Comparison of some interesting molluscs, trawled by the Belgian fishery in the Bay of Biscay, with similar representatives from adjacent waters: part IV

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Abstract: In the fourth part of the report on the molluscs collected by the Belgian fishery during the previous decade in the Bay of Biscay, a second series of bivalves is briefly described, figured and compared with similar specimens from North Atlantic waters, the Mediterranean Sea or West Africa.

Abbreviations:
FN: private collection of Frank Nolf.
H.: height.
JPK: private collection of Jean-Paul Kreps.
L.: length.
LV: left valve.
PEMARCO: Pêche Maritime du Congo.
RBINS: Royal Belgian Institute for Natural Sciences, Brussels, Belgium.
RV: right valve.

Description of species:

NUCULANIDAE

***Nuculana commutata* (Philippi, 1844)**
Plate LXVIII, Figs 397-400

= *Nucula commutata* Philippi, 1844
= *Arca fragilis* Chemnitz, 1784
= *Lembulus deltoideus* Risso, 1826
= *Nucula acuminata* Eichwald, 1853

Range: From the Bay of Biscay (Pl. LXVIII, Figs 399-400), W France, N Spain south to Angola, W Africa. More common in the Mediterranean Sea (Pl. LXVIII, Figs 397-398).

It lives in organic detritus bottoms and in mud from 40 to 200 m.

Shell: Solid with heavy concentric ridges and a yellowish-green periostracum. Distinguished from similar species such as *Nuculana pella* (Linnaeus, 1767) by the lack of a deep incision on the rostrum.

YOLDIIDAE

***Yoldiella philippiana* (Nyst, 1845)**
Plate LXVIII, Figs 401-405

= *Nucula philippiana* Nyst, 1845
= *Nucula tenuis* Philippi, 1836
= *Leda pygmaea* Münster, 1835
= *Yoldiella lenticula tomlini* Winckworth, 1932
= *Yoldiella frigida mediterranea* Nordsieck, 1974

Range: From Norway (Pl. LXVIII, Fig. 404), the British Isles, the Bay of Biscay (Pl. LXVIII, Figs 401-403), the Iberian Peninsula, south to W Africa and into the Mediterranean (Pl. LXVIII, Fig. 405).

Shell: The margins are not crenulated and the shells are covered by a thin periostracum.

***Yoldiella* cf. *propinqua* (Leche, 1878)**
Plate LXVIII, Fig. 406

= *Yoldia propinqua* Leche, 1878
= *Yoldia pygmaea* var. *symmetrica* Friele, 1878
= *Portlandia persei* Messjatsev, 1931

Range: *Yoldiella propinqua* is widespread in the north Atlantic and Arctic waters from western Greenland to Norway and the Kara Sea (type locality) and eastwards to the Laptev Sea. It is considered a true northern species from deep water within the Norwegian fauna, where it is reported from 400 to 1100 m (Killeen & Turner, 2009).

Shell: A rather solid shell, but slightly translucent.

This is the shell reported by Vanwalleghem *et al.* (2007), yet erroneously identified as *Microgloma pusilla* (Jeffreys, 1879).

Because of a lack of enough material we are unable to definitively assign it to a certain species. The umbo, slightly anterior to the midline, is broad and prominent, and the dorsal margin is slightly convex and gently sloping. Moreover, the shell shows a moderate tumidity. All these characteristics are typical of *Y. propinqua*, but juvenile specimens of *Yoldiella philippiana* (Nyst, 1845), a species closely related to the former, possess the same features and are not elongated posteriorly as in the adult ones. If this specimen should really prove to belong to *Y. propinqua*, this would result in a serious range extension of this typically northern species.

MYTILIDAE

***Idas cylindricus* Pelorce, 2009**
provisionally included in "*Idas*" s.l.
Plate LXIX, Figs 407-408

Range: off Sète, Hérault, Gulf of Lion (NW of the Mediterranean Sea), S France (type locality).
Range extension: South of La Rochelle, Bay of Biscay, W France.

This species, associated with old sunken whale bones, has only been known from the type locality up to now. However, Belgian fishermen collected a number of shells at a depth of 180 m south of La Rochelle in the Bay of Biscay in July 2005, a serious range extension into the East Atlantic (Pl. LXIX, Figs 407-408). These specimens were juvenile and they were mixed with representatives of *I. simpsoni* with the same length (between 5-10 mm) (Pl. LXIX, Figs 409-410). They were readily recognized through the typical rectangular outline, the thick brown internal ligament not exceeding the outer border of the shell, the markedly anterior position of the umbo and the height which is about half of the length (in our specimens the H/L ratio is about 0.55). Juvenile specimens of *I. cylindricus* have the dorsal margin nearly parallel with the ventral margin.

On Pl. LXXI, Figs 421-422 we show an unidentified shell, maybe a specimen of ***Idas ghisottii* Warén & Carrozza, 1990**, another representative of 'typically Mediterranean' *Idas*-species or possibly an *Adipicola* sp., knowing that the genera *Idas* and *Adipicola* are very close. This sublittoral shell was collected by Belgian fishermen in the Celtic Sea, off SW England, UK. It could be the first report of *Idas ghisottii* in E Atlantic waters which would mean a very important range extension beyond the Mediterranean Sea. *I. ghisottii* has a shorter and finer ligamental area than *I. cylindricus*. The anterior outline is also very different. *I. ghisottii* is very elongate and has a very low H/L ratio (our specimen: 0.30).
Pelorce & Poutiers (2009) correctly remarked that the *Idas*-group in the East Atlantic is not fully known and certainly needs a revision.

***Idas simpsoni* (Marshall, 1900)**
classified as "*Idas*" (*s.l.*) *simpsoni* (Marshall, 1900) by Pelorce & Poutiers (2009)
Plate LXIX, Figs 409-412; Plate LXX, Figs 413-416; Plate LXXI, Figs 417-420

= *Myrina simpsoni* Marshall, 1900
= *Adipicola pelagica* Oskarsson, 1982

Range: from the Shetland Islands (Pl. LXX, Pl. 415-416), Norway, southern Iceland along the British Isles (Pl. LXXI, Figs 419-420) to the Bay of Biscay (Pl. LXIX, Figs 409-412; Pl. LXX, Figs 413-414) and the Iberian Peninsula into the Mediterranean Sea (Pl. LXXI, Figs 417-418).

This species has an exceptional habitat as it mainly lives on the skeletons of dolphins and skulls of whales, where it lies attached to the sutures by its byssus. Sporadically found on sunken pieces of wood. Reported from sublittoral depths of 70 m to bathyal depths of 350-430 m.

GLYCYMERIDIDAE

***Glycymeris glycymeris* (Linnaeus, 1758)**
Plate LXXII, Figs 423-428; Plate LXXIII, Figs 429-434; Plate LXXIV, Figs 435-440; Plate LXXV, Figs 441-446; Plate LXXVI, Figs 447-452; Plate LXXVII, Figs 453-454 & 457

= *Arca glycymeris* Linnaeus, 1758
= ? *Arca nummaria* Linnaeus, 1758
= *Glycymeris orbicularis* da Costa, 1778
= *Pectunculus marmoratus* Lamarck, 1819
= *Arca minima* Turton, 1819 [non Schröter, 1802]
= *Pectunculus dautzenbergii* de Gregorio, 1892

Range: It is distributed from Norway and the Baltic Sea south to the British Isles (Pl. LXXIII, Figs 431-434), Normandy and Brittany (France) where it is abundant (Pl. LXXIV, Figs 435-440; Pl. LXXV, Figs 441-446; Pl. LXXVI, Figs 447-452; Pl. LXXVII, Figs 453-454), the Bay of Biscay (Pl. LXXII, Figs 423-428), the Atlantic Coast of Morocco, the Mediterranean Sea (Pl. LXXIII, Figs 429-430) and even from Madeira and the Canary Islands.

It lives on sand, mud and gravel bottoms from offshore down to about 75 m. In literature it is also reported from 1200 m.

Specimens from the Mediterranean can be confused with *Glycymeris pilosa* (Linnaeus, 1767) (Pl. LXXVII, Figs 455-456 & 458).
Most authors consider both as the same species and merely regard the latter as a synonym, a subspecies or a form of *Glycymeris glycymeris*. This is particularly due to the high degree of variability in this species, which inspired some authors to create different names for the many forms, e.g. *Pectunculus glycymeris* var. *bavayi* Bucquoy, Dautzenberg & Dollfus, 1891; *P. pilosus* var. *neapolitana* B.D.D., 1891; *P. glycymeris* var. *obscura* B.D.D., 1891; *P. pilosus* var. *subtruncata* B.D.D., 1891; *P. pilosus* var. *tumida* B.D.D., 1891; *P. pilosus* var. *costatiuscula* de Gregorio, 1892; *P. pilosus* var. *protumida* Monterosato, 1892; *P. pilosus* var. *subtransversa* de Gregorio, 1892; *P. glycymeris* var. *typica* Monterosato, 1892; *P. glycymeris* var. *lineolata* Dautzenberg, 1893; *P. glycymeris* var. *zigzag* Dautzenberg, 1893.
Although it is beyond the purpose of this paper to comment the identity of *G. glycymeris* and *G. pilosa*, we hereby briefly mention the main differences between both species:
- *G. pilosa* is restricted to the Mediterranean, whereas *G. glycymeris* is mainly an East Atlantic species, which is occasionally found in the Mediterranean Sea.
- *G. pilosa* grows larger, attaining a size of 80-95 mm.
- *G. pilosa* generally has a more elongated, more globose shape with the umbos more accentuated. The hinge and ligamentary area are wider and more developed. It is dark-violet inside, while *G. glycymeris* is mostly creamy-white with few brown blotches. We agree with Huber (2010) to state that colour and form are unreliable features. Both *G. glycymeris* and *G. pilosa* can possess a thick and rounded shell (*G. pilosa* var. *tumida* B.D.D., 1891: Pl. LXXVII, Fig. 456) as well as a thin flattened shell (*G. pilosa* var. *neapolitana* B.D.D., 1891: Pl. LXXVII, Fig. 455). Both may be white or brownish inside.
- *G. glycymeris* is more variable in shape and colour, sometimes valves have a ribbed compression. Specimens are generally equilateral with the beaks in the middle, especially in Brittany, France. Shells from the English Channel and the Irish Sea are typically asymmetric and slightly oblique. In fact Linnaeus used the name '*glycymeris*' for specimens which are slightly inequilateral and the name '*pilosa*' for those which are equilateral "testa suborbiculata aequilatera, pilosa, simillima *A. glycymeris*, sed testa perfecte regularis *A. glycymeris* vero parum irregularis est." We remarked that juvenile specimens of *G. glycymeris* are perfectly equilateral mostly with a creamy-white interior. Adult shells tend to become more inequilateral and they become brownish inside. Nearly the same remarks can be made about *G. pilosa*, except that it is darker coloured both interiorly and exteriorly.
- According to Huber (2010) true *G. pilosa* should possess an almost prosodetic ligament (entirely on the anterior side of the umbones). In fact this is rarely so, except in some juvenile specimens. The prosodetic condition of the ligament disappears by age. We are not convinced this proves a reliable characteristic. However, *G. glycymeris* has a central umbo and a more equilateral shell.
- The most distinctive characteristic seems to be the structure of the periostracum: *G. pilosa* has a thicker velvet coating with series of **longer (sometimes curled or hooked) hairs** (Pl. LXXVII, Fig. 458), whereas *G. glycymeris* has a **periostracum densely crowded with short hairs** (Pl. LXXVII, Fig. 457). B.D.D. (1891) remarked that the valves of *G. pilosa* are still covered with a smooth light brown epidermis as soon as the periostracum is removed.

After all, we can conclude that the differences between both species are rather minor and not well defined. It is clear that an intensive study at the DNA and molecular level of these two (?) enigmatic species will be needed in the future.

PTERIIDAE

***Pteria hirundo* (Linnaeus, 1758)**
Plate LXXVIII, Figs 459-461; Plate LXXIX, Figs 462-464; Plate LXXX, Figs 465-467

= *Mytilus hirundo* Linnaeus, 1758
= *Avicula communis* Schumacher, 1817
= *Avicula tarentina* Lamarck, 1819
= *Avicula falcata* Lamarck, 1819
= *Avicula aculeata* Risso, 1826
= *Avicula anglica* Brown, 1827
= *Avicula brittanica* Leach, 1852
= *Avicula vitrea* Reeve, 1857
= *Avicula jeffreysi* Dunker, 1879
= ? *Avicula versicolor* Dunker, 1872
= *Avicula hirundo* var. *nitida* Verrill, 1882

Range: From the British Isles, southwards to the Bay of Biscay (Pl. LXXVIII, Figs 459-461), the Iberian Peninsula and W Africa (as far as Angola) (Pl. LXXX, Figs 465-467), the Canaries, the Azores and into the Mediterranean Sea (Pl. LXXIX, Figs 462-464), where it is much more common than in the eastern Atlantic. It also occurs in the West Indies and can be regarded as a panatlantic species.

Specimens of *Pteria hirundo* live attached to all kind of bottoms (mud, sand, gravel, coralligenous assemblages or on gorgonians such as *Sphaerococcus coronopifolius* Stackhouse, 1797) by their byssus threads from offshore (10 m) to considerable depths (350-1550 m). Specimens of *P. hirundo* form important banks at a depth of 130 m, especially in the Bay of Biscay.

Shells can be smooth or scaled and the wings can show individual differences in length, especially the posterior ear. The outline can be more or less oblique.

PINNIDAE

***Atrina fragilis* (Pennant, 1777)**
Plate LXXXI, Figs 468-469; Plate LXXXII, Figs 470-471; Plate LXXXIII, Figs 472-473; Plate LXXXIV, Figs 474-475

= *Pinna ingens* Pennant, 1777
= *Pinna muricata* Donovan, 1799 [non L., 1758]
= *Pinna laevis* Donovan, 1803
= *Pinna elegans* Brown, 1827
= *Pinna truncata* Philippi, 1844
= *Pinna aradasii* Maravigna, 1851
= *Pinna gemmellari* Maravigna, 1851
= *Atrina pectinata* Auctt. [non L., 1758]

Range: From the southern coasts of the British Isles (Pl. LXXXII, Fig. 470; Pl. LXXXIV, Fig. 474), the Bay of Biscay (Pl. LXXXI, Figs 468-469) southwards to the Iberian Peninsula and into the Mediterranean Sea (Pl. LXXXII, Fig. 471; Pl. LXXXIII, Figs 472-473; Pl. LXXXIV, Fig. 475).
This fan-mussel lives in bottoms of mud, sandy mud and fine gravel, attached to small stones. It can be found from sublittoral waters (50 m) to bathyal depths of 600 m.

Shells are variable in shape and pattern. They are usually smooth, but occasionally with 5-10 ribs, or covered with small scales (*A. fragilis* var. *spinulosa* Bucquoy, Dautzenberg & Dollfus, 1890) (Pl. LXXXIV, Fig. 475). Some specimens may even have more ribs and possess a narrower ventral side, resulting in a more elongate outline (*Pinna fragilis* var. *angusta* Weinkauff, 1867) (Pl. LXXXIII, Fig. 473; Pl. LXXXIV, Fig. 474).

