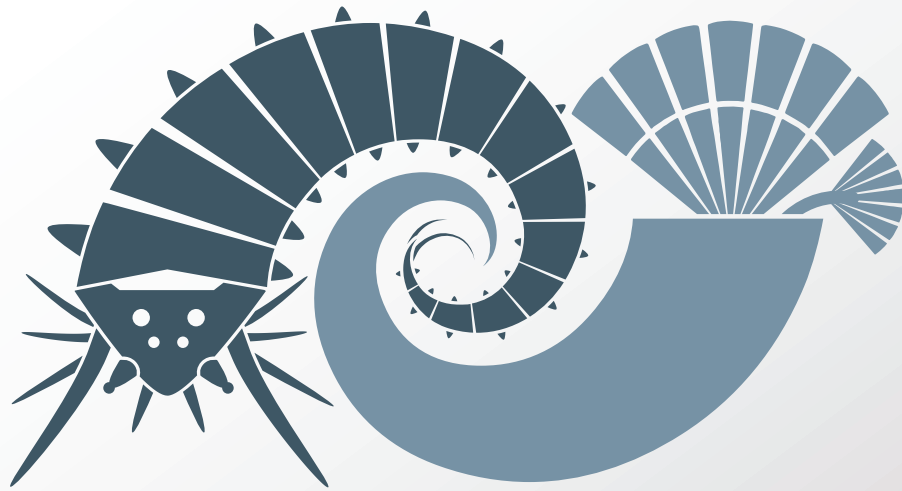


IPC12



12th International Polychaete Conference

National Museum Wales, Cardiff
1st - 5th August 2016

Programme & Abstracts

national
museum
wales
cymru

M. Nechama Ben-Eliahu 1935–2014



Nechama in Lecce (IPC10), 2010 (Photo: Andy Mackie)

Nechama was a determined polychaete researcher famed for her studies of lessepsian migrations and serpulids. She was a stalwart of the first 10 Polychaete Conferences, but cancer deterred her from attending the IPC11. Nechama died on 23rd March 2014.

Edmundo Ferraz Nonato 1920–2014



Photo courtesy of Paulo Lana

A pioneer for the study of Brazilian polychaetes, Professor Nonato died suddenly on 14th April 2014 aged 93 shortly after leaving the lab. He was a much-loved mentor and father figure for polychaete researchers in Brazil, and was respected the world over. Professor Nonato attended IPC6 in Curitiba, 1998.

In 2012, Brazilian colleagues launched NONATObase (<http://nonatobase.ufsc.br>) – the Polychaete database for the SW Atlantic – in his honour.

Jose Maria (Lobo) Orensanz 1945–2015



Lobo (Photo: Vasily Radashevsky)

José María Orensanz, affectionately known as 'Lobo' died from a heart attack on 5th January 2015, as he was packing a van for a family fieldtrip to his beloved Patagonian coast. Lobo was a kind and generous man, and mentor to generations of students. He made a series of significant scientific contributions on the taxonomy of marine or estuarine annelids, as well as in benthic ecology and artisanal fisheries.

Roger Bamber 1949–2015



Roger in Angers (IPC4), 1992 (Photo: Andy Mackie)

Roger was a larger than life marine taxonomist and ecologist. A true polymath, he had a great intellect, while at the same time being a 'man of the people'. Pycnogonids and tanaids were his main passion, but he worked on polychaetes also and attended several IPCs.

Roger passed away peacefully in his sleep on 16th February 2015, just over a year after a diagnosis with Motor Neurone Disease (Amyotrophic Lateral Sclerosis).

Croeso - Welcome

 #IPC12Cardiff

 @IPC2016

Welcome all to the 12th International Polychaete Conference at Amgueddfa Cymru – National Museum Wales in Cardiff, capital city of Wales.

We are delighted that around 190 researchers, students, and accompanying spouses, partners and children are participating in the conference. The registrants come from 29 countries; 31 considering the three home nations of England, Wales and Scotland!

The Museum is proud to be hosting IPC12, some 33 years after the triennial series was inaugurated by Pat Hutchings at the Australian Museum, Sydney. Since that landmark conference we have travelled the world – Sydney to Long Beach, Curitiba to Reykjavik – and we are honoured to have organised the first in the United Kingdom.

The Museum IPC12 organising committee would like to thank the Director General David Anderson, the Keeper of Natural Sciences Richard Bevins, and many more in the Museum for all their support. We thank also the external committee of Sue Chambers, Gordon Paterson, Adrian Glover, John Hartley, Pete Garwood and Matt Bentley, and previous conference organisers, for helpful discussions and advice throughout the last three years.

The polychaete world has lost a number of important researchers over the last three years and we are sad that they are not here with us in Cardiff this August. However, we are sure that all our absent friends would wish that we remember them for all the good and happy times shared. For this reason we aim to make this a conference that honours the spirit, character and inspiration of Kristian Fauchald.

Kristian, as you can read in the Tribute specially produced for this conference, inspired so many. Furthermore he was kind, helpful, very sociable, and was blessed with a great sense of humour ... and a great laugh. So, please don't be sad. Do as Kristian (and Lobo, Edmundo, Franklin, Minoru, Nechama, Roger, and André) would do: meet, talk, inspire, and celebrate polychaetes and life in equal measure.

We invite you to have a happy conference, re-connecting with those already known, meeting correspondents for the first time, and making new connections and new friends. Enjoy the Museum (don't forget to visit Wriggle!) and enjoy Cardiff.

lechyd da! — Good health!

Andy Mackie
Conference Chair &
President, International Polychaetology Association

Local Organising Committee

Dr Andy Mackie [Chair]

Harriet Wood [Fieldtrips & Tours]

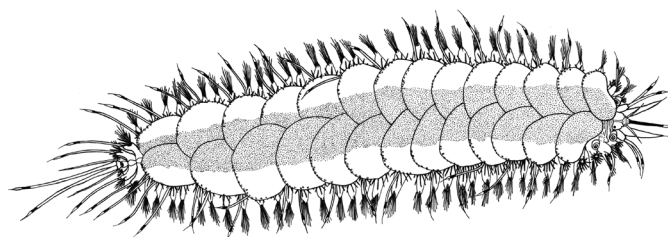
Teresa Darbyshire [Conference Co-ordinator]

Jen Gallichan [Events & local information]

Kate Mortimer [Co-ordinator & Social Media]

Jim Turner [Design & Publications]

Anna Holmes [Conference Proceedings]



Compiled and edited by J. Turner, 2016

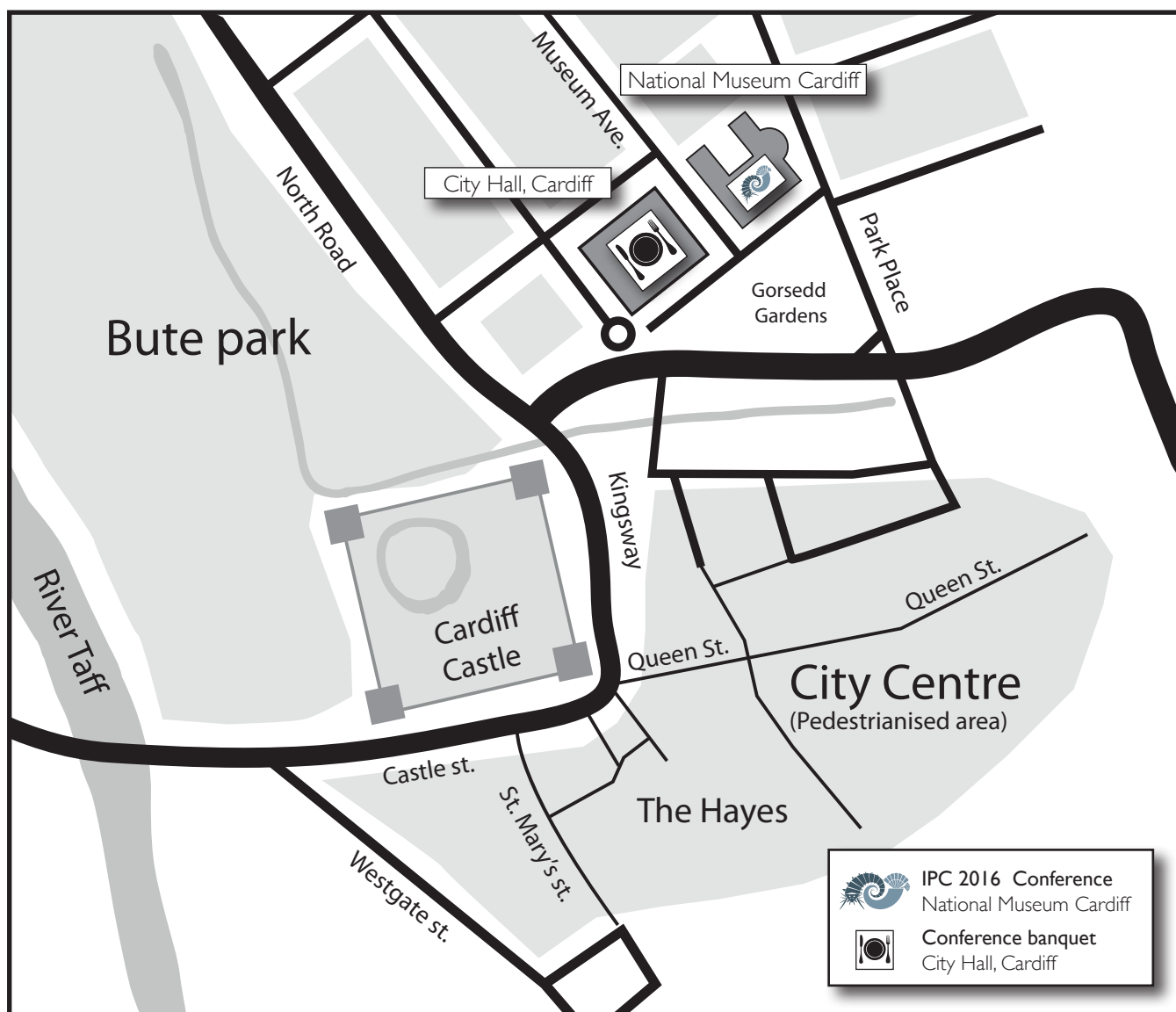
Conference Venues

National Museum Cardiff
Cathays Park, Cardiff, CF10 3NP

- Pre-Conference Workshop (optional): Philosophy of Biological Systematics (Kirk Fitzhugh) - 25-29 July
- IPC 2016 Conference - 1-5 August
- Icebreaker - Monday 1 August (18:00 - 20:00)
- Mid-conference excursion (departure and return point - Museum steps) - Wednesday 3 August (08:30 - 17:00)

City Hall, Cardiff
Cathays Park, Cardiff City Centre, CF10 3ND

- Conference Banquet - Friday 5 August (18.30 - 01:00)



Programme Outline

Sun 31 July

Registration & Poster hanging	
National Museum Cardiff	14.00 - 17.00
Conference registration opens, collection of conference pack, programme booklet & associated information. Setting up of posters in gallery adjacent to Reardon Smith Lecture Theatre.	

Monday 1 August

Day 1 - Conference Sessions	
08.00	Tea/coffee & Registration (continued)
08.45	Official welcome addresses & opening lecture
09.30	DEEP SEA Chair: Adrian Glover
10.30	Tea/Coffee
11.00	SYSTEMATICS Chair: Chris Glasby
12.30	Group Photo (steps at front of Museum) Buffet Lunch (Main hall)
14.00	SYSTEMATICS Chair: Markus Böggemann
15.30	Tea/Coffee
16.00	SYSTEMATICS Chair: James Blake
17.15	End of Sessions
Icebreaker	
18.00 - 20.00	IPC 2016 Icebreaker Event Main Hall, National Museum Wales, Cardiff

Tuesday 2 August

Day 2 - Conference Sessions	
08.30	Doors open
09.00	PHYLOGENY Chair: Damhnait McHugh
10.30	Tea/Coffee
11.00	PHYLOGENY Chair: Torsten Struck
12.15	Lunch (not provided)
13.45	ECOLOGY Chair: Ruth Barnich
15.15	Tea/Coffee
15.45	METHODOLOGIES Chair: Torkild Bakken
17.15	End of Sessions

Wednesday 3 August

Day 3 - Conference Excursion	
08.30 - 08.45	Delegates arrive at National Museum Cardiff (front steps)
09.00	Depart from National Museum Cardiff (WC facilities not available until arrival at the Castle) Please arrive on time. Buses leave promptly at 09.00
09.30	Arrive at Caerphilly Castle: <ul style="list-style-type: none"> • Coaches to park in designated area • Enter the Castle via drawbridge into the main visitor reception area • Delegates free to roam the castle grounds
10.30	Refreshments in the Great Hall: <ul style="list-style-type: none"> • Cold drinks and Welsh cakes for the delegates • Custodian will be available to answer questions about the castle
12.00	Depart from Caerphilly Castle
12.30	Arrive at Llanerch Vineyard: <ul style="list-style-type: none"> • Welcome to the vineyard with a selection of drinks • Farm favourites buffet lunch in Woodland Marquee • Wine tasting and tours of the Vineyard • Optional woodland walk around the ponds (children must be supervised)
17.00	Depart from Llanerch Vineyard
17.30	Arrive at National Museum Cardiff

Thursday 4 August

Day 4 - Conference Sessions	
08.30	Doors open
09.00	BIODIVERSITY Chair: Daniel Martin
10.30	Tea/Coffee
11.00	BIODIVERSITY & ECOLOGY Chair: Gordon Paterson
12.45	Lunch (not provided)
14.00	MORPHOLOGY Chair: Daniel Dauer
16.00 - 17.15	Tea/Coffee Poster Session

Friday 5 August

Day 5 - Conference Sessions	
08.30	Doors open
09.00	REPRODUCTION & LARVAL ECOLOGY Chair: Christina Gambi
10.30	Tea/Coffee
11.00	DEVELOPMENT Chair: Pat Hutchings
12.30	Lunch (not provided) International Polychaetology Association Advisory Council meeting
14.00	POLYCHAETE STUDIES Chair: Susan Chambers
15.15	International Polychaetology Association meeting & next conference bids
16.30	Close of Conference
Conference Banquet	
18.30 - 01.00	IPC 2016 Conference Banquet Cardiff City Hall Cathays Park, Cardiff City Centre, CF10 3ND

Programme of Presentations

Monday 1st August 2016

08.45 Official Welcome Addresses
Dr Andy **Mackie** (IPA President) & Dr Richard **Bevins** (Head of Department of Natural Sciences, AC-NMW)

Opening Lecture: Polychaetes & Aesthetics
Fredrik **Pleijel**

DEEP SEA Chair: Adrian Glover

09.30 Reconstruction of the nervous system in bone-eating *Osedax* spp. and its evolution across Siboglinidae (Annelida)
Katrine **Worsaae**, Nadezhda N. Rimskaya-Korsakova, Greg W. Rouse

09.45 Giants vs pygmies: two strategies in the evolution of deep-sea quill worms (Onuphidae, Annelida)
Nataliya **Budaeva**, Hannelore Paxton, Pedro Ribeiro, Pilar Haye, Dmitry Schepetov, Javier Sellanes, Endre Willassen

10.00 Using genomic tools to understand symbiont-host evolution of deep-sea tubeworms
Yuanning **Li**, Kenneth M. Halanych

10.15 DNA barcoding contributing to new knowledge on diversity and distribution of Polychaeta (Annelida) in Norwegian and adjacent waters
Torkild **Bakken**, Jon A. Kongsrud, Katrine Kongshavn, Eivind Oug, Tom Alvestad, Nataliya Budaeva, Arne Nygren, Endre Willassen

SYSTEMATICS Chair: Chris Glasby

11.00 A solution to going down the rabbit hole of systematics
Kirk **Fitzhugh**
Q & A

11.30 The importance of the Paleo-Tethys Ocean for the evolution of *Stygocapitella* (Parergodrilidae, Annelida)
Torsten **Struck**, Jens Koczula, Dave Stateczny, Christian Meyer, Günter Purschke

11.45 Integrative taxonomy reveals species diversity within *Capitella capitata* complex (Annelida: Capitellidae)
Camila Silva, Victor Corrêa Seixas, Rômulo Barroso, Maikon Didomenico, A. Cecília Amaral, Paulo Cesar **Paiva**

12.00 *Spirobranchus* spp. in the Gulf of Eilat: operculum morphology correlates with habitat selection
Orly **Perry**

12.15 The allure of anachaline polynoids: investigating their phylogenetic positions, unique morphologies, and troglomorphisms
Brett C. **Gonzalez**, Katrine Worsaae

SYSTEMATICS Chair: Markus Böggemann

14.00 Are “cosmopolitan” species an endangered species?
Pat **Hutchings**

14.15 Understanding invasive serpulid polychaetes: integrative taxonomy to the rescue
Elena **Kupriyanova**, Yanan Sun, Eunice Wong, Pat Hutchings

14.30 Mitochondrial genome rearrangements in calcareous tubeworms: what do they mean
Yanan **Sun**, Andre Minoche, Jian-Wen Qiu, Jane Williamson, Elena Kupriyanova

14.45 Ultrastructural and mineralogical diversity of *Hydroides* (Serpulidae) tubes: new insights into an old problem
Alexei **Ippolitov**, Harry ten Hove, Vladimir Kosorukov, Yanan Sun, Elena Kupriyanova

15.00 Unrecognized diversity within the scaleworm *Polyeunoa laevis* (Annelida: Polynoidae)
Victoria **Bogantes**, Kenneth Halanych

15.15 Diversity of polynoids (Polynoidae: Polychaeta) from Pacific and Southern Oceans
Paulo **Bonifácio**, Lenka Neal, Lenaick Menot

SYSTEMATICS Chair: James Blake

16.00 Cossuridae: review of current state of knowledge on taxonomy, morphology and phylogeny
Anna **Zhadan**, Elena Vortsepneva, Alexander Tzvetlin

16.15 In the Footsteps of Meredith Jones - Knowledge of the Magelonidae
Kate **Mortimer**

16.30 A new species of *Cirrophorus* (Annelida: Paraonidae) from the Mediterranean Sea, with taxonomic notes on the genera *Cirrophorus*, *Paradoneis* and *Paraonides*
Joachim **Langeneck**, Michele Barbieri, Ferruccio Maltagliati, Alberto Castelli

16.45 Review of *Axionice–Pista* complex (Polychaeta, Terebellidae)
Igor **Jirkov**, Martha Leontovich

17.00 Integrative taxonomy and the species problem in lugworms
Teresa **Darbyshire**

Tuesday 2nd August 2016

PHYLOGENY Chair: Damhnait McHugh

- 09.00 Annelid Phylogeny
Kenneth M. **Halanych** et. al. (Wormnet II consortium)
-
- 09.25 Phylogenomic analyses of *Clitellata* clarify relationships and illuminate genomic changes behind major habitat transitions
Frank **Anderson**, Christer Erséus, Sam James, Bronwyn Williams, Kevin Horn, Scott Santos, Ken Halanych
- Q & A
-
- 10.00 The impact of fossil data on annelid phylogeny inferred from discrete morphological characters
Luke **Parry**, Gregory Edgecombe, Jakob Vinther, Danny Eibye Jacobsen
-
- 10.15 Worm tubes from ancient hydrothermal vents and cold seeps – towards an improved identification
Magdalena N. **Georgieva**, Crispin T. S. Little, Jonathan S. Watson, Mark A. Sephton, Alexander D. Ball, Adrian G. Glover

PHYLOGENY Chair: Torsten Struck

- 11.00 Molecular phylogeny of bamboo worms (Annelida: Maldanidae)
Genki **Kobayashi**, Ryutaro Goto, Shigeaki Kojima
-
- 11.15 Phylogenetic study of the family Capitellidae (Annelida) in Japan
Shinri **Tomioka**, Hiroshi Kajihara
-
- 11.30 On the evolution of Spionidae (Annelida)
Vasily **Radashevsky**, Victoria Pankova, Vasily Malyar, Tatyana Neretina
-
- 11.45 Phylogeny and evolution of mitochondrial genomes in Polynoidae
Yanjie **Zhang**, Jin Sun, Jian-Wen Qiu
-
- 12.00 Diversity and phylogeny of *Diopatra* bristle worms (Onuphidae, Annelida) from West Africa
Martin **Hektoen**, Nataliya Budaeva

ECOLOGY Chair: Ruth Barnich

- 13.45 Invasion of the genus *Marenzelleria* (Polychaeta: Spionidae) into the Don River mouth and the Taganrog Bay: morphological and genetic study
Vitaly **Syomin**, Andrey Sikorski, Ralf Bastrop, Boris Stradomski, Elena Fomina, Dmitry Matishov
-
- 14.00 Spatial distribution and sympatry occurrence of *Marphysa* spp. (Eunicidae) in Morib mangrove, Malaysia
Izwandy **Idris**, Muta Harah Zakaria, Japar Sidik Bujang, Aziz Arshad
-
- 14.15 Cryptic dispersal as a driver of genetic connectivity in a shell boring polychaete (Annelida: Spionidae).
Andrew **David**, Benjamin Loveday, Conrad Matthee, Carol Simon
-
- 14.30 Microplastics ingestion by Nereidid, Onuphid and Capitellid polychaetes at Terengganu, peninsular Malaysia
Yusof Shuaib **Ibrahim**, Sabiqah Tuan Anuar, Nurizzati Zulnaidi
-
- 14.45 Insights into the genetic flow and the phylogenetic relationships of a new phyllodocid from the shallow-water Southern Ocean
Carlos **Leiva**, Ana Riesgo, Conxita Avila, Greg Rouse, Sergi Taboada
-
- 15.00 Particle selection and feeding behavior in two cirratulid polychaetes
Wagner **Magalhães**, Julie Bailey-Brock

METHODOLOGY Chair: Torkild Bakken

- 15.45 The DNA Barcode reference library of Korean Polychaetes
Hana **Kim**, Jung Ho Lee, Hyun-Chool Shin, Jin-Woo Chio, Byoung-Seoul Koh, Gi-Sik Min, Youn-Ho Lee
-
- 16.00 Experiences after three years of automated DNA barcoding of Polychaeta
Katrine **Kongshavn**, Jon Anders Kongsrud, Torkild Bakken, Tom Alvestad, Eivind Oug, Arne Nygren, Nataliya Budaeva, Endre Willassen
-
- 16.15 Micro-CTlab: A web based virtual gallery of biological specimens using micro-computed tomography (micro-CT)
Kleoniki Keklikoglou, Evaggelia Chatzinikolaou, Sarah Faulwetter, Irene Filiopoulou, Alexandros Gougousis, Nikitas Michalakis, Nikos Minadakis, Emmanouela Panteri, George Perantinos, Christos **Arvanitidis**
-
- 16.30 Next-generation histology as a tool in Annelid morphology
Ekin **Tilic**, Patrick Beckers
-
- 16.45 AMMA-IP3: Indo-Pakistan Polychaeta (Annelida) Portal
Mathan **Magesh**, Javed Mustaquim, Elena K Kupriyanova, Paul W. Kingsley, Paulo Roberto Pagliosa
-
- 17.00 How to get funding to do polychaete taxonomy, and some new data from the deep-sea Pacific
Adrian **Glover**, Thomas Dahlgren, Helena Wiklund

Thursday 4th August 2016

BIODIVERSITY Chair: Daniel Martin

- 09.00 **The Vema Fracture Zone – a bridge through the Middle Atlantic Ridge?**
Theresa **Guggolz**, Angelika Brandt, Karin Meißner, Lidia Lins
- 09.15 **Marine Intertidal Polychaetes of Kuwait**
Manal **Al-Kandari**, Zainab Sattari, Vasily Radashevsky, Elena Kupriyanova and Anna Zhadan
- 09.30 **Functional biodiversity of marine soft bottom polychetes in two Mediterranean coastal areas**
Federica **Nasi**, Rocco Auriemma, Tamara Cibic, Paola Del Negro, Erik Bonsdorff, Marie Nordström
- 09.45 **Macrobenthic Polychaetes along the Continental Shelf of Southwest and Southeast Coast of India**
C K **Smitha**, Rosamma Philip, R. Damodaran
- 10.00 **NIS surveys: polychaete diversity in San Francisco bay, California (USA)**
Erica **Keppel**, Andy L. Chang, Michelle L. Marraffini, Leslie Harris, Gregory Michael Ruiz
- 10.15 **Benthic index development for Barnegat Bay, USA based on three years of macrofaunal data**
Gary L. Taghon, Patricia A. **Ramey**, Charlotte M. Fuller, Rosemarie F. Petrecca, Judith P. Grassle

BIODIVERSITY & ECOLOGY Chair: Gordon Paterson

- 11.00 **A preliminary investigation on Macrobenthic Polychaete community structure in intertidal habitats along the south Andaman coast, India.**
Raj Kiran **Lakra**, Jawed Equbal, Savurirajan Muthulingam, Kunal Satyam, Ganesh Thiruchitrabalam
- 11.15 **Spatio-temporal analysis of benthic polychaete community structure in northwestern coast of Baja California, Mexico**
Arturo **Alvarez-Aguilar**, Verónica Rodríguez-Villanueva, Vincio Macías-Zamora
- 11.30 **Establishing an Ecological Baseline of Infaunal Community Assemblages in Nearshore Sediments of Southeast Florida**
Candace **Grimes**
- 11.45 **Community Ecology of Polychaeta (Annelida) in Soft Bottom Macrobenthos of Southern South China Sea**
Noor Shahida **Rosli**, Zainudin Bachok
- 12.00 **Soft-bottom macroinvertebrate communities from the shallow waters of Deception Island (South Shetland Islands, Antarctica)**
Conxita **Avila**, Carlos Angulo-Preckler, Carlos Leiva, Sergi Taboada
- 12.15 **Serpulids and bryozoans from submarine caves of the Eastern Mediterranean**
Rossana **Sanfilippo**, Antonietta Rosso, Vasilis Gerovasileiou
- 12.30 **High diversity of Syllidae from Chilean Patagonia: new species and records found inside *Chaetopterus variopedatus* tubes**
Eulogio **Soto**, Guillermo San Martín

MORPHOLOGY Chair: Daniel Dauer

- 14.00 **Does sessility simplify nervous systems? A case study in Annelida**
Patrick **Beckers**, Thomas Bartolomaeus
- 14.15 **Nervous system diversity in interstitial Syllidae**
Hannah **Schmidbaur**, Thomas Schwaha, Gerhard Steiner
- 14.30 **Detailed reconstructions of the brain structure and neurotransmitter reactivity in three species of meiofaunal Dinophilidae (Annelida) reveal unexpected high organizational variation**
Alexandra **Kerbl**, Markus Conzelmann, Gáspár Jékely, Katrine Worsaae
- 14.45 **Functional evidence for the parenteral nourishment in the gutless polychaete *Astomus taenioides* (Annelida, Protodrilida)**
Günter **Purschke**, Isabel Dykstra, Claude Jouin-Toulmond
- 15.00 **Fine structure of polychaete tubes in Maldanidae (Annelida)**
Tatiana **Shcherbakova**, Maria Mardashova, Olga Sokolova, Alexander Tzvetlin
- 15.15 **A closer look at tomopterid biology: fluid and swimming mechanics**
Karen **Osborn**, Nadege Aoki, Natalia Mushegian, Kakani Katija
- 15.30 **Exploring functional morphology and its inference on the distribution of Sabellariidae**
Larisse **Faroni-Perez**
- 15.45 **Stylet jaws of the Chrysopetalidae (Annelida: Phyllodocida)**
Charlotte **Watson**, Sarah Faulwetter

POSTER SESSION

16.00 - 17.15 Official poster session

Friday 5th August 2016

REPRODUCTION & LARVAL ECOLOGY Chair: Christina Gambi

- 09.00 The fertilization process, oviposition behavior and larval development of *Nereis vexillosa* (Annelida:Polychaeta)
Dazuo **Yang**
- 09.15 Strategic plasticity: Reproductive periodicity and gamete development of an invasive fanworm, *Sabella spallanzanii*
Aria **Lee**, Katherine Dafforn, Emma Johnston, Pat Hutchings
- 09.30 New discoveries in onuphid reproduction – surprising, intriguing, bizarre
Andrés **Arias**, Hannelore Paxton
- 09.45 A transcriptomic approach to Syllid (Annelida) reproduction
Patri **Álvarez-Campos**, Gonzalo Giribet, Ana Riesgo
- 10.00 Cryptic diversity and colonization processes in *Ophryotrocha* inhabiting mammal bones in the shallow-water Mediterranean Sea
Sergi **Taboada**, Carlos Leiva, Maria Bas, Nancy Schult, Damhnait Mchugh
- 10.15 Metamorphosis and settlement of the intertidal tubeworm *Spirobranchus cariniferus* (Gray 1843)
Robert Paul **Wolf**, Nicole E. Phillips

DEVELOPMENT Chair: Pat Hutchings

- 11.00 Structure and formation of coelomic cavities in Annelida
Thomas **Bartolomaeus**, Björn Quast, Markus Koch
- 11.15 Larval Development of Polychaeta from the Northern California Coast VI. Additional Species from Laboratory Cultures and Plankton together with the Seasonal Occurrence of Planktic larvae over a 6-year period
James A. **Blake**
- 11.30 Enigmatic freshwater freaks: larval development of *Caobangia billeti* Giard 1893 (Fabriciidae)
Glafira **Kolbasova**, Alexander Tzvetlin
- 11.45 Establishing a syllid model species – gene expression studies in *Typosyllis antoni*
Christoph **Bleidorn**, Maria Teresa Aguado
- 12.00 The larval neuroanatomy of basally branching annelids (Oweniidae and Magelonidae)
Conrad **Helm**, Ioannis Kourtesis, Harald Hausen
- 12.15 The development of *Thalassema thalasseum* (Echiura) provides novel insights into the evolution of trochophore larvae
Joern **von Doehren**, Ekin Tilic

POLYCHAETE STUDIES Chair: Susan Chambers

- 14.00 Bait collecting activity in the Knysna estuary, 20 years on
Carol **Simon**, Alheit Du Toit, Louw Claassens, Frances Smith, Peter Smith, Kyle Smith
- 14.15 Diversity of venom cocktails and unexpected neurotoxin expression in the venomous Glyceridae
Sandy **Richter**, Lahcen I. Campbell, Giampietro Schiavo, Christoph Bleidorn, Ronald A. Jenner
- 14.30 Transcriptome-based molecular characterization of venom in amphinomids (Annelida, Amphinomidae)
Aida **Verdes**, Danny Simpson, Mandë Holford
- 14.45 Spatial and temporal interrelations of isotropic and oriented structures of spirorbin tubes (Serpulidae)
Alexei **Ippolitov**, Alexander Rzhavsky
- 15.00 Tigers into the blue: Territorial attacks in the chaetopterid associated polynoid *Ophthalmonoe pettiboneae*
Daniel **Martin**, Temir A. Britayev

INTERNATIONAL POLYCHAETOLOGY ASSOCIATION

- 15.15 - 16.30 International Polychaetology Association Meeting & next conference bids

List of Posters

- 1 ***Pseudopolydora* (Annelida, Spionidae) from the Arabian Gulf, Kuwait**
Manal **Al-Kandari**, Vasily Radashevsky
- 2 **New records of polychaetes from Kuwait**
Manal **Al-Kandari**, Anna Zhandan
- 3 **Diversity and species distributions of *Glyceriformia* in shelf areas off western Africa**
Lloyd **Allotey**, Akanbi Bamikole Williams, Jon Anders Kongsrud, Tom Alvestad, Katrine Kongshavn, Endre Willassen
- 4 **Systematics and evolution of *Trypanosyllis* and the case of its pseudo-cryptic type species *Trypanosyllis krohnii* (Annelida, Syllidae)**
Patricia **Álvarez-Campos**, Gonzalo Giribet, Guillermo San Martín, Greg Rouse, Sergi Taboada, Carlos Leiva, Ana Riesgo
- 5 **The *Syllis gracilis* species complex: a molecular approach to a difficult taxonomic problem (Annelida, Syllidae)**
Patricia **Álvarez-Campos**, Gonzalo Giribet, Ana Riesgo
- 6 ***Eclysippe* Eliason, 1955 (Annelida, Ampharetidae) from the North Atlantic with the description of a new species from Norwegian waters**
Tom **Alvestad**, Jon Anders Kongsrud, Katrine Kongshavn
- 7 **Onuphid polychaetes associated with *Cymodocea nodosa* meadows of La Gomera (Canary Islands, NW Africa) – new species and new records from the eastern Atlantic**
Andrés **Arias**, Jorge Núñez, Hannelore Paxton
- 8 **Redescription and ontogeny of the controversial eunicid *Marphysa saxicola* Langerhans, 1881**
Andrés **Arias**, Jorge Núñez
- 9 **Shallow-water *Osedax* (Annelida, Siboglinidae) from Antarctic, Subantarctic, and Mediterranean waters**
Conxita **Avila**, Sergi Taboada, Ana Riesgo, Maria Bas, Miquel A. Arnedo, Javier Cristobo, Greg W. Rouse
- 10 **Diversity of the genus *Malmgrenia* McIntosh, 1874 in the NE Atlantic re-assessed**
Ruth **Barnich**, Anna Dietrich, Tajana Hager, Dieter Fiege
- 11 **On the genus *Branchamphinome* (Polychaeta: Amphinomidae), with a description of a new species from the Southwestern Atlantic and emendation of the genus**
Rômulo **Barroso**, Natalia Ranauro, Jerry Kudenov
- 12 **The evolution of the nervous systems in Annelida in the light of current molecular phylogenies**
Patrick **Beckers**, Thomas Bartolomaeus
- 13 **Non-invasive identification of tomopterids and genetic validation of northeast Pacific species**
Leann **Biancani**, Karen Osborn
- 14 **Abyssal *Glyceriformia* (Annelida) from the ANDEEP expeditions**
Markus **Böggemann**,
- 15 **Morphological analysis of *Perinereis nuntia* (Annelida: Nereididae) of Iran suggests restricted gene flow between Persian Gulf and Gulf of Oman populations**
Alieh Bonyadi Naeini, Hassan Rahimian, Nasrullah Rastegar-Pouyani, Christopher J. **Glasby**
- 16 **Functional changes in polychaete assemblages subjected to contaminants from industrial effluent discharges in Norwegian fjords**
Gunhild **Borgersen**, Eivind Oug, Hilde Cecilie Trannum
- 17 **Genetic investigations into cryptic diversity, biogeography and the trophic traits of deep-sea Antarctic polychaetes**
Madeleine Brasier, Rachel Jeffreys, Adrian **Glover**, Katrin Linse, Henry Ruhl

-
- 18 Lumping and splitting at once: the interesting case of *Ephesiella* and *Sphaerodorum* (Sphaerodoridae, Annelida) in the North East Atlantic
Maria Capa, Joan Pons, Torkild **Bakken**, Arne Nygren
- 19 On some Terebelliform polychaetes from deep waters in the SW Atlantic Ocean
Orlemir Carrerette, João M. **Nogueira**
- 20 A new species of *Bispira* (Polychaeta: Sabellidae) from the Alboran Sea (SW Mediterranean Sea)
Diego **Cepeda-Gómez**, Patricia Lattig
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Presentations

Marine Intertidal Polychaetes of Kuwait

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Thirty intertidal and six subtidal transects throughout Kuwait's coastal zone, including five islands, were sampled qualitatively and quantitatively during late autumn and winter seasons from December 2013 to March 2016. All samples have been processed for fauna ≥ 0.5 mm, and sorted to the lowest possible taxon. Intertidal areas ranged from < 100 to > 1000 m, and consisted of hard, rocky or muddy substrata or combinations of sand, mud, and rocky substrata. To date, 618 macrofauna taxa have been identified as follows: 32 % crustaceans, 30 % mollusks, 29 % polychaetes, 4 % fishes, 1.9 % echinoderms, 1.6 % anthozoans, 0.7 % Porifera, 0.5 % Sipuncula, and 0.3 % Nemertea. Polychaetes represent the third most diverse group with 179 species belonging to 48 families. With 17 species, Nereididae and Spionidae were the most species-rich polychaete families. Nereidid species often dominated rocky substrata, but were also common in sandy and muddy sediments. Six species of Eunicidae and eight species of Serpulidae were very common on rocky substrata. Paraonidae and Cirratulidae characterized muddy areas, while Capitellidae, Glyceridae, Paraonidae, Saccocirridae, Syllidae were most common in sandy beaches. Five families of polychaetes are new to the Arabian Gulf: Nerillidae, Protodrilidae, Paralacydonidae, Polygordiidae, and Sphaerodoridae. Fifty-four (30%) of the identified polychaete species are new to the Arabian Gulf. Species identifications are ongoing.

THURS - 09.15 - BIODIVERSITY

Spatio-temporal analysis of benthic polychaete community structure in northwestern coast of Baja California, Mexico

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The aim of this study was to characterize and analyze for the first time the spatial-temporal patterns of polychaete community structure and to identify potential evidence of environmental impact from point sources of wastewater discharge in a continental shelf area off the northwestern coast of Mexico within the Southern California Bight (SCB) region. A total of 229 benthic stations were sampled along a regional-scale area covering 120 km off the coast in autumn 1998, 2003 and 2013. The samples were collected using a van Veen grab (0.1m²) at depths ranging between 15-500 m. A total of 58,810 polychaetes representing 44 families were identified. The families with highest abundances were Spionidae, Maldanidae, Cirratulidae, Chaetopteridae and Onuphidae. Total abundance and richness of polychaetes families increased temporally in the majority of the region. We registered an increase in abundance of opportunistic polychaetes and therefore a decrease of family richness near discharge wastewaters mainly at the northernmost section of the study area. However high values of diversity (H') were found for most of the area. BEST-BIOENV analysis suggest that depth, % Organic Carbon, Cu, Cr, Fe, Mn and Zn best explain polychaete community patterns. PERMANOVA analysis indicates that the changes over spatio-temporal community structure of benthic polychaetes and environmental parameters had temporally significant differences. We concluded that the 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.

THURS - 11.15 - BIODIVERSITY & ECOLOGY

A transcriptomic approach to Syllid (Annelida) reproduction

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Syllid squizogamous reproduction is unique in the animal kingdom. When the breeding season approaches, a peculiar structure resembling the adult that containing the gametes, called a stolon, is formed in the posterior part of the adult. When these mature, they detach and the gametes are released into the water column. Under natural conditions, the stolonization is synchronized in different species, and it is under environmental and endogenous control, probably via endocrine regulation from the prostomium and proventricle. Here, we used a transcriptomic approach to identify and characterize differential gene expression of reproduction-related genes in the stolon vs. somatic part of reproductive and non-reproductive adults of *Syllis magdalena*. Two reference transcriptomes were *de novo* assembled: one from non-reproductive individuals (prostomium, proventricle, and the final segments) and another from reproductive individuals (same tissues and also female and male stolons). Transcriptomes were annotated with BLAST and BLAST2GO. Differential gene expression analyses of the different tissues sequenced were made with DESeq2. Our results show 22 genes differentially expressed between the anterior and final segments of reproductive individuals, including upregulation of the gene *insulin related peptide 2 neuropeptide precursor* in the prostomium, which mediates reproductive growth in nematodes. Between female vs. male stolons, 896 genes mostly related to gametogenesis were differentially expressed (127 genes upregulated in females, and 769 upregulated in males). Our results shed light into the molecular basis underlying squizogamous reproduction in syllids and provide important information of previously uncharacterized genes in this understudied group of annelids

FRI - 09.45 - REPRODUCTION & LARVAL ECOLOGY

Phylogenomic analyses of Clitellata clarify relationships and illuminate genomic changes behind major habitat transitions

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Clitellata comprises approximately ten thousand extant species of primarily freshwater and terrestrial annelids, including the familiar, ecologically and economically important earthworms and leeches. Monophyly of Clitellata has long been well supported, but relationships among the major clitellate subclades have not been thoroughly resolved. Annelida is one of the few animal phyla to undergo freshwater and terrestrial radiations; a robust phylogeny for Clitellata could provide the framework to explore evolutionary and genetic processes underlying their undeniable success. As part of the WormNet II project, we used transcriptomes from ~100 clitellate species representing nearly all subclades—earthworms, leeches, branchiobdellidans, enchytraeids, lumbriculids, haplotaxids, nauidids and phreodrilids—along with several polychaete outgroups to infer phylogenetic relationships across Clitellata. We recover strong support for most major subgroups, and confirm most higher-level relationships seen in previous studies, including a clade comprising leeches, branchiobdellidans and lumbriculids. One major exception is our recovery of a close relationship between earthworms and haplotaxids. Within the context of the reconstructed topology, transcriptome data show evidence of expansions of key osmoregulatory gene families (e.g., the sodium-potassium ATPases) early in clitellate evolution, concomitant with a transition from marine to freshwater habitats. Further exploration of these data in a phylogenetic context should yield substantial new insight into the evolution and diversification of the largest clade of annelids.

