

# NEPTUNEA



vol.15, n°1      January 2019

**Kon.B.V.C. Section Coast**  
is a branch of the  
'Koninklijke Belgische Vereniging voor Conchylologie' (Kon.B.V.C.)  
(Royal Belgian Society for Conchology)

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- Back cover: Philippe Dautzenberg (1849-1935)

**Layout:** Frank Nolf

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'**NEPTUNEA**' is a publication of B.V.C. Section Coast,  
issued four times a year on irregular basis

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Legal deposit: BD 52.109

# ***Colubraria pulchrafuscata* Dekkers, 2007: a junior synonym of *Colubraria springsteeni* Parth, 1991**

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**Keywords:** Mollusca, Gastropoda, COLUBRARIIDAE, *Colubraria pulchrafuscata*, *Colubraria springsteeni*, *Colubraria brinkae*, junior synonym, range extension.

**Abstract:** In 2007, Dekkers described *Colubraria pulchrafuscata* as a new species originating from the South China Sea and compared it with *Colubraria castanea* Kuroda & Habe, 1952 (= *Colubraria tenera* Gray, 1839) and *Colubraria springsteeni* Parth, 1991. Yet, the comparison was based upon a false identification of the latter and comparison of the type figures (Parth, 1991) with the type series (holotype and three paratypes) of *C. pulchrafuscata* lead to the conclusion that *C. pulchrafuscata* is a junior synonym of *C. springsteeni* and should therefore be rejected as a valid taxon. The distributional ranges of both *Colubraria springsteeni* (Japan) and *Colubraria brinkae* Parth, 1992 (Queensland) are extended.

## **Abbreviations:**

**DM:** Private collection of David Monsecour (Aarschot, Belgium)

**ZMA:** Zoological Museum Amsterdam, the Netherlands (now part of Naturalis Biodiversity Center, Leiden, the Netherlands)

**Discussion:** The genus *Colubraria* Schumacher, 1817 is a rather small genus comprising about 25 Recent species, which occur in all tropical and subtropical waters. Yet, the genus is rather poorly documented in modern literature: Parth (1992) listed all species known at that time, but literally left quite a few species with question marks (uncertain status or uncertain identity). For the Indo-Pacific region, no further works comprising all known species can be mentioned ever since this publication: only publications on certain regions such as Wilson (1994), Okutani (2000), Dharma (2005), Thach (2005), Monsecour (2008) and Monsecour & Dekker (2014) have been published (this is a non-exhaustive list). None of these show *C. springsteeni*: so far, it has only been figured by Springsteen & Leobrera (1986): *Colubraria* sp., Parth (1991): *Colubraria springsteeni* and Dekkers (2007): *Colubraria pulchrafuscata*.

This fragmentary documentation and the confusion with other genera such as *Tritonoharpa* (CANCELLARIIDAE) make it very difficult to get a complete picture of the genus.

Dekkers (2007) described *C. pulchrafuscata* based on 4 shells: the holotype (ZMA, Moll.4.07.049; now incorporated in coll NBC) and three paratypes (one in his own collection, one in the private collection of Henk Dekker, the Netherlands, and one in DM). All shells originated from the South China Sea, but more detailed information could (and still cannot) be given because of the limited data commercial Chinese material comes with.

When comparing the type material of *C. springsteeni* with the type material of *C. pulchrafuscata* (Table 1), it becomes clear that there are no differences between both taxa. We can only conclude that both taxa refer to the same species, leading to the establishment of ***C. pulchrafuscata* syn. nom.** as a junior synonym of *C. springsteeni*.

	<i>C. springsteeni</i>	<i>C. pulchrafuscata</i>
<b>Size</b>	24.2 - 46.8 mm	38-45 mm
<b>Protoconch</b>	<i>paucispiral; white</i>	<i>about 2 whorl; white</i>
<b>Teleoconch</b>	<i>about 9 whorls</i>	<i>9 whorls</i>
<b>Sculpture</b>	<i>7-8 spiral cords on penultimate whorl; reticulated, large granules at the intersection points between spiral cords and axial riblets</i>	<i>8 spiral lines on penultimate whorls; coarse; knobs are crosspoints of spiral lines and axial ribbing</i>
<b>Varices</b>	<i>one per whorl, at a distance of about 300° total number: 13-14</i>	<i>at 2/3 whorls from each other total number: 11-14</i>
<b>Aperture</b>	<i>inner lip with 12-14 long denticles</i>	<i>with 14-15 lines extending into aperture (ca 3 mm)</i>
<b>Outer lip</b>	<i>arched, with thick varix, alternately 3 dark bands and 2 white ones</i>	<i>with thick varix with brown dots at end of spiral lines,</i>
<b>Fasciole</b>	<i>smooth</i>	<i>smooth</i>
<b>Aperture</b>	<i>elongate, pale brown to brown paler, strong denticle delimiting anal canal</i>	<i>elongate, cream to brown; with white, angulated denticle near anal canal</i>
<b>Columella</b>	<i>cream to brown; strongly calloused at the base, less in the parietal zone, leaving the colour pattern of brown and white bands visible (in transparency)</i>	<i>cream to brown; with shallow lines, stronger abapically and less strong in upper half, leaving the pattern visible</i>
<b>Shell colour</b>	<i>light brown, wide darker band at the centre of each whorl</i>	<i>cream with dark brown banding</i>

**Table 1:** comparison of the type series of *C. springsteeni* and *C. pulchrafuscata*. **Italics:** data taken from the original descriptions, **regular script:** added by the present authors.

In order to distinguish *C. pulchrafuscata* from its Pacific congeners, Dekkers (2007) compared it with *C. castanea* (= *C. tenera*), a species generally known to inhabit Chinese waters and “*C. springsteeni*”. Yet, he does not mention Parth’s (1991) original description of *C. springsteeni* in his list of references and the shell (plate 2, fig. 6, dorsal and ventral view) he illustrates as *C. springsteeni* is in fact a representative of *Colubraria brinkae* Parth, 1992. This misidentification started immediately after the description of *C. springsteeni*: the type material was the only material known to originate from the Philippines and specimens of *C. tenera*-like shells were quite often available to collectors. Because they were smaller, had less convex whorls and a less granulate sculpture than *C. tenera*, they were always identified as *C. springsteeni*, while they in fact represented *C. brinkae*. As this confusion lasted for about two decades (first correct identification in subsequent literature: Monsecour, 2008), it is no wonder Dekkers (2007) made the same misidentification. Still, the creation of a synonymous taxon could have been avoided if Dekkers had consulted Parth (1991) because both authors refer to the figure in Springsteen & Leobrera (1986: pl. 34, nr. 14).

Of course, *C. tenera*, *C. springsteeni* and *C. brinkae* are closely related species with partly overlapping distributional ranges: *C. brinkae* is known from Taiwan (type material), the Philippines and Queensland (new record and range extension herein, 25 specimens, DM), *C. springsteeni* is known from the Philippines (type material), the South China sea (type material of *C. pulchrafuscata* syn. nov.) and Japan (Oosezaki, Izu Peninsula, Shizuoka prefecture, Honshu, new record and range extension herein, 2 specimens, DM), but *C. tenera* has the widest range of all three species: it is known from almost the entire Indo-Pacific region, with records from the Philippines, Japan, Vietnam, the Chinese mainland (even though Zhongyan, 2004 does not mention any species of *Colubraria*, at least 5 species are known from the China Sea: *C. tenera*, *C. springsteeni*, *C. muricata*, *C. sowerbyi* and *C. nitidula*), Australia, Thailand, Mozambique, South Africa and Madagascar (all present in DM).

**Note:** It is striking that Parth (1991, 1992) described *C. springsteeni* from the Philippines (type locality: Cebu) and *C. brinkae* from Taiwan (type locality: “off Taiwan”) and that until now no further specimens or very few of either species have been recorded from these localities: *C. springsteeni*’s Philippine distribution is based on material collected by Springsteen & Leobrera and since then, only a handful of Philippine specimens have been collected. On the other hand, *C. brinkae* is rather common in the Philippines, with only the type material (Holotype and one paratype ex D. Brink, now DM) known from Taiwanese/Chinese waters. However, it is impossible that Parth mixed up his data slips as the sources for his material were completely different: Springsteen & Leobrera for *C. springsteeni* and D. Brink for both type specimens of *C. brinkae*. All shells were apparently self-collected by these suppliers, so the locality data must be reliable.

**Acknowledgements:** We would like to thank Frank Nolf (Oostende, Belgium) for taking some pictures, making the colour plate and improving Table 1.

