP and NP treatment. Experiment 2: High temperature was found to have positive effects on oocyte maturation. The size of maturated oocytes was 196.34±3.75 µm. Experiment 3: Oocyte growth was fastest at short daylengths and decreasing temperatures (TlPl), and lowest at constant temperature and long daylength (ThPh).

Molecular and morphological placement of an enigmatic deep-sea taxon (Chrysopetalidae: Annelida) instigates deeper investigation into chrysopetalid plesiomorphic notochaetal forms

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Chrysopetalidae subfamilies are characterized by their internally camerated dorsal chaetal scleritome. Chrysopetalinae are the paleate forms; Dysponetinae and free-living Calamyzinae are spinose forms, symbiotic Calamyzinae lack notochaetae. Rarely, paleate chaetae occur in dysponetins and minor spinose chaetae in chrysopetalins; recently unusual notochaetae were described for a symbiont calamyzin. Which chaetal type represents the plesiomorphic condition? A new chrysopetalid taxon was found at methane seeps off Costa Rica with a morphology aligning it within the Chrysopetalinae: robust body form, jaws, caruncle and petaloid paleal notochaetae. However, multigene phylogenetics place the new genus as sister to Dysponetinae. This renders the transformation of chaetal forms in chrysopetalids as more problematical and this issue is explored here.

A new perspective on aggregation and aggregative settlement of *Spirobranchus cariniferus* (Gray 1843) (Serpulida)

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Victoria University Coastal Ecological Laboratory

Aggregative settlement of serpulid larvae is often discussed as a response to the presence of a microbiological film and conspecifics. My studies showed that recruits of *Spirobranchus cariniferus* settled aggregatively, but this was not in response to adult conspecifics. Larvae of serpulid species aggregated near the point of settlement before they finally attached. Abiotic factors such as sunlight, wave action and tidal movement had a more substantial impact on settlement than the presence of adults of the same species. The appearance of solitary settled individuals can be interpreted as a consequence of environmental conditions, rather than larvae choice. There appears to be no difference between a solitary and aggregative settled specimen of *S. cariniferus*. However solitary worms seem to focus their energy on tube growth compared to their aggregative conspecifics.

The broadest distribution, the tiniest males, the smallest genome – going for a record, Dinos?

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Dinophilidae lack appendages, parapodia and chaetae and instead move their six segment long, microscopic bodies by ciliary motion. Its three defined genera each show distinct life cycles. Members of *Trilobodrilus* and *Dinophilus* (sensu stricto) are monomorphic and the latter present a prolonged life cycle with an encystment stage, helping them to sustain, e.g. Arctic winters. This may explain our population genetic finding of a boreal distribution of *D. vorticoides*; such a distribution is paradoxically and exceptionally broad for a meiofaunal species. Species of *Dimorphilus* nov. gen. show extreme dimorphism with *D. gyrociliatus* having a 50 µm long dwarf male comprising around 360 cells, including 68 neurons. It also possesses one of the smallest and most compact genomes in Spiralia with reduced introns and repetitive elements, yet conserved architecture. This is a new reductive pathway, which may reflect the family's evolutionary miniaturization from a macrofaunal ancestor as supported by its derived position within Annelida.

Abstracts: Poster Presentations

Presentations are listed alphabetically by presenter last name.

1) **Molecular evidence for the existance of cryptic species within the polychaete worms known as 'Iwa-mushi' in Japan (Annelida: Eunicidae: *Marphysa*)**

Hirokazu Abe[1], Masaatsu Tanaka[2], Masanori Taru[3], Satoshi Abe[3], & Atsuko Nishigaki[3]
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A molecular study was conducted to clarify how genetically homogeneous the common Japanese species of *Marphysa* known as 'Iwa-mushi' is. 'Iwa-mushi' is well known as a useful fishing bait and was first described as *Marphysa iwamushi* Izuka, 1907, and later synonymized to *M. sanguinea* (Montagu, 1813). The nucleotide sequences of nuclear and mitochondrial genes were compared among specimens newly collected in Japan and DDBJ/ENA/GenBank data for congeneric species. Our results showed that the Japanese 'Iwa-mushi' could be divided into five undetermined species. It is unknown which of the five undetermined species corresponds to *M. iwamushi*. Our results also suggest the hypothesis that one of these species may be an alien species introduced to Japan via imported live fishing bait, and that another species have been introduced to France via oyster transplantation from Japan. We considered that there is currently no evidence to support the presence of *M. sanguinea* in Japan.

2) **A novel symbiotic relationship between ascidians and an undescribed tunic boring polychaete (Annelida: Spionidae: *Polydora*)**

Hirokazu Abe[1], Kazuyuki Yamada[2], Osamu Hoshino[3], Tetsuya Ogino[4], Shun Kawaida[5], & Waka Sato-Okoshi[6]
[1]*Iwate Medical University;* [2]*Freelance benthic worker;* [3]*Diving Service Chap;* [4]*Kyoto University;* [5]*Shimane University;* [6]*Tohoku University*

Polychaete-ascidian symbiotic relationships are rare and only known for a few syllid species. We report on a novel symbiotic relationship between ascidians and an undescribed *Polydora* species, which was found in the tunics of the sessile solitary ascidians on subtidal rocky shore of Izu-Oshima Island in Japan. Anatomical and Micro-CT examination of the ascidians showed that the *Polydora* individuals bore into the cellulosic ascidian tunics and construct U-shaped burrow in a similar way to many other *Polydora* species which show shell-boring lifestyle. Most individuals of the *Polydora* species open their tubes near siphons of ascidians. It was considered that they obtain food by kleptoparasitism against to ascidians filter-feeding activities. Furthermore, cellulase activities in the *Polydora* individuals were detected by both plate assay and zymography, suggesting the hypothesis that potential cellulose digestion abilities enable them to bore into the cellulose-rich ascidian tunics.

3) **Temporal functional changes in polychaetes from the northwestern coast of Baja California, Mexico**

A. Alvarez-Aguilar[1], L.V. Rodríguez-Villanueva[2], J.V. Macías-Zamora[1], N. Ramírez-Álvarez[1], & F.A. Hernández-Gúzman[1]
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We analyzed the functional changes of the soft bottom polychaete community at level of family in northwest coast of Baja California, Mexico, through the use of Biological Traits Analysis (BTA). A total of 229 benthic stations were collected along a regional-scale area covering 120 km off the coast in three sampling campaigns: 1998, 2003 and 2013. The samples were collected using a Van Veen grab (0.1 m^2) at depths ranging between 15-200 m. A total of 58,810 polychaetous representing 44 families were identified. A first approach showed that suspension and surface deposit feeders represented 55-65% of fauna in 1998 and 2003 and increasing to 85% in 2013, especially near waste water discharges. The third most important feeding mode most important was subsurface deposit with a contribution of 15% in 1998 and 2003 but only 5% in 2013. We concluded that the regional spatio-temporal changes in polychaete community patterns may be affected by local discharges of wastewater, regional oceanographic processes (El Niño events), and an extended drought.

4) **Spatial distribution of Cirratulidae and its relationship with environmental variables on the west coast of Tijuana-Ensenada, Baja California Mexico**

A. Alvarez-Aguilar[1], L.V. Rodríguez-Villanueva[2], J.V. Macías-Zamora[1], N. Ramírez-Álvarez[1], & F.A. Hernández-Gúzman[1]
[1]*Facultad de Ciencias Marinas, Instituto de Investigaciones Oceanológicas, Universidad Autónoma de Baja California;* [2]*Marine Biology Laboratory, Public Utilities Department City of San Diego Ocean Monitoring Program*

Industrial effluents, municipal wastewater discharges and agricultural runoffs may contain significant amounts of polluting substances that can degrade the environment and alter the structure of benthic communities in nearby or adjacent zones of influence. On the continental shelf of Tijuana-Ensenada, the specific composition, abundance and distribution patterns of the polychaete annelid community of the Family Cirratulidae were evaluated and analyzed to determine if there is evidence of

environmental impact generated by the nearby wastewater discharges to the study area. In October 2013 samples were collected using a Van Veen grab (0.1 m^2) in 75 stations at depths from 14.5 to 208 m. Environmental variables measured were: salinity, temperature, grain size (% <63µm), organic carbon, metal concentrations (Cd, Co, Cr, Cu, Ni, Mn, Ni, Zn, Fe), and organic compounds (polybromodiphenyl ethers: PBDES) in the sediment. We identified 1253 polychaete annelids of the family Cirratulidae represented by 5 genera and 22 species. The species that dominated the community structure with higher abundances were *Chaetozone hartmanae* 21.7% (266 orgs.), *Monticellina cryptica* 21.6% (265 orgs.) and *Monticellina siblin*a 20.2% (248 orgs.). A greater abundance of cirratulids was observed in the southern area of the study area, while the diversity of cirratulids in general was low in most of the study area (H'<2), however, it reached higher values (near a H'=3) mainly in areas distant from the discharges of the Binacional and Punta Bandera wastewater treatment plants, as well as the Estero del Río Tijuana. The multivariate analysis Bio-Env showed that the variables that best explained the observed biotic pattern were salinity, grain size, and Cu, Fe, Zn and ΣPBDEs.

5) **Ampharetidae (Annelida) from deep Nordic Seas**

Tom Alvestad, Nataliya Budaeva, Katrine Kongshavn, & Jon Anders Kongsrud
University Museum of Bergen

The present study is based on material from epibenthic and infaunal samples collected during scientific cruises in the period 1981–2018 to different parts of the Nordic Seas, and on material from environmental monitoring at the shelf break off western Norway. The investigated localities cover a depth range from 500 to 4000 m. Most of the samples were taken in the Norwegian Sea, and some are from the Iceland Sea and from the margin between the Norwegian Sea and the Greenland Sea. The material included about 10000 specimens of ampharetids from 150 stations. A total of 12 species have been identified. Two species of *Ampharete* and one species of *Anobothrus* are described as new to science. *Anobothrus laubieri* is redescribed. DNA barcodes are provided for most of the species.

6) **Biodiversity of polychaetous annelids in Bahía de Todos Santos, Baja California, México.**

Osmar Araujo-Leyva[1], Verónica Rodríguez-Villanueva[2], & Vinicio Macías Zamora[1]
[1]Instituto de Investigaciones Ocenológicas, Universidad Autónoma de Baja California; [2]Marine Biology Laboratory, City of San Diego Public Utilities

The aim of this study was to describe and analyze the structure, distribution, and temporal variation in the composition of benthic polychaeta and their relation to abiotic characteristics in marine sediments along the continental shelf of Bahia de Todos Santos, Baja California, Mexico. Benthic macrofauna and environmental variables were collected at 19 stations in September 1998 ("BIGHT 98"), 15 stations in December 2013 ("BIGHT 13") and 16 stations in September 2018 ("BIGHT 18"). These data were compared to assess the response of benthic polychaete assemblages to natural and human induced changes in sediment characteristics. All stations were sampled using a Van Veen grab (0.1 m^2) at depths between 15 to 206 m. Sites were selected using a "multiple density nested random-tessellation stratified design". This method is based on a random stratified design that considered 3 strata: depth, continental platform amplitude, and proximity to potential sources of anthropogenic impact. Environmental parameters measured were depth (m), sediment grain size <63 µm (%), organic carbon (%), and metals: Co (µg/g), Cr (µg/g), Cu (µg/g), Fe (µg/g), Mn (µg/g), Ni (µg/g), Pb (µg/g), and Zn (µg/g). A total of 12,244 polychaetous annelids were identified in 42 families. Numerically dominant families were Spionidae (1949 org./0.1 m^2), Chaetopteridae (1792 org./0.1 m^2), Maldanidae (651 org./0.1 m^2), Cirratulidae (577 org./0.1 m^2), Onuphidae (445 org./0.1 m^2), Ampharetidae (119 org./0.1 m^2). The best represented families in 1998 were Spionidae (310 org./0.1 m^2), Maldanidae (150 org./0.1 m^2), Ampharetidae (119 org./0.1 m^2) and Cirratulidae (110 org./0.1 m^2). In 2003 they were Spionidae (733 org./0.1 m^2), Maldanidae (501 org./0.1 m^2), Cirratulidae (467 org./0.1 m^2) and Onuphidae (7443 org./0.1 m^2) but in 2013 they were Chaetopteridae (1792 org./0.1 m^2) and Spionidae (906 org./0.1 m^2).