TUES - 09.25 - PHYLOGENY

New discoveries in onuphid reproduction – surprising, intriguing, bizarre

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Members of the family Onuphidae are mostly tubicolous polychaetes extending worldwide from intertidal to abyssal depths. Reproductive strategies range from broadcast spawning to brooding in the parental tube or attached egg sacs, rarely viviparity. Oocytes are relatively large; development is either by lecithotrophic planktonic larvae or direct development, often with brood care. The sexes were generally regarded as separate; however, we recently discovered hermaphroditism in species of the genus *Diopatra* that were previously considered dioecious. We observed simultaneous hermaphroditism in *D. marocensis* and *D. biscayensis*, with the latter passing through a previous adolescent male phase, and sequential hermaphroditism of the protandrous

type in *D. neapolitana*, suggesting that the hermaphroditic condition may be widespread among this genus. It is intriguing that some *D. neapolitana* specimens, in an intermediate phase as simultaneous hermaphrodites, have dorsal paired papillae on branchial segments that store sperm ("spermaducal papillae"). These papillae act as seminal vesicles, storing own sperm, and also as sperm ducts, providing additional exit routes. A bizarre example is the discovery of a brooding *Rhamphobranchium brevibrachiatum* with a sperm capsule attached to its tube. The capsule contained long, thin spermatophores of a type not previously known for onuphids and leaves us at a loss trying to predict the sperm transfer method.

FRI - 09.30 - REPRODUCTION & LARVAL ECOLOGY

Soft-bottom macroinvertebrate communities from the shallow waters of Deception Island (South Shetland Islands, Antarctica)

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Deception Island (South Shetland Islands) is an atypical spot in the Antarctic context, because it is a still active volcano with a submerged caldera. Although, the waters of its enclosed bay, Port Foster, have been extensively studied from 40 m down, little is known about the macrozoobenthic composition of its shallower waters. The aim of this study was to characterize the so far unexplored soft-bottom marine macroinvertebrate communities living within the first few meters of water in Port Foster. Eight sampling stations were selected, and three replicates per station and depth (5 and 15 m) were collected by SCUBA diving using 0.008 m² corers. Six clusters of samples were distinguished, showing a high heterogeneity in the composition of the shallow-water macrofauna. This heterogeneity did not appear to be correlated to the proximity of the sites to the open sea or the depth zonation, neither to the sediment type or the organic matter content. Overall, the assemblages within each cluster were generally dominated by highly abundant opportunistic species, including the annelids *Capitella perarmata*, *Mesospio moorei*, *Leitoscoloplos kerguelensis*, *Apistobranchus glaciera*, and *Aphelochaeta cincinnata*, the amphipod *Cheirimedon femoratus*, and the bivalve *Yoldia eightsi*. The remarkably high densities reported in several of the stations, suggest that the shallow-water environment of Port Foster is highly productive. In the light of these results, we propose a general trophic web for the shallow-water areas of Port Foster linking the unusually high densities of macroinvertebrates with the also elevated occurrence of megafaunal echinoderms present in this area.

THURS - 12.00 - BIODIVERSITY & ECOLOGY

DNA barcoding contributing to new knowledge on diversity and distribution of Polychaeta (Annelida) in Norwegian and adjacent waters

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DNA barcoding is becoming an integrated part of taxonomic practice in biodiversity research. Barcoding helps in resolving species complexes and is instrumental for detecting cryptic and pseudocryptic species. In recent studies from Norwegian and adjacent waters, DNA barcoding has been used in an explorative approach to examine polychaete diversity and distribution patterns. More than 2300 specimens representing over 530 species have been barcoded from northern seas. Integrated with careful morphological studies, DNA barcoding has significantly contributed to species discrimination and provided new knowledge on diversity and distribution patterns. In particular, presences of unrecognised species among thought-to-be well known species, unexpected species distributions, and strong species changes from shelf to deep-sea environments have been revealed. For several groups of species a particularly high diversity in mitochondrial haplotypes was detected. Case studies are presented to demonstrate new knowledge in both diversity and species distribution. Most new data indicate that species richness among closely related sympatric species in Norwegian waters is considerably higher than presently known. Though, species distributions coincide with prevailing oceanographic regimes. In contrast, some species are confirmed to have large-distance distributions spanning from Arctic to Lusitanian areas, and crossing generally established biogeographical zones. The new knowledge is important for environmental baseline studies, impact assessments and trend monitoring with respect to future development of petroleum exploitation, fisheries, seabed mining, and climatic change that rely heavily on high taxonomic resolution. Enabling DNA barcoding in such studies will be important as a tool for identification, but also as a backbone in environmental barcoding.

MON - 10.15 - DEEP SEA

Structure and formation of coelomic cavities in Annelida

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Annelids possess paired, segmentally arranged coelomic cavities. The coeloms are lined by myoepithelia that also represent the body wall (somatic) and intestinal (visceral) musculature. A distinct peritoneal lining, if present, is restricted to the somatic wall of coelomic cavities. A coelomic lining independent of the body wall and gut musculature does not exist in polychaetes. Coelomogenesis starts from caudally located, polarized mesoderm that differs in structure between larvae and juveniles, a fact long known as heteronomy. In late larvae the caudal mesoderm tapers into two ventro-lateral cones consisting of undifferentiated, polarized mitotically active cells. At a certain time during ontogenesis the posterior-most cells differentiate into a perianal sphincter. Their anterior neighbours then start mitoses to generate a band of polarized cells that becomes serially subdivided into blocks of epithelialized cells by ECM. While the myofilament content increases, fluid accumulates to form coelomic cavities between the epithelia. In some species these lining cells differentiate into peritoneal and fiber muscular cells that may become layered by some ECM formed later during ontogenesis. Our study provides evidence that epithelio-muscle cells are consistently the first coelomic lining that occurs during coelomogenesis. As such it is retained in the organization of mesenteria, dissepiments and transversal muscles as well as in the visceral muscular system. We assume that such a lining represents the primary state in annelids, an assumption that is supported by the recent molecular phylogenies since such lining is also found in adults of basally branching annelids.

FRI - 11.00 - DEVELOPMENT

Does sessility simplify nervous systems? A case study in Annelida

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Ascidian tunicates are a prominent example for a strict correlation between simplification of the nervous system and sessility. Some authors recently regarded this correlation as a causal relation assuming that sessility results in simplified nervous systems. Vagile animals are accordingly expected to have a more complex neuroanatomy. Annelids are ideal to test these assumptions. Recent phylogenomic analyses show that sessility is an ancestral trait, maintained in the basal most branching tubicolous annelids, like in oweniids. According to these analyses certain higher annelid taxa, like sabellids, secondarily returned to sessility. By comparing the brain structures of these taxa, one would expect (1) that the brain structure of vagile species is more complex than that of sessile species and (2) that secondary sessility simplifies the brains structure, probably in such way that it is similar to primarily sessile species in terms of character reversals. We therefore generated complete series of Azan-stained histological sections of the *cns* of 42 annelid species from different subgroups. We used aligned stacks to reconstruct the anatomy of the central nervous systems and to infer the evolution of this organ system based on recently published molecular phylogenies. We can show that the brain of vagile species turned out to be highly complex, while basally branching sessile groups possess a simple basiepidermal, ring-like brain. In contrast to our expectation secondarily sessile species possess a brain that is far more complex than that in basally branching taxa and which shows more similarities to the *cns* of vagile species.

THURS - 14.00 - MORPHOLOGY

Larval Development of Polychaeta from the Northern California Coast VI. Additional Species from Laboratory Cultures and Plankton together with the Seasonal Occurrence of Planktic larvae over a 6-year period

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Larvae of approximately 80 species were obtained from the vicinity of Tomales Bay, California, over a 6-year period (1971–1976). This study reports on larvae of 15 species in 10 families. *Micronereis nanaimoensis*, *Nephtys caecoides*, *Boccardia berkeleyorum*, *Phragmatopoma californica*, and *Ampharete labrops* were cultured from embryos obtained from laboratory fertilizations or field collected egg masses or capsules. Ten species were obtained from plankton and some were cultured through metamorphosis including *Pectinaria californiensis*, *Mediomastus californiensis*, and *Capitella* sp.; other planktic larvae included *Sthenelais fusca*, *Nephtys californiensis*, *Prionospio pygmaea*, *Polydora pygidialis*, *Polydora spongicola*, *Armandia brevis*, and *Sabellaria cementarium*. A summary table is presented documenting seasonal occurrence in the plankton of 58 species.

FRI - 11.15 - DEVELOPMENT

Establishing a syllid model species – gene expression studies in *Typosyllis antoni*Christoph **Bleidorn**¹, Maria Teresa Aguado²¹ Museo Nacional de Ciencias Naturales, José Gutiérrez Abascal 2, Madrid, Madrid, 28006, Spain² Universidad Autonoma Madrid, Spain

Syllidae are one of the most speciose and taxonomically complex groups within Annelida. The phylogeny is, in comparison to most other annelid families, well-resolved, providing a backbone for comparative approaches. Syllidae are of high interest from an evolutionary point of view due to their variety of body plans, sexual reproductive modes, or their ability of regeneration. However, only few experimental studies regarding these questions are available and so far no syllid has been investigated on the level of gene expression. *Typosyllis antoni* is a recently described syllid with schizogamic reproduction and the ability to regenerate both ends of the body, which can be easily kept in aquaria. Here we present our results of analysing transcriptomic resources of this species based on RNAseq data from deep Illumina sequencing. We will show results from analyses of selected gene families, as well as the first established *in situ* hybridization studies of syllids in general. We outline how the establishment of a syllid model organism can be used to tackle various evolutionary developmental questions with focus on the evolution of body plans and reproductive modes.

FRI - 11.45 - DEVELOPMENT

Unrecognized diversity within the scaleworm *Polyeunoa laevis* (Annelida: Polynoidae)Victoria **Bogantes**¹, Kenneth Halanych²^{1,2} Auburn University, 101 Rouse life Science building, Auburn, Alabama, 36849, United States

Polynoidae is one of the most diverse families of polychaetes, including more than 60 known species reported just for the Southern Ocean. *Polyeunoa laevis* is a scale worm commonly found in the Antarctic waters and usually associated with gorgonians (especially *Thouarella*), but it is also reported from the southwest Atlantic, Magellan and sub-Antarctic regions. This species shows a range of morphological variation making taxonomy confusing and *P. laevis* has been argued to represent a species complex. However, the tip of the neuropodial acicular lobe not extended to supra-acicular process and most of the neurochaetae being unidentate are considered useful characters for species identification. Here, we explore the diversity of *P. laevis* using specimens collected from Southeast Argentina, Antarctic Peninsula and Weddell, Bellingshausen, Amundsen, and Ross Seas. A total of 114 specimens were morphologically examined and sequenced for the COI mitochondrial region. Molecular phylogenetic results recovered 3 clades, two in the Antarctica and one from Argentina. This study suggests some connectivity between the two clades for the Antarctic region which also correspond to differences in the temperature of water masses. Genetic and morphological results show differences between specimens from South Argentina and the Antarctic region. We also conducted a parallel study with *Thouarella* inhabited by *P. laevis*. This study reveals that in both cases current biodiversity in the Southern Ocean for these taxa has been underestimated, although phylogeographic patterns may be different.

MON - 15.00 - SYSTEMATICS

Diversity of polynoids (Polynoidae: Polychaeta) from Pacific and Southern OceansPaulo **Bonifácio**¹, Lenka Neal², Lenaick Menot³¹ IFREMER, REM-EEP-LEP Ifremer, ZI Pointe Du Diable. CS 10070, Plouzané, Bretagne, 29280, France² NHM London, Natural History Museum, Department of Life Sciences, Cromwell Road, London, SW7 5BD, United Kingdom³ IFREMER, REM-EEP-LEP Ifremer, ZI Pointe Du Diable. CS 10070, Plouzané, Bretagne, 29280, France

The family Polynoidae is composed by 21 subfamilies and some of them, such as Macellicephalinae, appear to be restricted to the deep-sea. In the Southern Ocean around 60 polynoid species are known, while in the polymetallic nodule fields of the Clarion-Clipperton Fracture Zone (CCFZ), there is yet no record about polynoid diversity. This study aims to describe and compare polynoids from deep-sea areas: CCFZ in Pacific Ocean (2015, JPIO, 4000-5000m depth); Amundsen Sea (2008, BIOPEARL II, 500-1500m depth), Scotia and Weddell Seas (2002, ANDEEP II-III, 1000-5000m depth) in the Southern Ocean. Samples were collected using mainly an epibenthic sledge. This work includes descriptions of new species based on morphology and molecular data (COI, 16S and 18S genes). The monophyly of the subfamily Macellicephalinae is evaluated and the genetic connectivity for common morphotypes shared among different locations is examined. Among the 43 morphotypes of Polynoidae, the subfamily Macellicephalinae is the most abundant and species rich. New species belonging to the genera *Bathyedithia*, *Bruunilla*, *Bathyfauelia*, *Macellicephalina*, *Macellicephaloides* and *Polaruschakov* have been identified as well as 5 morphotypes which do not fit any of the known genera. In the CCFZ, one of more abundant species, *Bathyfauelia* sp. A, was found in 4 of 5 studied areas, indicating no

evidence for a biogeographic barrier and high connectivity between them, at least 100 km apart from each other. Furthermore, common morphotypes were observed between in the CCFZ and Southern Ocean.

MON - 15.15 - SYSTEMATICS

Giants vs pygmies: two strategies in the evolution of deep-sea quill worms (Onuphidae, Annelida)

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A monophyletic group of deep-sea polychaetes, the quill worms, inhabit organic tubes resembling a quill – the basal part of a bird feather. The tubes are unique among annelids, very firm and light, and possibly evolved as an adaptation to the epibenthic life style. The quill worms have a worldwide distribution, excluding the Arctic, and are divided into three genera: *Hyalinoecia*, *Leptoecia* and the monotypic *Hyalospinifera*. Analyses of five molecular markers support the monophyly of the group and two genera, *Hyalinoecia* and *Leptoecia*, while the position of *Hyalospinifera* cannot be assessed due to unavailability of material for a genetic study. We recognize 14 species within *Hyalinoecia*, including a cryptic species formerly assigned to the 'cosmopolitan' quill worm *H. tubicola* and a new species from the slope depths off Chile. *Leptoecia* comprises nine species including two new species from Australian slope and South Atlantic abyssal depths. Despite a number of morphological similarities, the two genera demonstrate opposite life strategies. *Hyalinoecia* are among the largest polychaetes inhabiting slope depths, reaching up to 40 cm in length. They are capable of crawling on the seafloor surface in search of scattered food sources such as remains of fish or other animals. *Leptoecia* are comparably much smaller organisms having a set of underdeveloped morphological characters shaping their progenetic appearance. Presumably progenesis in *Leptoecia* has evolved as an adaptation to a life at great depths, an extremely nutrition-poor environment highly influenced by seasonal influx of organic matter.

MON - 09.45 - DEEP SEA

Integrative taxonomy and the species problem in lugworms

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Anecdotal evidence from local people in the Falkland Islands suggested that two forms of lugworm (Polychaeta: Arenicolidae) might be present on the shores although only one subspecies *Abarenicola assimilis brevior* Wells, 1963, was currently described for the islands. Reports placed the two forms at different positions on the shore and differing in appearance. Specimens were collected from two sites in 2011 and preserved for both DNA sequencing and morphology. Initial observations showed some tentative differences in morphology but were not conclusive although the genetic results confirmed two distinct species to be present. In 2012 a larger, more widespread population study was carried out. The molecular results showed the original identifications based on habitat and superficial appearance to be mostly incorrect but enabled investigation of the related voucher specimens that eventually led to the detailing of true morphological differences. The genetic results indicated that the two forms were as distinct from each other and from other *Abarenicola* species as other *Abarenicola* species were from each other. They were therefore given the status of species and not subspecies as would fit the current system of subspecies erected by Wells in 1963. Wells himself suggested in his 1963 paper that the subspecies he had described might well represent full species, but did not feel that the morphological evidence was strong enough at that time. He even suggested that genetic evidence in the future might prove them to be distinct as now seems likely. New observations, both morphological and molecular, of other *Abarenicola* subspecies could now help to resolve the true status of these forms.

MON - 17.00 - SYSTEMATICS

Cryptic dispersal as a driver of genetic connectivity in a shell boring polychaete (Annelida: Spionidae).

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Larval dispersal plays a crucial role in influencing the evolutionary potential of many marine species, where it governs demographics and population structure. In the current study, we used a phylogeographic and modeling approach to quantify the dispersal capabilities of the oyster pest, *Polydora hoplura* in South Africa and we attempted to reconstruct its dispersal history in the region.

Populations were sampled from seven localities and a fragment of the mtDNA gene, Cyt b and the nuclear intron, ATP5a was amplified. A high resolution ocean model of the South African coast was constructed using the Regional Ocean Modeling System (ROMS) and larvae were represented by passive Lagrangian drifters that were deployed at selected sites on the coast. The results showed low genetic structure (ϕ -st: 0.04 for both markers) between two major marine biogeographic regions which was indicative of high connectivity. However, our model found limited movement around Cape Point with 0 connectivity between west coast and south/south east coast sites and less 50% connectivity in the opposite direction. We attributed the discordance in connectivity patterns to cryptic dispersal and propose that consistent anthropogenic movement via multiple vectors could be overestimating genetic connectivity in *P. hoplura*. As globalization continues, it is likely that genetic homogenization of spatially separated populations will continue, possibly reducing the evolutionary potential of certain species.

TUES - 14.15 - ECOLOGY

The development of *Thalassema thalasseum* (Echiura) provides novel insights into the evolution of trochophore larvae

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The lophotrochozoan clade Echiura (spoon-worms) comprises non-segmented, mainly deposit-feeding, marine worms. While originally having been considered a separate phylum echiurans are nowadays recognized as derived part of the annelid radiation based on several molecular phylogenetic analyses. Most recent analyses of the development of the nervous system have lent morphological support to this hypothesis. As in Annelida, the ventral nerve cord develops in an anterior to posterior progression as a metamerically arranged, initially paired primordium that fuses later in development. The ancestral type of development in Echiura, however, is presently unclear. The last common annelid ancestor is assumed to have had a trochophore larva with an apical organ comprising few serotonergic and FMRFamideergic flask-shaped cells and trochal neurite bundles also showing serotonergic and FMRFamideergic immuno-reactivity underlying the trochal band of elongated cilia. However, considerable variation due to differing life history strategies is seen in recent annelid species. While echiuran species show both lecithotrophic and planktotrophic development a representative of their assumed closest relative, *Capitella teleta* develops via a lecithotrophic larva. Investigation of the development of a basal representative of Echiura, *Thalassema thalasseum* reveals considerable differences to other echiuran species. While there are correspondences to *C. teleta* that support the assumed close affiliation of Echiura to Capitellidae the data also suggest that unlike in *C. teleta*, the ancestral mode of development in Echiura was via a planktotrophic trochophore larva.

FRI - 12.15 - DEVELOPMENT

Exploring functional morphology and its inference on the distribution of Sabellariidae

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Sabellariids occurs from deep to intertidal seas. Although they have been considered by several studies, some morphological traits and behaviours are poorly understood. For instance, recent advances have demonstrated sensorial organs and their relationship with life-traits. Moreover, the shape of the operculum has a phylogenetic signal. However, no study has evaluated how the traits of operculum relate to adaptive radiations across habitats. Here, the aims were 1) to understand if different opercular forms and paleae would promote differences in their effectiveness for tube sealing, and if such morphological variability can be useful for understanding evolutionary radiation into different habitats; and 2) to report new morphological traits and behaviour in *Sabellaria alveolata*. A literature review of sabellariids was used to create a dataframe of their distribution and opercular traits. Afterward, the opercular traits and tube sealing behaviour of two intertidal species with different opercular shapes (*Phragmatopoma caudata* and *S. alveolata*) were investigated. These traits were assessed using light microscopy, SEM, and observations of live organisms. Results indicated that paleae orientation is the foremost divergence among sabellariids from intertidal and deep seas, and it could function as a key morphological feature for living between tides; likewise fused opercular lobes may be another adaptation. However, *S. alveolata* close their tube openings with sediment at low tide. This behaviour can minimize the environmental stress which intertidal organisms face. Finally, this species has an ability to perceive movements, and potential photoreceptors features are described.

THURS - 15.30 - MORPHOLOGY

A solution to going down the rabbit hole of systematics

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Treating systematics as a field consistent with scientific inquiry requires that inferences of phylogenetic hypotheses have the goal of producing explanations of past causal events that explain differentially shared characters among organisms. Linking observations of characters to inferences occurs by way of our why-questions, which are implied by a data matrix. Because of their form, why-questions require the use of common-cause theories. Such theories in phylogenetic inferences include natural selection and genetic drift. Selection or drift can explain 'morphological' characters but selection cannot be causally applied to sequences since fitness differences cannot be directly associated with individual nucleotides or amino acids. The relation of selection to sequence data is then one of 'downward' or 'top-down' causation from those phenotypes upon which selection occurs. The application of phylogenetic inference to explain sequence data is thus restricted to instances where drift is the relevant theory; those nucleotides or amino acids that can be explained via downward causation are precluded from inclusion in the data matrix. The restrictions on the inclusion of sequence data in phylogenetic inferences also apply to species hypotheses, precluding the more restrictive approach of DNA barcoding. Not being able to discern drift and selection as relevant causal mechanisms can severely constrain the inclusion and explanations of sequence data.

MON - 11.00 - SYSTEMATICS

Worm tubes from ancient hydrothermal vents and cold seeps – towards an improved identification

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Annelids are some of the most conspicuous dwellers of modern vent and seep ecosystems, many of which construct spectacular, primarily organic, dwelling tubes. Tubular fossils are frequently encountered within ancient vent and seep deposits, suggesting the probable occupation of these environments by annelids over long evolutionary timescales. However, while the taxonomy of other animal fossils from vents and seep deposits has been constrained more precisely, that of the annelids has remained largely undetermined due to difficulties in identification, with many tubular fossils referred to simply as 'worm tubes' rather than being assigned to specific modern or fossil lineages. This has hindered our ability to understand the evolutionary history of this major animal lineage within vent and seep environments. This study employs chemical analyses coupled with morphological characterisation and imaging to better constrain the taxonomic affinity of problematic fossil tubes from ancient vents and seeps, through a detailed comparison with modern annelid tubes collected from these environments. Whether tubes possess sufficient diagnostic characters to allow discrimination between different annelid lineages will be discussed, as well as the implications for the evolutionary history of annelids within vent and seep environments.

TUES - 10.15 - PHYLOGENY

How to get funding to do polychaete taxonomy, and some new data from the deep-sea Pacific

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Taxonomy at its heart is the semantic enhancement of the language we use to describe and disseminate all biological knowledge. This alone makes it extraordinarily important in biology. However, this does not seem to be enough to get funding agencies to pay for it. In this talk we will provide some practical tips on the various hooks you can use to get taxonomy funded. This might be useful for those starting out. By way of example, we will review some of the new taxonomic data we are generating from the abyssal Pacific mining exploration claims.

TUES - 17.00 - METHODOLOGY

The allure of anchialine polynoids: investigating their phylogenetic positions, unique morphologies, and troglomorphisms

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Anchialine caves host a suite of uniquely adapted organisms, persisting under extreme environmental conditions, total darkness, limited oxygen, and particular hydrological and biogeochemical parameters. Unbeknown, crustaceans dominate the biodiversity, but continuous investigations have revealed a large and hidden diversity of annelids. Within this diversity are two anchialine polynoids, *Gesiella jameensis* and *Pelagomacellicephala iliffei*, found at opposite sides of the Atlantic and in caves born of significantly different age and geology. Known for over four decades, these polynoids were originally classified within Macellicephalinae, a subfamily known from bathyal/abyssal depths. Of putative deep-sea ancestry, these anchialine taxa exhibit similar morphology, including lack of eyes and pigmentation, elongated sensory appendages, and a swimming lifestyle, all suggested troglomorphic adaptations. Our results are the first to conduct model-based phylogenies with *Gesiella* and *Pelagomacellicephala*, employing phylogenetic generalized linear mixed models (PGLMMs) to test for troglomorphism; furthermore presenting detailed morphological investigation of the unique 'wheeled-organ' of *Gesiella*. While investigations are ongoing, our results suggest this structure aids in chemical sensing, given the voluminous epithelial and glandular cells and the dense nerve network from the band of metachronically beating cilia. Furthermore, our results support the deep-sea ancestry of the anchialine polynoids, recovered within a clade of Macellicephalinae and strictly deep-sea taxa. Both anchialine taxa are recovered sister to each other, indicating a single colonization event into marine subterranean environments before the opening of the Atlantic. PGLMMs also showed significant correlation between environment and dorsal cirri length, supporting this morphology as troglomorphic adaptations to anchialine environments and swimming lifestyles.

MON - 12.15 - SYSTEMATICS

Establishing an Ecological Baseline of Infaunal Community Assemblages in Nearshore Sediments of Southeast Florida

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Nearshore sediments provide a habitat for several phyla of marine organisms that are key components of benthic communities. Establishing ecological baselines for infauna in southeastern Florida is a key component to understanding effects of current and future disturbances. Ecosystem studies in adjacent terrestrial and marine habitats, such as reefs, seagrass beds, and mangroves, help assess and monitor changes due to human population growth, sea level change, and global warming. However, nearshore sediment infaunal communities are neither as thoroughly investigated nor as well understood. Therefore, benthic samples were collected seasonally from six locations from May 2015 to February 2016 using a 7.7-cm PVC corer to examine macroinfaunal composition, richness and diversity in relation to environment, season, and sediment characteristics (e.g., composition and angularity). Results suggest a seasonal shift of grain size distribution which appears to affect infaunal abundance and diversity. This study provides one of the first seasonal baselines for macroinfauna in southeastern Florida.

THURS - 11.30 - BIODIVERSITY & ECOLOGY

The Vema Fracture Zone – a bridge through the Middle Atlantic Ridge?

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During the Vema-TRANSIT (Bathymetry of the Vema-Fracture Zone and Puerto Rico Trench and Abyssal Atlantic Biodiversity Study) expedition from December, 2014 to January, 2015 a transect along the Vema Fracture Zone in the equatorial Atlantic was surveyed and sampled at about 10°N. The Vema Transform is one of the largest fracture zones of the Mid-Atlantic Ridge and is characterized by a large left-lateral offset. Benthic communities of the transect and the abyssal basins on both sides were investigated to examine whether the Vema Fracture Zone serves as a connection allowing faunal exchange through the Mid-Atlantic Ridge. Samples were collected using a camera equipped epibenthic sledge. More than 3200 polychaetes were found in the samples and identified at least to family level until now. However, the most abundant families, Polynoidae and Spionidae were determined to species level. Statistical analyses were performed to gain insights in the dispersal of polychaetes in the abyssal

Atlantic along the Vema Fracture Zone. Based on preliminary results from morphological studies the faunal overlap between species communities in the basins east and west of the Middle Atlantic Ridge is negligible with only a few species occurring on both sides.

THURS - 09.00 - BIODIVERSITY

Annelid Phylogeny

Kenneth M. **Halanych**¹ *et. al.*, [Wormnet II Consortium]

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Annelida is a wonderfully diverse clade of animals that encompasses a broad range of morphologies and life styles. Over the past several years, we have come to understand that this diversity is even greater than we thought with the confirmation that sipunculids, myzostomids, echiurids and siboglinids are all derived annelids. However, our understanding of the annelid tree is still coming into focus. Although the recognized families tend to be well circumscribed, relationships among them are still debated. Phylogenomic studies have begun to reshape our understanding of the annelid tree. Here, as part of the WormNet II project, we conduct a large-scale phylogenomic analysis (based on transcriptomes for hundreds of taxa, comprising hundreds of genes) that spans the diversity of Annelida. We confirm recent analyses that place taxa such as Magelonidae, Owenidae, Chaetopteridae and Amphinoidea and Sipunculida near the base of the tree and consider the implications of this finding for our understanding of annelid evolution. We also assess the support for several higher taxa such as Nereidiformia, Eunicida, Sabellida, Cirratuliformia, Terebelliformia and Spionida. As traditionally conceived, some of these taxa (e.g., Spionida and Sabellida) are not supported by phylogenomic data, and the data offer insight on taxa (e.g. Siboglinidae, Clitellata, Tomopteridae, *Hrabeiella*) that have had variable or uncertain placement. Additionally, this work represents a large amount of genetic data that will be a great resource in exploring various aspects of annelid biology.

TUES - 09.00 - PHYLOGENY

Diversity and phylogeny of *Diopatra* bristle worms (Onuphidae, Annelida) from West Africa

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Diopatra is the most species-rich genus of onuphid bristle worms, with 59 currently recognized species worldwide, distributed in tropical and subtropical waters. The genus has several autapomorphies such as spiral shaped branchiae and serrated limbate chaetae. *Epidiopatra* was erected in the early 1900's as a genus similar to *Diopatra* but lacking peristomial cirri. It was recently proposed to be polyphyletic and merged with *Diopatra*. This study aims to examine the diversity of *Diopatra* worms from West African waters and to trace evolution of morphological characters within the genus. Approximately 900 specimens (including types) from 133 stations were examined in the collections of the University Museum of Bergen, and the Zoological Museum of Hamburg. A molecular analysis was based on two mitochondrial markers (16S rDNA and COI) sequenced for 82 specimens in addition to xx sequences of *Diopatra* and outgroup taxa obtained from GenBank. Bayesian analysis was used to infer the relationships of the species. The monophyly of *Diopatra* with inclusion of the polyphyletic *Epidiopatra* was confirmed. A total of 17 species were found in the study material, 11 species were previously known and six were new to science. The possible species status of additional 11 identified morphotypes could not be confirmed due to insufficient material, but hinting at a large unknown diversity within the genus. Mesquite was used to trace the most parsimonious evolution of selected morphological characters, which led to the discovery of several synapomorphies (ventral parapodia lobes, lateral projections on ceratophores) supporting monophyletic clades within *Diopatra*.

TUES - 12.00 - PHYLOGENY

The larval neuroanatomy of basally branching annelids (Oweniidae and Magelonidae)Conrad **Helm**¹, Ioannis Kourtesis², Harald Hausen³^{1,2,3} Sars International Centre for Marine Molecular Biology, University of Bergen, Thormøhlensgt. 55, Bergen, 5008, Norway

Comparative investigations dealing with neuroanatomy and neural development shed light on conserved developmental mechanisms across various taxa. Concerning annelids, these studies mainly focus on taxa deeply nested within the annelid tree, while basally branching groups are still poorly investigated. According to recent phylogenomic approaches unraveling annelid evolution, Oweniidae and Magelonidae represent the most basally branching annelid clades. Although these groups are thought to exhibit several plesiomorphic characters, adult neuroanatomy and neural development are scarcely studied topics so far. Using a combined morphological approach including immunohistochemistry with subsequent confocal laser scanning microscopy (clsm) and scanning electron microscopy (SEM), we analyzed the ontogeny of different larval stages of the oweniid *Owenia fusiformis* Delle Chiaje, 1844 and the magelonid *Magelona mirabilis* (Johnston, 1865). With special focus on neural development, our study reveals a prominent apical organ formed by flask-shaped perikarya, circumesophageal connectives interconnecting apical and trunk nervous systems, and serially arranged neural structures in the ventral nerve cord of both taxa. Thus, the neural development of oweniids and magelonids seems highly comparable to the larval neuroarchitecture of other annelids. Consequently, our data represent an important basis for further comparative investigations to unravel ancestral patterns of annelid neural development.

FRI - 12.00 - DEVELOPMENT

Are “cosmopolitan” species an endangered species?Pat **Hutchings**¹¹ Australian Museum Research Institute, Australian Museum, 1 William Street, Sydney, NSW, 2010, Australia

Until recently a large number of polychaete species were recorded as being cosmopolitan, as well as Arctic species being recorded from the Antarctic. This was in part due to the use of major regional polychaete studies by people like Fauvel, Day, Hartmann-Schröder in other parts of the world. It was also suggested that because many species have pelagic larvae they could be transported long distances. However increasingly with the use of molecular and detailed morphological examination, such species are being found to represent suites of species. To facilitate this, it is critical to re-examine material from the type locality, as typically no type material was ever deposited, designate a neotype and fully describe it. This then allows previously misidentified species to be re-described as new species with restricted distributions. So these so called “cosmopolitan” species need to be assigned to the extinct list, apart from those which are deliberately introduced or hitch hike around the world by ballast water or hull fouling.

MON - 14.00 - SYSTEMATICS

Microplastics ingestion by nereidid, onuphid and capitellid polychaetes at Terengganu, peninsular MalaysiaYusof Shuaib **Ibrahim**¹, Sabiqah Tuan Anuar², Nurizzati Zulnaidi³^{1,2,3} UNIVERSITY MALAYSIA TERENGGANU, MALAYSIA, School of Marine Science and Environment, University Malaysia Terengganu, Kuala Terengganu, Terengganu, 21030, Malaysia

Setiu Wetlands are known as the largest natural wetlands in the East Coast region of Malaysia Peninsular comprising various ecosystems. Polychaetes are one of the keystone species that have a large effect on the environments. The ingestion of microplastics by polychaetes provides a potential pathway for the transfer of pollutants and plastics additives. The occurrence of microplastics accumulated inside the polychaete species was studied at the natural habitat of Setiu Wetland in Terengganu on October 2015 and February 2016. A total of 34 specimens from three families (Nereididae, Onuphidae, Capitellidae) obtained from rotten *Nypa fruticans* and sediment samples dug with a shovel at 3 sampling sites of Setiu Wetland. The extraction of microplastics was carried out via alkali digestion method (10M of NaOH) and then identified visually according to their physical characteristics; shape, colour and size. Most of the microplastics particles present were found in filament form with sizes less than 5 mm. Additionally other forms (fragments, rounded, flat) also present. Attenuated Total Reflectance Fourier Transformation Infrared Spectroscopy (ATR-FTIR) analysis was carried out to identify the microplastic. Results showed the presence of strong peaks associated to polyamide. The prevalence of microplastics in the wetland was likely due to the placement of houses on the estuary as well as degradation of fishing gears that eventually accumulated in the wetland.

TUES - 14.30 - ECOLOGY

Spatial distribution and sympatry occurrence of *Marphysa* spp. (Eunicidae) in Morib mangrove, Malaysia

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Co-existing organisms exhibit resource partitioning to allow positive growth of each species. *Marphysa* cf. *sanguinea* and *M. moribidii* Idris, Hutchings and Arshad 2014 are two co-existing Eunicids found in Morib mangrove, Malaysia. However, pattern and factors for distribution of these two species are unknown. The study is aimed to determine the spatial distribution pattern and interaction in resource partitioning of both sympatric species. Samplings were conducted in three intertidal zones including upper (UTF), middle (MTF) and lower (LTF) tidal flats. Number of individuals from each species and environmental parameters were determined. The populations of *M. moribidii* in the Morib mangrove was mostly confined in UTF and described by having high percentage of total organic matter; very fine sand, low salinity and pH, and adjacent to stilt roots of *Rhizophora apiculata*. *Marphysa* cf. *sanguinea* was dominant in the LTF and defined as having low percentage of total organic matter; high percentage of fine sand, salinity and pH with no vegetation. However, both *Marphysa* species were found in equal densities at the MTF (transition zone) and exhibited a mixture of both UTF and LTF. However, all specimens were found within the same depth. We suggested that the habitat partitioning between *M. moribidii* and *M. cf. sanguinea* were caused by combination of abiotic (environmental) and biological (competition and predation) requirements.

TUES - 14.00 - ECOLOGY

Ultrastructural and mineralogical diversity of *Hydroïdes* (Serpulidae) tubes: new insights into an old problem

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Calcareous serpulid tubes demonstrate outstanding ultrastructural variability. Among all genera, available data are controversial for *Hydroïdes*. Three studied species show different number of layers and different types of ultrastructures and both predominantly calcitic and purely aragonitic tubes (Vinn *et al.*, 2008). Our study, covering 36 *Hydroïdes* species, re-estimated mineralogical and ultrastructural variability of the genus. Mineralogically, *Hydroïdes* has predominantly calcitic tubes with aragonite content 0-42% (usually 8-15%). On X-ray diffraction histograms, calcite always forms a minor peak of low-Mg calcite and a major peak of high-Mg calcite. The former distinguishes most *Hydroïdes* from closely related *Serpula* and *Crucigera*. There is a weak, but clear correlation between tube size and calcite content, indicating possible decline of aragonite during ontogeny. Ultrastructurally, all *Hydroïdes* are characterized by an essential combination of lamello-fibrillar and irregularly oriented prismatic layer with high organic content. Most also have spherulitic prismatic or simple prismatic outer covering layers, and few have a similar inner layer: 32 out of 36 species have a characteristic "fish-net" layer near the lumen with a previously unrecognized type of structure. This group of species coincides with major clade of *Hydroïdes* in molecular phylogeny (Tovar-Hernandez *et al.*, 2015), and few species without this apomorphy form a sister group. Ultrastructural similarities suggesting possible close relationships among some species need to be verified by molecular data.

The investigation was supported by RFBR grant 16-05-01088 and ABRS grant RF213-19.

MON - 14.45 - SYSTEMATICS

Review of *Axionice–Pista* complex (Polychaeta, Terebellidae)

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There has been confusion regarding the delineation of terebellid genera. Some genera like *Pista* Malmgren, 1866 obviously are not monophyletic and opinion of necessity to revise them is widely accepted. Phylogenetic analysis of generic level morphological characters of *Axionice–Pista* complex shows that genera *Axionice* & *Pista* are well defined by arrangement of different lateral lobes on segments 1–3, shape of branchiae, structure of ventral pads and usually source of development of uncinular manubrium. As type species of *Pista* — *Amphitrite cristata* Muller, 1776 usually has been accepted species other than described by its author, while *A. cristata* s.str. has been described as *Scionella lornensis* Pearson, 1969 and even accepted as type species of *Pistella* Hartmann-Schroder, 1996.

MON - 16.45 - SYSTEMATICS

Micro-CTvlab: A web based virtual gallery of biological specimens using micro-computed tomography (micro- CT)

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During recent years, micro-computed tomography (micro-CT) has seen an increasing use in biological research areas, such as functional morphology, taxonomy, evolutionary biology and developmental research. Micro-CT is a technology which uses X-rays to create sub-micron resolution images of external and internal features of specimens. These images can then be rendered in a three-dimensional space and used for qualitative and quantitative 3D analyses.

A virtual micro-CT laboratory (Micro-CT vLab) has been developed within the framework of LifeWatchGreece project, aiming at making micro-CT data of biological specimens freely available over the internet. The Micro-CT vLab offers to the user virtual image galleries of various taxa which can be displayed and downloaded through a web application. Furthermore, a mobile application was developed which allows the user to manipulate the 3D models through a series of online tools, available for tablets and cell phones. With a few clicks, accurate, detailed and three-dimensional models of organisms can be studied and virtually dissected without destroying the actual specimen.

TUES - 16.15 - METHODOLOGY

NIS surveys: polychaete diversity in San Francisco bay, California (USA)

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Human-mediated introductions of non-native species are a major threat to coastal ecosystems worldwide. It is important to monitor bays with major maritime traffic to track new introductions and faunal changes. Fouling species can easily survive on ship hulls or in ballast water, hitching a ride to new areas outside of their native distributions. These new introductions can alter the composition of the resident community. Among taxa, few genera seem to have a better chance to colonize regions outside of their native ranges. For some of them, their impact on human activities is known, while for others, our knowledge is incomplete or even absent. The variety of these impacts highlight the importance of investigating the changes in fouling communities near major shipping routes such as San Francisco Bay (SFB). To characterize the polychaetes of the fouling community, settlement panel surveys were conducted during four years (2012-2015). PVC settlement plates were deployed at 10 sites in the brackish-to-marine region for three months. All organisms were morphologically identified and assigned an invasion status. The composition and the status of polychaete taxa across years was examined, as well as in relation to changes in environmental parameters. The richness of the polychaete fauna changed significantly in the northern or southern basin according to the hydrodynamic regime of

the bay across years. New introductions were recorded for the first time in the bay. These results highlight the importance of long-term surveys of marine fouling communities to understand patterns of community diversity and mechanisms that influence them.

THURS - 10.00 - BIODIVERSITY

Detailed reconstructions of the brain structure and neurotransmitter reactivity in three species of meiofaunal Dinophilidae (Annelida) reveal unexpected high organizational variation

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Several neurotransmitters show similar immunoreactivity patterns in the nervous system among annelids, indicating common neuropeptidergic function and origin. Yet this specificity has not been tested with neither a broad range of neuropeptides, nor in meiofaunal annelids with compact brains and low cell numbers.