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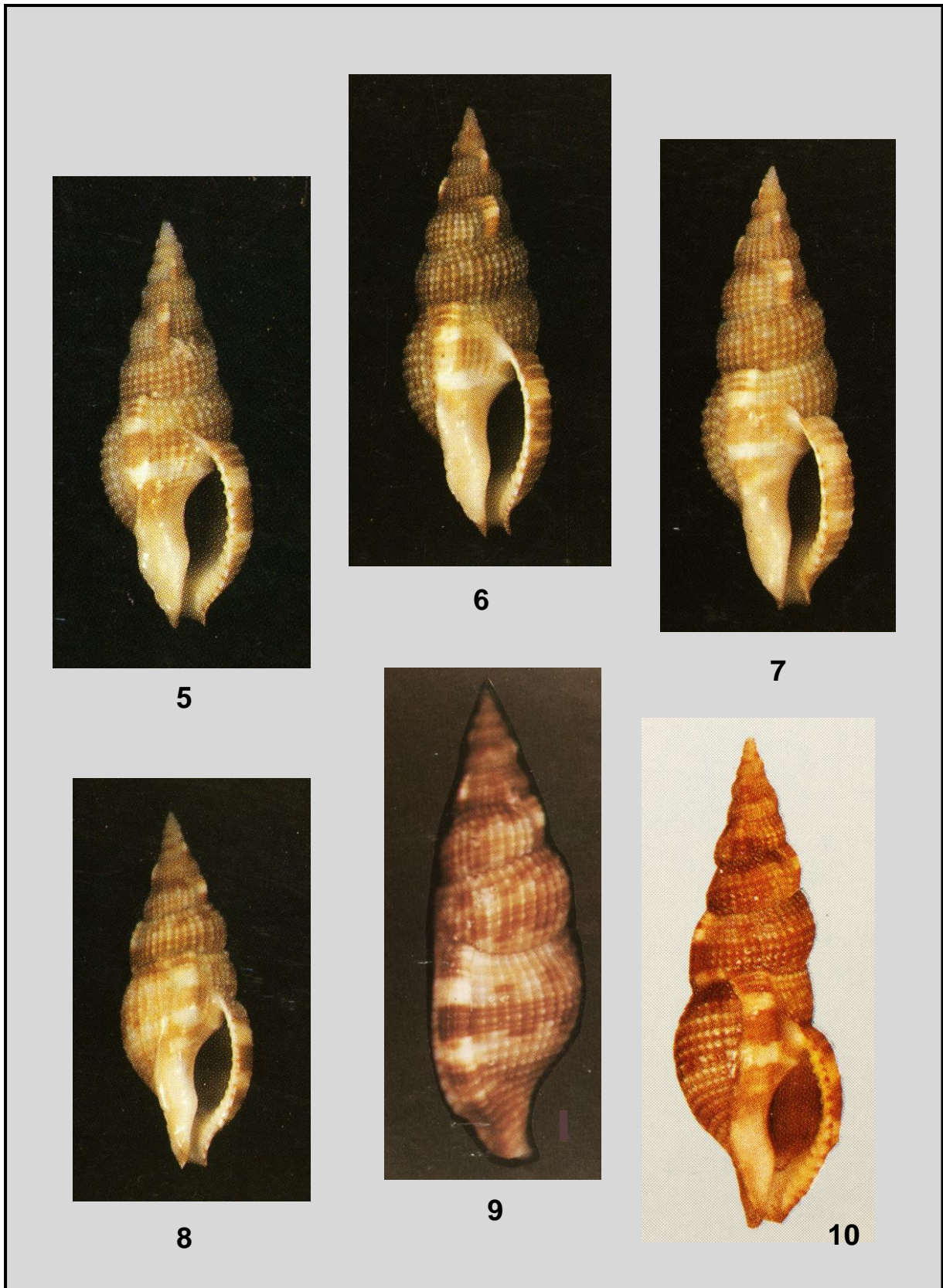


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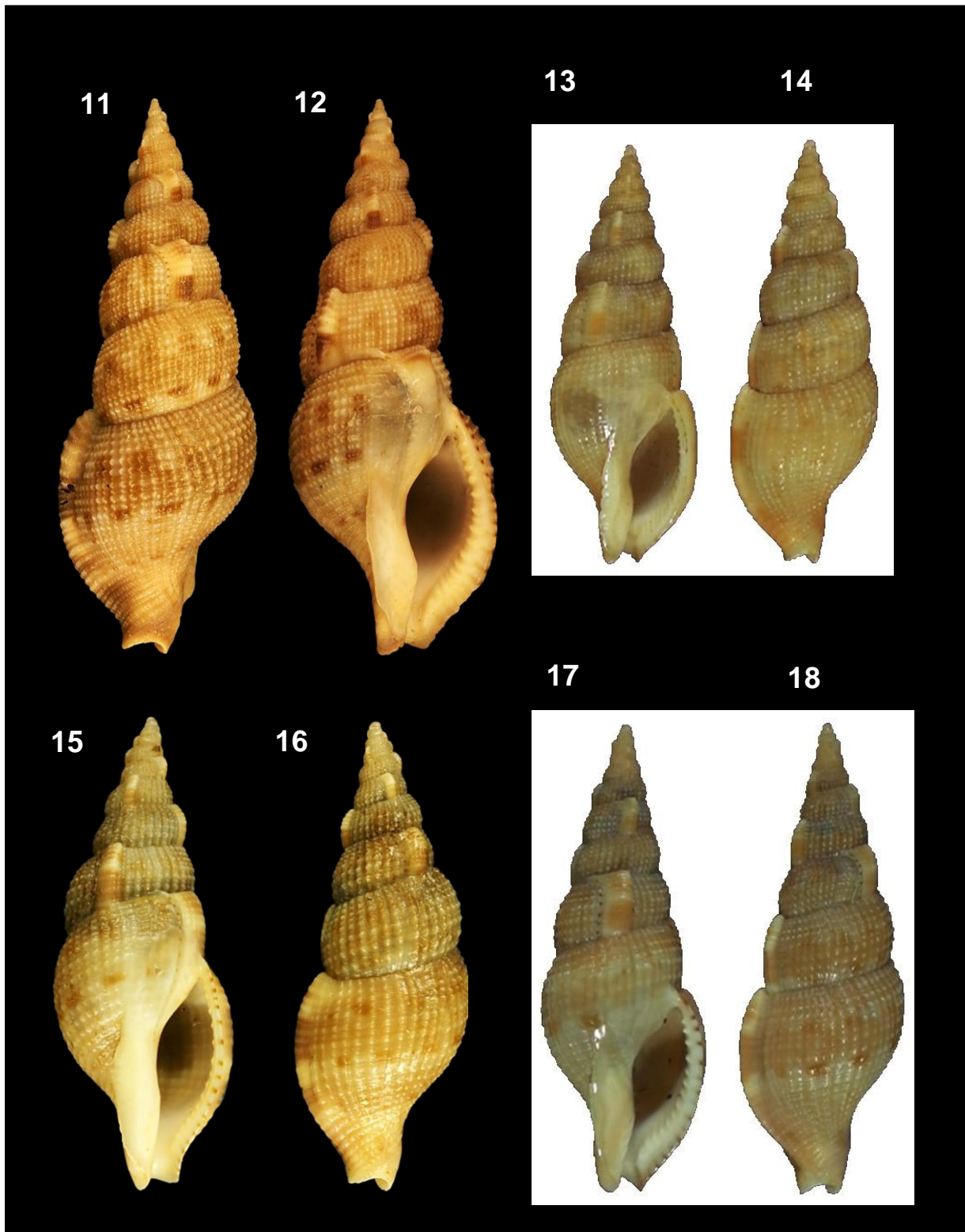


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**Plate I.** Figs 1-3: *Colubraria pulchrafuscata* Dekkers, 2007; 1: Holotype: front and dorsum (after Dekkers, 2007); 2: Paratype 1: front and dorsum (after Dekkers, 2007); 3: Paratype 2: front and dorsum (after Dekkers, 2007); 4: *Colubraria springsteeni* Parth, 1991. Osezaki, Numazu City, Izu Peninsula, Shizuoka Prefecture, Japan. Dived on sand at -45 m. April 2014. 41.4 mm.



Pl. II. Figs 5-10: *Colubraria springsteeni* Parth, 1991; 5: Paratype E (after Parth, 1991); 6: Paratype A (after Parth); 7: Paratype B (after Path); 8-9: Holotype (after Parth); 10: Springsteen & Leobrer's (1986) *Colubraria* sp. (= *C. springsteeni* Parth, 1991).



**Pl. III. Figs 11-12: *Colubraria tenera*** (Gray, 1839). Caubian Island, near Bohol, Philippines. Dived at a depth of 25 m. December 1999. 56.48 mm; **13-14: *Colubraria brinkae*** Parth, 1992. Taiwan. Trawled in deep water. 30.5mm; **15-16: *Colubraria brinkae*** Parth, 1992. Balicasag Island, Bohol, Philippines. Trawled by tangle nets at a depth of 100 m. March 2006. 31.16 mm; **17-18: *Colubraria brinkae*** Parth, 1992. Queensland, Australia. Dredged at a depth of 30m. 35.0mm.



***Modiolus gallicus* (Dautzenberg, 1895)  
a cryptic mussel from the NE Atlantic appears merely to be a  
juvenile form of *Modiolus modiolus* (Linnaeus, 1758)**

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**Keywords:** MYTILIDAE, *Modiolus gallicus*,  
*Modiolus modiolus*, NE Atlantic.

