

Chordata, Chondrichthyes & Osteichthyes

Since the discovery of animal communities in oceanic hydrothermal vents in 1977, fishes have been regularly observed in association with these chemosynthetically driven communities, but in most cases they are difficult to catch and therefore species identification can often only rely on images captured by the diving vehicles.

Ichthyologic information pertaining to species inhabiting the deep-sea hydrothermal vents is mentioned in over 30 papers and even in the more detailed and updated lists (BISCOITO et al. 2002; GEISTDOERFER 1996, 1998; TUNNICLIFFE 1991) there are species missing. The situation for bathyal species inhabiting the periphery of active vent fields is even less clear since the vast majority of identifications have been based on video records or photographs.

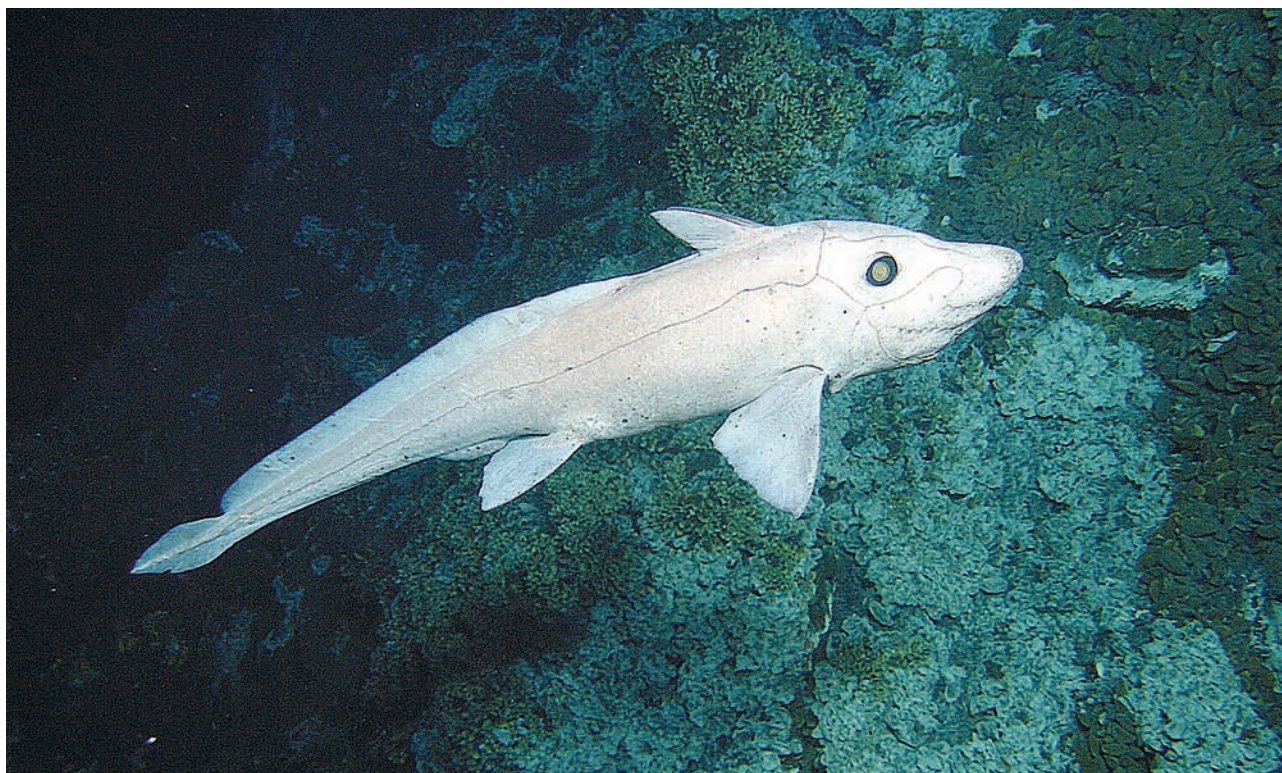
Species living inside active fields

Vent fishes were found at only 20 of some 50 active vent fields discovered to date. The specific diversity found is low and the degree of endemism is high, which seems to be an overall characteristic of the hydrothermal vent fauna (TUNNICLIFFE 1991).

The family Zoarcidae dominates in terms of the number of species and biomass. Eelpouts form a highly diverse family with over 220 known, mostly benthic species (WEITZMAN 1997) and are one of the more successful fish families to occupy continental slopes down to 5000 m (ANDERSON 1994; WEITZMAN 1997). Nonetheless, it is remarkable that they have been able to adapt (and evolve) to the vent environments. As pointed out by GEISTDOERFER (1996) these adaptations are neither anatomical, nor trophic. In order to cope with the chemical conditions of vents and seeps, these species must have biochemical adaptations. These adaptations, as well as the factors conditioning the distribution of the species need further investigation. At the present level of our knowledge on the taxonomy and distribution of the species, zoogeographical considerations cannot be produced.

Bathyal species living in the vicinity of the vents and seeps

As for the peripheral bathyal fish fauna, data available are far from being satisfactory. The five best-represented families sensu lato (Centrophoridae, Somniosidae and Etmopteridae),



Hydrolagus pallidus from Lucky Strike, Mid-Atlantic Ridge, Atos cruise © Ifremer.

Macrouridae, Ophidiidae, Squalidae, Moridae and Synphobranchidae correspond to the most common families in the deep sea (WEITZMAN 1997). However, the variations in numbers of recorded species from field to field are enormous and definitely reflect insufficient research.

Although there are twice as many known active sites in the Pacific as in the Atlantic, the number of species recorded in the latter is higher (38 versus 43). Depth may well be the main reason for this, as vent fields in the Atlantic range from 850 m down to 3650 m and the ones in the East Pacific are all around 2500 m of depth. As pointed out by MERRETT & HAEDRICH (1997) for the Porcupine Seabight, demersal fish abundance tends to increase with depth attaining a maximum around 1000 m and then decreases sharply. This is in accordance with available data, wherein the highest number of records is from Menez Gwen (850 m) and Lucky Strike (1700 m) on the Mid-Atlantic Ridge (DESBROYÈRES et al. 2001).

The fact that the fields near the Azores Triple Junction (Mid-Atlantic Ridge) have been more intensively studied by professional ichthyologists can also have an influence in the results obtained. This bias precludes us from drawing conclusions on abundance, diversity and zoogeography of this fauna. To

overcome it, scientific teams working on hydrothermal vent biology should be reinforced with fish biologists as well as making more ship-time available for this kind of research.

The species treated herein are not only those who live inside the active fields, which are commonly considered as “vent endemic”, but also some of the more commonly seen in the periphery of the vents, in some cases feeding even on vent invertebrates and thus contributing for the export of energy from the chemosynthetically-driven environment to the photosynthetically-dependent bathyal environment.

New species

Amongst the so-called “vent endemic” species, at least six new to science are being described while this contribution is being published: three Zoarcidae from 9°N East Pacific Rise, the Kermadec Arc and the Rodriguez Triple Junction in the Indian Ocean respectively, one Ophidiidae from 17°S southern Pacific Pacific Rise, one Myxinidae from 38°S Pacific-Antarctic Ridge and one Cynoglossidae from seamounts at the Mariana Arc and the Kermadec Arc (E. Anderson, J. Hashimoto, J. Nielsen & C. Roberts, pers. comm.).

