

**Annex 7/1: Fish Morphology and general characteristics useful for
the identification of deep-sea fishes in the Southeast Asian region**

By Dr. Toshio Kawai

Fish morphology and general characters for identification of deep-sea fishes in the Southeast Asian region

- Methods of measurements and counts
- How to identify deep-sea fishes
- Deep-sea fishes from Southeast Asia

Toshio Kawai (Hokkaido University Museum, Japan)

- Methods of measurements and counts
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-

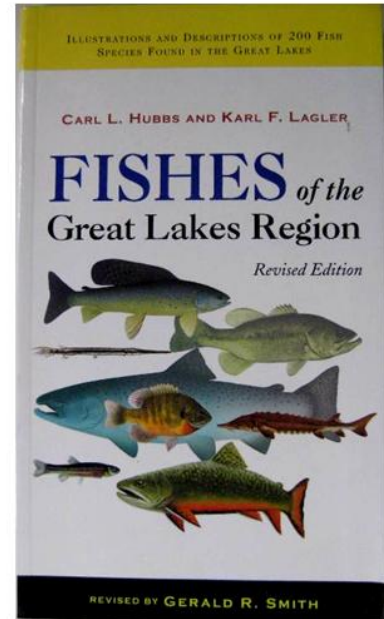
Methods of measurements and counts

Hubbs, C. L. and K. F. Lagler (1947) *Fishes of the Great Lakes region.*

Hubbs, C. L. and K. F. Lagler (1958) *Fishes of the Great Lakes region.*

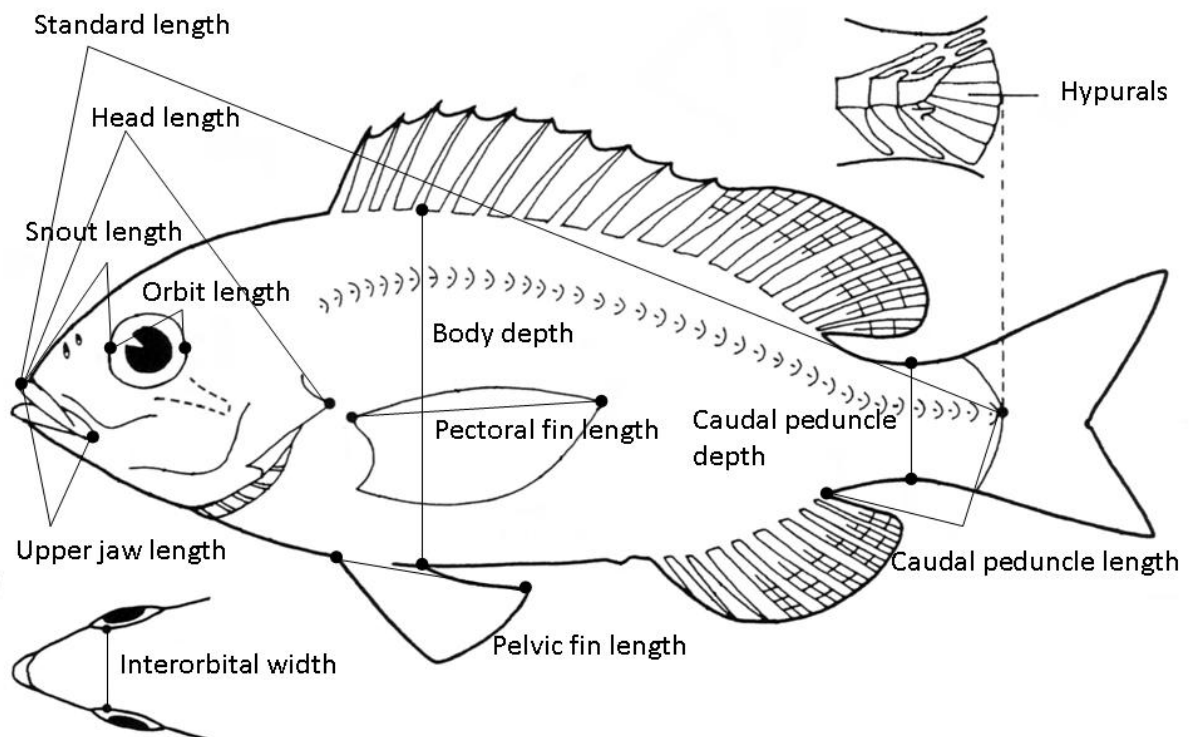
Hubbs, C. L. and K. F. Lagler (1964) *Fishes of the Great Lakes region.*

Hubbs, C. L. and K. F. Lagler (2006) *Fishes of the Great Lakes region. Revised edition.*

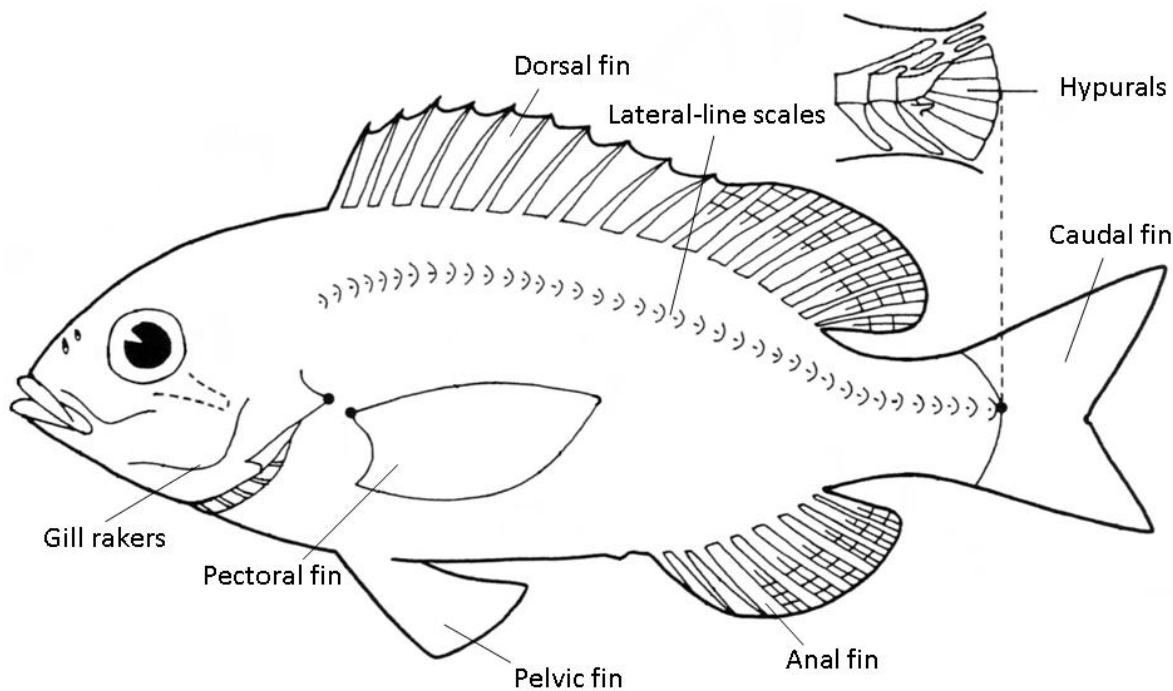


Hubbs and Lagler (2006)