We assessed the immunoreactivity of 14 neuropeptidergic antibodies – partly conventionally used, partly found in the transcriptome of *Dinophilus gyrociliatus* – which we mapped on a detailed reconstruction of the brain and nervous system in three closely related microscopic annelids (*D. gyrociliatus*, *D. taeniatus* and *Trilobodrilus axi*). Immunoreactivity of each of the tested antibodies was recovered in at least one of the investigated species, with *D. gyrociliatus* expressing the highest number of neuropeptides (13/14) as well as neuropeptidergic cells (210 compared to 100 and 101, respectively). The distribution of labelled cells within the brain expressed high interspecific variation, consolidated by intraspecific consistency. The small size of the brains consisting of 650-750 cells made it possible to map each immunoreactive cell on a DAPI template, revealing no overlap in the peptides tested for. This suggests that a nerve cell can be specific to one neuropeptide and possibly to one function – even in a system consisting of few cells.

The detailed neural reconstruction revealed high commissural complexity of the compact meiofaunal brain. The tested neurotransmitters are mostly scattered throughout the entire brain, thereby not demarcating compartments or functional regions. Additionally, the surprising finding that the neuropeptidergic patterns vary among closely related species probably indicates a dynamic evolution of the neuromodulatory landscape.

THURS - 14.30 - MORPHOLOGY

The DNA Barcode reference library of Korean Polychaetes

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In Korea, polychaetes inhabit a variety of habitats in all the coasts. Thanks to the well-developed mud flats, polychaetes have a great diversity and abundance. On the other hand, most polychaete species are challenging to identify, as the morphological characteristics of many species are quite similar. In this study, we used a partial sequence (658bp) of the mitochondrial gene (cytochrome c oxidase subunit I), an internationally recognized DNA barcode marker. We analyzed 136 individuals from 53 species, and 47 of these species (including one endemic species (*Phyllodoce koreana*)) were examined for the first time. Average intraspecific and interspecific distances of the COI sequences based on Kimura's two-parameter model (K2P) were 0.5% (SD = 0.5%) and 21.7% (SD = 3.2%), respectively, which suggests that these COI barcodes can effectively be used to identify Korean polychaetes. In the neighbor-joining trees of COI, most of the congeneric species, excluding *Platynereis bicanaliculata* and *Lumbrineris japonica*, were clustered together. We hypothesize that the two species (*P. bicanaliculata* and *L. japonica*) that diverge from this pattern and that show differences of 17.8% and 21.2% from the other congeneric species in the COI sequences could, in fact, be new species. Further morphological and molecular studies are needed to verify these new species. Furthermore, we applied a ranking system to all the specimens to demonstrate the high taxonomic reliability of the DNA barcodes. Continuous revision and an updating process for the DNA barcode database is needed to improve the quality of information provided by previous reference libraries.

TUES - 15.45 - METHODOLOGY

Molecular phylogeny of bamboo worms (Annelida: Maldanidae)

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Recent molecular studies have provided more robust phylogenetic frameworks within Annelida; but intrarelationships of each family remain poorly understood. The Maldanidae (bamboo worms) is one of the largest families of annelids, including about 250 species and 40 genera. Maldanids are easily recognized by their bamboo-like segments along the cylindrical body. They are distributed in various environments from intertidal to hadal zones, such as rocky shores, tidal flats, sunken woods, cold seep areas and hydrothermal vent fields. Maldanids often occur at high density and function as ecosystem engineers, modifying surrounding environments through constructing their burrows within the bottom sediment. In this study, we investigated intrafamilial relationship of maldanids by molecular analysis based on two mitochondrial (16S rRNA and cytochrome c oxidase subunit I) and two nuclear (18S rRNA and 28S rRNA) genes of over 30 maldanid species collected from intertidal to the depth of 4,500 m. Our preliminary results showed that some subfamilies of the family Maldanidae are paraphyletic and suggested that similarities in cephalic plates or anal plates, which have morphologically supported the monophyly of the current maldanid subfamilies, might be results of convergence. We will discuss the evolutionary pattern of their significant ecological characters, such as autotomy, regeneration and feeding modes based on the reconstructed tree.

TUES - 11.00 - PHYLOGENY

Enigmatic freshwater freaks: larval development of *Caobangia billeti* Giard 1893 (Fabriciidae)

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Caobangia is an aberrant group of shell-burrowing annelids living on tropical freshwater snails. In 1974 M.L. Jones described caobangiid larva and the curious phoronid-like anatomy of adults; but he did not observe the development of organs during metamorphosis. Laboratory observation on the development of *Caobangia billeti* allow us to detail undescribed metamorphosis stages and to throw some light on the anlage organs, ascending gut formation and localization of the prepygidial growth zone. *C. billeti* trochophore consists of 10 segments (prostomial, peristomial and 8 larval body segments) and the pygidium. Embryogenesis involves a development of segmentally arranged bands of cilia and ventral ciliar fields, development of chaetae and the beginning of anterior radioles formation. During metamorphosis the branchial crown develops, pygidium accretes with the dorsal side of segments 7–11. It leads to formation of the anal trunk with the dorsal anus near the 7th segment. Prostomial and peristomial segments fuse together and reduce; cephalic ganglia descend into the first thoracic chaetiger. The post-metamorphosis juvenile has 8 thoracic segments with 10 pair of ganglia and 3 abdominal segments, lacking the ventral nerve cord. The only segmentation evidence in the abdomen are 3 pairs of segmental parapodia. As the worm grows, the anal trunk stretches along the body and the number of abdominal parapodia increases posteriorly. Thus, the prepygidial growth zone lies at the posterior end of the abdomen, and the ascending gut is a projection of pygidium.

FRI - 11.30 - DEVELOPMENT

Experiences after three years of automated DNA barcoding of Polychaeta

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Since 2013 the University Museum of Bergen and its collaborators have submitted over 3500 polychaete tissue samples to be sequenced at the Canadian Centre for DNA Barcoding (CCDB), and the sequences uploaded to the BOLD database. The material comprises 670 morphologically distinguished species from 55 families from samples collected in Norwegian waters (principally by MAREANO and NorBOL-affiliated projects), and along the West coast of Africa by R/V "Dr. Fridtjof Nansen" research cruises in recent years. It is no secret that DNA (COI) barcoding of polychaetes is challenging. The usefulness of barcoding hinges on

it reliably producing good quality sequences for operational taxonomic units. Our experience suggests that the current high throughput methodology is not able to consistently do so with "universal" primers. In families covering >50 samples, 24-81% of the specimens failed. Taking into account that 15-25% of polychaete species are likely to be undescribed or of unresolved taxonomic status, the extent of the information missing is considerable. Yet the method - combined with morphological studies - is highly useful to indicate cryptic and pseudocryptic species, and in revealing more accurate distribution patterns for the taxa. When DNA barcoding failed in particular specimens, we were sometimes able to supplement our data with 16S sequences, which seem to differentiate specimen clusters at resolutions similar to those of COI. We hope to spark a community-wide discussion about the experiences, improvement of methodology, and possible workarounds for polychaete barcoding that you might have, starting by presenting our own results so far.

TUES - 16.00 - METHODOLOGY

Understanding invasive serpulid polychaetes: integrative taxonomy to the rescue

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We discuss case studies addressing wide distributions and taxonomic uncertainties in reportedly invasive serpulids. *Hydroides elegans* is a cryptogenic invasive species. Described from Sydney, it has been ship-transported and established in 54 subtropical areas world-wide, but its Australian origin is doubtful. *Hydroides ezoensis* from Japan as well as *H. sanctaecrucis* and *H. dirampha* from the Caribbean are established introduced species ship-transported around the world. While *Hydroides dianthus* described from New England and distributed along the US east coast has been well established in Europe, Brazil, China, and Japan, it is made of two genetically distinct cryptic species groups within its native range. Similarly, *Hydroides operculata* described from Somali and later reported from the Mediterranean, Persian Gulf, Sri Lanka, Australia, and China is a complex of at least four cryptic genetically distinct species. Even more complicated is the situation with *Hydroides brachyacantha* described from Mexico and reported from many localities: it is a complex of unknown number of species that in Australia includes two species (*H. amri* and *H. nikae*) both morphologically and genetically distinct from *H. brachyacantha sensu stricto*. Another case is *Ficopomatus enigmaticus*, a cryptogenic reef-building estuarine species however known as the "Australian tubeworm". Our study suggested the presence in Australia of three genetic groups with overlapping ranges, one of which is morphologically distinct from the other two. These examples indicate that integrative molecular and morphological taxonomic studies are needed before the origin and invasion pathways of polychaetes can be resolved.

MON - 14.15 - SYSTEMATICS

A preliminary investigation on Macrobenthic Polychaete community structure in intertidal habitats along the south Andaman coast, India.

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Long-term investigations on macrobenthic infauna with high spatial and temporal sampling replication in Andaman & Nicobar Islands have been the subject of complete negligence. To address such paucity, a total of 540 random replicate macroinfaunal samples were collected in the year 2013-14 at 11 locations covering five different intertidal habitats viz., sea grass beds, mud flats, muddy reef flat, sand flats and sandy beach. Present study investigates the spatial and temporal pattern of abundance, distribution and diversity of polychaetes at higher taxonomic resolution along the tropical South Andaman Islands archipelago. Due to lack of regional level taxonomic literature and expertise impede further resolution of lowest level of identification. The mean polychaetes density was observed as 610 ind/m² and ranged between 78 and 4245 ind/m². Capitellidae was the dominant family (133 ind/m²) followed by Paraonidae (118 ind/m²) and Spionidae (107 ind/m²) together contributing around 59% of total population. Sea grass habitat (938 ind/m²) supports highest abundance, the bulk contributed by Paraonidae (251 ind/m²). Mud flats showed the dominance of Orbiniidae. Similarly, Capitellidae at reef flats and Spionidae at sandy habitats registered their predominance. Seasonally, monsoon period (783 ind/m², 42.85%) recorded the highest. The attempt of this study was to provide the descriptive information on the intertidal Polychaete community structure, abundance and diversity of South Andaman coast. However, in addition to 7 new families, total 38 Polychaete families have been recorded during the present investigation, promises at least total 45 families from this region.

THURS - 11.00 - BIODIVERSITY & ECOLOGY

A new species of *Cirrophorus* (Annelida: Paraonidae) from the Mediterranean Sea, with taxonomic notes on the genera *Cirrophorus*, *Paradoneis* and *Paraonides*

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Cirrophorus sp. nov. is described from brackish and eutrophized environment of the Central Mediterranean Sea; this species has been historically misidentified as *Cirrophorus furcatus* (Hartman, 1957), from which it can be distinguished on the basis of number and shape of branchiae and presence of thick neuropodial chaetae in the posterior chaetigers. Molecular data, based on 16S and 18S rDNA sequences, support the distinction between *C.* sp. nov. and *C. furcatus*. On the basis of molecular data, the synonymy between *Cirrophorus* Ehlers, 1908, and *Paradoneis* Hartman, 1965, suggested by some authors, and the correct use of *Paraonides* Cerruti, 1909 and *Paraonella* Strelzov, 1973, are discussed.

MON - 16.30 - SYSTEMATICS

Strategic plasticity: Reproductive periodicity and gamete development of an invasive fanworm, *Sabella spallanzanii*

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The dispersal and establishment of invasive species in new environments can be facilitated by reproductive strategies that give species a competitive edge. Favourable strategies include early maturity, high reproductive capacity and flexibility in reproductive schedules. Understanding the capacity for these reproductive strategies to facilitate successful invasion could therefore provide crucial insight for managers seeking to design eradication programs. The European fanworm, *Sabella spallanzanii*, has established invasive populations along the southern coast of Australia. Gamete development and reproductive periodicity of this worm were investigated in two locations in Gulf St Vincent, South Australia over a 1 year period. Individuals were sampled monthly and dissected for histological analysis. Worms appeared to be reproductively mature after reaching 60 – 90mm body length (thorax and abdomen). Early results suggest that males and females spawned synchronously between December and March. *S. spallanzanii* body length and egg size from this population appear to be smaller than conspecifics in its native range and other invasive locations. Differences in the reproductive strategies of invasive species between native and invasive locations have previously been documented. This study suggests the potential for local reproductive plasticity in *S. spallanzanii* between different invasive locations. Information about the local spawning periodicity and size at reproductive maturity will be crucial for determining the optimum timing of control efforts for *S. spallanzanii* in South Australia.

FRI - 09.15 - REPRODUCTION & LARVAL ECOLOGY

Insights into the genetic flow and the phylogenetic relationships of a new phyllodocid from the shallow-water Southern Ocean

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Despite the fact that shallow-water polychaetes have been widely studied in the Southern Ocean, still new species that are relatively common are often discovered. Here, we report the discovery of a new and abundant upper-infralittoral Antarctic phyllodocid of the genus *Eulalia*. Morphologically, this species mixes features of different genera, not matching completely with any phyllodocid genus previously described. Its most remarkable morphological trait is the lack of a nuchal organ, the absence of which is reported, to our knowledge, for the first time in the family Phyllodocidae. Although its generic status is not clear yet, we assign the new phyllodocid to the genus *Eulalia* in concordance with our Maximum Likelihood and Bayesian Inference phylogenetic analyses based on two nuclear (18S and 28S) and two mitochondrial (COI and 16S) markers. Using the COI and 16S of 91 and 83 individuals respectively from 5 populations across the South Shetland Islands and the Antarctic Peninsula, we investigated the genetic connectivity of this new species. The haplotype networks obtained suggest that all populations present panmixis, likely due to the presence of planktotrophic larvae allowing for the long-distance dispersal of the species. Another hypothesis explaining panmixis is passive transport of adults through the algae they inhabit and that are drifted away by marine currents. Future studies will be directed to clarify its phylogenetic status, to enlarge the sampling to test its dispersal abilities through larger distances, and to establish a robust phylogeographic hypothesis for the species in the light of past climatic events.

TUES - 14.45 - ECOLOGY

Using genomic tools to understand symbiont-host evolution of deep-sea tubeworms

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Annelid tubeworms, Siboglinidae, represent keystone species in deep-sea chemosynthetic communities (e.g. hydrothermal vents, cold seeps, mud volcanoes, large organic falls). Dominance of tubeworms in these chemosynthetic habitats is facilitated by endosymbiotic bacteria which provide energy, making them of evolutionary and physiological interest. To date, approximately 200 species have been described within 4 major siboglinid lineages: Vestimentifera, *Sclerolinum*, *Osedax* and Frenulata. Three of main lineages of siboglinids (vestimentiferans, frenulates, and *Sclerolinum*) house chemoautotrophic gammaproteobacteria, whereas *Osedax* houses heterotrophic Oceanospirillales. In this study, we have sequenced transcriptomic data from host and genomic data from symbionts to further explore the host-symbiont evolution of this group. Recent phylogenomic and mitogenomic studies suggested *Osedax* being most closely related to the Vestimentifera and *Sclerolinum* clade. Furthermore, in order to compare whether symbiont-host metabolic machineries (e.g. sulfur metabolism, carbon fixation and secondary metabolite) are conserved across different taxa, we have sequenced four endosymbiont genomes from *Lamallibrachia luymesii*, *Escarpia spicata*, *Seepiophila jonesii*, *Galathealinum brachiosum* as well as using public bacterial genomes from *Riftia pachyptila*, *Tevnia jerichonana* and *Ridgeia piscesae*, to conduct comparative genomics to assess genomic pathways that may facilitate interaction between host and symbiont. Preliminary analyses suggested that the primary and secondary metabolic pathway were relatively conserved across taxa, although variations have been observed in endosymbiont genome of *Galathealinum* (e.g. rTCA cycle). More importantly, several conserved bacterial genes were not found in sequenced symbiont genomes, raising the question if these gene products were potentially provided by the host and then subsequently lost by the endosymbionts.

MON - 10.00 - DEEP SEA

Particle selection and feeding behavior in two cirratulid polychaetes

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Cirratulid polychaetes are abundant and diverse members of benthic macrofaunas. The feeding morphology varies in having a pair or many feeding tentacles, and the ecological importance of both methods of food collections needs to be better investigated to understand their costs and benefits. Particle selection and feeding behavior of a bitentaculate (*Aphelocheata honouliuli*) and a multitentaculate species (*Timarete hawaiiensis*) were studied in order to understand whether the acquisition of a greater number of feeding tentacles had led to a greater retention efficiency of particles. Feeding behaviors were observed in individuals with or without feeding tentacles and exposed to three different size ranges of glass beads (0–20, 40–70 and 70–110 μm in diameter). Particle selection was tested for coated and uncoated glass beads of three different size ranges in 20 specimens of each species. Feeding behavior was similar in both species. Individuals of *T. hawaiiensis* in which the feeding tentacles were removed were observed collecting particles with the aid of branchiae. The multitentaculate species studied had greater retention efficiency than the bitentaculate species but the rates of particle collection were similar when scaled by the dry body weight. Two-way ANOVA results showed that both bitentaculate and multitentaculate species significantly selected in favor of smaller particle sizes. A better understanding of the phylogenetic relationships between the bitentaculate and multitentaculate cirratulids is needed but our results indicate that an advantage of having multiple tentacles is an increase in particle encounter and collection.

TUES - 15.00 - ECOLOGY

AMMA-IP3: Indo-Pakistan Polychaeta (Annelida) Portal

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Modern biological research in taxonomy requires digitalization of previous studies and reports into digital documents or online database for easy accessibility of information. AMMA-IP3 is a database of marine polychaetes recorded within the jurisdictional coastal waters of India and Pakistan with free and open access to data for researchers. The database, with all valid species from various records, is an effort to provide a detailed and elaborate description of every regionally reported polychaetes, inclusive of endemic species, comprising taxonomy, habitat, and occurrence. The taxonomical description is a comparative analysis of species found in either country with their original description and this effort was taken to resolve the taxonomic issues related to poorly known regional species. These qualitative and quantitative features of AMMA-IP3 are the highlights of the database, which differ from other online data repositories. The information was retrieved from various sources viz, articles, books, reports, monographs, dissertations, thesis, seminar abstracts and proceedings. The idea of constructing a database came from Polychaetologists of India and Pakistan, as well as from other parts of the world. The database is designed using advanced technologies such as PHP, Java Script and HTML and it will serve as a valuable tool to marine ecologists and taxonomists with specific interest to India and Pakistan. It will also provide assistance for collection and identification of polychaete samples and references from India and Pakistan with the guidance of a committee of experts.

TUES - 16.45 - METHODOLOGY

Tigers into the blue: Territorial attacks in the chaetopterid associated polynoid *Ophthalmonoe pettiboneae*

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The species of *Chaetopterus* are particularly suitable as hosts. Known symbionts include decapods, fish and about 10 species of polychaetes. One of them is the polynoid scale-worm *Ophthalmonoe pettiboneae*. Our study highlights the complex network of relationships involving a Vietnamese soft bottom species of *Chaetopterus*, which harbours a carapid fish and male/female couples of a porcellanid crab sharing hosts with *O. pettiboneae*. The prevalence of the scale-worm infestation may reach up to 64%, and it always lives solitary inside the tubes. An experimental manipulation of hosts and symbionts density allowed us to assess the reasons of this strictly regular distribution and demonstrated an extremely high level of intraspecific aggressiveness. The symbiont defends its host from the entrance of conspecifics, but also appears to control the experimental tank, where it behaves as active hunter, chasing and attacking other introduced conspecifics. Additional hosts fall also under the control of the symbiont. In the experiments with paired hosts, habitually one was occupied by the symbiont and the other remained empty. In all cases, the symbiont remaining outside the tube showed traumas caused by the attacks (which may even include the fragmentation of the body into two parts). In the sea, the infestation was lower in dense host populations than in scattered ones suggesting that symbiont controls both the host tube and surrounding bottoms. We thus demonstrate the aggressive character of *O. pettiboneae*, which resemble tigers not only in its black, orange and white dorsal colouring, but also in behaving as active hunters.

FRI - 15.00 - POLYCHAETE STUDIES

In the Footsteps of Meredith Jones - Knowledge of the Magelonidae

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The Magelonidae is a unique and relatively small family of polychaetes, consisting of approximately 70 known species world-wide. Much of our knowledge on the group comes from the works of William Carmichael McIntosh, Professor of Natural History at the University of St Andrews and Meredith Jones of the Smithsonian Institution. Following on from Meredith's presentation at the 1st International Polychaete Conference in Sydney 1983 on the then current knowledge of the group, we take a look at how our knowledge has increased and changed over the last 30 years. Looking at the morphology, feeding, behaviour and reproductive biology of this interesting and wonderful group of annelids.

MON - 16.15 - SYSTEMATICS

Functional biodiversity of marine soft bottom polychaetes in two Mediterranean coastal areas

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Marine ecosystems are being continuously impacted by human activities on a global scale, but especially in coastal areas. Human pressures that affect the macrofaunal organisms in terms of biodiversity, reduction in food web complexity and diversity within functional groups may also lead to changes in the overall ecosystem functioning. In order to assess which specific functional features may be affected by anthropogenic contamination, two coastal ecosystems differently impacted by human activities were chosen: the Mar Piccolo of Taranto (Ionian Sea) and the harbour of Trieste (northern Adriatic Sea). In both areas the macrofaunal community was sampled at four stations in two sampling periods, February and April 2014 (in the Mar Piccolo) and May 2014 and March 2015 (in the harbour of Trieste). All the collected species were coded based on their affinity for particular traits (e.g. life span, environmental typology of larval development, adult type of movement and feeding habits) using a "fuzzy coding" procedure. The frequency traits of the entire community was calculated by multiplying the affinity score for each modality of each species by the relative abundance of the species at each station and sampling period. A total of 107 taxa of polychaetes and 33 functional traits were considered for the biological traits analysis. For both ecosystems, the traits frequencies were higher in summer than in winter and the lowest values were observed at the most contaminated stations. The adult movement mobility method and feeding habits were the traits most affected by contamination.

THURS - 09.30 - BIODIVERSITY

A closer look at tomopterid biology: fluid and swimming mechanics

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The Tomopteridae are a distinctive clade of holopelagic polychaetes that range in size from a few millimeters to nearly half a meter in length. They are found throughout the world's ocean from the surface to at least 3800 m depth. First described in the 1800's, they are abundant, transparent, bioluminescent polychaetes. While little is yet known regarding their biology, they are considered predators and are likely an important food source for fishes. Observation and collection with remotely operated vehicles over the past 10 years has allowed me to gather data on numerous aspects of their biology, including: distribution in the water column, size range, identification of live animals, reproductive behavior, parasite load, internal circulation, swimming mechanics, species boundaries, diet and coloration. I will talk briefly about several of these topics but focus my talk on the biomechanics of their swimming and interaction with the surrounding water. Data was generated from high-speed video of several species of *Tomopteris* swimming in a laser illuminated particle field allowing us a detailed study of their swimming and fluid mechanics. Despite being rapid and agile swimmers, tomopterids cause minimal disturbance to the water they pass through, minimizing their chance of being detected by prey. Differences in their morphology, musculature and locomotion are compared to other better-known errant polychaetes.

THURS - 15.15 - MORPHOLOGY

The impact of fossil data on annelid phylogeny inferred from discrete morphological characters

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Cladistic analyses of discrete characters of annelids have typically supported the reciprocal monophyly of Polychaeta and Clitellata, with simple bodied 'scolecidan' taxa recovered as an early diverging polychaete clade or grade. This is in stark contrast to molecular phylogenies, in which polychaetes are paraphyletic and include clitellates, echiurans and sipunculans. The oldest annelid body fossils are complex-bodied polychaetes that possess well-developed parapodia and paired head appendages (palps), suggesting that the root of annelids is misplaced in morphological trees. We present a reinvestigation of the morphology of key fossil taxa and include them in a comprehensive phylogenetic analysis of annelids. We explore annelid phylogeny using Bayesian inference and parsimony analyses under both equal and implied weighting which all recover polychaete paraphyly. Our results further support the conclusion that echiurans and clitellates are derived polychaetes and suggest that the Cambrian taxa belong to the annelid stem group. Morphological trees including fossils depict two main clades of crown-group annelids that are readily reconciled with Errantia and Sedentaria, the fundamental groupings in phylogenomic analyses. Understanding the placement of fossil taxa in annelid phylogeny is crucial for establishing a timescale for annelid evolution and dating the origins of key clades and innovations.

TUES - 10.00 - PHYLOGENY

Spirobranchus spp. in the Gulf of Eilat: operculum morphology correlates with habitat selection

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A major question in evolutionary ecology is what the mechanisms governing the adaptation of an organism to its habitat are. *Spirobranchus* spp. (Christmas tree worms) are sessile polychaetes inhabiting a wide range of microhabitats in coral reefs around the world. In this study we examined the relationship between the phylogeny of *Spirobranchus* spp. and their morphotypes, determined by the opercular morphology. Additionally, we tested for correlation between habitat selection and both phylogenetic and morphological characteristics. Among *Spirobranchus* spp. in the Gulf of Eilat, 10 operculum morphotypes were identified, 2 of which fit pre-determined species, *S. gardineri* and *S. tetraceros*. The other morphologies were grouped to 8 distinct morphotypes within the *S. corniculatus* complex. We sequenced 2 ribosomal (18S and ITS), and one mitochondrial (Cytb) genes of 44 individuals of the 10 morphotypes to construct a phylogenetic tree. As expected, based on the phylogenetic tree, *S. tetraceros* formed a monophyletic clade, while the other 8 morphotypes were grouped under the *S. corniculatus* complex. *S. gardineri* formed a monophyletic clade based on the mitochondrial locus only, but not by the nuclear ones, suggesting a female – biased, asymmetrical gene flow. In addition, a significant association was found between phylogenetic and morphological association and habitat selection, where *S. tetraceros* were exclusively found on corals, whereas a specific morphotype in *S. corniculatus* complex was found mostly on artificial objects. These results overall shed light on the evolution of local adaptation of *Spirobranchus* spp. worms and provide evidence for phenotypic variation associated with evolutionary history in this complex.

MON - 12.00 - SYSTEMATICS

Functional evidence for the parenteral nourishment in the gutless polychaete *Astomus taenioides* (Annelida, Protodrilida)

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The protodrilid *Astomus taenioides* Jouin, 1979 is a member of the meiofauna living in coral sands on the island of Moorea, French Polynesia. This annelid is characterized by a vestigial alimentary canal without mouth and digestive cavity and a body shape with laterally inflated segments increasing the body surface. This species is the only known gutless annelid which does not live in symbiosis with bacteria in any tissue of its body such as it is known for Phalloporilinae and Siboglinidae. Moreover, it is one of the very few examples of free-living metazoans without a functional alimentary canal. Previous ultrastructural observations suggested that the epidermal supportive cells might play a major role in nutrition by uptake of organic matter by endocytosis via their apical membrane. To test this hypothesis experiments were conducted applying ferritin as a marker for endocytosis. Evidence of ferritin uptake was proven with analytical TEM using electron spectroscopy imaging (ESI) and electron energy loss spectroscopy (EELS)

by the presence of iron in intracellular compartments. These experiments revealed a considerable uptake of ferritin via coated pits and vesicles and digestion through the lysosomal pathway. 60 min after exposure iron was also detectable in the residual gut epithelium. Comparative experiments with another protodrilid, *Protodrilus ciliatus*, possessing a functional gut revealed certain, but rather weak, capability of epidermal uptake of organic compounds as well, but with significantly lower efficiency. So far *Astomus taenioides* represents the only free-living gutless metazoan for which the sole reliance on parenteral nutrition could be shown.

THURS - 14.45 - MORPHOLOGY

On the evolution of Spionidae (Annelida)

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A hypothesis on relationships among spionid polychaetes is provided based on the results of a combined phylogenetic analysis of morphological, reproductive and molecular characters. Evolutionary transformation series are discussed for selected characters.

TUES - 11.30 - PHYLOGENY

Spatial and temporal interrelations of isotropic and oriented structures of spirorbin tubes (Serpulidae)

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Serpulid tubes demonstrate outstanding ultrastructural variability (Vinn *et al.*, 2008). However, evolutionary and ontogenetic interrelations of principal ultrastructural types remain poorly understood and there is no well-accepted model of serpulid biomineralization, despite some hypotheses were discussed (Vinn *et al.*, 2009).

Process of tube formation was well-documented by us on extensive spirorbin material. Among all genera, *Protolaeospira* (tribe **Romanchellini**) is characterized by complicated multi-layered tube, providing some insights for understanding details of biomineralization process in Serpulidae. Most members of the genus have inner and outer covering spherulitic prismatic (SPHP) layers, underlain by spherulitic irregularly oriented prismatic (SIOP) structure gradually transforming in the middle part of the wall into irregularly oriented prismatic (IOP) structure. Sections obtained across the tube apertures show that crystals composing IOP structure are of the same appearance, like anywhere away from the aperture. This indicates that such crystals are probably formed within the calcium-secreting glands, and added to tube as ready units. Moving away from the aperture, subsequently growing SIOP and SPHP crystals appear along inner and outer surfaces. They evidently grow *in situ*, using as primary nucleation sites smaller prismatic crystals mentioned above. Therefore, spherulitic and prismatic crystals are a result of different processes of crystal formation, occurring in two different sites. We also observed growth stops, marked by the development of SPHP structure along certain growth lamellae, directly interconnecting inner and outer SPHP layers, indicating the same nature of outer and inner spherulitic layers.

The investigation was supported by RFBR grant 16-05-01088.

FRI - 14.45 - POLYCHAETE STUDIES

Diversity of venom cocktails and unexpected neurotoxin expression in the venomous Glyceridae

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The Glyceridae (Annelida) are venomous annelids known to be worldwide distributed from intertidal to abyssal depths. They are easily recognizable by an eversible pharynx containing four teeth that are connected to venom glands. Early studies already reported that a bite of *Glycera dibranchiata* causes a swollen painful hand, and that venom of *Glycera tridactyla* paralyzes crustaceans. In the venom glands of the latter species, biologically active proteins and an unusual neurotoxin, namely α -Glycerotoxin (GLTx) could be identified. The neurotoxin is able to up-regulate presynaptic Cav2.2 channels (N-type Ca²⁺ channels), whereby its effects have been shown to be dose-dependent and reversible, making this toxin a potentially valuable medical tool. Using an integrative approach comprising transcriptome libraries, qPCR experiments, *in situ* hybridization experiments and antibody staining, we were able to elucidate the expression domain of the neurotoxin GLTx. Surprisingly, our findings reject the current understanding of the venom apparatus as we identified the GLTx expression domain to be located in so far undescribed pharyngeal structures. Moreover, based on a robust glycerid phylogeny, we aimed to trace the evolutionary history of glycerid venom cocktails. We constructed deeply sequenced transcriptome libraries of three glycerid species, namely *Glycera dibranchiata*, *Glycera fallax*, and *Glycera tridactyla*. Comparative transcriptomics coupled with proteomic studies revealed a complex venom cocktail in these three glycerid species. We show that our multidisciplinary analysis produces fundamentally new insights into glycerid venoms and venom systems.

FRI - 14.15 - POLYCHAETE STUDIES

Community Ecology of Polychaeta (Annelida) in Soft Bottom Macrobenthos of Southern South China Sea

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This study specifically embarks to determine the community structure of polychaetes and their relationship with sediment parameters. The sampling was conducted in April and July 2011 at 43 sampling stations covered offshore areas of Pekan-Dungun, Kuala Terengganu and Kudat-Balambangan Island. Polychaetes (n=5) were sampled by Smith McIntyre grab (0.1 m²). Sediment was sieved through a wire mesh sieves (5.0, 3.0 and 0.5 mm) and fixed with 10% buffered formalin. In the laboratory, polychaete samples were rinsed, sorted, counted, identified and preserved in 70% ethanol. A total of 12,477 individuals of polychaetes were recorded and grouped into 47 families. Family Spionidae was found to be the most dominant family 17.7%. The mean total density of polychaetes at Kudat-Balambangan Island (670±213 individuals/m²) and Pekan-Dungun (612±215 individuals/m²) (p>0.05) was significantly higher compared to sampling station at offshore Kuala Terengganu (420±167 individuals/m²) (p<0.05). The mean value of diversity (3.88 to 5.65) differ significantly (p<0.05) however evenness index (0.72 to 0.92) did not differ significantly (p>0.05) between all study areas. The density of polychaetes has a significant correlation (p<0.05) with the percentage of silt and organic carbon in the sediment. Besides, the polychaetes was relatively highest at the stations dominated by silty-clay, silty-clay-loam and silt-loam and stations located nearer to the shore (depths below 60 m).

THURS - 11.45 - BIODIVERSITY & ECOLOGY

Serpulids and bryozoans from submarine caves of the Eastern Mediterranean

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Serpulids and bryozoans have been firstly studied from two submarine caves: the Fara (11-18m) cave and the Agios Vasilios cave (24-40m), located in the Lesvos Island (Aegean Sea). A total of 72 bryozoan and 18 serpulid (13 serpulinae and 5 spirorbinae) species were detected from 20x20cm surfaces scraped from the walls and ceilings, at progressive distances from the entrances, in the semidark and dark zones. More than one half of the bryozoans are shared by both caves, and 32 species were exclusively found in the Agios Vasilios cave. Diversity increased from the entrance to the inner zones of the Fara cave, remaining stable in the Agios Vasilios cave, notwithstanding changes in composition. Most of serpulids were present in both caves, 4 species being exclusively found in the Agios Vasilios cave. *Semivermilia crenata* greatly prevails followed by *Josephella marenzelleri* and *Janita fimbriata*. Species richness weakly increased from the cave entrances inwards, coupled with a marked change in composition. Bioconstruction capacity was observed for some bryozoans, which form cm-sized nodular and crest-like concretions, and for the serpulid *Protula* whose tubes form coiled donuts and plait-like aggregates up to 6cm wide and 8cm high. Although the observed patterns of bryozoan and serpulid distribution and growth adaptations were in agreement with those recorded in other submarine caves (Rosso *et al.*, 2013), most of the recorded taxa are new records for the cave fauna of the eastern Mediterranean.

THURS - 12.15 - BIODIVERSITY & ECOLOGY

Nervous system diversity in interstitial Syllidae

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Annelid phylogeny is in constant flux and additional information on morphological data can contribute significantly. Descriptions of the nervous system of various annelid taxa have become more frequent with the emergence of new methods, but little data is available on the widespread, species-rich family Syllidae. The family is considered monophyletic, but internal phylogeny is complex and its relationship to other Phyllodocida remains uncertain. Immunocytochemical stainings, confocal laser scanning microscopy (CLSM) and histological methods are employed to reconstruct the adult nervous system of *Syllis gerlachi*, *Syllis garciai*, *Plakosyllis brevipes*, *Prosphaerosyllis* c.f. *marmarae* and *Sphaerosyllis taylori*. Preliminary results show a trineuralian ventral nerve cord; only *P. brevipes* possesses five connectives. The peripheral nervous system consists of four segmental neurite bundles which form dorsal commissures. Additional small neurite bundles may originate from the ventral nerve cord, e.g. innervating ventral sensory papillae in *P. marmarae*. The parapodial innervation comprises the main parapodial nerve and an anterior neurite bundle. The main nerve may be divided into several separate neurite bundles; their arrangement and number can differ between species. In *P. brevipes* peripheral ganglia associated with segmental nerves were found. Reconstructions of the anterior nervous system including the stomatogastric nerves currently are work in progress. Variations in number of segmental nerves and ventral nerve cord connectives have been reported for other annelid families. The correspondences and phylogenetic significance of these characters are discussed.

THURS - 14.15 - MORPHOLOGY

Fine structure of polychaete tubes in Maldanidae (Annelida)

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Most of the marine annelids are active builders. Terebellidae, Sabellidae, Oweniidae, Onuphidae, Maldanidae, and some other families make agglutinated constructions (mainly tubes) by fixing sediment particles via specific secret of their epithelial glands. Fine structure of the tubes of 6 species of Maldanidae from 5 genera (*Nicomache minor*, *N. lumbricalis*, *Maldane sarsi*, *Praxillella praetermissa*, *Rhodine gracilior*, *Axiothella catenata*) were examined by SEM to compare construction of their tubes. These species demonstrate different lifestyles. *N. minor* and *N. lumbricalis* inhabit massive hard tubes attached to stones. Other species live inside the sediment, but *Rhodine* build rigid organic tubes, while *Praxillella*, *Axiothella* and *Maldane* are characterized by slender sand or silty tubes easy for rebuilding and renovation. All tubes have similar basic structure. The inner surface of the tube (inner cylinder) is made of hardened organic lining secreted by the worm. The sediment particles are fastened together by the filaments departing from the inner cylinder. In the genera studied (except *Rhodine* and *Praxillella*) the external tube surface is also covered with a layer

of organic substance with adhered detritus particles (outer cylinder). All examined maldanid tubes have similar microstructure. Organic component of the tubes is a network of thin filaments. The filaments form a 3D network in agglutinated part of the tube and fabric-like linings in the inner and outer cylinders. Tubes of all studied Maldanidae taxa have common characteristics, which are important to taxonomy and could be used for identification of fossils.

THURS - 15.00 - MORPHOLOGY

Integrative taxonomy reveals species diversity within *Capitella capitata* complex (Annelida: Capitellidae)

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Capitella capitata (Fabricius, 1780) was originally described from Greenland, but its distribution was expanded to Mediterranean Sea and Atlantic Ocean, leading to the cosmopolitan status of this species. However, a recent re-description and reproductive biology study of this species suggested that it's not widespread but restricted to the Arctic and subarctic localities. We conducted morphological (~17.000 inds) and phylogenetic analyses, based on a combined dataset of mtDNA sequences (134 of 16S and 106 of COI), from populations of 13 different sites of Brazil, from a specimen of the type locality and four additional sequences from GenBank belonging to *C. capitata* and *C. teleta* Blake, Grassle & Eckelbarger, 2009. Our morphological and molecular data were congruent and supported the existence of four different species and all distinct from *Capitella capitata*, pointing out the biodiversity and distribution of this genus along the Brazilian coast. Genetic distance among the species ranged from 21.3% to 34.2% in 16S and from 14.1% to 21.8% in COI. At the moment, there are four species at the Brazilian coast, three new species and a new record to the South Atlantic, *C. aciculata* (Hartman, 1959). One of these species occurs on just one sampling site (São Paulo State), while the others species are sympatrically distributed along the coast. The main differences between these species are the shape of prostomium, characteristic of peristomium (complete or incomplete ring), number of thoracic setiger bearing capillary chaeta, shape and number of thoracic and abdominal hooded hooks and shape and size of pygidium.

MON - 11.45 - SYSTEMATICS

Bait collecting activity in the Knysna estuary, 20 years on

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The Knysna estuary on the south coast of South Africa is an important conservation site for the rare Knysna seahorse *Hippocampus capensis* and siphonariid limpet *Siphonaria compressa*. However, it also supports many fishermen who collect bait from within the estuary, creating a potential conflict with conservation efforts. Surveys conducted in 1997 and 2004 suggest changes in the utilisation of bait species by local subsistence fishermen, from exclusively using mudprawns (*Upogebia africana*) to also using polychaetes (*Arenicola loveni* and *Marphysa elitungeni*). This may be a consequence of the increased pressure on bait species resulting from the reduction in the area from which bait can be collected legally and possibly an increase in numbers of local fishermen active within the estuary. The primary aim of this study is therefore to investigate the possible change in baiting practices (focusing on polychaete worms) by fishermen. Over the 2015/2016 Christmas season 26 local fishermen were interviewed and these data suggest changes in demographics and preferred bait species and collection sites. Now >50% of the interviewees were recreational (compared to 0% in 1997). Furthermore, one subsistence fishermen collected only polychaetes, while the rest still collected mainly mudprawns. By contrast, 30% of the recreational fishermen preferentially collected polychaetes (*A. loveni* and *Diopatra* sp.). Polychaetes were, however, a popular alternative to mudprawns for most interviewees. The observed change in preferred baiting sites may be a consequence of the increase in recreational fishers. Additional data will be collected during the Easter holidays and winter (low season).

FRI - 14.00 - POLYCHAETE STUDIES

Macrobenthic Polychaetes along the Continental Shelf of Southwest and Southeast Coast of India

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Polychaetes represent the dominant component of macrobenthic faunal community and are considered as good indicators for stress or pollution in marine environment. The study has elucidated community structure and species composition of polychaetes along the continental shelf of southwest and southeast coast of India. The study area extends from latitude 11°59'N to 07°10'N and longitude 75°05'E to 77°19'E (Off Kannur to Off Cape Comorin, 7 transects) along SW coast and latitude 10°59'N to 14°N and longitude 79°58'E to 80°24'E (Off Nagapatnam to Off Krishnapatnam, 4 transects) along SE coast. In each transect samples collected from four stations (30m, 50m, 100m and 200m depth ranges) by using modified Smith-McIntyre grab of size 0.2m² during 5th to 19th January 2005. Altogether 298 species of polychaetes were identified from the entire study area out of which 15 families of errantia and 21 families of sedentaria. Along the SW coast, 253 polychaete species were identified from the different depth ranges and the dominating species were *Prionospio (M) andamanensis* and *Prionospio pinnata*. Along SE coast 185 polychaete species were identified and most dominating species were *Tharyx dorsobranchialis* and *Paraonis gracilis gracilis*. Mean Shannon diversity (H'log2) index along SW showed an increase from 30m to 50m, then decreased towards depth whereas it decreased towards depth along SE coast.