References:

- ANDERSON M.E. (1994) *Ichthyol. Bull. J.L.B. Smith. Inst. Ichtyol.* **60**: 1-120.
- BISCOITO M., SEGONZAC M., ALMEIDA A.J., DESBROYÈRES D., GEISTDOERFER P., TURNIPSEED M. & C. VAN DOVER (2002) *Cah. Biol. Mar.* **43**: 359-362.
- DESBROYÈRES D., BISCOITO M., CAPRAIS J.-C., COLAÇO A., COMTET T., CRASSOUS P., FOUQUET Y., KHRIPOUNOFF A., LE BRIS N., OLU K., RISO R., SARRADIN P.-M., SEGONZAC M. & A. VANGRIESHEIM (2001) *Deep-Sea Res. Part I* **48**: 1325-1346.
- GEISTDOERFER P. (1996) *Oceanol. Acta* **19**(5): 539-548.
- GEISTDOERFER P. (1998) *Ann. Inst. Océanogr.* **74**(2): 201-215.
- MERRETT N.R. & R.L. HAEDRICH (1997) *Deep-sea Demersal Fish and Fisheries*. Chapman & Hall, London: 1-282.
- TUNNICLIFFE V. (1991) *Oceanogr. Mar. Biol. Annu. Rev.* **29**: 319-407.
- WEITZMAN S.H. (1997) in RANDALL J.E. & A.P. FARRELL (Eds.) *Deep-Sea Fishes*: 43-78.

Chordata, Vertebrata, Chondrichthyes, Chimaeriformes, Chimaeridae

Hydrolagus affinis (CAPELLO, 1868) “small-eyed rabbitfish”

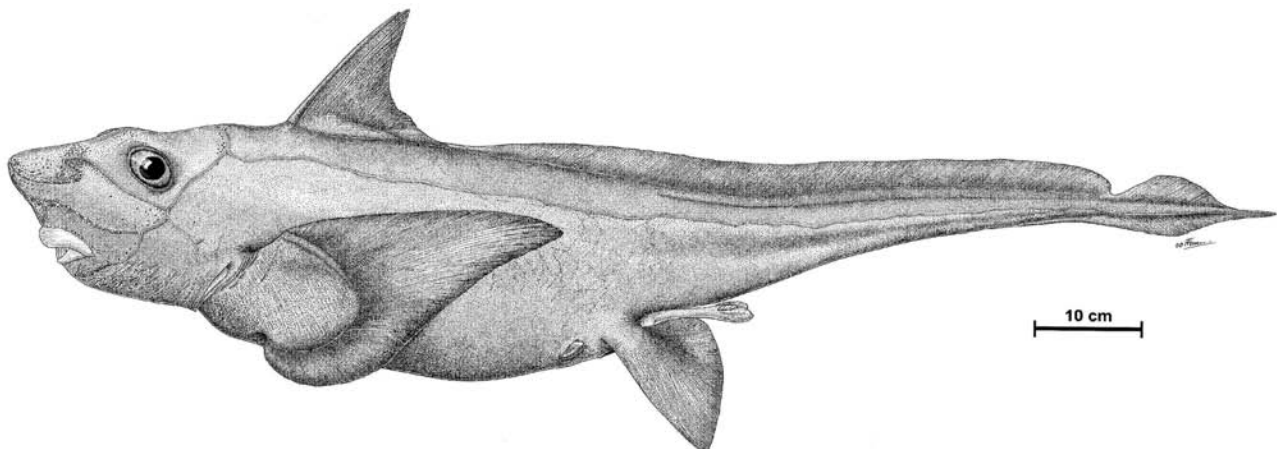
Size: To about 1300 mm total length.

Color: Uniform dark violet/brown.

Morphology: Body greatly tapering from a massive head and trunk to a pointed caudal fin with a short filament at its tip. Snout short, somewhat conical, overhanging mouth. First dorsal fin short-based, triangular and high, with a strong spine in front. Second dorsal fin long and low. Pectoral fins not reaching to pelvic fin base when laid back. Anal fin continuous with caudal fin.

Biology: Benthopelagic on continental slopes and down to abyssal plains. At Lucky Strike, specimens were observed swimming gently above the bottom and off the hydrothermal vent field. Carnivorous. At Lucky Strike, preys included the vent endemic mussel, *Bathymodiolus azoricus*. Oviparous.

Distribution: General: Western Atlantic: from Davis Strait and off Newfoundland to Cape Cod. Eastern Atlantic: Denmark Strait, Rockall Trough, northern Bay of Biscay and off the coast of Portugal. Possibly a much wider Distribution than records show. Mid-Atlantic Ridge vents: Lucky Strike, Mount Saldanha, Famous Segment, Rainbow. Depth range: 300 to 2400 m.



1: Habitus; by H. Encarnação © MMF, 2000.

References:

HARDY G.S. & M. STEHMANN (1990) Arch. Fischereiwiss. **40**(3): 229-248.

MARQUES A. & F. PORTEIRO (2000) Copeia **2000**(3): 806-807.

MÖLLER P.R., KULLBERG T. & O.A. JØRGENSEN (2004) Cybium **28**(1): 55-60.

STEHMANN M. & D.L. BÜRKEL (1984) in WHITEHEAD P.J.P., BAUCHOT M.-L., HUREAU J.-C., NIELSEN J. & E. TORTONESE (Eds.) Fishes of the North-eastern Atlantic and the Mediterranean **1**: 212-215.

Chordata, Vertebrata, Chondrichthyes, Chimaeriformes, Chimaeridae

Hydrolagus pallidus HARDY & STEHMANN, 1990 “pallid ghost shark”

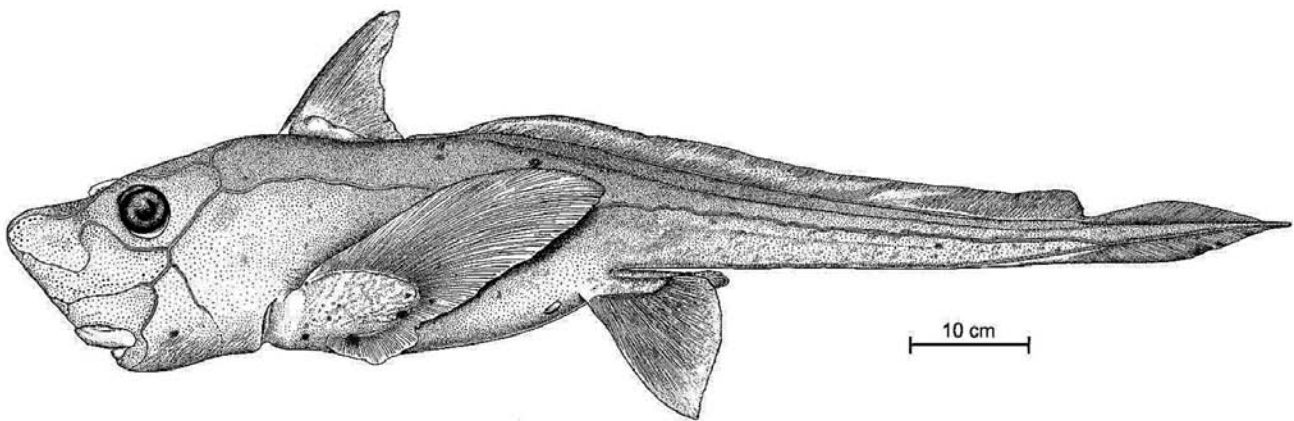
Size: To about 1300 mm total length.

Color: Uniform creamy to light greyish.