7) **Living in an alga: a preliminary comparison of organisms associated with shallow-water red algae from Antarctica and the Mediterranean**

Júlia Sardà-Avila[1], Rafael Sardà[2], & Conxita Avila[1]
[1]University of Barcelona; [2]CEAB-CSIC

Shallow-water marine benthic algal communities usually harbor extremely high densities of organisms that may play essential roles in nutrient and energy flow, as well as in the ecology of the algae. In Antarctica, these communities have been scarcely studied so far, and when they are analyzed, this is done for a few taxonomical groups separately, thus missing the overall perspective of the whole communities. Our study intends to describe the nearshore Antarctic Peninsular benthic community living in the red alga *Gymnogongrus turquetti,* and to compare the results to an ecologically similar alga, *Sphaerococcus coronopifolius* from the Mediterranean; both algae belong to the Class Florideophyceae, Order Gigartinales. Samples of these two species were investigated in order to establish an inventory and determine abundance, species richness, diversity, and size of the organisms.

8) **Living in a sponge: a preliminary study of the fauna associated with the Antarctic sponge *Kirkpatrickia variolosa***

Conxita Avila[1], Eduard Giralt[1], João Gil[2], Rafael Sardà[3], Carlos Angulo-Preckler[1]
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The particular features of Port Foster's caldera on Deception Island (Antarctica) are an interesting subject of study because of its soft and hard substrates and its peculiar volcanic features. Antarctic benthic communities here are still poorly known, particularly the communities of small-sized invertebrates living associated to other organisms, such as sponges. We studied here the fauna associated to the Antarctic sponge *Kirkpatrickia variolosa* inhabiting the rocky substrates of Fildes Point, Whaler's Bay at a shallow depth (5-15 m). This sponge is characterized by being massive and intensely red, with a size up to 30 cm in height. In order to do this, four samples of the sponge were obtained by SCUBA to separate and identify the organisms inhabiting them. A total of 15,222 specimens were found, most of them between 1 to 3 mm.

9) **Molecular study of *Chaetozone* (Annelida, Cirratulidae) reveals hidden diversity in common benthic polychaetes**

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The polychaetes of Cirratulidae are common in offshore benthic sediments and considered as an important group in environmental monitoring. Amongst them, the genus *Chaetozone* is the most species-diverse worldwide. Seven species of *Chaetozone* have been recorded in Norway, although these records should be considered cautiously as species delineation is challenging from morphology. In total 306 specimens from Norwegian and adjacent waters were DNA sequenced with the universal mitochondrial barcoding region COI, and D1-D2 regions of the nuclear 28S rDNA, and datasets investigated with phylogenetic and species delimitation analyses such as ABGD, mPTP and GMYC. These molecular analyses were used as a frame to re-examine the morphological diagnostic features of each of the species. Over 130 new COI barcodes are obtained, and a total of 16 species are recovered in the analyses. These include specimens of *Chaetozone setosa* from the type locality, and its distribution is confirmed to be limited to Arctic waters. This is a first molecular approach to study species delineation, evolutionary relationships and geographic structure of members of *Chaetozone*, a genus which taxonomy has proven to be difficult. It provides a tool for both molecular and morphological identification and demonstrates the underestimated diversity of *Chaetozone* in the Northeast Atlantic. This study may indicate what should be expected in terms of diversity of cirratulids in other geographic regions, and further emphasise the taxonomic challenges in this group.

10) **A new deep sea species of *Chloeia* (Annelida: Amphinomidae) from a pockmark field of southwestern Atlantic**

Rômulo Barroso[1], Jerry D. Kudenov[2], Victor Seixas[3], Orlemir Carrerette[4], Mauricio Shimabukuro[4], Paulo Sumida[4], & Paulo Paiva[3]
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Pockmarks are craters-like depressions in seabed commonly found along continental margins that are generally associated to episodic gas/fluid seepage. The main gas seepage is usually methane, which may stimulate and increase local benthic production through a bacteria-based food web. Recently, a wide pockmark field, associated to the salt-diapirism process was reported along the upper slope of the southeastern Brazilian margin. In this study we describe a new species of *Chloeia* (Amphinomidae) from this pockmark field around 750 m depth. Our new species is similar to *C. violacea* and *C. kudenovi* in that the longest neuropodial cirri occur on the second chaetiger. However, dorsal surfaces on each segment of the new *Chloeia* species host an anterior arc of pigment, in contrast to *C. kudenovi*, which totally lacks pigmentation, and *C. violacea*, in which pigmentation occurs only along the posterior region of each chaetiger. The well-developed prostomial eyes also distinguished the new species from the other ones. The new species shows an ontogenetic variation in the bifurcate neuropodial chaetae in that inner surfaces of the long prongs were dentate in juveniles, and completely smooth in adults; the difference may reflect the retention of larval features in the smaller worms. The genus *Chloeia* is generally more diverse and abundant in shallow waters, with 21 recognized species, and up to date, only 4 are reported to deep waters. The description of this new species increases our knowledge of the biodiversity in pockmark areas, and adds to the diversity of the *Choleia* in deep-sea environment.

11) **A new species of *Atherospio* (Polychaeta, Spionidae) from a deep-water continental slope site off Turkey in the eastern Mediterranean Sea**

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A new spionid polychaete belonging to the genus *Atherospio* Mackie & Duff, 1986 has been discovered in deep-sea sediments in the eastern Mediterranean Sea as part of an expedition by the Ocean Exploration Trust. Specimens were collected from

the E/V *Nautilus* in August 2012 off Turkey, at a depth of 2216 m on the Anaximander Seamount at the Amsterdam mud volcano site. Cores were taken from sediments covered with microbial mats. This new species is assigned to *Atherospio* because it has modified neurosetae in some anterior setigers and the branchiae transition from being simple, cirriform and free from the notopodia in anterior setigers to being broad, flattened and fused to the dorsal lamellae in middle and posterior setigers. The species is unusual in having: (1) a reduced, uniramous setiger 1; (2) well-developed pre- and postsetal lamellae that encompass the neurosetae and notosetae; (3) notopodial lamellae fused with the branchiae in middle and posterior segments; (4) unusual unidentate hooded hooks in both noto- and neuropodia; (5) modified spines in neuropodia of setigers 4–10 that have a prominent bristled aristate apex; (6) a pygidium that bears an elongate terminal cirrus and two long lateral cirri. The two previously described species are from shallow-water depths. The new species is the first *Atherospio* from the deep-sea and associated with a cold seep habitat.

12) ***Meiodorvillea* (Dorvilleidae) new to taxonomic and phyllogenetic perspectives**

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An important collection of Dorvilleidae is deposited at the Museum of Zoology, Instituto de Biologia, Universidade Estadual de Campinas (ZUEC-POL), with more than 5000 specimens collected in Southwest Atlantic Ocean. This collection has about 40 different morphotypes collected in beaches and depths of 12 up to 3300 meters, mainly coming from three large projects carried out in Brazil, Revizee (Evaluation of the living resources of the Exclusive Economic Zone), Habitats, and Ambes (Environmental characterization from continental shelf to deep regions). This family is poorly studied in Brazil and has only nine recorded species. *Meiodorvillea* is a little known worldwide genus, with only two species described, *M. minuta* (Hartman, 1965) and *M. apalpata* Jumars, 1974. A rigorous analysis of the specimens of this collection has revealed four new species and important new morphological states mainly about setae, body appendages and jaw apparatus. According to the literature, the phylogeny of Dorvilleidae is still uncertain showing that *Meiodorvillea* is morphologically related to *Marycarmenia, Protodorvillea, Dorvillea, Pettiboneia, Eliberidens, Gymondorvillea*, and *Schistomeringos.* This research aims to search for synapomorphies and reconstruct the ancestral state of the characters, based on the new morphological findings of *Meiodorvillea*, together with the support of the specific literature and the examination of type material of the genera mentioned above. Support: FAPESP 2018/13244-9; 2018/10313-0.

13) **Phylogeography of *Aglaophamus malmgreni* (Nephtyidae) in the Arctic and northeastern Atlantic**

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Aglaophamus malmgreni is a widely distributed annelid species in the Northern Hemisphere. A fragment of COI was sequenced in 98 specimens of *A. malmgreni* obtained from the Laptev Sea, the Kara Sea, the Barents Sea and the Norwegian Sea. Twelve more sequences were obtained from GenBank and BOLD including records from the Canadian Arctic. Four main groups with 3-6% p-distance were found in the analysis: two deep clades in the Norwegian (900-1600 m) and the Laptev (2000-3000 m) seas, one widely spread Arcto-Atlantic eurybathic (60-1200 m) clade, and a single divergent sequence from the deep Laptev Sea. Haplotype diversity in the Arctic-Atlantic clade was very high demonstrating a lack of clear separation among populations. The haplotypes were well dispersed across all study sites with no clear geographical of bathymetrical structure observed.

14) **Species delineation of *Sabellastarte* (Sabellidae: Polychaeta) around the Arabian Penensula using morphometrics and DNA barcoding**

Shannon D. Brown[1], Katherine Rowe[1], Laura Gajdzik[1], John A. Burt[2], Alyssa Marshell[3], Gustav Paulay[4], & Michael L. Berumen[1]
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Morphometrics is used to identify and delineate species. Such analyses have been used to describe the eight species of the *Sabellastarte* spp. (Sabellidae), which are conspicuous members of the benthos from tropical and temperate waters. However, certain morphological features can be similar among species and even change during development, growth, and regeneration. It was therefore suggested to add genetic information to further validate the different species of *Sabellastarte*. Studies utilizing both morphological and genetic techniques have been limited in the Arabian Peninsula. To date, these studies have led to the identification of one species in the Red Sea (*S. sanctijosephi*) and a second (*S. spectabilis*) in the Arabian Sea and Gulf. Our study aimed to fill this gap by simultaneously using two molecular markers (16s and CO1) and predetermined morphological characteristics (e.g., branchial crown appendages, abdominal features) to delineate the *Sabellastarte* spp. in the Arabian Peninsula. Our samples comprise around 100 specimens from the Saudi coastline of the Red Sea, the Gulf of Oman, and the Arabian Gulf. In addition to morphological and genetic data, we recorded environmental and

biological information to further inform about the ecology and distribution patterns of the *Sabellastarte* species. Our preliminary results suggest the presence of at least one morphospecies in the Red Sea and two morphospecies in the Gulf Oman that vary in the color and number of radioles as well as habitat substrate. These differences are potentially driven by the local and regional variation in environmental and oceanographic conditions.

15) **Natural radiole damage and regeneration of the feather duster worm *Schizobranchia insignis***

Shannon D. Brown[1, 2] & Richard B. Emlet[1]

[1]*Oregon Institute of Marine Biology;* [2]*King Abdullah University of Science and Technology*

The feather duster worm, *Schizobranchia insignis*, is an abundant marine invertebrate found in the subtidal and low intertidal of the northeastern Pacific Ocean. While previous research has examined the regeneration of the entire posterior and anterior region of the worm, limited information is available on the regeneration of radioles, the anterior appendages used for feeding and respiration. Radioles can be damaged by physical or biological means. We documented the occurrence of natural radiole damage in two populations of *S. insignis* and examined the process of radiole regeneration in the laboratory. In the sheltered boat basin population, 68% of the 22 worms sampled showed signs of natural damage. Whereas, all 21 of the *S. insignis* from the exposed site had branchial crown damage. During recovery, *S. insignis* did not consistently regenerate the same number of branches as observed prior to damage. In addition, a majority of the radiole elongation during recovery occurred after branching. While the full regeneration process was not observed, after 20 days, 4 of 12 worms had completed bifurcation, which was signified by pointed tips on the distal-most branches. As the only sabellid with branched radioles, our study of *S. insignis* provides a unique examination of natural damage and appendage regrowth.

16) **Contributions to the knowledge of littoral polychaete annelids from Tunisia**

Marwa Chaibi[1], Daniel Martin[2], & Atf Azzouna[1]

[1]*Université de Tunis El Manar;* [2]*Centred'Estudis Avançats de Blanes (CEAB-CSIC)*

Many polychaete inventories have been produced in the Mediterranean Sea, being probably the most complete and recent that included in Coll et al. (2010). In Tunisia, several studies dealt with polychaetes during the last century (McIntosh 1912; Fauvel 1924 a, b; Zibrowius1970, 1971; Bellan 1961; Westheide 1971, 1972; Cantone et al. 1978), which have been recently updated based on bibliography (Ayari et al., 2009) or on data from particular regions, such as the NE coast of the Tunis Gulf (Zaâbi & Afli 2005) or the Cap Bon Peninsula (Zaabi et al. 2012). Part of this faunistic information was obtained from ecological studies targeting the Tunisian marine ecosystems, thus providing additional species reports (Zaâbi & Afli 2005, 2006; Zaâbi et al. 2009, 2010; Ayari & Afli 2003, 2008; Trigui El-Menif et al. 2007). The present oral presentation reports on an update of the inventory of polychaete species from Tunisian coasts based on an historic review of the previously existing literature and on new materials collected from different types of representative habitats in the Gulf of Tunisia. Our taxonomic assessment of the polychaete fauna from the gulf has revealed the presence of 21 families, 36 genera and 80 species, of which 20 are new for the country. These include the flabelligerid *Trophoniella radesiensis*, recently described as a new species by Chaibi et al (2919). As a result, the total number of polychaete species known from the Tunisian coasts rises to 258.

