

Gnathostomulida and Kinorhyncha



Martin V. Sørensen

Associate Professor and curator of microscopic invertebrates

Natural History Museum of Denmark

Gnathostomulida

– Jaw Worms



- Protostome phylum within Platyzoa
- Closely related with Rotifera
- Fairly new group
 - Discovered in the 1920'ies
 - Described as a flatworm group in 1956
 - Recognized as phylum in 1969
- Currently 100 valid species
- Can be confused with flatworms, marine oligochaetes and some polychaetes



Gnathostomulida

– Jaw Worms



- Ventral mouth leading to blind gut



Gnathostomulida

– Jaw Worms

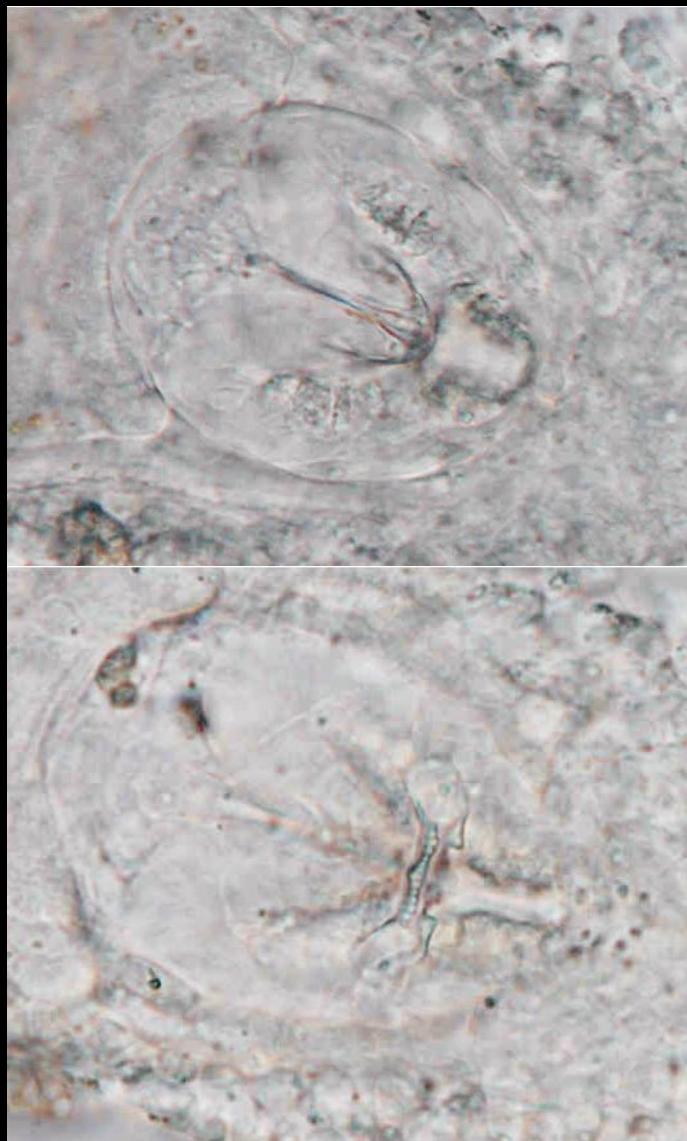


- Simple cephalic sensory organs
- Simple epidermis with monociliated cells



Gnathostomulida

– Jaw Worms

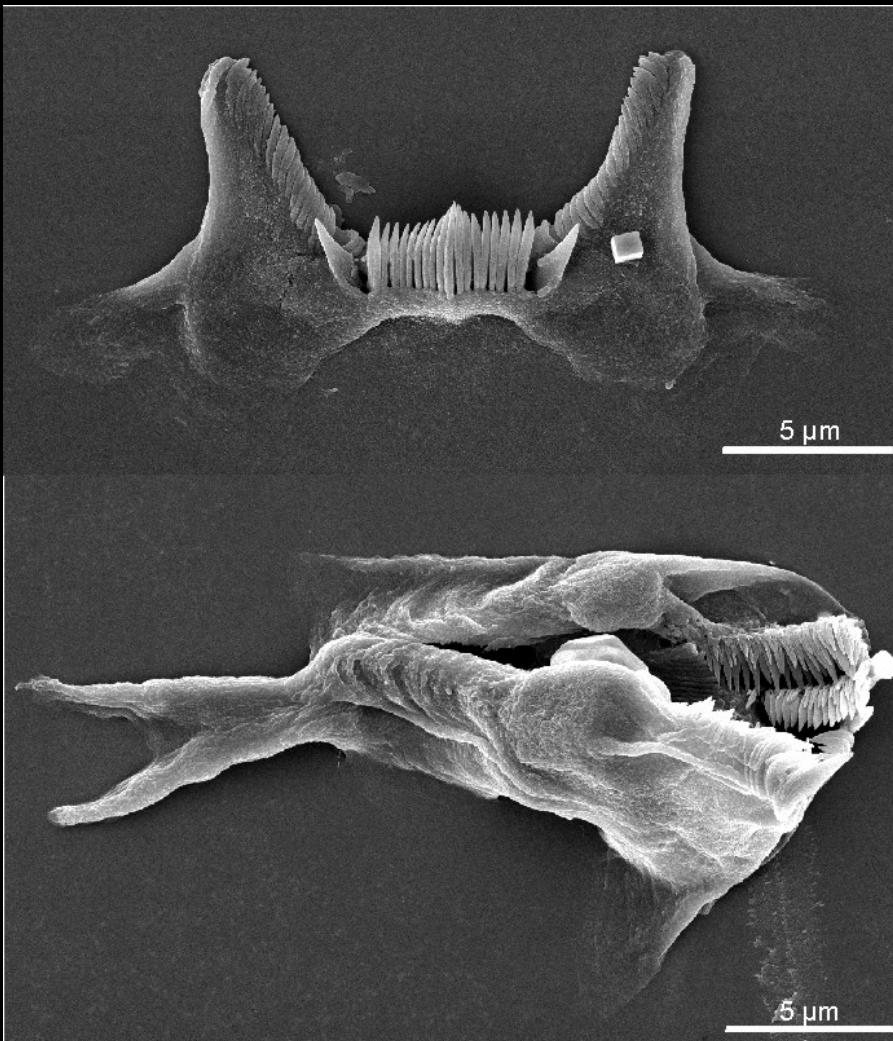


- Simple cephalic sensory organs
- Simple epidermis with monociliated cells
- Pharynx with hard parts forming jaws



Gnathostomulida

– Jaw Worms



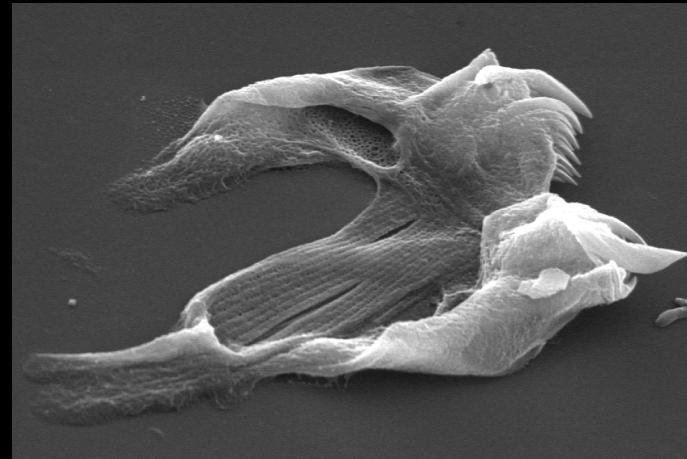
- Simple cephalic sensory organs
- Simple epidermis with monociliated cells
- Pharynx with hard parts forming jaws