THURS - 09.45 - BIODIVERSITY

High diversity of Syllidae from Chilean Patagonia: new species and records found inside *Chaetopterus variopedatus* tubes

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Syllidae represents one of the most unknown polychaete groups in Chile. Despite they are common members from several substrates and environments the study about taxonomy, biology and ecology is often forgotten due to its small size and complex morphology. In this research we describe new species, old species descriptions are updated and new records are presented. Most of the species were found living inside *Chaetopterus variopedatus* tubes as part of particular ecological association with small sea urchins, decapods (grapsidae), sabellids and spionids. Specimens were collected at shallow depths (<30 m) at the patagonian region of channels, ice-fields and fjords, southern Chile between 2001 and 2010. The new species belong to *Parahelersia* sp. nov, *Exogone* sp1 and sp2 nov, *Syllis* sp1 and sp2 nov, *Syllides* sp1 and sp2 nov and *Nudisyllis* sp nov. New records for Chile continental are *Sphaerosyllis hirsuta*, *Salvatoria koorineclavata*, *Erinaceusyllis perspicax*, n. com., *Brachysyllis infusate*, *Epigamia maclearanus*, *Syllis pulvinata* and *Parapionosyllis brevicirra*. Finally the updated descriptions belong to *Exogone heterosetoides*, *Exogone anomalochaeta*, *Erynaceusyllis bidentata* and *Perkynosyllis longisetosa*. *Chaetopterus variopedatus* tubes would offer the suitable habitat for small polychaetes and other invertebrates as good solution to lack of habitats due to high presence of surficial ice on these environments, contributing to the high species diversity on Syllidae. This research updates the knowledge of this family for continental Chile and it is a very important contribution to knowledge of marine biodiversity at patagonian region.

THURS - 12.30 - BIODIVERSITY & ECOLOGY

The importance of the Paleo-Tethys Ocean for the evolution of *Stygocapitella* (Parergodrilidae, Annelida)

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Many interstitial species with limited dispersal capacity are complexes of cryptic species showing a seemingly cosmopolitan distribution. Mainly two hypotheses have been put forward explaining the global distribution of such complexes. The first hypothesis assumes that vicariance following plate tectonics has driven their distribution and the strong similarities would be cases of morphological stasis lasting for millions of years. The second one stresses the importance of dispersal over long distances during the last thousands of years. The interstitial annelid *Stygocapitella subterranea* is such a complex with populations in Northern America,

Europe, Australia, and South Africa and a tropical distribution gap. Using specimens from both hemispheres and morphological, nuclear and mitochondrial data we show that the origin of this complex is within the Southern hemisphere. About 260 million years ago the complex split into Panthalassic and Paleo-Tethys parts and the Northern hemisphere was colonized from the Australian region via the Paleo-Tethys Ocean about 80 million years ago. Hence, the distribution of this complex was not driven by recent distributions, but rather it showed a strong case of morphological stasis. On the other hand, our analyses also indicate that the distribution did not strictly follow vicariant events, but only generally the formation of the Paleo-Tethys Ocean and then its disappearance. More important was the Paleo-Tethys Ocean and, therefore, in the distribution of marine, especially interstitial, species it should be considered more often.

MON - 11.30 - SYSTEMATICS

Mitochondrial genome rearrangements in calcareous tubeworms: what do they mean?

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Calcareous tubeworm family Serpulidae is one of the most economically important groups of polychaetes as it includes a number of the most widespread fouling and bioinvading species. However, species identification in this family is problematic due to high morphological variability, especially in *Hydroides*, the largest serpulid genus. This problem is further compounded by a lack of reliable molecular identification tools because all earlier attempts to sequence the barcoding (Cytochrome *b*) gene in Serpulidae using "universal" primers were unsuccessful. To provide reference sequences needed to design new serpulid-specific barcoding primers, we sequenced and analysed the complete mitochondrial genomes of several serpulid species using next-generation sequencing approach. Surprisingly, the serpulid mitochondrial genomes showed a substantial rearrangement in gene order which is significantly different from the highly conserved pattern suggested for polychaetes. Besides, we observed numerous large intergenic regions in these mitochondrial genomes that are rarely reported for other polychaetes. We discuss the implications that the gene rearrangement in Serpulidae might have for evolution of this group.

MON - 14.30 - SYSTEMATICS

Invasion of the genus *Marenzelleria* (Polychaeta: Spionidae) into the Don River mouth and the Taganrog Bay: morphological and genetic study

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Alien polychaetes belonging to the genus *Marenzelleria* have been recorded in the Don River mouth and the Taganrog Bay of the Sea of Azov in February-March 2014. Morphological characteristics varied greatly and matched those of two species: *M. neglecta* and *M. arctica*. Yet, transitional specimens have been observed later. A genetic study using different molecular markers [mitochondrial (16S, COI, cytb) and nuclear (histone H3a, 28S) DNA sequences] doubtlessly showed that there is only *M. neglecta* present despite any morphological mismatches. A morphological description of the species according to the new data is presented, together with a revised table of key numeric characters' variability from the last revision of the genus. Since 2014, *Marenzelleria* has spread swiftly and became dominant in a considerable part of the Taganrog Bay, making up to 91% of the total abundance/biomass (6800 ind/m² and 31.2 g/m²). Its occurrence is 100% in the recent surveys. Such a sharp increase seems to be due to the lack of gathering detritophages in the bay; this is supported by the fact that *Marenzelleria* did not form its own specific community. If *M. neglecta* is excluded, the communities' structure is equal to that before the invasion. Due to the presence of underutilized resources, *Marenzelleria* simply joined the existing communities. In the Sea of Azov itself, *M. neglecta* is not as abundant, but occurs to the Strait of Kertch, inclusively. Its further spread into the Black Sea seems possible, as well as into the Caspian Sea via the Volga-Don Canal.

TUES - 13.45 - ECOLOGY

Cryptic diversity and colonization processes in *Ophryotrocha* inhabiting mammal bones in the shallow-water Mediterranean Sea

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Mammal carcasses represent extraordinary marine benthic habitats that harbor diverse polychaete communities, including several members of the dorvilleid genus *Ophryotrocha*. We studied the colonization patterns of two species of *Ophryotrocha* (*O. puerilis* and *O. alborana*) on mammal bones deployed in the NW Mediterranean: (i) experimental bones deployed at ~20 m for a year near Blanes, with samples collected at 3-month intervals; and 'control' bones deployed (ii) at Blanes harbor (10 m) and (iii) at the head of a nearby submarine canyon (53 m). Molecular analyses for organisms identified as *O. puerilis* indicate the occurrence of two cryptic species (based on COI divergences and on phylogenetic and species delimitation analyses of COI, 16S rRNA, and Histone 3), one on the experimental bones and another appearing at the head of the submarine canyon. This is the second time that cryptic diversity of *Ophryotrocha* and, most importantly, it is found in the type species of the genus and one of the most widespread organisms in the genus across the Mediterranean, which challenges the validity of previous morphologically based identifications of *O. puerilis*. COI sequences for the most common cryptic species in the survey (experimental bones) revealed shared haplotypes among the different bones and trimesters suggesting continuous recruitment across time, whereas COI sequences for *O. alborana* revealed unique haplotypes for worms from different bones and trimester samples, indicating three separate recruitment events. Our study suggests that different species of *Ophryotrocha* have different patterns of bone colonization despite sharing similar life histories.

FRI - 10.00 - REPRODUCTION & LARVAL ECOLOGY

Benthic index development for Barnegat Bay, USA based on three years of macrofaunal data

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Barnegat Bay (BB), an estuary on the New Jersey coast, is recognized for its esthetic, economic, and recreational value but human impacts such as development and eutrophication potentially threaten its ecological integrity. As part of a comprehensive program to address the health of BB, macroinvertebrate communities and environmental parameters were monitored in the summer for three years (July 2012 - 2014) at 100 stations. Overall, macroinvertebrates were abundant and diverse with 304,629 individuals comprising 238 species/taxa collected over all years. The north-south salinity gradient exerted a strong effect on the distribution and abundance of most taxa. Multivariate statistical analyses revealed several clusters that appear to represent different communities that reflect, in most cases, environmental clusters that divide the bay into four regions based on bottom water and sediment properties. The environmental properties and macrofaunal communities were relatively similar over the three summers. This was somewhat surprising given that an intense and destructive storm, Hurricane Sandy, made landfall just south of BB in October 2012. The data are being examined with respect to certain historical data sets, with the goal of finding an appropriate benthic index, and/or potential indicator species. The numerically dominant species is *Mediomastus ambiseta* (F. Capitellidae).

THURS - 10.15 - BIODIVERSITY

Next-generation histology as a tool in Annelid morphology

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Histological sectioning has a long tradition in morphological investigations of annelids, but it is today almost replaced by new microscopical methods like μ CT and cLSM. These techniques have the advantage of providing three-dimensional datasets which enable automated image processing for anatomical reconstructions. Histology and semi-thin sectioning on the other hand provide a higher resolution at cellular level and allow unambiguous interpretation of the data due to differential or tissue specific stains. Yet, the use of serial section histology for 3D reconstruction underlay three drawbacks: 1) Image data must be acquired section by section and transformed into an aligned image stack. 2) Structure labelling in terms of segmentation of images cannot be automated. 3) High resolution image stacks comprise several gigabytes of data and thus are difficult to handle by software for

processing and publication. Here we present a standardized work-flow for serial section histology to circumvent these difficulties. In short, we use a semi-automated microscope to acquire high resolution image data. The images are collected into a stack and aligned semi-automatically. The subsequent conversion of the image data into small tiles allows manual segmentation at any level of resolution. The data are finally deposited in the database *MorphDBase* where they can be accessed and downloaded freely by other researchers. A survey in morphology of the central nervous system and chaetae of diverse annelid taxa demonstrates that this work-flow fastens serial section histology dramatically and results in comparable, openly accessible and well-documented research data.

TUES - 16.30 - METHODOLOGY

Phylogenetic study of the family Capitellidae (Annelida) in Japan

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Capitellids are mostly marine, free living, benthic worms, occurring from shallow to abyssal water around the world. They have the following simple body plan: a blunt, cone-shaped prostomium without appendage; a cylindrical peristomium; and chaetigerous segments without parapodium. Some members including *Capitella teleta*, *Notomastus latericeus*, and *Heteromastus similis* have been commonly used and reported in various fields of studies such as evolutionary developmental biology, ecology, and toxicology. Until now, however, the taxonomic situation of the group has scarcely been improved since Rouse and Pleijel (2001: Polychaetes, Oxford University Press, New York) noted that "taxonomic revision of this family is seriously needed", because generic diagnoses are still based on character combinations rather than phylogenetic relationships. This means that even if two or more species are placed in the same genus, they are not necessarily more closely related to each other than to another in different genus. Therefore, problems may arise when one attempts interspecific comparative studies in the aforementioned various research areas.

In this study, we inferred interspecies relationship of capitellids in Japan by molecular phylogenetic analyses. We will discuss the validity of their taxonomic characters based on the results.

TUES - 11.15 - PHYLOGENY

Transcriptome-based molecular characterization of venom in amphinomids (Annelida, Amphinomidae)

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Within the Annelida, there are several lineages that use venom for predation or defensive purposes. Amphinomids, more commonly known as fireworms, are one of these venomous lineages. This group of marine polychaetes is characterized by the presence of defensive calcareous chaetae, which break off upon contact and deliver an inflammatory substance. However, knowledge on fireworm venom is still very limited. No venom producing tissue has yet been identified and only one active toxin, complanine, has been chemically characterized. However, neither complanine, nor any other putative components of amphinomid venom have been described at the molecular level. Here we use a transcriptomic approach to identify putative venom compounds in three species of amphinomids: *Hermodice carunculata*, *Paramphinome jeffresi* and *Eurythoe complanata*. Following next-generation sequencing, transcriptomes are assembled *de novo* and putative toxins are characterized by three different strategies: 1) BLAST searches against a venom database; 2) HMMER homology searches; and 3) InterProScan analyses. Following this approach, a great diversity of putative peptide toxins and venom-related proteins have been identified in the three amphinomid transcriptomes. These transcripts represent a variety of toxin classes that have been repeatedly recruited into animal venoms, including C-type lectins, Kazal domain protease inhibitors, Gigantoxin-like neurotoxins and Ryncolin-like peptides. While the putative amphinomid toxins identified here need to be validated through proteomic and functional studies, our results suggest that venom has convergently evolved in fireworms as a defensive tool to deter predators.

FRI - 14.30 - POLYCHAETE STUDIES

Stylet jaws of the Chrysopetalidae (Annelida: Phyllodocida)

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Micro-CT imaging elucidates jaw and pharynx structure in 13 nominal taxa belonging to Chrysopetalinae, Dysponetinae and Calamyzinae: Chrysopetalidae. Systematic evaluation of chrysopetalid jaw form in each taxon is presented and used to compare inter-generic relationships within each subfamily, between each subfamily, and with other polychaete families possessing lateral jaws. Jaw morphology proves diagnostic at all levels. Greatest diversity of jaw form, associated with most developed sensory body structures, is found amongst taxa of the mobile, epibenthic Chrysopetalinae that inhabit crevicular habitats associated with dense invertebrate communities. A novel feature of a pharyngeal calcareous ring is reported in one clade that exhibits facultative commensalism. Dysponetinae comprises many small species of one genus that inhabit epi or endobenthic habitats; all species possess one type of slender, tanned pair of stylets and certain simplified body structures. Taxa of the Calamyzinae possess a polyphyletic jaw form and grades of simplified, sensory body morphology. Free-living and commensal taxa inhabit bacteriovorous/chemosynthetic habitats; if jaws are present (possibly representing a non-functional ontogenetic stage) they are composed of an anterior platelet jaw and posterior grooved, elongate jaw. A more specialized stylet jaw is present in ectoparasitic calmyzins. It is demonstrated that the grooved, hollow stylet jaw proves a unique character supporting the monophyly of the family Chrysopetalidae.

THURS - 15.45 - MORPHOLOGY

Metamorphosis and settlement of the intertidal tubeworm *Spirobranchus cariniferus* (Gray 1843)

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Many sessile marine organisms have a dispersive pelagic larval stage, and the transition from a pelagic to the benthic stage is an important process that includes both settlement (a shift in habitat), and metamorphosis (a physiological transition to the juvenile). For sessile polychaetes (e.g. Sabellida) these terms have often been used inconsistently and will also help mediate whether species form aggregative populations. The purpose of this study was to describe these events in the New Zealand serpulid tubeworm, *Spirobranchus cariniferus*, and to examine factors that may mediate settlement success, in particular settlement cues. When larvae of *S. cariniferus* become ready to settle, they swim near the bottom and/or crawl on it for up to several days. Once those larvae reach a suitable location, then they will attach themselves to the surface, beginning with building a tube and continuing with their metamorphosis.

In a pilot experiment, we observed low settlement success (0-4%) within 48 hours whereas, after a much longer period (408 hours) 14-30% of individuals were attached to the surface. In a different experiment, we observed gregarious settlement near the water surface in response to a developing biofilm. Further, settlement was very low (2-12% after 26 days) under starvation conditions regardless of the cue (conspecific tube material or sandstone). These results suggest that the process of settlement may not be rapid, but instead may take a longer period of time than has been previously assumed and that larval settlement behavior is mediated in part by food availability over this period.

FRI - 10.15 - REPRODUCTION & LARVAL ECOLOGY

Reconstruction of the nervous system in bone-eating *Osedax* spp. and its evolution across Siboglinidae (Annelida)

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The annelid nervous system has long been known to encompass a greater variety than many other evolutionary lineages, however, neurophylogenetic studies testing the homology and evolution of these multiple neural traits have never been carried out in the Annelida. The Siboglinidae nervous system is, with a ventrally positioned brain and indistinct segmentation of the anterior body, highly deviant from other annelids and its origin is still questioned. Central for understanding the nervous system of these endosymbiont-housing, generally gutless, tubeworms is the bone-devouring *Osedax*; the nervous traits of which are here mapped

and their evolution traced across Siboglinidae. The four examined female *Osedax* spp. and the bone-eating *O. priapus* male all showed a simple nervous system, comprising a ventral brain with several commissures connected with anteriorly directed paired palp and gonoduct nerves, and four main pairs of posteriorly directed longitudinal nerves. A broader comparison across Siboglinidae suggests new homologies of the ambiguous, and much debated, anterior segments - with the trunk of *Osedax* females (and *O. priapus* males) suggested to comprise two segments and *Osedax* dwarf males suggested to have three body segments in total. However, besides from additional lateral and dorsal longitudinal nerves and details of the brain only described for *Osedax*, this first neural character reconstruction reveals that the intraepidermal nervous system with multiple, widely separated nerve cords, double brain commissures, and double palp nerves of *Osedax* are all siboglinid plesiomorphies; hereby bridging the evolutionary gap to non-siboglinid annelids and enhancing our understanding of the neural evolution within Siboglinidae.

MON - 0.930 - DEEP SEA

The fertilization process, oviposition behavior and larval development of *Nereis vexillosa* (Annelida: Polychaete)

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Nereis vexillosa is the dominant polychaete in the northern coast of China. This paper studies the fertilization process, oviposition behavior, and larval development of *Nereis vexillosa*. Results show that breeding of *N. vexillosa* occurs annually in early April in Dalian, Huanghai Sea, China. The worms proceed from metamorphosis to heteronereis before laying eggs. The population swarms during the full moon in April. Male worms release sperm in the seawater. Then, the females lay eggs in the surface sediment. The fertilization process is quick. The extremely sticky fertilization membrane is immediately raised, each egg adhering to the next and forming egg masses. The fertilized eggs proceed through several stages of development, including cleavage, blastula, gastrula, trochophore larvae, and finally, three-segmented larvae. Three-segmented larvae puncture the egg membranes and swim in the water. The four-segmented larvae develop by relying on the oil balls in their bodies. When the four-segmented larva stage is reached, the larvae metamorphose to benthic larvae. The suitable temperature for embryo development is 13°C–16°C with a salinity of 30–35. The hatching time, from eggs to free swimming larvae, is 148.1–172.5 h at 13°C–16°C.

FRI - 09.00 - REPRODUCTION & LARVAL ECOLOGY

Cossuridae: review of current state of knowledge on taxonomy, morphology and phylogeny

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Cossuridae comprises only one genus with 26 species; they are small and medium size worms inhabiting soft sediments from intertidal to abyssal depths; cossurids are easily recognizable by their unpaired branchial filament. Despite their commonness, Cossuridae are poorly known group with many unresolved problems. Relationships within family as well as with other polychaetes are uncertain; molecular data are scarce. Some species such as *C. pygodactylata* have a wide geographic and ecological range, it suggests the presence of potential cryptic species. Identification of cossurids may be complicated: they have comparatively poor external morphology - rather uniform simple chaetae, lack of head appendices, similar body regionalization. The important characters used for distinguishing of species such as attachment of branchial filament and number of thoracic chaetigers are hard to interpret correctly. Homology of branchial filament with palps, dorsal cirri or branchiae of other polychaetes is unknown. To reveal the nature of branchial filament we analysed its innervation using immunohistochemistry and confocal laser scanning microscopy. It was shown that branchial filament is innervated from left segmental nerve going from the ganglion of chaetiger 2. This result proves the absence of homology of filament with palps. The most possible homology is with segmental structures - dorsal cirri or branchiae, like in cirratulids. The current state of our knowledge does not allow hypothesizing on phylogenetic affinity of Cossuridae; further morphological and molecular studies are needed.

MON - 16.00 - SYSTEMATICS

Phylogeny and evolution of mitochondrial genomes in PolynoidaeYanjie **Zhang**¹, Jin Sun², Jian-Wen Qiu³^{1,3} Hong Kong Baptist University, 224 Waterloo Road, Kowloon Tong, Hong Kong, Hong Kong, CHINA, 00000, Hong Kong² Hong Kong University of Science and Technology, Hong Kong

Polynoidae (Phyllodocida) is the most diverse family of scale worms with approximately 750 species in 200 genera. A revision of this family is urgently needed because of the ambiguous delimitation of character states and the inconsistency in the phylogeny, especially the 120 deep-sea species in 50 genera of deep-sea polynoids described since the late 1970s. Mitochondrial genomes have been increasingly used to understand the phylogeny of metazoans because they provide rich information on gene sequences as well as gene orders. However, no mitochondrial genome sequences are available for Polynoidae. Here, we aim to use mitochondrial genomes to improve our understanding of the phylogeny and evolution of Polynoidae, especially the deep-sea genera. We reported complete mitochondrial genomes of eight polynoids, including three shallow water species (*Halosydna* sp.; *Lepidonotus* sp.; *Melaenis* sp.) and five deep-sea species (*Branchipolynoe pettiboneae*; *Branchipolynoe* sp.; *Branchinotogluma japonica*; *Lepidonotopodium* sp.; Polynoidae *indet.*). Our phylogenetic analysis showed that the deep-sea polynoids form a well-supported clade and they derived from shallow water species. The gene order of the *B. pettiboneae* mitochondrial genome has undergone remarkable rearrangements when compared with the other polynoids. Sequence substitution analysis will be conducted to determine whether some mitochondrial genes have experienced a strong selective pressure in adaptation to the deep-sea environment.

TUES - 11.45 - PHYLOGENY

Posters

***Pseudopolydora* (Annelida, Spionidae) from the Arabian Gulf, Kuwait**

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Four *Pseudopolydora* species, *P. cf. antennata* (Claparède, 1868), *P. cf. corniculata* Radashevsky & Hsieh, 2000, *P. cf. diopatra* Hsieh, 1992, and *P. cf. paucibranchiata* (Okuda, 1937) are described and illustrated from the intertidal zone of the Arabian Gulf, Kuwait. An identification key for the species is provided. Adults of all species live in tubes in soft sediments, while adults of *P. cf. diopatra* also bore into shells of gastropods and dead corals encrusted by coralline algae. Adults of *P. cf. antennata* and *P. cf. paucibranchiata* form dense settlements up to 50,000 individuals per one square meter, whereas adults of *P. cf. corniculata* and *P. cf. diopatra* are rare. Sequence data of gene fragments of the mitochondrial 16S rDNA and nuclear 28S rDNA are provided for the first time for the Arabian polychaetes for comparison with their counterparts from the European and the Pacific regions.

New records of polychaetes from Kuwait

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A number of new polychaete records were found in Kuwait's coastal zone during intertidal and subtidal survey in 2013-2015. Paracalydonidae and Protodrillidae are new families for the Arabian region, including the Red Sea, the Gulf of Aden, the Arabian Sea, the Gulf of Oman and the Arabian Gulf. Nerillidae, Saccocirridae and Sphaerodoridae are new families for the Arabian Gulf. *Monticellina* (Cirratulidae), *Podarkeopsis* (Hesionidae), *Leitoscoloplos* (Orbiniidae), *Levinsenia* (Paraonidae), *Pseudopotamilla* (Sabellidae) are new genera for the Arabian region. *Aphrodita* (Aphroditidae), *Protocirrineris* (Cirratulidae), *Augeneria*, *Lumbrineriopsis* (Lumbrineridae), *Pholoe* (Pholoidae), *Malmgreniella* (Polynoidae), *Fabriciola* (Fabricidae) are new genera for the Arabian Gulf. The analysis of the sequence data for the 18S rRNA, 16S rRNA and COI genes has shown cryptic speciation with two clades within *Leodamas chevalieri* (Orbiniidae). All these facts indicate that polychaete biodiversity of Arabian Gulf in general and Kuwait particularly is highly underestimated and needs further faunistic and taxonomical studies.

Diversity and species distributions of Glyceriformia in shelf areas off western Africa

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The present study is based on a large collection of marine benthic invertebrates sampled from shelf areas off Western Africa from Morocco to Angola within the framework of the EAF-Nansen Project under the United Nation Food and Agricultural Organization (FAO). Polychaetes of the families Glyceridae and Goniadidae have been identified to species or genus level using available literature with keys or morphological descriptions. Morphology based identifications suggested a total of 19 species: 9 species of Glyceridae, and 10 species of Goniadidae. Representatives for all identified taxa were selected for DNA barcoding. Genetic barcodes represent independent taxonomic characters that may help to assess species identities or evolutionary significant units. Despite a success rate of only 50% for the submitted samples, the sequences were initially assigned to 24 genetically different clades (known as Barcode Index Numbers or "BINs" in the BOLD database). This may indicate the presence of several more taxa since genetic p-distances between these BINs are usually well above 10%. In this report we will summarize DNA barcoding results, faunistic data, and present some taxonomical notes for selected taxa.

Systematics and evolution of *Trypanosyllis* and the case of its pseudo-cryptic type species *Trypanosyllis krohnii* (Annelida, Syllidae)

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Trypanosyllis is a genus of Syllidae whose members show distinctive flattened, ribbon-like bodies and a pharynx armed with a trepan. However, the phylogenetic relationships within the genus remain unsettled, especially with respect to the morphologically similar genera *Eurusyllis* and *Xenosyllis*, and *Trypanobia*. In addition, *Parahaplosyllis* and *Ramisyllis* (with a similar type of reproduction) have been recently reported to be phylogenetically related to the above-mentioned genera, although their relationships are not entirely resolved. To shed light into this systematic uncertainty, we have analyzed four molecular markers in 101 specimens of *Trypanosyllis* and all its related genera, sampled from around the world. In our analyses, we include sequences of the type species of the previously considered subgenera *Trypanedenta* and *Trypanobia* for the first time. We show that the presently construed *Trypanosyllis* is paraphyletic and we resurrect *Pseudosyllis* and *Trypanedenta* as genera. We also reorganize the genus *Trypanobia*, which was also paraphyletic, and we describe a new *Trypanobia* species. The phylogenetic relationships among all these flattened syllids are discussed in detail. In addition, *Trypanosyllis krohnii*, previously believed to be cosmopolitan, was identified as a complex of at least eight pseudo-cryptic species. Our results show a complex scenario of speciation with cases of pseudo-cryptic species that correspond to geographically restricted lineages.

The *Syllis gracilis* species complex: a molecular approach to a difficult taxonomic problem (Annelida, Syllidae)

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Syllis gracilis Grube, 1840 possesses a remarkable type of chaeta, Y-shaped, making the species easy to identify. Based on this morphological character, it has been cited in tropical and temperate waters, being considered a worldwide-distributed species. However, during the nineteenth and twentieth centuries, several *Syllis* species from localities around the world were described presenting these ypsiloid chaetae. All of them, except for *S. magellanica*, *S. picta*, *S. mayeri*, and *S. ypsiloides*, are currently considered junior synonyms of *Syllis gracilis*, regardless of the large geographic distances between populations. *Syllis gracilis* is thus considered a marine cosmopolitan species in spite of recent questioning about cosmopolitanism among annelids. Our phylogenetic analysis of a multilocus molecular dataset (two mitochondrial and two nuclear markers) for 61 specimens of *Syllis gracilis* and its closely related species *S. picta*, *S. magellanica*, *S. ypsiloides*, *S. hyalina* and *S. armillaris*, collected around the world, provided evidence of the cryptic and pseudo-cryptic speciation of *Syllis gracilis*. Our results of the analyses of species delimitation with GMYC and PTP showed at least eight lineages within this traditionally considered worldwide-distributed species, six of them with geographically restricted distributions.

***Eclysippe* Eliason, 1955 (Annelida, Ampharetidae) from the North Atlantic with the description of a new species from Norwegian waters**

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The genus *Eclysippe* was established by Eliason for the species *Lysippe vanelli*, originally described from shelf areas off the Atlantic coast of Morocco. Two more species have been assigned to the genus *Eclysippe*, *E. eliasoni*, from off North Carolina and *E. trilobata* from off California. In the present study, numerous specimens of *Eclysippe* from Norway, Iceland and Northwest Africa have been examined, and three species have been recorded. *Eclysippe vanelli* are formally redescribed based on newly collected specimens from off Northwest Africa. A neotype has been selected, from close to the type locality, as the type material of this species has been lost. A new species is described from shelf areas off South Norway, and specimens from shelf depths south of Iceland are described as *Eclysippe* cf. *eliasoni*. DNA-barcodes have been obtained for all species.

Onuphid polychaetes associated with *Cymodocea nodosa* meadows of La Gomera (Canary Islands, NW Africa) – new species and new records from the eastern Atlantic

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A collection of onuphid polychaetes from a subtidal community of *Cymodocea nodosa*, acquired in August 1995 from off La Gomera were re-examined, revealing the presence of four species of *Aponuphis* and one undescribed species of *Kinbergonuphis*. The finding of the latter constitutes the first record of this genus in the NE Atlantic and NW Africa. *Kinbergonuphis* sp. nov. is characterised by: conspicuous dorsal black transverse pigment bands on anterior segments, fading gradually in the median region; antennae and palps with 4–5 ceratophoral rings; first five chaetigers with tridentate pseudocompound hooks of two types: slender long-appendaged and robust short-appendaged; large median hook on chaetiger 6 to 7; pectinate chaetae with 9–11 teeth first present from chaetiger 1; subacicular hooks from chaetiger 14–15; ventral cirri subulate in first six chaetigers; single branchiae from chaetiger 6, reaching a maximal number of four filaments in median chaetigers. The genus *Aponuphis* was represented by *A. bilineata*, *A. brementi*, *A. ornata* and *A. willsiei*. The records of *A. bilineata* and *A. brementi* constitute most likely the southernmost distribution of these species in the Atlantic, whilst this is the first report of *A. willsiei* in the Atlantic waters, expanding its distribution range significantly, since to date the species was only known from the Mediterranean Sea.

Redescription and ontogeny of the controversial eunicid *Marphysa saxicola* Langerhans, 1881

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The crevicular eunicid *Marphysa saxicola* was described by Langerhans from the rocky shores of the northwestern coast of Tenerife (Canary Islands, NW Africa). The original description presents a species with high variability of some morphological characters, such as presence/absence of peristomial cirri and branchiae. Both features have been traditionally considered as diagnostic in generic and species discrimination. Thereafter, the species was treated as “*incertae sedis*” and/or as synonym of *Paramarphysa longula* Ehlers.

We have reexamined the only extant syntype of *M. saxicola* (preserved in the Naturhistorisches Museum of Wien) and several topotype specimens from Tenerife and other islands of the Canary archipelago. We were fortunate to find (within the topotypes) a large size-series of individuals, ranging from small juveniles of 15 chaetigers, 0.35 mm wide (at 10th chaetiger) to fully grown specimens of 160 chaetigers, 1.70 mm wide allowing us to trace the ontogenetic development of the species. Little juveniles and specimens smaller than 1 mm wide lacked peristomial cirri and branchiae. Specimens larger than 1.40 mm wide (i.e. specimens that have attained about two-thirds of their maximum size) presented both peristomial cirri and branchiae, which is considered here the adult condition of the species. On the basis of these discoveries, we redescribe the species, demonstrating that it is not “*incertae sedis*” and is strictly different from *P. longula*. Furthermore, based upon its adult morphology the species is not consistent with the diagnosis of the genus *Marphysa* and thus we propose to transfer it to the genus *Nicidion*.

Shallow-water *Osedax* (Annelida, Siboglinidae) from Antarctic, Subantarctic, and Mediterranean waters

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Osedax represent a remarkable example of evolutionary adaptation to a specialized habitat, i.e. sunken vertebrate bones. Usually, females of these animals live anchored inside bone owing to a ramified root system from an ovisac, and obtain nutrition via symbiosis with Oceanospirillales gammaproteobacteria. Since their discovery, 26 *Osedax* OTUs were reported from a wide bathymetric range in the Pacific, North Atlantic, and Southern Oceans. Using experimentally deployed and naturally occurring bones we reported the presence of *O. deceptionensis* at very shallow-waters in Deception Island (type locality; Antarctica) and at moderate depths near South Georgia Is. (Subantarctic). We present molecular evidence in a phylogenetic analysis based on five concatenated genes (28S rDNA, Histone H3, 18S rDNA, 16S rDNA, and COI), supporting the placement of *O. deceptionensis* as a separate lineage, although its position remains uncertain. This phylogenetic analysis includes a new unnamed species recently discovered in the shallow-water Mediterranean Sea belonging to *Osedax* Clade I. A timeframe of the diversification of *Osedax* inferred using a Bayesian framework further suggests that *Osedax* diverged from other siboglinids during Middle Cretaceous (ca. 108 Ma) and indicates that the most recent common ancestor of *Osedax* dates to Late Cretaceous (ca. 74.8 Ma), concomitantly with large marine reptiles and teleost fishes. Molecular analysis of *O. deceptionensis* includes a COI-based haplotype network indicating that individuals from Deception Is. and the South Georgia Is. (ca. 1600 km apart) are the same species, confirming their well-developed dispersal capabilities.

Diversity of the genus *Malmgrenia* McIntosh, 1874 in the NE Atlantic re-assessed

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Ten species of *Malmgrenia* are currently recorded from the North East Atlantic. In eight of them all long notochaetae have stout, entire tips (*M. andreapolis*, *M. arenicolae*, *M. castanea*, *M. lillianae*, *M. ljungmani*, *M. louiseae*, *M. lunulata* and *M. mcintoshii*). They differ by their elytral, parapodial and neurochaetal characters. Two additional species (*M. darbouxi* and *M. marphysae*) can be separated from this group by their long notochaetae tapering to a fine, entire tip.

Meanwhile we found two new species in the area, both with some long notochaetae showing a fine, bidentate tip (i.e. with subdistal tooth), but differing mainly by their supra-acicular process, being elongate in *Malmgrenia* sp. nov. 1 and short in *Malmgrenia* sp. nov. 2.

The presence of bidentate notochaetae first led to confusion with *Pettibonesia furcosetosa*, originally described as *Malmgrenia* as well. But in this species, some of the long notochaetae terminate in a fine furcate (i.e. distally split) tip.

The discovery of the two new *Malmgrenia* species led us to re-assess the generic characters of *Malmgrenia* and *Pettibonesia*. As a result, we consider the presence of small cephalic peaks as a character of generic importance for *Pettibonesia*, especially since cephalic peaks are not found in any of the *Malmgrenia* species described for the area. The bidentate condition of some notochaetae suggests that the two new species could be assigned to *Pettibonesia*, but the fact that both new species lack cephalic peaks led us to assign them to *Malmgrenia*.

On the genus *Branchamphinome* (Polychaeta: Amphinomidae), with a description of a new species from the Southwestern Atlantic and emendation of the genus

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The presence of hooks is a long accepted diagnostic character in Amphinomidae, and present only in *Paramphinome* Sars, 1869, in which they are confined to notopodia of chaetiger 1. The presence of hooks is newly reported here in another amphinomid genus, *Branchamphinome* Hartman, 1967, in which we describe a new species from shallow southwestern Atlantic waters (150m) off Brazil. The new taxon inhabits muddy-sandy sediments at temperatures of 16-20°C, and represents the first report of *Branchamphinome* from tropical waters. Upon reexamination, notopodial hooks were also found to occur in the lectotype of *Branchamphinome antarctica* Hartman, 1967, which occurs in the Southern Ocean. Besides the above two taxa, *B. islandica* Detinova, 1985 from deep northern Atlantic waters, is the only other known congener. Although we have not examined Detinova's types, it seems probable that notopodial hooks will be confirmed in her species. The genus is therefore emended to include the presence of notopodial hooks, which remains a diagnostic trait. *Branchamphinome* sp. nov. morphologically diverges from the other two congeners in having a characteristic pigmentation pattern, differently shaped branchiae and disposition of eyes on the prostomium. While the significance of notopodial hooks in amphinomids remains poorly understood, their presence may be an ontogenetic feature of small-bodied amphinomids.

The evolution of the nervous systems in Annelida in the light of current molecular phylogenies

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Annelids are a taxon of segmented vermiform spiralian and one of the best studied animal groups. However, their phylogeny is still uncertain and a matter of debate since the first comparative morphological works appeared in the middle of the 19th century and the discussion continues since the advent of molecular phylogenies in the late 20th century e.g. Struck 2011, Weigert et al., 2014. Investigations on the nervous system have a long tradition in comparative animal morphology. Characteristics of this organ system are still used to infer phylogeny of animal taxa. Annelids have been investigated in this context most notably by Holmgren and Fauvel in the early 20th century and Orrhage since 1960. Most of these publications focused on the innervation patterns of the different body appendages like antenna, tentacles and palps and neglected the overall anatomy of the nervous system. Additionally all of these studies have one big disadvantage: the transparency of the data, since the original data (stained slices), which were used to describe and reconstruct the nervous systems are not available to other researchers. We therefore generated Azan stained serial sections (aligned stacks) of currently 42 annelid species and publish these in a morphological data base (*MorphDbase*) from which they can be downloaded and reinvestigated by other researchers. The aligned stacks are used to infer the entire anatomy of the central nervous systems and to reconstruct the evolution of this organ system based on the most recent molecular phylogeny published by Weigert et al., in 2014.

Non-invasive identification of tomopterids and genetic validation of northeast Pacific species

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Tomopterids are aberrant polychaetes with gelatinous bodies, unique head appendages and highly derived parapodia that lack chaetae. They are globally diverse and abundant plankton occurring throughout the entire water column. To date, nearly 60 species have been described and 16 of those are reported to have worldwide distributions. Like so many planktonic animals, tomopterid species have long been assumed to have wide geographic distributions. In many planktonic species this assumed wide distribution is contradicted by genetic evidence. We use genetic sequence data to identify species boundaries in the northeast Pacific and reconcile our findings with accepted morphospecies. Additionally, we examine characters useful in identification of live animals, which can be challenging because positive identification typically requires examination of gland arrangement in the parapodia of fixed animals. The abundance and ecological importance of tomopterids make them common targets for comparative physiology, bioluminescence and food web studies, yet in these studies the species are rarely identified and in most cases cannot be identified after the fact because the specimen is completely destroyed during analysis. We take this opportunity to identify morphological characteristics that are easily visible on live animals and reconcile these with fixed characters and genetic identifications, setting the stage for a revision of the family.

Abyssal Glyceriformia (Annelida) from the ANDEEP expeditions

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The faunas living in the vast deep sea regions around the Antarctic are very poorly known. This is especially true for the biodiversity of polychaetes inhabiting these remote areas. Therefore, new morphological data of Glyceriformia from the ANDEEP and ANDEEP-SYSTCO cruises to the South Atlantic Ocean and the Southern Ocean are reported. Based on benthos samples from four expeditions aboard R/V POLARSTERN, two species of Glyceridae (*Glycera capitata*, *G. diva*) and four species of Goniadidae (*Bathylglycinde sibogana*, *B. stepaniantsae*, *Goniada maculata*, *Progoniada regularis*) were studied. The distribution patterns of the different taxa demonstrated that some species have a high dispersal capability and show an extended level of eurybathy, whereas other species are restricted to the deep sea.

Morphological analysis of *Perinereis nuntia* (Annelida: Nereididae) of Iran suggests restricted gene flow between Persian Gulf and Gulf of Oman populations

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Perinereis nuntia species group is a common polychaete of intertidal and shallow marine waters and is widely distributed in the coastal waters of the southern continents and the tropical Indo-Pacific. However, there are considerable inter- and intra-population morphological variations. Recent studies indicate that *P. nuntia* is the most dominant species in both the Persian Gulf and Gulf of Oman. The aim of the present study is to clarify inter-population variation of *P. nuntia* from the Persian Gulf and Gulf of Oman based on morphological characteristics. Sampling was carried out at 12 different locations along the Iranian coasts and islands of the Persian Gulf and Gulf of Oman. The specimens were fixed and preserved following routine procedures. Twenty-three qualitative and quantitative characteristics of the pharynx and parapodia were measured and one-way ANOVA followed by Duncan's and Kruskal-Wallis tests and a Principle Component Analysis was performed with SPSS Ver. 22. Preliminary morphological analyses using ANOVA indicate variation between populations from the Persian Gulf and those from Gulf of Oman with significant differences in the number of paragnaths of the oral ring (Area V+VIL+VIR+VII-VIII) and number of paragnaths in area VI, suggesting possible cryptic speciation. By comparison, analysis of all characters using PCA showed no significant differences between populations, which supports a single species hypothesis. Considering that there are limited morphological differences between populations of the two regions, gene flow could be inferred as being restricted to some extent; however, the conclusion, requires molecular evidence to be confirmed.

