

# The taxonomy and biogeography of macrofaunal annelids, with focus on the abyssal benthic Pacific fauna relevant to the CCFZ

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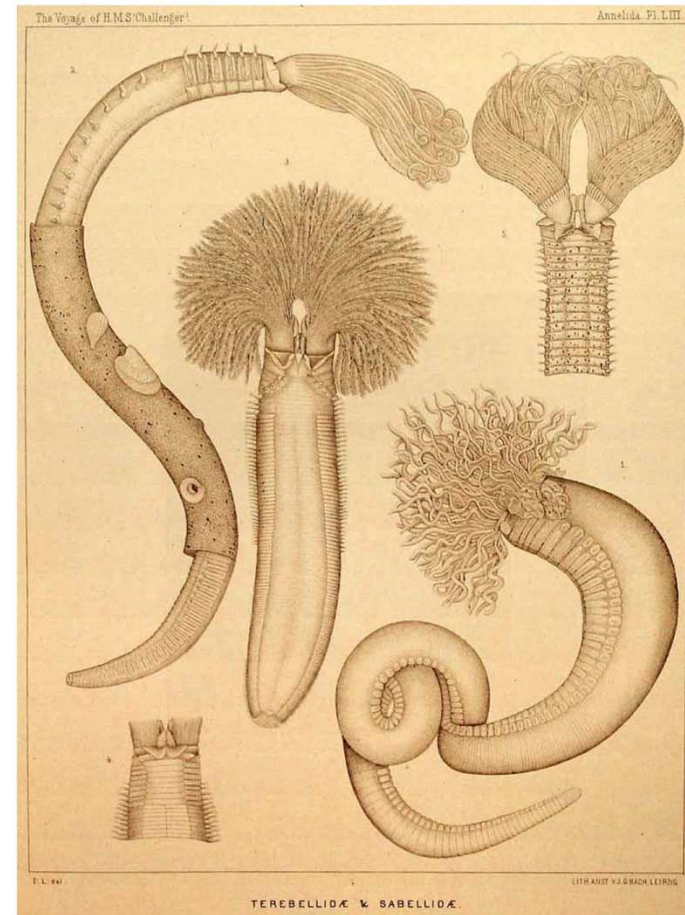
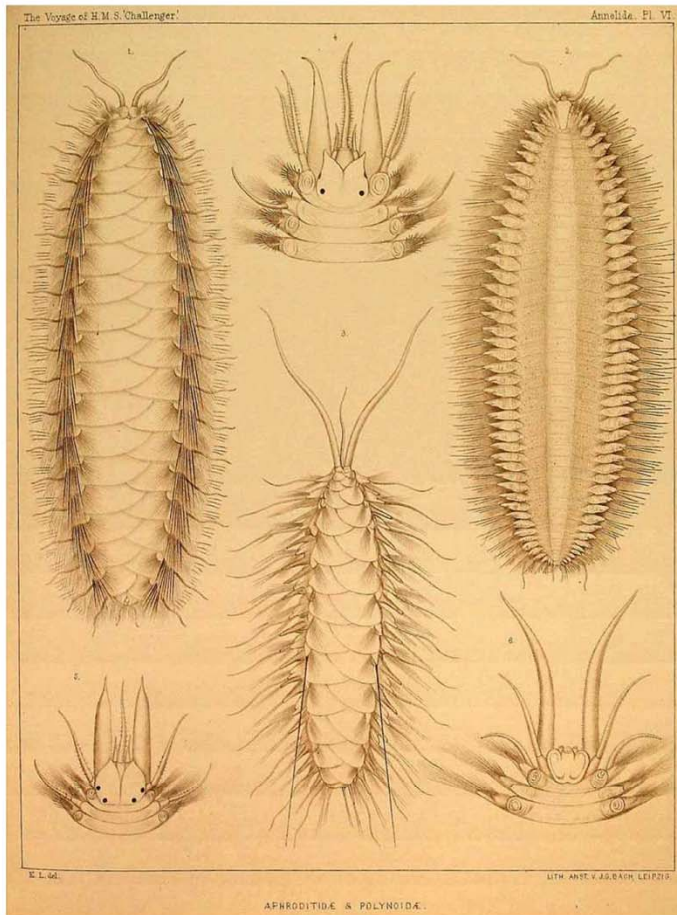
# Polychaeta

- Somewhere between 12-17,000 described species
- In molecular phylogenies – including also Sipuncula and Echiura
- Not many reports of described polychaete species from CCZ, despite the group being one of the most abundant in all marine samples