**Abstract:** *Modiolus gallicus* (Dautzenberg, 1895) has always been a rather controversial species, not fully understood and rather absent from shell collections. Type material of *Modiolus gallicus* (RBINS) has been compared with several samples of *Modiolus modiolus* (Linnaeus, 1758) from different localities in NW Europe, belonging to the private collections of the present authors. The differences with similar species such as *Modiolus barbatus* (Linnaeus, 1758) and *Gibbomodiola adriatica* (Lamarck, 1819) are clearly established. This study has resulted in the decision that specimens identified as *Modiolus gallicus* merely have to be regarded as young representatives of *Modiolus modiolus* with sometimes particular shell shapes due to the living conditions at a juvenile stage.

**Abbreviations:**

CFN: Private collection of Frank Nolf (Oostende, Belgium)

CJV: Private collection of Johan Verstraeten (Oostende, Belgium)

CSH: Private collection of Steve Hubrecht (Oostende, Belgium)

RBINS: Royal Belgian Institute for Natural Sciences, Brussels, Belgium

H.: height

L.: length

W.: width

LV: left valve

RV: right valve

**Introduction:** Ph. Dautzenberg (1895) described *Modiola gallica* as a new species from the coasts

of Normandy (France) and the English Channel. He also referred to one specimen from La Bernerie (Loire-Atlantique, W France) (Collection Caillaud, Museum d'Histoire naturelle de Nantes). The latter had been mentioned in the catalogue of the museum as *Modiola modiolus* var. *minor* (Caillaud, 1865). Earlier on, Dautzenberg (1893) listed this form as *Modiolus vulgaris* Fleming and he judged that *M. modiolus* var. *minor* was a synonym. Later on, he came in possession of the paper by Fleming and changed his opinion in declaring it all concerned juvenile forms of *Modiolus modiolus*.

**Original description of *Modiola gallica***

**Dautzenberg, 1895:** 'Testa aequivalvis, valde inaequilateralis, ovato-oblonga, tumida, medio gibbosa. Latus anticum parvum, semper productum; posticum vero maximum, expansum. Apices incurvati. Incrementi rugae parum numerosae, inaequales. Color albus, epidermide nitidissimo, flavo-castaneo, postice barbato, indutus. T. 30 millim. alta; 58 millim. lata; 24 millim. crassa.'

'Coquille équivalve, très inéquilatérale, renflée, médiocrement solide. Sommets très saillants, incurvés, situés un peu en arrière de l'extrémité antérieure. Région antérieure très petite, dépassant toujours les sommets; région postérieure très grande, très convexe au milieu, déclive du côté ventral, comprimée du côté dorsal. Bord antérieure arrondi, bord dorsal décrivant un angle obtus, bord postérieur arrondi, bord ventral faiblement sinueux, pourvu d'une fente byssale très étroite. Surface ornée de stries d'accroissement irrégulières et présentant au-dessous de la crête obtuse, qui règne entre le sommet et l'extrémité postéro-inférieure de la

coquille, un sillon rayonnant très superficiel. Intérieur des valves lisse, luisant, faiblement nacré. Impression du muscle adducteur antérieur des valves petite, arrondie, située sous les crochets; impression du muscle adducteur postérieur grande, arrondie. Bord cardinal simple, renforcé en arrière des sommets par une lame sur laquelle s'insère profondément un ligament interne corné, brun. Coloration blanche sous un épiderme très luisant, vernissé, d'un brun clair mordoré, plus foncé de chaque côté de la crête médiane. Cet épiderme, caduc dans le voisinage des sommets, est pourvu sur la région postérieure, de barbules larges à la base, effilées à l'extrémité et portant de petites expansions latérales spiniformes, visibles seulement sous la loupe. Ces barbules, peu serrées, très irrégulièrement développées, agglutinent de nombreux matériaux: grains de sable, débris de coquilles, etc.'

#### Free adaptation of the original description:

Shell equivalve, very inequilateral, tumid, moderately solid. Beaks protruding, curved, slightly positioned towards the back of the posterior extremity. Anterior area very small, always extending from the beaks. Posterior area very large, very convex in the middle of the shell. Anterior margin rounded, dorsal part obtuse, posterior margin rounded, ventral part slightly sinuous, with a very narrow byssal gap. Surface with irregular growth lines. Below the ridge on the upper margin a very superficial furrow runs from the anterior to the posterior side. Interior of the valves smooth and glossy, slightly nacreous. Anterior muscle scar small and rounded, located just under the umbo; posterior muscle scar large and rounded. Brown, horny ligament fitted on an elementary hinge plate. Colour creamy white under a glossy, light reddish-brown periostracum, darker towards the margins and mostly obsolete near the umbones. At the posterior side the epidermis is gathered into concentric fringes broad at the base and ending in very narrow extremities with lateral expansions, only visible under a magnifying glass. The fringes may contain small fragments of sand grains and shell grit.

**Habitat:** According to Ph. Dautzenberg *Modiolus gallicus* occurs at 10-15 m in areas inhabited by *Pecten maximus* (L. 1758) in the neighbourhood of Le Havre (Normandy, France). Actually, we are aware of specimens from Iceland, Normandy (France), the English Channel, the Silver Pit (known by Belgian fishermen as 'Kreeftenput') (North Sea) and Pas-de-Calais (North France). Dautzenberg (1895) only mentions French localities: Boulogne-sur-Mer (Pas-de-Calais), Le Havre, Villers-sur-Mer, Grandcamp and Saint-

Pair (all in Normandy), Saint-Malo (Brittany), La Bernerie (Vendée, W France). Huber (2010) also mentions Orkney Islands, Scotland, UK, 59°01' N/ 04°01' W and depths from 20 to 88 m.

**Measurements:** from 40 to 90 mm.

**Material and methods:** First of all we want to stress that only the type material from the Dautzenberg collection will be treated as *Modiolus gallicus* in this paper. All other specimens less than 10 cm from our private collections which are similar to both *M. gallicus* (Dautzenberg, 1895) and *M. modiolus* (Linnaeus, 1758) are mentioned in the text and listed in the captions as *Modiolus* cf. *gallicus* or '*Modiolus gallicus*'. Larger specimens clearly belong to *Modiolus modiolus*.

#### Ph. Dautzenberg collection (RBINS):

*Modiolus gallicus* (Pl. I, Figs 1-6; Pl. II, Figs 7-12; Pl. III, Figs 13-17).

- Villers-sur-Mer, Normandy, France. Trawled by fishermen. 5 November 1895. Sample of 1 specimen: H. 36.79 mm L. 72.01 mm. (Pl. I, Figs 1-2).
- off Cherbourg, Normandy, France. Dredged by fishermen. 12 January 1913 (sample of 4 specimens):
  - H. 24.63 mm L. 47.64 mm (Pl. II, Figs 3-6)
  - H. 26.94 mm L. 54.33 mm (Pl. II, Figs 7-10)
  - H. 26.70 mm L. 53.93 mm (Pl. II, Figs 11-12)
  - H. 31.30 mm L. 55.82 mm (Pl. III, Figs 13-17).

#### F. Nolf collection:

- *Modiolus* cf. *gallicus*: The English Channel, SW England, UK. Trawled by Belgian fishermen. Sample of two specimens:
  - H. 32.76 mm L. 57.26 mm
  - H. 42.70 mm L. 79.77 mm
- *Modiolus* cf. *gallicus*: 1 specimen, H. 39.97 mm L. 82.84 mm. Off Dunkerque, Pas-de-Calais, northern France. Trawled by the MSI "Hasselt" (leg. F. Nolf) at a depth of 35 m. March 1973. (Pl. IV, Fig. 18).
- *Modiolus* cf. *gallicus*: 1 specimen, H. 15.96 mm L. 29.03 mm. Off Gufunes, Iceland. Dredged by fishermen at a depth of 15 m. July 1970. (Pl. IV, Figs 19-20).
- *Modiolus* cf. *gallicus*: 1 specimen, H. 20.42 mm L. 38.83 mm. Plage Goas Trez, Trébeurden, Brittany, France. In seaweed washed ashore. July 1975. (Pl. IV, Figs 23-24).

**S. Hubrecht collection:** 33 specimens (*Modiolus* cf. *modiolus* and *M. modiolus*) from the 'Kreeftenput' (Silver Pit, North Sea). Trawled by Belgian fishermen in 1968 (see: Table I).

**J. Verstraeten collection:**

- *M. modiolus*: 1 specimen, H. 34.90 mm L. 61.44 mm. Holme, North Norfolk, UK. Washed ashore during storms. February 1990. (Pl. XIII, Figs 58-60).
- *M. modiolus*: 2 specimens, H. 33.87 mm L. 63.19 mm (Pl. V, Fig. 28) and H. 35.04 mm L. 61.74 mm (Pl. V, Fig. 29). Loch Creran, near Oban, Scotland, UK. Among stones and seaweed at low tide. 1996.
- *Modiolus* cf. *gallicus*: H. 27.69 mm L. 49.43 mm. Faxaflói, Iceland. (Pl. IV, Figs 21-22).
- *Modiolus* cf. *gallicus*: 2 specimens, H. 26.21 mm L. 46.56 mm (Pl. V, Fig. 25) and H. 27.98 mm L. 61.89 mm. North Sea. Trawled by Belgian fishermen (Oostende).
- *Modiolus* cf. *gallicus*: H. 37.30 mm L. 72.26 mm. The English Channel, SW England, UK. Trawled by Belgian fishermen at a depth of 20-30 m. (Pl. V, Figs 26-27).