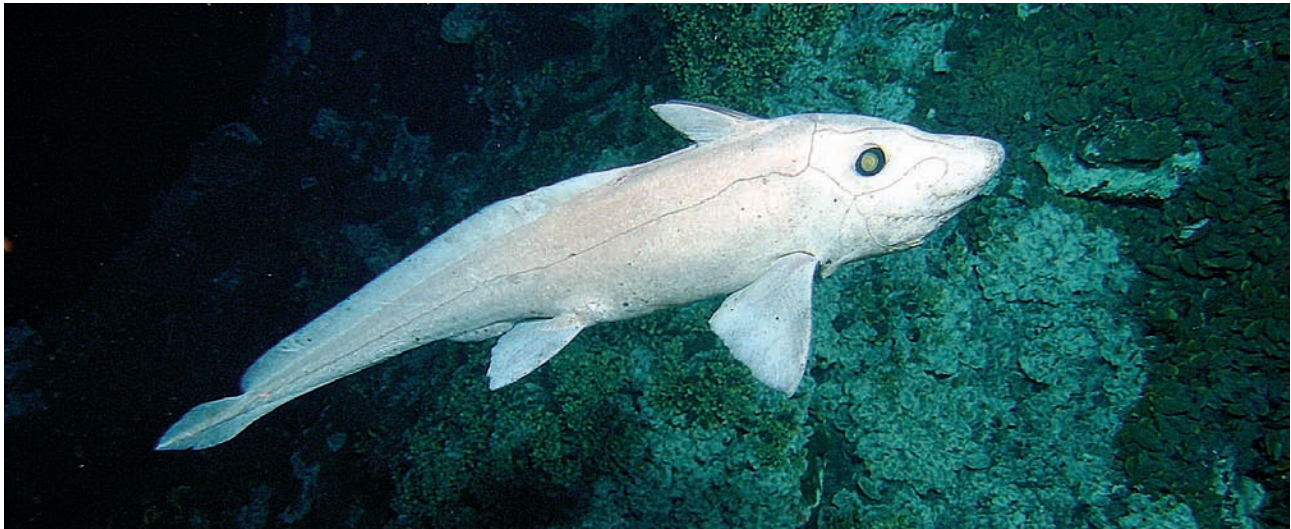
Morphology: Body greatly tapering from a massive head and trunk to a pointed caudal fin with a short filament at its tip. Snout short, somewhat conical, overhanging mouth. First dorsal fin short-based, triangular and high, with a strong spine in front. Second dorsal fin long and low. Pectoral fins not reaching to pelvic fin base when laid back. Anal fin continuous with caudal fin.

Biology: Benthopelagic on continental slopes and down to abyssal plains. At Lucky Strike, specimens were observed swimming gently above the bottom and off the hydrothermal vent field. Carnivorous, possibly feeding on small fishes and invertebrates. Oviparous.

Distribution: General: Western Atlantic: Davis Strait, Canada, Bear Seamount, New England; Eastern Atlantic: Greenland, off Iceland, from the southern Bay of Biscay to off western Scotland and Mid-Atlantic Ridge: Lucky Strike, Menez Hom, Mount Saldanha, Rainbow. Depth range: 1200-2075 m.



1: Habitus; by H. Encarnação © MMF, 2002.



2: At Rainbow, Mid-Atlantic Ridge; cruise Atos © Ifremer.

References:

- HARDY G.S. & M. STEHMANN (1990) Arch. Fischereiwiss. **40**(3): 229-248.
MÖLLER P.R., KULLBERG T. & O.A. JØRGENSEN (2004) Cybium **28**(1): 55-60.
SALDANHA L. & M. BISCOITO (1997) Bol. Mus. Municip. Funchal **49**(283): 189-206.

Chordata, Vertebrata, Osteichthyes, Anguilliformes, Synbranchidae

Dysommia rugosa GINSBURG, 1951

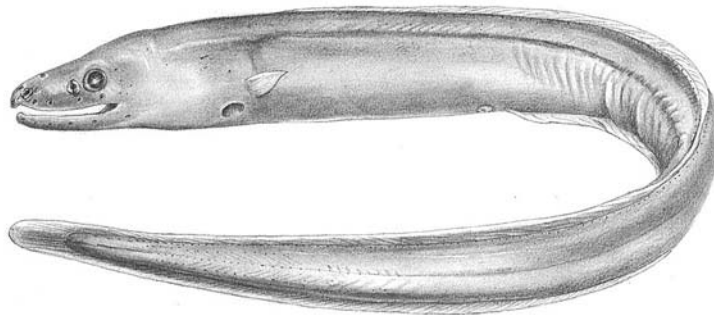
Size: Up to 352 mm total length.

Morphology: Naked ilyophine eel with small broad-based pectoral fins, their tips not sharply pointed. Dorsal-fin origin forward, about one head length behind a vertical through the gill slits. Fleshy, papillose snout slightly overhangs tip of lower jaw. Gill slits separate, small (about equal to diameter of eye), crescentic, oriented nearly vertically on the ventrolateral surface. Vertebrae 127-134.

Biology: Benthopelagic; carnivorous, feeding on shrimps and possibly other invertebrates. Oviparous. At Vailulu'u, living in crevices and holes in a low-temperature (10°C) diffuse vent

field with substantial coverage of microbial mat. Not found in non-venting habitats at the same depth nearby. Swims short distances into the water column, probably to feed.

Distribution: General: Widespread at tropical latitudes. Western Atlantic Ocean, from off the Carolinas to the Caribbean. Southwestern Indian Ocean, Canal of Mozambique. Pacific Ocean, Hawaii. At vents, this species has been reported only from warm-water vents at the peak of a volcanic cone, Nafanua, at Vailulu'u Seamount, Samoan Archipelago. Depth range: 260-775 m.



1: Habitus; from ROBIN & ROBIN (1989).



2: In situ view at Vailulu'u Seamount; by C. Young © OIMB.

Reference:

ROBINS C.H. & C.R. ROBINS (1989) in: BÖHLKE E. (Ed.) Fishes of the Western North Atlantic. Part 9(1): 207-253.

C. YOUNG & M. BISCOITTO

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Chordata, Vertebrata, Osteichthyes, Anguilliformes, Synbranchidae

Ilyophis saldanhai KARMOVSKAYA & PARIN, 1999

Size: Total length 410 mm (Atlantic specimens), and 335 mm (Pacific specimen).

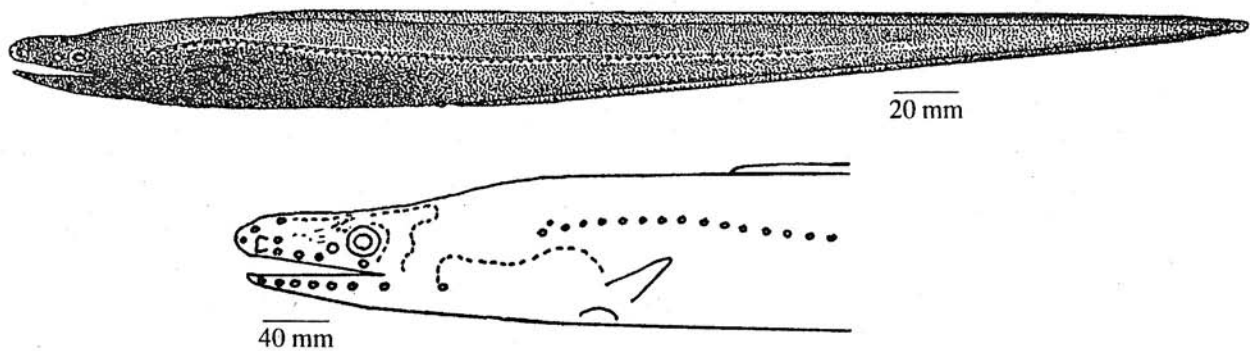
Color: Uniformly brownish.

Morphology: Body elongate, compressed and naked. Origin of dorsal fin above the 11th pore of the lateral line and behind end of pectoral fin, origin of anal fin after the 32nd pore of the lateral line, both fused with caudal fin (fig. 1). Head well differentiated from the rest of the body, its profile slightly convex at level of posterior margin of orbit. Head 3.3 times in pre-anal length. Snout length moderate (2.65 times in head). Fleshy tip of snout with two pairs of well-developed plicae (fig. 2). Two sharply pronounced medial folds descending from tip of snout; at its lower edge, then bending horizontally to the right and left of median line of snout. Two other shorter lyre-shaped folds situated laterally to two median folds. Supra-orbital canal with three pores, postorbital canal with two pores, infra-orbital canal with five pores, preoperculo-mandibular canal with eight pores, six before the commissure, the seventh at the level of the commissure and the eighth on the preopercle. Mouth opening

straight, its rictus situated behind a vertical through posterior margin of orbit. Mouth cavity covered with longitudinal folds bearing numerous papillae that differ in size and shape. Teeth in jaws conical, pointed, slightly curved, bent inside, and closely set in rows forming a band on each jaw. Teeth increasing in size in inner rows and medially on each jaw. Teeth on palate larger. Teeth on vomer forming two irregular longitudinal rows (Fig. 2). Eyes small, round, covered with a thin membrane, their diameter 6.7 times in head and 2.5 times in snout. Anterior nostrils tubular, directed forward, bearing small flaps. Openings of posterior nostrils simple and round, their indented margins slightly turned out. Gill slits semicircular, situated horizontally at lower part of head before bases of pectoral fins (CAUSSE et al. 2005; KARMOVSKAYA & PARIN 1999).