Functional changes in polychaete assemblages subjected to contaminants from industrial effluent discharges in Norwegian fjords

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Several Norwegian fjords are heavily contaminated by metals and organic micropollutants from effluent discharges from aluminium smelters and metallurgical industry. During the last decades, environmental impact monitoring has been regularly carried out on the decree of Norwegian environmental authorities. The monitoring has particularly focused on soft sediment species composition and diversity in relation to pollution concentration gradients. The polychaetes constitute one of the most important species groups in the impacted areas with e.g. species of amphinomids, phyllodocids, spionids and capitellids being among the most tolerant to high contaminant levels. In the present study, the effects of pollution on the functioning of the polychaete species assemblages were examined. Monitoring data from sediments polluted by polycyclic aromatic hydrocarbons (PAHs) were selected for analysis. The functioning was characterized using 'Biological traits analysis' (BTA) that combines structural data with traits for each species. The traits included encompass a variety of features such as life habit, activity, feeding, size, sediment dwelling depth, sediment reworking potential, reproduction etc. Traits were categorised into effects traits and response traits to assess functional characteristics that are particularly related, respectively, to ecosystem functioning, e.g. sediment biomixing and bioirrigation, and to life strategies reflecting the species' adaptations to the environment. Analyses were carried out across several fjord systems to illustrate general functional gradients according to contaminant levels. Information on species traits was extracted from the recently released database on traits of marine polychaetes 'Polytraits' and from an institutional database at the Norwegian Institute for Water Research (NIVA).

Genetic investigations into cryptic diversity, biogeography and the trophic traits of deep-sea Antarctic polychaetes

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Our knowledge of Antarctic biodiversity and biogeography has improved greatly with the increased use of DNA barcoding. The comparison of sequence data from multiple individuals has revealed that many accepted morphological species actually consist of several genetically distinct cryptic clades. If these sequences are obtained over a large biogeographic area they can also be used to genetically test current biogeographic classifications. Phylogenetic analysis of mitochondrial DNA collected from 15 polychaete species within the Scotia, Amundsen, Bellingshausen and Weddell Seas revealed evidence of cryptic diversity in more than 50% of the morphospecies. Georeferenced haplotype networks showed that the majority of these cryptic species exist allopatrically exhibiting circum-Antarctic distributions. These results suggest a strong role of recent dispersal and high levels of connectivity across the west Antarctic region. To further our understanding of the ecological role of species diversity I will be using compound specific stable isotope analysis to define the trophic level of these genetically identified polychaete species. By combining high-resolution genetic and biochemical data we will gain an insight into the relationship between species and functional diversity within Antarctic polychaetes, their contribution to ecosystem function and speculate the potential impact of species loss with climate change.

Lumping and splitting at once: the interesting case of *Ephesiella* and *Sphaerodorum* (Sphaerodoridae, Annelida) in the North East Atlantic

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Sphaerodoridae is a family of marine annelids with a characteristic apomorphy, the spherical tubercles that cover their surface. There are two main body forms, the small and ellipsoid forms, generally up to 2 mm in length with strongly convex dorsal surface, and the long and slender forms, with up to 20 mm and slightly convex dorsum. The long bodied sphaerodorids include the genera *Ephesiella*, *Ephesiopsis* and *Sphaerodorum*. Differences between these genera is based on the chaetal morphology, being all compound in *Ephesiella* (except for the very first chaetiger where a simple chaeta may occur), all simple in *Sphaerodorum*, and both simple and compound in each parapodia in *Ephesiopsis*. Other than this, the group of long bodied sphaerodorids is largely homogenous in their morphology. For this study, we have used nuclear and mitochondrial DNA sequences to assess the geographic and bathymetric distribution among the two common species in the North East Atlantic, *Ephesiella abyssorum* and *Sphaerodorum flavum*. The results show that the genetic structure found within these two morphological species is much larger than expected, and after performing an assortment of methods for species delimitation we can predict that at least seven species inhabit the North East Atlantic. Moreover, our results also show that the two genera *Ephesiella* and *Sphaerodorum* are unequivocally not reciprocally monophyletic and should be synonymized.

On some Terebelliform polychaetes from deep waters in the SW Atlantic Ocean

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Polychaetes are usually one of the most important groups in terms of both benthic biomass and species richness, from the intertidal zone to great depths. The Terebelliformia group counts on 30 genera and ~75 species already recorded for the Brazilian waters. Most of taxonomic surveys in Brazil, however, were concentrated in coastal areas, while the fauna inhabiting deeper areas is virtually unknown. The aim of this study is to report the diversity and distribution of Terebelliformia from off the southeastern Brazil (500 – 3.300 m deep). The material was collected by two important projects: HABITATS ("Environmental Heterogeneity in the Campos Basin"), and AMBES ("Environmental Characterization of the Espírito Santo Basin"), both coordinated by CENPES/PETROBRAS, between 2008 – 2015. About 1500 specimens of terebelliform polychaetes were identified from the continental

slope and canyons, belonging to 12 species, including a new genus and 10 new species to science, *Pista* sp. nov., *Streblosoma* sp. nov., *Proclea* sp. nov., *Spinospaera* sp. nov., *Lanice* sp. nov., *Terebellides* sp. nov. 1, *Terebellides* sp. nov. 2, *Octobranchus* sp. nov., *Trichobranchus* sp. nov. and *Loimia megaloculata*. Some of these species were abundant and dominant in most of samples from both studied basins, in different depths (500–3300 m), as those of the genera *Pista*, *Streblosoma* and *Terebellides*. Thus, it's likely that these abundant species have a wide distribution on deep waters along the southwestern Atlantic Ocean, but many other regions still need to be better known, considering the heterogeneity of the sea floor as well as the extension of that Ocean.

A new species of *Bispira* (Polychaeta: Sabellidae) from the Alboran Sea (SW Mediterranean Sea)

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The genus *Bispira* Krøyer, 1856 currently belongs to the family Sabellidae Latreille, 1825 and comprises 22 species of benthic polychaetes. The monophyly of the genus is not currently assessed by any synapomorphy. Some morphological characters, including diagnostic ones defined by the type species *Bispira voluticornis* (Montagu, 1804), may be present or absent, or shared with other Sabellidae genera. In the Mediterranean Sea, the genus is rather sparse, with only two known species: *Bispira mariae* Lo Bianco, 1893 and *Bispira viola* Grube, 1863. A new species is herein described, *Bispira* sp. A, from the Avempace Seamount in the Alboran Sea (SW Mediterranean Sea) collected on muddy sand at 288–297 m depth within the framework of the Fauna Ibérica national project in July 1989. The new species is characterized by having branchial lobes with semicircular bases. The axial skeleton is composed of six vacuolated cells in cross section. Dorsal basal flanges are rounded and short. Each branchial lobe has from one to three pairs of compound, radiolar eyes from the dorsal-most to at least the ninth pair of radioles. The first segment is twice as long as the following. The abdominal neurochaetae are spine-like in anterior chaetigers and spine-like and elongate, narrowly hooded in posterior chaetigers, arranged in C-shaped bundles. With the description of this new species, the biodiversity knowledge of *Bispira* is increased for the Mediterranean Sea.

A new species of *Haplosyllis* (Annelida: Syllidae) from Saudi Arabian Red Sea, with a dichotomous key of the Indo-Pacific species

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The Red Sea, as well as some other regions of the Indian Ocean, is highly diverse, encompassing a large number of endemic species (Head, 1987; Sheppard *et al.*, 1992; Wehe & Fiege, 2002).

The previous knowledge on the species of *Haplosyllis* from this region is scarce and confusing. Initially, only *H. spongicola* (Grube, 1855) and *H. djiboutiensis* (Gravier, 1900) were the only reported species, being apparently present all along the region (Amoureux 1983; Amoureux *et al.*, 1980; Ben-Eliahu 1972; 1977; Ben-Eliahu & Safriel, 1982; Fauvel, 1919; 1927; 1955; Hartman, 1974; Hartmann-Schröder, 1960; Kiseleva, 1971; Mohammad, 1976; 1980; Monro, 1937). Latter, Lattig *et al.*, (2010) and Lattig & Martin (2011) found marked differences within the Indo-Pacific populations of *H. djiboutiensis*, which were considering as belonging to a species-complex. Accordingly, two endobiont species, *H. eldagainoae* and *H. giuseppemagninoi*, belonging to this complex and living in association with the sponges *Theonella swinhoei* Gray, 1868 (Red Sea and Indian Ocean) and *Liosina paradoxa* Thielle, 1899, respectively (Indian Ocean), were described as new, valid taxa (Lattig & Martin, 2011).

The materials from the Saudi Arabian Red Sea deposited at the Senckenberg Museum revealed to contain a new species of *Haplosyllis*, which is herein fully described and illustrated. This new species can be clearly distinguished from *H. djiboutiensis* by the numerous, small, dorsal granules and the chaetal shape, as well as by having a lower number of articles on each dorsal cirrus.

A dichotomous key of the Indo-Pacific species of *Haplosyllis* is also provided.

On the origins of Cryptic Species: Insights from the interstitial *Stygocapitella subterranea* species complex (Parergodrilidae)

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Molecular data enabled the discovery of hidden lineages with considerable genetic diversity within originally described species (cryptic species). Failing to detect such lineages highlights our poor understanding of biological diversity and processes. Cryptic species might be more common in some environments, particularly in extreme ones like the interstitial realm. The marine interstitium, or the space between sand grains, is characterized by the severe physical constraints of its three-dimensional structure. Surprisingly, although dispersal stages are lacking, some interstitial taxa exhibit a global distribution. This conundrum was named the "meiofauna paradox". Although several hypotheses such as transoceanic rafting and/or vicariance by plate tectonics have been suggested to clarify this paradox, these explanations seem illusive. Furthermore, although the discovery of hidden species lineages might suggest that the paradox is an artefact of poor taxonomic delimitation, we are yet unable to explain distributions on a continental scale. To tackle these questions I will study the interstitial annelid *Stygocapitella subterranea* Knöllner, 1934 (Parergodrilidae) cryptic species complex. Preliminary analyses have reported three separate genetic clusters occurring at European and both Northern American coastlines with individuals having identical morphologies.

In particular, during my PhD I will 1) review recent advances regarding supposedly cosmopolitan distributions, dispersal potential and the meiofauna paradox across interstitial species; 2) assess the number of cryptic entities in the complex, confirm the degree of morphological similarity and gauge dispersal potential at continental and intercontinental scales through a phylogeographic study; 3) study population-genomic indices at regional and local scales along Northern and Western European populations.

Chaetozone of N E Atlantic and Mediterranean shallow waters.

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There were four species of *Chaetozone* described from shallow waters (<200m) of the N E Atlantic before 1994. They are *C. setosa* Malmgren, 1867, Svalbard, *Chaetozone macrophthalma* Langerhans, 1880, off Madeira, *Chaetozone dunmani* McIntosh, 1911, Ireland and *Chaetozone Z* McIntosh, 1911, no locality. There were two species from the Mediterranean *Chaetozone A* McIntosh, 1911 from the Bay of Tunis and *C. carpenteri* McIntosh, 1911 from Bona Bay off Algiers, Cape Guardia and Cape Finisterre, Atlantic coast of Spain. Since 1994, two taxa have been described from the N E Atlantic, shallow waters, *C. gibber* Woodham and Chambers, 1994 and *C. christiei* Chambers, 2000. There are three other taxa recorded from the Mediterranean, *C. corona* Berkeley and Berkeley, 1941 (Çinar and Ergun, 2007), *Chaetozone* sp. (Gambi and Giangrande, 1986) and *Chaetozone cf. setosa* Ayari 2009 from Tunisia. Although other taxa originally described in other genera and subsequently placed in *Chaetozone* their current generic placement in *Chaetozone* is doubtful. This includes *Heterocirrus caputesocis* Saint-Joseph, 1894, *Chaetozone zetlandica* McIntosh, 1911, *Cirrineris incertus* Fauvel, 1936, *Tharyx vivipara* Christie, 1984 and *Tharyx retieri* Lechapt, 1994. During the last 20 years it has become apparent that *Chaetozone* diversity is greater than first assumed (Blake, 2015) and many species are now not considered cosmopolitan (Chambers et al 2007). In 2000 it was recognised that there were more than the 2 shallow water species in British waters but a lack of whole specimens in good condition prevented descriptions. The aim here is to separate *Chaetozone* with descriptions and a key.

A new species and new record of genus *Sternaspis* (Polychaeta: Sternaspidae) from Korean waters

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A taxonomic study is conducted using the materials of genus *Sternaspis* collected from muddy intertidal and subtidal habitats in Korean waters. *Sternaspis chinensis* Wu, Salazar-Vallejo & Xu, 2015 and *Sternaspis n. sp.*, which were considered to be *Sternaspis scutata* Ranzani, 1817 previously identified in Korean waters, are reported along with their descriptions and illustrations. *Sternaspis chinensis* is newly found from the western and southern coasts of Korea (the Yellow Sea and East China Sea), especially in the shallow coastal bays. The new species, *Sternaspis n. sp.* found from the southeastern coast of Korea (the East Sea or Japan Sea) is very similar to *S. chinensis* in general morphology, especially on the concentric lines, the anterior margins, a median notch, and the fan margin of the ventro-caudal shield. However, *Sternaspis n. sp.* can be distinguished from the latter by following characteristics

of the shield: the shield of the new species is reddish-brown, bearing indistinct or restrictively developed concentric bands on the marginal area, and with the thick and translucent integument layer, while that of *S. chinensis* is reddish-orange or brick red, having markedly developed concentric bands on almost whole area, and with the thin and transparent integument layer.

High genetic diversity in abyssal plain annelid infauna

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Species ranges, realized dispersal abilities, population structure and connectivity are important aspects of conservation biology. In the deep-sea, population genetic data are available for some scavenging species and a few species present at habitats such as hydrothermal vents, but little is known about population connectivity of macrofauna species at abyssal plains covering 54% of the earth's surface. In an effort to understand general patterns of population connectivity in the Central Pacific Ocean, we collected samples representing a range of annelid species and analyzed them for genetic structure. This was made possible only by a very ambitious sampling program involving multiple deployments of dedicated sampling gear (such as epibenthic sledges and boxcores) as well as samples of opportunity from specimens brought up more or less serendipitously by other gear (such as ROV and various landers). Based on preliminary results from the barcode gene COI of select target annelids, we suggest that the genetic diversity is generally very high and that genetic structure exists in some species at a regional geographic scale while others show extraordinary levels of connectivity also between ocean basins. Possible mechanisms for maintaining divergence at abyssal plains are dispersal restrictions caused by directional near-seabed currents channeled by ridges and seamounts, a heterogeneous seascape from variation in surface primary production, sedimentation and erosion rates, variation in larval sources from e.g. rocky outcrops, and small-scale habitat variability induced by features such as polymetallic nodules. These early data suggesting the presence of population structure are important in assessing biodiversity conservation questions and ultimately the governance of deep-sea areas under consideration for exploitation.

Taxocene patterns of benthic secondary productivity along an estuarine/stress gradient

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We examined the comparative importance of macrobenthic infaunal taxocenes in regard to patterns of secondary productivity (1) along the entire estuarine gradient (tidal freshwater through polyhaline zones) and (2) patterns affected by two major anthropogenic stressors – low bottom dissolved oxygen and sediment contamination of polycyclic aromatic hydrocarbons (PAHs). Along the estuarine gradient the highest biomass values were in the lower salinity zones (tidal freshwater and oligohaline) where infaunal bivalves dominated. The biomass values were 10X higher than in the higher salinity habitats (polyhaline). However, when secondary production was estimated the difference between low salinity and higher salinity habitats types was only 2X higher in the low salinity habitats. This discrepancy is driven by the high secondary productivity of polychaete species. In general other taxocenes (including, amphipods, cumaceans, isopods, gastropods, hemichordates and nemertines) were minor contributors. Regions with summer hypoxic/anoxic events had reduced levels of secondary production; however, regions with high levels of sediment PAHs, generally did not show reduced levels of secondary productivity. Both these stressed regions were highly dominated by polychaete production.

Physiological performance of the invasive polychaete, *Marenzelleria viridis*, under varying salinity regimes

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Marenzelleria viridis is an invasive polychaete in the Baltic region and its success is due in part to a broad salinity tolerance at the critical early stages of its development. While many studies have focused on the effect of hypoosmotic stress on the larval stages of this species, few have addressed the potential carry over effects to the adult stage. The current study investigated the effects of low salinity on the physiology of *M. viridis*, by using its regenerative capabilities as a proxy for physiological performance. Specimens were collected from tidal flats in Long Island, New York which encompasses *M. viridis*' native range. Worms were ablated at the 14th to 20th chaetiger and regeneration of anterior regions were followed under salinity regimes ranging from 0 ppt to 24 ppt (control). Our results showed that morphogenesis during anterior regeneration followed a similar pattern to other spionid worms. All worms cultured at salinities above 0 ppt completed regeneration while a 75% mortality rate was found for the latter. Salinity surprisingly did not have an effect on regeneration rate but low salinity cultures regenerated significantly less tissue than their counterparts in the control treatment- a trade-off of reduced growth rate in response to hypoosmotic stress. Finally, variation in dorsal pigmentation patterns was observed in regenerated individuals, contributing to growing evidence that this taxonomic character may in fact be a plastic and or variable trait.

Eurysyllis (Phyllodocida: Syllidae) from Brazil, with the description of 3 new species

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Eurysyllis Ehlers, 1864 currently comprises 7 species, characterized by the relatively small, dorso-ventrally flattened bodies, dorsum covered by longitudinal rows of tubercles, and appendages (i.e., antennae and cirri) composed of a single article each. The results presented herein were obtained with the analyses of material collected by two large surveys sponsored by the Brazilian energy company, Petrobras, in partnership with researchers from several universities in the country. The projects "Habitats – Environmental heterogeneity in the Campos Basin" and "AMBES – Environmental heterogeneity of the Espírito Santo Basin" sampled these previously largely unexplored basins, in depths ranging from ~30–2000 m deep. We found 3 new to science species of *Eurysyllis* among that material, which represents the first record of the genus in Brazilian waters. *Eurysyllis* sp. 1 presents 4 longitudinal rows of spherical tubercles dorsally; single pair of eyes; and unidentate falciger blades. *Eurysyllis* sp. 2 has 8 rows of tiny spherical tubercles on the first five segments and 9 rows of tubercles on the remaining segments, except for the proventricle segments, which show 11 rows of tubercles; single pair of eyes; and unidentate falciger blades. *Eurysyllis* sp. 3 has only 2 rows of tiny spherical tubercles on the first segments, progressively larger towards posterior body, two additional dorso-lateral longitudinal rows start to appear between the existent and the cirri, from the proventricle segments onwards, and, after the proventricle segments, another pair, more dorsally located, with apparently flat, shield-like tubercles; single pair of eyes; and unidentate falciger blades.

Trypanosyllis and *Xenosyllis* (Phyllodocida: Syllidae) from Campos and Espírito Santo Basins (SE Brazil)

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We present herein new reports of *Trypanosyllis* Claparède, 1864 and the first record of *Xenosyllis* Marion & Bobretzky, 1875, in Brazilian waters. The material analysed came from off the southeastern Brazilian coast, collected on Campos and Espírito Santo basins, from ~30–2000 m deep. The genus *Trypanosyllis* was represented by three species, *T. aurantiacus* Nogueira & Fukuda, 2008, a Brazilian species, so far only known from the type locality, on rocky shores off the state of São Paulo; *T. coeliaca* Claparède, 1868, originally known from the Mediterranean Sea and a new record for the South Atlantic Ocean; and *T. zebra* Grube, 1860, originally described from the Adriatic Sea, the only species previously known to occur in the area. The analysis of the material also revealed the presence of two species of *Xenosyllis*, a genus which had not previously been registered for the South Atlantic. Two species of *Xenosyllis* were found, *X. scabra* Ehlers, 1864, originally known from the Mediterranean Sea, and *X. moloch* San Martín, Hutchings & Aguado, 2008, to date only known from the type locality, in the Tasmanian Sea. Our findings suggest the possible existence of sibling species in *Xenosyllis*, evidencing the need of additional tools for the identification of the species, other than only morphological data.

Redescription of *Nephtys longicornis* Perejaslavzeva, 1891

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The species described by Perejaslavzeva (1891) has a strange history. Since it has been described, Jacobova (1930) regarded it as variety of *Nephtys cirrosa* Ehlers, 1868 without any explanation. Hartman (1959) wrongly listed it as *Nephtys cirrosa longicornis* Jacobova, 1930. WoRMS (2015) follows her and does not even mention its author — Perejaslavzeva. On the other hand Vinogradov (1949) and Vinogradov and Losovskaya (1968) accepted *Nephtys longicornis* as a distinct species. Marinov (1977) and Kisseleva (2004) supposed that it is a synonym of *Micronephthys stammeri* (Augener, 1932). Our investigation of specimens from the Black Sea (type locality) shows that there is no difference between *Nephtys longicornis* and *Micronephthys stammeri*, and last species should be accepted as junior synonym. The redescription of *Nephtys longicornis* based on specimens from the Black Sea (type locality) is given.

Phylogeny of Ampharetidae

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The ecology of the polychaete family Ampharetidae has received a lot of interest due to its almost ubiquitous presence in chemosynthetic habitats (hydrothermal vents, cold seeps and organic falls), and a number of new species have recently been described. The taxonomy of the family, however, is complex with a high number of genera, of which many are monospecific. Interpretations of morphological characters are challenging, and there is a need to clarify which characters are phylogenetically informative. With this study we aim to use a multi-gene molecular approach (using COI, 16S, 18S and 28S) to generate a phylogeny of the Ampharetidae with high taxonomic sampling within the family. Preliminary results of this work will be presented, and implications for the taxonomy of Ampharetidae will be discussed.

Assessing the ecological quality of Port Blair coast (South Andaman, India) using benthic biotic indices

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The adverse effect of direct sewage discharge on the benthic communities is globally recognized. Andaman & Nicobar Islands has very sensitive ecosystem. Human activities have been intensified around Port Blair city. Benthic Indices are highly recommended for evaluating the ecological status of coastal ecosystem. In fact coastal quality of Island is unknown. Therefore, the present study was carried out to assess the health of area using univariate and multivariate macrobenthic indices. Sampling was carried out at two sewage outfall and one reference sites from 2014 to 2016 in replicates for macrofauna and environmental parameters. The two urban proximity outfall area of Bay region, was dominated by *Capitella capitata*, *Orbinia*, *Armandia* and Spionid group indicating moderate to poorly disturbed condition and the reference site was represented by species belonging to the ecological group I and II (*Axiiothella*, *Ophellia*, *Scoloplella*, Urothoid and Gammaridean amphipods) indicating good ecological condition. Performances of traditional benthic indices (H', ABC, AMBI and BOPA) alone were efficient to evaluate the quality status. However, multi-factorial extension of AMBI (M-AMBI) performed satisfactorily. Further, independent descriptors of sediment and biological parameters have been incorporated. Failing to detect natural and multiple source of perturbation, biotic indices have been criticized at several instances. Therefore, an attempt has been made by acquiring natural reference condition, single agent of disturbance and dry season. It is suggested that choices of dry period and use of complementary indices for effective assessment of tropical coastal waters are desirable.

Climate and environmental changes driving biogeographic shifts in sabellariid reefs

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Climate and global environmental changes (CEC) can impact marine ecosystems by driving spatio-temporal changes in the distribution and abundance of species. Using species distribution modelling, we predicted how current ranges of temperate and tropical worm reefs may respond to CEC. We focused on two reef-building worms: *Phragmatopoma virgini* occurring in the temperate SE-Pacific and SW-Atlantic Oceans, and *Phragmatopoma caudata* in the tropical W-Atlantic. Compared to current distributions, we tested if: i) under the lowest predicted atmospheric CO₂ concentrations (RCP2.6), suitable areas of habitat would show minor changes throughout the century; and ii) under highest predicted atmospheric CO₂ concentrations (RCP8.5), if suitable areas would undergo poleward shifts, especially at the end of the century. Under RCP2.6 in the middle of the century, the areas of suitable habitat slightly increased for the temperate species and contracted for the tropical. At the end of century, multi-directional shifts without range retraction were predicted for both species, but the tropical worm reefs showed major changes to their distribution. Under the higher CO₂ scenario and throughout the century, multi-directional shifts increased the areas of suitable habitat for the temperate species, while tropical species experienced poleward shifts and retraction at low latitudes. Results indicated that biogeographic shifts for temperate and tropical worm reefs are idiosyncratic to the CEC scenarios considered. Overall, temperate worm reefs showed an increase in suitable habitats, but with magnitude varying between scenarios and times; for the tropical worm reefs, responses were generally more antagonistic, also depending on the scenario and time considered.

First record of the subfamily Anoplosyllinae Aguado & San Martín, 2009 (Phyllodocida, Syllidae) in Brazil, with 13 new species

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Syllidae Grube, 1850, one of the largest polychaete families, currently comprises about 700 species, distributed among 5 subfamilies plus some *Incertae Sedis* genera. Anoplosyllinae Aguado & San Martín, 2009 is the latest subfamily described and also the smallest, with 45 species described to date; it accommodates relatively small bodied animals, with smooth antennae, peristomial and anterior body dorsal cirri, smooth or articulated dorsal cirri on mid- and posterior body chaetigers, and straight and short pharynx, without an armature. Despite the nearly 150 species of the Syllidae registered so far in Brazil, no species of Anoplosyllinae has ever been found. We report herein the first findings for this subfamily in Brazilian waters, with 13 species identified morphologically, all still undescribed. By analyzing recently collected material from the Campos Basin, southeastern Brazil, we found 7 species of *Syllides* Ørsted, 1845, 1 of *Streptosyllis* Webster & Benedict, 1884, and 5 of *Streptospinigera* Kudenov, 1983. It is worth mentioning that, besides the present being the first report for the subfamily off the country, the five new to science species of *Streptospinigera* more than double the known diversity of this genus, which was previously known from only four species.

Terebellides (Terebellidae: Polychaeta) from the North Polar Basin

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Syllis prolifera Krohn, a common syllid associated to vegetated shallow reefs of the Mediterranean Sea, is one of the most abundant taxa associated to naturally acidified rocky reef of the CO₂ vent system off the island of Ischia. The species could be considered a good model to study acclimatization and adaptation of benthic organisms to ocean acidification. A study aimed to investigate reproductive biology and population structure and dynamics of *S. prolifera* was conducted in two sites subjected to different pH conditions: the acidified site of the CO₂ vents (mean pH= 7.4 -7.9), and a control site (*S. Anna*) with normal pH conditions (pH= 8.10). Semi-quantitative samples of macroalgae were collected in both sites every two months, from April 2014 to April 2015, at 0.5-2 m depth. *S. prolifera* resulted always present and more abundant in the acidified area respect to the control zone. Specimens bearing reproductive stolons, however, did not vary among sites and pH conditions and are present all year around except in February. The population structure analysis revealed a recruitment event in August in the control zone, while in the acidified site

a constant unimodal pattern in the size/frequency distribution was observed all around the year, suggesting the overlap of more cohorts. The main differences related to pH conditions, such as higher abundances and occurrence all year around in the acidified conditions, are likely due to reduced competition with other species, and constant and higher presence of macroalgae for shelter and food occurring in the vent site.

Biology and population structure of *Syllis prolifera* Krohn (Syllidae) in relation to ocean acidification

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Syllis prolifera Krohn, a common syllid associated to vegetated shallow reefs of the Mediterranean Sea, is one of the most abundant taxa associated to naturally acidified rocky reef of the CO₂ vent system off the island of Ischia. The species could be considered a good model to study acclimatization and adaptation of benthic organisms to ocean acidification. A study aimed to investigate reproductive biology and population structure and dynamics of *S. prolifera* was conducted in two sites subjected to different pH conditions: the acidified site of the CO₂ vents (mean pH= 7.4 -7.9), and a control site (S. Anna) with normal pH conditions (pH= 8.10). Semi-quantitative samples of macroalgae were collected in both sites every two months, from April 2014 to April 2015, at 0.5-2 m depth. *S. prolifera* resulted always present and more abundant in the acidified area respect to the control zone. Specimens bearing reproductive stolons, however, did not vary among sites and pH conditions and are present all year around except in February. The population structure analysis revealed a recruitment event in August in the control zone, while in the acidified site a constant unimodal pattern in the size/frequency distribution was observed all around the year, suggesting the overlap of more cohorts. The main differences related to pH conditions, such as higher abundances and occurrence all year around in the acidified conditions, are likely due to reduced competition with other species, and constant and higher presence of macroalgae for shelter and food occurring in the vent site.

DNA taxonomy and population connectivity (macrofauna and megafauna) methods for work in the abyssal Clarion-Clipperton Zone (CCZ), central Pacific Ocean

Adrian **Glover**¹

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Recent years have seen increased survey and sampling expeditions to the Clarion-Clipperton Zone (CCZ), central Pacific Ocean, driven by commercial interests from contractors in the potential extraction of polymetallic nodules in the region. Part of the International Seabed Authority (ISA) regulatory requirements are that these contractors undertake environmental research expeditions to their CCZ exploration claims following guidelines approved by the ISA Legal and Technical Commission (ISA, 2010). Section 9 (e) of these guidelines instruct contractors to ‘...collect data on the sea floor communities specifically relating to megafauna, macrofauna, meiofauna, microfauna, nodule fauna and demersal scavengers’. There are a number of methodological challenges to this, including the water depth (4000-5000m), extremely warm surface waters (~28° C) compared to bottom water (~1.5° C) and great distances to ports requiring a large and long seagoing expedition with only a limited number of scientists. Both scientists and regulators have recently realized that a major gap in our knowledge of the region is the fundamental taxonomy of the animals that live there; this is essential to inform our knowledge of the biogeography, natural history and ultimately our stewardship of the region. Recognising this, the ISA is currently sponsoring a series of taxonomic workshops on the CCZ fauna and to assist in this process we present here our methodology for DNA taxonomy (incorporating both molecular and morphological data) of the macrofauna from the CCZ in the recent ABYSSLINE cruise program to the UK-1 exploration claim. Key to quality taxonomic work on macrofaunal animals from the tropical abyss is careful extraction of the animals (in cold filtered seawater), microscopic observation and preservation of live specimens, from a variety of sampling devices by experienced zoologists at sea.

Deep Sea ID: a field guide to the marine life of the deep sea

Adrian **Glover**¹

¹ Natural History Museum, Life Sciences Department, Cromwell Rd, London, London, SW7 5BD, United Kingdom

Deep Sea ID, is a field guide interface to the World Register of Deep-Sea Species (WoRDSS) that currently stores on your device (for offline access) the taxonomic information for over 20,000 deep-sea species, over 450 high-resolution photographs of deep-sea specimens as well as links to online taxonomic tools, sources and important references. The app is designed to improve access to taxonomic information for researchers and contractors working at sea, in the field or in the laboratory as well as educators and science communicators who wish to learn more about the remarkable diversity of deep-sea life.

At this poster and demo I will explain why we made this app, how we did it, the importance of open data and take you on a visual tour through some of the amazing creatures of the deep sea.

Investigating the complexities of the Sigalionidae using a total evidence approach (Aphroditiformia; Annelida)

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The Aphroditiformia is one of the most successful groups of annelids in terms of diversity colonized habitats, and morphological variation. Within the Aphroditiformia, the Sigalionidae are second only to Polynoidae in terms of number of species, however they have colonized the widest range of habitats and exhibit the highest morphological variation and novelty. Here we present the most diverse model-based phylogeny of the Aphroditiformia using both molecular and combined molecular/morphological approaches, placing emphasis on understanding the relationships within the Sigalionidae. Our molecular dataset comprises the largest gathering of taxa from within the subclades "Pholoidae" and "Pisionidae" including interstitial species never previously sampled. Moreover, twenty-eight additional members of the Sigalionidae (from each valid genus) were included in our total dataset analyses to further investigate the character evolution and systematics within the Sigalionidae. Our recovered topology and clades were nearly congruent with the results from previous analyses; however, our systematic review has recovered six families constituting the Aphroditiformia, including the Acoetidae, Aphroditidae, Eulepethidae, Iphionidae, Polynoidae, and the Sigalionidae. Both the pisionids and pholoids remained nested within the Sigalionidae throughout all analyses. Additionally, the total dataset analyses made possible the recognition of several additional clades within the Sigalionidae, resulting in the identification of two new subfamilies, the Sthenelanellinae and the Sigalioninae. We also recognize the monophyly of the Pelogeniinae, while providing new rank designations for the proper taxonomic recognition of the clades representing the pisionids (= Pisioninae) and pholoids (= Pholoinae).

Merging morphological and molecular techniques to identify and characterise polychaetes

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Polychaetes are usually the most abundant taxon in soft sediment benthic communities and are often used as indicators of environmental conditions. In New Zealand identification of polychaetes for biomonitoring and biosecurity purposes is traditionally undertaken using microscopy. Rapidly evolving molecular methods can complement these techniques. Merging morphological and molecular analyses is particularly advantageous in biosecurity research, where early detection and precise identification of potential pest species is crucial for efficient management measures. In this poster we highlight three studies. (1) Metabarcoding - we applied molecular metabarcoding to settlement plates that had been deployed in a busy port for between 1 to 15 days. Ten polychaetes species were detected on plates deployed for only 1 day. At this early life stage the microscopic propagules were unidentifiable by traditional taxonomic analyses. (2) Quantitative PCR (QPCR) – this technique is used for species-specific identification. The Mediterranean fan worm *Sabella spallanzanii* is currently an unwanted organism in New Zealand. We recently developed a QPCR and assessed the cross reactivity of the assay using ca. 30 New Zealand and Australian native Sabellidae. This assay has since been used to validate the results of metabarcoding projects and for early detection of this species. (3) Population genetics – has been used to identify donor areas and likely pathways of invasive polychaetes. For example, we identified that the population of *Ficopomatus enigmaticus* spreading in North Iberian coastal waters most likely originates from New Zealand, rather than from a nearby invasive populations.

Polychaete latitudinal patterns of alpha and beta diversity along the Western Gulf of California continental shelf, Mexican Pacific

Pablo Hernández-Alcántara¹, Diana Melissa Cuéllar-Mercado², Adriana Barbosa-López³, Vivianne **Solís-Weiss**⁴

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To explore the ecological model of decreasing species richness at higher latitudes, we analyze here the changes in alpha (species richness and Simpson index) and beta (Wilson-Schmidha coefficient) diversity in the polychaetes of the continental shelf of the Western Gulf of California along a latitudinal gradient of about 8 degrees. We sampled 28 stations during three oceanographic cruises and identified 2,870 polychaetes (38 families, 236 species). This fauna was highly diversified, with wide variations along the Gulf (2 – 50 spp./station; D= 0.45 – 0.98) and a parabolic distribution curve with highest values in the central region (32 spp./station; D = 0.96). To the north of the “islands region”, and towards the south-southeast, fewer species were found (12 spp./station; D = 0.90 in both). Those variations allowed us to differentiate five conglomerates. To substantiate these patterns at a larger (regional) scale, we compiled information about all the species registered in that area, finding 690 species in 47 families. The variations in beta diversity (0.31-0.85) showed clear differences in the kind of fauna of the south and southwest Baja California peninsula (> 0.8). In the central region, beta diversity was reduced (average = 0.54), indicating that the fauna composition becomes gradually more similar in that area until the presence of the “islands”, to the north, breaks this tendency. This “islands region” seems to have a negative effect in the species distribution, so that the fauna found in the north is similar throughout that area, but different from that recorded in the central region.

Delineation of *Capitella* species in the Northern Gulf of Mexico

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^{1,2,3} Texas A&M University at Galveston

Capitella capitata was frequently cited as a cosmopolitan bioindicator because it occurs in high densities in anthropogenically-disturbed marine environments. However, it is now clear *Capitella capitata* is a cryptic species complex on the basis of allozyme and developmental studies. We aimed to assess species boundaries in this complex in the northern Gulf of Mexico using molecular sequence data. We sequenced a fragment of the mitochondrial cytochrome c oxidase subunit I gene for individuals of *Capitella* cf. *capitata* and *Capitella* cf. *aciculata* (distinguished by acicular spines on the first two chaetigers) collected from Texas and Florida coasts and analyzed them in conjunction with data available in GenBank. Our results indicate the presence of a Gulf of Mexico clade that is distinct from populations in Canada and the Indo-Pacific. Populations in the Gulf of Mexico are structured geographically, with support for Texas and Florida clades, and there are no clear boundaries between *Capitella* cf. *capitata* and *Capitella* cf. *aciculata*. This is corroborated by the fact that multiple specimens were morphologically intermediate between the two species. Future efforts will be focused on understanding the relationship between *Capitella* cf. *capitata* and *Capitella* cf. *aciculata* in the northern Gulf of Mexico.

Infestation of the cultured Atlantic bay scallop *Argopecten irradians* by *Polydora* spp. (Annelida, Spionidae) in South Korea

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The genus *Polydora* (Annelida, Spionidae) includes many species well known for their boring activity into calcareous substrates such as mollusk shells. *Polydora* infestation may cause depreciation in commercial value, reduction of growth rate and meat yield, and heavy mortality of commercially important mollusks. We had chance to investigate the infestation of the cultured Atlantic bay scallop *Argopecten irradians* by the genus *Polydora* from “Geoje (Oryang-ri)” and Jaran Bay (Suwol-ri, Tongyeong), South Korea. These bay scallops were originally imported from Atlantic coast of North America via China. Totally three *Polydora* species, namely *Polydora haswelli*, *P. websteri*, and *P. uncinata* were observed to bore into the shells. *Polydora websteri* had a tendency to inhabit the narrow joint part of the ear of right valve. The narrow part of the ear seemed to be more advantageous to settle and make mud tubes at the initial stage of settlement on the shell surface. On the other hand, *P. haswelli* and *P. uncinata* often inhabit the central part of both valves covered with abnormal black shell materials. *Polydora websteri* was the most dominant species which bore into the bay scallop shells in Jaran Bay.

The invasive fanworm *Sabella spallanzanii* (Sabellidae, Annelida) in Australia and New Zealand

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The Mediterranean fan worm *Sabella spallanzanii* is a highly invasive pest species introduced by biofouling to Australia and New Zealand. The species, with tubes up to 0.5 m long, has the potential to influence aquaculture operations, both as a nuisance fouler and as a competitor with cultured filter-feeding species such as oysters and mussels. The species was first detected in New Zealand, in Lyttelton Port, in March 2008. By January 2010 it had spread to multiple locations in North Island, New Zealand. In Australia it was first discovered in Western Australia in 1965, and has since been recorded in Victoria, South Australia, Tasmania and Twofold Bay in far-southern NSW. In April 2013, Australian Museum scientists discovered *S. spallanzanii* in Botany Bay, near Sydney, NSW an important commercial port, well north of previous records. A marine pest risk assessment by the NSW DPI (Glasby & Lobb 2008) predicted the Mediterranean fanworm to be the second most likely invasive to be introduced into Botany Bay from a domestic port, citing the Port of Melbourne as the most likely source. Is the Botany Bay population an extension of the Victorian population or from Twofold Bay or a new inoculation from New Zealand or Europe? Where did the New Zealand population derive from? We analysed the phylogeography of native (Mediterranean Sea) and invasive populations (Australia and New Zealand) of *Sabella spallanzanii* using multiple genetic markers to infer the possible route and transmission vectors of the invasive populations.

Two new species of *Pista* Malmgren, 1866 (Polychaeta: Terebellidae) from the Adriatic Sea (Mediterranean)

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Two new species of *Pista* were collected in 2008 and 2010 from the muddy sand in the Northern Adriatic Sea (Mediterranean). They were initially identified as *Pista* cf. *lornensis* (Pearson, 1969) however this seemed unlikely given that this species was described from Loch Linnhe, on the north west coast of Scotland. Examination of the material in detail revealed two undescribed species. *Pista* sp.n. (Rovinj city harbor; 7m, 30.09.2010.) is characterised by branchial filaments arranged in separate tiers from a main stalk, lateral lobes continue mid ventrally, and anterior notopodia much smaller than subsequent ones. *Pista* sp.n. (offshore station 13NM off the western coast of Istria, 31m, 05.12.2008.) has branchial filaments arranged in a spiral from the main stalk, with 1st pair of notopodia very small with few small chaetae, and 2nd also small, subsequent notopodia with swollen glandular bases, lower lip forms a ridged lobe and the shape and arrangement of lateral lobes on segments 2, 3 and 4 differs from *Pista* sp.n. (Rovinj city harbor; 7m, 30.09.2010.) These two new species are compared to other species described from the region, but a complete revision of the genus is urgently needed.