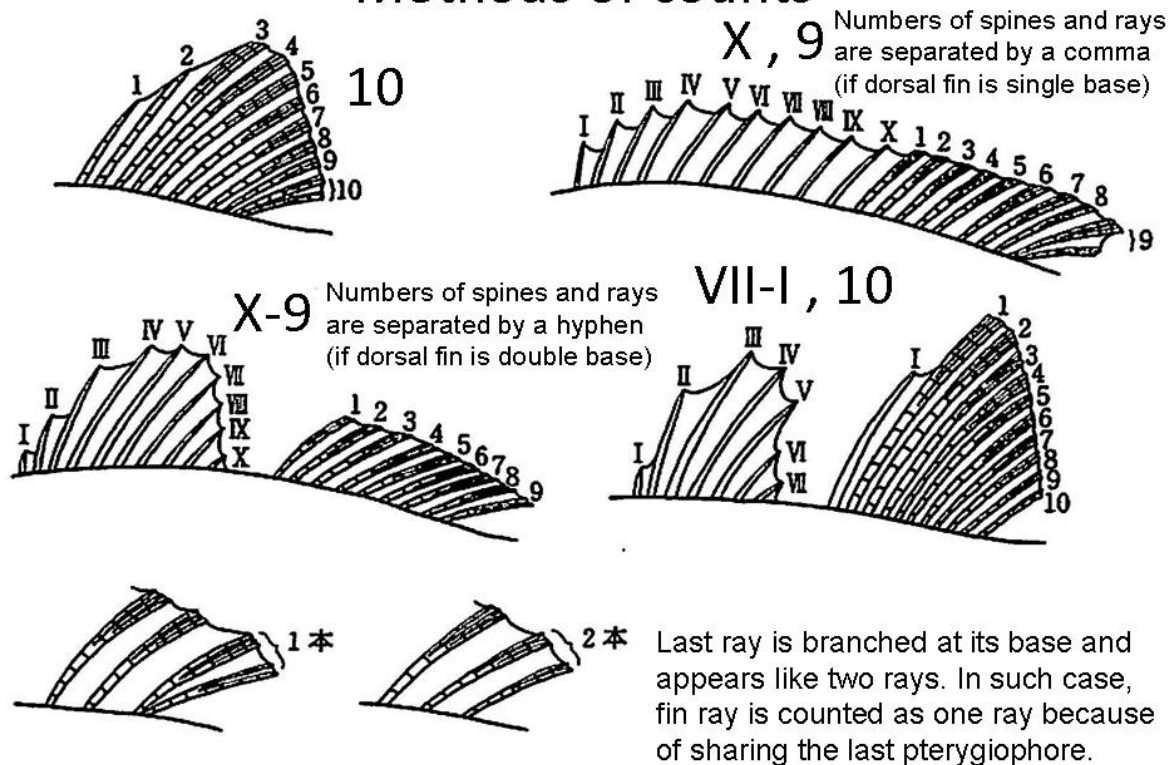
Methods of measurements



Methods of counts

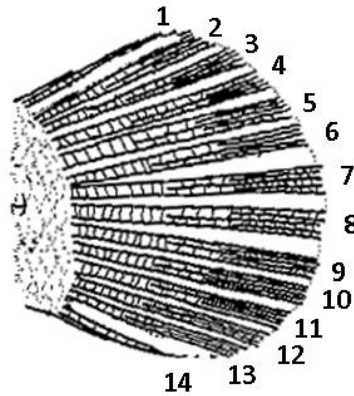


Methods of counts



Spines: Roman numerals Soft rays: Arabic numerals

Principal caudal fin counts

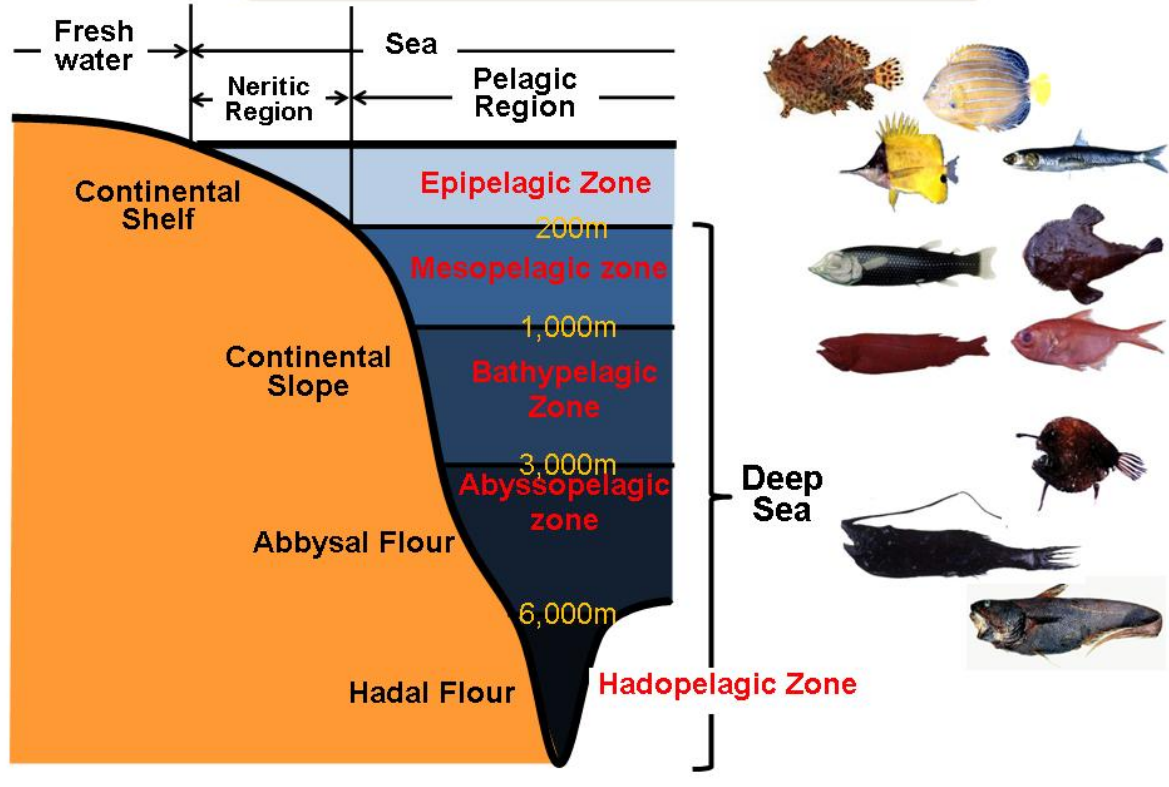


Branched rays + Two unbranched rays

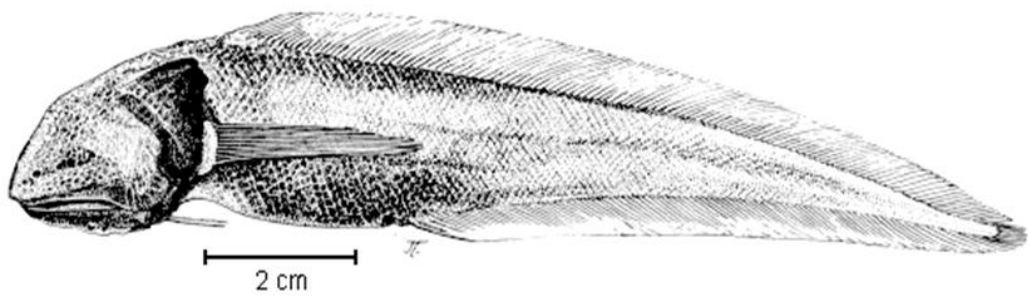
$$12+2=14$$

-
- Methods of measurements and counts
 - How to identify deep-sea fishes
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-

Deep sea and deep-sea fishes



Record of deepest fish



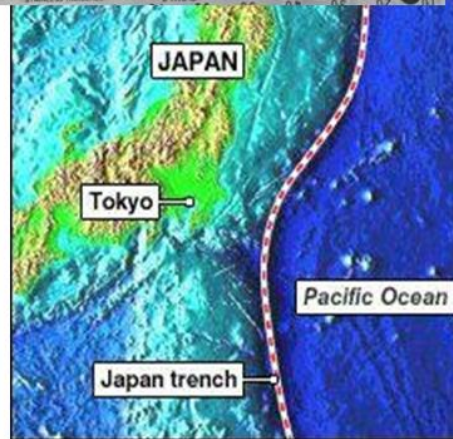
Abyssobrotula galathea (Ophidiidae)

★ 8,370 m depth from the Caribbean Sea, Puerto Rico
Nielsen (1977)

Pseudoliparis amblystomopsis



Japan Trench
7,703 m depth



Video camera

By Takashi P. Satoh (National Museum of Nature and Science, Tokyo) **Put cut fish in the case**

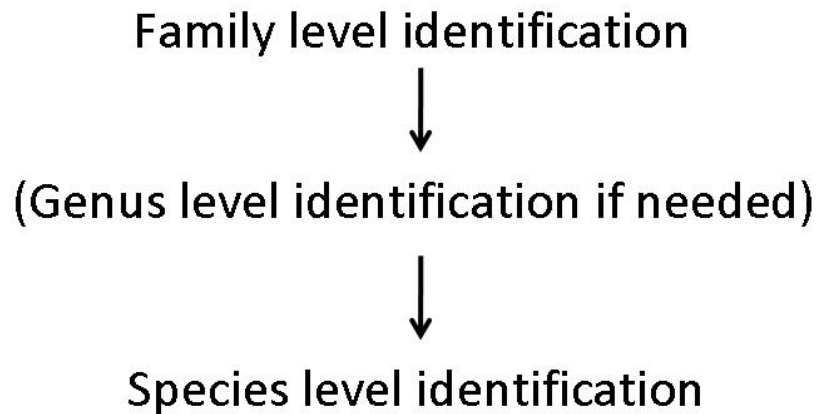


Pseudoliparis amblystomopsis

By Ocean Research Center, University of Tokyo

How to identify deep sea fishes?

Method : Deep Sea Fishes = Shallow Water Fishes



Family level identification

Nakabo (2002) Fishes of Japan with pictorial keys to the species

Most fish families around western North Pacific are included in this book



Not found

Nelson (2006) Fishes of the World. Fourth Edition:
No Identification Key

e.g. Hispidoberycidae



Remember fish faces

Genus level identification (if needed)

Carpenter & Niem (1999) FAO species identification field guide for fishery purposes. The living marine resources of the western central Pacific.

Species level identification

Carpenter & Niem (1999) FAO species identification field guide for fishery purposes. The living marine resources of the western central Pacific.