17) **Cumulative impacts of hypoxia and trawling on Northeast Pacific benthos**

Alessia C. Ciraolo & Paul V.R. Snelgrove

Department of Ocean Sciences, Memorial University of Newfoundland

An expanding Oxygen Minimum Layer (OMZ) intersects with bottom trawling that has impacted the British Columbia (BC) continental slope between 600 and 2000 m since 1990s. Our preliminary results from different depths and O2 concentrations indicate low abundance and diversity dominated by sedentary and detritivorous polychaetes, but we aim to improve knowledge on individual and cumulative impacts of these activities on benthic diversity and functioning, which remain largely unknown. Specifically our study will examine the co-varying effects of depth and dissolved oxygen trends through short-term (<24 h) shipboard incubations of sediments collected by multicoring, and successive laboratory analyses to evaluate the separate and synergistic effects of impacts on: 1) how seabed macrofaunal and microbial diversity interact with O_2 gradients and historical trawling intensity; 2) how these effects influence recycling of organic matter and nutrient regeneration. Enhancing knowledge could help in developing strategies for monitoring and protecting diversity and ecosystem functioning of vulnerable environments.

18) ***Myxicola infundibulum* (Montagu, 1808) in the UK –More than one species?**

Teresa Darbyshire

Amgueddfa Cymru-National Museum Wales

Myxicola infundibulum (Montagu, 1808), the type species for the genus, was first described from the Kingsbridge estuary in the south of England. Since that time over 20 species have been described under the name *Myxicola* with three of those being recorded from the UK – *M. aesthetica* (Claparéde, 1870)*, M. infundibulum* and *M. sarsii* (Krøyer, 1856). In 1927, Fauvel

synonymised 6 species of *Myxicola* with *M. infundibulum*, including *M. sarsii,* and Hartman (1938, 1942, 1959) later synonymised a further 6 species, also with *M. infundibulum*. Only seven species of *Myxicola* are currently considered valid, and *M. infundibulum* is recorded from northwest and northeast Atlantic coasts, northeast Pacific coasts, the Arctic and Australia. In the UK, *M. aesthetica* is the only other valid species recorded for the genus and is distinctly different in both its size (much smaller) and its habitat (kelp holdfasts versus soft sediments). Two distinct forms of '*infundibulum'* appear to be present however, one with black tips to the radioles and one without (questionably *M. sarsii*). Differences in the appearance of the tube are also apparent from live observations by divers and the two forms rarely occur together leading to increasing questions on whether they are really the same species. A new project, in conjunction with British divers, will photograph and collect specimens of both forms and undertake morphological and molecular analyses to determine their status.

19) **Redescription of *Nereis (Neanthes) micromma* Harper, 1979 (Polychaeta: Nereididae) based on type material and additional material from Tampa Bay, Florida, USA, with a discussion of the ontogenetic changes in parapodial morphology and inclusion in the genus *Neanthes* Kinberg, 1865**

Jennifer S. Davenport[1], Christopher J. Glasby[2], & David J. Karlen[3]
[1]*Wood Environment & Infrastructure Solutions, Inc;* [2]*The Museum and Art Gallery of the Northern Territory;* [3]*Hillsborough County Environmental Protection Commission*

Several small specimens of what was initially thought to be an undescribed nereidid polychaete were observed in benthic samples collected from Tampa Bay, Florida, USA. They lacked notopodial falcigers, paragnaths and papillae on the proboscis, and upper notopodial ligules. However, slightly larger specimens possessed a small, developing upper notopodial ligule and a few paragnaths on the proboscis. Comparison with common nereidid polychaetes from this area yielded an identification of *Nereis (Neanthes) micromma* Harper, 1979. Morphological characteristics of the type material and Tampa Bay specimens were examined with standard light microscopy and SEM, and various measurements were taken. Statistical analyses were performed on the morphometric data in order to evaluate ontogenetic variation. Results from the analyses indicated previously unreported size-related variation in paragnath arrangement and parapodial morphology; therefore a redescription of *N. micromma* will be presented here. Additionally, *N. (Neanthes) micromma* was confirmed as a member of the genus *Neanthes* Kinberg, 1865 given the results of this study, and other species currently assigned to the subgenus *Neanthes* Kinberg (1866) were also evaluated for their membership in the genus.

20) **DNA barcoding of polychaetes collected during the 2018 Rapid Assessment Survey of Marine Species at New England floating docks.**

Andrew David & Michael Krick
Biology Department, Clarkson University

In this study we incorporated DNA barcoding into a recent Rapid Assessment Survey of polychaete fauna associated with floating dock communities from the New England coast. Three primer pairs were used to amplify a 550-710 bp fragment of the cytochrome c oxidase I (COI) gene for 38 specimens collected from eight sites along the New England coastline. Barcoding results yielded 11 Operational Taxonomic Units represented by six families and each morphologically identified species was molecularly confirmed using the GenBank and BoLD database (id scores: 92-100%). Phylogenetic analyses along with low intraspecific genetic distance estimates (0.000-0.019) strongly supported the similarity indices. All species except *Harmothoe imbricata* were recorded in previous surveys where only morphological data was used. This is the first DNA barcoding study of polychaetes from the New England coast and it reinforces the utility of molecular data for quick and accurate identifications of marine invertebrates.

21) **The structure characterization of biocement proteins from *Phragmatopoma lapidosa***

Maria A. Dean, Kris Curtis, & Jake Van Oort
Coe College

Phragmatopoma lapidosa is a gregarious, marine annelid living in large reef structures along the intertidal, Atlantic coast regions, from Virginia to the Florida Keys. The worm produces a proteinaceous biocement to which it attaches sand grains in order to form a tube shaped home. This project used amino acid sequences obtained from cement proteins to examine how the biocement may be structured. A combination of bench chemical analyses of amino acid modifications that occur naturally in the biocement proteins was used with computer generated structures to predict a model that covers the biocement protein interactions. Both secondary and tertiary protein structures were predicted using two freeware programs, PredictProtein and PHYRE2, in order to propose possible protein folding and protein-protein interactions.

22) **Syllids from Brazil – a Lilliputian perspective**

Marcelo V. Fukuda[1], Maikon di Domenico[2], & Rômulo Barroso[3]

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Of all the nearly 172 species of the Syllidae Grube, 1850 registered in Brazil so far, only 5 can be considered as meiofaunal: *Brania arminii* (Langerhans, 1879), *Erinaceusyllis centroamericana* (Hartmann-Schröder, 1959), *E. subterranea* (Hartmann-Schröder, 1960), *Neopetitia amphophthalma* (Siewing, 1956) and *Salvatoria neapolitana* (Goodrich, 1930). To enhance the knowledge on this vast Lilliputian world, we recently started a project aiming specifically to get a better picture of these representatives of the interstitial fauna. With only a couple collections so far, and in localities relatively well-studied regarding the invertebrate macrofauna, we have already found 10 morpho-species of syllids: *Erinaceusyllis* sp., *Exogone* sp., *N. amphophthalma*, *Parapionosyllis* sp., *Salvatoria* sp. 1-2 and *Syllis* sp. 1-4. Identifications to species level were not yet initiated, and will be coupled with molecular characterization of the taxa at least for 3 markers (nuclear 18S and mitochondrial 16S and COI). In any case, the incipient results so far achieved indicate the potential increase in the number of species recognized from the meiofauna; as we proceed with the identifications of the species found, it will be possible to discriminate whether they are indeed restricted to these interstitial environments or only juvenile stages of more ubiquous species. Financial support: Brazilian National Research Council (CNPq), proc. 425143/2016-3.

23) **Exogoninae (Annelida; Syllidae) from Southwestern Atlantic oceanic islands: Four new species and new records**

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Up to now, 172 species of Syllidae have been recorded in Brazilian waters, mostly from coastal regions and some from the continental slope and the deep sea. However, only 7 species are known from Brazilian oceanic islands (Rocas Atoll, Fernando de Noronha and Trindade Islands), at least 545 km away of the coast but still part of the exclusive economic zone of the country. We directed some efforts to investigate the richness of Syllidae in these islands. As results we present herein four new species of Exogoninae: *Exogone* sp. nov., *Salvatoria* sp. nov. 1, *Salvatoria* sp. nov. 2 and *Sphaerosyllis* sp. nov. Also, we provide the first account of *E. africana*, *E. breviantennata*, *E. naidinoides*, *E. simplex* and *Salvatoria* sp. in SW Atlantic oceanic islands. These records more than double the number of species known for these islands. *Exogone africana*, *E. breviantennata*, *E. naidinoides* and *E. simplex* have been previously recorded from the Atlantic, Pacific, and Indian Oceans associated with a range of substrates, at a range of depths. With identifications based solely in the morphology, to assume that these species indeed have such broad distribution may hamper conservation efforts and lower our ability to recognize introduced and invasive species, by an underestimation of biodiversity. The use of museum collections and associate DNA sequences to vouchers, and also the continued survey on the species diversities, especially of areas for which no information is available, may minimize these problems.

24) **Levels of infestation by an undescribed polychaete (*Polydora*: Spionidae) in populations of the clam *Nodipecten subnodosus* in Ojo de Liebre Lagoon, Baja California Sur, Mexico**

Laura González-Ortiz[1], Pablo Hernández-Alcántara[2], & Verónica Rodríguez-Villanueva[3]

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The level of infestation intensity, and the preference of the spionid *Polydora* sp. nov. for either superior or inferior valves in the host clam *Nodipecten subnodosus* (common name lion's paw scallop) were analyzed for populations in Ojo de Liebre lagoon, Mexican Pacific. A total of 639 shells from the clam banks Chocolatero, Zacatoso, El Dátil and La Concha were collected during seven sampling periods carried out between May 2014 and October 2015. In the clam banks Chocolatero and Zacatoso the clams with sizes less than 51 cm^2 were the most abundant, while in La Concha and El Datil the sizes between 51-89 cm^2 dominated. The number of clams infected by *Polydora* sp. nov. were clearly higher in Chocolatero (88 clams, 60%) and Zacatoso (86 clams, 51%) than in La Concha (35 clams, 21%) and El Datil (29 clams, 19%). In Chocolatero and Zacatoso 61% and 51% of the upper valves and 15% and 14% of the lower valves presented blisters, while in La Concha and El Datil the infestation was significantly lower 21% and 19% of the upper valves and 6% and 8% of the lower valves presented blisters. On average, the percentage of clams infested by *Polydora* sp. nov. was clearly higher in the clam banks Chocolatero (62.06%) and Zacatoso (50.55%) than in La Concha (21.98%) and El Datil (5.97%).

25) **First report of the non-native freshwater nereidid polychaete *Namalycastis hawaiiensis* (Johnson, 1903) in a freshwater spring in Israel, and possible route of introduction**

Liron Goren[1, 2] & Yaron Hershkowitz[2]

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The subfamily Namanereidinae (Annelida: Nereididae), is one of the most successful polychaete groups to colonize brackish and freshwater environments worldwide. Among them, *Namalycastis hawaiiensis* (Johnson, 1903), is one of the few namanereids that is recognized as invasive. It was first described from a freshwater spring in Hawaii and has a tropical Indo-Pacific distribution ranging from Hawaii in the east to Sumatra in the west. Recently it has spread to mainland Japan via the aquarium trade and was intercepted in Australia. Here we report its first record in a freshwater spring in Israel, the Middle East, and discuss its possible route of introduction. We hypothesize that the species was unintentionally introduced via the aquarium trade, as additional specimens were collected and identified from an aquarium of cichlid fish found in a pet store. We corroborate previous studies and hypotheses that a cryptic invasion of this species has already expanded worldwide.