Gnathostomulida



Haplognathia lunulifera



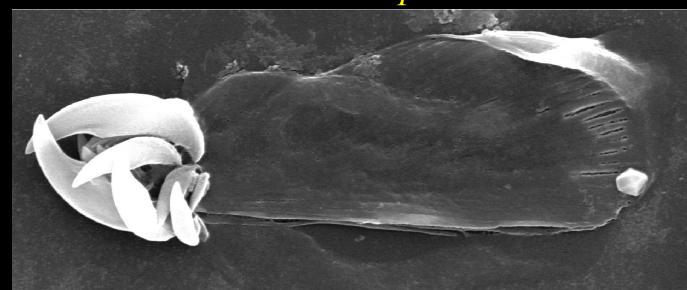
Gnathostomula paradoxa



Rastrognathia macrostoma



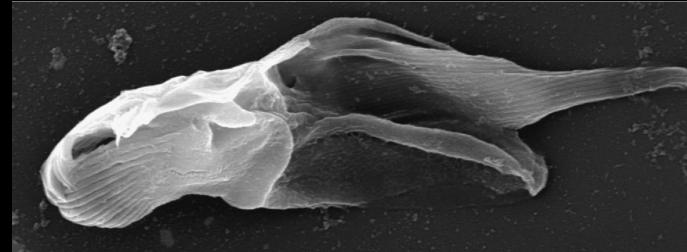
Haplognathia ruberrima



Probognathia minima



Tenuignathia rikerae



Mesognatharia remanei



Gnathostomulida

– Jaw Worms



Typical habitat:

- Sand – coral or quartz – with some detritus

Extraction method:

- Relax with magnesium chloride
- Pour relaxed animals into a 60 µm mesh, place it in a petri dish with sea water, and let them crawl through
- Key to ID doesn't exist yet, but is expected in 2018/19



Kinorhyncha

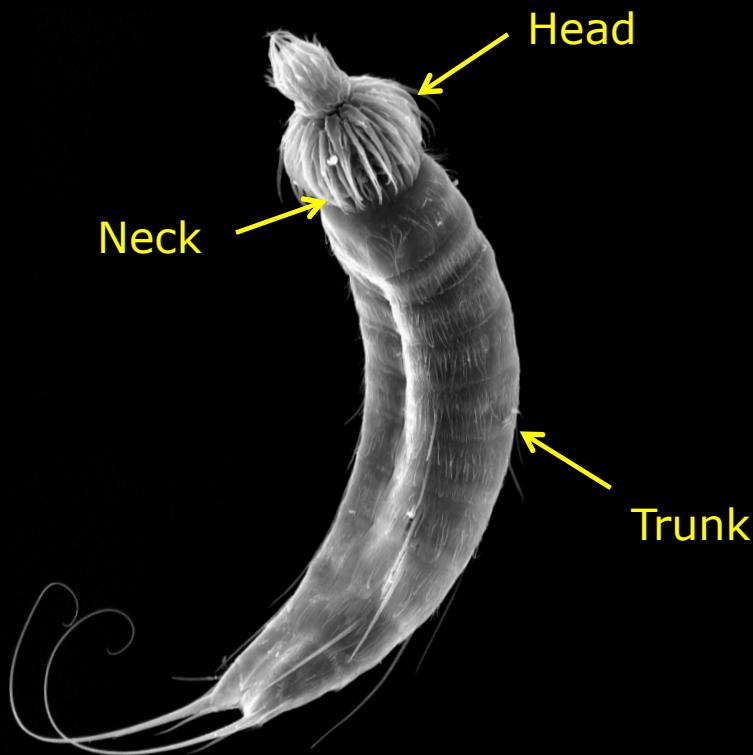
– Mud Dragons



- Protostome phylum within Ecdysozoa
- Currently 255 valid species
- Range in size from 150 µm to 1 mm