GRYPHAEIDAE

***Neopycnodonte cochlear* (Poli, 1795)**
Plate LXXXV, Figs 476-479; Plate LXXXVI, Figs 480-482; Plate LXXXVII, Figs 483-486; Plate LXXXVIII, Figs 487-489; Plate LXXXIX, Figs 490-491; Plate LXXXX, Figs 492-497; Plate LXXXXI, Figs 498-501; Pl. LXXXXII, Figs 502-505; Plate LXXXXIII, Figs 506-510

= *Ostrea cochlear* Poli, 1795
= *Ostrea excavata* Lamarck, 1819
[non Fabricius, 1779]
= *O. italica* Defrance, 1821
= *O. crocea* Dufo, 1840
= *O. cucullina* Deshayes in Mailaard, 1863
= *Pycnodonte floribunda* Monterosato, 1916
= *O. musashiana* Yokoyama, 1920
= *O. alveatula* Jousseaume in Lamy, 1925
= *Ostrea hiranoi* Baker & Spicer, 1930
= *O. laysana* Dall, Bartsch & Rehder, 1938
= *O. kauaia* Dall, Bartsch & Rehder, 1938
= *Ostrea* (*Ostreola*) *laterostrata* Fenaux, 1942

Range: From Iceland, the English Channel (Pl. LXXXXII, Figs 502-505; Pl. LXXXXIII, Figs 506-510) into the East Atlantic (Pl. LXXXV, Figs 476-479; Pl. LXXXVI, Figs 480-482) southwards to Angola and into the Mediterranean Sea (Pl. LXXXVII, Figs 485-486; Pl. LXXXVIII, Figs 487-489; Pl. LXXXIX, Figs 490-491), where it is a common species. Also known from Madeira, the Canaries (Pl. LXXXVII, Figs 483-484) and the Azores. Specimens are found on both sides of the Atlantic Ocean (Carolina, Florida, Spain, Portugal and the Bay of Biscay with Ireland as its northern limit). This species has even been recorded from Japan. In fact, it has a worldwide distribution.

N. cochlear lives on any substrate chiefly in deeper water (coral, cables, wrecks from 45 m down to as deep as 2,000 m) (Plate LXXXIX, Figs 490-491) on muddy gravel bottoms but even in crevices in the sublittoral area and on drifting objects or on other shells such as *Charonia lampas* (Linnaeus, 1758) in the Bay of Biscay (Plate LXXXV, Figs 476-479; Pl. LXXXVI, Figs 480-482) and the Mediterranean Sea.
Occasionally clusters containing 5-10 specimens are trawled (Plate LXXXIX, Figs 490-491).

The genus *Neopycnodonte* (family GRYPHAEIDAE) was monospecific (Harry, 1985) for a long time. Recently Gofas et al. (2009) described *Neopycnodonte zibrowii* as the largest species in this genus (up to ca. 20 cm dorso-ventrally, to over 12 cm antero-posteriorly), living at a depth of about 500 m in the NE Atlantic (Azores and Bay of Biscay).

Several juvenile oysters attached to a plastic box washed ashore on the local beach of Koksijde (Belgium), on 23 January 2005 (Pl. LXXXX, Figs 492-497; Pl. LXXXXI, Figs 498-501). These specimens were remarkable by their unique magenta and ochre-brown colour. Some of them had completely taken the cubic form of the substrate.

Careful study by marine biologist F. Kerckhof (Oostende, Belgium) revealed that the specimens belonged to *Neopycnodonte cochlear* (Poli, 1795), occasionally attached to different drifting objects washed ashore in the southern North Sea (Belgian, Dutch and German coasts) (Visser *et al*., 1967; Slager, 1981; Adema, 1987 & 1988; Kerckhof, 1995). Fossil shells of this species are frequently found in Zeeland (The Netherlands). Later on, in August 2006, more specimens were found by F. Kerckhof in trawl nets in the harbour of Roscoff (Brittany, France) (Pl. LXXXXII, Figs 502-505; Pl. LXXXXIII, Figs 506-510). These specimens were also juvenile, pinkish cream coloured, very flattened and often very angled in shape. The latter characteristic could be explained by the very thin structure of the shell established in this species, resulting in a perfect adaptation to the substrate. None of them possessed the typical 'cupped' form of the species.

We obtained confirmation of the identification when F. Kerckhof was traveling along the Galician coast (Bay of Biscay, North Spain). He found several oysters on cables and large barnacles, which appeared to have been located on the bottom of the sea during a certain period. Specimens with the 'cupped' form were found among flattened ones, very similar to those found in Koksijde and Roscoff. Again the typical characteristics were present: the magenta colour of the shell, the very fragile thin structure and both flattened and cupped forms. Anyway, in the genus *Crassostrea* 'cupped' as well as 'flattened' specimens exist. After careful study we found that all shells had the following features in common: the typical row of chomata in the area of the hinge, the vesicular structure at the margins of the lower valve and especially the position of the subcircular muscle scar. Moreover, a striking feature was the reddish orange colour of the attaching muscle in all studied specimens. These observations were confirmed by comparing the juvenile specimens with other individuals attached to *Charonia lampas* (Linnaeus, 1758) from the Bay of Biscay (Pl. LXXXV, Figs 476-479; Pl. XXXVI, Figs 480-482). Several of them were rather flattened as well and every once in a while they possessed traces of the same magenta colour, even when they had thoroughly been cleaned with bleaching agent.

Apparently, specimens of *Neopycnodonte cochlear* (Poli, 1795) moved northwards in the eastern Atlantic and even into the English Channel and the North Sea during the previous decades. Until now only small juvenile specimens have been obtained from fishery or found on different substrates washed ashore in this area. A particular characteristic of the shells is the magenta colour and the fact that they perfectly adopt the form of the substrate even if it is angular.

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References:

Adema, J.P.H.M., 1987. Een glazen drijver van een visnet aangespoeld op het strand tussen Katwijk en Noordwijk. *Het Zeepaard*, **47**(6): 141-152.

Adema, J.P.H.M., 1988. Een glimp van de Azoren op het strand van Katwijk. *Grasduinen*, januari 1988: 36-38.

Allen, J.A., 1954. A Comparative Study of the British Species of *Nucula* and *Nuculana*. *J. Mar. biol. Ass. U.K*., **33**: 457-472.

Ardovini, R. & Cossignani, T., 2004. *West African Shells*. L'Informatore Piceno. Ancona. 319 pp.

Bouchet, Ph. & Rocroi, J.-P., Bieler, R., Carter, J.G. & Coan, E.V., 2010. Nomenclator of Bivalve Families with a Classification of Bivalve Families. *Malacologia*, **52**(2): 1-184.

Bucquoy, E., Dautzenberg, Ph. & Dollfus, G., 1887-1898. *Les Mollusques marins du Roussillon,* t. II*: Pélécypodes*. 884 pp., 99 plates.

CLEMAM. Check List of European Marine Molluscs. http://www.somali.asso.fr/clemam

Dautzenberg, Ph., 1891. Campagne scientifique du yacht l' «Hirondelle» en 1886: Contribution à la faune malacologique du Golfe de Gascogne. *Mémoires de la Société Zoologique de France*, IV, 604-619, pl. XVI-XVII.

Dautzenberg, Ph., 1927. Mollusques provenant des campagnes scientifiques du Prince Albert Ier de Monaco dans l'Océan Atlantique et dans le Golfe de Gascogne. *Résultats des Campagnes Scientifiques accomplies sur son yacht par Albert Ier Prince Souverain de Monaco*, Fascicule LXXII: 1-400, 9 pls.

Dautzenberg, Ph. & Fischer, H., 1896. Campagnes scientifiques du Prince de Monaco. Dragages effectués par l' «Hirondelle» et la «Princesse Alice», 1888-1895. Gastéropodes. *Mémoires de la Société Zoologique de France*, IX, 395-498, pl. XV-XXII.

Dautzenberg, Ph. & Fischer, P.-H., 1925. Les Mollusques marins du Finistère et en particulier de la région de Roscoff. *Travaux de la Station Biologique de Roscoff*, fasc. 3, 180 pp. Paris.

Delongueville, C. & Scaillet, R. 2009. *Neopycnodonte zibrowii* Gofas, Salas & Taviani in Wisshak et al., 2009 dans le Golfe de Gascogne. *Novapex/Société*, **10**(1): 9-12.

Giannuzzi-Savelli, R., Pusateri F., Palmeri, A., Ebreo C. & Coppini M., Margelli, A., Bogi C., 2001. *Atlas of the Mediterranean Seashells,* Vol. 7 *(Bivalvia: Protobranchia – Pteriomorpha).* Roma. 246 pp.

Gofas, S., Salas, C. & Taviani, M. *in* Wisshak, M., López Correa, M., Gofas, S., Salas, C., Taviani, M., Jakobsen, J. & Freiwald, A., 2008. Shell architecture, element composition, and stable isotope signature of the giant deep-sea oyster *Neopycnodonte zibrowii* sp. n. from the NE Atlantic. *Deep-Sea Research I* (2008), doi:10.1016/j.dsr.2008.10.002.

Harry, H.W., 1985. Synopsis of the supraspecific classification of living oysters. (Bivalvia; Gryphaeidae and Ostreidae). *Veliger*, **28**: 121-158.

Huber, M., 2010. *Compendium of Bivalves*. ConchBooks. Hackenheim. 901 pp.

Kerckhof, F., 1995. Voor het eerst aangespoeld: *Pycnodonte cochlear*, een zuidelijke oester. *De Strandvlo*, **15**(4): 141-148.

Killeen, I.J. & Turner, J.A., 2009. *Yoldiella* and *Portlandia* (Bivalvia) from the Faroe-Shetland Channel and Rockall Trough, Northeast Atlantic. *Journal of Conchology*, **39**(6): 733-778.

Millard, V., 2008. *Classification of Mollusca. A classification of Worldwide Mollusca.* Vol. 2. Fourth Edition. Clareinch. 1140 pp.

Nicklès, M., 1955. Scaphopodes et Lamellibranches récoltés dans l'Ouest Africain. In: *Atlantide Report, n°3, Scientific Results of the Danish Expedition to the Coasts of Tropical West Africa 1945-1946*. Copenhagen. 93-237, figs 1-41.

Nolf, F. & Kreps, J.-P., 2008. Comparison of some interesting molluscs, trawled by the Belgian fishery in the Bay of Biscay, with similar representatives from adjacent waters: part I. *Neptunea*, **7**(3): 1-33.

Nolf, F. & Kreps, J.-P., 2009. Comparison of some interesting molluscs, trawled by the Belgian fishery in the Bay of Biscay, with similar representatives from adjacent waters: part I. *Neptunea*, **8**(3): 1-28.

Nolf, F. & Kreps, J.-P., 2010. Comparison of some interesting molluscs, trawled by the Belgian fishery in the Bay of Biscay, with similar representatives from adjacent waters: part III. *Neptunea*, **9**(1): 1-34.

Oliver, P.G., 1992. *Bivalved Seashells of the Red Sea*. National Museum of Wales. Verlag Christa Hemmen, Wiesbaden. 330 pp.

Pelorce, J. & Poutiers, J.-M., 2009. Une nouvelle espèce de Bathymodiolinae (Mollusca, Bivalvia, Mytilidae) associée à des os de baleine coulés en Méditerranée. *Zoosystema*, **31**(4): 975-985.

Poppe, G.T. & Goto, Y., 1993. *European Seashells* (vol. II). Verlag Christa Hemmen. Wiesbaden. 221 pp.

Repetto, G., Orlando, F. & Arduino, G., 2005. *Conchiglie del Mediterraneo*. Torino. 392 pp.

Slager, G., 1981. Het C.S. verslag. *Het Zeepaard*, **41**(1): 1-21.

Sneli, J.-A., Schiøtte, T., Jensen, K.R., Wikander, P.B., Stokland, Ø. & Sørensen, J., 2005. The Marine Mollusca of the Faroes. *Annales Societatis Scientarium Færoensis*, Supplementum XXXXII. Tórshavn. 190 pp.

Stenzel, H.B., 1971. *Treatise on Invertebrate Paleontology*. Mollusca 6, Bivalvia, Oysters, Part N, vol. 3 (of 3): 953-1224. The Geological Society of America and the University of Kansas. Boulder, Colorado.

Tebble, N., 1976. *British Bivalve Seashells. A Handbook for Identification*. 2nd edition. Edinburgh. 212 pp., 12 plates.

Vanwalleghem, R., Verhaeghe, Y. & Swinnen, F., 2007. Seashells taken by Belgian trawlers in the eastern Bay of Biscay, Western France. *Xenophora*, **120**: 10-14.

Vaught, K.C., 1989. *A classification of the living Mollusca*. American Malacologists. Melbourne, Florida. xii + 189 pp.

Visser, G.J.M., Reydon, J.P. & van der Wal, M.J., 1967. Bijdrage tot de kennis van de mariene mollusken van het eiland Texel. *Het Zeepaard*, **27**(4): 57-97.

Warén, A. & Carrozza, F., 1990. *Idas ghisottii* sp. n. a new mytilid bivalve associated with sunken wood in the Mediterranean. *Bollettino Malacologico*, **26**(1-4): 19-24.

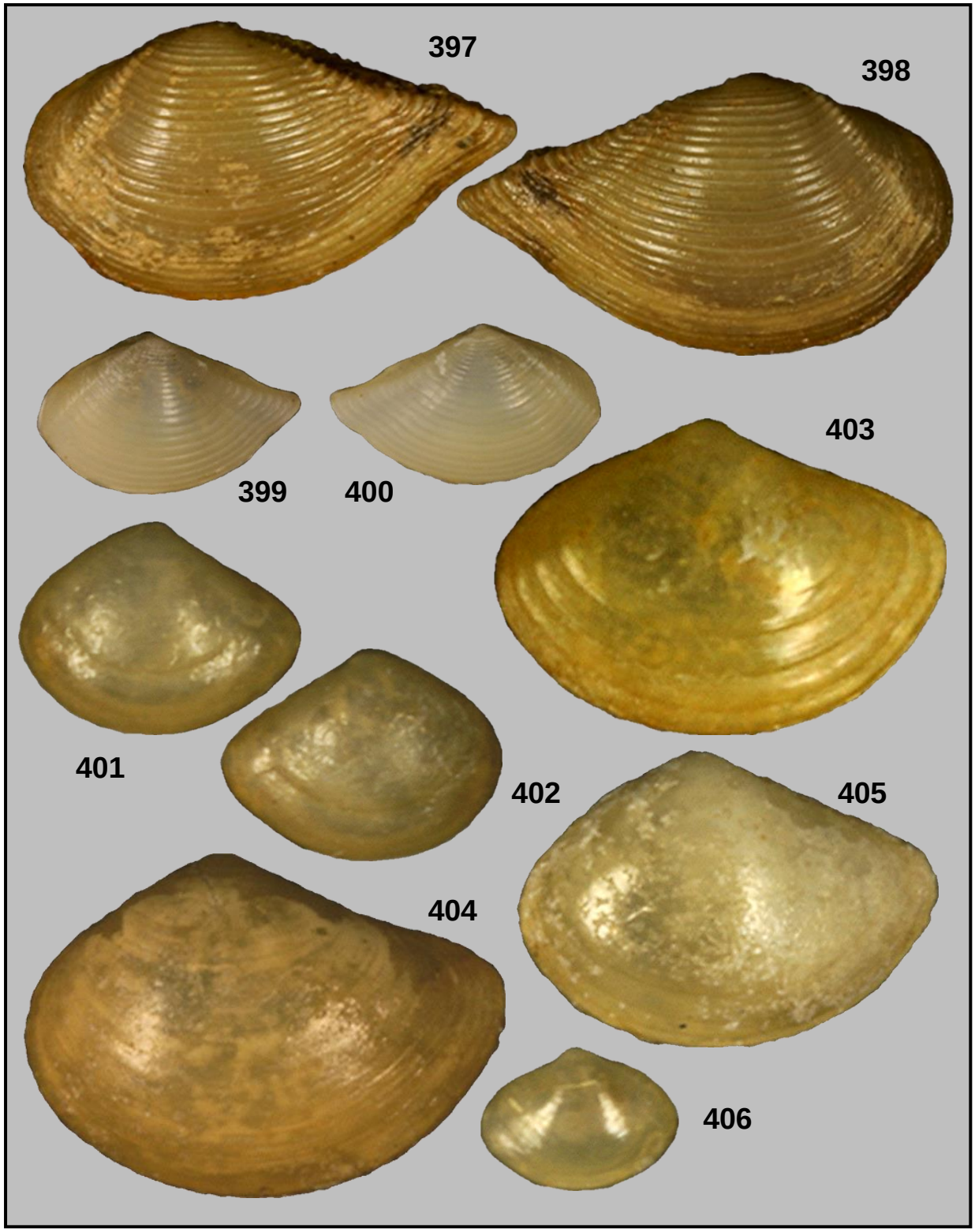

Plate LXVIII. Figs 397-400: *Nuculana commutata* (Philippi, 1844). FN; 397-398: Ampolla, Tarragona, Spain. Trawled by fishermen. In coral rubble. H. 5.58 mm L. 9.52 mm; 397: LV; 398: RV; 399-400: South of La Rochelle, Bay of Biscay, W France. Trawled by Belgian fishermen at -130 m. July 2003. H. 2.55 mm L. 3.87 mm; 399: LV; 400: RV.