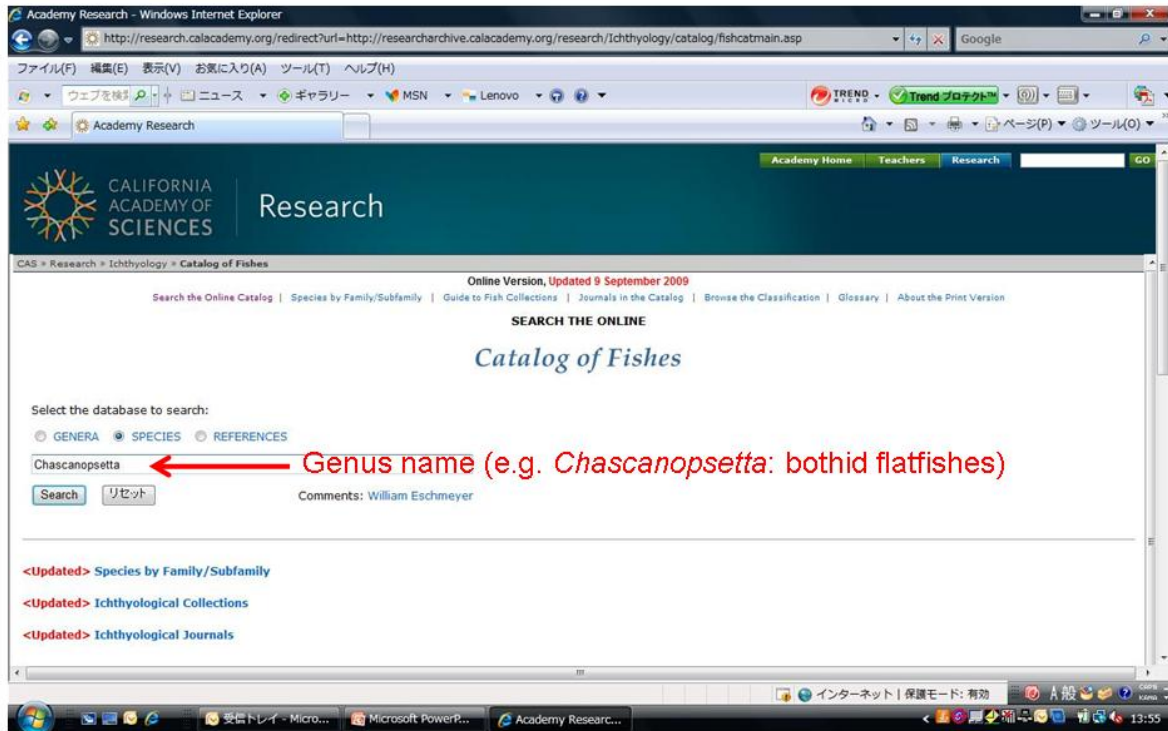
No key ↓

Eschmeyer (on line version) Catalog of Fishes, California Academy of Science

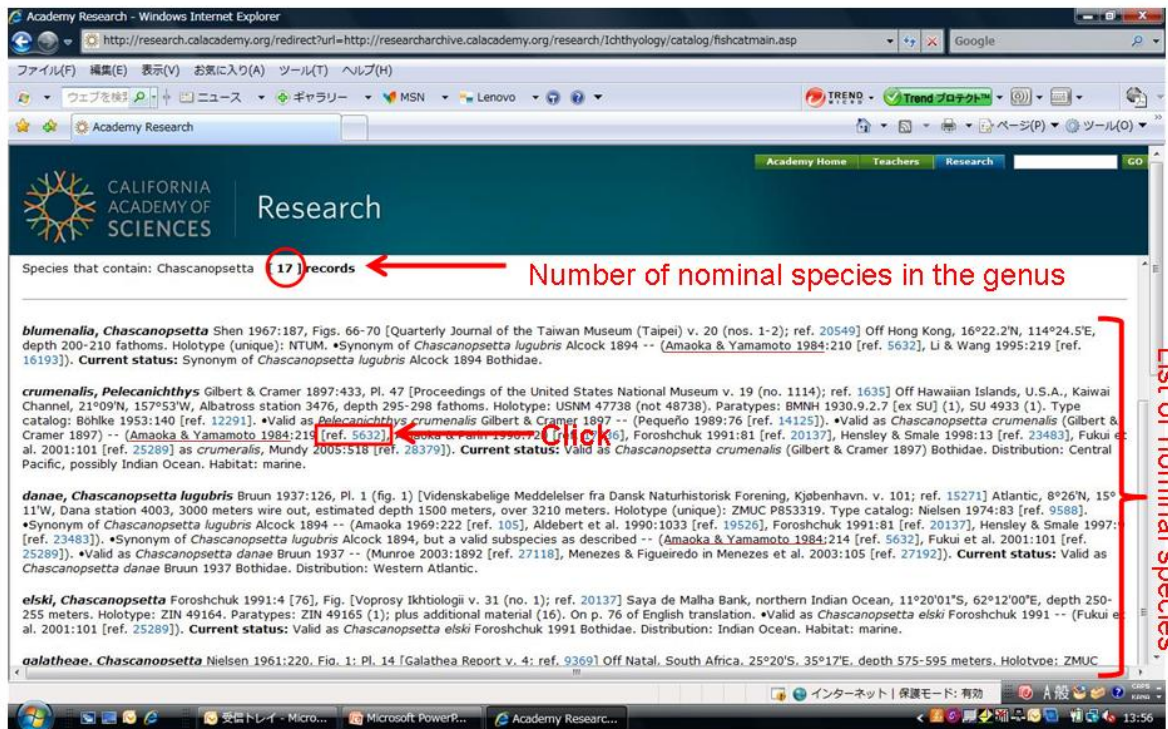


Find manuscripts

Eschmeyer (on line virsion) Catalog of Fishes

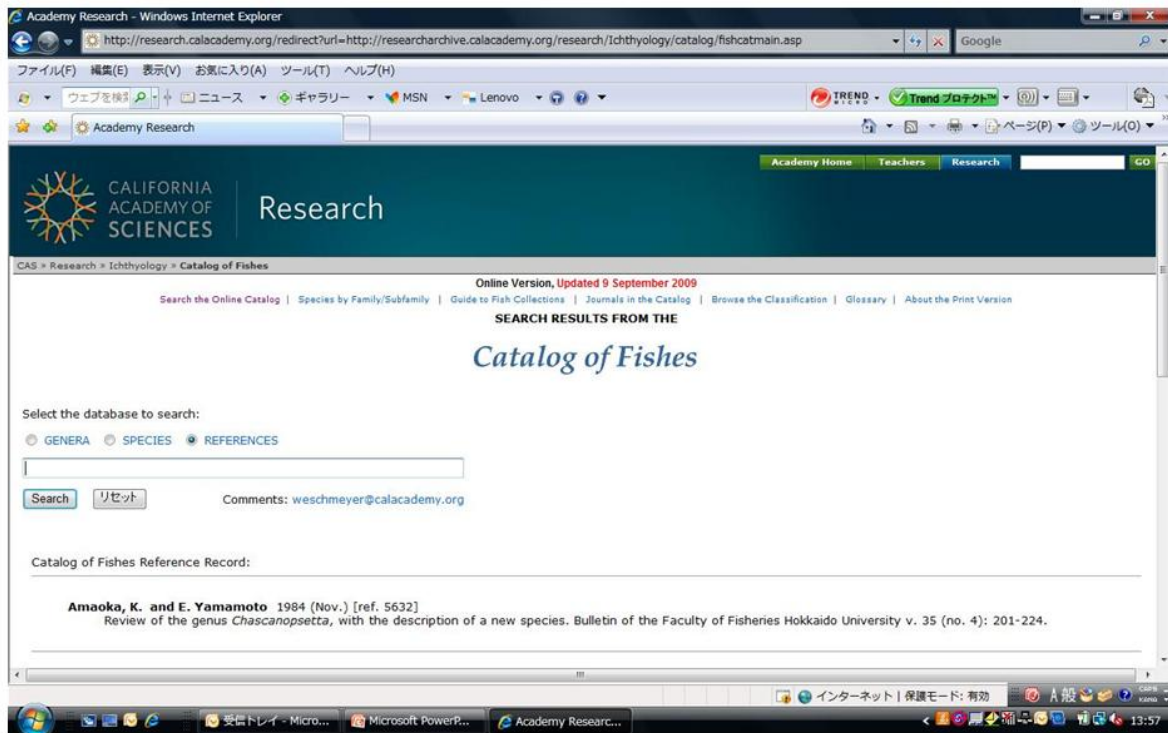


Eschmeyer (online version) Catalog of Fishes



Look for a manuscript which quote many species.

Eschmeyer (on line version) Catalog of Fishes



Genus *Chascanopsetta*

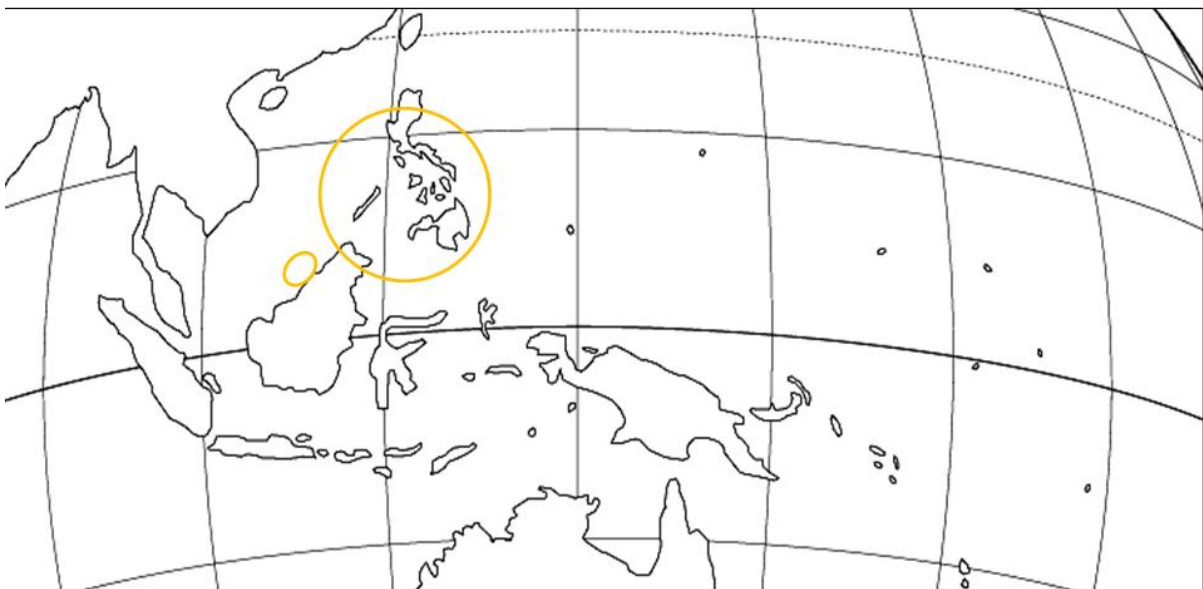
	Nominal species	Valid species
Amaoka & Yamamoto (1984) key to species of the genus	14 species 1 step	5 species 2 subspecies
Foroshchuk (1991) <i>C. elski</i> sp. nov.	15 species 2 step (if not identified by 1 step)	6 species 2 subspecies
Hensley & Smale (1998) <i>C. kenyaensis</i> sp. nov.		
Amaoka & Parin (1990) <i>C. megagnatha</i> sp. nov.		

undescribed species



- Methods of measurements and counts
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Deep-sea fishes from Southeast Asia



Philippines: 400-1,000

Brunei Darussalam: 100-150 (not deepsea)

Other deepsea fishes from Southeast Asia

Myxiniiformes

Myxinidae

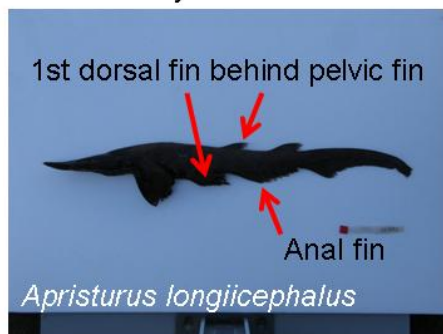


Eptatretus sp.

Mouth without jaws, a simple hole beneath snout
3 pairs of barbels

Elasmobranchii 1

Scyliorhinidae



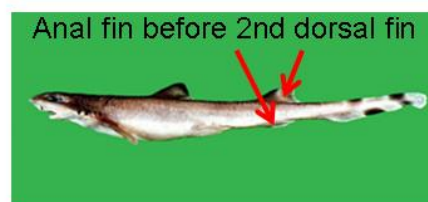
1st dorsal fin behind pelvic fin

Anal fin

Apristurus longiicephalus

Proscylliidae

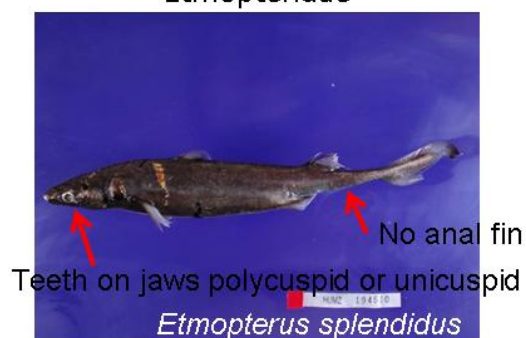
(Not deepsea fishes)



Anal fin before 2nd dorsal fin

Eridacnis radcliffei

Etmopteridae



Teeth on jaws polycuspid or unicuspid
No anal fin

Etmopterus splendidus

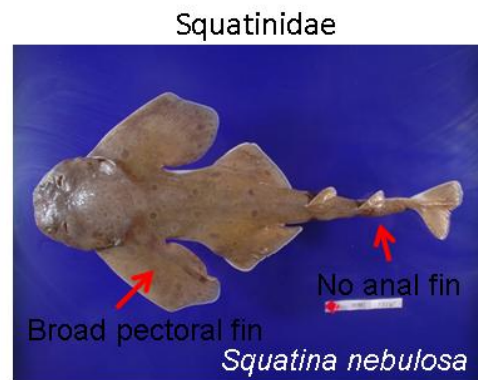
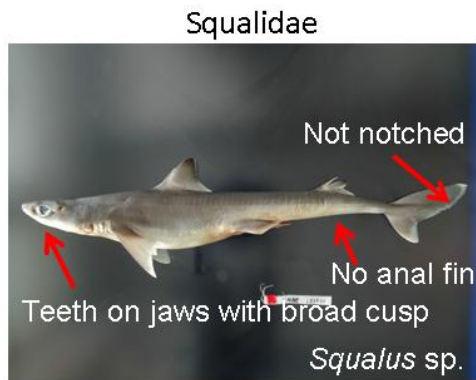
Centrophoridae



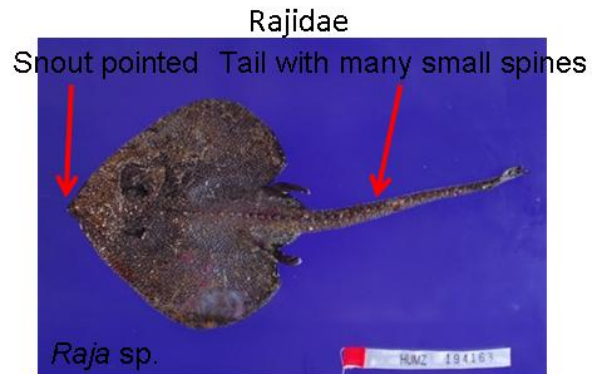
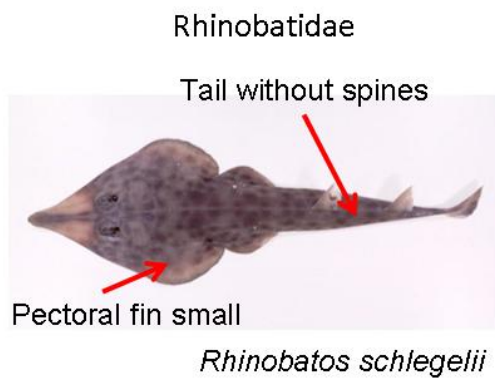
Teeth on jaws with broad cusp
No anal fin Notched

