

Order Gobiiformes

Gobies

Gobiiformes include gobies, as well as cardinal fishes (Apogonidae) and nursery fishes (Kurtidae). Gobies are commonly small benthic fishes, forming one of the most speciose groups among Teleostei. There are approximately 270 genera, with more than 2400 species. These can be found in all aquatic habitats, especially in coral reefs. Gobies are distinguished from all other freshwater fishes in West Asia by the fusion of the pelvics, which form a suction organ with an anterior transverse membrane. They also have two dorsals, and the pelvic is located beneath the base of the pectoral.

Most gobies have a short lifespan, with an average of less than few years. However, the biology of most species in West Asia still needs to be studied. Male gobies engage in parental care, with eggs suspended from the roof of small cavities beneath stones, shells, leaves, or any other hard structure. The male may mate with multiple females and guards the eggs until the larvae hatch and leave the nest. Many gobies exhibit sexual dimorphism, with male exhibiting larger fins and more intense colouration, often black in *Neogobius* and *Ponticola* species.

Previously, Gobiiform systematics was based on a limited number of morphological characters. However, recent molecular studies have confirmed the majority of these classifications. Currently, nine families of gobies are recognised: Butidae, Eleotridae, Gobiidae, Milyeringidae,

Odontobutidae, Oxudercidae, Rhyacichthyidae, Thalasseleotrididae, and Xenisthmidae. In freshwater habitats of West Asia, two families occur: Gobiidae and Oxudercidae. There is no consistent morphological character distinguishing Gobiidae and Oxudercidae; both are identified as families only by molecular characters. In West Asia, genera as disparate as sand gobies (*Knipowitschia*) and mudskippers (*Boleophthalmus*, *Periophthalmus*, *Scartelaos*) belong to Oxudercidae. In contrast, all the Ponto-Caspian gobies (*Neogobius* and *Ponticola*) and some genera from the Indian Ocean belong to Gobiidae. As both families are not diagnosed by external characteristics, the keys for the genera of gobies are designed to facilitate the identification of all freshwater gobies in West Asia.

The Odontobutid goby *Perccottus glenii* is a highly invasive species in Europe. It occurs as a weed in carp farms and is introduced with non-biosafe carp. Given the lack of regulation of fish stocking in West Asia, the introduction of *Perccottus glenii* can be expected anytime. Two eleotrid gobies (*Eleotris acanthopomus* and *Ophiocara porocephala*) have been identified in brackish inland waters of Oman. As they do not qualify as freshwater fishes, they are not included in this book, as are species such as *Bathygobius fuscus* and *Acentrogobius dayi*, which are included in the key but otherwise excluded from the book because they occur only in brackish waters in the Persian Gulf. **Further reading.** Nelson et al. 2016 (diversity); Near & Thacker 2024 (phylogeny).



Perccottus glenii; upper Volga, Russia; ~70 mm SL.

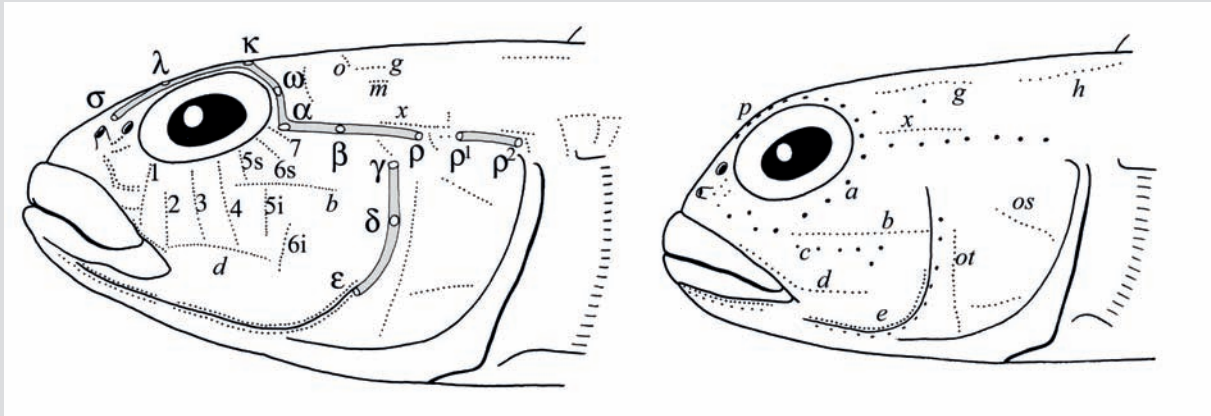


Figure 59. Cephalic lateral line system in gobies (from Kottelat & Freyhof 2007; after Miller in Whitehead et al. 1986).