All material used for comparison is present in the F. Nolf collection:

- ***Modiolus modiolus*** (Pl. XIV, Figs 61-64).
- ***Modiolus barbatus*** (Pl. XV, Figs 65-72; Pl. XVI, Figs 73-78).
- ***Gibbomodiola adriatica*** (Pl. XVII, Figs 79-88); Pl. XVIII, Figs 89-96; Pl. XIX, Figs 97-104; Pl. XX, Figs 105-110).

**The genus *Modiolus* Lamarck, 1799**

(syn. *Volsella* Scopoli, 1777 rejected, IZCN 325; *Modiola* Lamarck, 1801 rejected IZCN 325; *Perna* 'Adanson' Mörch, 1853 non Philippon, 1788 obj; *Eumodiolus* Ihering, 1900 obj.)

**Type species: *Mytilus modiolus* Linnaeus, 1758.** Syst. Nat., p.706. Circumboreal. Northern Europe, western Atlantic from the Arctic to northeast Florida, eastern Pacific from the Arctic Sea to San Pedro, California.

According to Huber (2010) no recent review is available for this large and diverse genus.

Specimens belonging to the genus *Modiolus* have a rhomboidal outline and a tumid shape. In habitats, anatomy and morphology very distinct groups have been placed in *Modiolus*. The genus *Modiolus* is restricted to modioliform species close to the rather solid type species with a strong hirsute periostracum and simple branchial structure.

Specimens of ***Gibbomodiola*** are modioliform, gibbous and smooth without periostracal hairs (Huber, 2010).

**Discussion:**

It is clear that *Modiolus gallicus* is a controversial species, that is difficult to separate from similar species such as *Modiolus modiolus* but easily distinguishable from *Gibbomodiola adriatica*. Few authors recognise *Modiolus gallicus* as a valid species and they do not segregate it from the large holdings of *Modiolus modiolus* (e.g. the British Museum of Natural History). In general the European regional literature does not mention *Modiolus gallicus*, except Tebble (1966) who supposed that specimens from the English Channel, which live low down on rocky shores, could belong to a subspecies or variety of *M. barbatus*, with a white or slightly purple-coloured shell instead of the red interior valves of the latter and less prominent serrations on the spines.

**Differences with *Modiolus modiolus* (Linnaeus, 1758):**

Calliaud (1865) was the first author to mention the presence of *Modiolus gallicus* in French waters in his catalogue of the shells collected in the Loire-Atlantique (W France). He used the name *Modiola modiolus* L., var. *minor*. Dautzenberg (1893) referred to this shell as *Modiola vulgaris* (Fleming, 1828) with *M. modiolus* var. *minor* Caillaud, 1865 as a synonym, but two years later he realised that *M. vulgaris* was no more than a junior synonym of *Modiolus modiolus* (Linnaeus, 1758).

*Modiolus modiolus* has a much larger shell (100-220 mm). The size of *Modiolus gallicus* ends where that of *M. modiolus* begins. Therefore we first tried to compare large specimens of *M. gallicus* with small ones of *M. modiolus*. Large shells (> 100 mm) found in the NE Atlantic, the English Channel and the North Sea offer no problems. The periostracum of *M. gallicus* is rusty brown and rarely black while that of *M. modiolus* is dark brown and mostly completely black. In fact this is a normal phenomenon within all young and adult mussels. The shell of *M. gallicus* is thin and fragile, compared to the thick shell of *M. modiolus*, another characteristic in the growth process. The latter has a broader and swollen shell while the shell of *M. gallicus* is more compressed (Huber, 2010), protruding and elongate. The umbones in *M. gallicus* are more terminal. *M. gallicus* has a more rhomboidal shell, with the lower margin of the anterior end twisted upwards and not rounded as in *M. modiolus*.

*M. modiolus* is creamish white or purplish pink under the black epidermis, *M. gallicus* is white and only scarcely blushed with pinkish orange.

The interior of *M. gallicus* clearly shows bluish-grey growth lines due to the thin structure of the shell. This is hardly visible in *M. modiolus*. Unfortunately, the given characteristics are not constant and not evident enough to separate

both species. Moreover, it is regrettable that Dautzenberg did not figure any specimen of *Modiolus modiolus* to compare with *M. gallicus*.

The specimens in the homogeneous sample from a single locality (Silver Pit) in the S. Hubrecht collection were measured in detail as shown in Table 1. This batch contains specimens that are certainly *Modiolus modiolus* as well as specimens of '*Modiolus gallicus*'. The samples in the remaining studied material were not large enough to make meaningful measurements.

The plots (Figs 2-5) illustrate the relationship between the various dimension measurements (H/L/W/weight). In general there is a good correlation independent of the shells are belonging to *M. modiolus* or *M. gallicus*. There is no consistency of deviating specimens that could be attributed to a different species.

Plot 4 (Fig 5) illustrates the relationship between weight versus length. Here the correlation is less clear, although the graph is rather exponential, as could be expected.

It is clear that even within one sample there is a degree of variation in shape. According to fishermen, young *Modiolus modiolus* live in clusters bound together by their byssus. These clusters can contain specimens of varying size including adult ones. Given the steric hindrance in such clusters it leads to some form of distortion in individual specimens. This explains the random deviation in measurements of individual specimens. As the specimens grow larger, adults tend to live in a solitary way.

#### Differences with *Modiolus barbatus* (Linnaeus, 1758):

Compared to *M. barbatus*, *Modiolus gallicus* is more oval and elongate, less compressed at the dorsal side, the beaks are less terminal and situated behind the anterior extremity of the shells. Growth lines are less numerous and less regular, the epidermis is glossier with a smaller number of hairs. The shells of *M. barbatus* are mostly richly tinged with reddish purple, certainly on the interior side.

#### Differences with *Gibbomodiola adriatica* (Lamarck, 1819):

##### Synonymised names:

*Callitriche discolor* Scacchi, 1833  
*Modiola brachytera* Locard, 1886  
*Modiola lamarckiana* Locard, 1886  
*Modiola ovalis* G.B. Sowerby II, 1859  
*Modiola radiata* T. Brown, 1827  
*Modiola strangulata* Locard, 1886  
*Mytilus cavolini* Scacchi, 1833

Compared to *G. adriatica*, *M. gallicus* is larger, with a heavier and thicker shell, a more cylindrical outline, and has got a distinct hairy periostracum

Typical of *G. adriatica* are the purplish blue or pink stripes running from the anterior to the posterior end immediately behind the shallow furrow below the upper margin. The outer surface is variously coloured with, pink, orange, bluish-grey and white blotches and stripes which has resulted in the creation of several names of colour forms by 19<sup>th</sup> century authors. The interior of the valves usually has a bluish blotch, and is sometimes even completely very dark blue coloured. In fact *M. gallicus* can never be confused with *G. adriatica* except for the similar outline of the anterior region, but the beaks of *M. gallicus* are more protruding and swollen.

#### Conclusion:

We first of all have to state that specimens from Normandy (France) in the Ph. Dautzenberg collection (RBIN) fully match the description of the author. However, other specimens from The English Channel and the North Sea with about the same measurements could be compared with *M. gallicus*, but they could just as well be considered as juvenile forms of *Modiolus modiolus*. The characteristics described by Dautzenberg are not constant enough to make a difference between two species. We did not establish any combination of parameters that allow to distinguish small (juvenile) specimens (less than about 10 cm) of both species. Therefore we have to decide that the name *Modiolus gallicus* was assigned to juvenile specimens of *Modiolus modiolus* which show a brown instead of the typical black periostracum, with a thin and fragile shell, compared to the thick shell of *M. modiolus*. *M. gallicus* is more compressed, protruding and elongate with the umbones more terminal in contrast with the broader and more swollen shell of *M. modiolus*. *M. gallicus* has a more rhomboidal shell, with the lower margin of the anterior end twisted upwards and not as rounded as in *M. modiolus*. All these differences are so small and certainly not constant because they are probably related to the habitat and the way in which the specimens grow attached to each other in clusters or individually attached to stones or rocks or any other sediment. We conclude that both represent one single species and that the name *Modiolus gallicus* (Dautzenberg, 1895) has to be accepted as a junior synonym of *Modiolus modiolus* (Linnaeus, 1758).