Biology: This species is benthopelagic, associated with vent communities. Carnivorous, feeding on hydrothermal vent invertebrates (small shrimps and polychaetes).

Distribution: East Pacific Rise: 21°S, hydrothermal vent site Gromit, and MAR: Broken Spur vent field.



1: Holotype; from KARMOVSKAYA & PARRIN (1999).



2: In vivo, after collection from East Pacific Rise: 21°S, Gromit site; cruise Biospeedo, by Briand © Ifremer.



3: In situ, cruise Biospeedo © Ifremer.

References:

- CAUSSE R., BISCOITO M. & P. BRIAND (2006) *Cybium* **29**(4): 413-416.
KARMOVSKAYA E.S. & PARIN N.V. (1999) *J. Ichthyol.* **39**(5): 353-362.
NIELSEN J. & D.C. COHEN (2005) *Cybium* **29**(4): 395-398.
PARIN N.V. (1995) *Vopr. Ihtiol.* **35**(5): 698-701.

Chordata, Vertebrata, Osteichthyes, Anguilliformes, Synphobranchidae

Thermobiotus mytilogeiton GEISTDOERFER, 1991

Size: Up to 247 mm.

Color: In formalin pale brownish, beige in vivo with abdomen darker.

Morphology: Eel-shaped, no scales, no pectoral fins, lateral line present. Dorsal fin origin behind level of anus. Teeth on both jaws, small and needle-like. Vertebrae 132.

Biology: Dwelling among mussels.

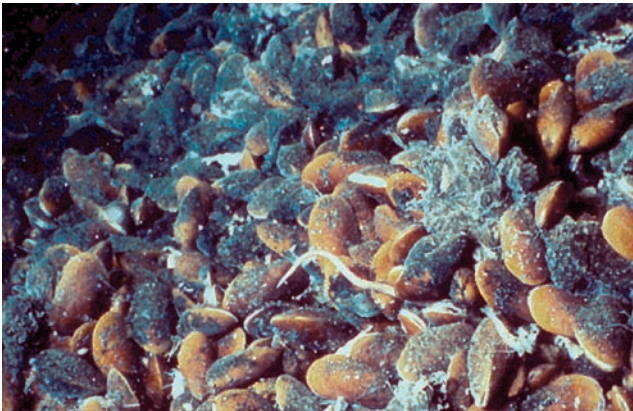
Distribution: Lau Back-Arc Basin: Valu Fa Rise.



1: Total view; by P. Briand © Ifremer.



2: Anterior part in lateral view; by P. Briand © Ifremer.



4: In situ view of a specimen on a mussel bed of *Bathymodiolus brevior*, at Lau Basin; cruise Biolau © Ifremer.



3: Anterior end in ventral view; by P. Briand © Ifremer.

References:

GEISTDOERFER P. (1991) C. R. Acad. Sci. Paris, Sér. III **312**: 91-97.
MEUNIER F.J. & P. GEISTDOERFER (1991) *Cybium* **15**: 83-87.

P. BRIAND

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Chordata, Vertebrata, Osteichthyes, Gadiformes, Lotidae

Gaidropsarus RAFINESQUE, 1810

Size: To about 360 mm standard length.

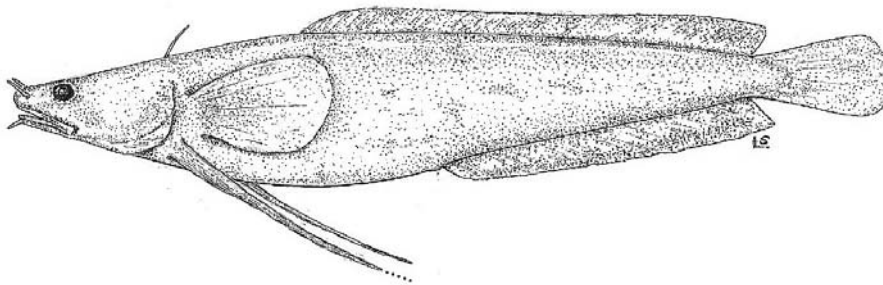
Color: Generally reddish pink with a distinct white mark on cheeks.

Morphology: Elongate gadoid fish with two dorsal fins, the first with a moderately elongate first finray, followed by fine short rays. A single anal fin. Second dorsal and anal fins long and moderately high. Three barbels, one on chin and one on each anterior nostril. Pre-anal length longer than post-anal (excluding the caudal fin). Snout longer than twice the eye diameter. Forty seven vertebrae (16+31).

Remark: A specimen was collected with the "Nautile" submersible during Diva 2 cruise and its description is in press. Other specimens caught in the Bay of Biscay and the Rockall Trough, currently under study, may eventually prove to belong to the same yet undescribed species.

Biology: Very few data. Benthic. The specimens observed at Lucky Strike were usually inside crevices, on the mussel beds, well inside the active hydrothermal vent field. Carnivorous, feeding on hydrothermal vent crustaceans (alvinocaridid shrimps).

Distribution: Mid-Atlantic Ridge: Lucky Strike.



1: By Luiz Saldanha © LMG, 1986.



2: At Lucky Strike; cruise Seahma © FCT & Ifremer.



3: At Lucky Strike; cruise Diva © FCT & Ifremer.



4: Anterior part in dorsal view; by P. Briand © Ifremer.

Reference:

SALDANHA L. & M. BISCOITO (1997) Bol. Mus. Municip. Funchal **49**(283): 189-206.

M. BISCOITO & A.J. ALMEIDA

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Chordata, Vertebrata, Osteichthyes, Gadiformes, Moridae

Lepidion schmidti SVETOVIDOV, 1936

Size: Up to 1230 mm standard length.

Morphology: Head conical and robust. Posterior nostril ahead of eye. Chin barbel present, as long as snout. Orbit 3.5-5.8 in head length. Second ray of first dorsal fin very elongate. Lateral line well marked until near the origin of caudal peduncle.

Remark: One specimen caught with the "Nautile" at Rainbow and others at Lucky Strike with bottom long lines.

Biology: Probably benthopelagic on continental slope. At Rainbow, Lucky Strike and Menez Gwen, specimens were found lying on the bottom, amongst rocks or in crevices, in the inner periphery of the active fields (over brown sulphide deposits).

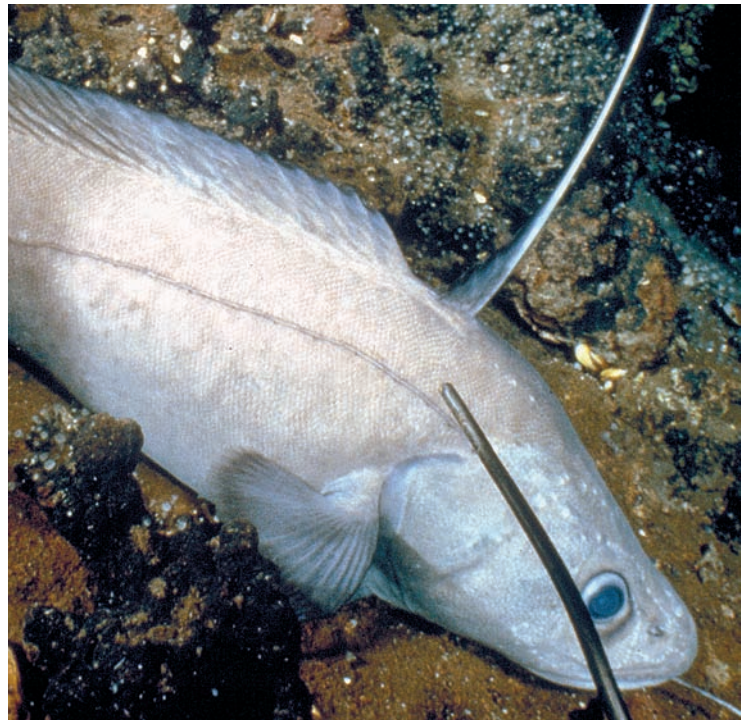
Distribution: General Eastern North Atlantic: in the Bay of Biscay and West of Ireland; Pacific Ocean: Sagami Bay, Japan; Mid-Atlantic Ridge: Menez Gwen. Depth range: 900-2300 m.