Figs 401-405: *Yoldiella philippiana* (Nyst, 1845); 401-402: South of La Rochelle, Bay of Biscay, W France. Trawled by Belgian fishermen at a depth of 80 m. June 2004. H. 2.34 mm L. 2.88 mm. FN; 401: LV; 402: RV; 403: South of La Rochelle, Bay of Biscay, W France. Trawled at -120 m. July 2010. JPK. LV. H. 4.10 mm L. 4.92 mm; 404: Kars Fjord, Norway. Dredged at a depth of 150 m. FN. LV. H. 3.48 mm L. 5.08 mm; 405: Capraia Island, Italy. Dredged at -100 m. May 1977. FN. LV. H. 2.91 mm L. 4.08 mm; Fig. 406: *Yoldiella* cf. *propinqua* (Leche, 1878). Off La Rochelle, Bay of Biscay, W France. Dredged at -85 m. June 2002. FN. RV. H. 1.40 mm L. 1.89 mm.

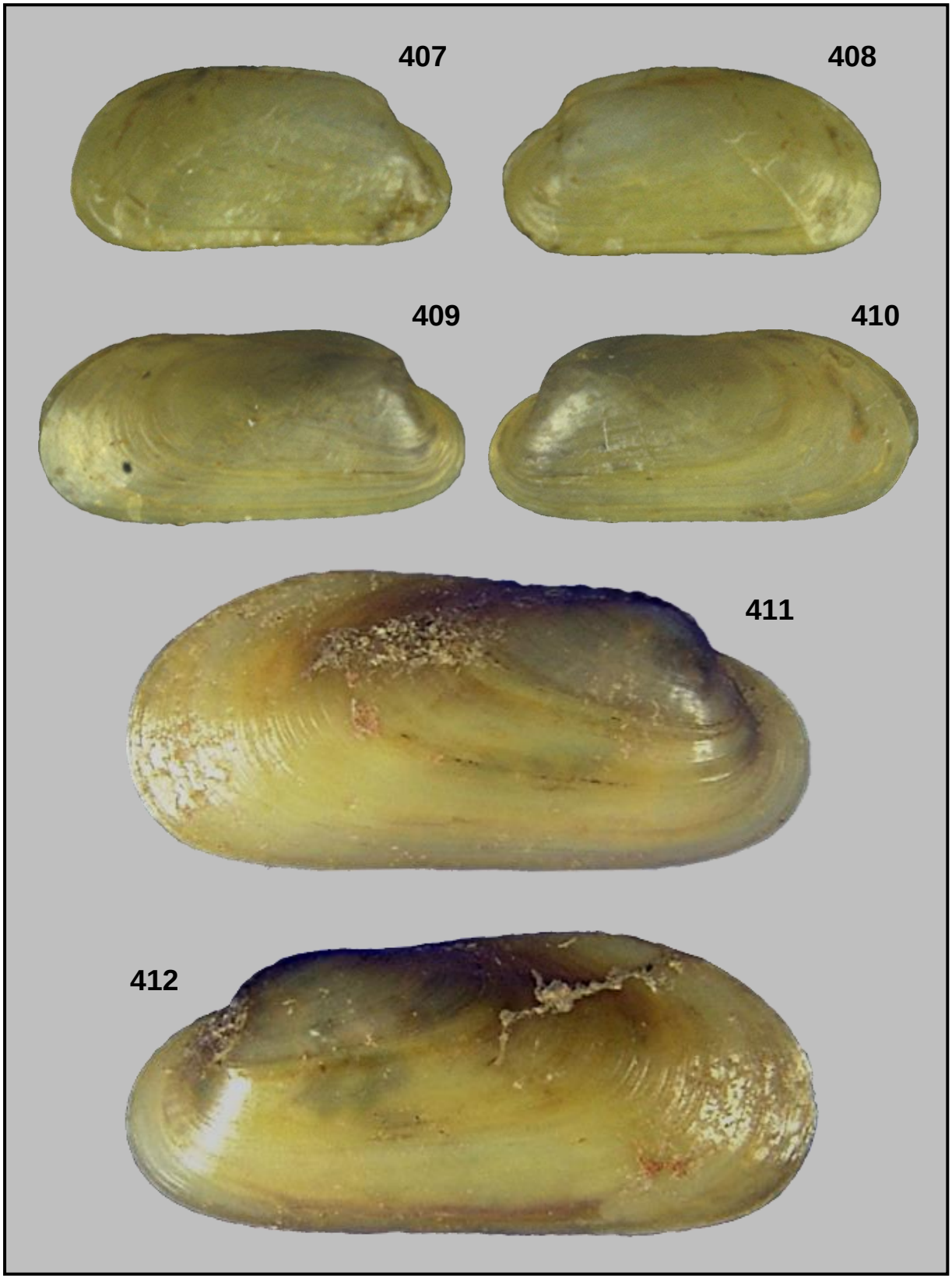

Plate LXIX. Figs 407-408: *Idas cylindricus* Pelorce, 2009. South of La Rochelle, Bay of Biscay, W France. Trawled by Belgian fishermen at a depth of 180 m. July 2005. FN. H. 2.90 mm L. 5.19 mm; 407: LV; 408: RV;
Figs 409-412: *Idas simpsoni* (Marshall, 1900). South of La Rochelle, Bay of Biscay, W France. Trawled by Belgian fishermen at -180 m. July 2005. On the skeleton of a dolphin. JPK ; 409-410: H. 3.79 mm L. 8.89 mm; 409: LV; 410: RV; 411-412: H. 12.43 mm L. 25.08mm; 411: LV; 412: RV.

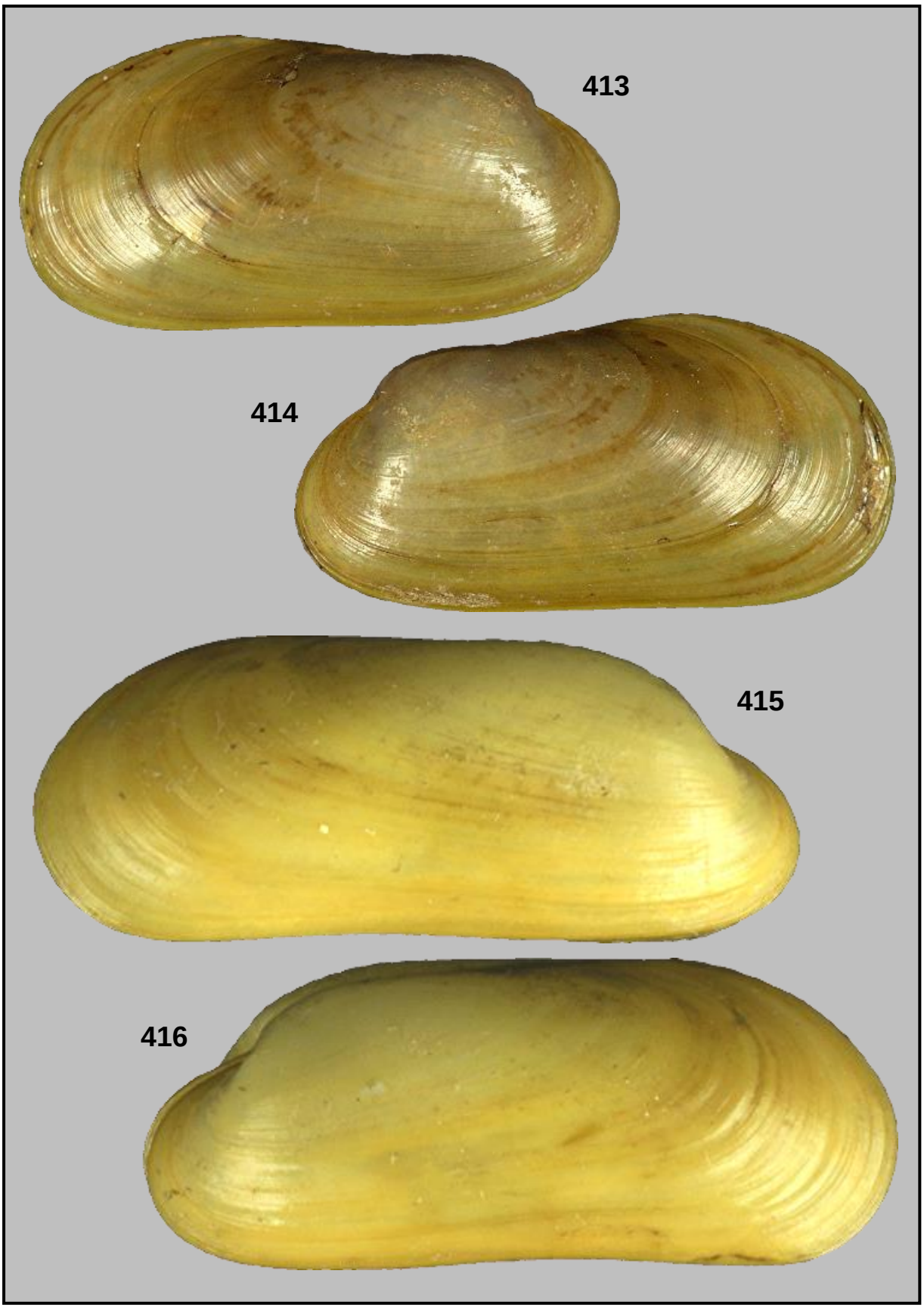

Plate LXX. Figs 413-416: *Idas simpsoni* (Marshall, 1900); 413-414: South of La Rochelle, Bay of Biscay, W France. Trawled by Belgian fishermen at -100 m. July 2002. On the skeleton of a dolphin. JPK. H. 7.80 mm L. 15.66 mm; 413: LV; 414: RV; 415-416: Viking Bank, off Shetland Islands, Scotland, UK, North Sea. 61° 10' N/ 00° 45' E. 5 May 1975. H. 9.18 mm L. 22.27 mm. FN; 415: LV; 416: RV.

Plate LXXI. Figs 417-420: *Idas simpsoni* (Marshall, 1900). FN; 417-418: Capraia Island, Tuscan Archipelago, Italy. H. 9.64 mm L. 22.16 mm; 417: LV; 418: RV; 419-420: Off Waterford, Irish Sea, W England, UK. Trawled by Belgian fishermen. H. 12.26 mm L. 28.80 mm; 419: LV; 420: RV;
Figs 421-422: ? *Idas ghisottii* Warén & Carrozza, 1990. Small Grounds, SW England, UK. Trawled by Belgian fishermen. H. 6.64 mm L. 22.05 mm; 421: LV; 422: RV.

Plate LXXII. Figs 423-428: *Glycymeris glycymeris* (Linnaeus, 1758). South of La Rochelle, Bay of Biscay. W France. Trawled by fishermen. 1970. FN; 423-424: H. 61.13 mm L. 63.64 mm; 423: RV; 424: LV; 425-426: H. 61.03 mm L. 63.25 mm; 425: RV; 426: LV; 427-428: H. 57.10 mm L. 58.04 mm; 427: RV; 428: LV.

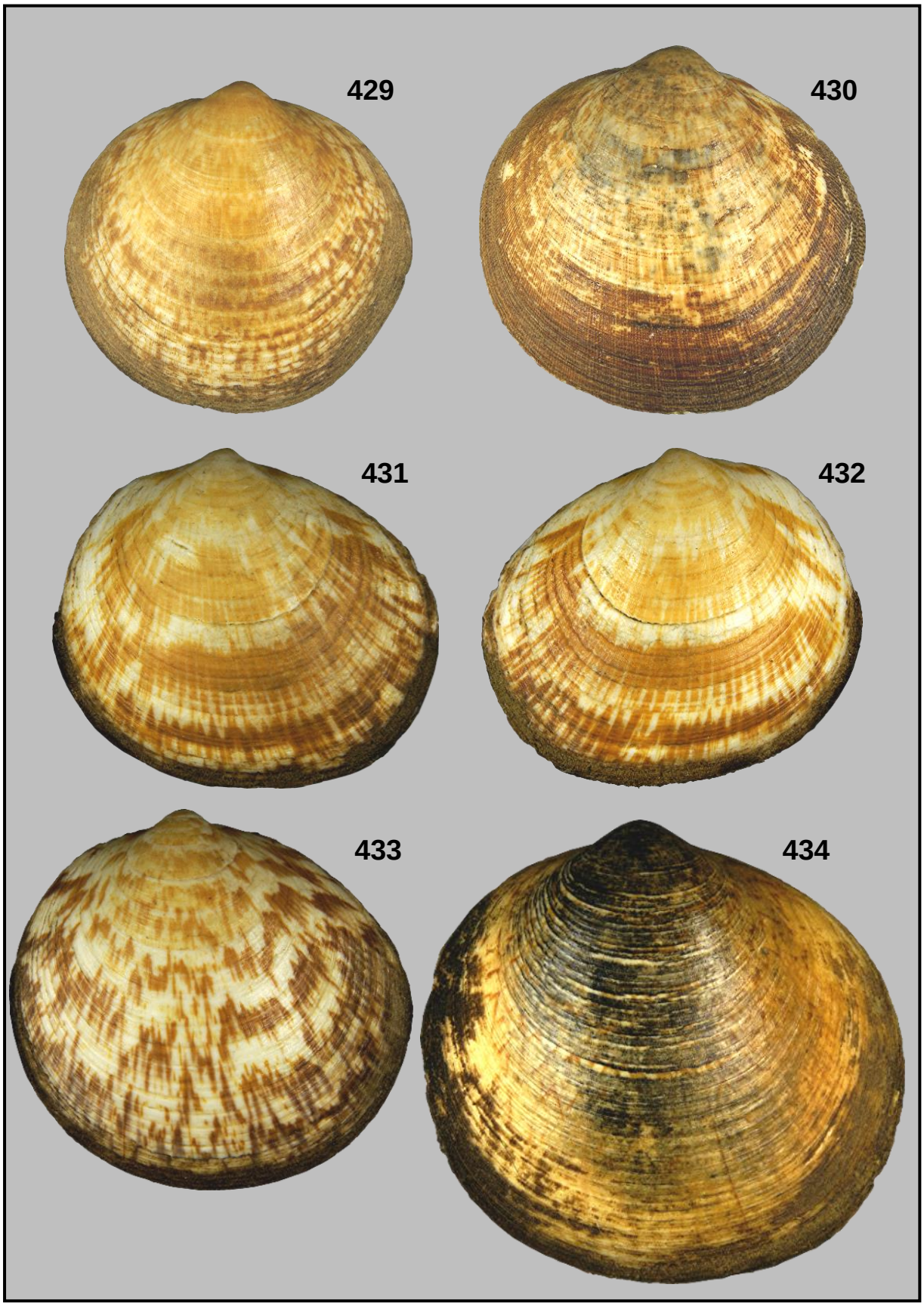

Plate LXXIII. Figs 429-434: *Glycymeris glycymeris* (Linnaeus, 1758). FN; 429: Palamós, Gerona, Spain. Trawled by local fishermen. September 1978. RV. H. 48.32 mm L. 50.75 mm; 430: Porto Cesareo, Lecce, Italy. Dredged at a depth of 14 m. In sand. July 1994. RV. H. 57.08 mm L. 60.22 mm; 431-434: Land's End, SW England, UK. Trawled by fishermen at a depth of 25 m. 1968. In muddy sand bottom; 431-432: H. 48.88 mm L. 54.91 mm; 431: RV; 432: LV; 433: RV. H. 54.12 mm L. 56.80 mm; 434: RV. H. 69.16 mm L. 71.33 mm.