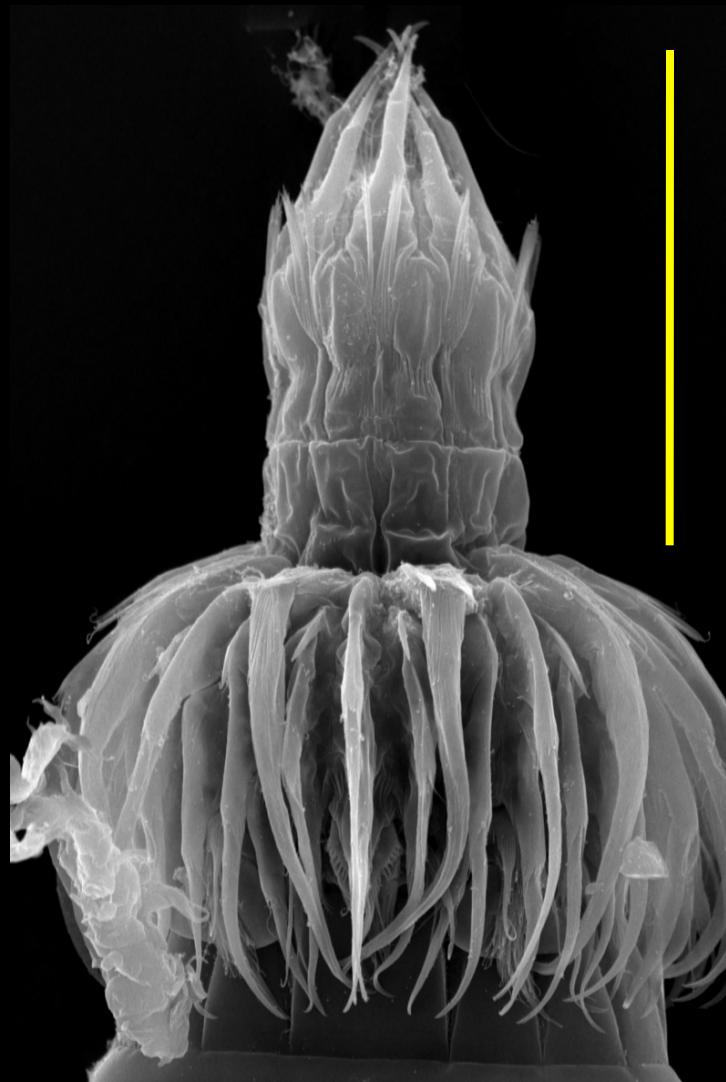
Morphology



- Protostome phylum within Ecdysozoa
- Currently 247 valid species
- Range in size from 150 µm to 1 mm