1: At Rainbow vent field; cruise Atos © Ifremer.



2: At Lucky Strike vent field; cruise Victor Première © Ifremer.



3: At Lucky Strike vent field; cruise Marvel © Ifremer.

References:

COHEN D.M. (1984) in WHITEHEAD P.J.P., BAUCHOT M.L., HUREAU J.-C., NIELSEN J. & E. TORTONESE (Eds.) Fishes of the North-eastern Atlantic and the Mediterranean **2**: 713-723.

SALDANHA L. & M. BISCOITO (1997) Bol. Mus. Munic. Funchal **49**(283): 189-206.

Chordata, Vertebrata, Osteichthyes, Ophidiiformes, Bythitidae

Cataetyx laticeps KOEFOED, 1927

Size: To about 650 mm standard length.

Color: Greyish brown.

Morphology: Body elongate. Head dorsoventrally flattened, with a strong opercular spine. Dorsal and anal fins confluent with caudal. Dorsal finrays 91-107; anal finrays 74-87; pectoral finrays 22-29; pelvic finrays 1.

Remarks: Specimens were collected with the submersible at Lucky Strike. A second species of this genus was recorded from Rainbow (a single specimen caught in a fish trap) and so far cannot be assigned to any of the previously known species of *Cataetyx*.

Biology: Benthic species. At Lucky Strike, specimens occurring often in pairs on sulphide deposits amongst shells of dead mussels, on the inner border of the hydrothermal field. Carnivorous. At Lucky Strike, feeding on hydrothermal vent crustaceans (crab *Segonzacia mesatlantica*, alvinocaridid shrimps). Viviparous.

Distribution: Generally known from a few localities in the Northeast Atlantic and western Mediterranean. Found also in the Azores and along West Africa to the Cape of Good Hope. Possibly also in the Gulf of Mexico. Mid-Atlantic Ridge: Menez Gwen, Lucky Strike, Mount Saldanha, Menez Hom, and Rainbow. Depth range: 900-2830 m.



1: At Lucky Strike, Tower Eiffel vent field; cruise Exomar © Ifremer.



4: At Lucky Strike, Tower Eiffel vent field; cruise Exomar © Ifremer.

References:

- NIELSEN J.G. (1984) in WHITEHEAD P.J.P., BAUCHOT M.L., HUREAU J.-C., NIELSEN J. & E. TORTONESE (Eds.) Fishes of the North-eastern Atlantic and the Mediterranean **3**: 1153-1157.
SALDANHA L. (1994) *Cybiurn* **18**(4): 460-462.
SALDANHA L. & M. BISCOITO (1997) *Bol. Mus. Municip. Funchal* **49**(283): 189-206.

Chordata, Vertebrata, Osteichthyes, Ophidiiformes, Bythitidae

Thermichthys hollisi (COHEN, ROSENBLATT & MOSER 1990)

Size: 218-304 mm standard length.

Morphology: A bythitid genus with joined vertical fins, short body and blunt snout. Body with imbricate scales and head naked. Mouth terminal, upper jaw ending well behind eye. Eye shorter than snout. Opercular spine strong. Palatine with teeth. Developed rakers on anterior arch 3. Rays in dorsal fin 122-124, anal fin 88, caudal fin 12, pectoral fin 36-37 and ventral fin 1. Vertebrae 76, precaudal 20-21.

Biology: One specimen was caught associated with hydrothermal vents. A specimen of *T. hollisi* was seen eating a zoarcid fish

(*Thermarces*-like) with half of its length, during cruise Biospeedo. In the video images, only the posterior half of the prey-fish has been swallowed and the anterior part is slowly moving.

Distribution: Known from two specimens from the Galapagos Spreading Center and Southern East Pacific Rise: 17°S, site Hobbs.



1 top: Specimen taken in vivo, onboard, dorsal view; bottom: dorsolateral view; East Pacific Rise: 17°S, site Hobbs, cruise Biospeedo © Ifremer.

References:

COHEN D.M., ROSENBLATT R.H. & H.G. MOSER (1990) Deep-Sea Res. A **37**: 267-283.
NIELSEN J.G. & D.M. COHEN (2005) Cybium **29**(4): 395-398.

Chordata, Vertebrata, Osteichthyes, Ophidiiformes, Ophidiidae

Ventichthys biospeedoi NIELSEN, MOLLER & SEGONZAC, in press

Size: Maximum standard length 282 mm.

Morphology: Body robust, very small, overlapping scales on head and body, thick skin, and four indistinct lateral lines; dorsal fin origin above tip of pectorals, basis of pelvic fins below hind margin of opercle; head broad with blunt snout; strong opercular spine covered by thick skin; upper jaw ends just behind eye; teeth granular, one median basibranchial tooth patch; anterior gill arch with 10-11 long rakers; number of rays in dorsal fin 80-89, caudal fin 8, anal fin 64-72, pelvic fin 2, pectoral fin 24-25; number of vertebrae 16-17+36.

Biology: Species abundant, living in shimmering vent fluids with temperatures between 2 and 7°C, among hydrothermal community: mytilid and clam bivalves, stalked barnacles. Necrophagous.

Distribution: East Pacific Rise: 17°S, site Oasis, but probably the same species occurs on northern and southern sites.



1: Couple of specimens caught at East Pacific Rise: 17°S, site Oasis; cruise Biospeedo, by P. Briand © Ifremer.



2: In situ view of several specimens on shimmering water, on mussel bed *Bathymodiolus thermophilus*, with stalked barnacle (*Neolepas* n. sp.) and sea anemone (*Chondrophellia* cf. *coronata*); East Pacific Rise: 17°S, site Oasis; cruise Biospeedo © Ifremer.

Reference:

NIELSEN J.G. & P.R. MOLLER & M. SEGONZAC (in press) Zootaxa.

J.G. NIELSEN, MOLLER P.R. & M. SEGONZAC

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Chordata, Vertebrata, Osteichthyes, Perciformes, Zoarcidae

Pachycara gymninium ANDERSON & PEDEN, 1988

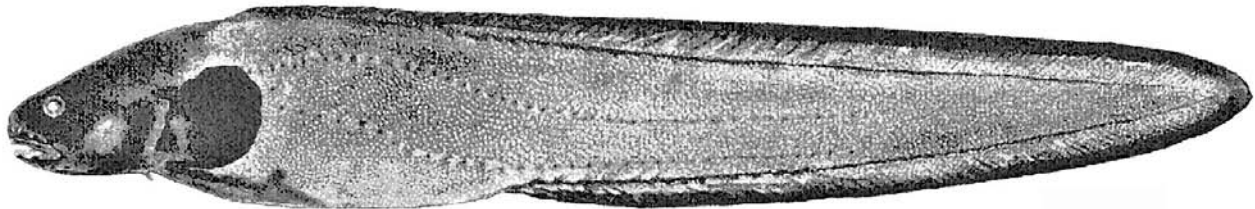
Size: Up to about 420 mm standard length.

Color: In life dark brown, head and pectoral fin darker, almost black. Margins of vertical fins and peritoneum black.

Morphology: Body short, deep, broader in cross section, when compared with its congeners. Head large, ovoid. Pelvic fins present (4.8-11.3% of head length). Mediolateral branch of lateral line originating in pectoral axil just posterior to vertical through pectoral base. Scales absent on nape, or, if present, not extending anterior to line connecting anterodorsal edges of gill slits. Vertebrae 102-109. Anal fin origin associated with vertebrae 27-31.