# Early explorations

- Mainly using trawls and thus getting mostly large animals or animals in long tubes
- Dominant polychaete families:
  - Terebellidae
  - Ampharetidae
  - Polynoidae
  - Aphroditidae

# Dominant large-bodied annelids



McIntosh 1885, from the Challenger Expedition

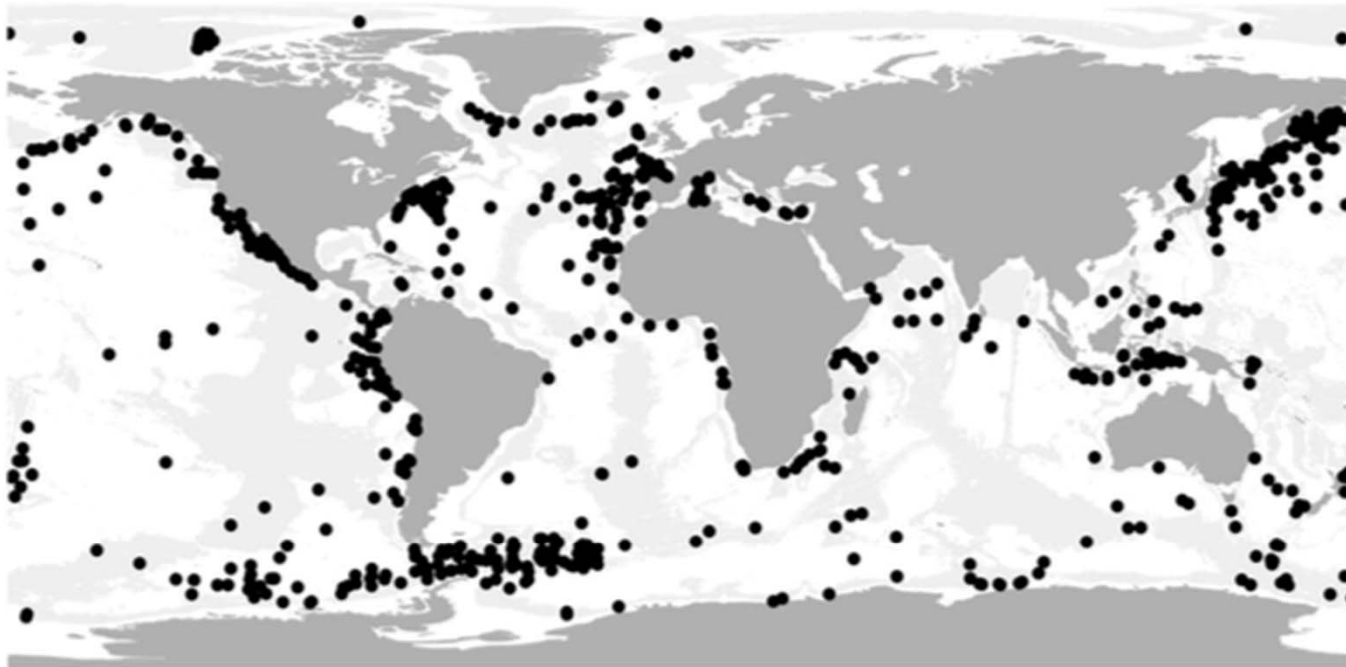
# Recent explorations

- Using boxcorers, megacorers and EpiBenthic Sleds
- Careful sieving on a 250-300 um sieve
- Among the dominant polychaete families:
  - Spionidae
  - Paraonidae
  - Syllidae
  - Acrocirridae
  - Sabellidae

# Deep-sea polychaetes

G.L.J. Paterson et al. / *Deep-Sea Research II* 56 (2009) 1739–1746

1741



**Fig. 1.** Geographical coverage of polychaete records from  $\geq 2000$  m. The map indicates that most records come from the continental margins, with densest coverage in the N Atlantic margins and western seaboard of North America. However, it is the large voids in the Pacific, South Atlantic and Indian Oceans which stand out, highlighting a lack of exploration of the ocean floor furthest from land. The continuing challenges of working in the middle of these vast tracts of the ocean mean that our understanding of the patterns of distribution of deep-sea benthos remains limited. The lightly shaded grey area is the region between 2000 and 4000 m where most of the records were sampled.

Paterson et al. 2009

# Polychaete records

From the EqPac and HOT sites, a total of 177 polychaete species were recorded from 2.94 m<sup>2</sup> of seabed; from the DOMES A, ECHO 1 and PRA sites in the CCFZ region, the total was 183 species from 21 m<sup>2</sup> of seabed (Table 1). 70% of identifiable specimens could be assigned to known genera, but only about 5 to 10% could be identified as a previously named species; thus, the vast bulk (>90%) of the collected polychaete species are undescribed taxonomically (i.e. they are new to science).