Structure and dynamics of macrobenthic polychaete community before and after the Great East Japan Earthquake in Onagawa Bay, northeastern Japan

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¹ Tohoku University, 1-1 Amamiyamachi, Tsutsumidori, Aobaku, Sendai, 981-8555, Japan

The 2011 Great East Japan Earthquake and subsequent tsunami have severely damaged the coastal ecosystems of the northeastern Japan. We investigated the macrobenthic polychaete community using grab samplers in Onagawa Bay, located in the northeastern coast of Japan from July 2007 to March 2016. Before the tsunami, the density and composition of polychaetes had been stable for three years with the dominance of cirratulid and magelonid polychaetes. Just after the tsunami, the density and biomass of polychaetes had drastically decreased and the structure of polychaete community had completely changed. For two years after the tsunami, the density and composition of polychaetes fluctuated. During this period, opportunistic spionid and capitellid polychaetes dominated and regulated by sediment deterioration indicated by high concentration of sulfide and n-hexane extracts. In June 2013, maldanid polychaetes began to dominate and the density of polychaetes recovered to the pre-tsunami level as followed by the decrease of sulfide and n-hexane extracts. In 2015, however, the density of maldanids gradually began to decrease. Until today, the biomass of polychaetes has not yet returned to the pre-tsunami level. Not only the direct physical impacts of earthquake and tsunami but also the chemical pollution which derived from different debris and heavy oil tanks collapsed by the tsunami may have caused those drastic changes in polychaete community. The polychaete community in Onagawa Bay is still in the process of succession though five years have passed after the disturbance.

Hematophagous leeches of the genus *Haementeria* from Brazil

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Haementeria is a genus of hematofagous leeches common in South America, which was recently redefined to include one species previously considered as belonging to *Oligobdella*. Recent studies have shown the importance of this genus on anticoagulants production and hosts infection with trypanosomes and other protists. Despite its importance, the species of *Haementeria* are not clearly defined, mostly because the internal morphology of many species was not described. The present study is part of a project aiming to inventariate the Brazilian leech fauna, using classical and modern techniques to access the external and internal morphology of the species of *Haementeria* found in our study. A total of ten species were examined by means of scanning electron microscope, hand dissections, histological sections and micro-computed tomography. The results show that the external morphology relevance was overestimated, since the high level of variation on the metameric position of papillae causes some overlap and confusion on species identification. However, the detailed study of papillae shows a species-specific morphology. According to our findings, the current diagnosis of *Haementeria* is emended to accommodate some species previously mistakenly identified as belonging to *Oligobdella* and *Placobdella*, the latter restricted to North America. The South American and particularly the Brazilian leech fauna are still poorly known. As an example, out of the ten species of *Haementeria* described herein, five are new to science.

Ten undescribed species of *Cirriformia* (Annelida: Cirratulidae) from Japan

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The cirratulid genus *Cirriformia* Hartman, 1936 (type species: *Terebella tentaculata* Montagu, 1808) contains 23 valid species (Read and Fauchald 2016). Based on Japanese material, Marenzeller (1879) established *Cirratulus comosus* Marenzeller, 1879, which, however, has been synonymized with *Cirriformia tentaculata* (Montagu, 1808) by Imajima and Hartman (1964). While Yamada (2009) suggested a possibility of the existence of multiple species, most of the previous literature have reported only one species in *Cirriformia* under the name either *Cirriformia tentaculata* or *C. cf. comosa* from waters around Japan.

During a faunal survey by NJ, more than 500 specimens of *Cirriformia* were collected from 94 (mostly intertidal) sampling sites all around Japan. Detailed morphological observation of chaetae and tentacle, as well as methyl-green staining patterns suggested that they were comprised of 12 morpho-species. The results were concordant with a molecular analysis based on the mitochondrial cytochrome c oxidase subunit I gene partial sequences (509 bases). A literature investigation indicated that they represent ten undescribed and two *Cirriformia tentaculata*-like species.

The deepest record for polychaetes from Mariana trench

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The hadal zone (6000 m and deeper) is a harsh environment for living things, with high pressure, cold temperature, low food supply, and nearly complete darkness. Research on the hadal zone is crucial for our understanding on the mechanism of adaptation to extreme marine environments.

In 2002, more than 10 specimens of polynoids were collected at a depth of 10,898 m in the Challenger Deep, Mariana Trench by using the ROV KAIKO operated from the research vessel KAIREI of Japan Agency for Marine-Earth Science and Technology. This study broke the previous records of the deepest polychaetes: *Poecilochaetus vityazi* from a depth of 10,687 m in the Tonga Trench and Polynoidae sp. from a depth of 10,730 m in the Mariana Trench (Jamieson, 2016). The specimens examined in this study represented an undescribed genus and species based on the number of segments and scales, and the shape of the prostomium, proboscis, and chaetae. We also observed specimens by a Micro X-ray computed tomography scanning and semithin slice sectioning and found some unusual morphological features possibly for the adaptation to the hadal-zone.

A simple method to make identification of aquatic invertebrates much easier

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It is proposed that the use of methyl blue will improve routine stereomicroscope identification work, as it allows much greater contrast between important features. We obtain good results with animals with an external epidermis (Polychaeta, Echinodermata). Animals with an exoskeleton (Crustacea, Bivalvia) give weak or absent contrast effect. Toxicity of methyl blue for humans even it has been swallowed is absent.

Molecular regionalization in the compact adult brain of the meiofaunal annelid *Dinophilus gyrociliatus* (Dinophilidae)

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Despite the heterogeneity of neural arrangements within Annelida, the molecular profiles related to central nervous system patterning has so far been considered conserved. Although molecular comparative studies of gene expression patterns can be used to identify specific regions in otherwise uniform brains, they have focused mainly on indirect-developing macrofaunal taxa, excluding microscopic, direct developing annelids from evolutionary analyses of annelid neuroanatomy.

We have analysed the expression domains of 11 evolutionarily conserved genes involved in anterior neural patterning in adult females of the direct-developing meiofaunal annelid *Dinophilus gyrociliatus*. The uniform, compact brain shows expression of *dimmed*, *foxG*, *gooseoid*, *homeobrain*, *nk2.1*, *orthodenticle*, *orthopedia*, *pax6*, *six3/6* and *synaptotagmin-1*. While most of the studied markers localize to specific brain areas, *six3/6* and *synaptotagmin-1* are expressed in nearly all perikarya of the brain. Only *synaptotagmin-1* is found in ganglionic accumulations along the anterior ventral nerve cord. *Gooseoid* and *pax6* have expression domains in the median and posterior region of the brain, while all other genes overlap in the anterior region of the brain.

Our findings reveal that the expression patterns of the genes *foxG*, *orthodenticle*, *orthopedia* and *six3/6* correlate with those described in *Platynereis dumerilii* larvae, and *homeobrain*, *nk2.1*, *orthodenticle* and *synaptotagmin-1* resemble the pattern of late larvae of *Capitella teleta*. Although data on other annelids are limited, molecular similarities between adult *Dinophilus* and larval *Platynereis* and *Capitella* suggest an overall conservation of molecular mechanisms patterning the anterior neural regions, independent from developmental and ecological strategies as well as nervous system sizes and configurations.

Body growth pattern of vestimentiferan tubeworms (Annelida: Siboglinidae) suggested by the size distribution of cuticular plaques

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Vestimentiferan tubeworms (Annelida: Siboglinidae) are peculiar members of annelids, which lack a digestive system. Their body plan is unique, comprising of the obturacula, the vestimentum, the trunk, and the opisthosome. Within the genus *Lamellibrachia*, metric characters, such as the number of branchial lamellae, sheath lamellae, and the diameter of cuticular plaques, have been used as the diagnostic characters. However, no clear rules for the measurements of the cuticular plaques are available: which and how many plaques should be measured and compared. We examined the size distribution of the cuticular plaques on *Lamellibrachia sagami*. Significant differences in the diameter of plaques were detected within both the vestimentum and the trunk of each specimen. The diameter of plaques was smaller in the outer side of the vestimentum than in the inner, and also smaller in the posterior area of the trunk than in the anterior. It may be attributable to difference in growing phase of plaques of each site. We thought that the smaller plaques are newer than the larger. In other words, the vestimentum might grow in both directions to the outer and the anterior against the body axis while the trunk grows backwards.

The early succession of polychaetes in a shallow eutrophic lagoon after the 2011 tsunami impact

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The Great East Japan Earthquake and huge tsunami struck the Pacific coast of northeastern Japan on 11 March 2011. In the intertidal and subtidal soft bottoms, a large-scale removal of sediment was observed and the benthic community was severely damaged. Gamo Lagoon, which is located at the Nanakita River mouth, Sendai Bay, was a shallow eutrophic lagoon and suffered serious damage. We started the investigation of benthic community dynamics after the tsunami impact in Gamo Lagoon from May 2011 and we especially focused on polychaetes which dominated in the early succession stage. The density of benthic animals was very low in May. Then, polychaetes (*Capitella* aff. *teleta*, *Hediste atoka*, *H. diadroma*, *Pseudopolydora* cf. *kempi* and *P. cf. reticulata*) started to increase during June and July. Since these species represent various life cycles and larval developments, we discuss the early succession of these species in detail.

Ophelina (Polychaeta, Opheliidae) in Norwegian waters and adjacent areas – taxonomy, identification and species distributions

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The present study is based on revision of available museum material and identification of newly collected specimens from a large number of localities ranging from coastal areas to the deep Norwegian Sea, stretching from southern Norway and the North Sea to the high Arctic. A total of 11 species have been identified based on morphology. Use of molecular data (DNA barcoding) give well supported clades for the recorded species. Molecular data (COI and the nuclear ITS1) further indicate the presence of additional cryptic species in both *Ophelina cylindricaudata* (three distinct genetic clades) and *Ophelina acuminata* (two distinct genetic clades). The validity of the species *Ophelina ingebrigtzeni*, originally described from Svalbard and presently placed in synonymy with *Ophelina acuminata*, is discussed. One species, previously confused with *Ophelina abranchiata*, is here described as a new species, the two having distinct distributions relating to oceanographic regimes. Two species of previously unclear taxonomical status, *Ophelina minima* and *Ophelina modesta*, are formally redescribed. Two species, *Ophelina groenlandica* and *Ophelina basicirra* are recorded in Norwegian waters for the first time. A synoptic table summarizing important morphological characteristics of all recorded species is provided, together with a detailed account of species distribution patterns in Norwegian and adjacent areas.

Novel morphology in a new genus and species of deep-water Amphinomidae (Annelida: Amphinomida) from the eastern Pacific

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Amphinomidae are conspicuous inhabitants of shallow tropical reef habitats, and well-known as 'fireworms' capable of imparting painful stings due to complanine (an urticating neurotoxic trimethylamine) whenever contact is made with their detachable, needle-sharp harpoon notochaetae. 'Fireworms' are also known for their large colorful bodies, for which the color patterns are species-specific in certain genera. Amphinomids are anatomically complex annelids that include around 150 nominal species that are arrayed in 21 genera, of which two genera represent fossil taxa from Permo-Triassic and Cretaceous deposits. Morphologically, amphinomids are unique among annelids in possessing a suite of traits that includes: brittle calcareous chaetae, a well-developed prostomial caruncle, two pairs of interconnected ventral nerve chords, and an unarmed muscular ventral pharynx. Besides the five prostomial appendages present in every known species of this family, no other antennae or tentaculate appendages have ever been reported in adults. We describe the presence a novel peristomial structure in a new genus and species of adult Amphinomidae from the East Pacific Rise: a pair of retractile oral peristomial tentacles that arise from just inside the mouth through which they

protract. The structure of these tentacles is described along with their surmised function. We hypothesize that the novel pair of adult oral peristomial tentacles is homologous to the paired ventrolateral tentacles of 'rostraria' larvae. This species is named in honour of Kristian Fauchald, in recognition of his life-long contributions to polychaetology, and especially for being our mentor, colleague and friend.

Abyssal polychaete size spectra, metabolic theory and macroecology

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We examine density, biomass, respiration, and species richness body-size spectra for the macrofaunal polychaete assemblage from a long-term (1991-2011) time-series study of an abyssal location in the NE Pacific (Sta M, 35° N 123° W, 4000m water depth). These size spectra are well summarised by the basic predictions of the Metabolic Theory of Ecology (MTE) and macroecology (density \propto mass^{-3/4}, biomass \propto mass^{1/4}, respiration \propto mass⁰, species \propto mass^{-3/8}). Temporal variation (inter-annual) in density size spectra appears to be modest, suggesting the potential value of body size-based methods in the modelling of benthic ecology and biogeochemistry.

We compared our polychaete body mass spectra with field measurements of Particulate Organic Carbon (POC) flux and Sediment Community Oxygen Consumption (SCOC). Significant regressions were found for density and biomass. We then computed the normalisation constant for individual respiration found that it appeared to vary seasonally, being enhanced in the months when POC is expected to arrive/be on the seafloor. It is commonly assumed that a seasonal response in SCOC is driven by microbial metabolism or population growth. Our results indicate that variation in the individual metabolic rate of larger invertebrates may make a significant contribution to seasonal variation in benthic carbon flux.

Molecular data support *Pharyngocirrus gabriellae* (Saccocirridae: Annelida) as an amphi-Atlantic and amphi-American species

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The interstitial saccocirrid *Pharyngocirrus gabriellae* (Du Bois-Reymond Marcus, 1946), originally described from southeastern Brazil, has been reported from worldwide shallow waters. The reported distribution pattern could be masking a complex of cryptic species or in fact correspond to a single widespread species due to geological and oceanographic processes. To assess these two explanatory hypotheses, we inferred the relationships among 95 terminals (5 species of Protodrilidae and 16 species of *Saccocirrus* as outgroups, and 74 specimens attributed to *Pharyngocirrus* and collected from worldwide locations) through maximum-likelihood and Bayesian methods and species delimitation analyses (ABGD, GMYC and PTP), using 16S rRNA gene fragment. Both analyses resulted in a clade with 64 specimens referred to *Pharyngocirrus gabriellae*, including amphi-Atlantic and amphi-American populations (Chile, Brazil, Cuba, Panama, and Canary Islands). Surprisingly, individuals from each of these populations of *P. gabriellae* were not recovered as monophyletic groups but intermixed, and their sequences differed only from 0 to 14 based pairs. In addition, our analyses revealed that the 16S sequences of *Saccocirrus sonomacrus* (KF954446), *Saccocirrus* sp. 3 (KF954448, from Panama) and *Saccocirrus* sp. 4 (KF954450, from Canary Islands) deposited in Genbank match with *P. gabriellae* sequences. Our results highlight that at least some interstitial taxa may be true cosmopolitans or widespread animals, in contrast to previous studies, which showed high speciation rates for other meiofaunal groups. However, sequencing of additional genes, sampling of more regions, and calibration of a molecular clock are needed to better evaluate such widespread distribution patterns.

Oxidative stress in the polychaete *Laeonereis culveri* after abrupt contamination and decontamination by sewage in a subtropical estuary

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This study experimentally evaluated *in situ* responses of the polychaete *Laeonereis culveri* to acute or chronic contamination/decontamination by sewage in a subtropical estuary. We assessed levels of the total antioxidant capacity (ACAP) and lipoperoxidation (LPO) through an experiment involving reciprocal transplants between contaminated and uncontaminated intertidal areas in acute/short term (24 to 96 hours) and chronic/medium term (7 to 14 days) time scales. In the acute assay, LPO levels significantly increased in animals transplanted from an uncontaminated to a contaminated area. However, there was no significant decrease in ACAP levels between transplanted worms and those from origin areas. There was no significant decrease of LPO levels in animals transplanted from contaminated to uncontaminated areas, but ACAP levels surprisingly decreased over time. None of the biochemical variables were affected in the chronic assay. Variations in biochemical responses were more related to background variability over time and heterogeneity among areas than to the experimental manipulation itself. Our results strongly suggest that biochemical responses in *L. culveri* occur on the time scale of hours to days after abrupt contamination or decontamination.

A new giant species of *Loimia* (Annelida: Polychaeta: Terebellidae) from France

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Since 2011, specimens of a giant species of *Loimia* Malmgren, 1866 were regularly found within North Brittany sandy beaches (France). This finding is very surprising because, despite the high level of knowledge of the marine species from this area since the XIXth century (Roscoff Marine Station) as well as the number of benthic surveys performed since the 1980's, this species had never been reported before. Thus, we hypothesize that these specimens belong to a new species, and that this species would be considered as a non-indigenous species, introduced in Brittany around 2011 but never described *a priori* from its potential original native area. However, another hypothesis could state that since this species digs deeply in the sediment (40 cm below surface), it may also be possible that any specimen has never been sampled before with classical benthic sampling methods.

This species is characterized by its gigantic size (max recorded length 650 mm), not previously reported in the genus, thus exclusive to this species. It is also characterized by having two pairs of lateral lappets on segments 1 and 3; first pair more ventral, second pair more developed and lateral but oblique, with wavy edge. Nine ventral pads from segment 2 (fused on segments 2 and 3), first three pads swollen, next ones decreasing in size. Uncini pectinate shaped, with 5-6 teeth slightly decreasing in size, in one vertical row. Pygidium with about 12 long conic concentric papillae.

Two new records of the genus *Naineris* (Polychaeta: Orbiniidae) on the Brazilian coast

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Members of Orbiniidae Hartman, 1942, are burrowing deposit feeders, with size ranging from 4 mm to 30 cm and occur from shallow to deep-water. Orbiniidae family consists of 150 species, belonging to 22 genera. Only 27 species have been recorded for Brazilian coast so far, with high concentration of records in São Paulo and Rio de Janeiro states. *Naineris* Blaville, 1828, is considered a cosmopolitan genus, comprising 24 species. Species of the genus have 1 or 2 peristomial rings, prostomium truncate and semicircular front, thorax with 12-30 chaetigers and branchiae starting in chaetigers 2-23. Chaetae include crenulated capillaries, projecting acicula and sometimes furcate chaetae. In this study, two species of the genus *Naineris*, not yet registered to Brazil, were identified in material from different depths in the Rio de Janeiro state. *Naineris quadricuspida* was collected on the continental shelf and slope (25-3000m) in the Campos Basin. These specimens were obtained by the Habitats project, "Environmental Heterogeneity in the Campos Basin", coordinated by CENPES/PETROBRAS (in 2008-2009). *Naineris dendritica* was collected in

beaches in Niterói and Rio de Janeiro cities (in 2015). Specimens were sorted, fixed in 4% and 10% formalin, preserved in 70% alcohol and then identified. Detailed descriptions, accompanied by illustrative plates were prepared for each species. *N. dendritica* Kinberg, 1867 and *N. quadricuspida* Fabricius, 1780 distributions are concentrated only in Northern Hemisphere and this is the first record of these species for the Southern Hemisphere, especially in Brazil.

Southward bound – first report of tropical Sabellids in temperate southern Australia

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Tube-dwelling polychaetes are one of the most invasive groups of polychaetes worldwide, and are easily dispersed and translocated to new regions. Cities around major shipping harbours are particularly vulnerable to invasions by new species. Along the coast of Adelaide, South Australia, we identified two species of Sabellidae from the genera *Branchiommma* and *Parasabella*. Species of both of these fan worm genera were previously unknown in this region. Sabellid worms are known to exhibit high intraspecific morphological plasticity and use of these diagnostic features is often a poor indicator of species. Due to this, molecular techniques were used to delineate and identify species. Nuclear (internal transcribed spacer) DNA sequences of 21 samples showed two distinct lineages. Comparison of the sequences with the NCBI Nucleotide BLAST database match species previously identified as *Branchiommma* sp. B (Capa et al., 2013), and *Parasabella* sp. 2 (Capa and Murray, 2015). Though these species have a cryptic distribution, they have only been found in tropical regions, including northern Australia. This is the first report of a tropical sabellid in a temperate region and may be the result of poleward range expansion due to warming oceans. This coupled with its invasion of a shipping hub could result in rapid range expansion of these species in the future.

A new species of *Branchipolynoe* (Polynoidae: Polychaeta) commensal with cold-seep deep-sea mussels in the South China Sea

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A new species of the mussel commensal *Branchipolynoe* sp. nov. is reported and described from the northern South China Sea, where for the first time the scaleworm is noted as occurring at a cold-seep. It is distinguished from the other known species of this genus by the chaetae details and the distribution of the notochaetae. The 18S and COI sequences of the new species have been obtained and submitted to the Genbank (Serial numbers: KU507073/KU507074).

Pista Malmgren, 1866 (Terebellidae) from Norway and adjacent areas

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Pista Malmgren, 1866 is the third largest genus of terebellids, with about 76 species described, and a worldwide distribution. Four species are known from Norwegian waters and adjacent areas, with the type species *Pista cristata*, originally described from southern Norway, as the most common species in the region. Different species of *Pista* in the region have previously been confused under the name *P. cristata*, and occurrence and distribution of the different species in Norwegian waters remain unclear. Herein a large number of specimens from a wide range of localities in Norwegian and adjacent waters were studied, including specimens of all known species from the region: *Pista cristata*, *P. bansei*, *P. lornensis* and *P. wui*, where the two former may contain cryptic species. Molecular analysis using mitochondrial COXI (DNA-barcoding) shows that *P. cristata* forms two distinct clades, with *P. wui* as its sister group; *P. bansei* comprises three distinct clades, with *P. cristata* – *P. wui* as its sister group. Finally, *P. lornensis* is found to be the sister group to *P. bansei* – *P. wui* – *P. cristata*. Thus, molecular results are congruent with morphological findings but also more resolved. Morphological data suggest that shape and number of lateral lappets and ventral shields provide important taxonomical information; the number of anterior segments on which uncini occur with long posterior process has a minor importance, thus the procedure of extracting uncini should be avoided. This research is a clear example on how combining molecular and morphological tools can help to estimate the real biodiversity.

Polycirrinae (Terebellidae, Polychaeta) from West Africa

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The present study is based on a large collection of marine benthic invertebrates sampled from shelf areas off Western Africa from Morocco to Angola within the framework of the EAF-Nansen Project under the United Nation Food and Agricultural Organization (FAO). Species diversity within the subfamily Polycirrinae has been evaluated using both morphology and DNA. Morphologically, species were differentiated using the number of segments with notochaetae, chaetae types as well as their staining contrast pattern in both ventral and dorsal anterior regions using methylene green. Thus, three species of *Lysilla* and two species of *Polycirrus* were identified. Only one species of *Lysilla* has been described for West African waters, from which these three species are slightly different. In the same way, only two species of *Polycirrus* have been described for West African waters, from which these two species are also slightly different. Regarding molecular analysis, the preliminary results using mitochondrial COXI (DNA-barcoding) are presented. The previous information implies that the diversity of West African Polycirrinae has been underestimated, and that progresses in molecular analysis as well as comparison with type material of described species, are needed to corroborate real species richness and biodiversity.

Planktonic polychaetes from South American Pacific

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Planktonic polychaetes are an important component in the marine column water. Some of them are part of the holoplankton, having all their life cycle in pelagic zone; some others are benthic but with planktonic behaviors or reproduction stages. Their role in the water column is being predators or consumed by some other major animal groups. In total, there are 9 pelagic polychaete families, and about 95 described species. They have a worldwide distribution, being present in several seas as well as in tropical and subtropical oceans. In the route to the First Antarctic Colombian Scientific Expedition, Austral Summer 2014-2015, the South American Pacific Ocean off the continental shelf, was sampled using a 200 µm bongo net at superficial depths. Seven stations, from Colombia to Chile, were visited. Specimens belonging to seven families were found; Alciopidae, Iospilidae, Lopadorhynchidae, Tomopteridae and Thyphloscolecidae were found as part of the holoplankton, and Spionidae and Terebellidae were found as part of the meroplankton. Additionally, polychaete larvae also were found, but their families still remain unknown. Preliminary results suggest that specimen abundances and family richness decrease from Colombia to Chile. Correlation analyses using biotic, physical and chemical variables are being done. The previous information implies that the marine biodiversity of the Eastern Pacific Ocean has been underestimated, despite the important role of the planktonic polychaetes. Progresses in taxonomic analyses are needed to corroborate real species richness and biodiversity from the region. This research is a contribution supported by Colombian Antarctic Scientific Agenda 2014-2035, Ocean Colombian Commission.

Taking a closer look: an SEM Review of *Levinsenia* (Paraonidae: Polychaeta).

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A scanning electron microscope review of *Levinsenia* species from California yielded several interesting results including a new species and the range extension from Thailand to California of *L. kirbyae* Lovell, 2002. Specimens of *L. gracilis* (Tauber, 1879) from Sweden, Iceland, and California, were compared and could not be distinguished on the basis of morphology. Two other Californian species, *L. multibranchiata* (Hartman, 1957) and *L. oculata* (Hartman, 1957) were examined. Use of the SEM revealed features previously undescribed for the genus: prostomial ciliary bundles, branchial ciliary connections, sub-notopodial sensory pores, and chaetal bundle arrangements. Future SEM work on other paraonid genera is needed to confirm if these features are present in other genera as shared family characters and may yield additional information.

Anguillosyllis (Polychaeta: Syllidae) from multiple deep-water locations in the northern and southern hemispheres

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Numerous specimens belonging to the syllid genus *Anguillosyllis* were collected during several deep-sea studies conducted between 1983 and 2011. These quantitative studies demonstrated that this genus is not as uncommon as once thought, but is sometimes even a dominant taxon or within the 10 most common benthic species at some deep-sea locations. Study areas included Georges Bank (New England), the North, Mid and South Atlantic Continental Slope and Rise (east coast of North America), the Gulf of Mexico (off Louisiana), Farallons (off San Francisco, California), South China Sea (Brunei), and Antarctica (ANDEEP III). Type specimens designated by Hartman of *A. palpata* from off Cape Horn and *A. pupa* from off New England were examined. Three new species are described, bringing the total number of *Anguillosyllis* to six. The collections allowed observations on mode of reproduction: eggs measuring 70–80 µm in both length and width were found in several posterior setigers of many specimens of all species. While adults of each species have a fixed number of setigers (either 9, 10, or 11), the smallest specimens found were 7 or 8 setigers, measured one-half to one-third the length of the adults, and had palps that were smaller and differed slightly in shape from those of the adults; all other characters were similar.

A new *Poecilochaetus* from Rodrigues, southwest Indian Ocean

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A new species of *Poecilochaetus* from Rodrigues is described, and the status of *Poecilochaetus serpens honiarae* from the Solomon Islands re-evaluated and changed to *Poecilochaetus honiarae*. A new phylogenetic analysis of Poecilochaetidae is presented.

A new species of *Raricirrus* (Annelida: Cirratuliformia) from deep-water sunken wood off California

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The genus *Raricirrus* is characterized by the absence of feeding palps, presence of filamentous branchiae, posterior segments shorter and wider than preceding ones, and by having diverse types of chaetae, including serrate capillaries, long natatory capillaries, falcate and finely pectinate chaetae, coarsely serrate chaetae and simple curved spines. All three known *Raricirrus* species have been collected associated with organically enriched environments: *R. maculatus* from sediments contaminated with heavy metals near to an industrial waste discharge site and originally described from southern California; *R. beryli* from sediments with high hydrocarbon concentrations in the northern North Sea; and *R. variabilis* from deep-sea submerged woods in the Virgin Islands. A new species of *Raricirrus* from deep-sea (3100 m) sunken wood off Monterey, California, is proposed based on morphological and mitochondrial DNA (16S) data. This species is unique among its congeners by the lack of serrate chaetae and by having an indistinct and tapering posterior region. *Raricirrus* sp. nov. has only long capillaries on anterior notopodia, straight acicular spines with companion capillaries on posterior notopodia (from chaetigers 15–20), and similar acicular spines and companion capillaries throughout neuropodia. The genus *Raricirrus* is emended to include the presence of acicular spines and the variable shape of the posterior end. *Raricirrus* sp. nov. seems to be an opportunist and widely distributed species. Molecular data showed that the studied population from the northeastern Pacific belongs to the same species as material collected from deep-sea hydrothermal vents in the Southern Ocean.

Opheliidae (Annelida: Polychaeta) from Hawaii, Guam and American Samoa

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Opheliid specimens from the Hawaiian Islands, Guam in the Mariana Islands and Tutuila in American Samoa were examined and eight species are described, three species of *Armandia*, one of *Polyophthalmus* and four of *Ophelina*. *Armandia* sp. nov. 1 is described from intertidal and shallow subtidal bottoms in Hawaii and shares several morphological similarities with *A. maculata* (Webster, 1884) from the Gulf of Mexico. *Armandia* sp. nov. 2 occurred from up to 100 meters depth at the vicinities of the four sewage outfalls in Oahu (Hawaii) and has a distinct anal cone with up to six pairs of anal cirri with a dorsal gradation in length in addition to a pair of basal cirri and the long, crenulated unpaired cirrus. *Armandia* sp. nov. 3 is described from shallow waters of Tutuila and characterized by a combination of characters such as distinct size of eyes, segmental origin of lateral eyes, and structures of the anal cone. Several individuals from Hawaii, Guam and Tutuila were tentatively identified as *Polyophthalmus pictus* (Dujardin, 1839) and a discussion about this species complex in the Pacific Ocean is presented. *Ophelina chaetigera* Hartman, 1965, *Ophelina farallonensis* Blake, 2000 and *Ophelina* sp. are also recorded to Hawaii from up to 507 m depth. A new species of *Ophelina* is proposed from shallow waters of Guam and characterized by the presence of thick and long capillaries on last chaetigers and anal cone with four pairs of elongate anal cirri.

Biochemical Composition and function of jelly masses of *Marphysa graveyi* (Polychaeta: Eunicidae) from Pulicat lake, India.

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Eggs of *Marphysa graveyi* are spawned in gelatinous masses and the developing larvae are harboured in them till they are ready to undergo settlement. Very little information is available about the egg mass of *M. graveyi* and its role as a protective receptacle. The present study was aimed at investigating the function of the jelly mass. For this purpose the morphometrics, biochemical composition and antimicrobial screening of the jelly mass against seven bacteria and three fungi were done. The results show that the function of the jelly mass is to nourish the developing embryos, protect against desiccation and predation from macrofauna and most importantly to prevent the dispersal of the juveniles from the desirable habitat.

Assessment of Polychaete Diversity on Pacific Coral Reefs Using Autonomous Reef Monitoring Structures (ARMS) and Genetic Barcoding.

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Polychaetes account for a large part of coral reef biodiversity, but because many polychaetes are difficult to collect, their contribution to reef ecosystems is not fully appreciated. Using Autonomous Reef Monitoring Structures (ARMS), standardized reef cryptofauna collection devices, we are assessing the diversity of polychaetes from deployed units recovered in 15 meters depth after a 3-year submergence period at opposite ends of the 1500 mile long Hawaiian Archipelago. Three ARMS units were recovered from two sites each off the inhabited Hawaii Island, the southernmost extent of the archipelago, and three total ARMS units were recovered from two sites off Kure Atoll, the northernmost extent of the uninhabited Northwestern Hawaiian Islands. Macrofauna (> 2 mm) were sorted to morphospecies and preserved in 95% ethanol for DNA extraction and sequencing of the cytochrome c oxidase subunit I (COI) barcode; voucher specimens were later transferred to formalin. As a preliminary study, we focused on amphinomid polychaetes. For the Hawaii Island ARMS, clustering of COI barcodes showed a single amphinomid OTU; based on sequence similarity, it appears to be *Pherecardia striata*, which is known to feed on the Crown-of-Thorns starfish (*Acanthaster planci*). Three amphinomid OTUs were found in the Kure ARMS, none of which have close matches in publicly available databases. Morphological characters of voucher specimens provide taxonomic designations and support the assessment of OTU diversity based on barcodes. The combination of ARMS and genetic barcoding provides new access to the diversity, distribution, and abundance of coral reef polychaetes. (Supported in part by NSF1036537)

Polychaete community dynamics found at the Western Channel Observatory(WCO); a contribution to the NERC national capability programme.

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A flavour of the work conducted at Plymouth Marine Laboratory as part of the Western Channel Observatory (WCO) is presented. The aim is to integrate long term biological and environmental time series data, to provide an insight into the specific relationships between the key benthic functional groups existing in polychaetes found at station L4 whilst considering the natural temporal changes occurring in the marine environment. Simultaneously, a whole suite of additional parameters were characterised, leading to the future analysis of specific drivers that contribute towards benthic pelagic coupling and carbon, nutrient cycling.

Life history of a symbiotic *Oxydromus* (Annelida, Hesionidae) hosted by *Scrobicularia plana* in Cádiz Bay, with the description of the Iberian population as a new species based on morphometry

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Oxydromus humesi is a strict bivalve endobiont, likely parasitic, living in association with *Tellina nymphalis* in Pointe-Noire (Congo mangrove swamps, West Africa), recently reported also from *Scrobicularia plana* (intertidal) and *Macoma cumana* (subtidal) in Cádiz Bay saltmarshes (southern Atlantic coast of Iberian Peninsula). Based on punctual data, the Iberian symbiont was reported to show regular distribution, intra-specific aggressive behaviour and complex host-entering behaviour. Our work aims to study the population dynamics of the Iberian population hosted by *S. plana* based on monthly sampling (April 2011 to May 2012). Mature adults occurred during the whole year, with a higher percentage of ripe females in spring and, particularly, in summer. The host bivalve was very abundant in the studied area. Numerous specimens fall within the size-range most preferred by the symbiont (i.e., >26 - 36 mm long). However, the prevalence tended to be very low (usually <5%) and showed a clear seasonal pattern, being lower during the warm season, in coincidence with maximum percentages of ripe females. Thus we suggest that males were able to leave their host during this period, likely to improve the possibilities of fertilization. In turn, females seemed to always remain inside their hosts. In addition, the abundant fresh materials obtained also allowed us to undertake a morphometric analysis, which reveals significant differences with the Congolese population, leading us to describe the Iberian symbiont as a new species.

Long-term studies of disturbance in the deep-sea – DISCOL revisited

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The DISCOL (DISturbance and reCOLonization) experiment was conducted in the vicinity of a German manganese nodule-mining claim in the Peru Basin (SE Pacific). The aim of the experiment was to study the impact of large-scale disturbances, as expected during deep-sea mining, on the benthic deep-sea fauna. It started in 1989 with the artificially induced disturbance of a circular area 2 nmi in diameter in about 4000 m depth. The impact was induced using a plough-like device penetrating the uppermost 15 cm of the sediment leaving circular tracks easily detectable by hydroacoustic and optical methods. The benthic fauna was investigated shortly after, half a year, and three years after disturbance, and again in 2015, i.e. after 26 years. The composition of the polychaete assemblages found in 2015 is very similar to the stage which was reached three years after disturbance. In all samples the Spionidae were the dominant group. Other numerically important taxa were the Cirratulidae, Maldanidae, Syllidae, Pilargidae. The disturbed areas were less densely populated and less speciose in comparison to the various reference (undisturbed) areas, though it has to be considered that sampling bias occurred. Specimens collected will serve for the establishment of a DNA sequence reference library, which will allow molecular identification of polychaete specimens from the investigated area. The comparison of the generated DNA sequences with sequences from other public reference libraries may help to estimate the distribution of polychaete species found in the deep-sea on a global scale.

Effects of the invasion of macroalga *Asparagopsis taxiformis* on the polychaete assemblages associated to the native macroalga *Cystoseira brachycarpa* in the Mediterranean Sea

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The establishment of non-indigenous species is one of the major threats to Mediterranean biodiversity. The tropical red macroalga *Asparagopsis taxiformis* is widely distributed in the Mediterranean Sea and appears invasive along the shallow rocky areas of western Sicily (Italy). Here it competes for space with the native brown macroalgae of the genus *Cystoseira*, in particular with *C. brachycarpa*, a valuable Mediterranean habitat former. This research aims to evaluate the potential effects of invasion of *A. taxiformis* on the polychaete assemblages associated with *C. brachycarpa*. Polychaetes were sorted from *Cystoseira* and *Asparagopsis* thalli collected along the Favignana Island (Sicily) in the rocky infralittoral algal community from four locations with different degree of invasion: 1) non-invaded, 2) invaded but dominated by *Cystoseira*, 3) invaded and dominated by *Asparagopsis*, 4) completely invaded. Ten replicates of each algal thalli were collected from two sites per location. Structure of polychaete assemblages changed significantly among degree of invasion. Reductions of average polychaete abundance and species richness occurred with invasion, with 58 individuals and 12 species per thallus on non-invaded location, only 4 individuals and 2 species on completely invaded location, and almost equal, intermediate values, on two partially invaded locations. Decrease of abundance was mainly caused by the decrease of sabellid *Amphiglena mediterranea* and syllids *Syllis prolifera* and *Sphaerosyllis austriaca*. These results raise concerns on the spread of non-indigenous habitat forming species and their potential impact on biodiversity at local scale.

Serpulidae (Annelida) from Vitória-Trindade seamount chain (Espírito Santo, Brazil)

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Vitória-Trindade chain is a volcanic mountain ridge extends for 1200 km from the shoreline of the state of Espírito Santo, southeastern Brazil, to Martim Vaz and Trindade islands, which are the most remote oceanic islands of Brazilian territory. The chain was formed as South America and Africa split apart, about 50 million years ago, and currently most of it is submerged in the Atlantic Ocean, at depths between 18 to 84 m. Two expeditions to Martim Vaz and Trindade islands, in 1995 and 1996, revealed much greater diversity of species than expected due to the geographical isolation, with a species composition similar to that of South America's continental shore line. Apparently, the mountain chain provided intermediate steps through which the mainland coastal fauna could reach Martim Vaz e Trindade islands. The great diversity of species is also observed among polychaetes and we report herein the presence of seven species of the family Serpulidae on Martim Vaz and Trindade islands: *Hydroides lambecki* Bastida-Zavala & ten Hove, 2002 (first occurrence in Brazil), *Pseudovermilia multispinosa* Monro, 1933 (first occurrence off southeastern Brazil), *Pseudovermilia harry* Nogueira & Abbud, 2009, *P. occidentalis* McIntosh, 1885, *Spirobranchus giganteus*, and *S. minutus* Rioja, 1941, plus a still under identification species of *Placostegus* Philippi, 1844 and another of *Vermiliopsis* Saint-Joseph, 1894, at least one of them new to science. Specimens of all of these species are briefly described herein.

A new hypothesis of phylogenetic relationships within the polychaete family Telothelepodidae (Annelida, Terebelliformia)

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Members of the twelve known species of the family Telothelepodidae, plus individuals among three additional undescribed species, were examined for the purpose of inferring phylogenetic relationships within the family. The out-groups include members of three Polycirridae species, one Sabellariidae, one Cirratulidae and one Spionidae. Members of twenty-one species, including both in- and out-groups, were coded for 56 morphological subjects ('characters') and 145 subject-predicate relations ('states'). The results, based on 33 most parsimonious trees, each 104 steps long, suggest that telothelepodids are divided into four genera, according to the morphology of the lower lip, glandular ventral surfaces of anterior segments, and visibility of segment 1 around the body. Two of these genera are monotypic and most plesiomorphic relative to the two monophyletic genera in the clade; the latter two

genera with five and eight species, respectively. The genera *Telothelep* Day, 1955, *Parathelep* Caullery, 1915 and *Rhinothelep* Hutchings, 1974 are redefined, and a new genus is described, to accommodate the phylogenetic hypotheses presented.

Taxonomic review of the species of the family Telothelepodidae Nogueira, Fitzhugh & Hutchings, 2013 (Annelida, Terebelliformia), with descriptions of one new genus and three new species

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We provide herein generic diagnoses and descriptions for all 15 species of the family Telothelepodidae, including three new species described herein. The traditional taxonomy of the family considers the segment on which neuropodia begin as the only character to define the genera, however, after a recent phylogenetic analysis of the family based exclusively on morphological characters (Nogueira *et al.*, in prep.), this character is not as relevant as some other features, such as the morphology of the lower lip, glandular ventral surfaces of anterior segments and visibility of segment I around the body, which are more important to define the genera. That phylogenetic hypothesis suggested that Telothelepodidae has four genera, two of which are monotypic and most plesiomorphic relative to the two remaining genera in the clade, these latter genera with five and eight species, respectively. *Telothelep* Day, 1955, *Parathelep* Caullery, 1915 and *Rhinothelep* Hutchings, 1974 are redefined, and a new generic name is attributed to *Telothelep macrothoracicus* Mohammad, 1980.

Benthic macrofauna communities of the Celtic Sea; a contribution to the Shelf Sea Biogeochemistry (SSB) programme

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As part of the NERC-funded Shelf Sea Biogeochemistry (SSB) programme, a series of research cruises were conducted in the Celtic Sea during 2014-2015. The aim of the programme is to explore the cycling of key elements (particularly carbon and nitrogen) within the UK's south west shelf ecosystem. Here, I present the results from the benthic macrofauna sampling conducted within the SSB programme. Four cruises were undertaken (April 2014, March 2015, May 2015 and August 2015), during each of which box core samples were taken from four contrasting benthic stations, with sediment types fine mud, sandy mud, muddy sand and coarse sand. Samples were subsequently processed for macrofauna diversity, abundance and biomass. Each station had its own distinct macrofauna community with dissimilarity between communities strongly influenced by sediment type. Diversity in particular, was highest at the muddy-sand and sandy-mud sites. Seasonal patterns in diversity, abundance and biomass were seen at each of these four sites, with abundance and biomass most strongly affected by season. This was probably because these measures most strongly reflect food availability. Our ongoing investigation of the macrofauna communities in the Celtic Sea will help clarify several biogeochemical and bioturbation processes as part of this large integrated programme.