Biology: Benthic over brown and green mud bottoms. Carnivorous, eating amphipods, isopods and polychaetes. Oviparous, a gravid female caught in February.

Distribution: General: Northeast Pacific Ocean, off the Queen Charlotte Islands, British Columbia, south of Guadalupe Island, Mexico and Gulf of California. Juan de Fuca Ridge: Crypto Vent Field, Axial Seamount; Endeavour Segment; Hammond's Hell vent. Depth range: 1575-3219 m.



1: Holotype, 422 mm standard length; by P. Drukker-Brammall, 1988.

References:

- ANDERSON M.E. & A.E. PEDEN (1988) Proc. Calif. Acad. Sci. **46**(3): 83-94.
TUNNICLIFFE V., McARTHUR A.G. & D. MCHUGH (1998) Adv. Mar. Biol. **34**: 353-451.

Pachycara rima ANDERSON, 1989

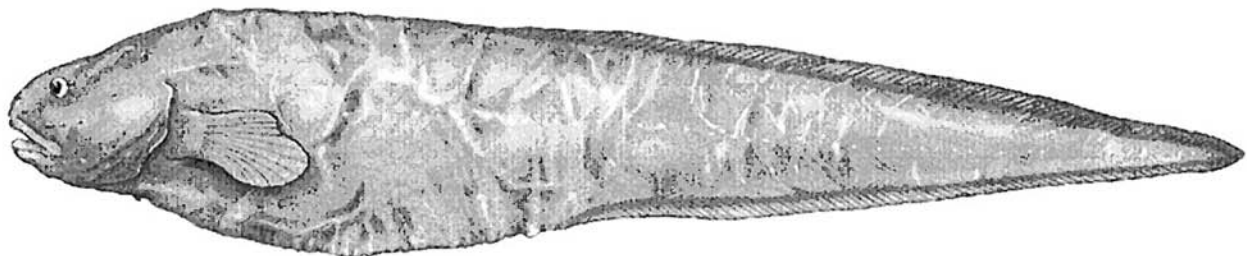
Size: Up to 403 mm standard length.

Color: Uniformly light brown, eye and abdomen bluish.

Morphology: Head deep, rounded, somewhat shorter than similarly sized congeners. Pelvic fins nubl-like, of two soft rays. Vertebrae 93. Dorsal-fin rays 86, anal-fin rays 70. Lateral line of mediolateral branch only. Dorsal fin origin associated with vertebra 8. Pseudobranchs absent.

Remark: Data available are not sufficient to determine whether this species is endemic to hydrothermal vent environments or not.

Distribution: Galapagos Spreading Center. Known only from the holotype.



1: Holotype, 403 mm standard length; © K. Klitz, 1989.

References:

- ANDERSON M.E. (1989) Proc. Calif. Acad. Sci. **46**(10): 221-242.
COHEN D.M. & R.L. HAEDRICH (1983) Deep-Sea Res. **30**(4A): 371-379.
COHEN D.M., ROSENBLATT R.H. & R.L. HAEDRICH (1985) Biol. Soc. Wash. Bull. **6**: 229-230.

Chordata, Vertebrata, Osteichthyes, Perciformes, Zoarcidae

Pachycara saldanhai BISCOITO & ALMEIDA, 2004

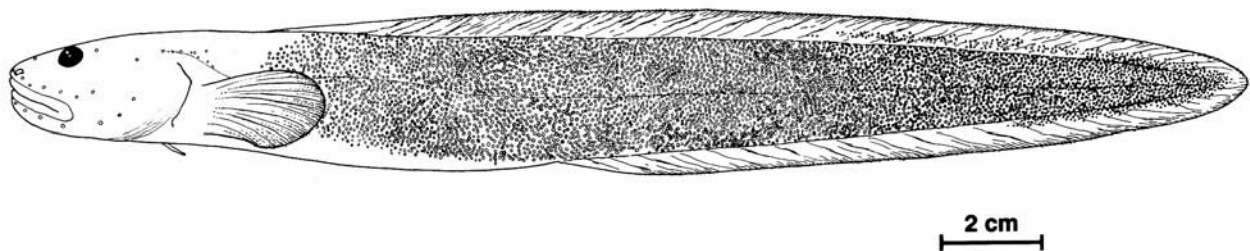
Size: Up to 256 mm total length.

Color: In life, light brownish grey, head, dorsal and anal fins darker. When preserved light brown, body with conspicuous whitish scale pockets.

Morphology: Body elongate and compressed, scaled. Mouth subterminal, no crests on chin. Dorsal fin origin over pectoral fins. Pelvic fins present. Lateral line with two branches. Dorsal fin rays 108-115, anal fin rays 90-95, vertebrae 117-123.

Biology: Benthic, not very numerous over sulphide deposits and among mussels inside the active field. Food: hydrothermal vent crustaceans.

Distribution: Up to present restricted to Mid-Atlantic Ridge: Rainbow.



1: Habitus; by H. Encarnação © MMF, 2002.



2: At Rainbow vent field; cruise Marvel © Ifremer.



3: At Rainbow vent field; cruise Marvel © Ifremer.

Reference:

BISCOITO M. & A.J. ALMEIDA (2004) Copeia **3**: 562-568.

M. BISCOITO & A.J. ALMEIDA

Denisia 18 (2006): 504

Chordata, Vertebrata, Osteichthyes, Perciformes, Zoarcidae

Pachycara thermophilum GEISTDOERFER, 1994

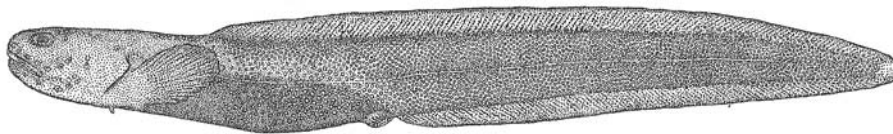
Size: Up to 388 mm total length.

Color: Light brown with pinkish hues. Border of fins darker.

Morphology: Eelpout shaped. Pelvic fin rays 2. Mediolateral lateral line only, originating just behind posterior-most postorbital pore. Scales absent on nape. Dorsal fin rays 105-107. Anal fin rays 86-89. Total vertebrae 113-114. Dorsal fin origin associated with vertebrae 7-8.

Biology: Benthic, in areas with active smokers, swimming in sea water 5-20°C, away from rocks and along smokers near crowds of shrimps *Rimicaris exoculata* and *Chorocaris chacei*. Carnivorous, feeding on hydrothermal vent shrimps.

Distribution: Mid-Atlantic Ridge: Snake Pit and TAG. Depth range: 3500-3700 m.



1: Habitus; by E. Heemstra © JLB Smith Inst. Ichth., 1996.



2: In situ at Snake Pit © Ifremer.



3: Habitus; by P. Briand © Ifremer.

References:

- ANDERSON M.E. & H. BLUHM (1996) Trans. R. Soc. Afr. **51**: 219-227.
GEISTDOERFER P. (1994) Cybium **18**(2): 109-115.
PARIN N.V. (1995) J. Ichthyol. **35**(9): 328-332.

Chordata, Vertebrata, Osteichthyes, Perciformes, Zoarcidae

Pyrolycus manusanus MACHIDA & HASHIMOTO, 2002

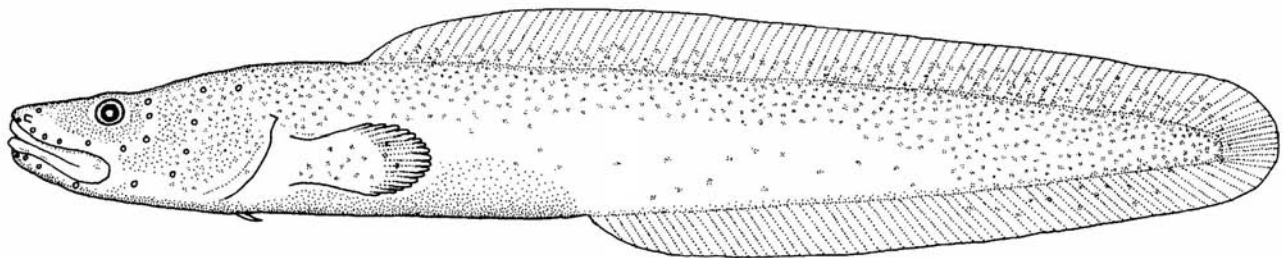
Size: Up to 170 mm total length.