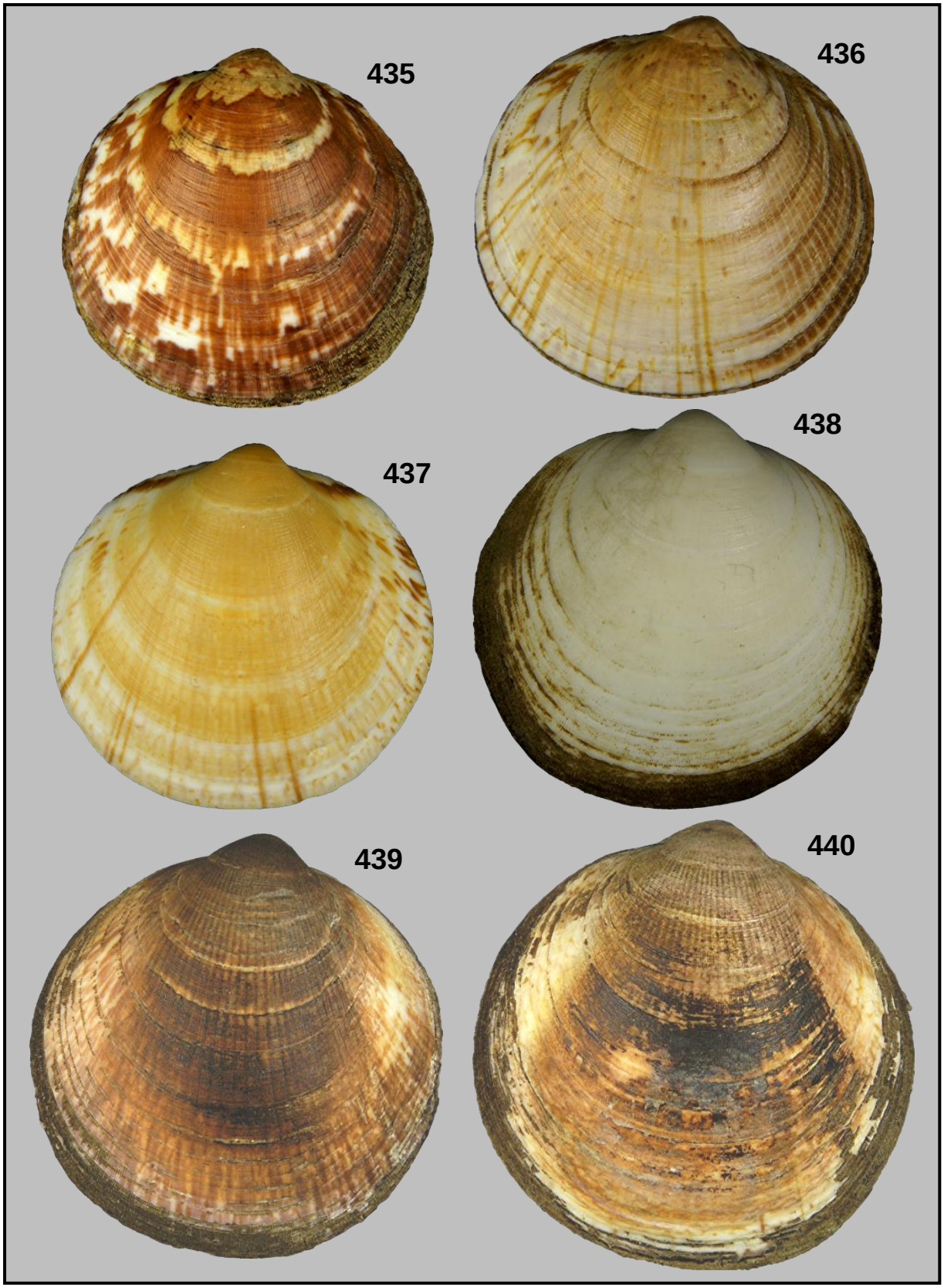

Plate LXXIV. Figs 435-440: *Glycymeris glycymeris* (Linnaeus, 1758). FN; 435-436: Coutainville, Normandy, France. In sand at extreme low tide. 17 April 2003; 435: RV. 31.38 mm L. 32.15 mm; 436: RV. 36.02 mm L. 37.75 mm; 437: Ile Callot, Bay of Morlaix, Brittany, France. In sand at extreme low tide. RV. 35.84 mm L. 37.07 mm; 438: Erquy, Brittany, France. Trawled by fishermen. July 1968. LV. H. 41.44 mm L. 42.18 mm; 439-440: St.-Jacut de la Mer, Brittany, France. In sand at low tide. 9 August 1998. RV; 439: H. 46.52 mm L. 44.92 mm; 440: H. 49.00 mm L. 47.62 mm.

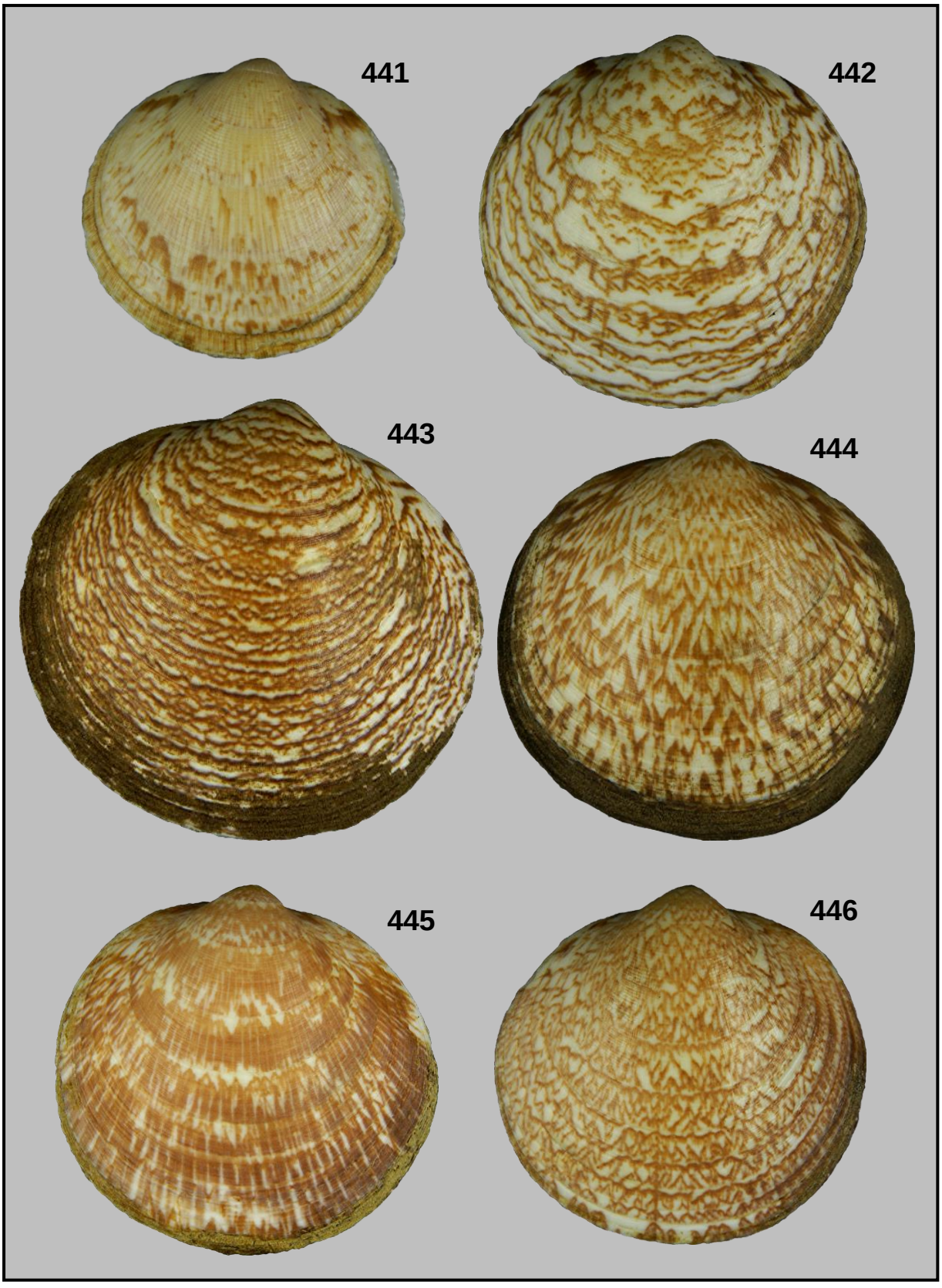

Plate LXXV. Figs 441-446: *Glycymeris glycymeris* (Linnaeus, 1758). St.-Cast le Guildo, Brittany, France. Trawled by local fishermen. 28 August 1992. RV. FN; 441: H. 28.25 mm L. 30.15 mm; 442: 37.99 mm L. 39.46 mm; 443: 54.25 mm L. 57.32 mm; 444: H. 45.03 mm L. 46.45 mm; 445: H. 41.27 mm L. 42.92 mm; 446: H. 39.12 mm L. 40.60 mm

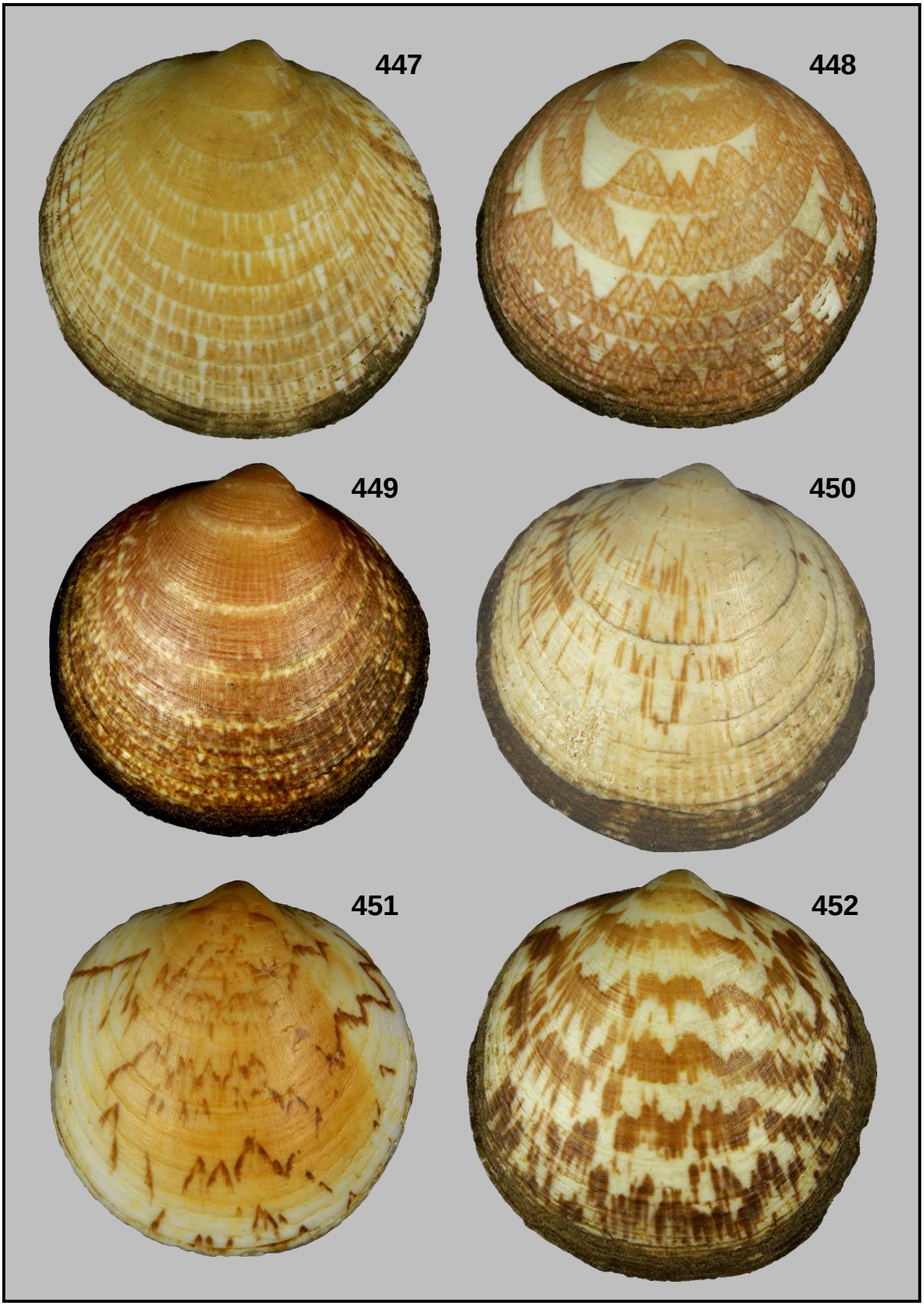

Plate LXXVI. Figs 447-452: *Glycymeris glycymeris* (Linnaeus, 1758). St.-Cast le Guildo, Brittany, France. Trawled by local fishermen. 28 August 1992. RV. FN; 447: H. 44.91 mm L. 45.17 mm; 448: H. 42.18 mm L. 43.53 mm; 449: H. 40.42 mm L. 41.35 mm; 450: H. 43.71 mm L. 45.23 mm; 451: H. 41.88 mm L. 41.06 mm; 452: H. 49.02 mm L. 48.65 mm.

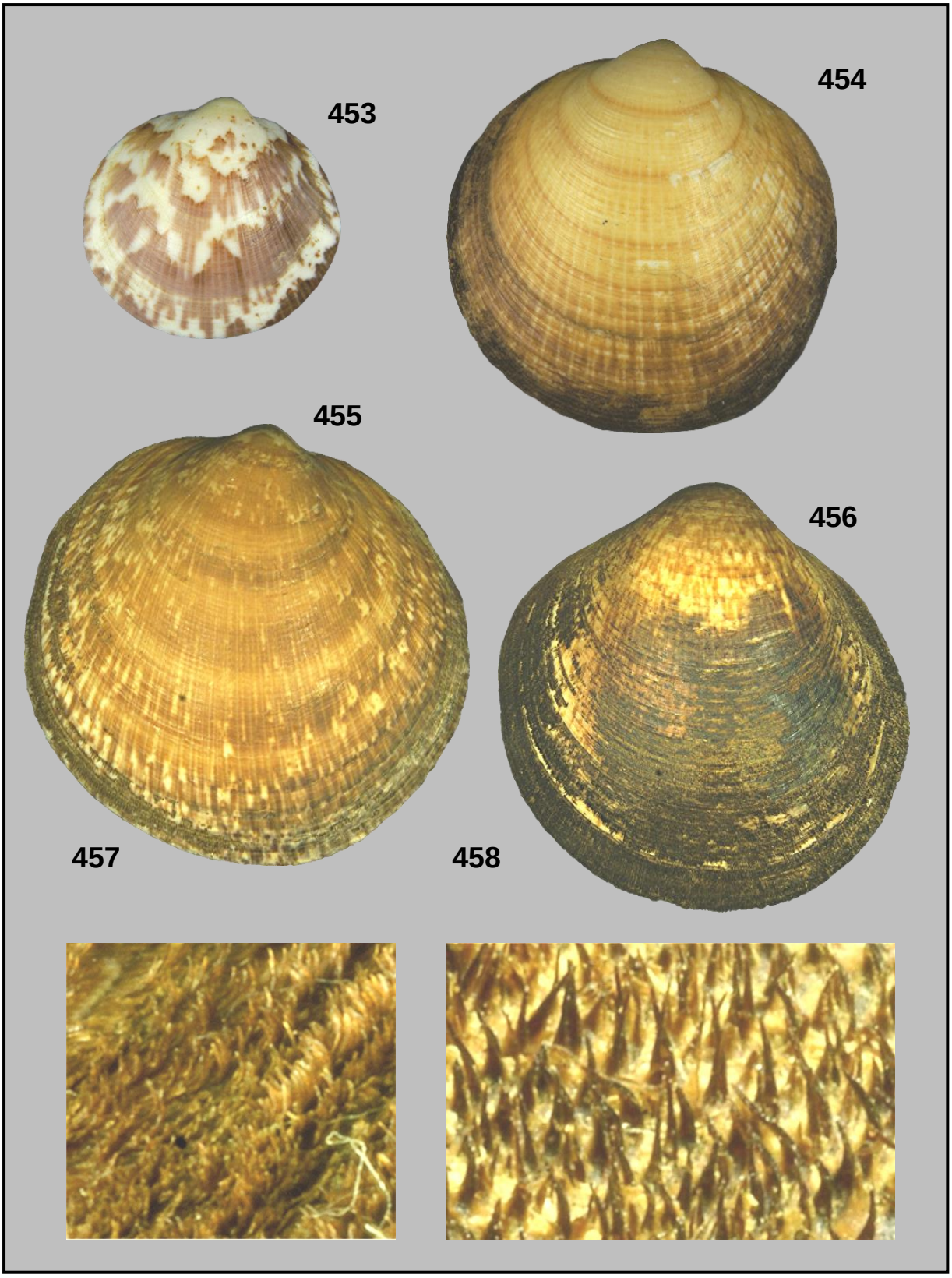

Plate LXXVII. Figs 453-454: *Glycymeris glycymeris* (Linnaeus, 1758). St.-Cast le Guildo, Brittany, France. Trawled by local fishermen. 28 August 1992. RV. FN; 453: H. 24.38 mm L. 25.65 mm; 454: H. 51.64 mm L. 51.20 mm; Fig. 455: *Glycymeris pilosa* var. *neapolitana* B.D.D., 1891. Sicily, Italy. Trawled by fishermen. H. 77.64 mm L. 79.67 mm; Fig. 456: *Glycymeris pilosa* var. *tumida* B.D.D., 1891. Barcelona, Spain. Trawled by local fishermen. December 1971. H. 76.43 mm L. 74.23 mm; Fig. 457: details of the periostracum of *G. glycymeris*; Fig. 458: details of the periostracum of *G. pilosa* (Linnaeus, 1767).