Glover et al. 2002

# Fauchald 1972

- "Benthic Polychaetous Annelids from Deep Water Off Western Mexico and Adjacent Areas in the Eastern Pacific Ocean"
- Describes 76 new species
- Lists in total 227 polychaete species from 43 families

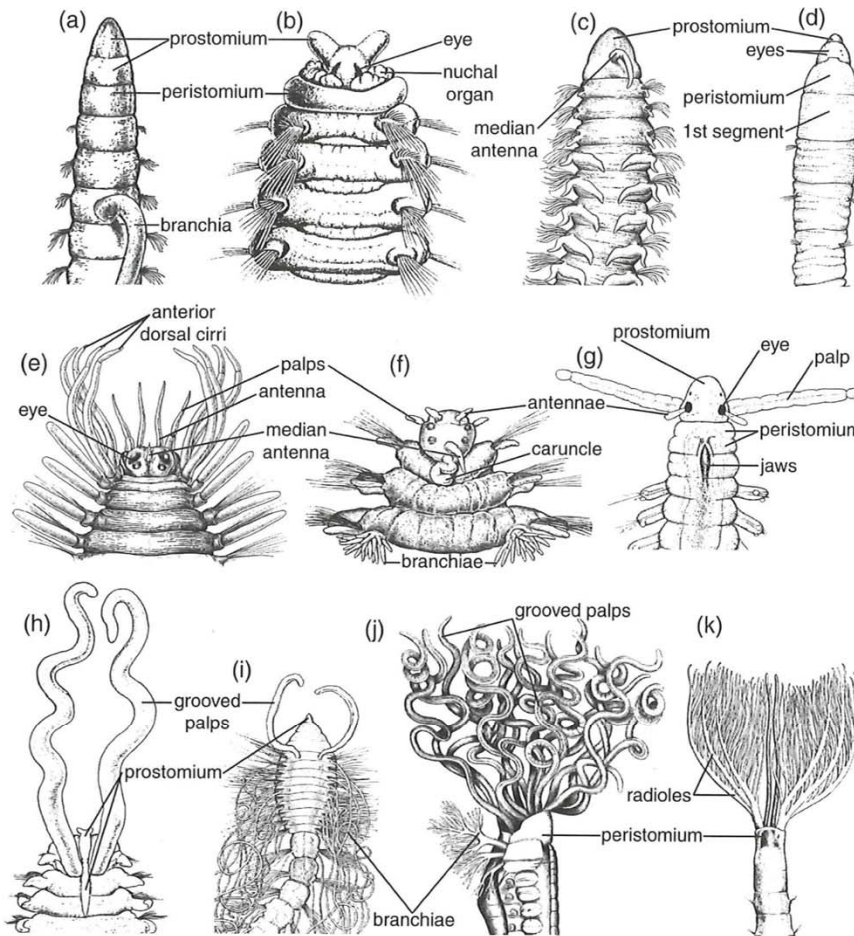


# Annelid diversity



Photos H. Wiklund