Morphology



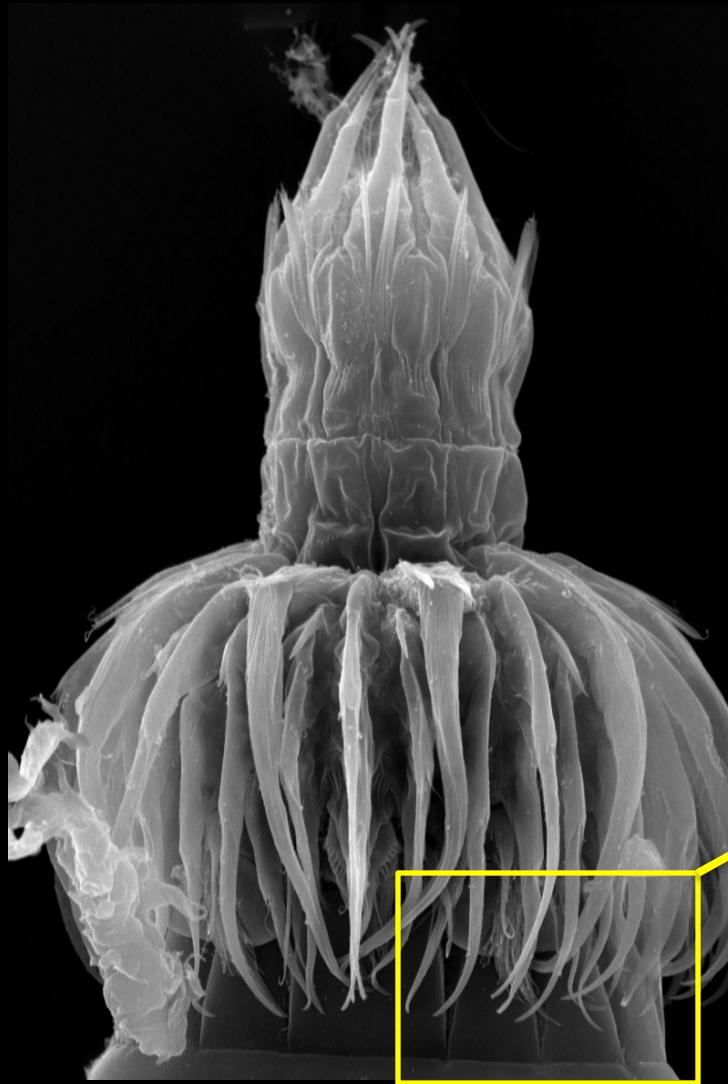
Mouth cone



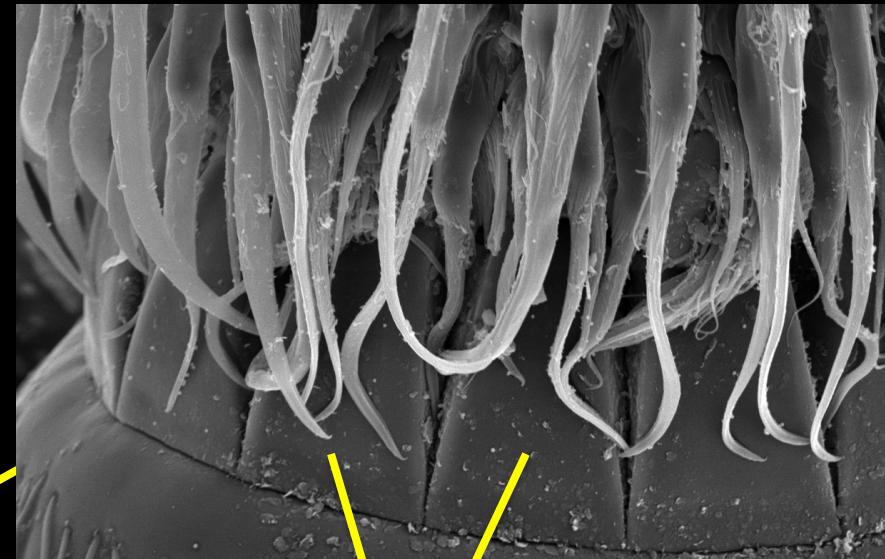
Introvert



Morphology



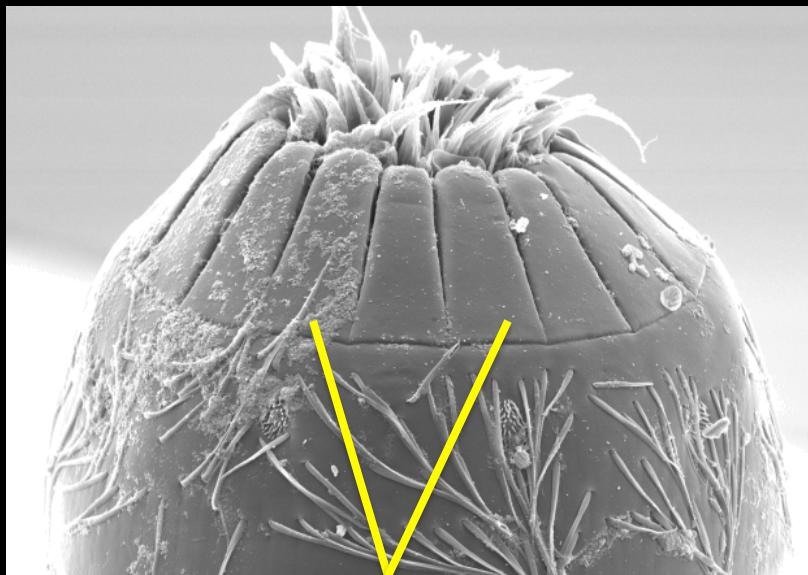
Neck



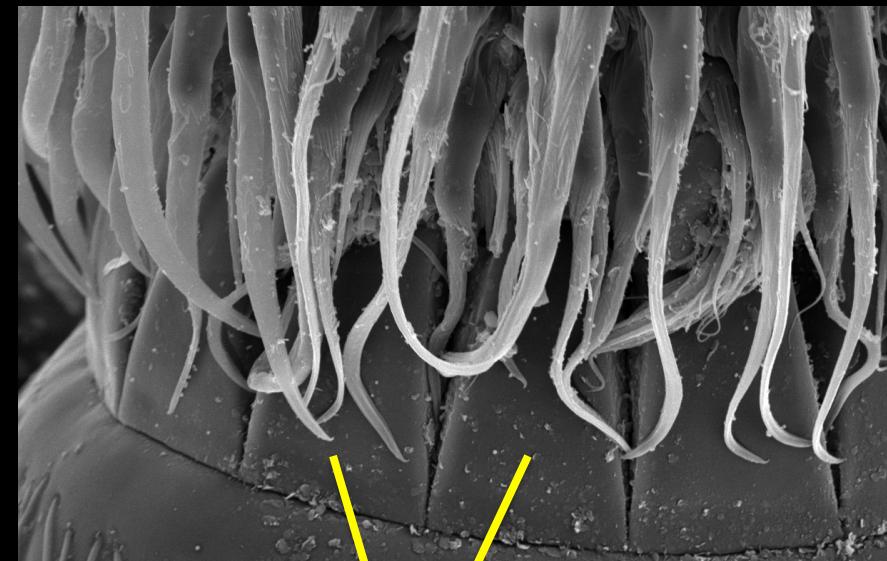
Placids



Morphology



Placids



Placids



Morphology



- Always 11 segments in adults
- Segmentation expressed in:
 - Cuticular rings
 - Musculature
 - Nervous system