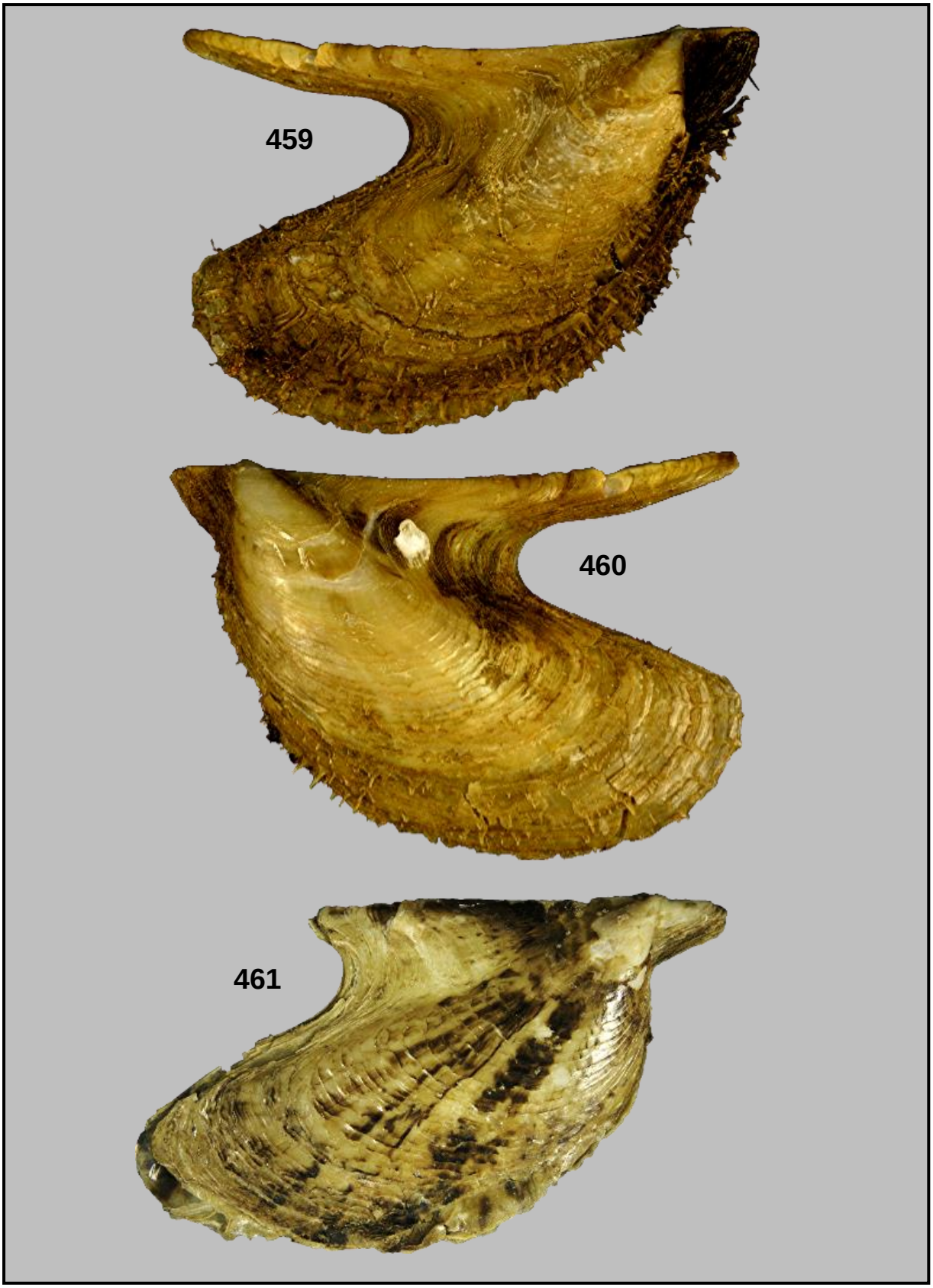

Plate LXXVIII. Figs 459-461: *Pteria hirundo* (Linnaeus, 1758). South of La Rochelle, Bay of Biscay, W France. Trawled by Belgian fishermen; 459: Trawled at -100 m. July 2002. JPK. RV. H. 57.45 mm L. 82.37 mm; 460: Trawled at -130 m. August 2009. LV. H. 68.79 mm L. 97.43 mm; 461: Trawled at -140 m. June 1998. RV. H. 57.43 mm L. 97.22 mm.

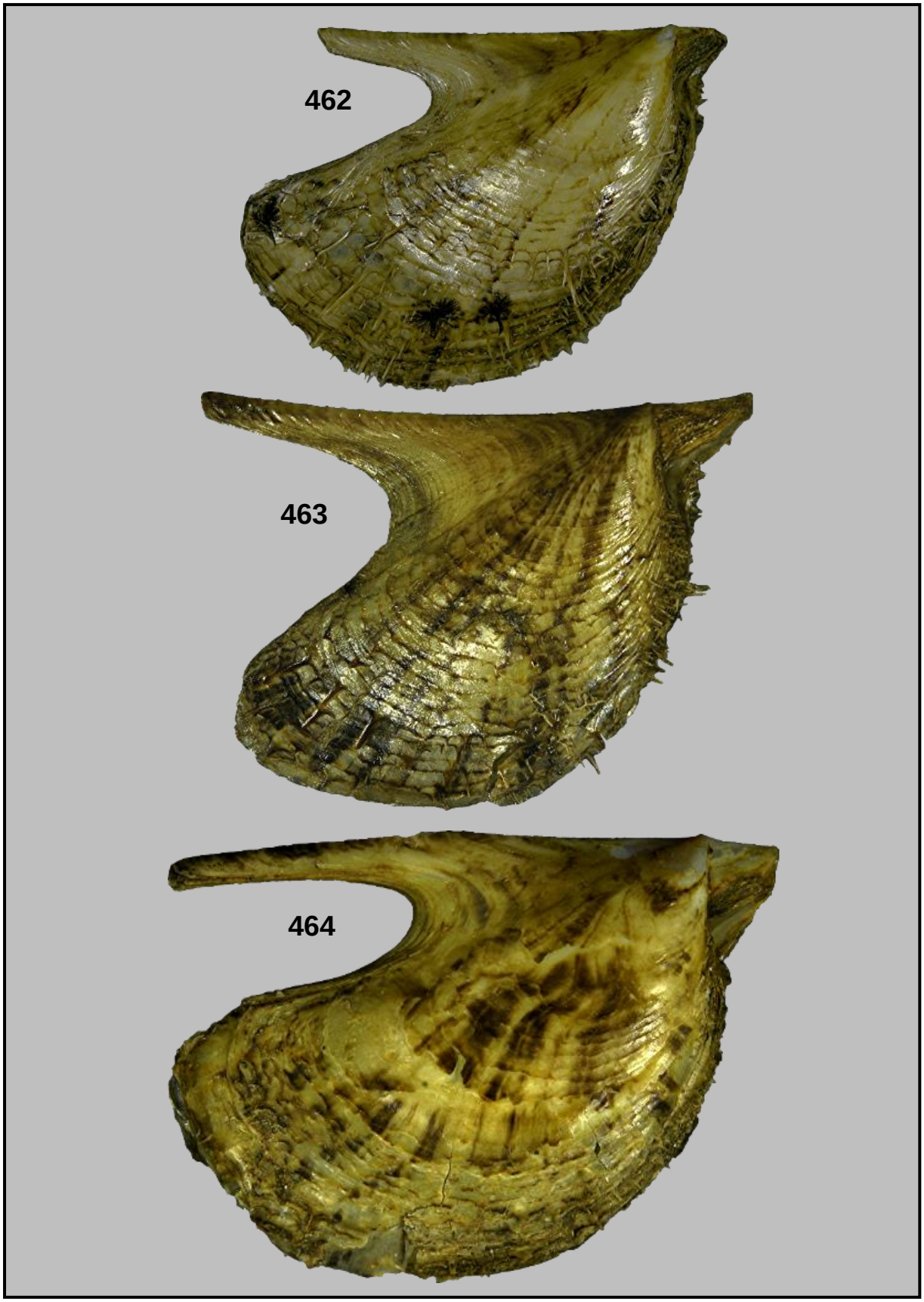

Plate LXXIX. Figs 462-464: *Pteria hirundo* (Linnaeus, 1758). RV. FN; Punta Ala, Tyrrhenian Sea, Italy. Trawled by fishermen at a depth of 150 m. November 1975; 462: H. 59.02 mm L. 80.28 mm; 463: 65.13 mm L. 85.41 mm; 464: Off Barcelona, Spain. Trawled by local fishermen. 1968. H. 67.21 mm L. 93.67 mm.

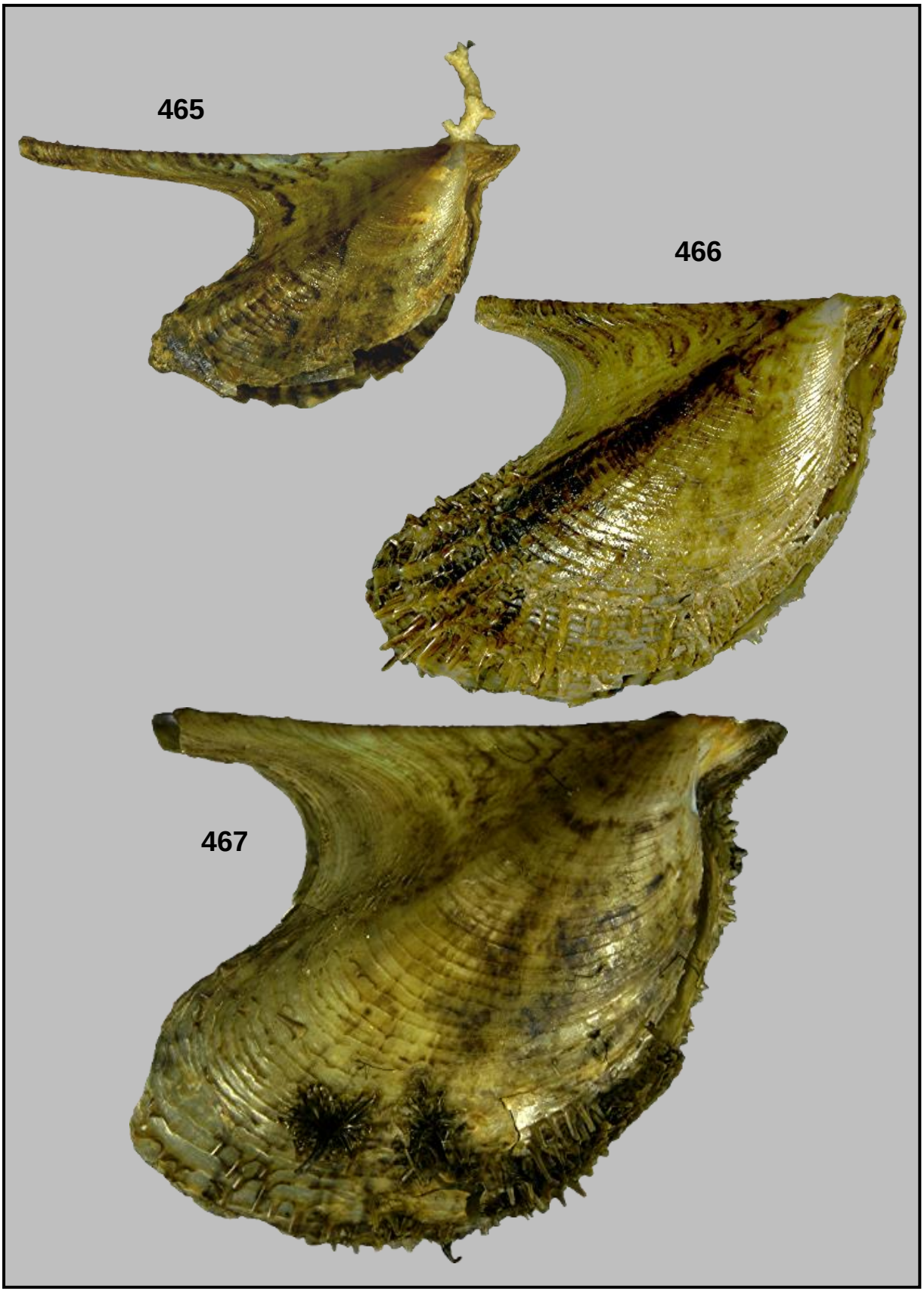

Plate LXXX. Figs 465-467: *Pteria hirundo* (Linnaeus, 1758). Off Ambriz, Angola. Trawled by Belgian fishermen (PEMARCO) at a depth of 130 m. Attached to coral. 1964. RV. FN; 465: 26.28 mm L. 48.32 mm; 466: H. 42.55 mm L. 55.03 mm; 467: H. 62.66 mm L. 76.32 mm.