Deania calcea

Elasmobranchii 2

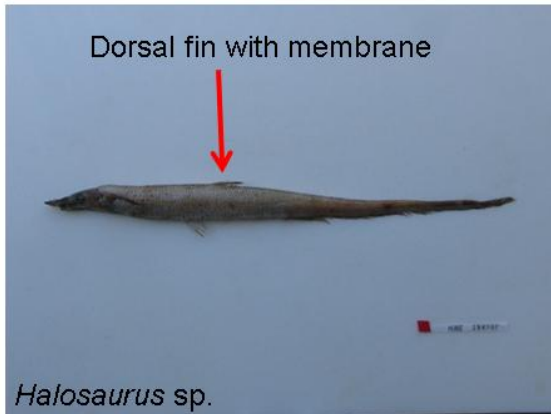


Elasmobranchii 3

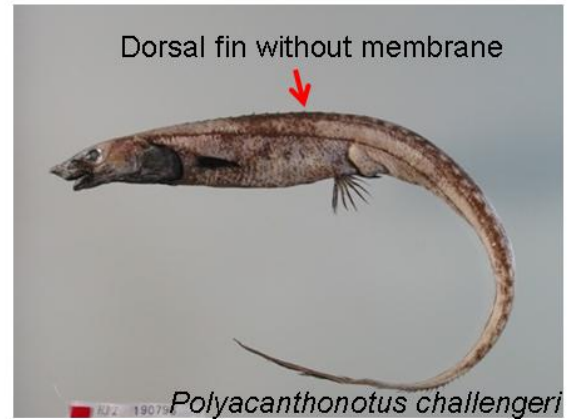


Notacanthiformes

Halosauridae



Notacanthidae



Anguilliformes 1

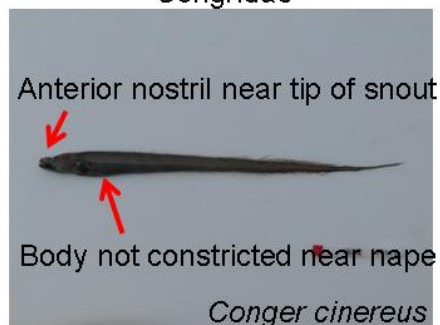
Synphobranchidae



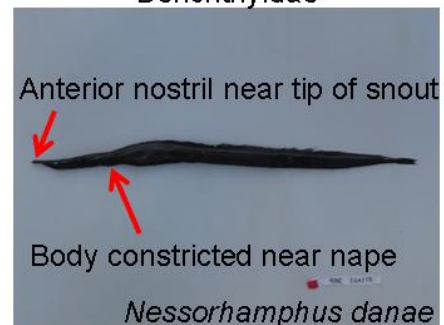
Colocongridae



Congridae



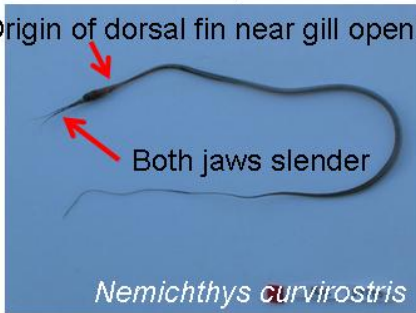
Derichthyidae



Anguilliformes 2

Nemichthyidae

Origin of dorsal fin near gill opening



Serrivomeridae

Origin of dorsal fin far behind gill opening



Nettastomatidae

Anterior nostril near tip of snout



Anguilliformes 3

Moringuinae
(Not deepsea fishes)



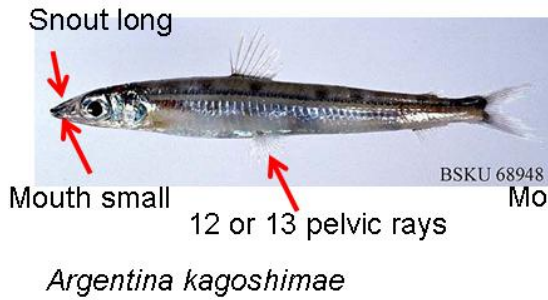
Dorsal and anal fins small

Ophichthidae
(Not deepsea fishes)