More species of Terebellides than you can imagine

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We investigate the genetic structure of North East Atlantic lineages of *Terebellides*, a homogenous genus of sedentary polychaetes (Annelida) mainly inhabiting continental shelf and slope sediments, with mitochondrial (COI, 16S) and nuclear data (ITS2, 28S). We demonstrate the presence of more than 25 species of which only five previously are known to science. Species boundaries are determined with molecular data using a broad range of analytical methods. Several of the new species are common, and the majority of them are found in sympatry with at least one other species in the complex.

The role of sensory system for adaptation to the hydrothermal vents in *Paralvinella hessleri*

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The environments around deep-sea hydrothermal vents are very harsh for organisms due to toxic heavy metals, high temperature, and other stressful chemicals. Despite such an extreme environment, the Alvinellid worm, *Paralvinella hessleri* are living most closely to the venting field. There are many intense studies about the adaptability of the family Alvinellidae to the hydrothermal vent environment so far. However, little is known about molecular sensors for chemical detection of the family, Alvinellidae. We found that *P. hessleri* exhibits a high sensitivity to the toxic chemicals via transient receptor potential (TRP) channel family, which is involved in the detection of various stimuli in single cell organisms to humans. We investigated what kinds of chemicals induced the avoidance behavior of *P. hessleri*. The worm strongly displayed an avoidance behavior against some acids and hydrogen peroxide among various chemicals. When comparing the sensitivity to acids and hydrogen peroxide between *P. hessleri* and *Thelepus* sp., the relative species living in the intertidal zone, the sensitivity of *P. hessleri* were much higher than that of *Thelepus* sp. This avoidance behavior of *P. hessleri* was inhibited by a TRP channel blocker, ruthenium red. These results showed the involvement of TRP channel on inducing avoidance behavior of *P. hessleri*. Currently, we obtained some TRP channel homologous genes of *P. hessleri* and attempted to identify TRP channels functioning as a sensor. We will discuss the role of the sensory systems for the adaptation to the hydrothermal vent environments in vent endemic animals.

Lumbrineridae (Annelida, Polychaeta) from Norwegian and adjacent waters with the description of a new deep-water species of *Abyssoninoe*

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About 15 species of Lumbrineridae have been reported from Norwegian and adjacent waters, belonging in the genera *Abyssoninoe*, *Augeneria*, *Lumbrineris* and *Scoletoma*. Several of the species are, however, inadequately characterized and may represent species complexes. The most important taxonomic characters are found in maxillary structures, types and shapes of chaetae, colour of aciculae and shape of parapodial lobes. The discrimination and characterization of species is complicated because several characters appear to be subject to more or less variation, either ontogenetic or between populations, and may overlap between morphologically similar species. The present study reports on the present state of knowledge with regard to species identities and distributions in northern seas. A large number of specimens from coastal waters, off-shore shelf areas and the deep Norwegian Sea have been examined. One species of *Abyssoninoe* from great depths of the Norwegian Sea is described as a new species. Several species, particularly of *Abyssoninoe* and *Lumbrineris*, have been examined with regard to variation of morphological characters. The genus *Augeneria* is particularly problematical and may represent five or more species. DNA barcoding has been used to help resolving species complexes, but sequences have so far been obtained for the most common species only. A table summarizing the taxonomic status for all species is provided, together with maps showing distribution patterns in Norwegian and adjacent waters.

Population genetic structure of a *Timarete punctata* complex species and their potential for biological invasion

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Genetic markers provide a useful tool to investigate different aspects in evolutionary history of species being also helpful to reveal aspects of biological invasions. Owing to economic and biological importance of invasions several studies have used the genetic diversity to assess differences among native and non-native populations. Cirratulids from *Timarete punctata* complex are probably exotic species, being cosmopolitan and abundant in intertidal areas and easily noticeable by their particular morphology. Specimens from Hawaii (Central Pacific), Panamá (Caribbean Sea) and Brazil (Southern Atlantic Ocean) were sampled. Mitochondrial fragments (COI and 16S), were sequenced and revealed that *T. punctata* complex encompass at least two cryptic species. The species considered here as *T. punctata* A exhibit a high population homogeneity over a very large geographic range (more than 14,000

km), confirming that a cosmopolitan distribution over circumtropical regions is plausible. The other cryptic species, *T. punctata* B was found only in Ribeira Beach, Bahia (Brazil), where both species occur in syntopy. The wide range of distribution with very low levels of genetic variation of one of the species was associated to a biological invasion mediated by anthropogenic activities. The biological aspects observed to *T. punctata* A are consistent with a species that have a high potential to become a biological invader. Furthermore, specimens from type-locality (Caribbean Sea) did not show a molecular signature compatible for a center of origin or the source of introductions, suggesting that *T. punctata* could be already an introduced species when it was formally described.

Using an ecological niche modeling approach to clarify the systematics of a group of Syllinae (Syllidae)

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Syllidae is widely distributed geographically from the tropics to the polar regions. However, the genera *Alcyonosyllis*, *Paraopisthosyllis* and *Megasyllis* appear to be restricted to the tropical shallow waters and are grouped in a monophyletic clade inside the subfamily Syllinae. Recently, we found a new species of *Paraopisthosyllis* in Brazil and, together with *Megasyllis procer* (also found in Brazilian waters), they are the only two reports of the group to the Atlantic Ocean. All the 25 other species of these genera are only known from the Indian and the Pacific oceans. The phylogeny of the group by Aguado and Glasby (2015) showed a monophyletic *Paraopisthosyllis* ('clade 1'); *Megasyllis* divided in two clades, the first one ('clade 2') including the type-species of the genus with high support, and the second ('clade 3') poorly supported, furthermore, including *Alcyonosyllis*. Here, we compare the ecological niche of the three genera versus the three clades by Aguado & Glasby (2015) using four algorithms to species distribution models, aiming to select the best grouping (genera or clades) to predict the Atlantic distribution of the groups based on Indo-Pacific data. Our results showed that the 'clades approach' was more accurate than the 'genera approach' evidencing the need to revise the systematics of the group. The distribution/modeling of the genus *Paraopisthosyllis* and of the 'clade 2' matches the present distribution of the species. The 'clade 3' could be divided in four genera, one of them *Alcyonosyllis*, or all species of *Megasyllis* in this clade be assigned as *Alcyonosyllis*.

Taxonomic Guide to the Marine Fauna and Flora of the Falkland Islands: The Offshore Polychaete Fauna

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An on-line taxonomic guide to benthic polychaetes of Falkland Islands has been developed (www.falklands.myspecies.info). The guide is part of a website aimed at providing taxonomic information on the marine fauna and flora of the Falkland Islands. The project has two main goals: 1) To assess the marine biodiversity of the Falklands region. 2) Provide a taxonomic guide to help standardize identification. The guide is aimed at establishing a standardised taxonomy to supporting environmental assessments around the Falklands, particularly those being undertaken as part of oil and gas exploration. The polychaetes are the first taxa to be dealt with in this project. At least 200 morphotypes have been identified to date from off-shore samples, study of these collections indicates that there are a large number of species new to science. However much of the existing taxonomic literature is out of date and there is a need for taxonomic revisions as scientific knowledge evolves. So for the polychaetes, providing a taxonomic guide is the first step in updating our knowledge of the fauna. The Taxonomic Guide to the Fauna and Flora of the Falkland Islands is an identification tool. Its aim is to provide a basis for future work by highlighting problems which need to be solved by taxonomic experts for a particular group. The contributions from polychaete research community as well as from taxonomists working in the environmental consultancy industry are welcomed. This work was supported by a grant from The South Atlantic Environmental Research Institute (SAERI).

Comparative anatomy of amphinomid pharynx and gut using CT

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Previous studies have shown that the amphinomid pharynx is complex with a large cushion-like, ventral muscular area, termed by Gustafson (1930) as "Schaborgan", that is characterised by obliquely arranged rows of lamellae and it is thought to be used in rasping soft bodied prey. CT studies indicate that the extent and complexity of this region varies depending on the species, possibly related to the prey on which the different amphinomids feed. The current study suggests that the lamellar ridges may have other functions than feeding. The study also compares the various muscle systems controlling the eversion and retraction of the pharynx in the different taxa studied.

First record of *Aonidella cirrobranchiata* (Polychaeta: Spionidae) for the Western Atlantic

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Polychaetes belonging to the Family Spionidae Grube, 1850 are very common and abundant in several marine ecosystems, being one of the most specious and ecologically important families. The genus *Aonidella* López-Jamar, 1989 comprises only 3 species. It is characterized by a flattened prostomium that does not continue posteriorly as a caruncle, parapodial lamellae that do not change in size or shape along the entire length of the body, angle between small teeth and main tooth very wide in hooded hooks, rows of holes present on the dorsum of chaetigers of the branchiate region and pygidium bearing four or more similar cirri. *Aonidella cirrobranchiata* (Day, 1961) was described based on material collected on Saldanha Bay (southwest Africa) and was latter recorded to the Bay of Biscay (northeast Europe) and the Bellingshausen Sea (Antarctica). Five specimens belonging to the species were found during AMBES Project on the continental slope of southern Brazil, between 121 and 2,506 m. These analyzed specimens fit quite well to the diagnosis of the species, except for the absence of a red pigmentation on the notopodial postchaetal lamellae of chaetiger 2. The species can be distinguished from other *Aonidella* species by the absence of a medial indentation on the prostomium, lack of eyes or sabre chaeta and by the presence of bidentate hooks. The present record expands both the geographical range of the species to the Western Atlantic, and its bathymetry, since this is the deepest record for the species.

First record of *Spiogalea* (Polychaeta: Spionidae) for the Western Atlantic

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Polychaetes belonging to the Family Spionidae Grube, 1850 are very common and abundant in several marine ecosystems, being one of the most specious and ecologically important families. The genus *Spiogalea* Aguirrezabalaga & Ceberio, 2005 is known only by the type species, *S. vieitezi* Aguirrezabalaga & Ceberio, 2005. It is characterized by two chevron-shaped chitinous plates surrounding anterior part of prostomium, absence of branchiae, notopodial chaetae all capillary and parapodia of first chaetiger reduced, lacking notopodial postchaetal lobe and with small neuropodial postchaetal lobe. *Spiogalea vieitezi* was described based on material collected on Bay of Biscay, at 1,000 m depth. Along with *Spiophanes* Grube, 1860 and *Glyphochaeta* Bick, 2005, *Spiogalea* lack branchiae, which is an unusual feature for Spionidae. Three specimens belonging to an undescribed species of the genus were found during AMBES Project on the continental slope of southern Brazil, at 890 m depth. These analyzed specimens fit reasonably well to the diagnosis of the genus, but noteworthy differences were observed, such as the presence of notopodial hooks on posterior-most chaetigers and a large single chitinous plate covering dorsal and ventral sides of the prostomium. Owing both to size differences and number of chaetigers, we suggest that observed differences between our material (much larger) and the type species could also be due to ontogenetic variation rather than taxonomic distinctness. The present record expands both the geographical range of the genus to the Western Atlantic, and its bathymetry, since this is the shallowest record for the genus.

Hermaphroditism in the Antarctic polychaete *Apistobranthus glacerae* Hartman, 1978 (Apistobranthidae)

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The Antarctic polychaete *Apistobranthus glacerae* is very common in soft bottoms of Admiralty Bay. Despite its abundance, little information on its biology is available, as with other apistobranthids in general. This study aims to describe some reproductive aspects of *A. glacerae* and to report the first record of hermaphroditism in Apistobranthidae. Samples were collected in Mackellar Inlet in Feb/2010. Forty entire individuals (1.1-8.2mm of total length) were used for anatomical and histological analysis of the gonads. Fourteen individuals presented only oocytes (females); twenty only spermatids (males) and four individuals presented both oocytes and spermatids, characterizing simultaneous hermaphroditism. The sex of two small individuals was not identified because of the absence of reproductive tissue. The average sizes of the males were significantly lower than females. The mature megalecithic oocyte diameters were 180-190µm, and the oocyte development was asynchronous. In male gonads only spermatids were found. Larvae and/or fertilized eggs were not found over the animals. The specimens were reproductively active at the end of the austral summer, which reinforces the importance of analyzing the annual cycle of the species in the region to clarify the type of hermaphroditism. The specimens were deposited at the ColBIO (FAPESP Proc. 2014-15168-7) of the Oceanographic Institute (USP). This study contributes to the INCT-APA (CNPq Proc. 574018/2008 and FAPERJ- E-26/170.023/2008).

Revisited Syllidae of the coarse sand benthic communities from the English Channel

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Under the RESOMAR French Marine Laboratories framework, a Syllid course was organised in June 2015 at the Banyuls-sur-mer Marine Station to revisit the taxonomy and distribution of the Syllidae from the English Channel (EC), mainly for the current studies on the coarse sand community in the eastern part of the Channel. This habitat is one of the more extended in the EC and known as a favourable niche for the small polychaete fauna. A two year survey (winter and summer sampling periods) on 19 stations on the *Branchiostoma lanceolatum* coarse sand community offshore Dieppe-Le Tréport permit to identify 29 taxa including 26 species. Among them seven are new for the EC polychaete fauna and six other are sampled for the first time in the eastern part of the EC. Species richness and abundances show high seasonal variations with maximum in summer and minimum in winter. Shannon-Wiener diversity is estimated with and without identification of Syllidae to specific level showing the importance of high expertise level to express the diversity of such coarse sand habitat. Our results are compared with the historic data existing for the EC and the recent study of Olivier *et al.*, (2011) of the intertidal coarse sand community from the Chausey Island western part of the EC. It appears that the Syllidae list recorded in Dauvin *et al.*, (2003) need to be amended and the Syllidae diversity re-evaluated using recent taxonomic works. Today, at least, 90 species had been recorded for the whole English Channel.

Polychaetes species diversity: applying monitoring data for spatial distribution and ecology update

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The efficiency of biodiversity researches and environmental monitoring studies in marine environments is strongly influenced by the selection of the spatial scale. Investigations at regional scale allow to analyse the comprehensive variability of biological systems, strongly influenced by the interactions of numerous environmental factors. To display the spatial variability of polychaetes diversity patterns and to investigate how this variability is related to the habitat characteristics, this research is aimed at identifying diversity distribution patterns of polychaete assemblages and species at a regional scale (Latium Continental Shelf, Tyrrhenian Sea, Italy) related to depth, sediment grain size, latitude and longitude. Multivariate analyses (e.g PERMANOVA, CCA, Spearman rank correlation) have pointed out the three main drivers explaining the biodiversity distribution patterns: bathymetric gradients, latitude gradient in environmental conditions and environmental heterogeneity (i.e. grain size distribution, habitat complexity). ISA analysis showed that some species distribution is significantly associated to definite sediment grain sizes and depth ranges. The species distribution patterns and the assemblages composition observed along the Latium shelf, tested with PERMDISP, confirm that a continuum of species distribution along Tyrrhenian coast can be expected and species diversity maps, created by Universal Kriging, represent comprehensive species diversity distribution patterns at the regional scale. These results confirm that monitoring studies can provide essential data also useful to implement specific EU action plan to reduce the rates of biodiversity loss (EU Biodiversity Action Plan), to define the quality status of coastal marine environment (MSFD 2008/56/EU) and to promote a sustainable use of marine resources (MSP 2014/89/EU).

Population identification and metallothionein expression in *Hediste diversicolor* (Annelida, Polychaeta) exposed to heavy metals at the Callahan Mine superfund site in Maine, USA

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The marine polychaete, *Hediste diversicolor* (Annelida; Polychaeta), was used to detect population and gene expression differences among populations obtained from heavy metal-contaminated sediments of the former Callahan zinc/copper mine site in Brooksville, Maine and from two nearby non-contaminated sites. Sediments from three sites were analyzed for metal content using X-Ray fluorescence, and collected worms were used in DNA and RNA extractions. Five genetic loci were targeted for detecting possible haplotypes, and gene expression differences in five metal-associated genes were assessed using real time quantitative PCR (QPCR). To identify the effects of high metal content, a panel of five genes with putative roles in metal ion detoxification and tolerance (e.g. metallothionein) were selected.

Mine sediments had significantly higher concentrations of zinc, magnesium oxide, ferric oxide and manganese oxides. Different haplotypes were not detected at any locus. Gene expression patterns were identified in five genes, which are currently being assessed for significant differences among three sites. Heavy metal contamination was confirmed in mine sediments. DNA analyses detected no population structure and suggests that the Callahan Mine population has not diverged from those of other sites. Gene expression analyses may indicate that worms are impacted by metal ion concentrations in affected sediments.

Histological analysis of regeneration stages in *Myxicola infundibulum* (Polychaeta, Sabellidae)

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Traditional histology and SEM were used to document anterior and posterior regeneration in *Myxicola infundibulum* (Sabellidae) worms collected from their natural habitat on the coast of Maine, USA. Results showed that small individuals (thorax diameter \leq 5mm) regenerated anteriorly in a manner similar to that of other regenerating sabellid worms, with the new formation of a branchial crown, head segment and two new thoracic chaetigers. Posterior regeneration resulted in a new U-shaped pygidium and multiple new abdominal segments. Histological sections of regenerates at successive stages document the breakdown and reorganization of body tissues. Clones (up to 13 individuals per worm) were also produced when the worm was sectioned into many pieces.

Biodiversity of Polychaetes (Annelida) in a rocky intertidal habitat from the Gulf of Oman, Iran

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Polychaetes are often dominant elements of the macro benthic communities in the marine intertidal habitats. So far 317 polychaete species have been recorded from the Persian Gulf and Gulf of Oman, from which 72 are recorded for Gulf of Oman, alone. However, quantifying the polychaete diversity is particularly important as they play crucial roles in the marine food-web and as they are regarded as indicators of communities' health in many coastal ecosystems. To measure the diversity of polychaetes in Gulf of Oman rocky intertidal habitats, samplings was carried out in a site with rocky substrate near Djod Village (25°26' N, 59°31' E) from June 2014 to April 2015. Quantitative samplings included three transects running perpendicular to the coast, with four repeats based on monsoon periods in the area. All in all, 50000 specimens were collected, belonging to 40 species from 32 genera and 22 families. Data were analyzed using SPSS (Ver:23) & PRIMER (Ver: 6) softwares. Among the 22 families encountered, Lumbrineridae had the highest Frequency of Occurrence (FO) and Serpulidae showed the highest Relative Abundance (RA). The highest species diversity was observed in low intertidal zones with stony substrate covered with algae (Shannon-Wiener index: 3.767). The sampling carried out during the northeast monsoon season, produced 33 species, resulting in highest seasonal species richness (3.262). demonstrating the presence of relatively better environmental conditions for amplification to expose and proliferation.

Dipolydora (Annelida: Spionidae) from around southern Korean Peninsula

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Eight *Dipolydora* species from shallow waters around southern Korean Peninsula are described and illustrated. An identification key to the species is provided. Adults of four species live in tubes in soft sediments, two species bore into mollusk shells, while adults of *D. carunculata* and *D. cf. socialis* occur in both kinds of habitats, in soft sediments and in mollusk shells. Sequence data of gene fragments of the mitochondrial and nuclear rDNA are provided for the Korean polychaetes for comparison with their counterparts from the European and the American regions.

Malacoceros (Annelida: Spionidae) from shallow waters around the British Islands

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Malacoceros from shallow waters around the British Islands are revised and three species, *M. vulgaris* (Johnston, 1827), *M. girardi* Quatrefages, 1843, and *M. tetracerus* (Schmarda, 1861) are distinguished. Adults are described and illustrated and an identification key to the species is provided.

Dipolydora (Annelida: Spionidae) from Norway

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Nine *Dipolydora* species are described and illustrated from shallow waters of Norway. An identification key to the species is provided. Adults of all species live in tubes in soft sediments.

Amphinomidae (Polychatete) from shallow and deep waters of southwestern Atlantic

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This study reports and describes the species of Amphinomidae collected from southern Brazil - off Espírito Santo State (between 19°3'S 37°44'W - 21°10'S 38°28'W). Sampling was conducted under the scope of the AMBES project "Marine Environmental characterization of the Espírito Santo Basin and Portion North of the Campos Basin", coordinated by CENPES/PETROBRAS (Brazilian oil company). Samples were taken with a Box-Corer from each of 10 transects running from 10 to 3000 m depth with eight sites in each transect. A total of 2361 specimens of Amphinomidae were collected, representing five genera and eight species: *Branchamphinome* sp. nov. (15 specimens; 138-163 m), *Chloeia viridis* (35 spms; 28-156 m), *Linopheurs canariensis* (34 spms; 25-46 m), *Paramphinome jeffreysii* (17 spms; 33-163 m) and *Pseudoeurythoe ambigua* (20-45 m) were distributed only on continental shelf, while, *Paramphinome australis* (588 spms; 34-1333 m), *Paramphinome posterobranchiata* (1,645 spms; 890-3035 m) and *Bathychloeia* sp. nov. (6 spms; 1886-3035 m) dominated deeper sites. Furthermore, the genus *Branchamphinome* is herein reported for the first time from tropical waters while *Bathychloeia* is herein reported for the first time for Western Atlantic. The latter two genera are each represented by new species.

***Tainokia*, an unusual Oeonidae recorded from the Atlantic ocean**

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Oeonidae is a family of long lumbrinerid-like worms with prionognath maxillary apparatus that distinguishes them from all other eunicemorph families. It comprises 12 genera and around 100 described species. Although they have a worldwide distribution and a wide bathymetric range (from the intertidal to abyssal depths), oeonids are not frequently recorded and usually occur in low abundance. Many are parasitic or have a parasitic phase during their life cycles, while others are free-living in sand and mud. One of the most unusual members of this family is the genus *Tainokia*, characterized mainly by having a single prostomial antenna, four eyes, two apodous peristomial segments and ligulate dorsal cirri. It includes a single species, *T. iridescens* Knox & Green, 1972, reported from Kaikoura Peninsula, New Zealand, in grey and slightly sulphurous sand at lower eulittoral. In our study one specimen belonging to this genus was retrieved from a dredge sample across the crater of Mercator mud volcano, in the Gulf of Cádiz (NE Atlantic), at 375-397m depths. This specimen differs from *T. iridescens* by the morphology of mandibulae and maxillae and by the presence of stout bidentate hooded hooks on median and posterior segments. A description and illustration of this new species is given and the diagnosis of the genus discussed.

Nephtyidae from Red Sea, with record of a new species

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Nephtyidae is a family of aciculate polychaetes that occurs worldwide at all depths but is usually most abundant in shallow waters on sandy and muddy bottoms. The family contains over 100 described species. According to Wehe and Fiege (2002), 12 are known to occur around the Arabian Peninsula. The majority of these species are mainly distributed in Arctic and Atlantic waters - *Aglaothamum lyrochaetus* (Fauvel, 1902), *A. malmgreni* (Théel, 1879), *Nephtys hystrix* McIntosh, 1900, *N. incisa* Malmgren, 1865 and *N. longosetosa* Ørsted, 1843, or has a wide geographic distribution - *Inermonephtys inermis* (Ehlers, 1887) and *N. paradoxa* Malm, 1874, thus requiring further investigation. The other five species are endemic or occur mainly in West Indian Ocean - *A. longicephalus* Hartman, 1974, *Micronephtys sphaerocirrata* (Wesenberg-Lund, 1949), *N. palatii* Gravier, 1904 and *N. tulearensis* Fauvel, 1919, or also in the Indo-Pacific region - *Aglaothamum dibranchis* (Grube, 1877). Data presented herein was collected in winter 2014 and 2015 during several expeditions aiming at characterizing the biodiversity patterns in shallow soft-sediments, and their relationship with environmental gradients. Six species were found: *I. inermis* and *N. palatii* (previously reported to the Red Sea), *A. lobatus*, *A. cf. verrilli* and *M. stammeri* (new records) and one species of *Inermonephtys* new to science. The bathymetric range of *M. stammeri* is extended to 17 m and occurrence depths for *N. palatii* are given for the first time (4 – 90 m). Distribution and ecological notes for all the species in the Red Sea are provided and discussed.

Nephtyidae (Polychaeta, Phyllodocida) of West African shelf areas

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Extensive sampling of benthic marine fauna along the west coast of Africa has been undertaken the last decade within the framework of the EAF-Nansen Project. This project is run under the auspices of the Food and Agricultural Organization of the United Nation. The University Museum of Bergen is securing this material for taxonomic sorting and diversity studies. The sorting and identification of the material is still ongoing, but preliminary results indicate high diversity with many undescribed or poorly known taxa. In the present study, a total of thirteen polychaete species belonging to the family Nephtyidae were identified. This family includes today over 100 described species found mainly in shallow but also in deep sandy and muddy bottoms around the world. Three of the recorded species were previously not known from West African waters (*A. pulcher*, *N. kersivalensis* and *M. cf. stammeri*), and another five species (three *Aglaothamum* and two *Nephtys*) are potentially new to science. Here we describe the occurrence and distribution of nephtyids in the Atlantic shelf areas of Africa. Taxonomic notes will be presented for selected taxa. DNA-barcoding results are included for the majority of the recorded taxa.

WoRMS-based adventures in Polychaeta nomenclature; some surprises, mistakes and misinterpretations

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The World Register of Marine Species (WoRMS) database aims to be the primary resource for accessing information on the validity of all polychaete genera and species names, and for linking to original digitised literature. Early polychaete names are well-catalogued thanks to the outstanding industry of Olga Hartman and Kristian Fauchald, but investigation with modern online tools can reveal interesting discoveries where what really occurred is not as previously thought. As the thousands of entries imported from print catalogues are cleansed of mistakes and duplications, and updated and reconciled by checking original usages via Biodiversity Heritage Library, there are new nomina nuda and homonyms revealed, but some old ones refuted. Other anomalies have been discovered, including strange X in Y authorships that aren't, wrong assumptions about the ICZN Code, and polychaetes that aren't polychaetes.

Abundance and distribution patterns of Paraonidae in the continental shelf of the southern Gulf of Mexico

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The paraonids are usually well represented in deep seas. However, their presence in the sublittoral environments of tropical seas is poorly documented. That is why the aim of the present study was to identify the paraonids present in the continental shelf of the western and southern Gulf of Mexico and analyze their distribution patterns. The biological material was collected in 301 stations during six oceanographic cruises (DINAMO 1, 2; IMCA 1, 2, 3, 4) on board the O/V "Justo Sierra". Paraonids were found only in 173 stations, at depths from 13 to 202 m. In all, 1,574 organisms were identified from four genera (*Paradoneis*, *Cirrophorus*, *Levinsenia* and *Aricidea*) and 35 species, 19 of which could not be referred to any described species and are therefore potentially new to science. *Aricidea* was clearly the dominant genus with 1,178 individuals and the largest number of species (21). On the other hand, only three species were found to belong to *Levinsenia* and only 78 individuals belonged to the genus *Cirrophorus*. *Aricidea catherinae* (409 ind.), *A. ca. wassi* (190 ind.) and *A. simplex* (174 ind.) were the most abundant and well distributed species in the study area, while 12 species were represented by less than 5 specimens. An increase in the number of species was observed towards the Eastern region of the Gulf. The variability associated to depth did not show a linear relationship, since the highest abundance and species richness in this group was found at intermediate depths, around 50 m.

Brain anatomy of esophagus-less *Osedax* (Siboglinidae) and organisation of the canonical for annelids supraesophageal commissures

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Gutless siboglinid tubeworms (frenulates, *Osedax*, *Sclerolinum* and vestimentiferans) relying their nutrition on bacterial endosymbionts is an annelid group of uncertain phylogenetic position. Orrhage and Müller compared the brains (a.k.a. supraesophageal ganglion) of a range of annelids and showed the general presence of 4 transverse commissures (though with different level of integration in the adult stage), connecting through their roots and circumesophageal connectives to the ventral nerve cords.

Hitherto, brains of siboglinids remain understudied, except for the brain of the large-sized Vestimentifera, exceptionally shown to constitute a fusion of both the supra- and subesophageal ganglia. Studies of other siboglinids are required for tracing the ancestral state of brain and substructures.

The brain anatomy of female *Osedax priapus* and *Osedax* "yellow collar" were reconstructed based on histology, 3D modeling, and immunohistochemistry combined with confocal microscopy.

Osedax has a ventral intraepidermal brain, consisting of a large neuropile that ventrally and laterally is covered by densely packed perikarya. The neuropile contains a number of transverse commissures as well as longitudinal and diagonal neurite bundles. In the posteriormost brain are found a dorsal and a ventral commissural bundle with inter-decussating fibers, both of which connect with the ventral nerve cords. A dorsal and a ventral neurite bundle innervating each palp originate from two diagonal median commissures and two anterior commissures of the neuropil, respectively. The connection of these commissures to the ventral cords cannot be traced, due to the laterally disguising dense neuropile, also complicating the homology assessment of *Osedax* brain characters.

Taxonomic review of the Family Cossuridae (Annelida: Polychaeta) and description of five *Cossura* species from the Brazilian southeast coast

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Cossurids are mobile excavators that feed by engulfing sediment with an eversible pharynx tipped by several buccal tentacles. The body can be divided into anterior (thoracic), median (abdominal) and posterior (pygidial) regions. The single long cylindrical branchial filament is unique to family and can be dorsally inserted on anterior, middle or posterior region of the chaetigers 2 to 5. Cossurids are currently composed of the single genus *Cossura* and 26 valid species. The objective of this study was to characterize taxonomically the cossurids based on the literature, and also to review the *Cossura* species from the Brazilian southeast coast. The examined material is from two research projects. The collections at Santos Harbor were done at shallow depths (± 10 m), while in the samples from the Ambes Project were divided into sub-regions: the mouth of the Doce River; the continental shelf, slope and submarine canyons, from 25 to 3,000 m depth. About 400 individuals belonging to five species were identified, three of these are potentially undescribed and two newly recorded to the Brazilian coast. Within the Ambes Project sub-regions, the highest abundance was found in the continental shelf (46.19%), followed by submarine canyons (12.2%), slope (7.36%) and mouth of the Doce River (0.5%). Specimens from Santos Harbor accounted for 33.75% of the total number of individuals analyzed. The most abundant species was *Cossura* sp. n. 3 (48.6%), followed by *Cossura soyeri* (26.97%), *Cossura* sp. n. 1 (20.86%), *Cossura heterochaeta* (2.29%), and *Cossura* sp. n. 2 (1.28%). A key to all valid species of *Cossura* is presented.

Do *Sabellaria wilsoni* (Polychaeta: Sabellariidae) reefs enhance benthic diversity along the Amazon coast?

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Sabellariidae polychaetes are important ecosystem engineers on sandy beaches due to their ability to structure biotic communities and alter environmental characteristics. We tested the hypothesis that Polychaeta reefs increase the biodiversity of meio- and macrofauna in Amazonian sandy beaches. Samples were taken at Algodoal Island from a *Sabellaria wilsoni* reef in the summer of 2011. In order to compare univariate ecological indexes (richness, density, diversity and evenness) and community structure between the reef and the adjacent sandy beach, one-way ANOVA and one-way Permanova were applied. Meio- and macrofauna were significantly richer on the reef. Twenty-two meiofauna taxa and 69 macrofauna taxa were recorded on the reef; 19 taxa and 10 taxa were recorded for meio- and macrofauna outside the reef. The density of meiofauna was not significantly different between environments (462.1 ± 70.3 ind.10 cm² on the reef and 1757.6 ± 308.8 ind.10 cm² on the beach). Macrofauna density was significantly higher inside the reef (75213.7 ± 26181.15 ind.m²) than on the beach (593.4 ± 289.8 ind.m²). Meiofauna diversity and evenness were higher on the reef, though these differences were not significant. Macrofauna diversity was significantly higher on the reef and macrofauna evenness was significantly higher on the beach. Meio- and macrofauna community structures differed significantly between the environments. It is possible to conclude that *Sabellaria wilsoni* reefs play an important role in structuring benthic communities on Amazonian beaches by favoring colonization by taxa that are absent on the adjacent sandy beaches enhancing biodiversity, particularly for the macrofauna.

Palaeozoic sabellids and serpulids (Annelida Polychaeta) from the Permian of Sicily

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Some tubular fossils attributable to sabellids and serpulids were discovered from some Wordian to upper Permian limestone megablocks, in the Sosio Valley (Western Sicily, Italy). Tubes are mainly attached to skeletons of sponges, crinoids, brachiopods and stromatoporids, which lived within a shallow-sea palaeoenvironment, at the outer edge of a carbonate platform. Material consist of about thirty incomplete tubes (encrusting and free portions), morphologically not always comparable with known genera, and one opercular cap resembling to the genus *Pyrgopolon* de Montfort, 1808. Tiny smooth tubes circular in cross-section, attributable to the genera *Glomerula* Brünnich Nielsen, 1931 and *Filograna* Berkeley, 1835 prevail. The other detected specimens consist of relatively large and strong tubes (up to 3 mm wide), triangular or circular in cross-sections. They are smooth, displaying only growth lines, or sculptured with keels or ribs. All specimens show large secondary calcite crystals in their tube wall, the original structure being totally biased by diagenesis. The taxa here described represent the earliest evidence of genuine calcareous tube-dwelling polychaetes, which add to *Palaeotubus sosiensis* recently discovered from the same rocks (Sanfilippo *et al.*, 2016).

Serpulidae (Polychaeta) associated to *Cystoseira* communities from the Mediterranean Sea: preliminary data

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First information on serpulid polychaetes from selected *Cystoseira* communities, in the Ciclopi Islands Marine Protected Area (Ionian Sea) is given. Samples were collected in the frame of the CIMPA-BioChange Project in June 2015, in one site (Punta Aguzza) internal to the CIMPA, and two sites (S. Maria La Scala and S. Tecla) outside. Three stations at 5, 9, and 25 m depth were sampled for each site, corresponding to the *Cystoseira brachycarpa*, *C. sauvageauana* and *C. spinosa* communities respectively. Serpulids are present with 14 serpulid species mostly represented by *Josephella marenzelleri*, *Pomatoceros triqueter* and *Vermiliopsis straticeps*, and 6 spirorbin species which are greatly dominant in terms of specimens, mainly belonging to *Pileolaria pseudomilitaris* and *Janua pagenstecheri*. Low cover values were observed. A trend of increasing species diversity can be traced from the shallowest to the deepest stations. Differences are evident between the two sites, with samples inside the CIMPA showing lower species diversity and specimen abundance, compared to the external ones. This appears to be related to the availability of suitable microhabitats and substrata created by the hosting algal species. Patterns of distribution were also evident, with juvenile spirorbins preferentially colonising the tips of the algal thalli, in respect to adult specimens preferring the axial thicker algal portions.

Is *Platynereis dumerilii* (Audouin & Milne Edwards, 1834) (Nereididae: Annelida) present along Brazilian coast?

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Many taxa that are assumed to be cosmopolitan have been shown to represent multiple lineages with more restricted distributions. One taxon that is presumed to have a wide distribution is *Platynereis dumerilii* which has been recorded all around the globe since its description at La Rochelle, France. Interestingly, the genus *Platynereis* currently has approximately 34 valid species many of which share similar morphology and, in particular, *P. dumerilii* has numerous synonymies. Morphological features normally used for distinguishing Nereididae species are less obvious in *Platynereis*, especially in atokous forms. The fact that some species can only be separated by morphology while in the epitokous form has likely contributed to reports of widely distributed records. Although previous studies have suggested that a cosmopolitan status of *Platynereis dumerilii* is unlikely, the issue has not been adequately addressed at an appropriate wide scale or with detailed morphological or molecular data. This study is part of a major collaborative project to conduct a phylogeographic analysis of *P. dumerilii* based on molecular and morphological data. At this time, we will present preliminary results for specimens from 4 Brazilian localities (Ceará - Northeast, Rio de Janeiro and Espírito Santo- Southeast and Paraná - South). Cytochrome c oxidase subunit I (COI) and 16S will be used as genetic markers to evaluate phylogeographic structure of *P. dumerilii* populations. Data from Brazilian localities will be also compared to *Platynereis* spp. sequences available in the Gene Bank and BOLD system.

Ontogeny of *Caulleriella bremecae* (Polychaeta: Cirratulidae): Evidence of viviparity

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Caulleriella bremecae was described from sewage-impacted areas in a warm-temperate region of Mar del Plata (38° S). In this work, we expand the distribution of this species to the Patagonia locality of Puerto Madryn (42° S) in a cold-temperate region. Mature individuals of this species were observed with intracoelomic embryos in different developmental stages along the body. The embryos in the anterior region of the body were more developed than posterior ones, with the concave surface in contact with the intestine of the worm. Scanning electronic microscopy showed that the contact area of both, parental and embryos have a tissue with microvilli, suggesting an interchangeable surface. The chaetal patterns in early stages of development are also shown.

Species of *Cirratulus* (Polychaeta: Cirratulidae) from the Argentinean coast

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The taxonomy of the family Cirratulidae is not an easy task and a revision of the cirratulids from the Southern regions is ongoing. Among the multitentaculates, *Cirratulus jucundus* (Kinberg, 1866), *Cirratulus patagonicus* (Kinberg, 1866) and *Cirriiformia nasuta* Ehlers, 1897 were described from Argentina and are all currently considered as valid. An examination of both deposited material and specimens collected from recent surveys have revealed two species of the multitentaculate genus *Cirratulus*. Coastal localities of the southern region of Argentina (Patagonia) showed the presence of *C. jucundus*. This species was previously mentioned in some expeditions to Antarctica and surrounding waters, including some coastal localities of Argentina. On the other hand, a new species to science is described for subtidal areas off Peninsula Valdes (42° S). This species has the characteristics of the genus, such as a prostomium with one row of black eyespots and peristomium with three rings and unique features such as the tentacular filaments and first pair of branchiae placed between the peristomium and first chaetiger near notopodial base; subsequent branchial filaments have a small dorsal displacement from notopodial base.

***Haplosyllis basticola* Sardá, Avila & Paul, 2002 revisited from a collection obtained in Lizard Island (Australia).**

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Haplosyllis basticola was described in 2002 from an association between the polychaete species and the sponge *Ianthella basta* (Pallas, 1776) off the island of Guam (Micronesia). Since then, several specimens found in other sites around Australia and Papua New Guinea have been included in this species, introducing several changes in their description, mainly the number of annulations in dorsal cirri and the number of setae per parapodia. During the course of a visit to Lizard Island following the IPC11 in Sydney, we had the opportunity to collect specimens of another population of what looked like *H. basticola*. Hundreds of individuals were obtained from a fragment of a sponge species collected at 20 m depth off the Marine Research Station although in this case no reproductive bodies were found. A detailed study of this population allows us to compare it with the previous population found in Guam. The species belongs to the group of *Haplosyllis* of small size (around 4 mm maximum length) but, as we described in the Guam population, the species has no articulations in their dorsal cirri behind the 5-6th setiger while adult specimens possess only one seta per parapodia. Further research on this group of *Haplosyllis* species should be done in order to solve what could be another potential species-complex.

Nervous system diversity in interstitial Syllidae

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Annelid phylogeny is in constant flux and additional information on morphological data can contribute significantly. Descriptions of the nervous system of various annelid taxa have become more frequent with the emergence of new methods, but little data is available on the widespread, species-rich family Syllidae. The family is considered monophyletic, but internal phylogeny is complex and its relationship to other Phyllodocida remains uncertain. Immunocytochemical stainings, confocal laser scanning microscopy (CLSM) and histological methods are employed to reconstruct the adult nervous system of *Syllis gerlachi*, *Syllis garciai*, *Plakosyllis brevipes*, *Prosphaerosyllis* c.f. *marmarae* and *Sphaerosyllis taylori*. Preliminary results show a trineuralian ventral nerve cord; only *P. brevipes* possesses five connectives. The peripheral nervous system consists of four segmental neurite bundles which form dorsal commissures. Additional small neurite bundles may originate from the ventral nerve cord, e.g. innervating ventral sensory papillae in *P. marmarae*. The parapodial innervation comprises the main parapodial nerve and an anterior neurite bundle. The main nerve may be divided into several separate neurite bundles; their arrangement and number can differ between species. In *P. brevipes* peripheral ganglia associated with segmental nerves were found. Reconstructions of the anterior nervous system including the stomatogastric nerves currently are work in progress. Variations in number of segmental nerves and ventral nerve cord connectives have been reported for other annelid families. The correspondences and phylogenetic significance of these characters are discussed.