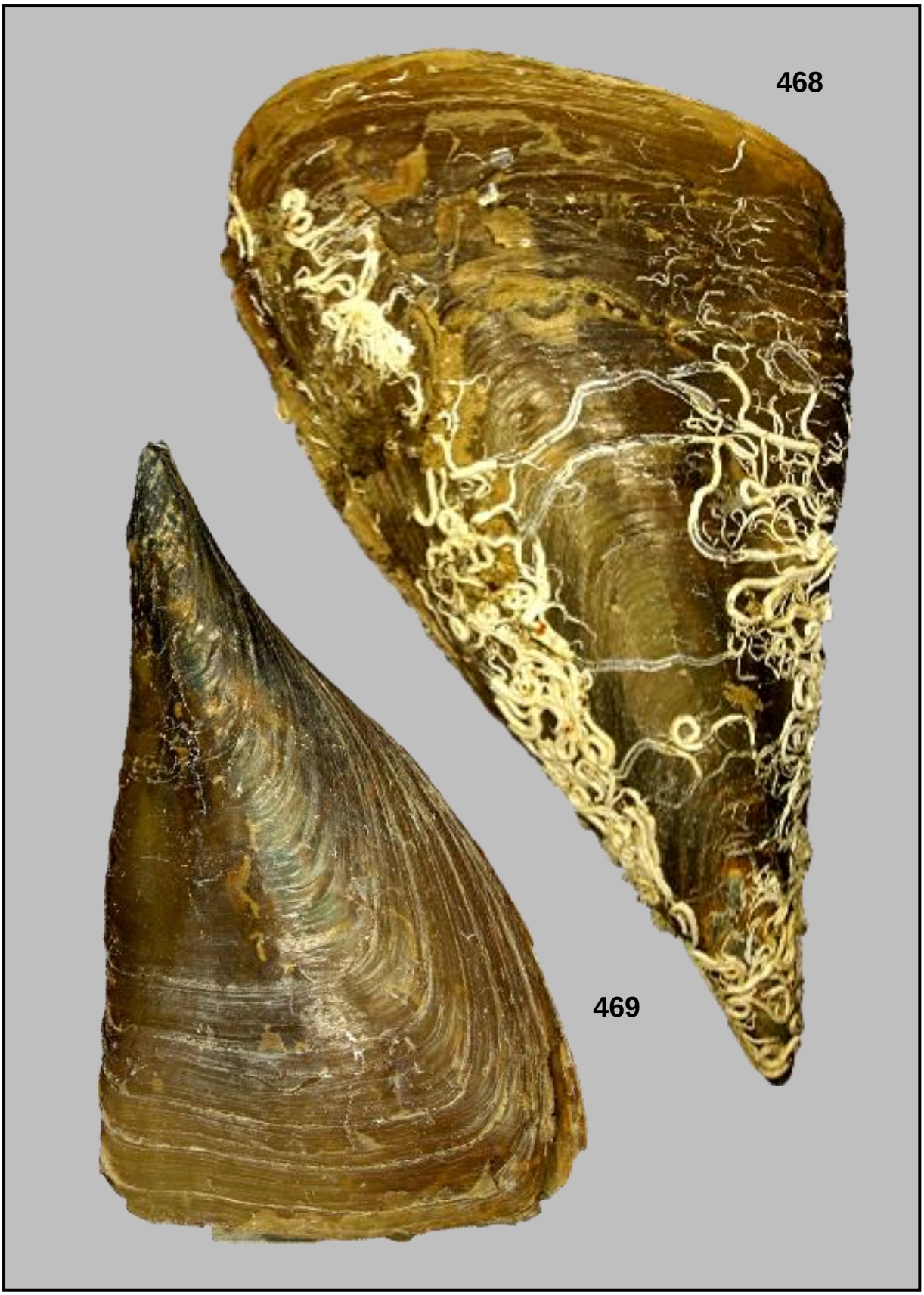

Plate LXXXI. Figs 468-469: *Atrina fragilis* (Pennant, 1777). South of La Rochelle, Bay of Biscay, W France. Trawled by Belgian fishermen at a depth of 130 m. JPK. RV; 468: August 2009. H. 173 mm L. 314 mm; 469: June 2006. H. 127 mm L. 226 mm.

Plate LXXXII. Figs 470-471: *Atrina fragilis* (Pennant, 1777). FN. RV; 470: 'Small Grounds', SW England, UK. Trawled by Belgian fishermen at a depth of 90 m. In sandy bottom. H. 143.5 mm L. 276 mm; 471: Anzio, Italy. Trawled by fishermen. 15 July 1971. H. 164.3 mm L. 277 mm.

Plate LXXXIII. Fig. 472: *Atrina fragilis* (Pennant, 1777). Ibiza, Balearic Islands, Spain. Trawled by fishermen. 1968. FN. RV. H. 143.5 mm L. 228 mm;
Fig. 473: *Atrina fragilis* var. *angusta* Weinkauff, 1867. Off Phare de Planier, Marseille, France. Trawled by local fishermen. November 1970. FN. RV. H. 91.4 mm L. 182.1 mm.

Plate LXXXIV. Figs 474: *Atrina fragilis* var*. angusta* Weinkauff, 1867. Cardigan Bay, Wales, SW England, UK. Trawled by Belgian fishermen. July 1985. FN. RV. H. 78.5 mm L. 175.2 mm; 475: *Atrina fragilis* var*. spinulosa* B.D.D., 1890. Gorgona Island, off Capraia Island, Italy. 42° 58' 01" N/ 09° 39' 26" E. Trawled by fishermen at a depth of 350 m. In mud. 28 May 1990. FN. RV. H. 79.39 mm L. 127.48 mm.

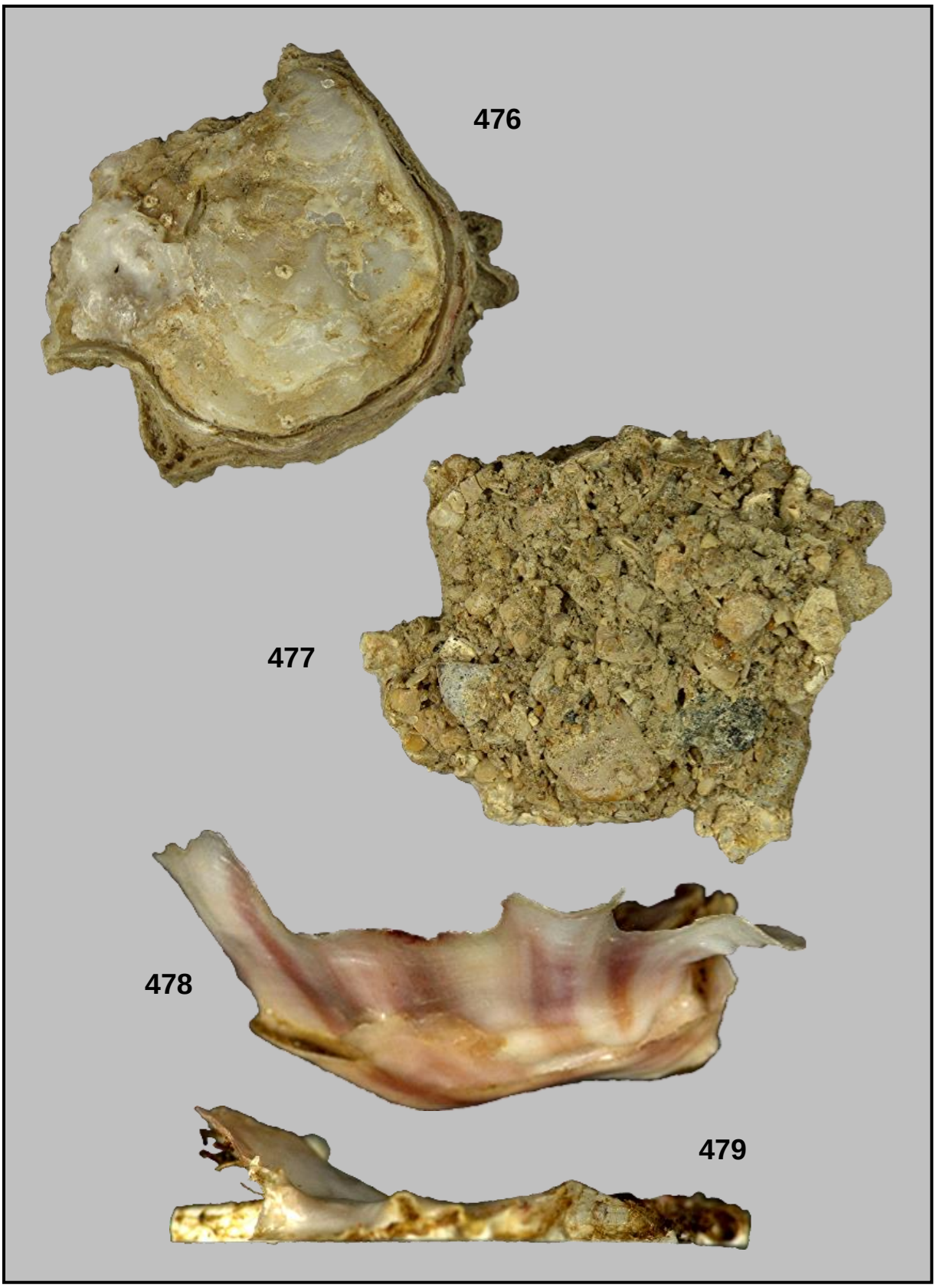

Plate LXXXV. Figs 476-479: *Neopycnodonte cochlear* (Poli, 1795). South of La Rochebonne Bank, Bay of Biscay, W France. Trawled by Belgian fishermen at a depth of 160 m. August 2007. FN. H. 43.82 mm L. 45.52 mm; 476: complete specimen; 477: outside of lower valve; 478: cupped form; 479: flattened specimen.

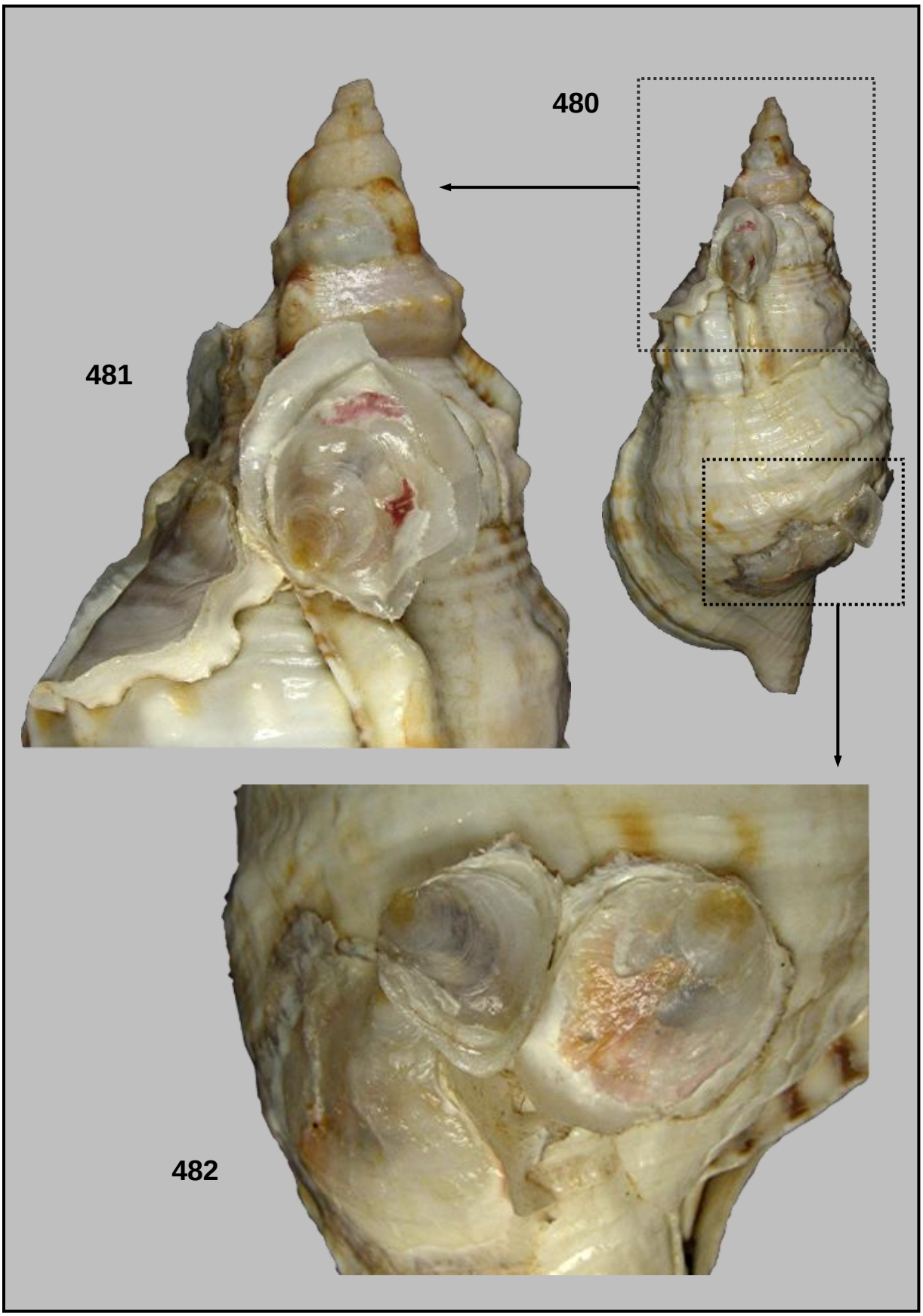

Plate LXXXVI. Figs 480-482: *Neopycnodonte cochlear* (Poli, 1795). North of La Rochebonne Bank, Bay of Biscay, W France. Trawled by Belgian fishermen at a depth of 130 m. July 2001. Specimens attached to *Charonia lampas* (Linnaeus, 1758). FN.

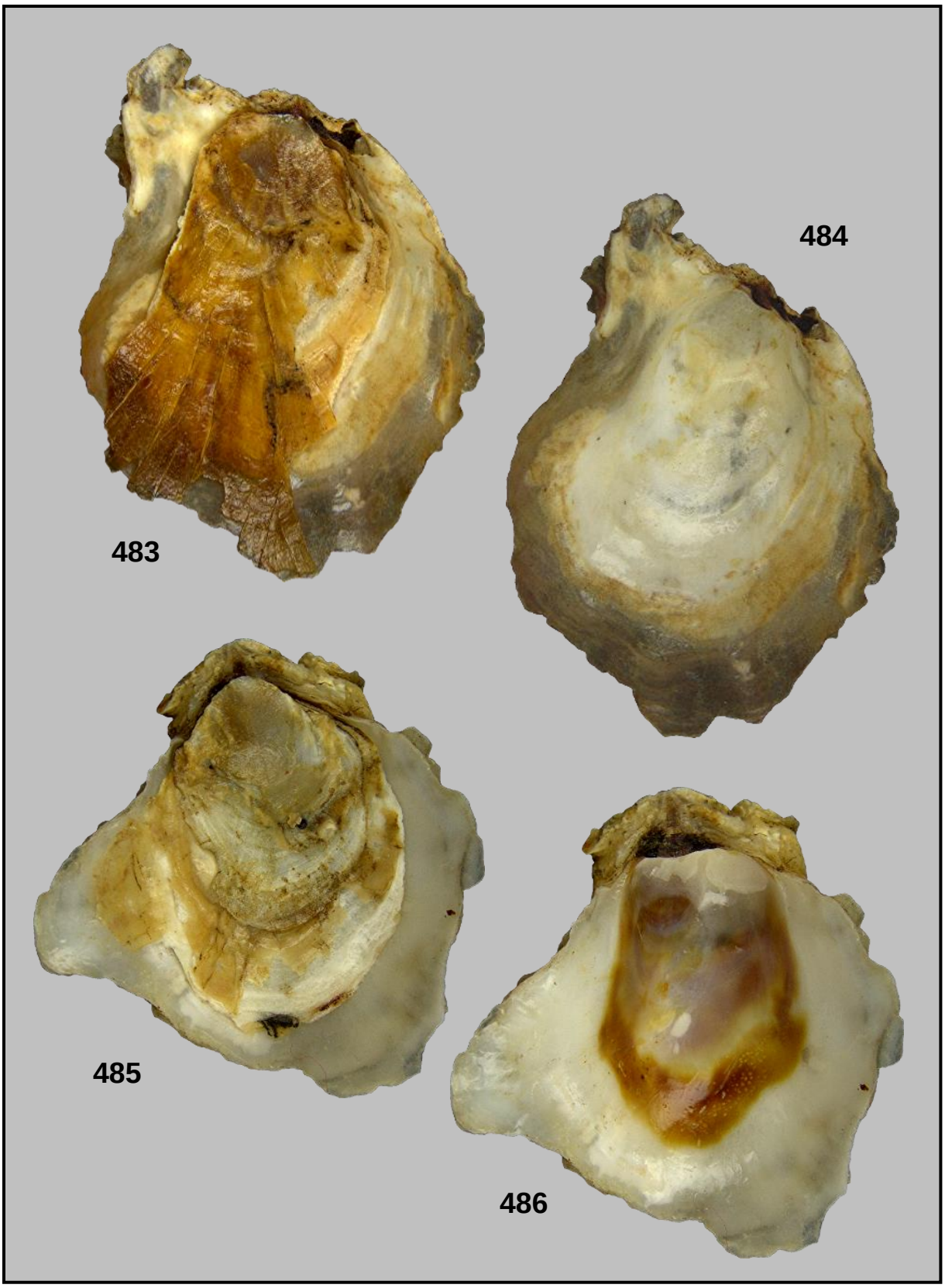

Plate LXXXVII. Figs 483-486: *Neopycnodonte cochlear* (Poli, 1795). FN; 483-484: Canary Islands. Trawled by Spanish fishermen. H. 58.66 mm L. 46.75 mm; 483: complete specimen; 484: inside of lower valve; Figs 485-486: Venice, Italy. Dived at a depth of 20 m. 19 July 1983; 485: complete specimen; 486: inside of left valve.