Color: Light brown or beige.

Morphology: Eeelpout shaped. Suborbital bones 6, canal with 6-7 pores; flesh gelatinous; dermal papillae absent from head; gill slit large, extending ventrally beyond pectoral fin base; pelvic fins present, each with 2-3 rays; scales, lateral line and pseudobranch absent; pyloric caeca present; oral valve weak; interorbital pore absent; postorbital pores 3; occipital pores 1; palatopterygoid series weak; vomerine and palatine teeth present; pectoral fin rays 16-17; caudal fin rays 8-10; vertebrae 22-23+56-59=78-81.

Biology: Seen in areas close to active smokers and/or in and around diffuse vent fluids. Carnivorous, alvinocaridid shrimps were found in stomach contents of some specimens.

Distribution: Manus Back-Arc Basin: Pacmanus and Desmos sites.



1: Holotype; from MACHIDA & HASHIMOTO (2002).



2: At Manus Back-Arc Basin; cruise Bioaccess © JAMSTEC.



3: At Manus Back-Arc Basin; cruise Bioaccess © JAMSTEC.

References:

- HASHIMOTO J., OHTA S., FIALA-MÉDIONI A., AUZENDE J.-M., KOJIMA S., SEGONZAC M., FUJIWARA Y., HUNT J.-C., GENA K., MIURA T., KIKUCHI T., YAMAGUCHI T., TODA T., CHIBA H., TSUCHIDA S., ISHIBASHI J., HENRI K., ZBINDEN M., PRUSKI A., INOUE A., KOBAYASHI H., BIRRIEN J.-L., NAKA J., YAMANAKA T., LAPORTE C., NISHIMURA K., YEATS C., MALAGUN S., KIA P., OYAZU M. & T. KATAYAMA (1999) *InterRidge News* **8**: 12-18.
MACHIDA Y. & J. HASHIMOTO (2002) *Ichthyol. Res.* **49**: 1-6.

Thermarces cerberus ROSENBLATT & COHEN, 1986

Size: Up to 370 mm total length.

Color: Whitish or pinkish.

Morphology: Eelpout shaped, head and body laterally compressed, naked, covered with mucous, without scales. Lips distinct, thick and fleshy, continuous and smooth; oral valves obsolete. Head pores large and conspicuous. Occipital pores absent. Teeth in both jaws stout, conical and pointed. No lateral line. Pelvic fins absent. Pectoral fins small, rounded, with rays covered by thick skin. Vertebrae: 93-97.

Remarks: 1. Another close species, *T. andersoni* ROSENBLATT & COHEN, 1986, was described from Galapagos Rift, but its synonymy with *T. cerberus* is debated. 2. A new species of *Ther-*

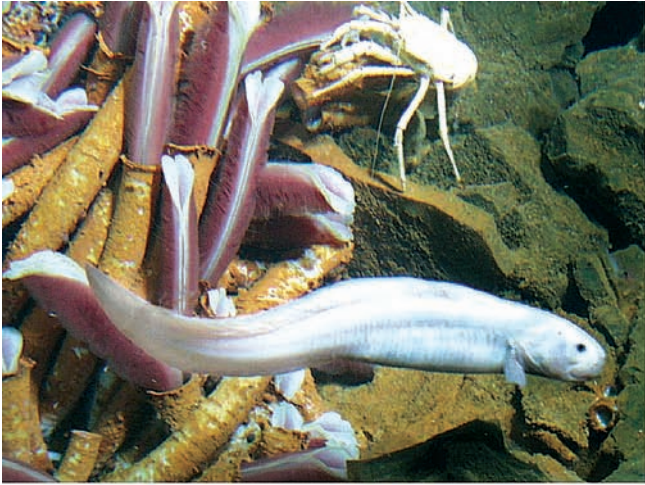
marces was found at East Pacific Rise: 9°N, showing strong morphological and color differences. It is being described elsewhere (M. Biscoito & M. Segonzac, unpublished data).

Biology: Observed in areas of active smokers, associated with *Riftia pachyptila* or on smoker walls. Very often stays in diffuse venting areas, amongst rubble. Carnivorous, feeding on small invertebrates, mainly amphipods and limpets, but also polychaetes. Occasionally they have been seen biting the gills of *R. pachyptila*.

Distribution: Galapagos Spreading Center; East Pacific Rise: 9°N, 13°N and 21°N; probably also at South East Pacific vent sites.



1: Fresh specimen collected at East Pacific Rise: 13°N; by P. Briand © Ifremer.



2: In situ specimens from East Pacific Rise: 13°N, among vestimentiferan (*Riftia pachyptila*) and mussel bed of *Bathymodiolus thermophilus*; cruise Phare © Ifremer.

References:

- GEISTDOERFER P. (1986) Bull. Mus. Natl. Hist. Nat. Paris, Sér. 4A **8**: 969-980.
GEISTDOERFER P. (1996) Oceanol. Acta **19**(5): 539-548.
ROSENBLATT R.H. & D.M. COHEN (1986) Trans. San Diego Soc. Nat. Hist. **21**: 71-79.

Chordata, Vertebrata, Osteichthyes, Scorpaeniformes, Liparidae

Careproctus hyaleius GEISTDOERFER, 1994

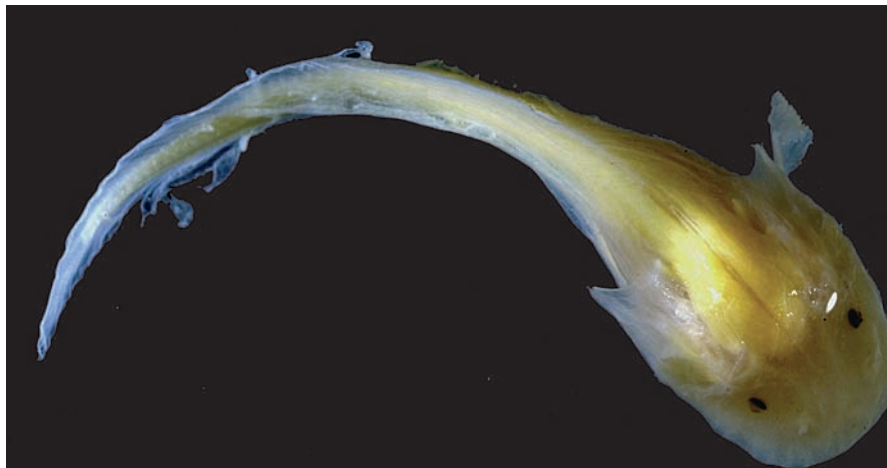
Size: Up to 112 mm standard length.

Color: Whitish to pinkish; translucent.

Morphology: Small-sized fish, tadpole-shaped, with a round and globular head accounting for 22% of total length. Branchial aperture small (32% of head length) and located in the upper part of the body. Teeth simple, hooked and all similar. Body flaccid, covered by thick layer of mucous. Bare and fragile skin. Pelvic fins modified into a sucking disc.

Biology: Frequently observed at the boundary of active vent fields and occasionally among *Riftia* or within diffuse venting areas.

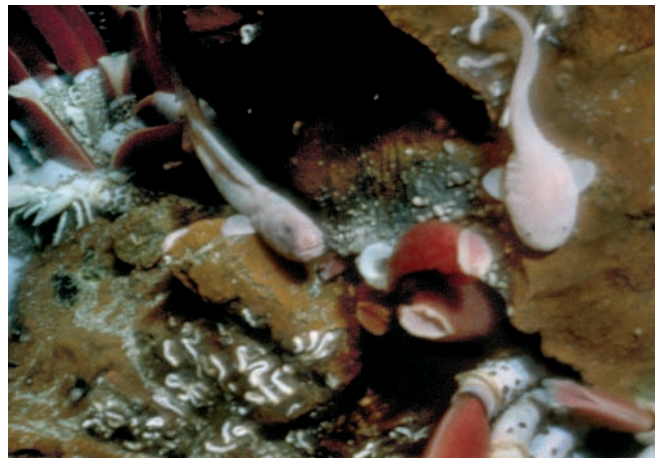
Distribution: East Pacific Rise: 9° N to 13° N.