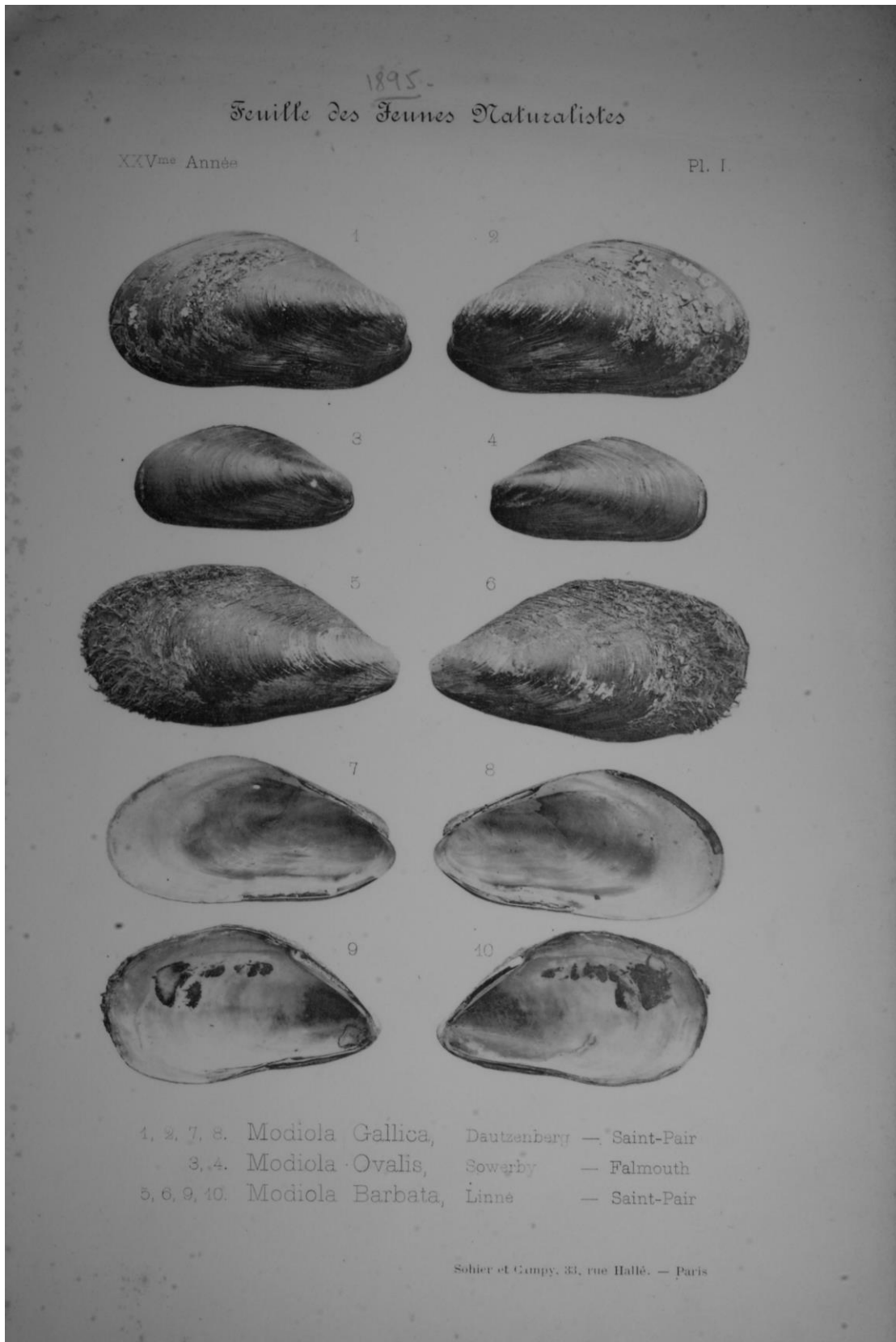
The differences with related species such as *M. barbatus* and *Gibbomodiola adriatica* are conclusive enough to avoid any confusion. Moreover, we observed the same variability in

the morphological structure of shells of these species, certainly in *Modiolus barbatus*. Till now, we had always deemed that *M. modiolus* had a very constant appearance: broad and thick shells, rarely elongated. In the present paper we postulate that rhomboidal, elongate, compressed and protruding specimens are present in the juvenile stage. The predominant colour of the epidermis is rusty brown to dark brown, but even black shells occur. Adult specimens are always black coloured.

**Acknowledgements:** We wish to thank Thierry Backeljau and Rose Sablon (both RBINS) for their kind help to make specimens of *Modiolus gallicus* in the Dautzenberg collection (RBINS) available for photography. The present article would never have been realised without the fruitful and critical remarks of the enthusiastic members of the 'Neptunea' group and our corrector of the English text, David Monsecour (Aarschot, Belgium). Delphine Clement gave some technical assistance regarding the plots.

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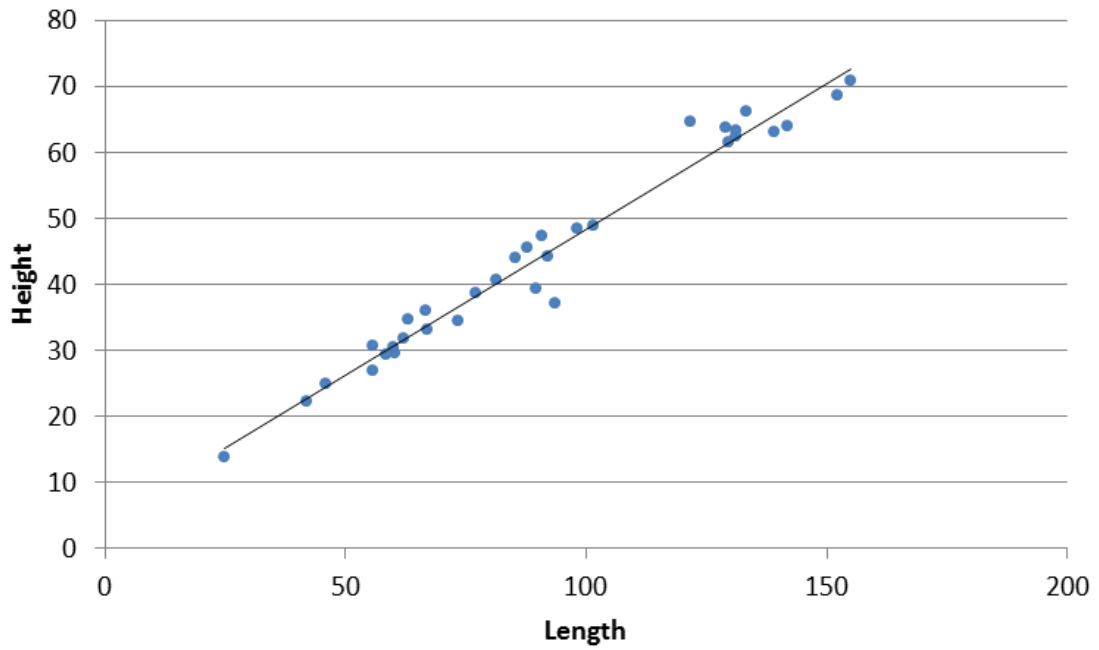
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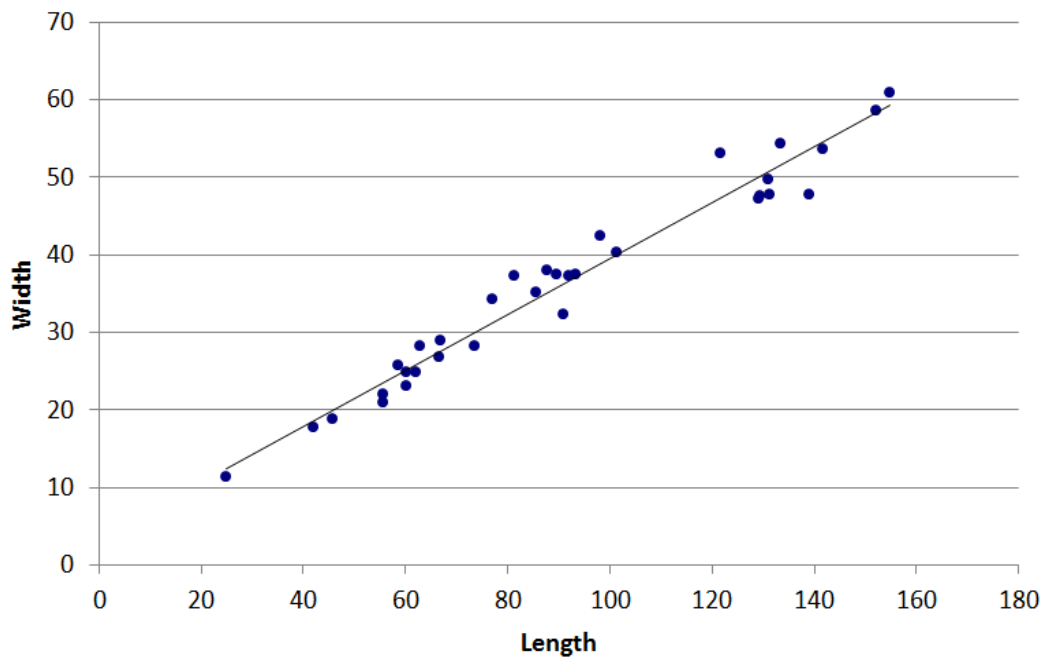
**Fig. 1: Description d'une nouvelle espèce de *Modiola* provenant du littoral occidental de la France, Dautzenberg, Ph., 1895. Feuilles des Jeunes Naturalistes, 25<sup>e</sup> ann., Pl. I. Paris.**