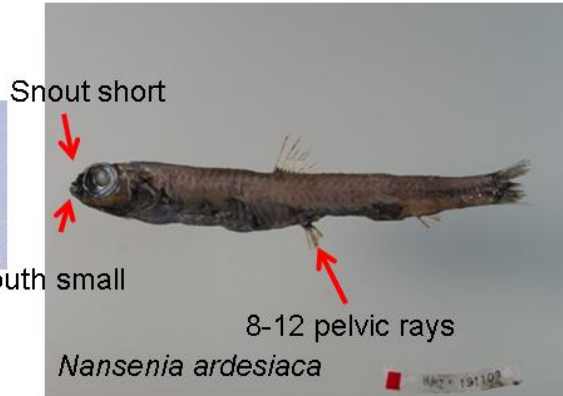


Argentiniformes

Argentinidae

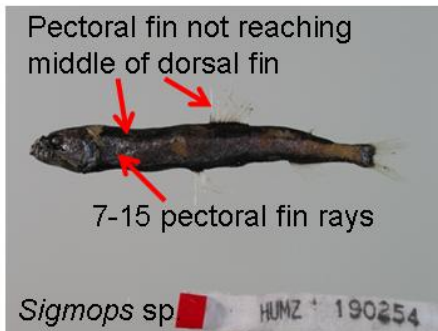


Microstomatidae

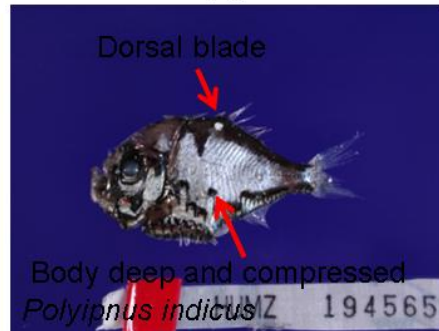


Stomiiformes 1

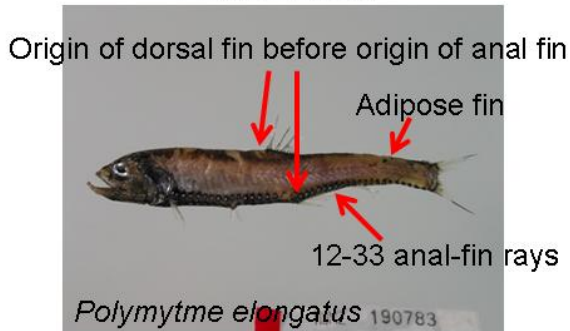
Gonostomatidae



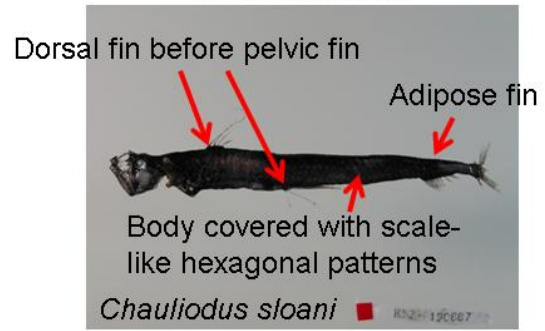
Sternoptychidae



Phosichthyidae



Chauliodontidae



Stomiiformes 2

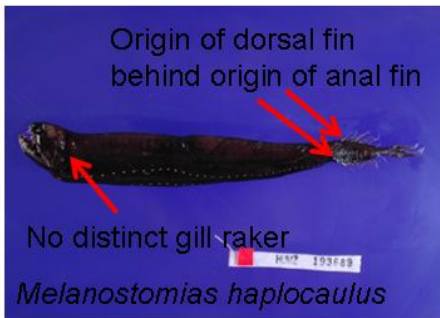
Stomiidae



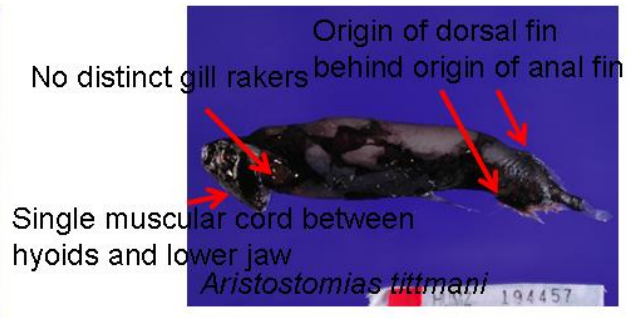
Astronesthidae



Melanostomiidae

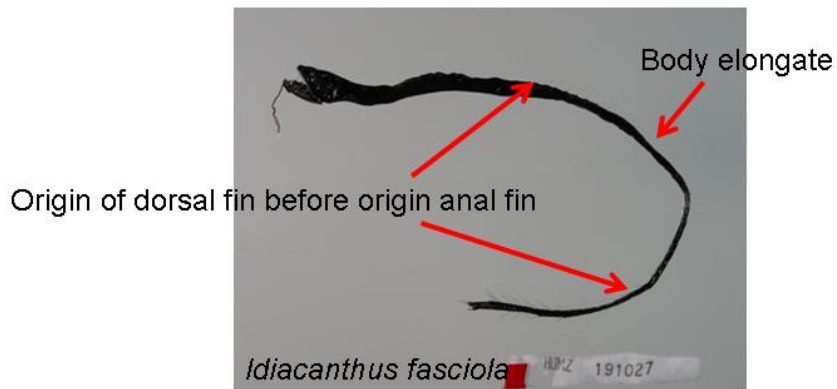


Malacosteidae

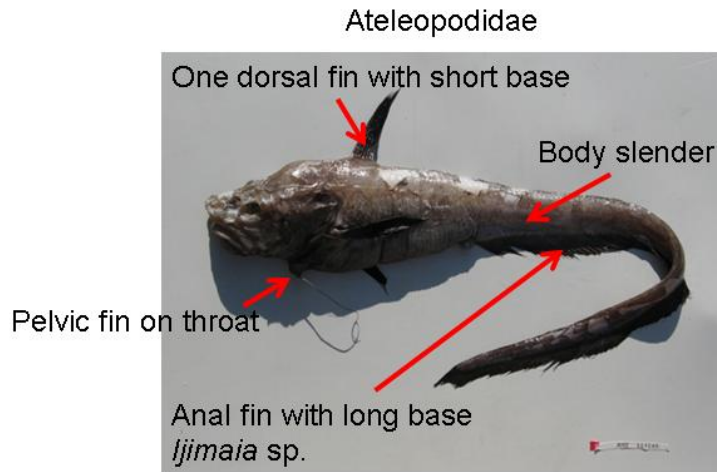


Stomiiformes 3

Idiacanthidae

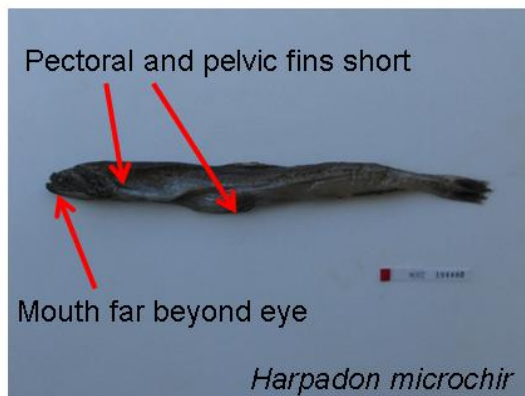


Ateleopodiformes

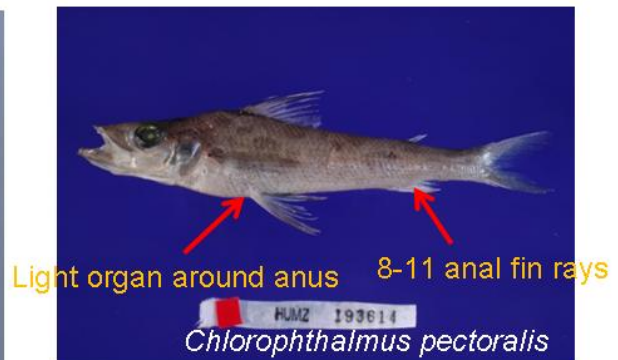


Aulopiformes 1

Synodontidae

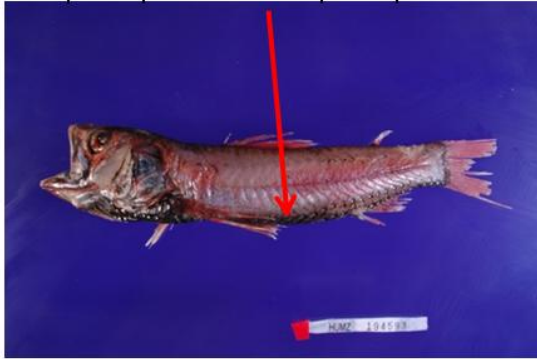


Chlorophthalmidae



Myctophiformes

Neoscopelidae
Body with longitudinal row of photophores or no photophores



Neoscopelus microchir

Myctophidae
Body with not longitudinal row of photophores



Benthosema fibulatum

Neoscopelidae

Neoscopelus microchir

Lateral series of photophores extending beyond origin of anal fin



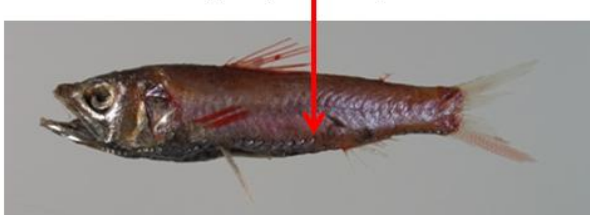
Scopelengys tristis

No photophores



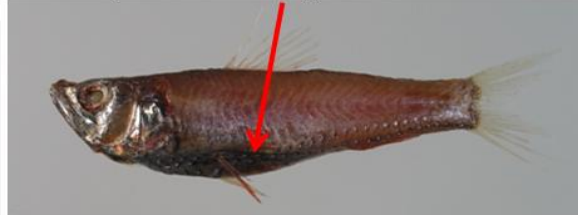
Neoscopelus macrolepidotus

Lateral series of photophores not extending beyond origin of anal fin



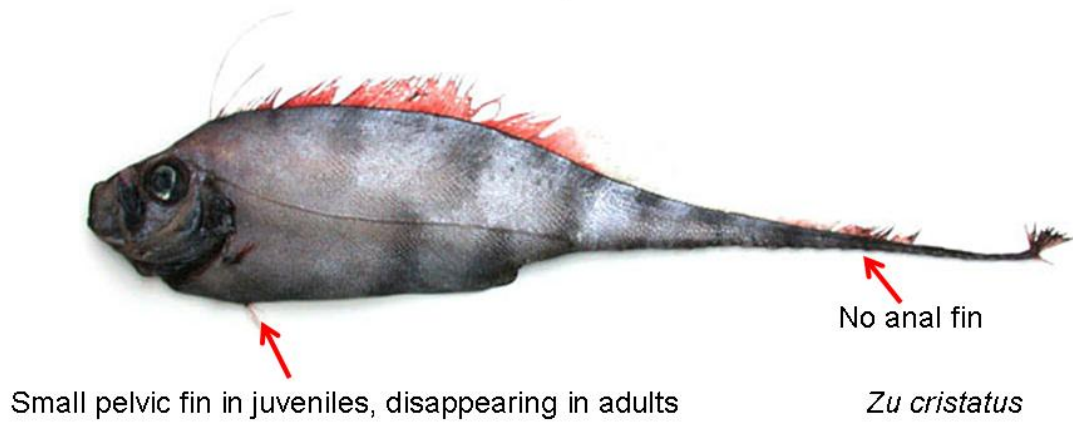
Neoscopelus porosus

3 series of photophores behind pelvic fin to origin of anal fin



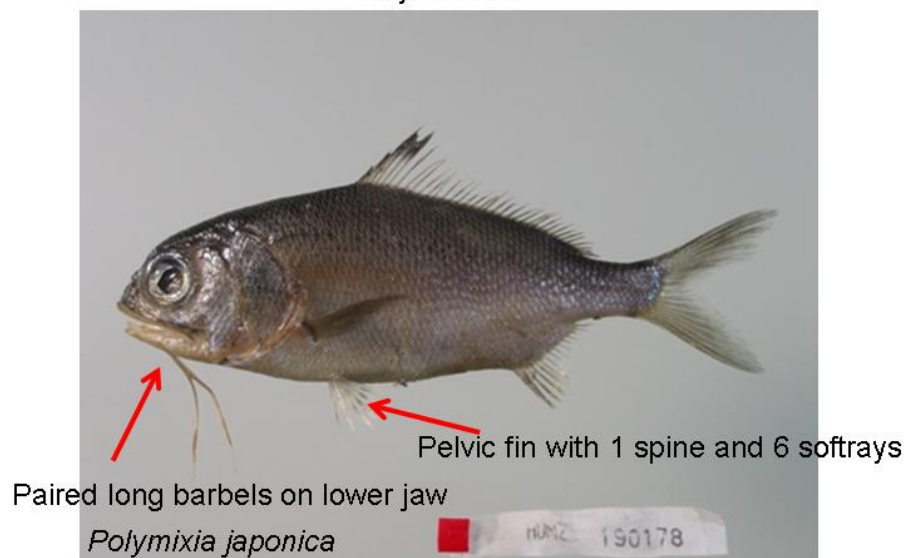
Lampridiformes

Trachipteridae

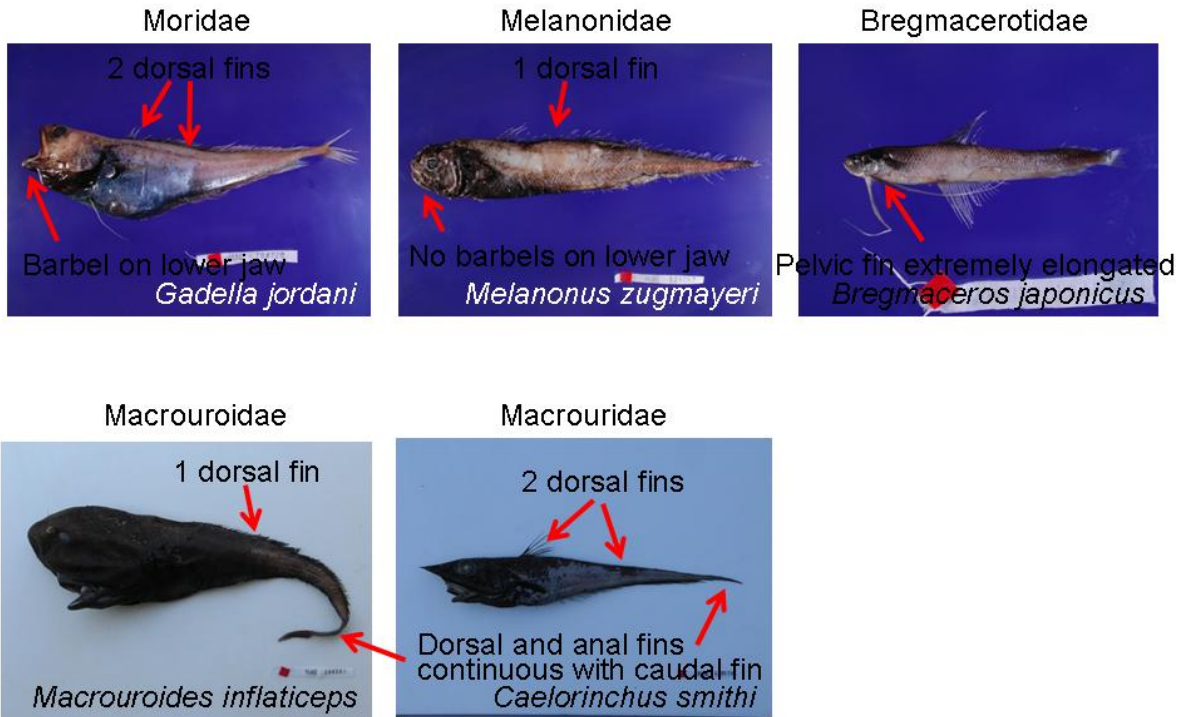


Polymixiiformes

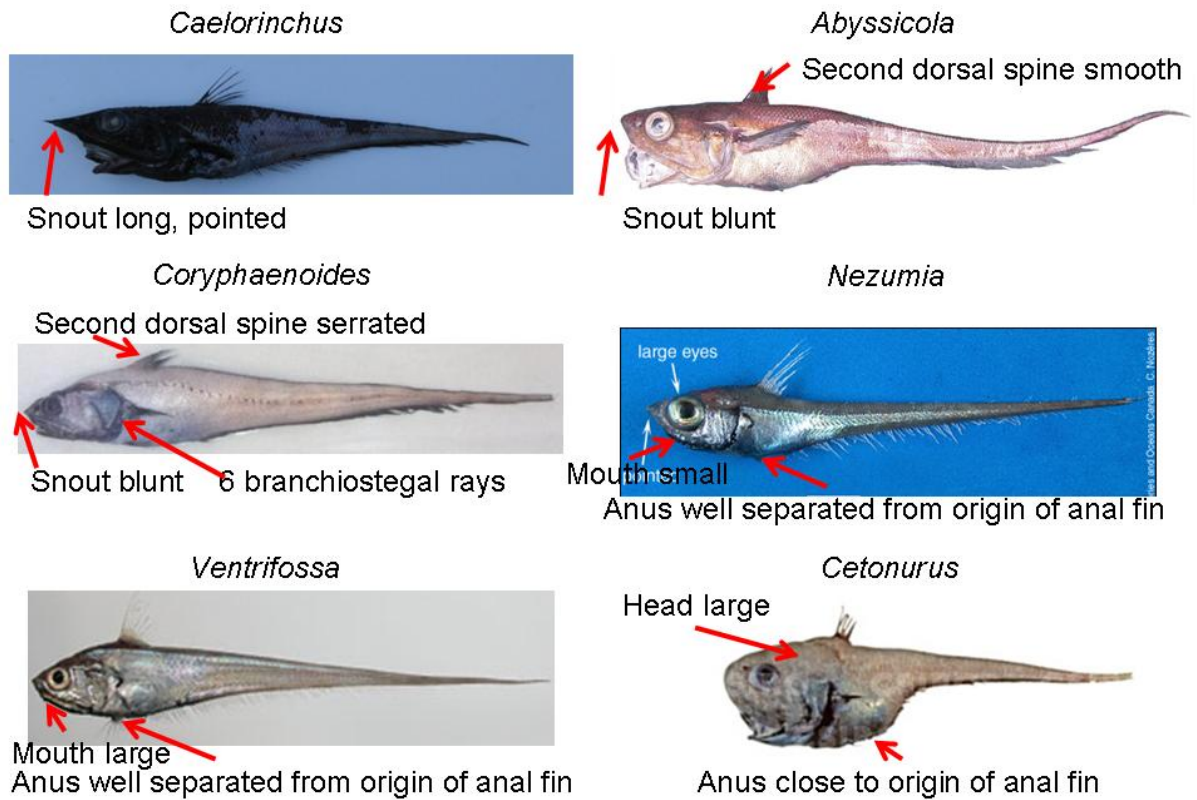
Polymixiidae



Gadiformes



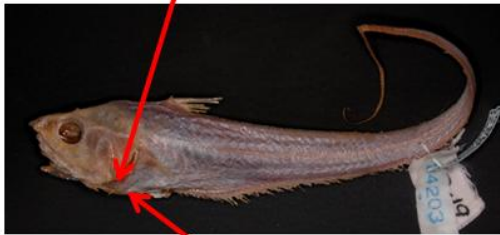
Macrouridae (1)