Distribution and habitats



- Typical habitats: Mud, sand and fine shell gravel
- Other habitats: Epibiotic, epiphytic, on corals
- Present in oxygenated layers, but may occur in anoxic layers as well. Rysgaard et al. 2000:
 - O₂ concentration in mud reaches 0 µM at 6 mm sediment depth
 - Kinorhynchs are present down to 20 mm, with highest density at 0 – 12 mm
- Distribution: Global for the phylum – local for the species



Sample processing – Bubble and Blot



- Fill $\frac{1}{4}$ bucket with mud



- Add $\frac{1}{2}$ sea water, and mix



- Pour mud/water into another bucket and back again
- Repeat at least 10 times



- Bubbles trap kinorhynchids at the surface
- Wait a few minutes



- Put piece of paper on surface, and drag it off carefully



- Wash paper and collect into a $65 \mu\text{m}$ net
- Repeat blotting and washing until no bubbles are left
- Repeat everything once more



Meiofauna Marina, Vol. 16, pp. 21-73, 26 figs., March 2008
© 2008 by Verlag Dr. Friedrich Pfeil, München, Germany – ISSN 1611-7557

Kinorhynch systematics and biology – an introduction to the study of kinorhynchs, inclusive identification keys to the genera

Martin V. Sørensen* and Fernando Pardos**

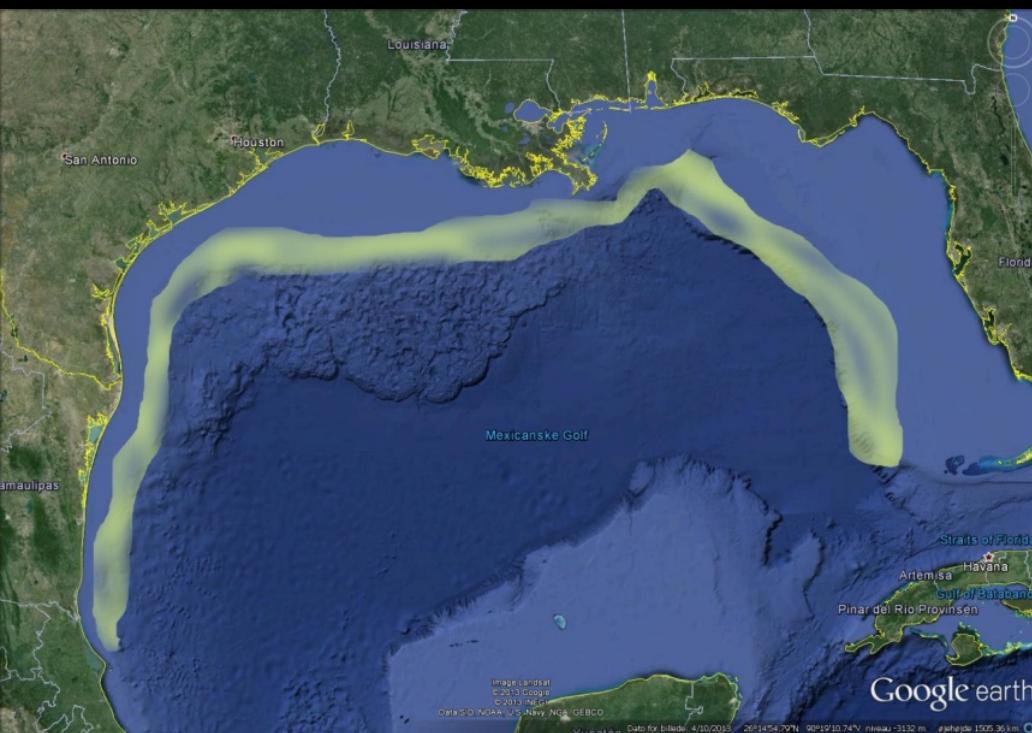
Abstract

Kinorhyncha is a phylum of microscopical, marine, benthic animals that are found throughout the world. Currently the group comprises 164 species, distributed on 18 genera, but the presence of numerous yet undescribed species implies that a great part of the kinorhynch biodiversity still needs to be uncovered. Our knowledge about their global distribution is still rather patchy, which may seem paradoxical considering the fact that kinorhynchs probably occur in most habitats. One explanation may be the special requirements to sample processing and the fact that only relatively few researchers consider themselves confident with kinorhynch systematics. As a result of the latter, general meiofaunal surveys often report kinorhynch findings as “Kinorhyncha sp.” only. The aim of the present contribution is to enable researchers to identify kinorhynchs at the generic level.