26) **Diversity of sponge-associated polychaetes across the Mediterranean Sea**

Liron Goren[1,2] & Micha Ilan[1]

[1]*School of Zoology, Tel Aviv University;* [2]*Steinhardt Museum of Natural History, Tel Aviv University*

Sponge-associated infauna have been investigated around the world and in the Mediterranean. Although polychaetes usually dominate these assemblages, they have been considered to be a collection of facultative species representing the fauna of the surrounding habitats. In this study we analyzed data from the literature along with new information collected in Israel, regarding sponge-inhabiting polychaete communities across the Mediterranean Sea, in order to evaluate how stable these communities are on a large biogeographical scale. We compiled lists of all benthic and sponge-associated polychaete fauna for the Mediterranean, its regions and subareas, and used cluster analysis, ordinations and taxonomic diversity indices (average taxonomic distinctness AvTD and variation in taxonomic distinctness VarTD) to examine these communities. 1,110 species of benthic polychaetes had been reported from the Mediterranean, of them 195 were reported from sponges. Community composition and trophic structure of sponge-inhabiting polychaetes is maintained across the Mediterranean, with the majority of species belonging to the family Syllidae, followed by Sabellidae and Nereididae. Together they accounted for 40%-60% of the species found inside sponges. Most of the species are carnivorous (45-75%) followed by deposit feeders (20-25%), omnivores (9-25%) and filter feeders, who comprise 9-15% of the species. Low AvTD and High VarTD suggests that sponge-inhabiting species are more related to each other, and community is thus governed by environmental conditions (habitat) rather than biotic interactions (competition etc.). This study suggests that sponge-inhabiting polychaetes are not just transient assembly of facultative species, rather it is a specialized and stable ecological community.

27) **Investigating the arrival of an alien *Leonnates* (Annelida: Nereididae) in New Zealand**

Fiona Gower[1], Geoffrey B Read[2], Barry Greenfield[2], & Joseph Marlow[1]

[1]*Cawthron Institute*; [2]*NIWA*

We report on the progressive establishment of a new alien nereidid worm in New Zealand. The distinctively papillated *Leonnates* genus (11 species) was recorded for the first time in New Zealand seas in June 2017. A single specimen, provisionally considered the Australian species *L. stephensoni* Rullier, was detected in Auckland Harbour. This individual was found among a well-studied worm fauna at an intertidal site that has been monitored for nearly 20 years. Since that first find the species has been detected elsewhere at some near-shore sites, both nearby and as far as 60 km away in the Hauraki Gulf. We also present molecular data by which we hope to compare the new arrival to its congeners known from warmer waters.

28) **Small morphological differences help to discern cryptic species of southern California orbiniids**

Brent Haggin

Los Angeles County Sanitation Districts

Ecological monitoring programs rely on diversity estimates to make decisions on the health of the local environment, but due to difficulties in species differentiation, cryptic species can artificially lower the diversity estimate by "lumping" multiple species into one. While minor morphological differences may be attributed to phenotypic variability in global populations, these differences may be the key to differentiating between cryptic species of similar organisms from local populations and previously described cosmopolitan species. Polychaetes of the family Orbiniidae have been routinely collected off of the Palos Verdes Peninsula, California and archived over the past 40 plus years. Three species complexes (*Scoloplos acmeceps*, a local species described from southern California and reported from Alaska to Mexico; *Leitoscoloplos pugettensis*, a regional species described from the Puget Sound, Washington and reported from Alaska to Costa Rica and Chile; and *Scoloplos armiger*, a cosmopolitan species described from the North Sea and reported globally) were examined using light microscopy to identify minor morphological differences, such as pigment patterns and chaetal arrangement. These differences allowed

each species complex to be separated into two or more provisional species. The proper identification and differentiation of local species will allow for a more robust evaluation of diversity within the benthic ecosystem and a more informed choice in future environmental management decisions. Future collections will focus on preservation in ethanol and the use of DNA to confirm that these differences represent new species and not just phenotypic variation within the population.

29) **Role of spatial and temporal heterogeneity in moderating temperate shelf sea carbon and macronutrient stocks**

Rachel Hale[1, 2], Karen Tait[3], Jasmin A. Godbold[2, 4], & Martin Solan[2]

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Continental shelf seas are dynamic and productive habitats. As such they play a disproportionate role in global carbon, macro- and micro-nutrient cycling. The heterogeneity of these environments across multiple scales is key in supporting diverse faunal communities and moderating benthic biogeochemical cycling. However, there is still uncertainty in how variability affects these processes and under what circumstances shelf sediments act as sources or sinks of carbon and nutrients. We show that heterogeneity is a key structuring force of shelf wide patterns in sediment biogeochemical cycling mediated through habitat modification by a diverse infaunal community. Faunal activity differs seasonally across habitat types, with consequent changes in sediment-water nutrient transport. Small-scale variations in sediment biogeochemical gradients reveal the importance of specific taxa for creation of microbial hotspots with increased abundance and activity of N-cycling microbes. Our results demonstrate the extent to which invertebrate community structure is both influenced by and creates benthic habitat heterogeneity, mediating biogeochemical cycling in shelf seas at both large and small scales. These observations highlight the dynamic nature of the biodiversity–habitat structure complex and begin to establish generalities of how abiotic and biotic interactions, including feedbacks and linkages, influence macronutrient and carbon exchange in shelf sea ecosystems.

30) **Shedding light on annelid bioluminescence**

Mary Colleen Hannon[1], Anderson Garbuglio de Oliveira[2], & Anja Schulze[1]

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There are 13 known bioluminescent families in the phylum Annelida, including polychaetes and clitellates. Light emission through bioluminescence appears multiple times within the clade and is likely a convergent trait. Polychaete light production has been recorded as a defense mechanism, injury response, mating cue, or general response to experimental chemical or mechanical perturbation. In all instances, bioluminescence is produced through a chemical reaction involving the release of chemical energy in the form of light, following the oxidation of a substrate (small organic molecule generically called luciferin) catalyzed by an enzyme (luciferase). Luciferins are highly conserved whilst their associated luciferases can be more varied genetically, leading to a diverse range of colors for bioluminescent reactions. Until recently, few studies have taken on the task of identifying new luminescent enzymes and characterizing the specific genes involved. Additionally, new techniques in isolating luciferases have provided insight into the biochemistry of these reactions. Research combining these new techniques and publicly available genetic data will shed light on the physical and phylogenetic properties of annelid bioluminescence.

31) **Adaptative convergencies led to similar morphologies in planktonic annelid stages**

Maria Teresa Aguado Molina[1], Guillermo Ponz[2], & Conrad Helm[1]

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The name *plankton* is derived from the Greek πλαγκτός "*planktos*", which means errant and it is used to refer to the diverse groups of organisms that live in the open water column. Within the Annelida, some of these organisms are polychaetes that spend their entire life cycles in the water column (i.e. *Tomopteris*), others are present only for short periods during certain reproductive stages (e.g. epitokes in nereidids and syllids). Across the different annelid families, these taxa usually share comparable structures, such as long parapodia and parapodial appendages for swimming, as well as remarkable anterior sensory structures, such as prominent eyes or chemosensory organs. Herein we also compare the inner morphology of these adaptational convergencies to this particular environment. Using immunohistochemistry and subsequent clsm, we compare *Tomopteris* sp. and the epitokes of *Platynereis dumerilii* and *Ramisyllis multicaudata*. Based on our investigations, all three annelid groups show many similarities concerning their internal morphology when comparing planktonic stages. Furthermore, the presence of these features in stolons of *Ramisyllis* suggests planktonic dispersal of the latter and thus uncovers the reproductive strategy of this scarcely investigated taxon.

32) **Co-occuring two undescribed species of the genus *Stygpcapitella* (Parergodrilidae)**

Natsumi Hookabe[1], Naoto Jimi[2], Shinta Fujimoto[3], & Hiroshi Kajihara[1]

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Annelids in the genus *Stygocapitella* Knöller, 1934 inhabit sandy beaches around or above high-water line. We report two undescribed species, *Stygocapitella* sp. 1 and *Stygocapitella* sp. 2, from Japan. *Stygocapitella* sp. 1 is characterized by four bilimbate and two forked chaetae in chaetiger 2. *Stygocapitella* sp. 2 is morphologically most similar to *S. australis* Struck, Koczula, Stateczny, Meyer & Purschke, 2017, but can be discriminated from the latter by having a slightly forked pygidium. We reconstructed the phylogeny of *Stygocapitella* by maximum likelihood and Bayesian inference analyses using partial sequences of the mitochondrial COI and nuclear 18S rRNA genes. The genetic distances between the most closely related two species, *Stygocapitella* sp. 1 and *S. subterranea* Knöllner, 1934, for COI were 20.4–20.7% (p-distance) and 24.1–24.5% (Kimura two-parameter distance), comparable with interspecific distances in other interstitial polychaete genera. Our molecular analyses did not suggest a sister-group relationship between *Stygocapitella* sp. 1 and *Stygocapitella* sp. 2, in spite of their simultaneous occurrence at the same vertical level in a single locality. Simultaneous occurrence of congeners inhabiting the sandy beach is known in other interstitial annelids (e.g., *Diurodrilus*). In the case of *Diurodrilus*, however, the abundance of each species depends on the vertical level; there is no record of two or more *Diurodrilus* species inhabiting the same horizontal level at the same time. We provide possible explanation for the simultaneous occurrence of non-sister *Stygocapitella* sp. 1 and *Stygocapitella* sp. 2 in terms of vicariance and dispersal events.

33) **Spicules in an undescribed species of *Thoracophelia* (Opheliidae)**

Naoto Jimi[1], Shinta Fujimoto[2], & Satoshi Imura[1]

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Spicules have been known from among several groups of animals and studied in terms of their function and evolution. So far, however, only three (*Echinofabricia alata*, *E. dubia*, *E. goodhartzorum*; Fabriciidae) of the 12,000 polychaete species are known to have spicules. Recently, we found spicules in an undescribed *Thoracophelia* species (Opheliidae). This species' spicules are stick-shaped (about length:width=30:1), about 15 μm long, and distributed in the coelom cavity of the worm. Our finding of spicules in Opheliidae indicates that polychaetes' spicules have multiple origins. Additionally, the undescribed species can be discriminated from other congeners by following features: *i*) having very small body (body length = around 1 mm); *ii*) having simple branchiae (no branching, smooth); *iii*) having spicules inside the body; *iv*) body formula 5 anterior abranchiate chaetigers + 20 branchiate chaetigers + 0 posterior abranchiate chaetigers = 25 chaetigers.

34) **An undescribed species of interstitial acrocirrid *Macrochaeta* (Acrocirridae)**

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We report an undescribed species of *Macrochaeta* from the Okinawa Island, Ryukyu Islands, Japan. Individuals of the undescribed species were collected from subtidal coarse sand at several sites ranging from 1–41 m below sea level. The undescribed species can be discriminated from its congeners by the following features: *i*) having only two pairs branchiae, *ii*) having one or two neurochaetae per fascicle, *iii*) having dorsally and ventrally fused achaetigers.

35) **Historical phylogeography and cryptic evolution of three (pseudo)cryptic nereidid polychaetes from South Africa**

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South African *Platynereis* B sp. nov. and *Platynereis massiliensis s.l.* are members of the true cryptic *P. dumerilii* species-complex as demonstrated by their identical morphologies and genetic distinctness. By contrast, *Pseudonereis podocirra* is part of the *Pseudonereis variegata* (pseudo)cryptic complex as they are morphologically similar but genetically distinct species. The three South African species have overlapping distributions but display contrasting population genetic structure patterns; differences observed for the two *Platynereis* species could be explained by larval development and biogeography, whereas the panmictic population observed for *P. podocirra* was hypothesised to have resulted from historical processes. This study aimed to investigate the historical process contributing to the contrasting patterns of structure and to investigate the processes that govern cryptic and (pseudo)cryptic diversity. An mtCOI dated chronogram revealed that climatic conditions during the middle-late Pleistocene influenced the population structure of the three species. Additionally, age also contributed to the contrasting patterns of structure evidenced by high gene flow across genetic barriers along the coast in the older *P. podocirra* indicating resilience, whilst the younger *Platynereis* species displayed structured lineages that were

limited by these genetic barriers. The two South African *Platynereis* species are hypothesised to have evolved sympatrically due to reproductive isolation and differences in temperature preferences and their identical morphologies suggest that these species are undergoing morphological stasis despite their ancient divergence times whereas *P. podocirra* and *P. variegata* speciated allopatrically and are undergoing morphological stasis or convergence.

36) **Phylogeography of Japanese arenicolids**

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Arenicolidae includes ca. 30 described species in four genera. Although some arenicolids are morphologically similar to each other and difficult to identify, taxonomic confirmation based on molecular data is scarce. At least four species of arenicolids, i.e., *Abarenicola claparedi oceanica*, *Abarenicola pacifica*, *Arenicola brasiliensis*, and *Branchiomaldane simplex*, have been recognized in Japan. In this study, the first phylogeographical patterns of Japanese arenicolids were revealed based on nucleotide sequences of two mitochondrial genes (COI and 16S) and a nuclear gene (ITS2). In addition to two lineages including already reported two species (*Abarenicola claparedi oceanica* and *Abarenicola pacifica*), three lineages of unidentified species (*Abarenicola* sp., *Arenicola* cf. *cristata*, and *Arenicola* sp.) were recognized by molecular phylogenetic analyses. We are examining the morphology of each lineage and intraspecific genetic differences among local populations.