Macrouridae (2)

Pseudonezumia

Scales absent on branchiostegal membrane



6 pelvic rays

Hymenogadus

Body cylindrical



Anus close to origin of anal fin

Malacocephalus

First dorsal fin II, 10-14



Scales present on branchiostegal membrane

Hymenocephalus

Body compressed

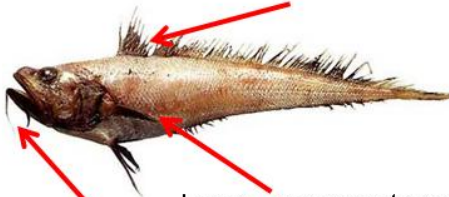


Anus close to origin of anal fin

Macrouridae (3)

Gadomus

Two dorsal fins close to each other; second dorsal fin more developed



Long uppermost pectoral ray

Long barbel on lower jaw

Bathygadus

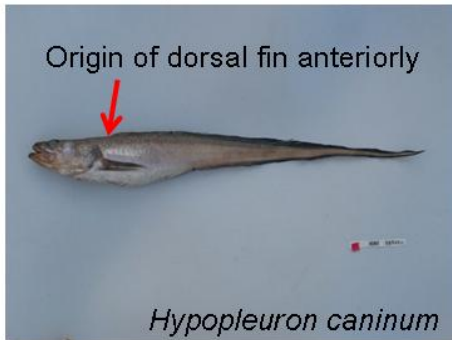


No pectoral rays elongated

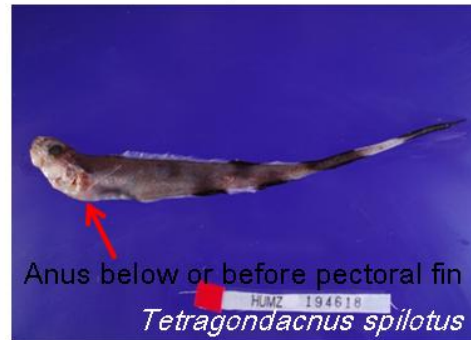
No barbels or minute barbels on jaw

Ophidiiformes

Ophidiidae



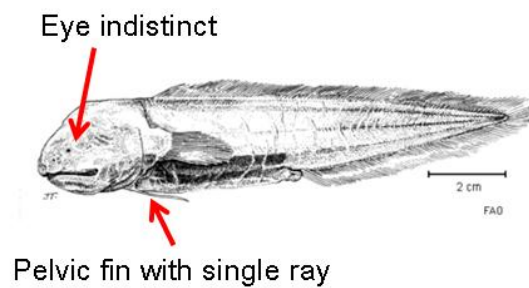
Carapidae



Bythitidae

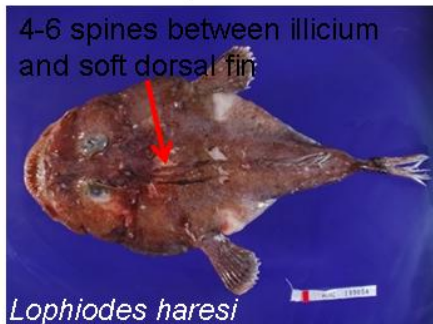


Aphyonidae

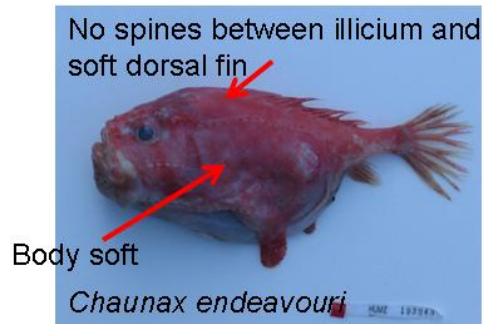


Lophiiformes 1

Lophiidae



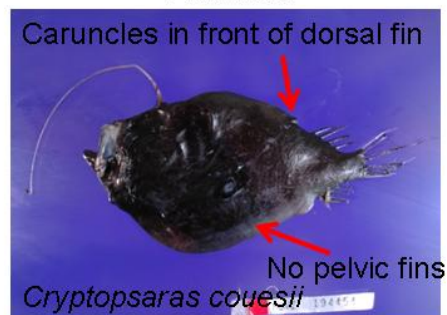
Chaunacidae



Ogcocephalidae



Ceratiidae

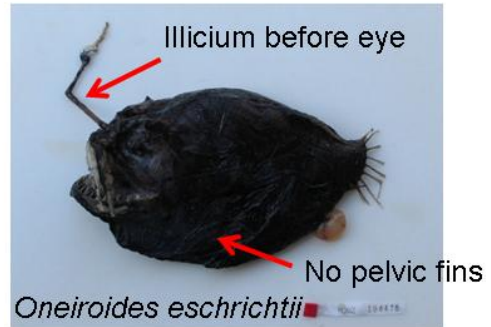


Lophiiformes 2

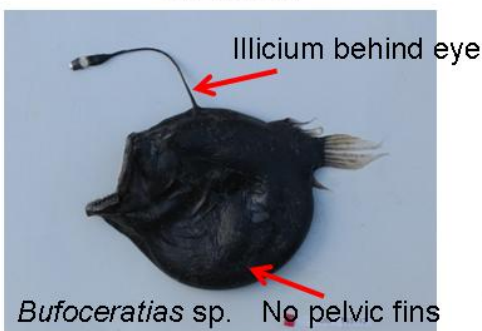
Linophryinae



Oneirodidae



Diceratiidae

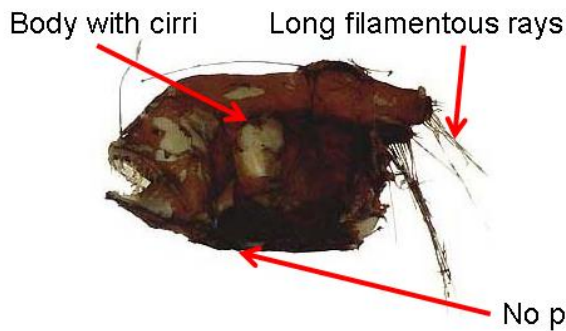


Himantolophidae

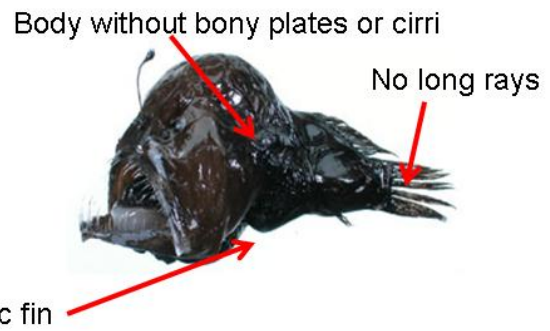


Lophiiformes 3

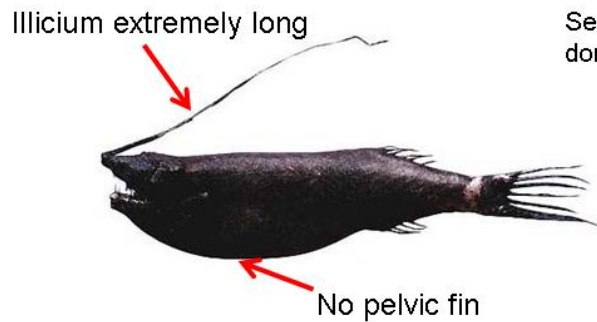
Caulophryinae



Melanocetidae



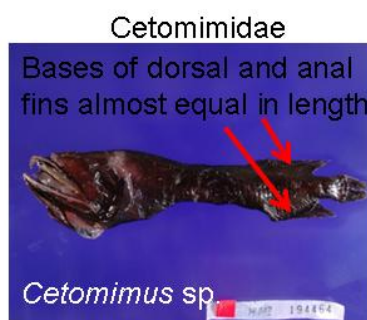
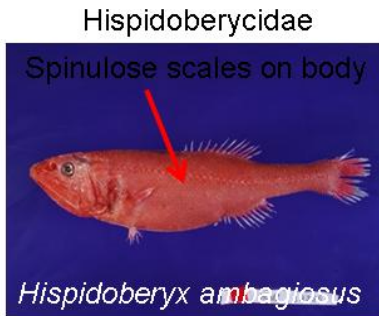
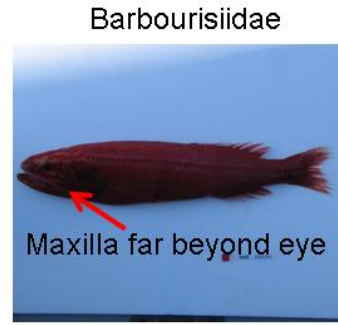
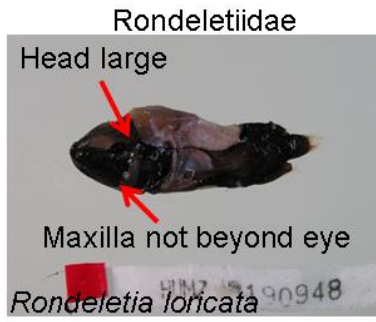
Gigantactinidae



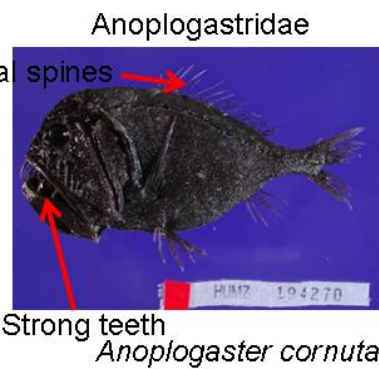
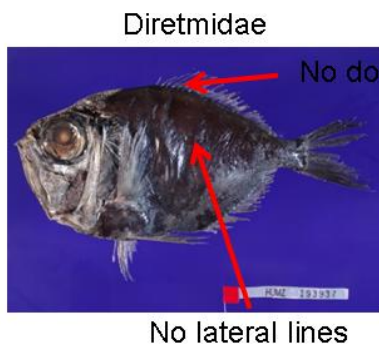
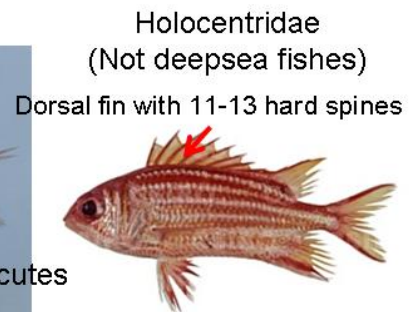
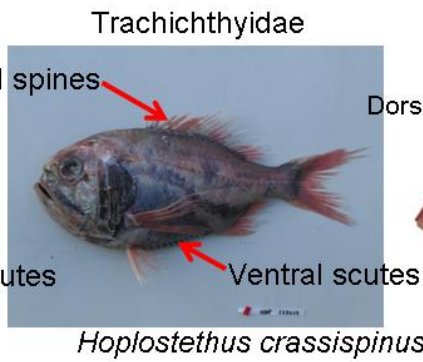
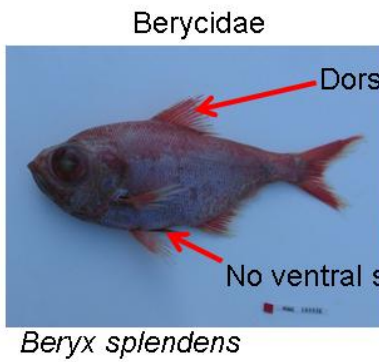
Antennariidae