Analysis of the continental shelf meiofauna in the Northern Gulf of Mexico: Effects of the Deepwater Horizon oil spill investigated during a long term community study (2007-present)

A research project under: GoMRI – The Gulf of Mexico Research Initiative



- Meiofauna diversity and distribution – in particular copepods and nematodes
- Special emphasis on kinorhynch taxonomy and faunistics
- Kinorhynch distribution in correlation with sediment composition and chemistry



GoMRI project

Samples pr. year

- 2007-09: 99 stations – 34 with kinorhynchs
- 2010: 31 stations – 10 with kinorhynchs
- 2011: 37 stations – 13 with kinorhynchs
- 2012: 36 stations – 24 with kinorhynchs
- 2013: 24 stations – 24 with kinorhynchs
- 2014: 16 stations – 16 with kinorhynchs
- 2015: still sorting
- Totals: 243 stations sampled in total
 - +121 stations with kinorhynchs
 - +1.000 specimens of kinorhynchs
 - ca. 25 different species



Shippek grab



Multicorer



GoMRI project



E. charlotteae Sørensen et al. 2015

E. skipperae Sørensen & Landers 2014

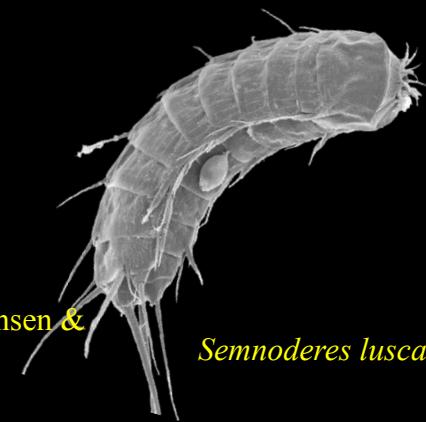
E. augustae Sørensen & Landers 2014

E. joyceae Landers & Sørensen 2015

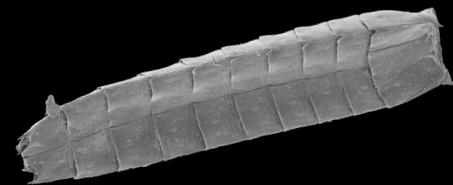
E. romanoi
Landers & Sørensen 2015



Sphenoderes aspidochelone Sørensen &
Landers 2017



Semnoderes lusca sp nov – in prep



Paracentrophyes sanchezae Sørensen &
Landers 2017



GoMRI project

Echinoderes joyceae