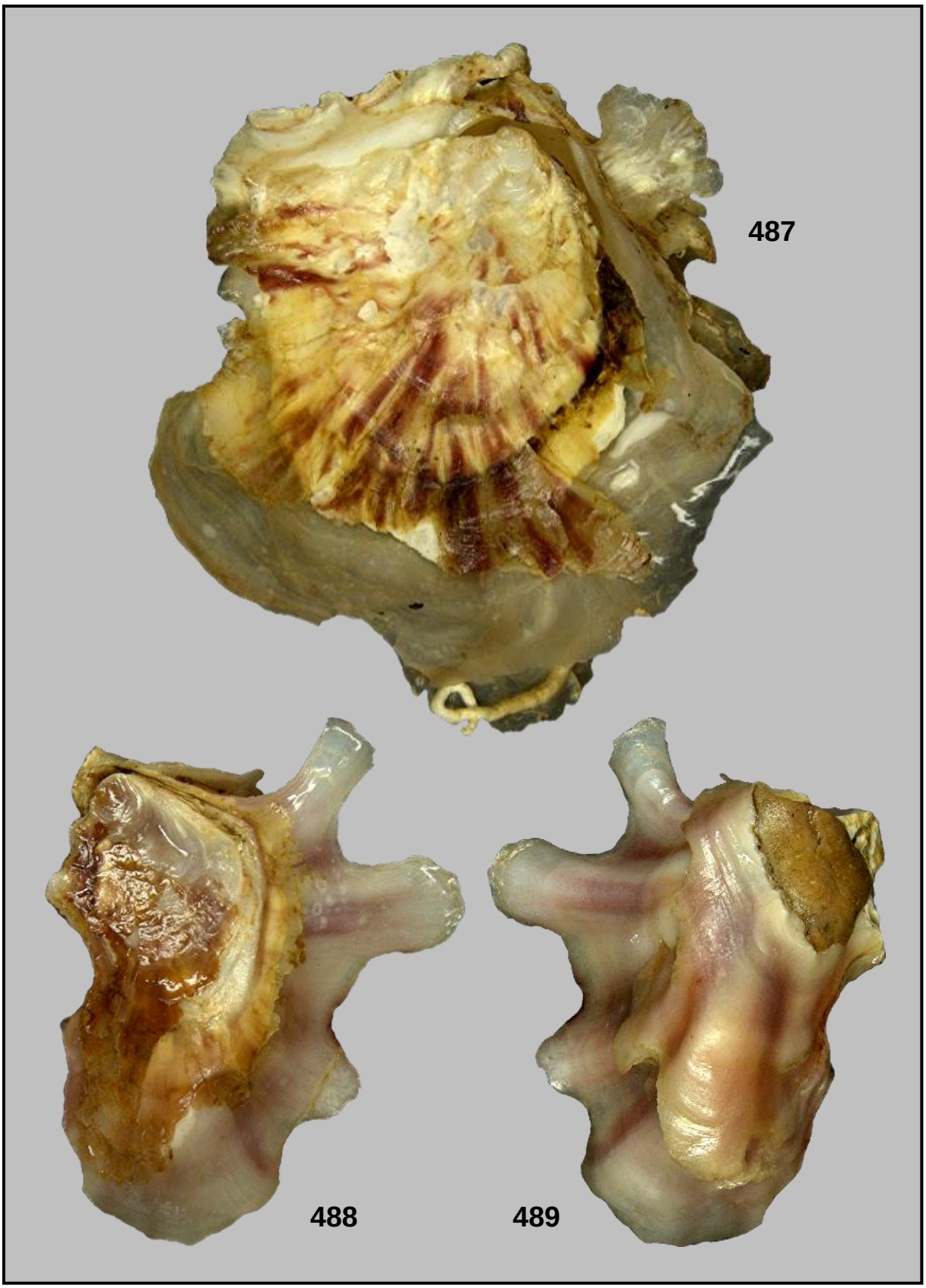

Plate LXXXVIII. Figs 487-489: *Neopycnodonte cochlear* (Poli, 1795). FN; 487: Off San Carlos De La Rapita, Spain. Trawled by Spanish fishermen. 1990. H. 81.82 mm L. 79.53 mm; 488-489: off Ibiza, Balearic Islands, Spain. Dredged at a depth of 80 m; 488: complete specimen; 489: outside of lower valve.

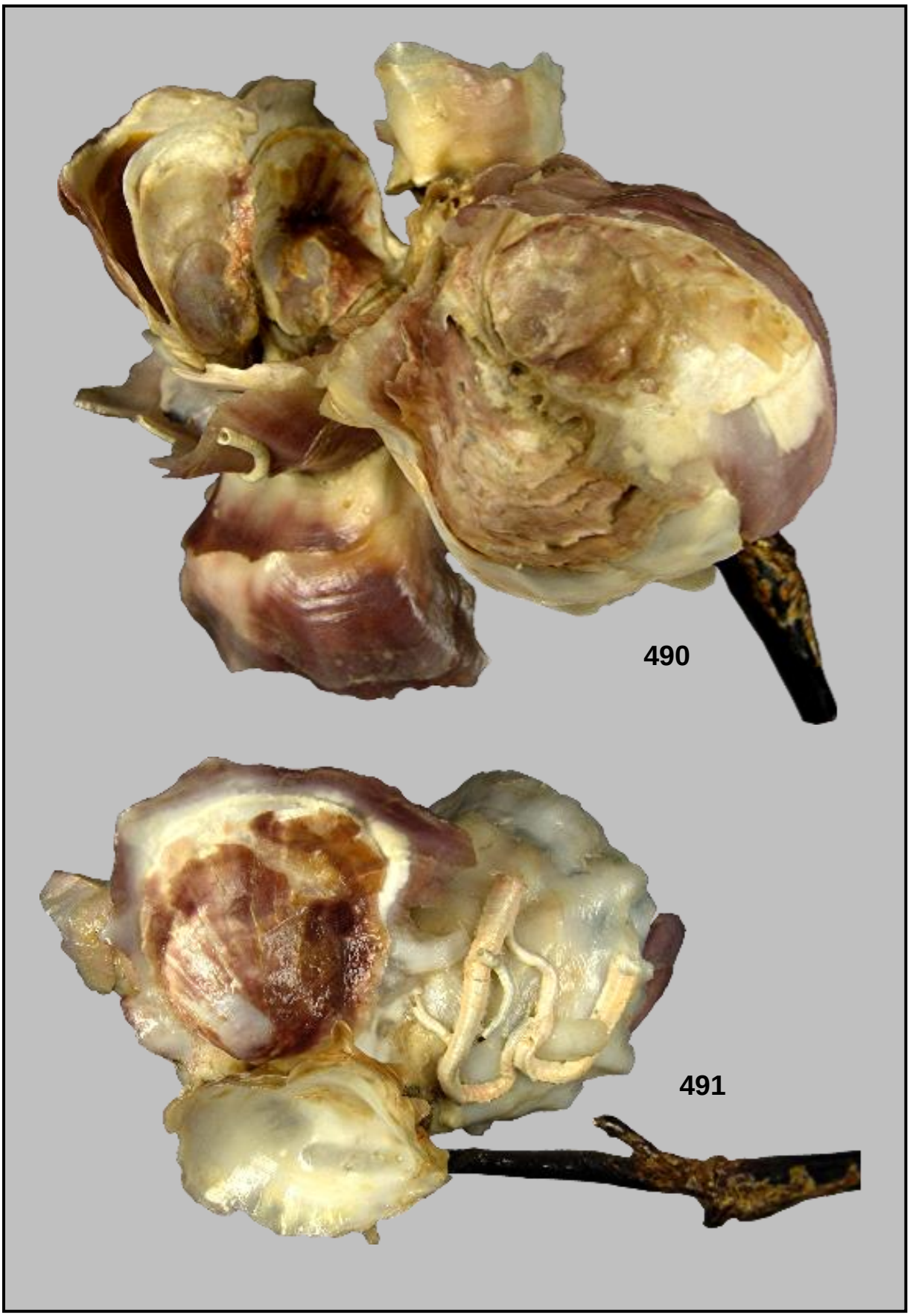

Plate LXXXIX. Figs 490-491: *Neopycnodonte cochlear* (Poli, 1795): clusters of several specimens on a substrate. Off Ibiza, Balearic Islands, Spain. Trawled by Spanish fishermen. FN.

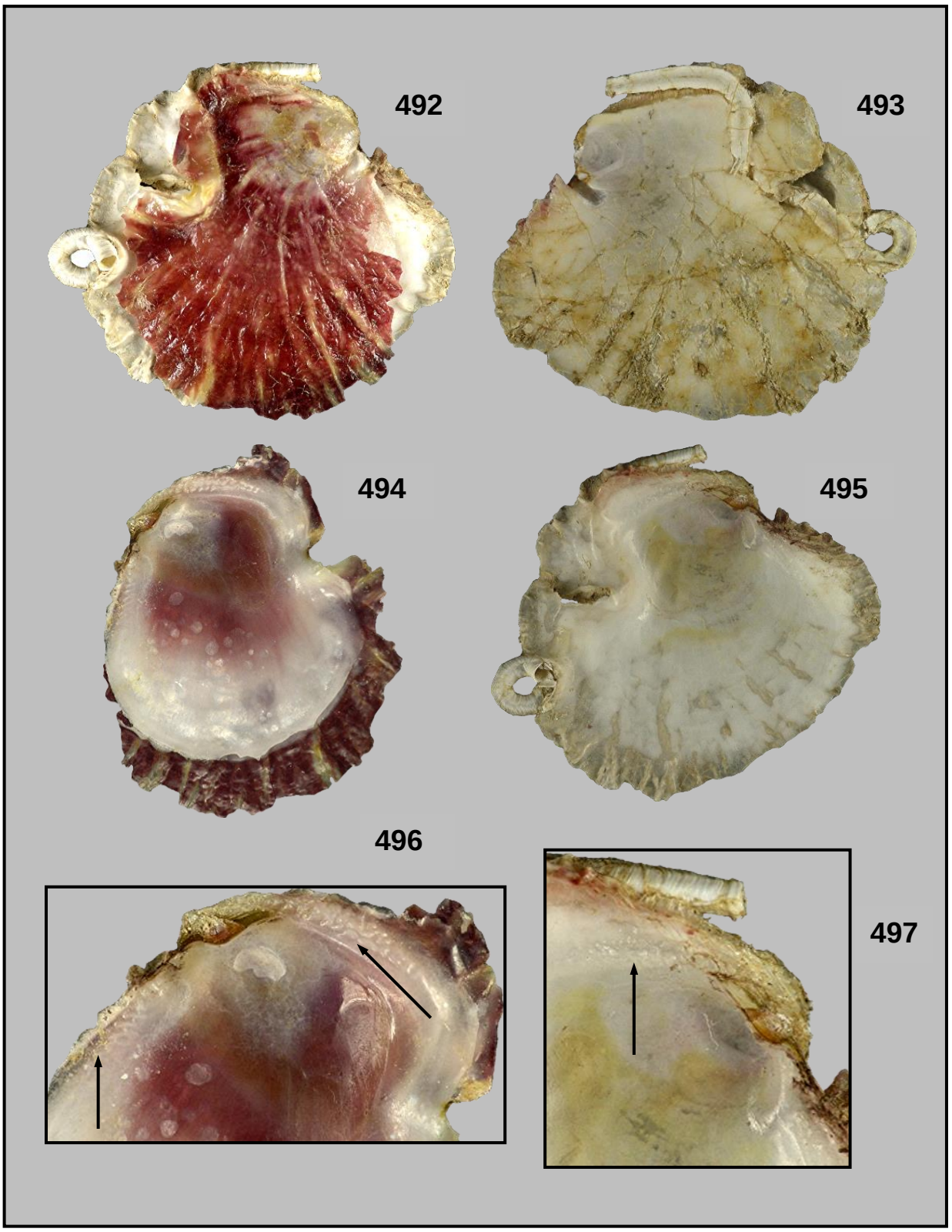

Plate LXXXX. Figs 492-497: *Neopycnodonte cochlear* (Poli, 1795). Koksijde, Belgium. Found attached to a plastic box on the beach after a gale. 23 January 2005. FN. H. 24.30 mm L. 26.80 mm; 492: RV = outside of upper valve; 493: LV = outside of lower valve; 494: inside of RV; 495: inside of LV; 496: chomata in upper valve; 497: chomata in lower valve.

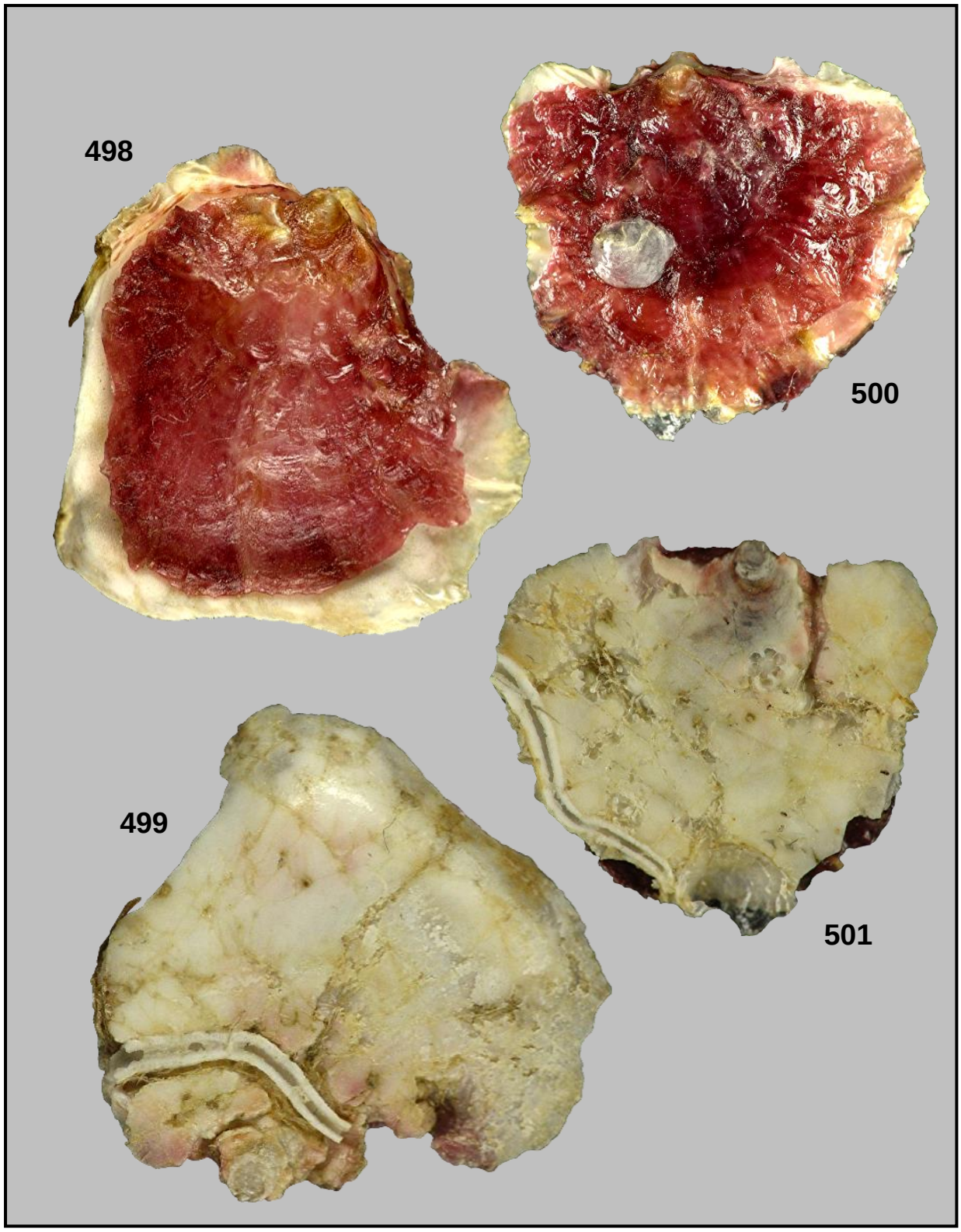

Plate LXXXXI. Figs 498-501: *Neopycnodonte cochlear* (Poli, 1795). Koksijde, Belgium. Found attached to a plastic box on the beach after a gale. 23 January 2005. FN; 498-499: H. 16.72 mm L. 17.19 mm; 498: RV = outside of upper valve; 499: LV = outside of lower valve; 500-501: H. 12.42 mm L. 13.87 mm; 500: outside of RV; 501: LV = outside of lower valve.