# Morphological characters

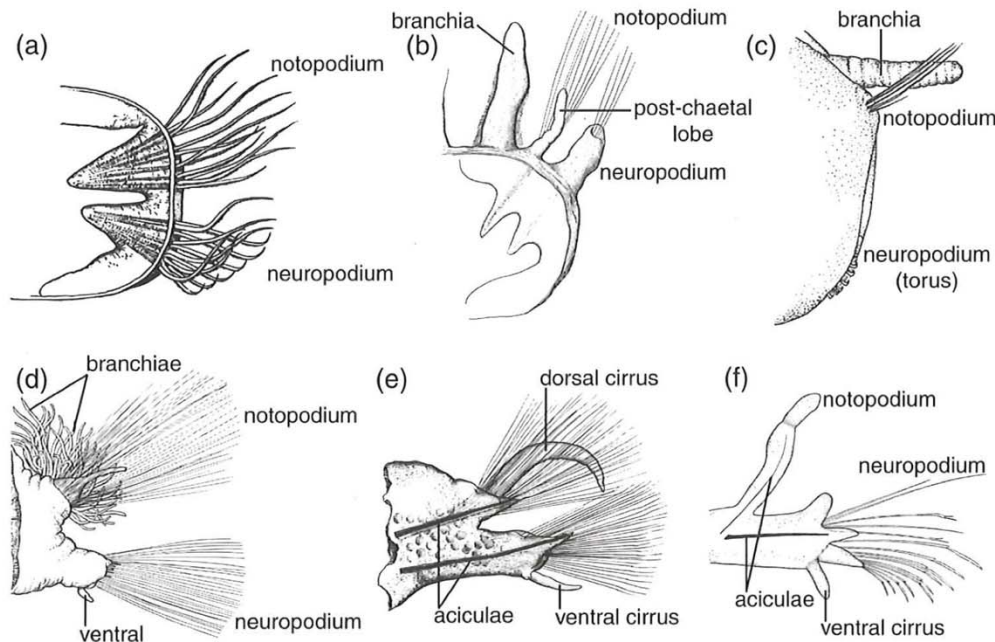


## Anterior appendages

- antennae
- palps
- tentacle crowns

From Rouse and Pleijel 2001, Polychaetes

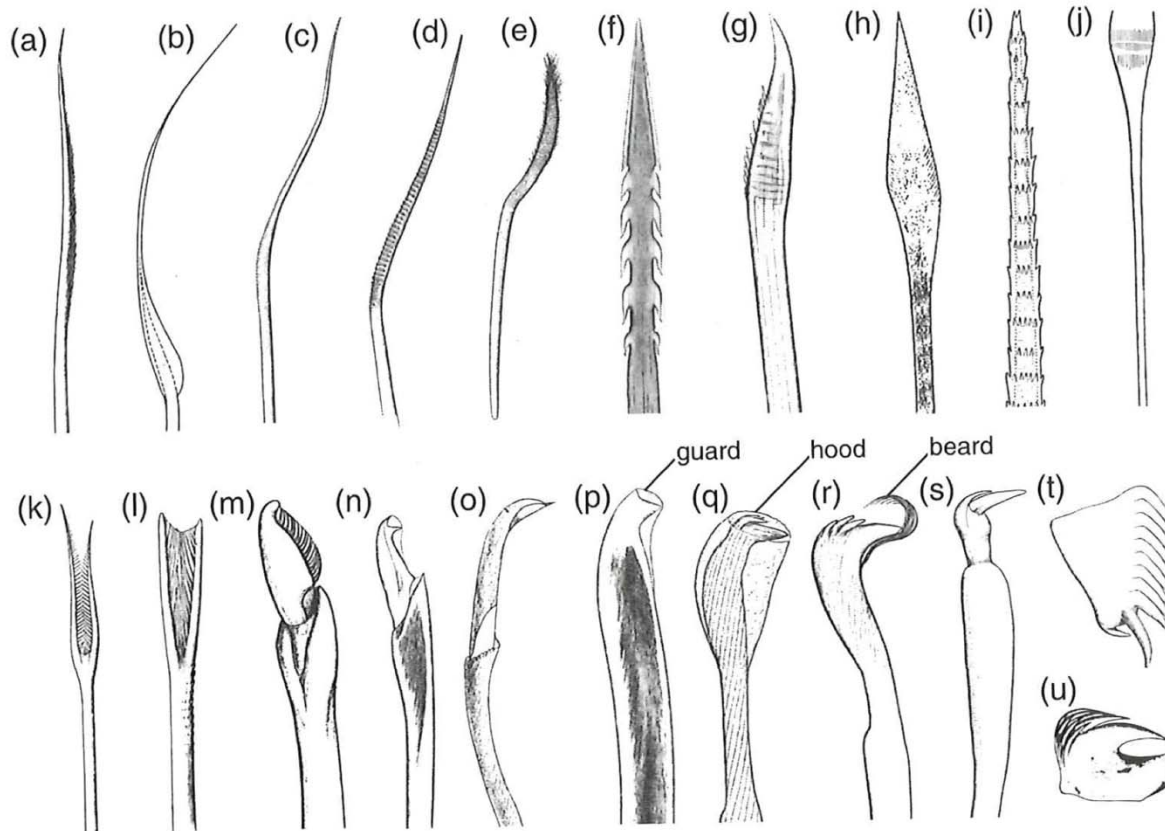
# Morphological characters



Parapodia  
 - uniramous  
 or biramous  
 - cirri  
 - lobes  
 - chaetae