Reproduction in *Ramisyllis multicaudata* (Phyllodocida: Syllidae)

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Reproduction in the shallow-water, sponge-dwelling, branching syllid *Ramisyllis multicaudata* exhibits several features unique among syllids and among annelids in general. We describe the morphology of the stolons and of the stolon stalk, unique to branching syllids, but different from those in the other known branching syllid, *S. ramosa* and we illustrate newly found paddle-shaped chaetae which might indicate that these stolons do swim. We list the number of branch points and termini in an effort to gauge the extent of branching in the worm contained in a small sponge. The species appears to have separate sexes, but this cannot be proven. We compare the stolons of branching syllids to those of *Trypanobia* and *Trypanosyllis*, now known to be close relatives. Included further are initial mass spectrometric data, which suggest that the sponge and the worm are eating the same thing or perhaps that the worm is feeding on the sponge; and observations on body form and symmetry, which both change abruptly along the length of the body. This study furthers our knowledge of the reproduction and biology of this unique polychaete.

Responses to low dissolved oxygen in the bearded fireworm, *Hermodice carunculata* (Annelida: Amphinomidae)

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Oxygen plays a key role in the metabolic processes of most organisms. In the marine environment, levels of dissolved oxygen (DO) can vary greatly over space and time and are a major factor in shaping biological communities. The bearded fireworm, *Hermodice carunculata*, is a common species throughout the Atlantic and its adjacent basins. *H. carunculata* inhabits shallow-water reef, rocky and coarse sediment habitats and reaches particularly high densities in areas where microbial decomposition depletes oxygen, such as coral-algae interfaces and fish farm outfalls. It is an omnivore which has been reported to cause damage to certain corals by direct feeding and as a vector to coral diseases. Because of its ecological importance, its common occurrence, wide geographic distribution, tolerance to low dissolved oxygen, and ease of collecting and maintenance in culture, *H. carunculata* can serve as a model species to examine molecular and organismal responses to low DO. This study examines gene expression profiles in *H. carunculata* in response to different levels of DO, in specimens collected in the field as well as animals maintained under controlled laboratory conditions. Differential gene expression is expected in genes that are involved in the activation of physiological stress responses (e.g. hypoxia inducible factors), oxygen delivery and processing (e.g. hemoglobin), metabolic depression (transcription factors) and anaerobic pathways (e.g. glycogen phosphorylase).

Sperm Watch: using citizen scientists to help understand reproductive patterns in *Arenicola marina* populations

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Capturing our Coast is a national project which aims to train members of the public from across the UK to collect data which will be used to investigate a range of fundamental ecological questions. Critically, we hope that hundreds of Citizen Scientists (CSs) will provide sufficient spatial and temporal coverage to begin to understand the key drivers of change (e.g. climate, non-native species etc) in distributions and phenology of inter-tidal species and communities. One of the studies which CSs will contribute towards, is to understand the timing of *Arenicola marina* spawning across the UK. Populations of this species usually spawn in the Autumn, but timing can differ significantly between populations and vary across years. Using quantitative measures of sperm puddles on the beach from multiple shores around the UK and over many tides this project aims to build a picture of spawning and understand any correlation with environmental variables. This work presents a novel method to research large scale patterns in polychaete reproduction, taking advantage of the many eyes on the ground and large potential for data collection which citizen science can provide. This work will act as a template that can be applied to many polychaetes with similar reproductive methods.

Complete mitochondrial genomes are not necessarily informative to recover a reliable invertebrate phylogeny

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Here, we describe the complete mitogenome of the polychaeta *Laeonereis culveri*, and we use this genome along with eight other annelid species to test the performance of markers and tree-building methods to recover a reliable phylogeny of Annelida. We also compared the efficiency of tree-building methods (neighbour-joining, maximum likelihood and Bayesian inference) and models. A total of 420 phylogenies were reconstructed and revealed that amino acids greatly outperformed the nucleotide dataset. Bayesian inference was more susceptible to type I error, due to high rates of incorrect clades with high statistical support. Conversely, maximum likelihood and neighbour-joining were more prone to type II error, as many correct clades were poorly supported. Our results clearly support the idea that the choice of the method and model was not as important as the choice of the gene. Six genes recovered the correct topology at least once. COB had the best performance followed by COI, CO3, NDI, ND6 and ND4L. Even for these genes, the support of the deepest clades was not significant in many cases. The concatenation of genes only improved the performance for maximum likelihood. These results showed that mitochondrial genes must be selected very carefully, mainly when used for deeper relationships.

Long-term comparison of polychaete species inhabiting soft-bottom habitats of the Cap de Creus continental shelf (northwestern Mediterranean Sea).

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Polychaete species present at eight of the stations within the northern part of the continental shelf of the "Cap de Creus" National Park (northwestern Mediterranean) that were initially sampled by Ramos in the early 1970's were reassessed in July 2009. A total of 2375 polychaetes belonging to 176 species were identified in the 16 samples obtained. Samples were easily separated in a MSD ordination into two groups corresponding to two different shelf communities; the Detritic Mud Community (DM) and the Terrigenous Coastal Mud Community (TCM). In the DM community *Paradoneis lyra*, *Galathowenia oculata* and *Monticellina heterochaeta* were the most dominant species while *Loimia medusa*, *Apomatus ampulliferus* and *Sthenelais boa* gave most biomass to the community. In the TCM community *Magelona minuta*, *Monticellina heterochaeta* and *Magelona wilsoni* were the most abundant ones and *Nephtys incisa*, *Notomastus profundus* and *Aponuphis fauveli* the ones that gave more biomass. Both communities showed a very high diversity with a large number of species and a large quantity of those in common. The comparison with the old data could only be done in qualitative inputs due the different mesh size employed (1 mm in the 70's and 0.5 mm in 2009), however our results showed a clear variations in the number of species and the structure of these two communities probably as a consequence of the increase in resuspension processes.

A new species of *Sphaerodoropsis* and the first record of Sphaerodoridae (Annelida: Phyllodocida) in sediments around a whale carcass

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A new species of *Sphaerodoropsis* is described from the abyssal Southwest Atlantic Ocean at the base of São Paulo Ridge (4204 m depth). This species was found in sediments impacted by a whale carcass. The new species has four longitudinal rows of macrotubercles and one transversal row per chaetiger and shares several characters with *S. anae* Aguado & Rouse, 2006 that is also associated with chemosynthetic environments. They can be clearly distinguished from *S. anae* and other *Sphaerodoropsis* species by the arrangement and the number of body, parapodial and frontal/mouth papillae.

***Laonice* species (Polychaeta, Spionidae) from the Whittard Canyon (NE Atlantic) with descriptions of two new species**

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Four species of *Laonice* (Polychaeta: Spionidae) were collected from lower bathyal depths (3300 - 3700 m) in the Whittard Canyon, NE Atlantic. Two new species are described. Two previously described species are also reported; *Laonice blakei* Sikorski, 1988 and *Laonice magnacristata* Maciolek, 2000. A short review and identification key for the genus *Laonice* in North Atlantic deep-water (> 400-500 m depth) are given.

A new *Capitella* polychaete worm (Annelida: Capitellidae) living inside whale bones in the abyssal South Atlantic

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Sunken whale carcasses are the largest organic input in the deep-sea, on which polychaetes represent up to 60% of the total species richness. Although some genus are very common in these habitats, *Capitella* species (*C. capitata* and *C. perarmata*) have been reported just twice in shallow-water whale-fall communities and in low densities. *Capitella iatapiuna* is the first associated with deep-sea whale-falls, and was the most abundant polychaete inside the bones. The specimens were collected at the base of São Paulo Ridge in Southwest Atlantic Ocean (4204 m), with the HOV Shinkai-6500, during the "Iatá-Piuna" expedition. The main characteristics of this species is a bluntly rounded prostomium; peristomium formed by a complete ring; eyespot absent; adult specimens with capillaries in notopodia of setigers 1-7 and in neuropodia of setigers 1-6; hooded hooks in neuropodia of setigers 7-9. Genital spine of setiger 8 (2-3 pairs) slightly curved with large base and tips sharply curved. Spines of setiger 9 (2 pairs) larger than those of setiger 8 also curved and with sharply curved tips. Pygidium simple lobe, without anal cirri. Chaetal formula of *Capitella iatapiuna* resembles the *C. caribaeorum* but both species can be distinguished by shape of prostomium and by numbers of teeth in abdominal hood hooks. Despite *C. aberranta* has also been found at abyssal depths (4862 m) and presents peristomium as a complete ring, this species has a conical prostomium; and presents modified thoracic notochaeta. The 16S inter-specific genetic distance between *Capitella iatapiuna* and *C. teleta* was of 20%.

A new species of *Heteromastus* Eisig, 1887 (Annelida: Capitellidae) from the Southeast Brazil

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Heteromastus it's a cosmopolitan genus commonly found in a variety of habitats. However, only two species have been recorded from Brazil: *H. filiformis* (Claparède, 1864) and *H. similis* Southern, 1921. The state of knowledge of the capitellid fauna occurring on the Brazilian coast is still poor, considering the great extension of the coast. Aiming to upgrade the taxonomic status of the family Capitellidae in Brazil, studies regarding morphological and molecular analyses are being made. A new species of *Heteromastus* is formally described on the basis of morphological and molecular (COI) data. The specimens were collected at different habitats of the northern coast of São Paulo State, which comprehends a mangrove and a tidal flat (São Sebastião Channel) and mussel beds (Caraguatubá Bay). The main characteristics of this species is prostomium conical and small; a pair of black subdermal eyespot; lateral organs and four pairs of intersegmental genital pores present along the entire thorax; thoracic hooded hooks with short main fang, surmounted by 2 apical teeth arranged in one row, indistinct shoulder; node and constriction poorly developed, long and straight posterior shaft, long hood; abdominal notopodial lobes as semi-triangular expansions; abdominal hooded hooks quite smaller than thoracic ones; large main fang, surmounted by several teeth arranged in three rows, short curved shoulder, well developed node and constriction, long and curved posterior shaft, short hood. The intra-specific genetic distance varied from 0.3%–0.6% and the inter-specific between *H. filiformis* and the new species was of 36.7%–37.4% (p-distance - K2P).

A new *Polydora* species in South Africa; is it *Polydora nuchalis* Woodwick, 1953, *Polydora triglanda* Radashevsky & Hsieh, 2000, or a new species?

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In 2011 a species tentatively identified as *Polydora* cf. *nuchalis* Woodwick, 1953 was identified in the Knysna estuary. These specimens resemble published descriptions with respect to size and number of chaetigers, presence of a knob-like occipital antenna, shape of the prostomium and structure of the modified spines and companion chaetae of chaetiger 5. However, they differ with respect to pigmentation patterns and branchiae length; in all the South African specimens examined pigment is present along the feeding grooves of the palps, with diffuse brown pigmentation on the dorsal anterior and more concentrated on the left and right of the peristomium just anterior to chaetiger 1 and the branchiae never touch in mid-dorsum. This, with differences in methyl green staining patterns, suggests that South African specimens may be a different species. Furthermore, preliminary analyses of 18S data suggest that the species found in Knysna is actually the tube-dwelling *Polydora triglanda* Radashevsky and Hsieh, 2000. The South African specimens resemble *P. triglanda* with respect to size and the presence of the occipital antenna, but in the latter species pigmentation is restricted to bands on palps and modified spines of chaetiger 5 are falcate with a lateral flange and pennoned companion chaetae are not plumose as for the South African specimens and *P. nuchalis*. The potential reciprocal monophyly of *P. cf. nuchalis* from South Africa and tube-dwelling *P. triglanda* from Taiwan will be investigated further with 16S and 28S markers.

The status of marine polychaete research in India

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Marine annelid studies along the Indian subcontinent started during the late eighteenth century with the descriptions of new species by Schmarda (1851). However, the monograph of Fauvel (1953) remains the most comprehensive work on the subject till date. Fauvel reported 304 polychaete species from India. The next major work was based on the polychaetes collected during the first International Indian Ocean Expedition (IIOE) (Hartman, 1974). More recently, the Zoological Survey of India (ZSI) has contributed to polychaete studies during the 1990's. Subsequently, the taxonomy of polychaetes was largely neglected in favour of biodiversity and ecological research. Currently, the CSIR - National Institute of Oceanography (CSIR-NIO) is the leading agency contributing to the marine polychaete studies. The CSIR-NIO has digitized marine biodiversity information of the Indian coast through a database named 'bioSearch'. The guiding principle of the database is to keep the resource freely available, in order to encourage regional and international scientific initiatives. Through our collaborations, we hope to stimulate regional and international interests in improving the overall accuracy of India's regional taxonomy along with new biodiversity and ecological studies. We sincerely hope to see the functionality of the bioSearch database and its user networks to grow with new possibilities, primarily with the tasks associated in DNA Barcoding and handling the other molecular and Geographic Information Systems (GIS) data to assess the effects of climate change along the Indian Subcontinent. We also intend of preparing a taxonomic monograph of the Indian polychaete species.

Redescription of *Cossura chilensis* Hartmann-Schröder, 1965 (Annelida; Polychaeta), using scanning electronic microscope.

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Cossura chilensis is a small body-size and burrowing polychaete inhabiting sand and muddy soft-bottom sediments. This species records commonly high densities on hypoxic environments playing a key role in the benthic communities of the continental shelf of central Chile, southeast Pacific. However *C. chilensis* was originally described using incomplete specimens missing out key characters from abdominal region, pygidium, chaetae details and other organs. Therefore the aim of this research was to make a full and detailed description of species using traditional light microscope and in addition scanning electronic microscope methods. Electronic analyses allowed distinguishing a dorsal wrinkle in the prostomium, segmentation on the branchiae and a longitudinal wrinkle on the same structure. Capillary chaetae are variable in length and like dense plumage in the only one side of the chaetae. This character appears on the chaetae base and neither is observed on the final end. On some chaetae from thoracic region the plumage is not dense observing the presence the long and fine teeth like saw-shape chaetae. From abdominal region the chaetigers are longer and with group of chaetae less dense (until 3 or 4 capillaries). The pygidium is small and round-shape with three long cirri located to the same distance around the anus. Methyl green staining pattern stained strongly the prostomium and weakly the peristomium, the two first chaetigers, while lateral pouches were observed from third chaetiger.

Phylogeny of the family Maldanidae based on molecular data

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The maldanids are considered to form a monophyletic group with more than 250 valid species organized in 40 genera and 6 subfamilies. The systematics and taxonomy of the family is largely based on the detailed review by Arwidsson (1906), with more recent contributions mainly focusing on specific genera or taxa.

Here we present the first molecular phylogeny of the family Maldanidae based on combined dataset of nuclear (18S and 28S) and mitochondrial (CO1 and 16S) genes. The analysis includes 25 terminal taxa representing 18 genera and all 6 valid subfamilies. Results are compared with those from previous phylogenetic studies of the maldanids based on morphological data, and taxonomic implications will be discussed.

Amphicteis* and *Paramphicteis* (Polychaeta: Ampharetidae) from China, with the description of a new species of *Amphicteis

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A new species of the ampharetid genus *Amphicteis* is described based on material from the East China Sea and the South China Sea. The new species is distinguished from the other known species of this genus by the possession of papilla on the paleal segment. A key to distinguish all species of *Amphicteis* and its close related genus *Paramphicteis* from the China seas is provided.

A global invader or a complex of regionally distributed species? Clarifying the status of an invasive calcareous tubeworm *Hydroides dianthus* (Verill, 1873) using barcoding

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Clarifying taxonomic status is essential to understanding population connectivity and the spread of potentially invasive species. Here we used barcoding to explore the issue in a common fouling invasive species *Hydroides dianthus* (Verill, 1873). The species originally described from off Massachusetts, USA, has been also reported from along the East coast of North America down to Florida and Grand Caribbean, as well as from Brazil, China, Europe, Japan, and West Africa. Unlike most congeners, *Hydroides dianthus* has tolerance for a wide temperature range, being distributed from temperate to subtropical waters. We barcoded *H. dianthus* collected from fourteen locations which covers the recorded distribution range of this species so far, and reconstructed phylogenies using cytochrome c oxidase subunit I (COI) gene. Our results support two main clades of all *H. dianthus* specimens. Clade 1 has a wide distribution from Massachusetts to west coast of Florida, Mediterranean Sea, and is also known from Brazil, China and Japan. Clade 2 was found only off Galveston, Texas and off Crimea Peninsula in the Black Sea. Haplotype network analyses revealed low genetic divergence in each clade. Our results indicate that *H. dianthus* is a complex of two cryptic invasive species. Human activities play the most important role in the dispersal of *H. dianthus*. We suggest a greater emphasis on identification of invasive *Hydroides* species and managing pathways responsible for *Hydroides* introductions.

The identity of an enigmatic deep-sea echiuran, *Thalassema antarcticum* (Annelida: Echiura: Thalassematidae): its transfer to the family Bonelliidae and the proposal of a new genus

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Echiurans are a group of bilateral, non-segmented protostomes, comprise ca. 175 known species worldwide. According to Goto (2016), echiurans are classified into the two superfamilies: Echiuroidea (with Thalassematidae, Echiuridae, and Urechidae) and Bonelliioidea (with Bonelliidae and Ikedidae). In this study, I reexamined the types of an enigmatic thalassematid, *Thalassema antarcticum* Stephen, 1941. This species was originally described based on two specimens: the holotype from Falkland Island, 132 m deep and the paratype from Schollaert Channel, Palmer Archipelago, 278–500 m deep. No further specimens have been collected. This species is aberrant not only among its congeners but also among echiurans as a whole, because it is the only species believed as lacking anal vesicles which are one of the fundamental characters of echiurans. Examination of the types, however, revealed that: 1) the “holotype” actually includes the two specimens (one complete and one anterior fragment), so it should be regarded as the syntypes; 2) anal vesicles are present in a syntype and the paratype; 3) the syntypes and the paratype are different species, and the latter should be identified as a bonelliid, *Alomasoma lanai* Ditadi, 1992; 4) the syntypes shares some apomorphic character states with Bonelliidae, such as dendritic anal vesicles and distally-situated gonostomes, and thus should be transferred to the family; and 5) the syntypes are most similar to the genus *Vitjazema*, while they are distinguished in possessing dendritic anal vesicles and a “hook pocket.” Consequently I concluded that a new bonelliid genus is necessary for accommodating *T. antarcticum*.

Revisiting the homology of annelid hooks

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A large number of annelid taxa possess hook-shaped chaetae. These chitinous structures resemble tiny anchors and are mainly associated with tube-borrowing sedentary worms. A series of previously published papers utilized the comparative study of chaetogeneses as a basis to establish a sound hypothesis on the homology of this type of chaeta and proposed a common ancestry of certain hook bearing taxa. These hypotheses were not corroborated by recent molecular phylogenies. In order to understand and explain the structural diversity and unity among annelid hooks we examined chaetogenesis of hooked chaetae in several taxa missing in previous studies, and now provide a more complete dataset; covering all the major branches of the annelid tree. The results of these studies support the homology of hooked chaetae only for certain taxa (Maldanidae, Arenicolidae), but also indicate independent evolution of hooked chaetae in others (Eunicida, Capitellidae, Spionidae). Especially the formation of hooks in the sabellariid *Sabellaria alveolata* is remarkably different from any other hooked chaetae studied so far, which demonstrates that hooked chaetae formation is not as uniform as previously assumed. Sipunculans also bear hooks extending from the cuticle of their introvert. Since identically termed structures are characteristic for different annelid subgroups, we studied the fine structure of sipunculan hooks. Our data provides evidence that sipunculan hooks are entirely cuticular structures which have nothing in common with annelid chaetae. We assume that similar functional constraints might have forced the evolution of such hooks, while others might contain a phylogenetic signal.

Chaetal arrangement of the fireworm *Eurythoe complanata* (Amphinomida) (Pallas, 1766)

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Chaetae are the chitinous bristles of annelid worms and occur in a variety of shapes and arrangements in different taxa. The plesiomorphic condition in annelids is a dorsal and a ventral group of chaetae on each segment. These chaetae often form a row, whereby formation of new chaetae is restricted to one edge, i.e., the ventral edge in notopodia and the dorsal edge in neuropodia. Previous studies show that chaetal arrangement can provide a useful source of information for systematics and that comparative studies of chaetal arrangement can help understand transformations and deviations from the annelid ground pattern. Amphinomida, were formerly considered as closely related to Errantia and were placed as sister group to Eunicida and Phyllodocida. However, in recent molecular phylogenies they group together with Sipuncula and form a clade that constitutes the sister group to "Sedentaria + Errantia". The shift in phylogenetic placement of Amphinomida, warrants further morphological comparisons. Like Eunicida and Phyllodocida, amphinomids possess bundles of chaetae and aciculae that reach deep inside the parapodia. Herein, we present 3D-reconstructions of the chaetal arrangement of the amphinomid *Eurythoe complanata*. The position of the chaetal formation site and the structure of the chaetal sac present a set of morphological characters that provide a basis for comparisons with chaetal arrangements in Eunicida and Phyllodocida.

A report of two capitellid species (Capitellidae: Annelida) from southern Japan

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Capitellids are free living benthic worms, with more than 150 known species in 39 genera in the world. In Japan, 34 species in 22 genera have been reported so far. However, most of the previous studies and reports did not identify the material to the species level. Taking into account the complex environments along the Japanese archipelago, a non-negligible number of undescribed and unreported capitellid species are likely to inhabit in Japanese waters.

In this study, we found two species of capitellid worms at a mud flat in Iriomote Island, southwestern Japan. We will report the results of subsequent morphological observations and examination of the staining pattern with methyl green.

Reappraisal of *Platynereis massiliensis* (Moquin-Tandon) (Nereididae) in the Mediterranean Sea, a neglected sibling species of *Platynereis dumerilii* (Audouin & Milne Edwards)

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Platynereis massiliensis (Moquin-Tandon) (Nereididae) is a sibling species of *Platynereis dumerilii* (Audouin & Milne Edwards), whose adult, not reproductive, stages are identical but with a highly different reproductive habit. *P. dumerilii* is gonochoric, with heteronereid modification, semelparous, free spawning and planktotrophic larval stage; while *P. massiliensis* shows no epitokous phase and is a protandrous hermaphrodite, characterized by egg brooding and semi-direct larval development. In the Mediterranean Sea *P. massiliensis*, first described in the Marseille region, was successively recorded in Banyuls and in the Gulf of Naples. However, these studies, focused on embryology and larval development, were not considered in the taxonomic/ecological literature and in fact, *P. massiliensis* is not reported in any of the Mediterranean polychaete check-lists and revisions. Ecological and monitoring surveys, generally based on the analysis of fixed adult, not-reproductive specimens, recorded only the presence of *P. dumerilii*, therefore *P. massiliensis* has been likely misidentified and confused with its most common and widespread sibling. Studies of polychaete populations in naturally acidified waters of the Castello Aragonese CO₂ vent system at the Ischia island (Italy), revealed the occurrence of *P. massiliensis* whose distribution, restricted to this acidified area, opens challenging questions about the advantage of brooding as adaptation to ocean acidification. The aim of this work is to reappraise the occurrence of *P. massiliensis* in the Mediterranean Sea, and provide preliminary observations on its reproductive biology at the Ischia CO₂ vent system.

Characterizing the evolution of bioluminescence in *Odontosyllis* (Annelida, Syllidae) through phylogenetic analysis

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Bioluminescence, the emission of light living organisms, has several independent origins within Annelida. Polychaetes of the genus *Odontosyllis* in particular, are arguably the best-studied examples of luminescent annelids, with several species showing an impressive bioluminescent display during reproduction in the summer months. A few days after a full moon and shortly after sunset, the worms leave the bottom of the ocean and swim to the surface to reproduce. Females appear first, secreting bright green luminous mucus that attracts males, which swim towards them, producing short flashes of light. This mating ritual has been thoroughly studied, however, the molecular basis and the evolution of light production in *Odontosyllis* are not well understood. To investigate the origins of bioluminescence, it is first necessary to elucidate the evolutionary relationships within the genus. *Odontosyllis* currently comprises 49 valid species, and around 20 additional species whose taxonomic status is unclear. We have completed a taxonomic revision of the genus, including detailed study of type material and ambiguous taxa. Additionally, we provide a robust molecular phylogeny of *Odontosyllis* based on Maximum Likelihood and Bayesian Inference analyses of nuclear and mitochondrial markers (28S rDNA, 18S rDNA, 16S rDNA, Cytochrome Oxidase I) from 67 *Odontosyllis* specimens representing 34 species and 37 outgroups, including very closely related genera such as *Eusyllis*. Lastly, we shed light into the origins of bioluminescence in the genus through ancestral character reconstruction analyses and suggest a possible scenario for the evolution of light production in this remarkable group of polychaetes.

Polychaete community structure along northwest coast of India: A baseline study at family-level.

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Present study aims to analyze familial diversity of Polychaeta along northwest coast of India coupled with prevailing environmental conditions. Five transects were sampled including two coralline Marine Protected Areas (MPAs) i.e. Malvan and Vadinar. Overall, 2080 polychaete specimens belonging to 38 families were obtained from 160 grab samples during premonsoon and post monsoon seasons of 2013. Thirteen families showed wide distribution throughout study locations covering broad geographical area. Univariate indices designated healthy status of all transects, the exception being Veraval that exhibited dominance of opportunistic Spionidae which thrived in harbor pollution. Sabellidae and Capitellidae were abundant at Ratnagiri and Malvan respectively. Paraonidae dominated Vadinar sediments whereas Sternaspidae was best represented at Mumbai. While spatial distinction in polychaete community was observed in nMDS analysis, seasonal variations were absent. CCA revealed distribution of polychaete families being strongly related to sediment characteristics, bottom water dissolved oxygen and salinity. This baseline work was useful in extracting preliminary information and revealing ecological trends of the polychaete community along selected 'coastal regions' susceptible to changes. Ongoing species identification from current study has yielded new species and subspecies description of *Heterospio indica* (Longosomatidae) and *Phascolion pacificum denticulatum* (Golfingiidae) respectively, later being the first record of this genus from Indian coast. Extension of current work with next detailed level of taxonomic classification has potential for new species descriptions in future.

Three new *Ophryotrocha* species (Polychaeta: Dorvilleidae) from hydrothermal vent and whale-fall habitats in the Southern Ocean

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The polychaete genus *Ophryotrocha* comprise around 70 described species, and they are often found in organically enriched habitats such as near sewage outlets and harbours, and on bacterial mats occurring on whale-falls, cold seeps and hydrothermal vents. Until now, only four described *Ophryotrocha* species have been reported from Antarctic waters, although records of undescribed species exists. Two of the new species in this study were discovered in samples from two vent sites along the East Scotia Ridge, and the third species was found on a nearby whale-fall in Kemp Caldera. The most abundant vent species exhibits vivipary, with a large number of specimens containing embryos and larvae in different developmental stages.

Effect of temperature and body weight on respiration and excretion in *Nereis vexillosa* (Polychaeta: Nereididae)Dazuo **Yang**¹, Yibing Zhou²^{1,2} Dalian Ocean University, No.52, Heishijiao Street, Shahekou district, Dalian, Liaoning, 116023, China

In this paper, the effect of body weight and temperature to the respiration and excretion of *Nereis vexillosa* was studied. Six different temperature gradient was set and worms were grouped according to their wet body weight into small (S), medium (M), large (L). The oxygen consumption rate and ammonia-N excretion rate was determined. The results showed that: (1) The oxygen consumption rate of different group worms was increased following with the temperature during 15-27°C. But it was remarkably decreased when the temperature reached 30°C. In the temperature 15-30°C, the relationship of between the dry body weight (W) of *Nereis vexillosa* and oxygen consumption rate (R) can be described as $R=aW-b$. (2) At the same temperature, The oxygen consumption were increased with dry body weight, the regression equation between the dry body weight (W) and oxygen consumption (R) can be described as $R=aWb$. (3) When the temperature was below 24°C, ammonia-N excretion rate of worms was stable. The temperature in 24-30°C, the ammonia-N excretion rate was increased significantly and showed that temperature dependent. But when temperature above 30°C, the ammonia-N excretion rate was decreased significantly. These data indicate that *Nereis vexillosa* was a cold water species and the metabolic rates were higher in smaller individuals, which is advantageous for their rapid growth.

Two new species of *Cossura* (Cossuridae, Annelida) from the terminal lobes of the Congo river deep-sea fanAnna **Zhadan**¹¹ Moscow State University, biological faculty, Leninskie Gory, 1-12, Moscow, 119234, Russian Federation

Two new species of *Cossura* were found in material collected during deep-water sampling in frame of CONGOLOBE project. These species were described using light and scanning electron microscopy. *Cossura* sp. A has 15-17 thoracic chaetigers; prostomium longer than wide, with widely rounded anterior margin, posterior prostomial ring rapidly expands, the same length as peristomium, without mid-ventral notch; branchial filament attached to midlength of chaetiger 3; pygidium divided by vertical cleft, with three cirri. *Cossura* sp. A is similar to *C. brunnea* Fauchald, 1972 by attachment of branchial filament, number of thoracic chaetigers, shape and location of chaetae, and differs by the shape of prostomium which is widely rounded anteriorly in *Cossura* sp. A and broadly triangular in *C. brunnea*; furthermore *Cossura* sp. A is uniformly pale whereas *C. brunnea* has dark pigmentation. *C. keablei* Zhadan, 2015 differs by having the midventral notch in posterior prostomial ring and by having more (22-26) thoracic chaetigers. The whole body of *Cossura* sp. B including chaetae is covered by thick mucous sheath similar to tunic of flabelligerids. *Cossura* sp. B has 16-19 thoracic chaetigers; prostomium conical, branchial filament arising from posterior part of chaetiger 2. *Cossura* sp. B resembles *C. longocirrata* Webster & Benedict, 1887 by the position of branchial filament, shape of prostomium, number of thoracic chaetigers, shape and distribution of chaetae; it differs by having thick mucous sheath. This character seems to be unique for Cossuridae.

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M. Nechama Ben-Eliahu (1935-2014)

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Edmundo Ferraz Nonato (1920-2014)

Morre o professor Edmundo Ferraz Nonato, do Instituto Oceanográfico
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Jose Maria (Lobo) Orensanz (1945-2015)

Diez, M.E., Tablado, A., Scarabino, F., Orensanz, J., Carrera-Parra, L.F., Elías, R. & Salazar-Vallejo, S.I. 2015. Lobo Orensanz (1945-2015) y su contribución al conocimiento de los poliquetos (Annelida). *Revista de Biología Marina y Oceanografía* **50(3)**: 397-410.
(<http://www.revbiolmar.cl/resumenes/v504/504-397.pdf>)

Roger Bamber (1949-2015)

An obituary was first published on WoRMS News in acknowledgement of his involvement with the database since its precursor – the European Register of Marine Species (ERMS). A special issue of *Zootaxa* was dedicated to honour the life and work of Roger Bamber, who made an outstanding contribution to the field of marine biology and taxonomy.

Horton, T. 2015. Roger Norman Bamber 1949 – 2015. *Bulletin of the Porcupine Marine Natural History Society* **4**: 8-13.

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Kristian Fauchald (1935-2015)

Following Kristian's death, a number of tributes and tributes were posted on the internet – including heartfelt remembrances by Linda Ward, Kirk Fitzhugh and Sergio-Vallejo. An obituary by Fred Pleijel and Greg Rouse was published on WoRMS. This and the aforementioned pieces by Ward and Fitzhugh were included in the tribute compiled by Mackie & Darbyshire (2015). The eulogy by Salazar-Vallejo appeared in print in 2016.

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Obituary – Dr André Souza dos Santos – UFSE (1983-2015)

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André Souza dos Santos was born in João Pessoa, Paraíba, Brazil, on March 16, 1983. He took degrees at the Universidade Federal da Paraíba. He concluded his graduation in 2007, a master thesis in 2010, and obtained his doctorate in 2014. In 2015 he went to Universidade Federal of Sergipe with a post-doctorate project, by FAPESSE: Fundação Privada Ligada à Universidade Federal de Sergipe, Projeto Marseal Talude da Petrobrás.

In 2004, he published his first paper on Nesting of Hawksbill Turtles in Paraíba, Brazil, when he was a volunteer on Project Guajiru, a Non-Governmental Organization for the protection of marine turtles. Thereafter he published almost exclusively on annelids, until his death in 2015.

During his graduation, he had an undergraduate scholarship (PIBIC) as a young scientist, and started to work with polychaete annelids, following his graduation studies (master and doctorate) under the supervision of Dr Martin Lindsey Christoffersen (UFPB). During this period, he attended many courses, participated in many scientific meetings, and after this, he moved to Rio de Janeiro. In this latter city, he met Dr. Ana Cláudia dos Santos Brasil (UFRJ), and started to become involved with Sabellariidae, a group he has loved ever since.

During his numerous travels, both in Brazil and abroad, he was inspired by several others scientists, such Dr Paulo da Cunha Lana (UFPR), Dr. João de Matos Nogueira (USP), Dr Cecília Amaral (UNICAMP), who collaborated with him, advancing and influencing his studies. André went to the USA to compare Brazilian specimens of sabellariids and terebellids from world-wide locations deposited in the Natural History Museum of Los Angeles County. At this time he met Dr Kirk Fitzhugh, who helped him to think about phylogenetic and abduction, and the lovely friend Leslie Harris, who received him in her house. They were very important influences in his life, serving to show him how a big collections works.

He worked as a volunteer curator of marine annelids at the Coleção de Invertebrados Paulo Young, UFPB. He made many collections, contributed to their organization and conservation, participated in several researcher projects, such as Projeto do Porto de Cabedelo, Paraíba; Projeto Biota, Paraíba; Caracterização espacial da macrofauna de praias arenosas em cinco ilhas da Baía de Sepetiba, Rio de Janeiro; and Taxonomic revision of Sabellariidae and Terebellidae from the Brazilian coast.

André had experience in the areas of systematics, taxonomy, and phylogenetics, with emphasis in Zoology. He acted especially on morphology and taxonomy of recent groups of Polychaeta, particularly Terebellidae and Sabellariidae, and published on both the systematics and ecology of these groups. His Ph.D. was on the taxonomy and phylogeny of Sabellariidae (Annelida: Polychaeta). He left eight published papers on annelid polychaetes, most notably Nishi *et al.* (2010), Santos *et al.* (2010a, b), Lomônaco *et al.* (2011) and De Assis *et al.* (2012, 2014). He also participated in several national and international meetings.

André was an intelligent and ambitious person, who got along well with almost everyone. He helped other students to identify and collect polychaetes, and searched new ways and techniques to improve these identifications. He contributed to the knowledge of polychaetes from northeastern Brazil, published new species for science, assembled with us the first catalogue of polychaetes from the coast of the State of Paraíba, and prepared taxonomic inventories of sabellariids and terebellids from the Brazilian coast and the world.

Unfortunately, André had a short life. On October 2, 2015, he passed away unexpectedly, struck by a terrible disease after a few days of internship in the hospital. He has contributed to a large part of our understanding on annelid polychaetes, especially sabellariids, which were his major focus in life. This young scientist will be remembered in our hearts forever.

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Franklin Carrasco Vásquez (1944-2015)

Born in Purén, southern Chile in 1944

Bachelor of Biology degree 1968: Universidad de Concepción, Chile.

Biology graduate 1974: Universidad de Concepción. Thesis: "Polychaeta larvae in the plankton from Concepcion Bay, Chile with focus on Spionidae family"

Master of Science, mention Zoology. 1986: Universidad de Concepción. Thesis: *Faunistic assemblages of annelids and their temporal variations on macrobenthos from Concepcion bay, Chile*

PhD in Zoology. 1989. Universidad de Concepción. Thesis: *Dynamic and monitoring of marine subtidal macrobenthos affected by pollution: a case of study at Concepcion bay, Chile*

Senior lecturer (Associate) 1973-1975: Pontificia Universidad Católica de Chile

Lecturer from 1975: Oceanography and Marine Biology Department. Universidad de Concepcion, Chile

Further studies in 1980 at Marine Benthic Ecology Laboratory de la State University of New York, Stony Brook, U.S.A.

1987-1988: Head of Oceanography Department. Universidad de Concepcion, Chile

1993-1998: Vice-Dean of Faculty of Natural and Oceanographic Sciences. Universidad de Concepción, Chile

1998-2013: Dean of Faculty of Natural and Oceanographic Sciences. Universidad de Concepción, Chile

He died on 29th December 2015 at Concepcion, Chile following a long illness.

Selected publications

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Eulogio Soto, Universidad de Valparaíso

Dr Minoru Imajima (1930-2016)

Dr Minoru Imajima was born in Sapporo, Japan, in 1930. After he graduated from the Faculty of Science, Hokkaido University of Education in 1953, he initially taught at the marine station of the University as an assistant and associate professor. He became a researcher at the Department of Zoology, National Science Museum, Tokyo, in 1963 and continued research on polychaete systematics until his retirement in 1994.

In 1962, he studied Japanese polychaetes with Dr Olga Hartman at the University of Southern California and they published *The polychaetous annelids of Japan, Part 1, 2* from the University of Southern California. This publication includes 50 families, 227 genera and 467 species of Polychaeta. Afterwards he described 930 species, including 233 holotypes from Japanese waters and this became the base of Japanese polychaete research. He not only collected specimens from Japan but also from Southeast Asia, the Indo-Pacific, Micronesia and other waters through many expeditions, and as a result established the National Science Museum, Tokyo as one of the most famous polychaete collections in Asia. The total number of figures drawn by him exceeds 9200.

We sincerely respect Dr Imajima for his modesty but never-ending enthusiasm and efforts toward annelid systematics. We all are most grateful to him for his great contributions, not only to annelid research but also to various systematics societies, and for his warm and kind education and research collaborations.

He passed away peacefully in the early morning of 13 March 2016, the day before his 86th birthday in Sayama City, Japan.

Waka Sato-Okoshi, Tohoku University, Japan

Kristian Fauchald 1935–2015



Kristian in his office (Photo: Sergio Salazar-Vallejo)

Kristian was the most highly influential polychaete taxonomist of his generation. He was kind, generous and inspirational to countless researchers. He authored many publications, including the famous 'Pink Book' and *The Diet of Worms*. Kristian died on 4th April 2015 following a heart attack the previous evening.

André Souza dos Santos 1983–2015



André
(Photo: José Eriberto De Assis)

André was intelligent and ambitious, and will be long remembered by his friends and colleagues. He helped other students to identify and collect polychaetes, and contributed to the knowledge of polychaetes from northeastern Brazil, published new species for science, assembled the first catalogue of polychaetes from Paraíba, and prepared taxonomic inventories of sabellariids and terebellids from Brazil and the world.

André passed away unexpectedly on 2nd October 2015 after a few days in hospital.

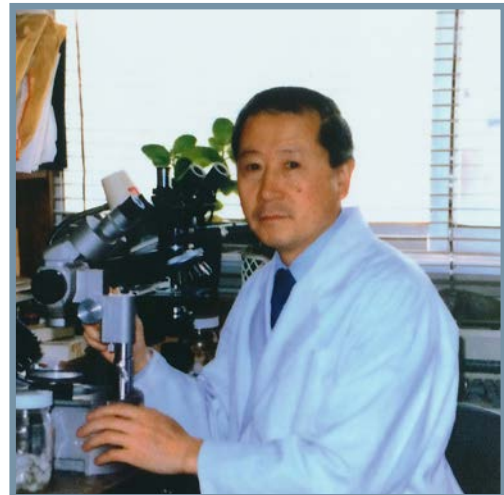
Franklin Carrasco Vásquez 1944-2015



Franklin in Lecce (IPC10), 2010 (Photo: Eulogio Soto)

Franklin was a very friendly and affable man, always available to collaborate in initiatives related to the development of marine sciences in Chile. He was recognised world-wide as an expert polychaetologist and benthic ecologist. He mentored many students and marine biologists, developing teaching courses and research programmes. Franklin died on 29th December 2015 at Concepcion, Chile, following a long illness.

Minoru Imajima 1930–2016



Dr Imajima in his laboratory
(Photo courtesy of Waka Sato-Okoshi)

Dr Minoru Imajima was a highly respected and prolific polychaete taxonomist working at the National Science Museum until his retirement in 1994.

He described 930 species, including 233 holotypes from Japanese waters and this became the base of Japanese polychaete research.

He passed away peacefully in the early morning of 13th March 2016, the day before his 86th birthday in Sayama City, Japan.

Wriggle!

The Wonderful World of Worms

Whilst at IPC 2016 why not visit *Wriggle! The Wonderful World of Worms* at National Museum Cardiff. A gallery designed to showcase some of the wonderful diversity and often spectacular beauty of worms including annelids, nematodes, nemertean and more.

The exhibition will run until September 2017.



Aphrodita aculeata
Photo: James Turner



Phyllodoce laminosa
Photo: Andy Mackie



Model made by 10 Tons
Photo: Thomas Foldberg



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National Museum Wales, Cardiff | 1-5 August 2016