1: Dorsal view; by P. Briand © Ifremer.



2: Ventral view; by P. Briand © Ifremer.



3: View in situ of a specimen (right), with a zoarcid *Thermarces cerberus*, tubeworms *Riftia pachyptila* and serpulids *Laminatubus alvini*; East Pacific Rise: 13°N. Cruise Hot 96 © Ifremer.

References:

BISCOITO M., SEGONZAC M., ALMEIDA A.J., GEISTDOERFER P., TURNSIPSEED M. & C. VAN DOVER (2002) Cah. Biol. Mar. **43**: 359-362.
GEISTDOERFER P. (1994) Cybium **18**(3): 325-333.

Chordata, Vertebrata, Osteichthyes, Scorpaeniformes, Sebastidae

Trachyscorpia cristulata echinata (KOEHLER, 1896) “spiny scorpionfish”

Size: Up to 500 mm standard length.

Color: Reddish, dorsal fin with bluish pigment.

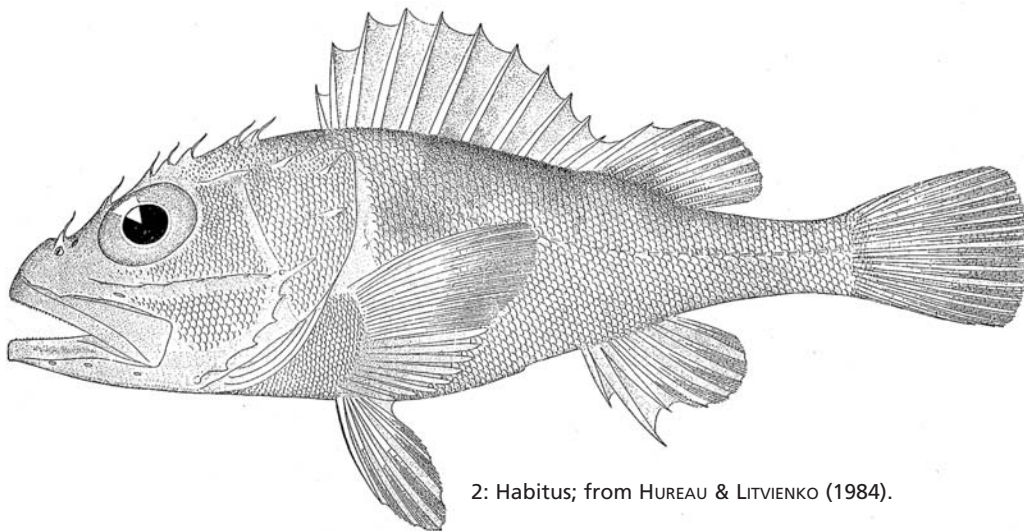
Morphology: Head large. Orbit large, much wider than snout length. Well developed spines on head. Dorsal fin ray with 12 spines and 8-9 rays. Pectoral fin with characteristic shape (longest rays near upper part of fin) and with 20-23 rays.

Biology: Benthic. At Menez Gwen on pillow lavas, off the active sites. Carnivorous. One anguilliform fish found inside the stomach of a specimen collected at Menez Gwen. Oviparous.

Distribution: General: Eastern Atlantic, from Ireland southward to Mauritania. Mid-Atlantic Ridge: Menez Gwen.



1: Menez Gwen; cruise Saldanha © Ifremer & FCT.



2: Habitus; from HUREAU & LITVIENKO (1984).

References:

HUREAU J.-C. & N.I. LITVINENKO, (1984) in WHITEHEAD P.J.P., BAUCHOT M.-L., HUREAU J.-C., NIELSEN J. & E. TORTONESE (Eds.) *Fishes of the North-eastern Atlantic and the Mediterranean* **3**: 1211-1229.

SALDANHA L. & M. BISCOITO (1997) *Bol. Mus. Municip. Funchal* **49**(283): 189-206.

Coryphaenoides armatus (HECTOR, 1875) "armed grenadier"

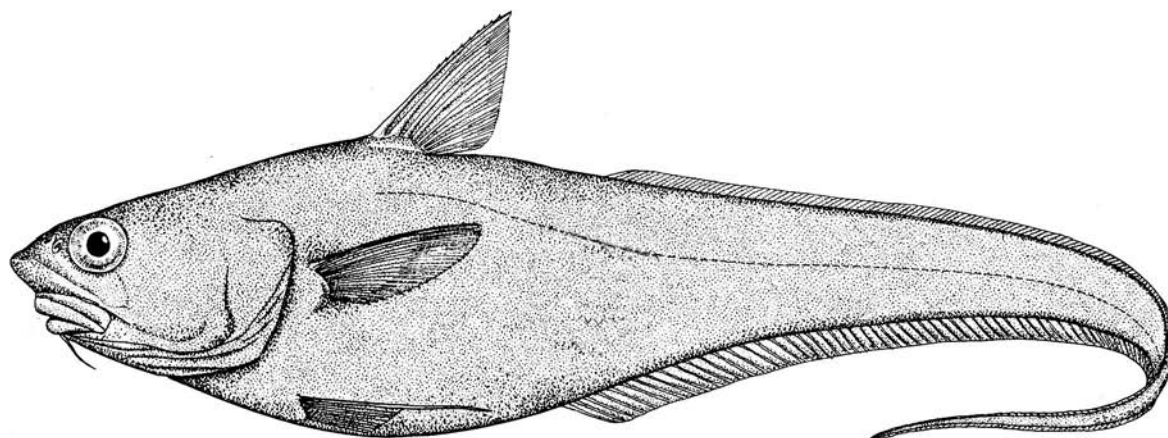
Size: To at least 800 mm total length.

Color: Generally brownish to reddish brown, fin membranes brownish, mouth and gill cavity blackish.

Morphology: Ventral parts of head mostly naked, including snout, most ventral surfaces of suborbital space, ventral preopercular margin and anterior part of mandible. Premaxillary teeth in one or two rows, one row on mandible. Inner gill rakers on first arch 11 to 14. First dorsal fin with two spines and 8-10 rays, pectoral fins rays I+17-21. Pelvic fins 10. Anus close to anal fin origin. No light organ.

Biology: Benthopelagic. Carnivorous, feeding on benthic animals (amphipods, isopods, cumaceans), also pelagic animals (mysids, euphausiids and other crustaceans, echinoderms, cephalopods and fishes). Two specimens were collected with bottom long lines at Lucky Strike and one at Snake Pit, the latter had *Rimicaris exoculata* in its stomach. Oviparous.

Distribution: General: Worldwide. Marginal to the Southern Ocean. Mid-Atlantic Ridge: Lucky Strike, Snake Pit, Rainbow; Galapagos Spreading Center; East Pacific Rise: 9°N. Depth range: 282-4700 m.



1: Habitus; from GÜNTHER (1887).



2: In situ from Mid-Atlantic Ridge; cruise Atos © Ifremer.

References:

- COHEN D.M. (1990) in QUÉRO J.-C., HUREAU J.-C., KARRER C., POST A. & L. SALDANHA (Eds.) Check-list of the Fishes of the Eastern Tropical Atlantic **2**: 541-563.
- COHEN D.M., T. INADA, T. IWAMOTO & N. SCIALABBA (1990) FAO Species Catalogue. FAO Fish. Synop. **125**(10): 1-442.
- GEISTDOERFER P. (1988) Oceanol. Acta, **8** n° sp.: 125-130.
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- GÜNTHER A. (1887) Challenger Reports, Zool. **22**: 1-268.
- MARQUES A & A.J. ALMEIDA (2000) InterRidge News **9**(2): 16-17.
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