No.	Height (mm)	Length (mm)	Width (mm)	Weight (g)
12	13.79	24.95	11.30	1
9	22.38	42.02	17.74	3
5	24.84	45.89	18.87	4
10	26.91	55.70	22.04	4
3	29.44	58.54	25.68	9
8	29.52	60.20	24.88	7
6	30.42	60.13	23.09	6
4	30.71	55.66	20.90	6
7	31.80	62.01	24.91	9
16	33.20	66.98	28.92	11
1	34.50	73.52	28.24	9
19	34.76	62.94	28.28	10
2	36.09	66.67	26.78	9
23	37.10	93.45	37.52	37
14	38.62	77.08	34.34	19
17	39.42	89.70	37.51	23
21	40.74	81.34	37.32	30
22	44.08	85.48	35.20	25
20	44.23	92.06	37.21	30
15	45.50	87.68	37.94	26
11	47.26	90.85	32.37	17
13	48.38	98.28	42.30	39
18	48.96	101.46	40.36	27
24	64.62	121.68	53.14	90
25	63.69	129.13	47.14	80
26	61.64	129.53	47.66	62
27	62.54	131.02	49.72	77
28	63.34	131.27	47.75	66
29	66.28	133.44	54.26	95
30	63.02	139.06	47.79	92
31	64.06	141.78	53.65	94
32	68.74	152.15	58.62	138
33	70.84	154.92	60.85	144

**Table 1: list of 33 specimens of *Modiolus cf. gallicus* from the Silver Pit (North Sea) (collection of Steve Hubrecht)**