37) **Redescripton of three lesser known genera and species of Archinominae Kudenov, 1991 (Annelida: Amphinomidae)**

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Several genera of Archinominae Kudenov, 1991 (Annelida: Amphinomidae) remain poorly known, particularly their caruncles, since they were originally described over a century ago, including *Bathychloeia* Horst, 1910, *Chloenopsis* Fauchald, 1977, *Parachloeia* Horst, 1911 and *Sangiria* Horst, 1912. The first taxon, *Bathychloeia*, is presently the subject of a separate study that will be reported elsewhere. Each of the latter three genera are monotypic and are redescribed based solely on type materials. While *Chloenopsis* has pinnate branchiae and harpoon notochaetae, its moderately developed caruncle lacks a condensed median keel typically observed in *Chloeia* and *Notopygos*. Rather, the ciliated nuchal ridges on the extreme margins of its medial and lateral caruncular lobes form conspicuous subvertical and horizontal ramparts, respectively, extending the caruncle's length. Its relationship to *Bathychloeia*, highlighted by previous authors, is one focus of this study. *Parachloeia* appears to be based on a sexually immature specimen that is essentially identical anatomically to *Notopygos* Grube, 1855, the latter of which we tentatively propose is the senior synonym of *Parachloeia*. Finally, *Sangiria* displays unusual tufts of pinnate branchiae, lacks harpoon notochaetae, and its caruncle also lacks a medial keel. However, its marginal, ciliated nuchal ridges on form only a few shallowly scalloped folds, and its low-lying medial lobe is transversely creased, smooth and appears glandular. We contend that the caruncles these archinomins presented anatomical features that fell outside accepted constructs of the Amphinomidae which, at the time, challenged and perplexed both Horst and McIntosh.

38) **A new species of the *Spirobranchus kraussii* complex (Annelida, Serpulidae) from the Persian Gulf and Gulf of Oman**

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A recent study (Simon *et al.* 2019) confirmed that *Spirobranchus kraussii* is not a widely distributed tropical species of Indo-Pacific origin and a Lessepsian migrant to the Mediterranean, but a large complex of species, some of which might be indeed invasive. Thus, a common intertidal gregarious serpulid, previously attributed to *S. kraussii* in Persian Gulf and Gulf of Oman, was described as *S. persicus* sp. nov., using a combination of morphological data with nuclear *18S* and mitochondrial *CytB* sequence data. The new species differs from *S. kraussii* by smaller size, fewer abdominal chaetigers and shape of talon. Bayesian and maximum likelihood phylogenetic analyses based on a combined dataset of nucleotide *18S* and amino-acid *CytB* sequences supported monophyly of *S. kraussii* clade (currently including *S. kraussii*, *S. persicus* n. sp., three unnamed species, and *S. cariniferus*). A preliminary hypothesis of phylogenetic relationships in the *S. kraussii* complex revealed that the new species forms a well-supported clade with unnamed species from Australia, Hawaii and Africa, and all those form a clade with a species from Japan, while *S. cariniferus* is a basal grade to the rest. Evidence of substitution saturation at a 300 bp fragment of nucleotide *CytB* suggests that using translated amino acid sequences of *CytB* to exclude non-informative substitutions should provide a better phylogenetic resolution for the genus *Spirobranchus*. Further studies are needed to determine the taxonomic and invasive status of *S.* cf. *kraussii* populations from the Mediterranean Sea, Suez Bay, Pakistan, India, Sri Lanka, Philippines, Singapore, and Panama.

39) **Host-specificity in corals-associated Christmas tree worms of the genus *Spirobranchus* Blainville, 1818 (Serpulidae, Annelida).**

Elena Kupriyanova[1], Maria J. Schreider[2], Johathan Kool[2], Richard Yu[2], & William Leggat[2]
[1]*Australian Museum Research Institute, Australian Museum;* [2]*School of Environmental and Life Sciences, University of Newcastle*

Christmas tree worms are serpulids of the genus *Spirobranchus* living in association with and characterised by brightly coloured spiralling radioles expanding above coral surface. The exact nature of the relationships between the worms and their coral hosts is unclear and is important for understanding the functioning of the coral reef system. To determine whether there were consistent genetic differences among *Spirobranchus* found on different species of coral, we sequenced fragments of mitochondrial cytochrome oxidase *b* (Cyt-*b*) and nuclear internal transcribed spacer (ITS) genes of *Spirobranchus* specimens opportunistically collected from coral reefs of Rowley Shoals, Kimberley, Western Australia. Our results suggest a lack of host-specificity between worms and corals, although this applies so far to a restricted geographical area. We have also used our data in combination with existing DNA sequence data *S. corniculatus* to further investigate species delimitations of Christmas tree worms in the Indo-Pacific region.

40) **Functional redundancy in polychaete assemblages from a tropical Large Marine Ecosystem (LME)**

Paulo da Cunha Lana & Barbara Carolina Garcia Gimenez
Benthos Lab, Center for Marine Studies, Federal University of Paraná

Functional redundancy assumes a critical relevance nowadays due to the serious threats that affect marine life worldwide. We assessed and compared levels of functional redundancy in polychaete assemblages from the continental shelf and from estuarine environments along the South Brazil Shelf Large Marine Ecosystem (SBSLME). To quantify functional redundancy, we used functional originality (FOri) and functional uniqueness (FUni). We found 61 and 48 polychaete taxa distributed in 50 and 42 functional entities (i.e., a unique combination of trait values) in continental shelf and estuarine environments, respectively. Results suggest a low level of functional redundancy in both environments. However, FOri was higher in the estuarine environment, while FUni was higher in the continental shelf. As expected, estuarine polychaetes have fewer unique combinations of trait values, but these combinations are more original and adequate to the varying conditions imposed by estuarine environmental drivers.

41) **Revision of Thelepodidae and Telothelepodidae (Polychaeta) from French waters**

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[1]*CNRS, University of Bordeaux*; [2]*Australian Museum*; [3]*Universidad de Antioquia*

In spite of centuries of European marine biodiversity studies, it is clear that new species are still being described. Maybe this is because of the lack of systematic sampling, as well as increasing recognition of species complexes and the myth of the so called “cosmopolitan” species. This research is the second part of the “Spaghetti Project” aiming to revise French species of spaghetti worms (Polycirridae, Terebellidae, Thelepodidae, Trichobranchidae and Telothelepodidae). This collaborative project involves all benthic taxonomists from French marine stations (RESOMAR network) and international collaborators, and is based on both newly collected specimens and available material from different French collections. Telothelepodidae Nogueira, Fitzhugh, Hutchings 2013 is a newly recognized family previously considered as belonging to the subfamily Thelepodinae Hessle, 1917, which is also now considered as the family Thelepodidae. Species of these two families are present in French waters, belonging to three genera: *Thelepus* Leuckart, 1849, *Parathelepus* Caullery, 1915 and *Streblosoma* Sars, 1872.

42) **First records and northernmost distribution of two spionid species (NE Atlantic, Bay of Biscay)**

Nicolas Lavesque[1], Jérôme Jourde[2], Suzie Humbert[1], Bastien Lamarque[1], Pierre-Guy Sauriau[2], & Karin Meißner[3]
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This study presents first records of *Spiophanes afer* Meißner, 2005 and *Prionospio cristaventralis* Delgado-Blas, Díaz-Díaz & Viéitez, 2018 from French waters. These two species were collected recently in the southern part of the Bay of Biscay. *Spiophanes afer* is characterized by the presence of an occipital antenna, dorsal ciliated organs extending to chaetigers 13–15, neuropodial hooks from chaetiger 15, ventrolateral intersegmental pouches from chaetigers 14–15, the presence of chaetal spreaders of “2+3 type”, and conspicuous dark brown pigment on parapodia of chaetigers 9–13. *Prionospio cristaventralis* is characterized by first and fourth pair of branchiae being pinnate and pairs 2–3 apinnate, ventral crests present from chaetigers 11–12, high dorsal crests on chaetigers 10–11 and very large notopodial prechaetal lamellae on anterior chaetigers. For both species these new records represent a northern extension of their known distributional range.

43) **A new *Poecilochaetus* (Annelida: Poecilochaetidae) from Rodrigues, southwest Indian Ocean, a redescription of *P. serpens honiarae* Gibbs, 1971, and a phylogeny of the family**

Andrew S.Y. Mackie[1] & Cinthya S.G. Santos[2]
[1]*Amgueddfa Cymru, National Museum Wales;* [2]*Universidade Federal Fluminense*

A new species of *Poecilochaetus* from Rodrigues is described and compared with *P. serpens* Allen, 1904 from England, UK. *Poecilochaetus serpens honiarae* Gibbs, 1971 from the Solomon Islands, southwest Pacific Ocean, is re-examined and its status changed to *P. honiarae*. A new phylogenetic analysis of Poecilochaetidae is presented and species relationships within the Poecilochaetidae discussed.

44) **Using Autonomous Reef Monitoring Structures (ARMS) and DNA barcoding to assess polychaete diversity on Pacific coral reefs**

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Using Autonomous Reef Monitoring Structures (ARMS), standardized reef cryptofauna collection devices, we assessed and compared the diversity of polychaetes from deployed units recovered from 15 meters depth after a 3-year period at locations along the 1500-mile long Hawaiian Archipelago: Hawaii, Maui, Kaua'i, French Frigate Shoals, Lisianski Island, Pearl and Hermes Atoll, and Kure Atoll. Up to five sites were sampled for each location, with two or three ARMS units recovered from each site. Preliminary analyses of barcodes for polychaetes (>2 mm) across all locations indicate low diversity for several families, including Terebellidae (60 specimens, 8 OTUs), Eunicidae (100 specimens, 4 OTUs), Polynoidae (22 specimens, 2 OTUs), and Amphinomidae (24 specimens, 4 OTUs); very few of the OTUs match species records in BOLD or GenBank. We are continuing to assess whether these patterns hold across other polychaete groups. (Supported in part by NSF1036537.)

45) **Revision of the "*Marphysa sanguinea*" species complex (Annelida: Eunicidae)**

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Marphysa sanguinea was described from Devonshire (U.K.) by Montagu in 1813. Due to the brief information on morphology included in the original description, the species has been commonly confused with native species triggering records of *M. sanguinea* from many localities around the world. In addition, 10 nominal species morphologically similar to *M. sanguinea* were improperly synonymized since the available type materials were not revised. The redescription and the designation of a neotype of *M. sanguinea* proposed recently have aided to compare several worldwide records, and allowed to describe 13 new species. However, only a few of the nominal species in synonymy have been addressed in detail, and reinstated after an accurate morphological revision. The aim of this study is to clarify the current taxonomic status of all the species using the recently proposed novel morphological methods, and to reassess the worldwide distribution of *M. sanguinea*. Herein, the type and additional materials from the remaining species previously considered junior synonyms of *M. sanguinea* are studied in detail; likewise, the types of some of the valid species, and other specimens recorded in literature as *M. sanguinea* from several regions are also revised. Six species are reinstated, two of them raised to species level, by having several features different to *M. sanguinea*, as the forms of dorsal cirri and postchaetal lobes, the subacicular hook coloration, the distribution of branchiae and the number of branchial filaments, and the types of pectinate chaetae. Further, two species are synonymized, and two new species from Hawaii and Croatia are proposed.

46) **Morphological studies of some closely related genera of *Marphysa* De Quatrefages, 1865 (Annelida: Eunicidae)**

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Marphysa is represented by more than 90 species which are divided into several informal groupings with a broad variety of shapes: A, B1-D1 ("Bellii" group), B2 ("Sanguinea" group), C2 ("Aenea" group), "Mortenseni" group, and "Teretiuscula" group. This diversity of forms and groups have disclosed *Marphysa* as a heterogeneous, poorly delimited genus. The most recent phylogenic reconstruction of eunicids suggested *Marphysa* monophyletic; nevertheless, the new recently proposed genus, *Treadwellphysa* Molina-Acevedo and Carrera-Parra, 2017, which encloses species previously regarded in a couple of *Marphysa* groupings, questions its monophyly. The aim of this study is to evaluate whether they would be considered different from *Marphysa* genus. Herein, the type and additional materials of 42 species belonging to three artificial groups of *Marphysa* are studied. After a detailed morphological revision, the groups B-D1, the group C2, and the "Mortenseni" group are considered as belonging to independent genera by the architecture of the maxillary apparatus, the branchial distribution, and the form of the prostomium and ventral cirri with swollen base. Therefore, two new genera are proposed and one is reinstated. *Paucibranchia* contains 20 valid species: 13 previously classified in the groups B1-D1, and 7 new species. The second new genus encompasses 10 valid species: 5 previously belonging to the "Mortenseni" group, and 5 new species.