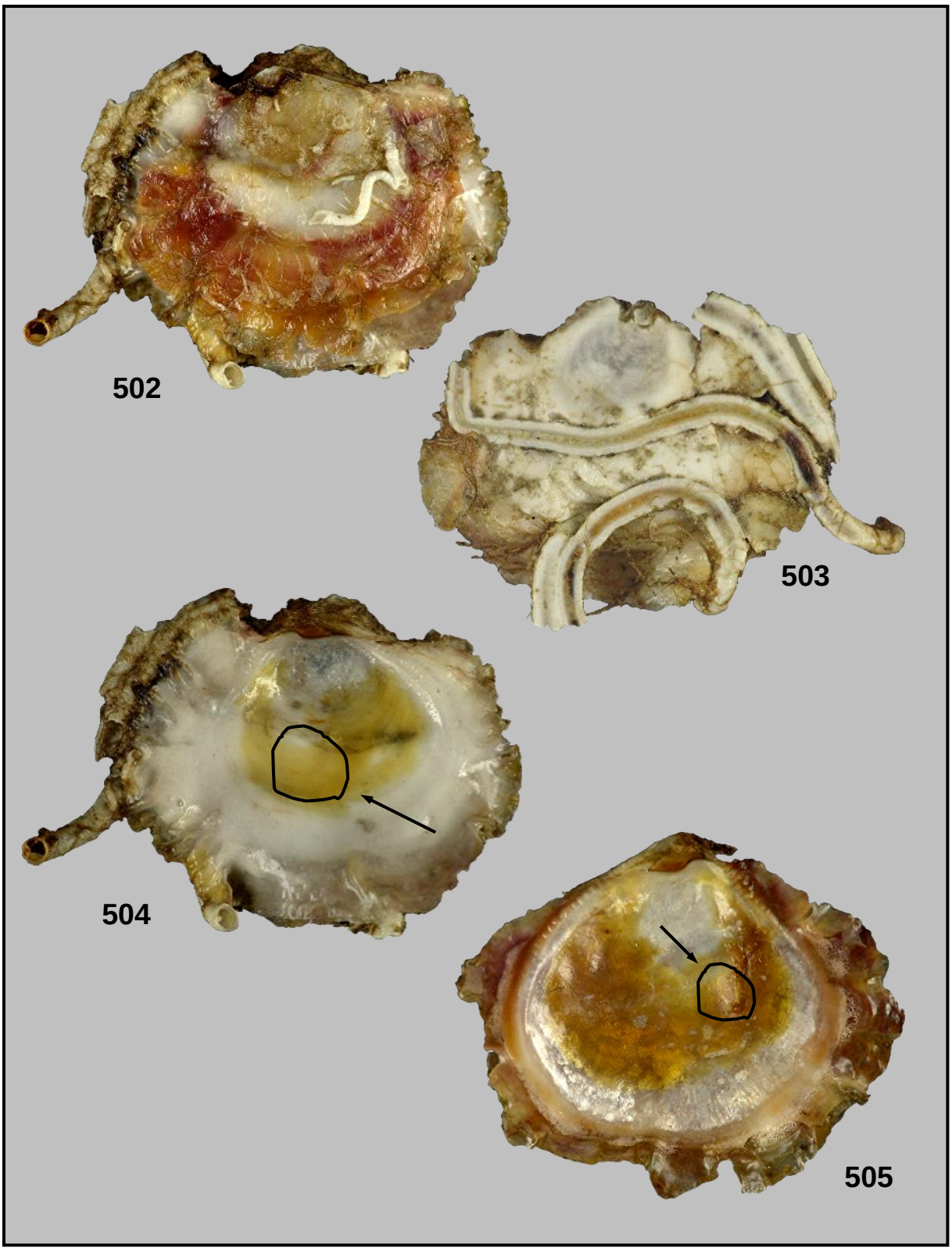

Plate LXXXXII. Figs 502-505: *Neopycnodonte cochlear* (Poli, 1795). Roscoff, Brittany, France. In trawl net in harbour. August 2006. FN. H. 20.37 mm L. 24.83 mm; 502: RV = outside of upper valve; 503: LV = outside of lower valve; 504: inside of RV with slightly flattened circular muscle scar; 505: inside of LV with slightly flattened circular muscle scar.

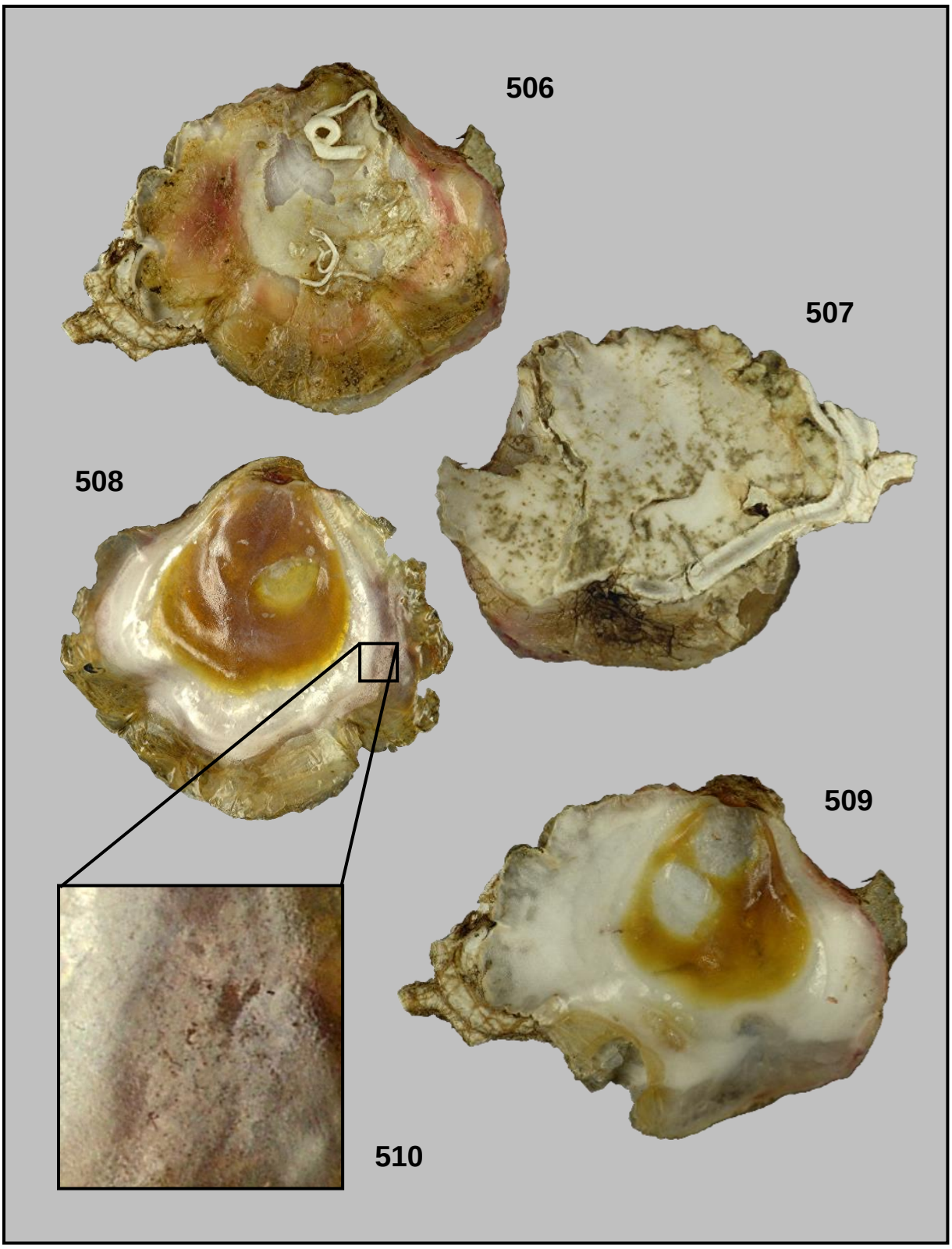

Plate LXXXXIII. Figs 506-510: *Neopycnodonte cochlear* (Poli, 1795). Roscoff, Brittany, France. In trawl net in harbour. August 2006. FN. H. 25.95 mm L. 30.10 mm; 506: RV = outside of upper valve; 507: LV = outside of lower valve; 508: inside of RV; 509: inside of LV; 510: vesicular structure.

List of species

GASTROPODA

FISSURELLIDAE
Emarginula fissura (Linnaeus, 1758)

ADDISONIIDAE
Addisonia excentrica (Tiberi, 1855)

CALLIOSTOMATIDAE
Jujubinus montagui (Wood, 1828)
Clelandella miliaris (Brocchi, 1814)
Gibbula tumida (Montagu, 1803)
Calliostoma granulatum (Born, 1778)

CAPULIDAE
Capulus ungaricus (Linnaeus, 1758)

APORRHAIDAE
Aporrhais pespelecani (Linnaeus, 1758)
Aporrhais serresianus (Michaud, 1828)

NATICIDAE
Euspira fusca (de Blainville, 1825)
Euspira pulchella (Risso, 1826)

OVULIDAE
Pseudosimnia carnea (Poiret, 1789)

TONNIDAE
Semicassis saburon (Bruguière, 1792)
Galeodea rugosa (Linnaeus, 1771)

RANELLIDAE
Charonia lampas (Linnaeus, 1758)
Ranella olearia (Linnaeus, 1758)

MURICIDAE
Coralliophila squamosa (Bivona Ant. in Bivona And., 1838)

BUCCINIDAE
Neptunea contraria (Linnaeus, 1771)
Colus gracilis (da Costa, 1778)
Colus jeffreysianus (P. Fischer, 1868)

CONIDAE
Bela costulata (Risso, 1826)
Bela powisiana (Dautzenberg, 1887)
Comarmondia gracilis (Montagu, 1803)
Mangelia coarctata (Forbes, 1840)
Raphitoma purpurea (Montagu, 1803)
Teretia teres (Reeve, 1844)

ARCHITECTONICIDAE
Heliacus fallaciosus (Tiberi, 1872)

PYRAMIDELLIDAE
Ondina sp.

CYLICHNIDAE
Roxania utriculus (Brocchi, 1814)

BIVALVIA

NUCULIDAE
Nucula hanleyi Winckworth, 1931
Nucula nitidosa Winckowrth, 1930
Nucula nucleus (Linnaeus, 1758)
Nucula sulcata Bronn, 1831
Ennucula tenuis (Montagu, 1808)

NUCULANIDAE
Nuculana commutata (Philippi, 1844)

YOLDIIDAE
Yoldiella philippiana (Nyst, 1845)
Yoldiella cf. *propinqua* (Leche, 1878)

MYTILIDAE
Idas cylindricus Pelorce, 2009
Idas simpsoni (Marshall, 1900)

GLYCYMERIDIDAE
Glycymeris glycymeris (Linnaeus, 1758)

PTERIIDAE
Pteria hirundo (Linnaeus, 1758)

PINNIDAE
Atrina pectinata (Linnaeus, 1767)

GRYPHAEIDAE
Neopycnodonte cochlear (Poli, 1795)

OSTREIDAE
Crassostrea gigas (Thunberg, 1793)

PECTINIDAE
Palliolum tigerinum (O.F. Müller, 1776)
Pseudamussium clavatum (Poli, 1795)

MONTACUTIDAE
Montacuta phascolionis Dautzenberg & H. Fischer, 1925)

ASTARTIDAE
Astarte fusca (Poli, 1791) (140-150 m – June 2005)
Astarte sulcata (da Costa, 1778) (160 m) many

CARDIIDAE
Acanthocardia echinata (Linnaeus, 1758)
Laevicardium crassum (Gmelin, 1791)

MACTRIDAE
*Mactra stultorum (*Linnaeus, 1758) – *M. stultorum cinerea* Montagu, 1808

TELLINIDAE
Tellina donacina Linnaeus, 1758
Tellina serrata Brocchi, 1814
Tellina pusilla Philippi, 1836

Arcopagia balaustina (Linnaeus, 1758)

SEMELIDAE
Abra alba (W. Wood, 1802)
Abra prismatica (Montagu, 1808)

PSAMMOBIIDAE
Gari costulata (Turton, 1822)

SOLECURTIDAE
Azorinus chamasolen (da Costa, 1778)
Solecurtus multistriatus (Scacchi, 1835) (160 m)
Solecurtus scopula (Turton, 1822) (160 m)

GLOSSIDAE
Glossus humanus (Linnaeus, 1758) (160 m)

VENERIDAE
Venus casina Linnaeus, 1758 (160 m)
Gouldia minima (Montagu, 1803)
Chamelea striatula (da Costa, 1778)
Timoclea ovata (Pennant, 1777) – *T. ovata* var. *marmorata*
Pitar rudis (Poli, 1795)
Callista chione (Linnaeus, 1758)
Dosinia lupinus lincta (Pulteney, 1799) (90-160m)

PHOLADIDAE
Pholadidea loscombiana Goodall in Turton, 1819

XYLOPHAGIDAE
Xylophaga praestans E.A. Smith, 1903 (160 m) in wood blocks (holes with a diameter of 1 – 3.5 cm)

TERIDINIDAE
Nototeredo norvagica (Spengler, 1792) (160 m)
Psiloteredo megotara (Hanley in Forbes & Hanley, 1848)

THRACIIDAE
Trachia pubescens (Pulteney, 1799) (160 m)

LYONSIIDAE
Lyonsia norwegica (Gmelin, 1791) (160 m)

CUSPIDARIIDAE
Cuspidaria cuspidata (Olivi, 1792)
Cuspidaria rostrata (Spengler, 1793

OSTREIDAE

***Crassostrea gigas* (Thunberg, 1793)**

= *Ostrea gigas* Thunberg, 1793
= *Gryphaea angulata* Lamarck, 1819
= *Crassostrea laperousii* Schrenck, 1861
= *Crassostrea talienwhanensis* Crosse, 1862
= *Crassostrea posjetica* Raugh, 1934
= *Ostrea complanata* Fenaux, 1944