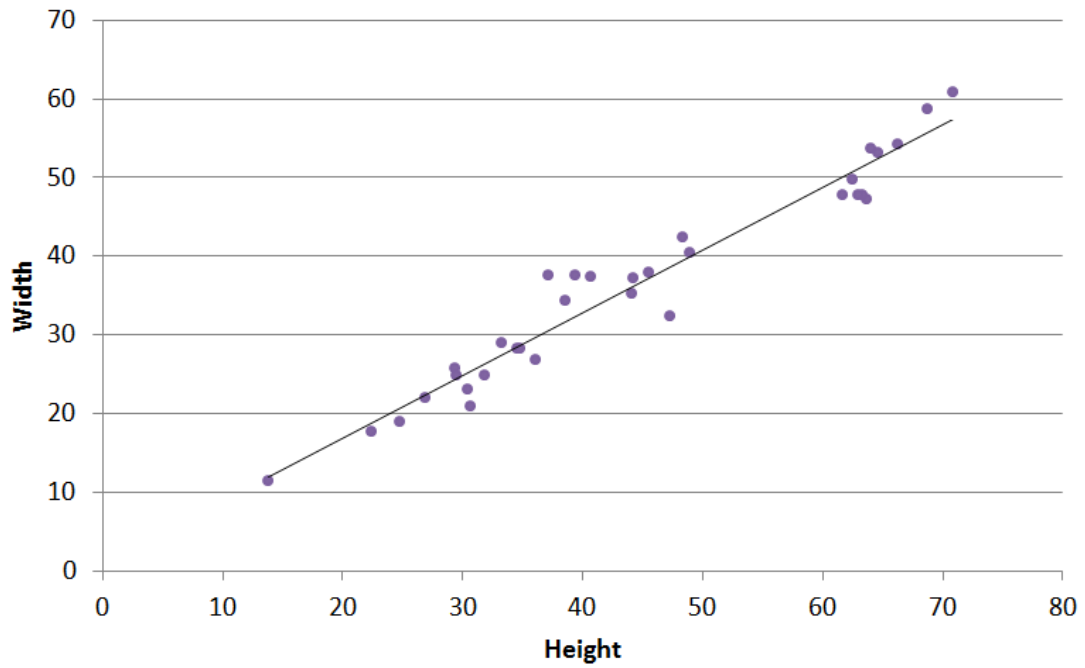


**Fig. 2: Plot of height/length measurements for all the specimens in the Silver Pit (North Sea) sample**

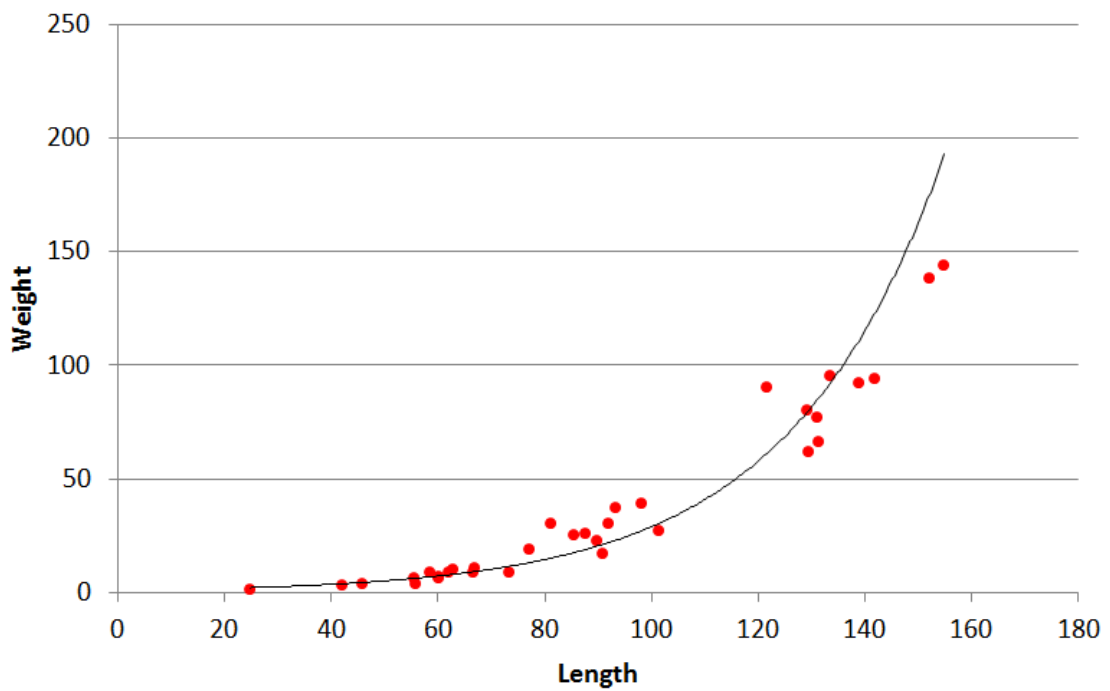


**Fig. 3: Plot of width/length measurements for all the specimens in the Silver Pit (North Sea) sample**

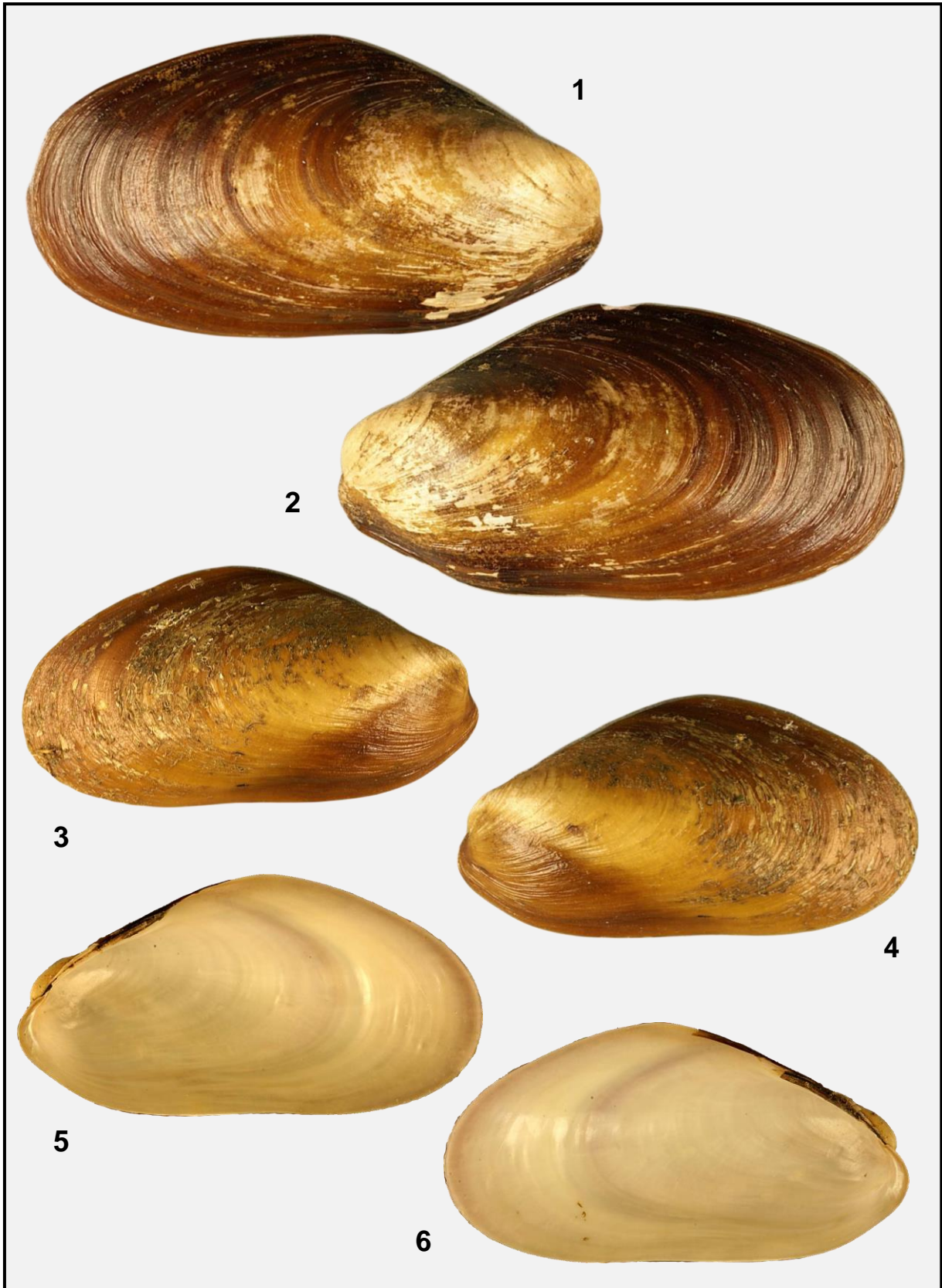




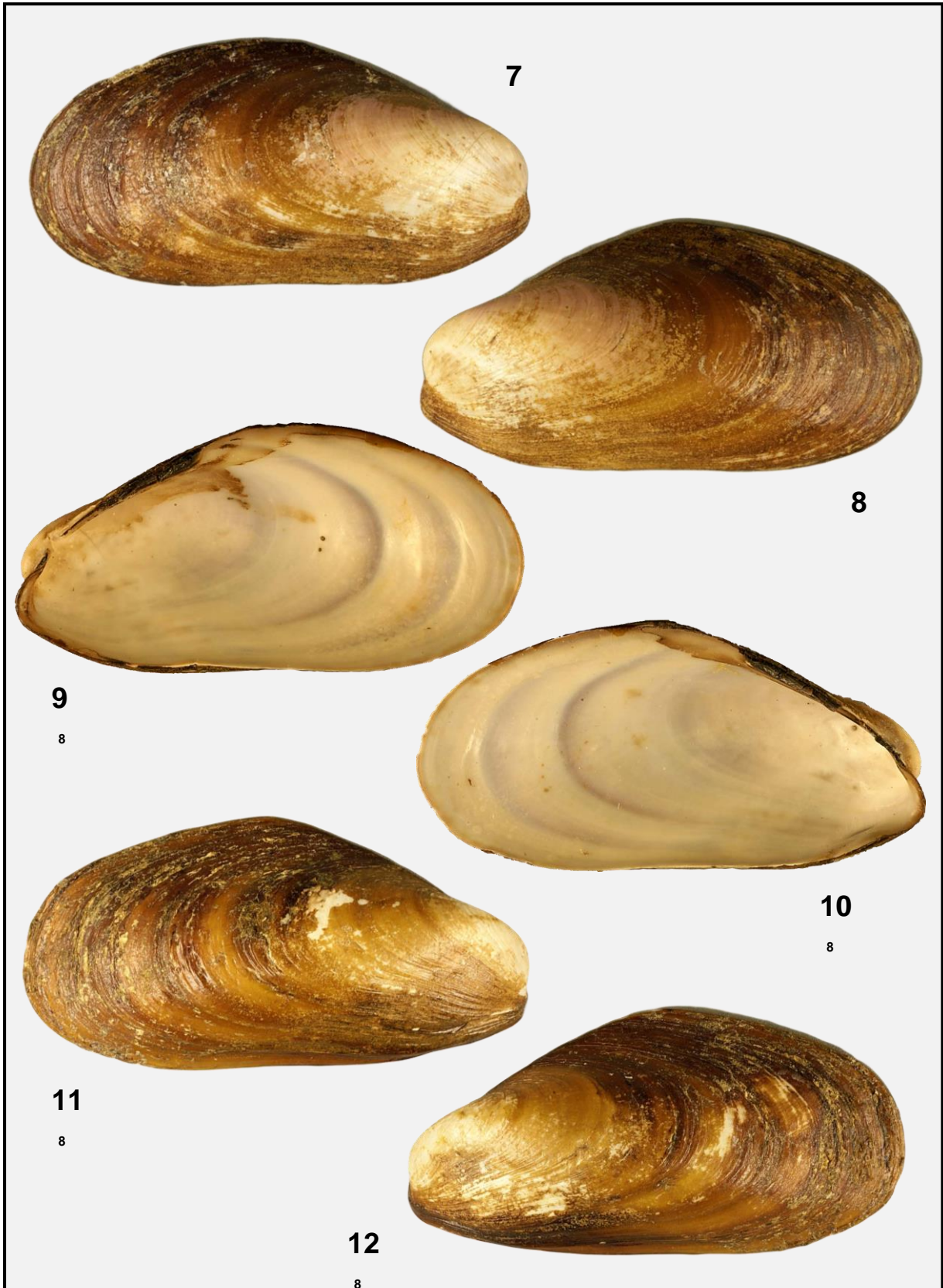
**Fig. 4: Plot of width/height measurements for all the specimens in the Silver Pit (North Sea) sample**



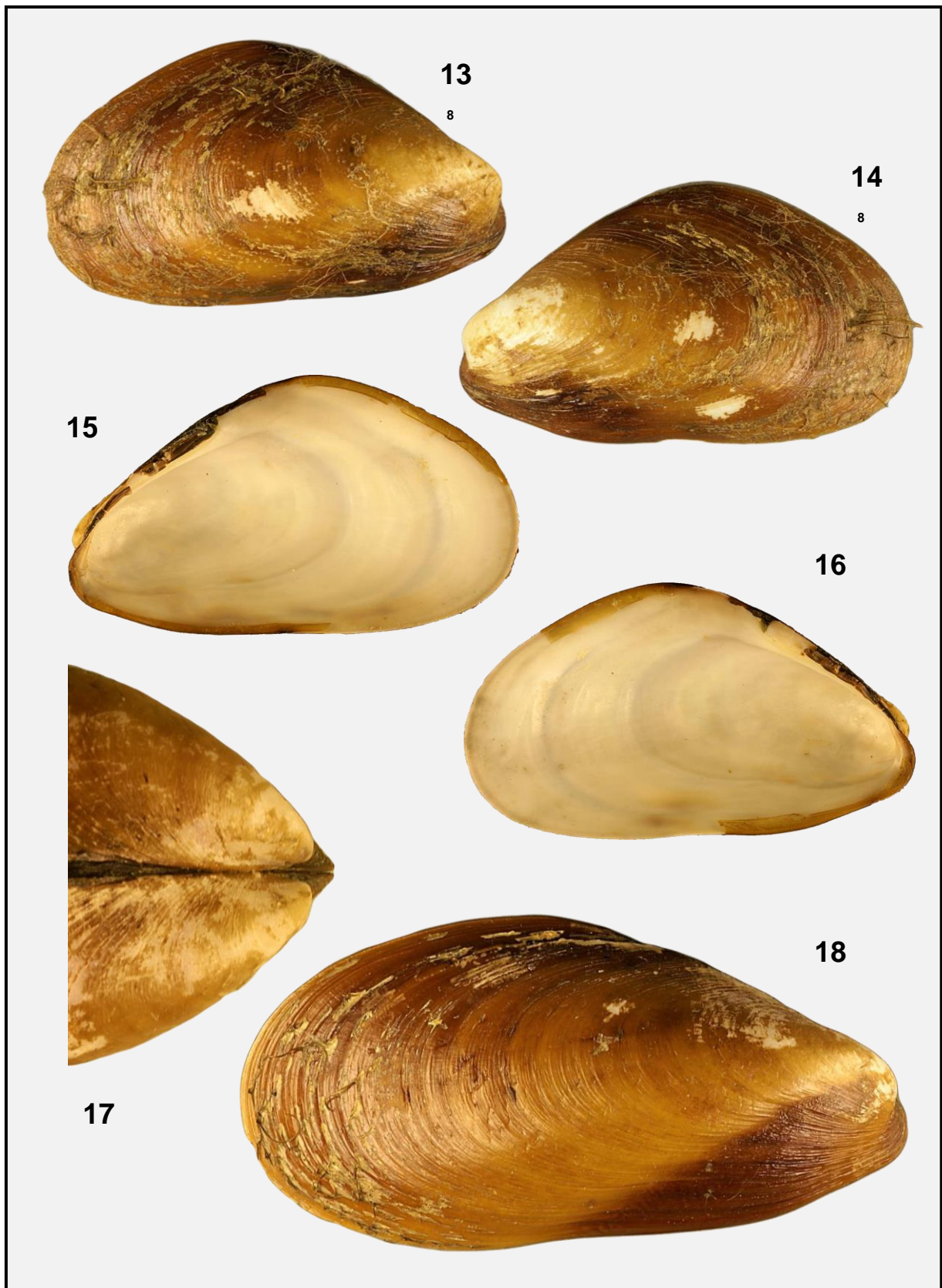
**Fig. 5: Plot of weight/length measurements for all the specimens in the Silver Pit (North Sea) sample**