Finally, *Amphiro* Kinberg, 1865 is restablished, and contains 9 valid species: 8 previously regarded in the group C2, and one new species. The diagnosis of *Marphysa* is restricted regarding to the morphology of the species into the groups B2 and "Teretiuscula".

47) **The Magelonidae of West Africa**

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Benthic samples collected during two major projects (Canary Current Large Marine Ecosystem project, CCLME and the Guinea Current Large Marine Ecosystem project, GCLME) since 2005 have highlighted a huge diversity of magelonid species off the west coast of Africa (in excess of 20 species), many of which are undescribed. The magelonid fauna of the region has been investigated in a collaborative project between the University Museum of Bergen and Amgueddfa Cymru – National Museum Wales (as part of the Marine Invertebrates of Western Africa (MIWA) program) via morphological and molecular techniques. Current results have highlighted six magelonid species in the region carrying pigmentation of the posterior thorax, and several species sharing similarities with *Magelona cornuta*, originally described from the Persian Gulf. The presence of four European species occurring off western Africa has been confirmed.

48) **New identification tools for scaleworms (Annelida: Aphroditiformia)**

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A host of recent research has greatly improved our understanding of phylogenetic relationships, and hence classification, of the Aphroditiformia or scale worms. Changes include discovery and description of many new taxa, redefinition of the predominantly abyssal Macellicephalinae to include many taxa with one or very few species, and revised status of a number of family-level taxa. Ongoing research will continue to provide better resolution. However, paradoxically, these discoveries make the challenge of identifying scale worms not easier but more difficult. The existing taxonomic literature, and unpublished type descriptions from the late Kristian Fauchald will be reinterpreted under the current taxonomic framework and developed into new identification tools. These new tools will leverage the flexibility and interactivity of Delta keys and online browsable databases such as EoL and WoRMS. Moreover, they will build upon the framework of the WoRMS database and descriptive data will be made available to WoRMS administrators for inclusion in searchable morphological trait fields. The descriptions will reflect future phylogenetic revisions as they are adopted by WoRMS where we intend that the character matrix ultimately be archived and made openly available. We hope that pilots of some tools might be available for download and testing in time for IPC13 at Long Beach. This work is part of a larger project to produce Annelida identification tools, supported by Australian Biological Resources Study grant to Elena Kupriyanova, Chris Glasby, Pat Hutchings and Robin Wilson.

49) **On a new species of Polycirrus (Annelida: Terebelliformia: Polycirridae) from the southwestern Atlantic**

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A new species of *Polycirrus* is herein described, from specimens collected off the states of Paraná (southern Brazil), São Paulo (southeastern Brazil), and Pernambuco and Paraíba (northeastern Brazil). Members of this new species present 31–43 pairs of notopodia, bearing pinnate and narrowly-winged chaetae, neuropodia beginning on segment 9, bearing type 1 uncini sensu Glasby & Glasby (2006) throughout, paired ventro-lateral glandular pads on segments 3–13, and nephridial and genital papillae on segments 3–8. A full description for members of this new species is herein provided, together with comparisons with individuals of the most similar congener species.

50) **A new species of *Terebellides* Sars, 1835 (Annelida, Trichobranchidae) from French Frigate Shoals, north-western Hawaiian Islands, with a discussion on the morphological characters of members of *Terebellides***

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A new species of *Terebellides* is described from the French Frigate Shoals Atoll, Papahanaumokuakea Marine National Monument, north-western Hawaiian Islands. *Terebellides frenchfrigateshoalensis* n. sp., is characterised by the reduced lower lip with developed marginal lobe, almost inconspicuous segment 1 and short and coiled abdomen. Members of *T. frenchfrigateshoalensis* n. sp. are compared with the most similar congeners, those with short and coiled abdomen, and also with individuals of all the species of the genus reported for areas relatively close to its type locality. Those species are: *T. akares*, *T. balinensis*, *T. biaciculata*, and *T. brevis*, for the abdominal morphology, and *T. balinensis*, *T. ehlersi*, *T. horikoshii*, *T. intoshi*, *T. japonica*, *T. kobei*, *T. lineata*, *T. pacifica*, and *T. parvus*, for the distribution. The Discussion is about the

morphological characters of members of *Terebellides*, including the variation observed among members of species of this genus from other localities, mostly from Brazil; the characters discussed are: the anterior end, anterior segments and general body shape, the branchia, the presence of a mid-dorsal hump, the notopodia and notochaetae, and the neuropodia and neurochaetae.

51) **Multibranchiate *Prionospio* species from southeastern Brazil**

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Universidade Federal do Rio de Janeiro

The annelid family Spionidae Grube, 1850 is very common and abundant in marine ecosystems, being one of the most speciose and ecologically important families. Spionids can be found from intertidal environments to the deep sea. The genus *Prionospio* includes species bearing only pinnate or apinnate branchiae or a combination of both. Species bearing only apinnate branchiae were included in the (now invalid) subgenus *Minuspio*, which also included most multibranchiate *Prionospio* species. During a survey on the continental shelf and slope off southeastern Brazil, seven multibranchiate *Prionospio* species were recorded. Two species, *P. delta* and *P. fauchaldi*, have been previously recorded in Brazil, while the remaining five correspond to undescribed species. All species despite being morphologically similar can be distinguished by the prostomial shape, presence of dorsal crests, presence of sabre chaetae, lamellae morphology, and hook morphology.

52) **A new host for the parasitic genus *Veneriserva* (Annelida: Dorvilleidae) from Antarctica waters**

Antônio João Malafaia Peixoto & Paulo Cesar de Paiva
Universidade Federal do Rio de Janeiro

The annelid family Dorvilleidae Chamberlin, 1919 comprises a few of the smallest known polychaetes, being present from intertidal environments to the deep sea. Although most species are free-living, there are symbiotic and parasitic species. The genus *Veneriserva* Rossi, 1984 was erected to include *V. pygoclava* Rossi, 1984, an endoparasite of *Aphrodita longipalpa* Essenberg, 1917, off the coast of California, USA. The genus presents reduction of the maxillary apparatus, reduction of parapodia and chaetae and lack of prostomial appendages. A sub-species was later described to Antarctica, parasiting another Aphroditidae species. Four *Veneriserva* specimens were found in the coelomic cavity of *Barrukia cristata* (Willey, 1902), a Polynoidae. This is the first case of Polynoidae worms being parasitized by another annelid. It is unclear if our specimens belong to the sub-species previously reported from Antartica, as differences were observed on the prostomial shape and maxillary apparatus.

53) **First record of protodrilid polychaete from Korea**

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Most of protodrilids are interstitial and live in the marine sand environment. They have no parapodia, chaetae and appendages. There are 39 species belonging to 6 genera recorded worldwide and most of them are found in European waters. In East Asia, only two species were recorded: one from China and the other from Japan. This is the third record in Asia and the first record in Korea. We collected specimens from Gangmun Beach, Gangneung-si, Korea. With the morphological analysis, this specimen is considered to belong to *Protodrilus* based on its characteristics such as ciliated palps, without pigmented eyes, nuchal organs dorsolateral and oval, and two pygidial lobes. To confirm this result, sequences of cytochrome c oxidase subunit I gene (COI) was obtained from 4 individuals and then we performed phylogenetic analysis of them together with sequences of *Protodrilus* spp. retrieved from GenBank. We used sequences of *Astomus*, *Claudrilus*, *Lindrilus*, *Megadrilus* and *Meiodrilus* spp. as outgroups. Results of molecular analysis represent that Korean specimens are very closely related with other species of *Protodrilus*, which supports the results of morphological analyses. Moreover, Korean specimens showed significant genetic differences with other species (>19%). These results suggest that Korean specimens of *Protodrilus* are probably new to science.

54) **Comparative transcriptomic analysis offers insight into genetic control of syllid reproduction**

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Of the staggeringly diverse reproductive strategies of annelids, perhaps none is more interesting than that of syllids (Annelida, Syllidae). During their reproduction, syllids not only undergo epitoky-related morphological changes as those observed in other annelids (e.g. nereidids), but, in some cases, also create independent reproductive units called stolons. This creates a uniquely complex life cycle which has been studied by many authors. Several studies during the 80's and 90's concluded that the process of stolonization was related to environmental factors such as water temperature and moon

cycles, and that there is a male-as-default hormonal regulatory system. However, the physiological and genetic mechanisms behind this process are still largely unknown and only recently there have been new efforts to try to understand this process in more detail. In order to find mechanisms potentially involved in reproductive processes in syllids, we selected female, male, and non-reproducing individuals of *Syllis prolifera* (stolonizing) and *Nudisyllis pulligera* (non-stolonizing) and used them for comparative transcriptomic analyses. For that, we assembled transcriptomes *de novo*, annotated them, and calculated and compared expression values for each of the assembled transcripts. This comparison allowed us to find that gene expression is altered to a greater extent in males than in females when compared to the non-reproducing individuals, pointing to a sex determination system in which negative regulation of gene expression might be playing an important role. Finally, we also used these data to find sex-specific changes in Gene Ontology categories not previously known to play a role in syllid reproduction.

55) **Stress-associated gene expression in two marine invertebrates (*Hediste diversicolor* and *Littorina littorea*) exposed to metal contamination at the Callahan Copper Mine Superfund site (Maine, USA)**

Nancy Prentiss & Timothy Breton
University of Maine at Farmington

Hediste diversicolor (Annelida; Polychaeta) and *Littorina littorea* (Mollusca; Gastropoda) were sampled (2016-2017) from two spatially nearby estuaries – Goose Pond (formerly a copper mine site and now a Superfund site) and Horseshoe Cove (a "non-contaminated" estuary). Metal levels in site sediments were assessed using x-ray fluorescence. Seven genes previously associated with copper and zinc stress responses were assessed in *H. diversicolor*, with no significant differences between sites for any genes. Three similar genes were assessed in *L. littorea* foot muscle and hepatopancreas, with significant increases (1.5-3 fold) detected in both tissues for Goose Pond snails. This research highlights the diversity of species-specific responses to environmental toxins and the need for a variety of toxicity assessments in Superfund sites. Research was funded by the Maine IDeA Network of Biomedical Research Excellence (INBRE), National Institutes of Health; Grant # P20-GM103423.

56) **Nocturnally swarming Caribbean polychaetes from St. John, U.S. Virgin Islands, USA**

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Qualitative samples of nocturnally swarming Caribbean polychaetes were conducted in shallow waters in the Virgin Islands National Park, St. John, U.S.V.I., at various times from 2007 to 2017. Adult worms attracted to underwater lights were collected with hand-held plankton nets. While the sampling was not conducted on a quantitative basis, an overview of the results indicates that some polychaetes (e.g. *Polyophthalmus* cf. *pictus*) occurred in most samples, regardless of the lunar phase, while species from other families (Amphinomidae, Glyceridae and Phyllodocidae) occurred only during specific lunar phases. A summary is presented for the nocturnal emergence of swarming adult polychaetes, which includes members from the following families: Amphinomidae, Dorvilleidae, Glyceridae, Nereididae, Opheliidae, Phyllodocidae and Syllidae. Research was funded, in part, through VI-EPSCoR's RII-NSF Grant No. 0814417.

57) **Polychaetes of Bocas del Toro, Panama: updates and new records**

Nancy K. Prentiss[1], Leslie H. Harris[2], Sergio Salazar-Vallejo[3], & Students of the Smithsonian Tropical Field Institute course: Systematics and Ecology of Caribbean Polychaetes
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Polychaetes have not been well documented along the Panamanian Atlantic and Pacific coastlines. These regions offer ample opportunity to document the occurrence of community assemblages, which often include alien species not previously reported. With over 100 years of shipping traffic through the Panama Canal, opportunistic species from the Pacific Ocean and elsewhere have become firmly established in Panama's Caribbean. Here, we present an updated record of polychaetes collected from shallow waters around the Bocas del Toro archipelago. This record combines the results of collaborative investigations conducted during two field courses organized by the Smithsonian Tropical Research Institute during June 2013 and July 2018, and by previous independent investigations. We also report new records for Bocas del Toro and provide updated information for previous records. This project was supported by the Smithsonian Tropical Field Institute, Bocas del Toro, Panama.