From Rouse and Pleijel 2001, Polychaetes

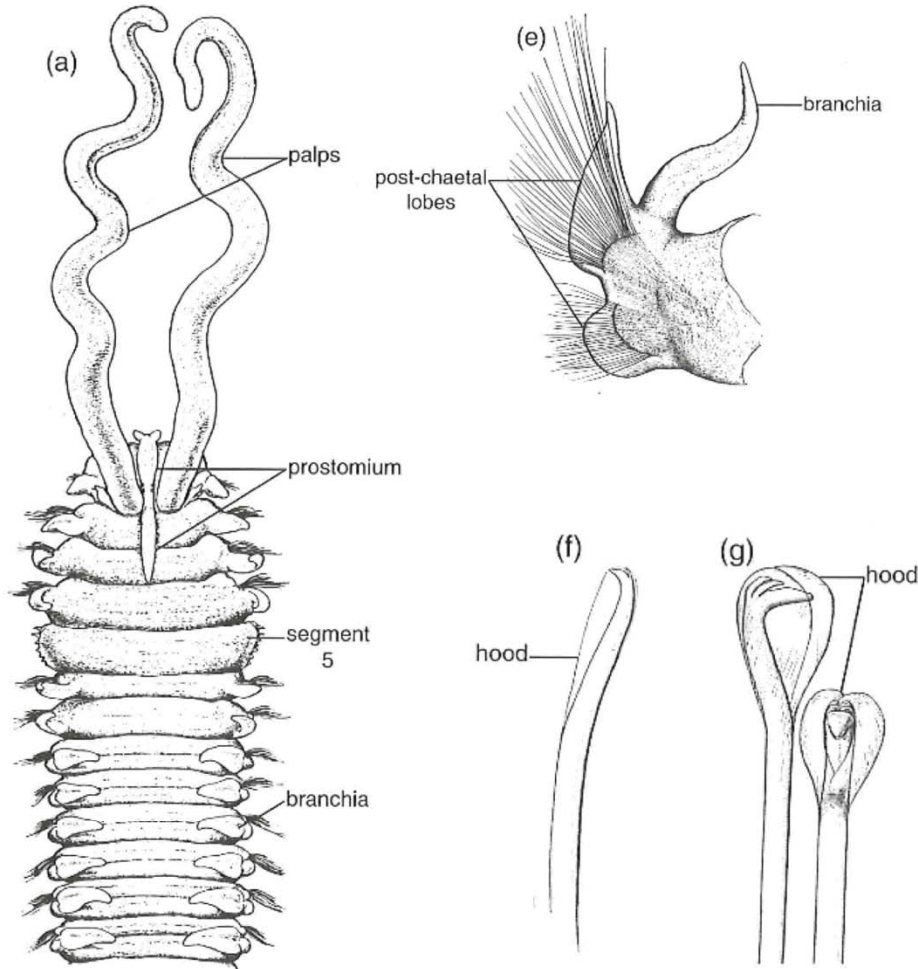
# Morphological characters



- Chaetae
- simple or compound
  - long or short blades
  - serrated or smooth
  - hooded
  - bifurcated

From Rouse and Pleijel 2001, Polychaetes

# Spionidae



Form of prostomium

Two long grooved palps (often lost)