Stephanoberyciformes

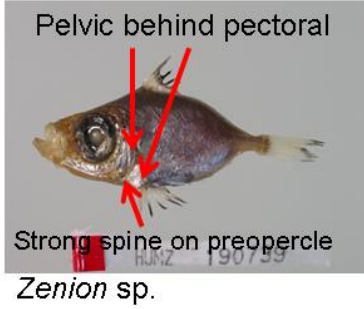


Beryciformes

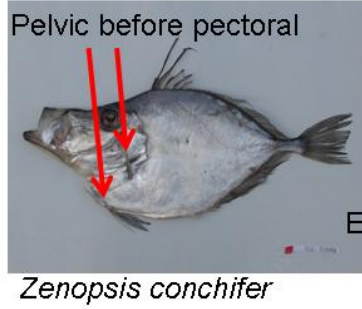


Zeiformes

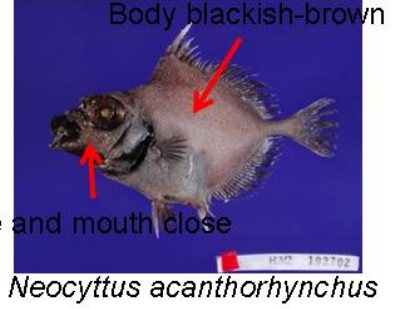
Macrurocyttidae



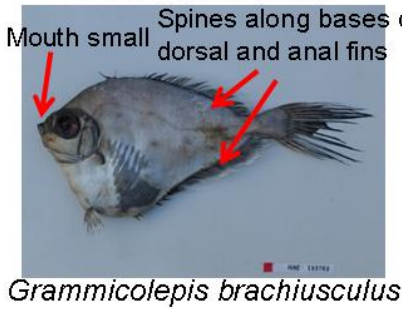
Zeidae



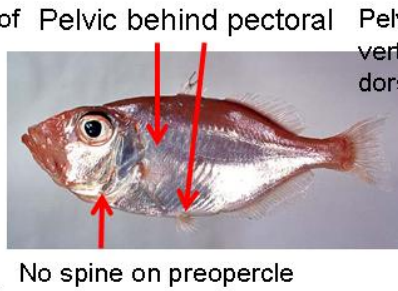
Oresomatidae



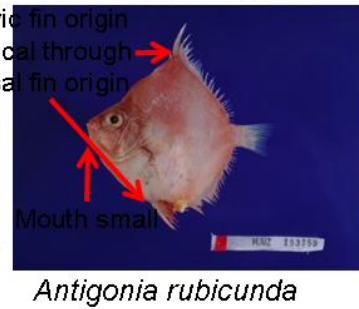
Grammicolepididae



Parazenidae

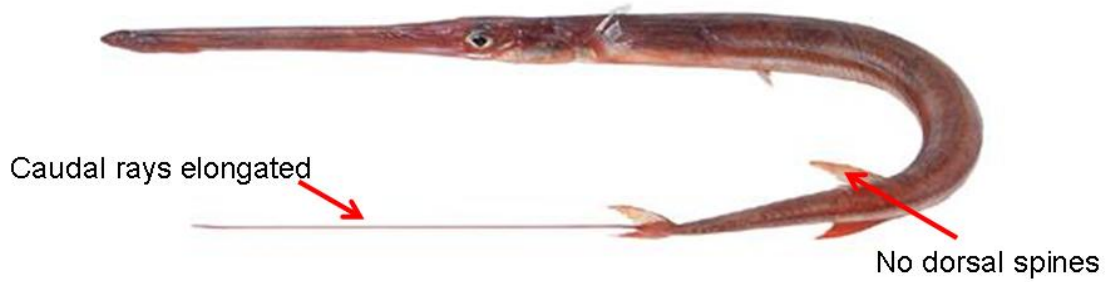


Caproidae

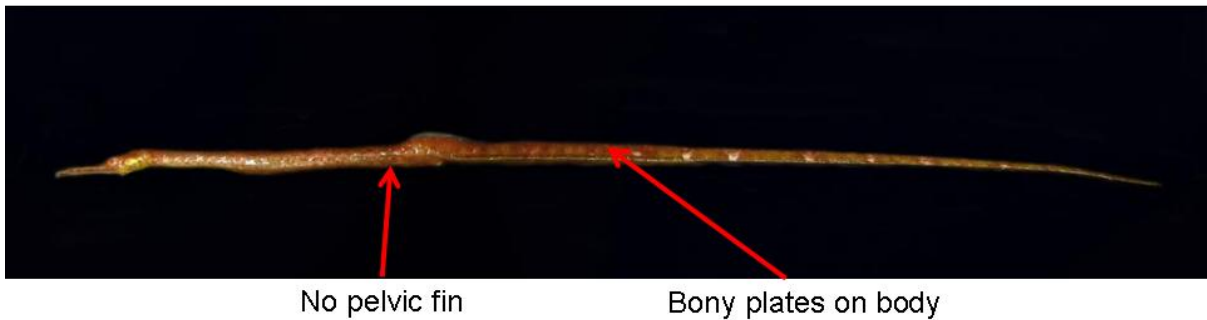


Gasterosteiformes

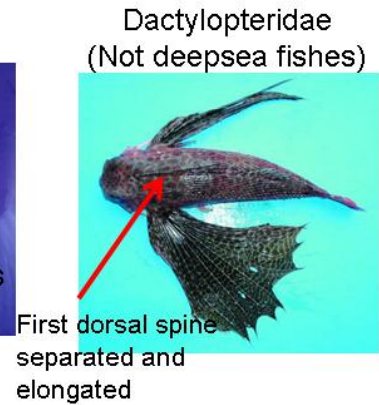
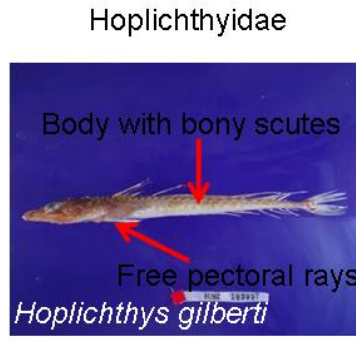
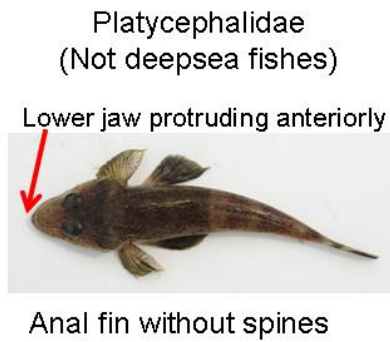
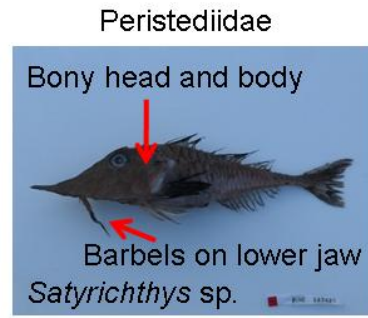
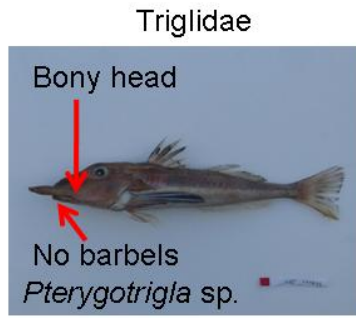
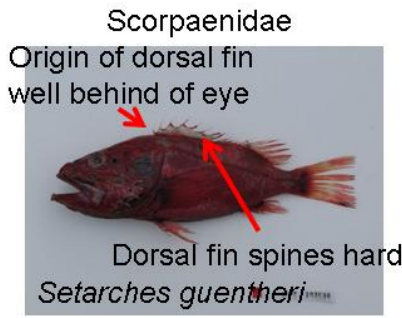
Fistulariidae (Not deepsea fishes)



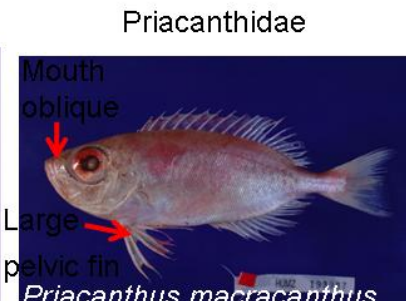
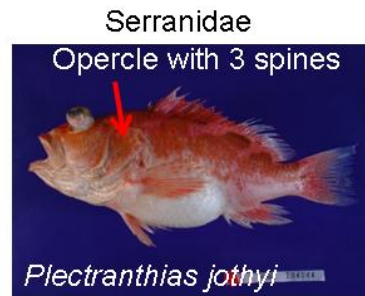
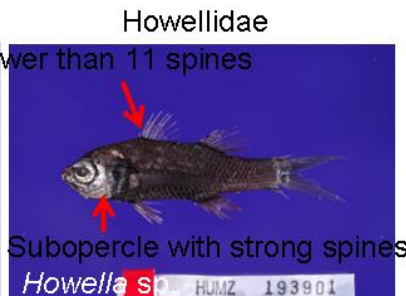
Syngnathidae (Not deepsea fishes)



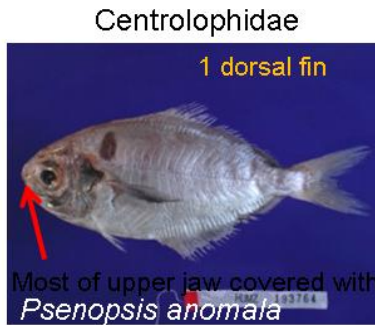
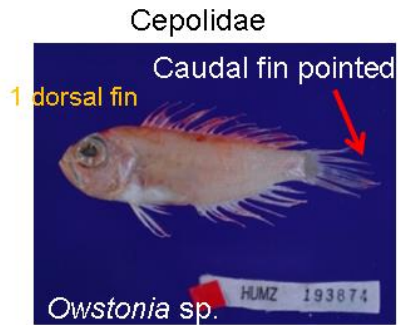
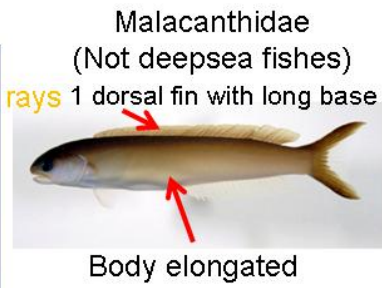
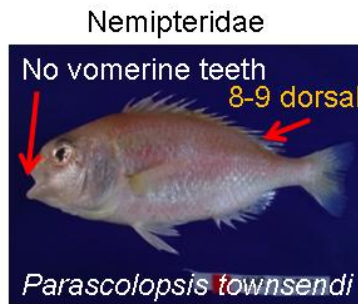
Scorpaeniformes