58) **Eye ultrastructure in basal annelid lineages and their importance for eye evolution in Annelida**

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Recent phylogenomic studies revealed a robust and new hypothesis explaining annelid phylogeny. Most surprising was the existence of a few basal lineages showing a comparatively simple organization. In view of this new phylogeny the evolution of

organ systems in annelids and the characters probably present in their last common ancestor have to be reevaluated. With respect to the light sensitive organs a pair of simple larval eyes and two pairs of adult eyes is regarded as being present in their last common ancestor. Typically adult eyes are multicellular pigment cup or pinhole eyes applying rhabdomeric photoreceptor cells (PRCs) and pigmented supportive cells (PSCs) in converse design. However, in the most basal lineages eyes are only present in a limited number of taxa and thus far their structure was unknown. Ultrastructural investigations in members of these lineages, Oweniidae and Chaetopteridae, revealed a completely different but corresponding structure of eyes and PRCs shedding new light on the evolutionary history of adult eyes in Annelida. The eyes in species of this basal radiation are simple pigment spot eyes and part of the epidermal epithelium comprising two cell types, monociliated PSCs and rhabdomeric PRCs. Both cell types show characteristics typical of epidermal supportive cells. These findings indicate that the annelid stem species most likely possessed a pair of pigment spot eyes with slightly specialized PRCs and, as is the case for the nuchal organs, pigment cup adult eyes presumably evolved later in annelid phylogeny, namely in the stem lineage of Amphinomida and Pleistoannelida.

59) **Distribution patterns of Glyceriformia (Annelida) around Iceland**

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Little is known about the benthic organisms living in the vast deep-sea regions. The research project IceAGE focused on the biodiversity in the climatic sensitive region around Iceland and different factors that e.g. influence species distribution and migration in correlation with ecological conditions. However, it is a fact that polychaetes are one of the dominant groups in such habitats and especially a few species of the annelid families Glyceridae and Goniadidae are widely distributed. The distribution patterns of these taxa demonstrate that some species have a high dispersal capability and show an extended level of eurybathy, whereas other species are restricted to the deep sea. Nevertheless, the underlying processes for the often-found cosmopolitan occurrence are mostly unclear. The passive transport by bottom ocean currents is generally accepted as the main factor for dispersal, whereas our studies suggest surface currents as the main reason. To test these contrary hypotheses, extensive material from the IceAGE project was investigated by morphological and molecular methods. The usage of markers with low conservation levels like the ITS-sequences gave further insights in population dynamics and intraspecific variations, whereas highly conserved coding regions were used to examine phylogenetic relationships. The combination of classical taxonomic techniques with modern aspects of biodiversity research allows a profound analysis of factors influencing the distribution and migration of species as well as the investigation of the background of biogeographic zonation.

60) **First record for the genus *Sabidius* Strelzov, 1973 (Annelida: Paraonidae) for the southern Atlantic Ocean, with a redescription of the type species and description of a new species**

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The present study reports and describes two species of the genus *Sabidius* Strelzov, 1973, collected from off southeastern Brazil, state of Espírito Santo, between 19°3'S 37°44'W and 21°10'S 38°28'W. *Sabidius* is currently known only from the type species, *S. cornatus* (Hartman, 1965), which was described based on material from off New England, from slope and abyssal bottoms, between 400-2900 m deep. The present is the first record for *S. cornatus* and also for this genus for the Southern Atlantic, and the shallowest as well, from 352-445 m depths. A new species of the *Sabidius* was also found in this survey, from 11-156 m depths, which differs from *S. cornatus* in having an antenna on the prostomium and larger branchiae reaching the anterior chaetiger. The present record expands both the geographical and bathymetric ranges of *Sabidius*.

61) **Describing a new species of *Syllis* as a promising organism for developmental studies (Syllidae, Annelida)**

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Syllidae is a very diverse annelid family in number of species and reproductive modes. Most syllid species reproduce sexually by epitoky but also asexual reproduction has been observed. Species with asexual reproduction are able to regenerate the whole body, restoring all missing parts, including the proventricle. Here, we describe a new species of *Syllis* (Syllinae), with the characterization of its reproduction and life cycle. *Syllis* sp. n. is easy to maintain in aquaria and cultures, as the specimens multiply quickly due to the ability of asexual reproduction by fission. We generated an updated molecular phylogeny of the subfamily Syllinae including all species with available sequences in GenBank and *Syllis* sp. n. The results indicate that the new species is the sister group of a clade containing *S. hyalina*, *Typosyllis gerundensis* and *S. armilaris* from the Mediterranean Sea. The life cycle of *Syllis* sp. n. is very interesting and complex, because it requires the ability to regenerate at different developmental stages. As *Syllis* sp. n. seems to be a promising species to study regeneration and development, we sequenced

and assembled its transcriptome and mitochondrial genome as valuable sources of data for evolutionary developmental biology studies in Annelida.

62) **Threadlike casts in the tube wall of *Protula* (Serpulidae, Polychaeta) from bathyal coral mounds in the Caribbean Sea**
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[1]Department of Biological, Geological and Environmental Sciences, University of Catania; [2]Department of Geology, Ghent University; [3]Senckenberg am Meer, Marine Research Department, University of Wilhelmshavenany; [4]MARUM, University of Bremen; [5]Department of Biology, Ecology and Earth Sciences, University of Calabria
An intriguing interaction between *Protula* tubes and some threadlike epibionts (of still uncertain determination) is here described for the first time from deep-sea coral mounds, in the Caribbean Sea. Interaction is suggested by the presence of embedment structures, i.e. bioclaustrations, produced by the worm on the external surface of its tube wall. These structures consist of thin tubular casts, ca. 10-15 micron in inner diameter, developed to form either irregularly intricate nets over all the tube surface, or regular reticulate networks inside the protruding ornamentations (roughly annular ridges and wrinkles) typical of the *Protula* genus. At places, an organic film, presumably corresponding to tissue residues of the unknown filiform organisms which become embedded in the growing worm tube, still occurs inside the lumens of the casts. Investigations will elucidate if bioclaustrated organisms are hydroid colonies that lived on *Protula* tubes contemporarily with their growth, as already known in literature. The symbiotic relationships between these infestant microrganisms and the hosting serpulid are discussed.

63) **Polydorid species (Annelida: Spionidae) associated with calcareous substrates from Normandy, France**
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Morphological and ecological characteristics and molecular analysis of polydorid species (Annelida, Spionidae) were investigated along the coast of Normandy, English Channel, France in March 2018. Totally eight species of polydorids from four genera *Polydora, Dipolydora, Boccardia* and *Boccardiella* were observed to inhabit the various calcareous-related substrates. *Polydora hoplura* Claparède, 1868*, P.* cf. *websteri* and *D. giardi* (Mesnil, 1893) were the most common species extracted from the shells of cultured oyster *Crassostrea gigas* (Thunberg, 1793). One unknown *Polydora* species, which is one of the *P. ciliata/websteri* complex from both morphological and genetic points of view, was discovered from limestones, wild oyster shells from muddy oyster beds and also from cultured oyster shells. This unknown species was observed to be abundant in each habitat condition and showed variation in pigmentation patterns and size. *Polydora hoplura, D. giardi, Dipolydora* sp., *B. proboscidea* (Haswell, 1885)*, B. pseudonatrix* Day, 1961 which is a new species recorded in the English Channel and *B. hamata* (Webster, 1879) were commonly observed from wild conditions. Only individuals of *B. proboscidea* which inhabited the areas covered with coralline algae possessed gametocytes in their coelom and many egg capsules and juveniles were observed during the sampling period. Few individuals of *P. hoplura* had oocytes in the coelom. These observations suggested a soon spring reproduction.

64) **Identification, distribution and abundance of an invasive worm used as bait in the Knysna estuary, South Africa**
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Management of the bait species, moonshine worm, in Knysna Estuary is inhibited by confusion over its identity and lack of population data. This study aimed to fill these gaps. Morphological and molecular evidence (16S and COI DNA) confirmed that it is *Diopatra aciculata,* first described from Australia. The species is defined by its long palps, antennae and dorsal cirri and short branchial region. *Diopatra aciculata* was found throughout most of the 14 km long estuary, but not in the upper reaches. While densities were significantly higher at intertidal than subtidal sites, there was no obvious spatial pattern of density along the length of the estuary. Given the large size (max 800 mm long) and population estimate of at least 20 million worms, it may significantly affect trophic and ecological structures in the estuary. The large estimated population size suggests that eradication would be difficult, further hindered by a subtidal population that may maintain the intertidal population.

65) **Composition and diversity of polychaete assemblages in the continental shelf of the southern Mexican Pacific**
Pablo Hernández-Alcántara[1], Francisco F. Velasco-López[1], Vivianne Solís-Weiss[2], & León F. Álvarez-Sánchez[3]
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For this study, 38 stations between 42 and 109 m depth were ordered along 14 transects perpendicular to the coastline of the continental shelf in the southern Mexican Pacific, with the aim to study the spatial variations of the composition and diversity of the local polychaete populations present. A total of 3741 specimens from 82 species and 27 families were identified. Density and species richness values showed ample variability (2–417 ind./0.1m²; 1–24 spp./sta.) and exponentially decreased with depth (R^2= 0.45 and 0.54, respectively). However, the average distinctness diversity increased with depth (Delta+: 70.3-100) due to the fact that most of the species belonged to different genera, which suggests greater morphological diversity of polychaetes. *Linopherus kristiani* (1359 ind. 0.1 m^{-2}), mainly occurring at the middle and outer shelf, and *Paraprionospio pinnata* (1338 ind. 0.1 m^{-2}), mostly located in shallow depths, were clearly the dominant species. Besides these polychaetes, the faunal assemblages were significantly structured (ρ = 0.951) by *Aglaophamus verrilli*, *Cossura brunnea*, *Hermundura riojai*, *Magelona marianae* and *M. pacifica*. The spatial changes in number of species and taxonomic distinctness were slightly correlated with depth (ρ = 0.4 and 0.2) and sand percentage (ρ = 0.35 and 0.2), and density values with depth (ρ = 0.3) and phosphate levels (ρ = 0.26).

66) **Spatial and bathymetric trends in polychaete assemblages from deep-sea of the southern Gulf of California, eastern Pacific**
Araceli Jaquelín Mercado-Santiago[1], Pablo Hernández-Alcántara[2], & Vivianne Solís-Weiss[3]
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The polychaete assemblages from the deep sea of the southern Gulf of California were characterized in terms of faunal composition, species richness and distributional patterns. During the spring season of 2012 and 2013, 15 stations located between 238 and 2900 m depth were sampled. A total of 85 species belonging to 59 genera and 26 families of polychaetes were identified. The families Onuphidae (11 spp.), Spionidae (10 spp.) and Cirratulidae (8 spp.) were the richest in species, while the families Paraonidae (119.04 ind./0.1 m^2), Spionidae (95.23 ind./0.1 m^2), Lumbrineridae (73.80 ind./0.1m^2) and Pilargidae (69.04 ind./0.1 m^2) were the most abundant, representing 51.9% of fauna. The number of individuals and species displayed an inverse parabolic distribution with depth, with the lowest values (4.76–42.86 ind./0.1m^2; 2–6 spp.) at middle depths (651–915 m). Three faunal assemblages defined by the bathymetric levels were detected (R_{ANOSIM}= 0.405, *p*=0.04): 1) *Prionospio ehlersi-Subadyte mexicana-Syllis alternata*, located at stations lower than 348 m; 2) *Aricidea* sp. A-*Ninoe jessicae* located between 651 and 915 m depth; and 3) *Aglaophamus paucilamellata-Aricidea (Acmira) simplex-Ancistrosyllis groenlandica* distributed at more than 1335 m depth.

67) **Polychaetes from underwater marine caves near Marseille (France, Mediterranean)**
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We investigated polychaetous annelids from soft sediment in three underwater marine caves located near Marseille and La Ciotat (Calanques National Park - NW Mediterranean): 3PP Cave, Jarre III Cave, Pérès Cave. To different degrees, these caves mimic deep-sea environmental conditions and they are famous by presence of carnivorous sponges of the family Cladorhizidae. We processed samples by using meiobenthic procedures (130-μm sieve). The samples obtained in 2007 were compared with those collected in 2018-2019. We identified representatives of 29 families: 24 families in the 3PP Cave, 23 in Jarre III Cave, 9 in Pérès cave. Oweniidae and Fabriciidae are newly reported from marine caves. The specific composition of polychaete fauna of the caves is peculiar and differs from surrounding biotopes. The lists of families for 2007 and 2018-2019 years are similar; it means the cave polychaete fauna is stable over time. The further studies will include identifications of polychaetes to species level, molecular genetic analysis and comparisons of cave fauna with one from deep-water Mediterranean trenches. The Russian Fund for Basic Researches supports this study (19-04-00501, 18-05-60158).