Branchiae – how many and where do they start

Transformed segment

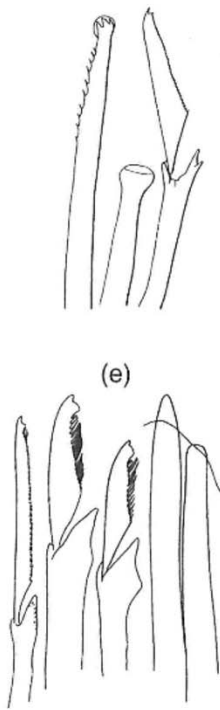
Parapodial lobes

Chaetae

# Syllidae



Photo H Wiklund



From Rouse and Pleijel 2001

Palps

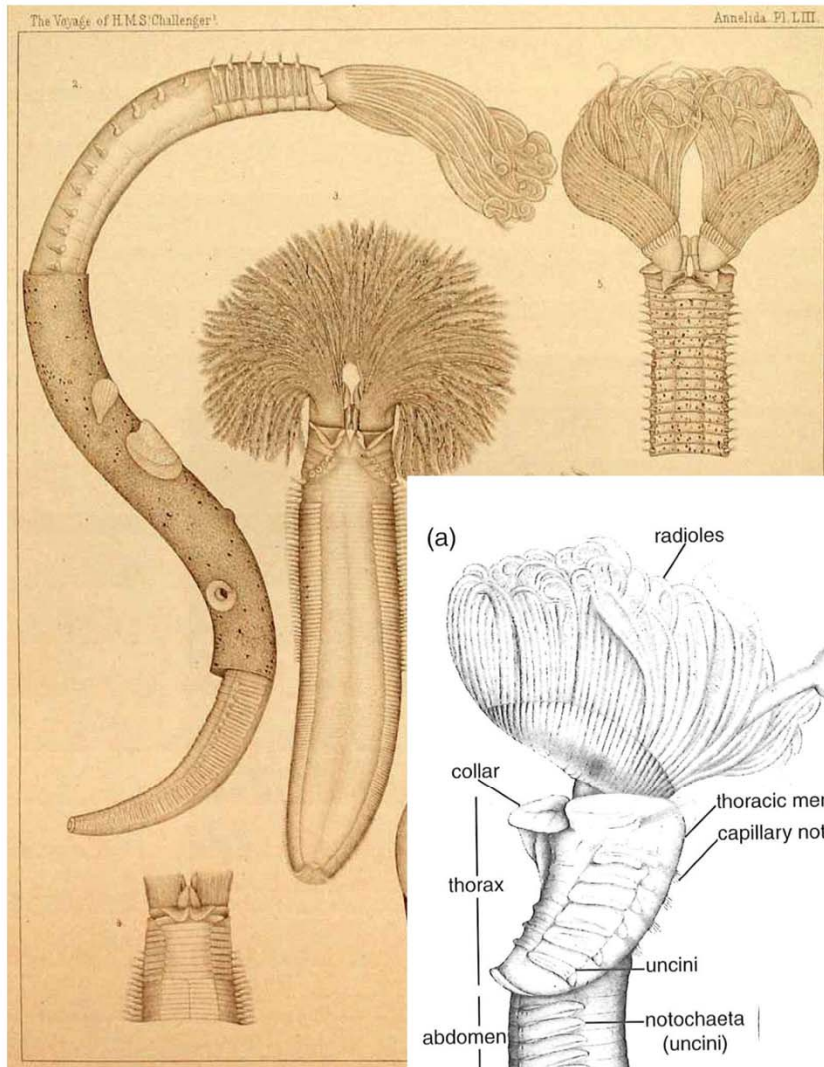
Proventricle

Antennae and cirri

Chaetae

Pharynx characters