Cephalic pores and papillae in Gobiidae. The lateral line system's canals, pores, and sensory papillae provide important diagnostic characters to distinguish goby genera and species. The figure shows the terminology and notation system used. Canals are stippled, and pores are indicated by Greek letters. It should be noted that there is no lateral line canal on the flank and that the canals may be variously developed on the head. In the species with the most developed canals, there is an anterior oculoscapular canal (from pores 's' to 'r'), a posterior oculoscapular canal (from pores 'r1' to 'r2') and a preopercular canal (from pores 'g' to 'e'). One or more of these canals may be absent or interrupted, and the posterior and anterior oculoscapular canals may be continuous or discontinuous. The anterior oculoscapular canals of both sides of the head may be separate or fused in the interorbital area. The anterior oculoscapular canal may be divided into a circumorbital and postorbital segment. The papillae are organised in vertical rows (numbered in Fig. 59, left) or longitudinal rows (lettered in Fig. 59, right). To examine the pores and papillae, a dissecting microscope is necessary. They are best viewed using oblique light. On occasion, they may be hidden by mucus. Some authors have attempted to highlight the canals by injecting chromic acid, ferric tannate, or potassium permanganate, but all these methods damage the specimens. Air pulsed by a small aquarium pump through an injection needle is a technique now used by goby specialists. Despite this, goby identification remains challenging even for experts. **Further reading.** Sanzo 1911; Miller, in Whitehead et al. 1986 (head canals, pores, and papillae).

Key to genera of gobies in freshwaters in the Black, Caspian, Marmara and Mediterranean basins

1a - 5–13½ branched rays in second dorsal; male with bluish-iridescent blotches on membrane of first dorsal.

.....2

1b - 14–20½ branched rays in second dorsal; male without bluish-iridescent blotches on membrane of first dorsal.

.....3

2a - Male with bluish-iridescent, small blotch on membrane between last and pre-last ray of first dorsal; male without white margins of dorsal, caudal, or anal.

.....*Knipowitschia*

2b - Male with bluish-iridescent, small blotches on 1–2nd dorsal membrane of first dorsal; male with a white margin of dorsal, caudal and anal.

.....*Rhinogobius*

3a - Anterior naris at end of a tube projecting forward beyond lip; 36–48 total scales in midlateral series.

.....*Proterorhinus*

3b - Anterior naris not projecting forward beyond lip; 49–85 total scales in midlateral series.

.....4

4a - 8–10 vertical rows of papillae in suborbital area (Fig. 60b); 72–85 total scales in midlateral series; nape naked.

.....*Mesogobius*

4b - 7 vertical rows of papillae in suborbital area (Fig. 60a); 49–74 total scales in midlateral series; nape covered with scales, if nape naked, then 54–65 scales in midlateral series.

.....5

5a - First branched ray of second dorsal about twice as long as penultimate ray; first dorsal with large black spot in posterior part (in *N. melanostomus* and *N. pallasii*).

.....*Neogobius*

5b - First branched ray of second dorsal about as long as penultimate ray; first dorsal without large black spot in posterior part.

.....6

6a - Midline of nape naked in front of preoperculum (Fig. 61); diagonal bars on body irregular in position and shape.

.....*Babka*

6b - Predorsal area and nape completely covered by scales; no bars on body.

.....*Ponticola*

Key to species of freshwater gobies of the Persian Gulf basin and the Arabian Peninsula

1a - Usually more than 1 row of teeth in lower jaw; eye not strongly elevated from head profile.

.....2

1b - Usually only one row of teeth in lower jaw; eye strongly elevated from head profile.

.....6

2a - Upper lip strongly projecting beyond lower lip.

.....*Awaous jayakari*

2b - Upper lip not or very slightly projecting beyond lower lip.

.....3

3a - Lower lip clearly projecting beyond upper lip; caudal spade-shaped; flank with 5 blotches along lateral midline; cheek with several rows of pores.

.....*Glossogobius*

3b - Lower lip not or very slightly projecting beyond upper lip; caudal roundish; flank mottled or marbled, or with 6–8 irregularly shaped bars or blotches; cheek without rows of pores.

.....4

4a - Male with bluish-iridescent, small blotches on 1–2nd dorsal membrane of first dorsal; orange spot as gill-membrane in male; 5–6 rays in first dorsal.

.....*Rhinogobius* sp.

4b - Male without bluish-iridescent, small blotches on 1–2nd dorsal membrane; no orange spot as gill-membrane in male; 7 rays in first dorsal.

.....5

5a - First ray of first dorsal longer than following rays; 9½ rays in second dorsal; 8½ rays in anal.

.....*Bathygobius fuscus*

5b - First ray of first dorsal shorter than second ray; 10½ rays in second dorsal; 9½ rays in anal.

.....*Acentrogobius dayi*

6a - No canine teeth behind lower jaw symphysis.

.....*Periophthalmus*

6b - One large canine tooth behind jaw symphysis and behind row of teeth in lower jaw.

.....7

7a - Barbels present on ventral side of head.

.....*Scartelaos*

7b - No barbels on ventral side of head.

.....*Boleophthalmus*



The Caspian Sea, here in Azerbaijan, is the habitat of a rich fauna of gobies, most of which do not enter freshwater.



Gobijs ophiocephalus; Krk Island, Croatia; ~65 mm SL.