68) **Comprehensive study of the head region and tentacle apparatus in *Owenia borealis* (Annelida: Oweniidae)**
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The organization of tentacle apparatus in bilaterians may help to understand the morphology of the last common bilaterian ancestor (LCBA). The main question is if LCBA possessed tentacle apparatus or not. Oweniidae is clade of annelids with “basal

radiation", which might retain some ancestral features of the LCBA. The organization of tentacles of *Owenia borealis* is studied by CLSM, SEM, TEM, and 3D reconstructions. The tentacle apparatus consists of 4 pairs of arms, which are located laterally and divided into left and right groups by indistinct dorsal ridge and ventral pharyngeal organ. The latter consists of two parts: the dorsal lip and the ventral pouch, which contains the inner cavity and has a different organization of the ventral and the dorsal epithelium. The pharyngeal organ is surrounded by ventro-lateral lips. Oral side of tentacles and ventro-lateral lips are covered by numerous cilia, whereas the pharyngeal organ lacks cilia. There are two nerve rings: inner and outer. Each arm is innervated by six thick nerves and many thin neurites, which start from the outer nerve ring. The coelomic lining of tentacle is formed by specialized coelothelium and myoepithelial monociliated cells. The specificity of tentacles organization i.e. the absence of specialized zones along tentacle, independent innervation of tentacles, the histological simplicity of coelomic lining and nerve rings in *O. borealis* may be evidence of the ancestral state or unspecialized tentacle apparatus, which was used for food particles collection, how the LCBA probably did. The Russian Science Foundation supports this study (#18-14-00082).

69) **Revision of three nereidid species complexes (Nereididae): reinstatement of two genera, and description of one new genus and six new species**

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Nereidids are among the polychaetes with the highest number of genera and species; nevertheless, the taxonomy of several heterogeneous taxa remain poorly understood because a robust morphological framework is not still established. The species complexes within the family are common examples of related species groupings with unclear morphological boundaries. Among them, the complexes '*Neanthes acuminata*', '*Alitta succinea*' and '*Alitta virens*' require consideration as for being the nominal species regarded as widely distributed, invasive, or appreciated by the maritime industries, respectively. In order to assess their convoluted taxonomy and to clarify the status of other 30 closely related species, a comprehensive morphological study of those three complexes are performed based upon the examination of type and non-type materials. This revision unveils the state of taxonomy not only at the species level, but also to genus. *Alitta* is redefined to include exclusively 7 species related to *A. virens* (type species). *Stratonice* is reinstated to transfer 13 species similar to *A. succinea*, including the type species of *Nectoneanthes*, and to allocate 3 new species. *Neanthioides*, whose type species was a former junior synonym of *N. acuminata*, is reinstated and distinguished from *Neanthes* to include 6 species (2 new ones). Finally, a new deep-sea genus similar to *Neanthioides* is established for one nominal and a new species. Hence, 27 redescriptions are provided, 11 species are reinstated, and 25 new combinations, 3 synonymies, and 6 new species are proposed. A more comprehensive taxonomic panorama of *Alitta* is presented, and the status of the species complexes are also elucidated.

70) **A remarkable new deep-sea nereidid with branchiae**

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A new genus and species of nereidid from off the Pacific coast of Costa Rica are described. Male epitokes swimming near the sea floor (1000 m depth) were collected and videorecorded using the HOV *Alvin* (operated from R/V *Atlantis*) in October 2018. Epitokes were also observed some months later. Three epitoke males and one infaunal female have been examined. The males interestingly exhibits branchial filaments in the cirrostyle of both dorsal and ventral cirri, a unique feature among nereidids. The males also have a complete prostomium, elongate dorsal ligules, very long neuropodial homogomph falcigers, enlarged cirrophore of dorsal cirri, neuropodia with only postchaetal lobe, conical paragnaths on both pharyngeal rings, marked epitokal modifications, and lacks eyes. The presence of branchiae is exceptional within Nereididae, only *Dendronereis* and *Dendronereides* share this feature. However, in contrast to the new taxon, these emerge from the cirrophore of dorsal cirri. Likewise, pharyngeal papillae are only present in those two genera, the prostomium is indented, the falcigers (if present) are much shorter, and at least three lobes are developed in some neuropodia. Preliminary mitochondrial DNA analysis relates the new taxa with *Tambalagamia*, *Laeonereis*, *Hediste* and *Alitta*, but further data is needed. In addition to the branchiae, the new taxon is different from these genera in the shape of prostomium and cirrophore of dorsal ligule, number of ventral cirri, and presence/type of falcigers and pharyngeal projections. Further molecular analysis, including nuclear genes and more genera, will be performed in order to assess the placement of this extraordinary nereidid.

71) **Developmental stages of notochaetae and anterior segments in nectochaete larvae during metamorphosis in *Chrysopetalum* species (Chrysopetalidae: Annelida)**

Charlotte Watson
Museum & Art Gallery of the Northern Territory

Chrysopetalum species display an adult morphology of notochaetal paleae and two pairs of tentacular cirri on segments 1 and 11. Nectochaete larvae exhibit a primary spinose notochaetal morphology after settlement from the plankton which is

replaced during metamorphosis with adult paleal notochaetae. A total of 6 cirri are present on segments 1 and 11 with biramous segment 11 comprising a pair of dorsal cirri, primary notochaetae, neuropodia and neurochaetae; ventral cirri are absent. During metamorphosis the chaetous, acirrose neuropodia of segment 11 are reabsorbed and replaced in stages with a pair of tentacular cirri so achieving the final adult state: achaetous segment 1 supports two pairs of tentacular cirri and segment 11 similar, ie. total of 8 cirri. Spinose notochaetae indicate an original state before replacement by paleae and the original anterior segmental arrangement in larvae of *Chrysopetalum* species is that seen in adults in the majority of Chrysopetalinae taxa.

72) **Confirmation of the mudworm *Polydora websteri* (Polychaeta: Spionidae) in oysters from Washington State, USA**

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Some spionid polychaetes induce mud blisters in bivalves and present an economic burden to the oyster industry. In particular, *Polydora websteri* has negatively impacted aquaculture operations in Australia, New Zealand, Hawaii, and the east coast of USA. Mud blisters have been observed in Pacific oysters (*Crassostrea gigas*) from Washington and data suggest that the area might be experiencing an outbreak of *P. websteri*. To confirm the identity of the polydorids as *P. websteri*, we obtained 600+ Pacific oysters from 14 sites and examined them for the worms. In addition, *P. websteri* were extracted from eastern oysters (*Crassostrea virginica*) collected in New York (near the type locality) for comparative studies. Polychaetes were fixed for SEM and light microscopy and sequenced (CO1 and 18S rRNA) for species-level identification. The findings represent the first confirmed report of *P. websteri* in oysters from Washington and have important implications for the half-shell industry.

73) **Interstitial nerillids gone swimming in the dark**

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Anchialine caves have revealed a variety of highly adapted animals including multiple records of Nerillidae. However, only one stygobitic lineage, *Speleonerilla* nom. nov. (previously known as *S. longipalpa*), seems obligate to this environment. Contrary to their benthic and interstitial nerillid relatives, species of *Speleonerilla* are predominantly found in the water column. We now have records from multiple anchialine caves across the Caribbean and in 2018 described three new species from Bahamas, Cuba and Canary Islands. Recently, we also found a new nerillid in an anchialine cave in Miyako (Southern Japan). It shows traits characteristic of both *Mesonerilla* and *Speleonerilla*, having compound chaetae, three antennae and long palps. Our combined molecular and morphological analyses will show whether it represents a separate evolutionary lineage. Nonetheless it emphasizes the worldwide adaptability of nerillids to the anchialine environment, where they dominate the annelid diversity.

74) **Coral reef-associated infaunal polychaetes in the western Gulf of Thailand**

Thamasak Yeemin, Makamas Sutthacheep, Sittiporn Pengsakun, Wanlaya Klinthong, Laongdown Jungrak, & Rattanawadee Niamsiri

Ramkhamhaeng University

Ecological interactions between the coral reef and sediment fauna are recognized as important factors influencing the structure and organization of marine communities. Polychaetes are major components of coral reef-associated infaunal macroinvertebrates. This study aimed to examine the composition and abundance of coral reef-associated infaunal polychaetes in the Western Gulf of Thailand. The polychaete samples were collected by SCUBA divers at four reef sites, i.e. Ko Kula, Ko Lawa, Ko Rang Kachiu, and Ko Maphrao in Mu Ko Chumphon. The total densities of infaunal polychaetes were in a range of 378-1,389 individuals m^{-2}. The highest density was found at Ko Maphrao which is a nearshore island. The dominant polychaete families included Magelonidae, Capitellidae, Opheliidae, Pisionidae, Nephtyidae, and Amphinomidae. This study highlights the importance of coral reef-associated infaunal polychaetes in the Gulf of Thailand.

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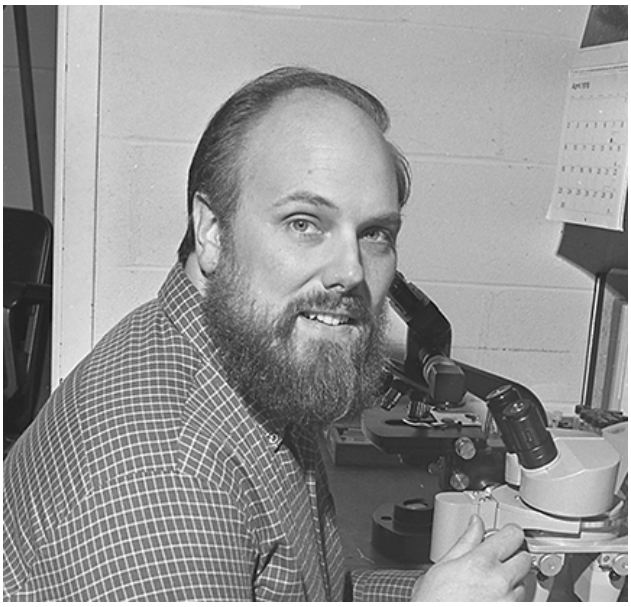
Notes

Colleagues Recently Lost



John Fredrick Grassle, 1939-2018
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(photo from whoi.edu)

Donald J. Reish, 1925-2018
Department of Biological Sciences
California State University Long Beach, USA
(photo courtesy of Lhisa Reish)

Robert Eugene Ruff, 1947-2017
Ruff Systematics, USA
(photo courtesy of Jim Blake)

Alexander Rzhavsky, 1959-2018
Russian Academy of Sciences, Russia
(photo courtesy of Elena Kupriyanova)

Overview of the Schedule

Sunday 4 August (*Hotel check-in area*)

1600–2000	Registration

Monday 5 August (*Grand/Windsor Salons*)

0700–1700	Registration
0730–0850	*Breakfast*
0850–0910	Welcome address
0910–1030	Systematics & Evolution I (4 talks)
1030–1100	*Break*
1100–1220	Systematics & Evolution II (4 talks)
1220–1340	*Lunch*
1340–1500	Ecology I (4 talks)
1500–1530	*Break*
1530–1630	Ecology II (3 talks)
1630–1700	Remembrance of Dr. Donald Reish
1700–1900	*Welcome wine & cheese social* (*Verandah Grill/Deck*)

Tuesday 6 August (*Grand/Windsor Salons*)

0730–0850	*Breakfast*
0850–1030	Morphology I (5 talks)
1030–1100	*Break*
1100–1220	Morphology II (4 talks)
1220–1340	*Lunch*
1340–1500	Systematics & Evolution III (4 talks)
1500–1530	*Break*
1530–1630	Systematics & Evolution IV (3 talks)
1630–1700	History of the Allan Hancock Foundation

Wednesday 7 August *(Optional mid-conference excursion)*

0800	Bus departs *Queen Mary*, to Exposition Park (meet in front of QM at 0745)
0930–1200	Exposition Park Rose Garden, California Science Center, Natural History Museum (on your own)
1200	Meet at Rose Garden Fountain; walk to Wallis Annenberg Building
1215–1330	Lunch in Muses Room
1330	Walk to Allan Hancock Foundation at University of Southern California
1530	Bus departs Exposition Park, to *Queen Mary*

Thursday, 8 August (*Grand/Windsor Salons*)

0730–0850	*Breakfast*
0850–1030	Development & Regeneration (5 talks)
1030–1050	*Break*
1050–1230	Physiology (5 talks)
1230–1340	*Lunch*
1340–1510	Diversity & Biogeography I (4 talks)
1510–1540	Remembrance of Drs. Fred Grassle, Eugene Ruff, & Alexander Rzhavsky
1540–1800	Poster session

Friday 9 August (*Grand/Windsor Salons*)

0730–0910	*Breakfast*
0910–1030	Diversity & Biogeography II (4 talks)
1030–1100	*Break*
1100–1220	Diversity & Biogeography III (4 talks)
1220–1400	*Lunch* [IPC Advisory Council Meeting, *Victoria Room*]
1400–1500	IPA business meeting
1500–1510	Closing remarks
1800–2300	*Banquet* (*Queen's Salon*)