Echinoderes n sp 2

Echinoderes n sp 3

Echinoderes sylviae - submitted

Echinoderes skipperae

Echinoderes romanoi

Echinoderes n sp 7

Echinoderes n sp 8

Echinoderes augustae

Echinoderes n sp 10

Echinoderes n sp 11

Echinoderes n sp 12

Echinoderes n sp 13

Echinoderes charlottae

E. bookhouti Higgins 1964

E. spinifurca Sørensen et al. 2005

Antygomonas gwenae

Antygomonas n sp 1

Centroderes readae Neuhaus et al. 2014

Centroderes drakei Neuhaus et al. 2014

Condyloides n sp 1

Semnoderes lusca

Sphenoderes aspidochelone

Paracentrophyes sanchezae

Pycnophyes n sp 1

Pycnophyes n sp 2

Pycnophyes n sp 3

Fujuriphyes viserioni - submitted

Leiocanthus langi

Cristaphyes n sp 1

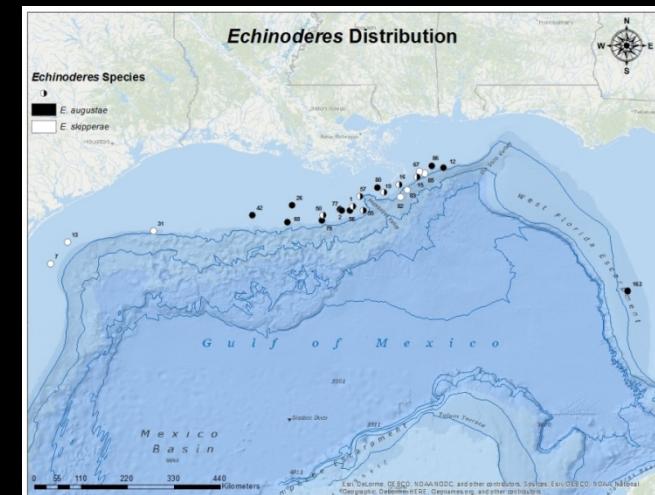
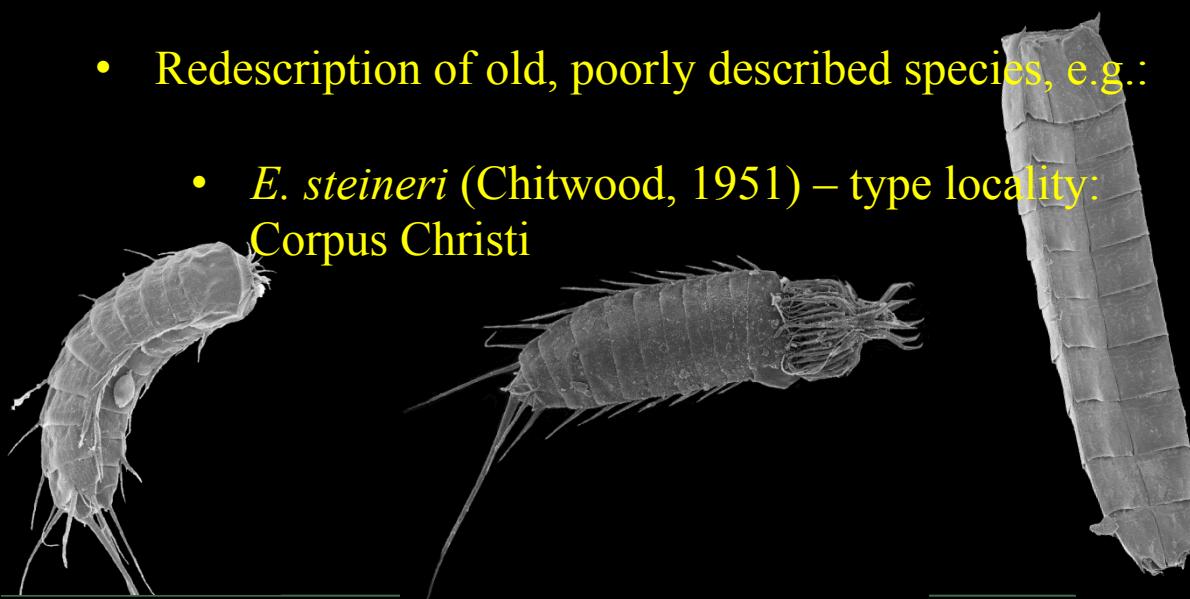
Cristaphyes n sp 2

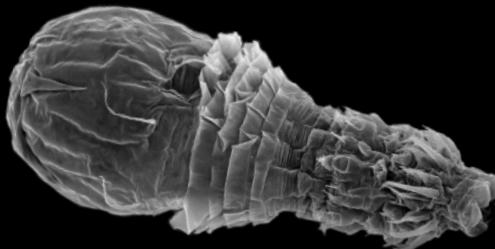


What's next?

Gulf of Mexico kinorhynch taxonomy and ecology:

- About 3-4 additional new species to describe
 - What determines the kinorhynch distribution patterns?
 - 40 quantitative stations from 2013/14 with +1.000 kinorhynch specimens identified: Landers et al. 2017
 - Quantitative stations from 2015: manuscript in prep.
 - Redescription of old, poorly described species, e.g.:
 - *E. steineri* (Chitwood, 1951) – type locality: Corpus Christi





Thanks to:

The Organizers

Kelley Thomas
Paul Montagna
Michael Reuscher
Holly Bik
Francesca Leasi
Krystalynne Morris
And many more.....