# Sabellidae/Serpulidae



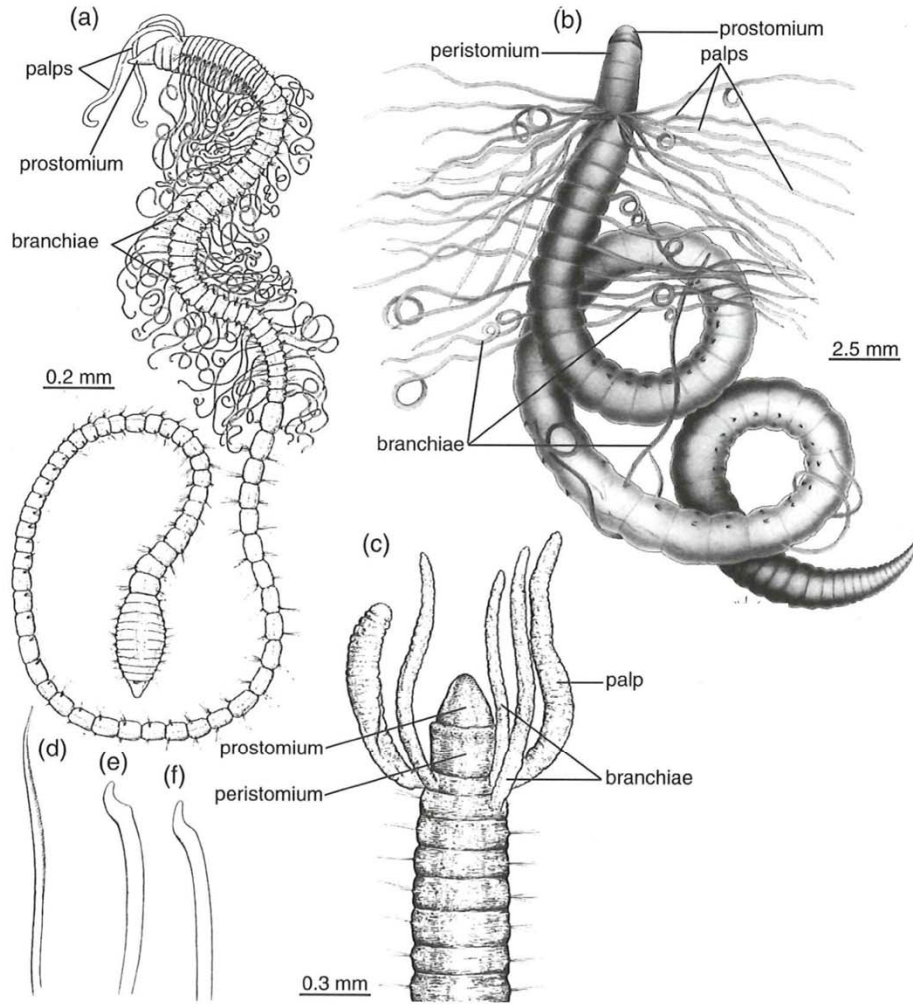
Tentacular crown

Number of thorax and abdominal segments

Serpulids - operculum

McIntosh 1885 and Rouse and Pleijel 2001

# Cirratulidae



Ventral palps

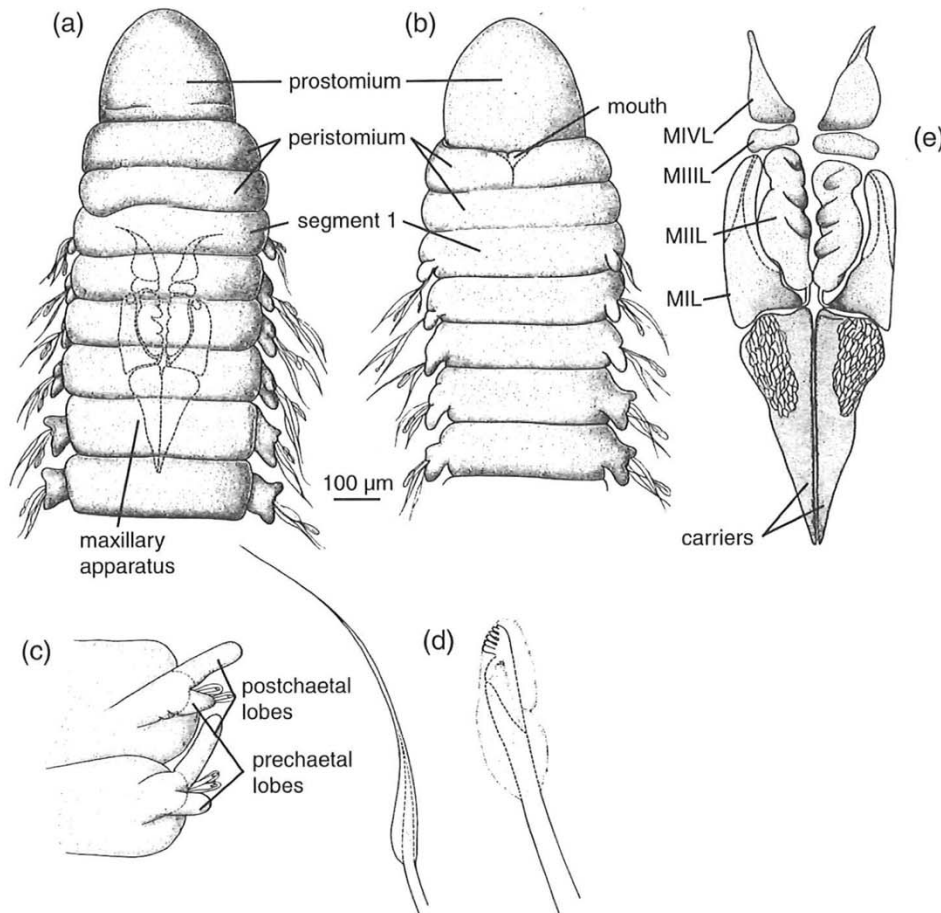
Dorsal branchiae (often lost, look for "scars")