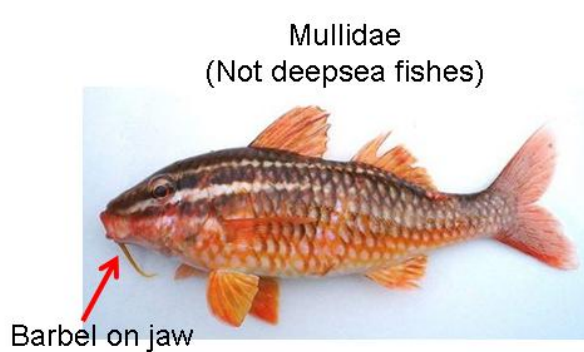
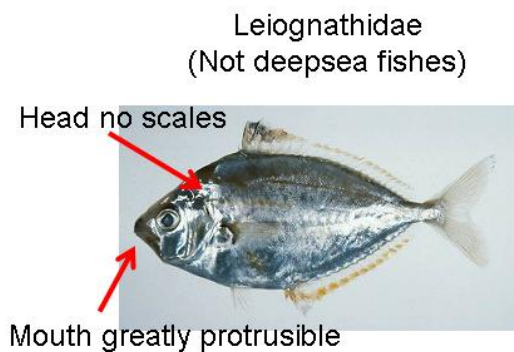
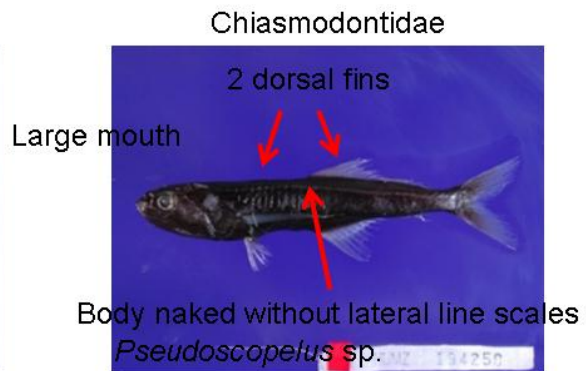
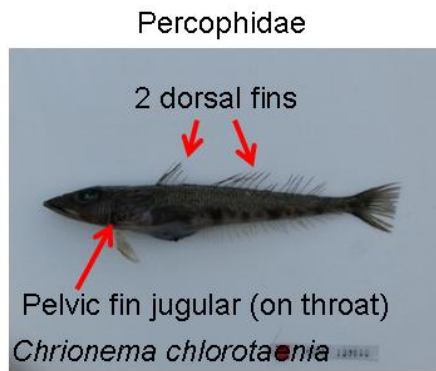
Perciformes 1



Perciformes 2

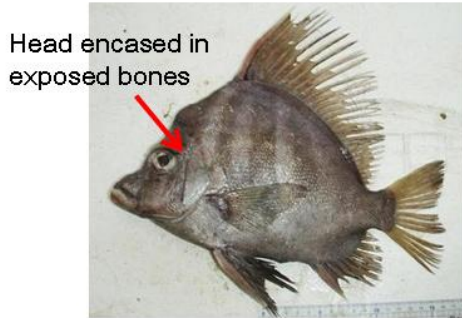


Perciformes 3

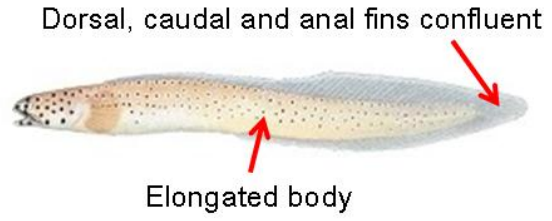


Perciformes 4

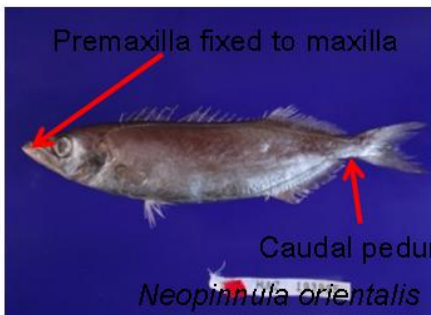
Pentacerotidae



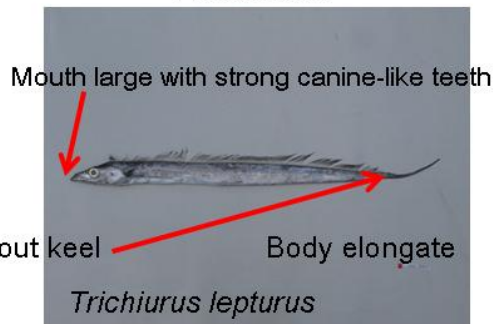
Notograptidae



Gempylidae

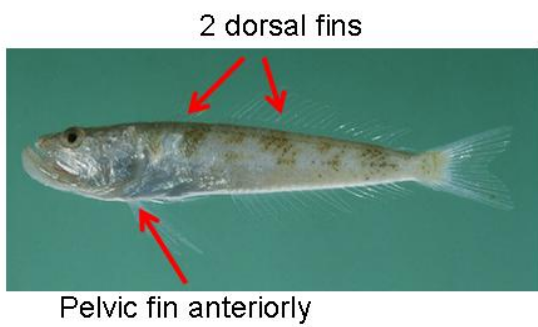


Trichiuridae

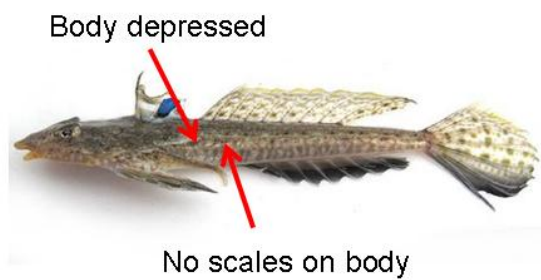


Perciformes 5

Champsodontidae

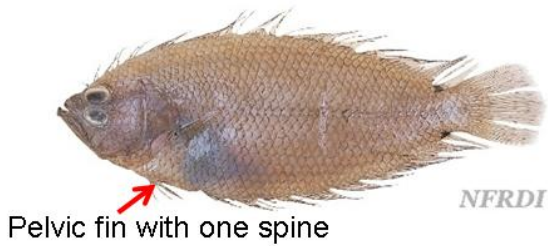


Callionymidae
(Not deepsea fishes)



Pleuronectiformes 1

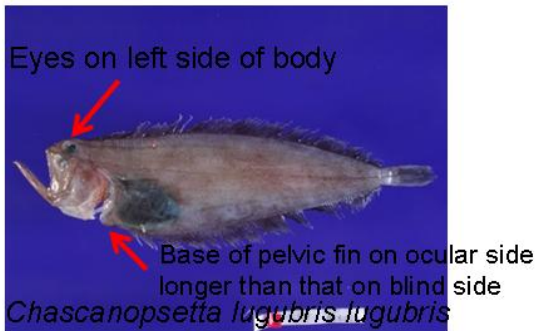
Citharidae



Paralichthyidae (Not deepsea fishes)

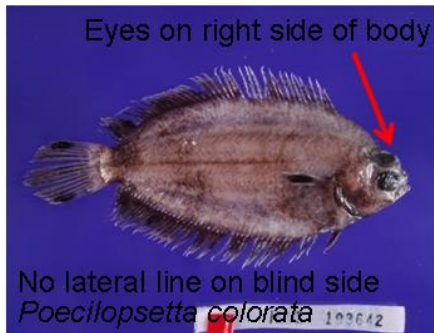


Bothidae

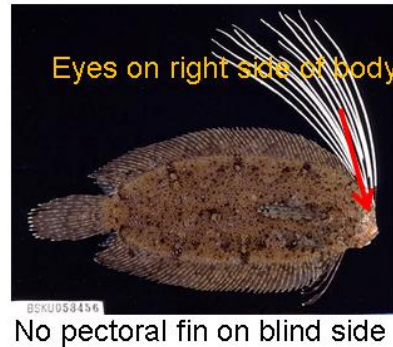


Pleuronectiformes 2

Poecilopsettidae



Samaridae



Soleidae



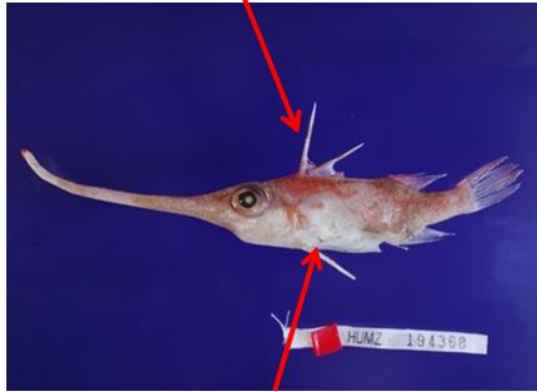
Cynoglossidae



Tetraodontiformes

Triacanthodidae

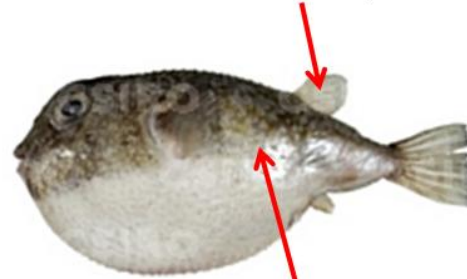
Dorsal fin with strong spines



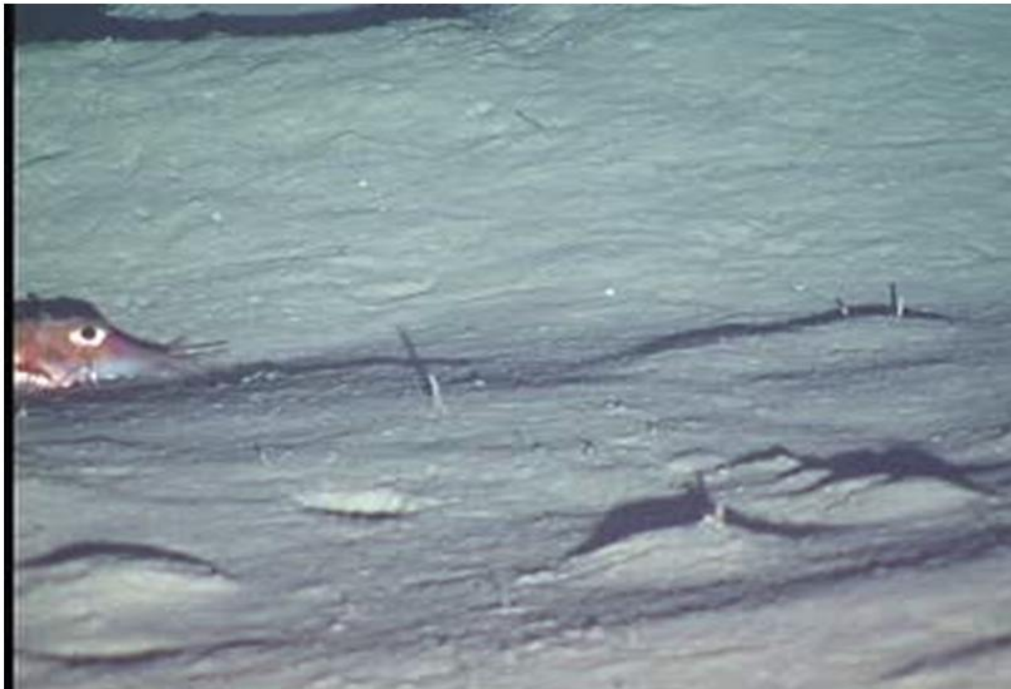
Pelvic fin with single strong spine

Tetraodontidae
(Not deepsea fishes)

Dorsal without spines



Body covered with skin



Peristediidae from NOAA

Thank you so much for your attention