Chaetae

From Rouse and Pleijel 2001, Polychaetes



# Lumbrineridae

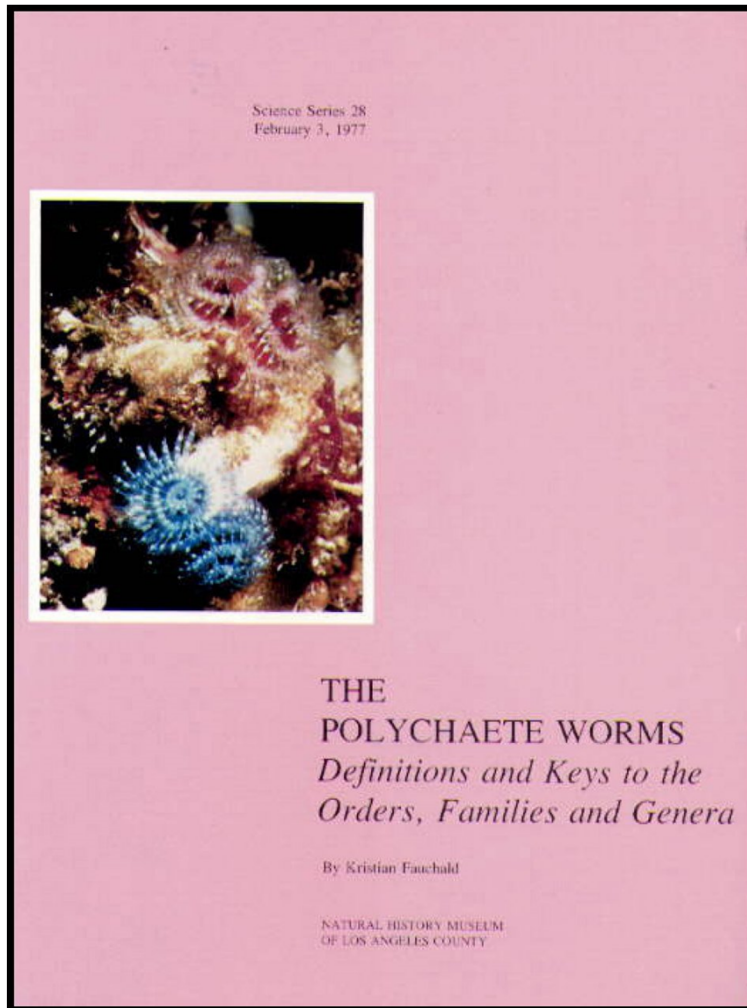


Internal characters – jaws

Parapodial lobes

Chaetae

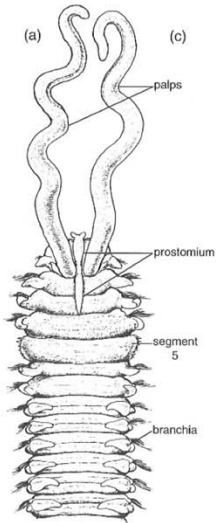
# Identification key



## " The Pink Book", Fauchald 1977

- 27a (26a). Branchiae in a transverse or oblique row or grouped in two groups on either side of the anterior dorsum, usually digitiform and smooth, more rarely bipinnate or lamellate (NOTE: Branchiae are often lost, but scars remain); buccal tentacles retractable; uncini with teeth in one or a few rows ..... AMPHARETIDAE (part)
- 27b (26a). Branchiae, if present, on two-three successive segments, stalked or sessile, branched or as numerous filaments, rarely smooth; buccal tentacles non-retractable; uncini with several teeth in one or more transverse rows above the main fang (crested) ..... 28
- 28a (27b). Thoracic uncini long-handled, abdominal ones short-handled ..... TRICHOBRANCHIDAE
- 28b (27b). Both thoracic and abdominal uncini short-handled; sometimes with a posterior prolongation in thoracic uncini ..... TEREBELLIDAE
- 29a (26b). Prostomium with at least one pair of antennae; peristomium usually with paired palps or tentacular cirri ..... 30
- 29b (26b). Prostomium without appendages or with a single antenna; peristomium with paired dorsal palps, maximally two pairs of tentacular cirri or without appendages ..... 58
- 30a (29a). Prostomium continued posteriorly in a caruncle; large notosetae furcate; others smooth or serrated . 31
- 30b (29a). Caruncle absent; furcate notosetae, if present, small, or furcate setae only kind of setae present . 32
- 31a (30a). Notosetae arranged in transverse rows on dorsum; branchiae shorter than setae . EUPHROSINIDAE
- 31b (30a). Notosetae in tufts on the notopodial lobes; branchiae conspicuous branching tufts AMPHINOMIDAE
- 32a (30b). Palps absent ..... 33
- 32b (30b). Palps present, sometimes as ventrolateral pads on the peristomium or fused to the anterior end of the prostomium so that the latter appear cleft, but usually free and digitate ..... 49

# Soft-bodied animals



- Sieve carefully using chilled water
- If possible, live sorting
- Preserve in ethanol for DNA work, for small animals 80% ethanol concentration is enough (if not bulk fixing)

# Summary

- Careful handling of animals
- Taxonomy difficult and time consuming, but necessary to put names on these species
- Molecular data adds to the information

# Resources

- The "Pink Book" can be downloaded from here: [www.vliz.be/imisdocs/publications/123110.pdf](http://www.vliz.be/imisdocs/publications/123110.pdf)
- Taxonomic Atlas: [http://www.data.boem.gov/homepg/data\\_center/other/espis/espismaster.asp?appid=1](http://www.data.boem.gov/homepg/data_center/other/espis/espismaster.asp?appid=1)
- Fauchald 1972 <http://si-pddr.si.edu/dspace/handle/10088/6207>