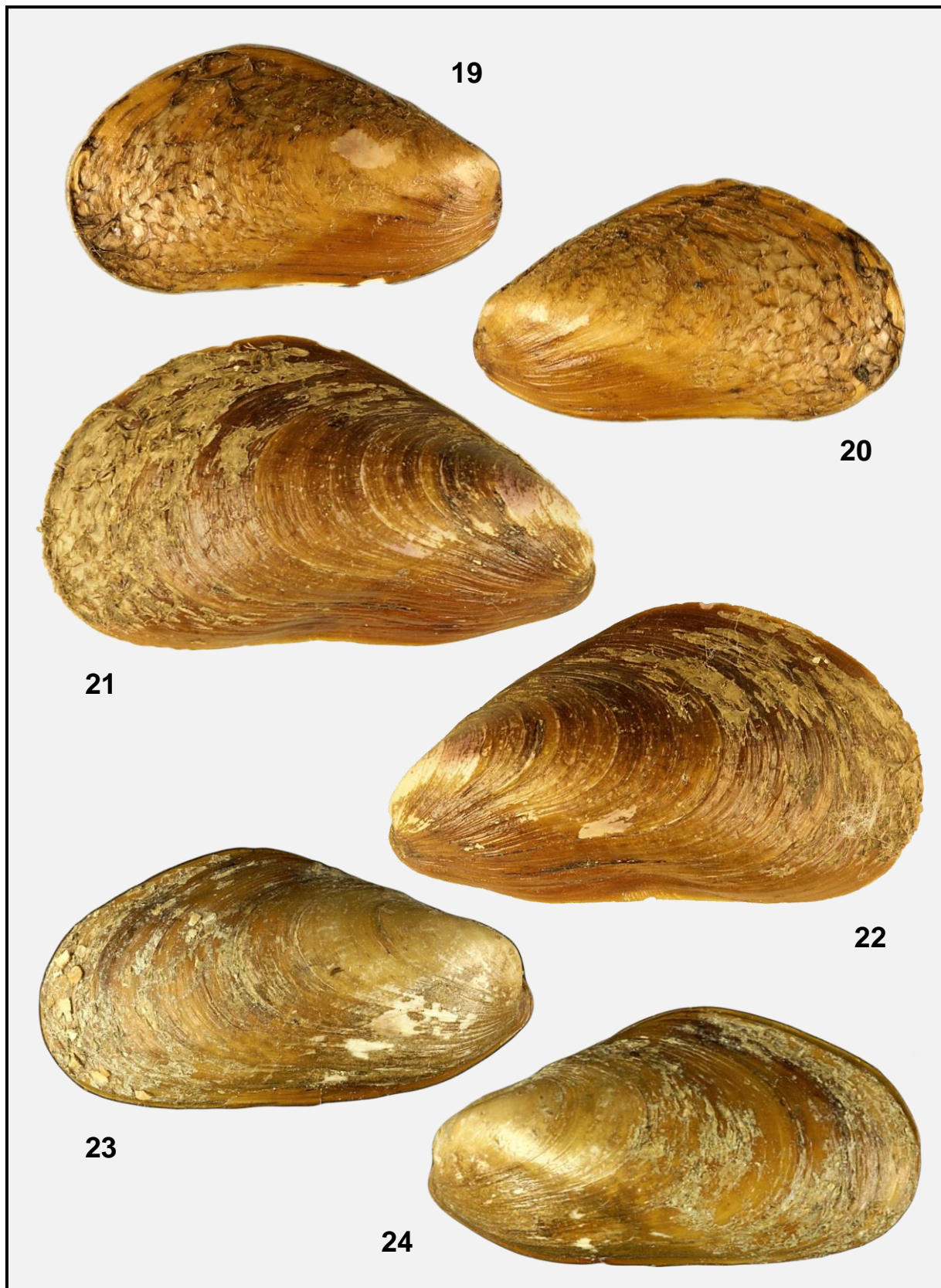
**Pl. I.** Figs 1-6. *Modiolus gallicus* (Dautzenberg, 1895). Coll. Ph. Dautzenberg (RBINS); 1-2: off Villers-sur-Mer, Normandy, France. Trawled by French fishermen. 5 November 1895. H. 36.79 mm L. 72.01 mm; 1: RV; 2: LV; 3-6: off Cherbourg, Normandy, France. Trawled by French fishermen. 12 January 1913. H. 24.63 mm L. 47.64 mm; 3: RV; 4: LV; 5: interior side of RV; 6: interior side of LV.



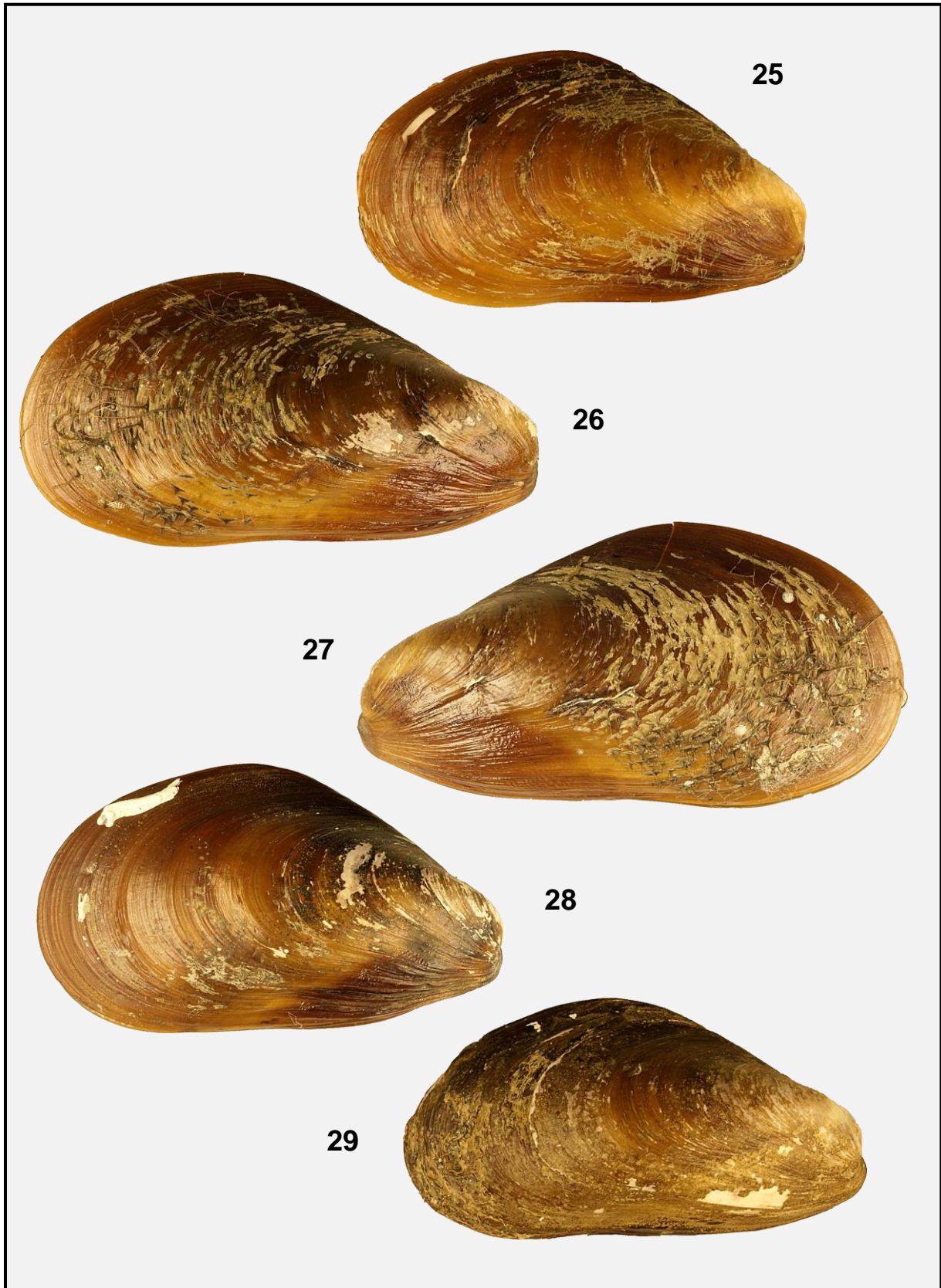
**Pl. II.** Figs 7-12. *Modiolus gallicus* (Dautzenberg, 1895). Coll. Ph. Dautzenberg (RBINS). Trawled by French fishermen off Cherbourg, Normandy, France. 12 January 1913; 7-10: H. 26.94 mm L. 54.33 mm; 7: RV; 8: LV; 9: interior side of RV; 10: interior side of LV; 11-12: H. 26.70 mm L. 53.93 mm; 11: RV; 12: LV.



**PI. III.** Figs 13-17. *Modiolus gallicus* (Dautzenberg, 1895). Coll. Ph. Dautzenberg (RBINS); Trawled by French fishermen off Cherbourg, Normandy, France. 12 January 1913. H. 31.30 mm L. 55.82 mm; 13: RV; 14: LV; 15: interior side of RV; 16: interior side of LV; 17: view on the umbones; 18: *Modiolus* cf. *gallicus*. Trawled by the Belgian Navy inshore minesweeper M472 "Hasselt" off Dunkerque, North France at a depth of 35 m. March 1973. H. 39.97 mm L. 82.84 mm. RV. CFN.



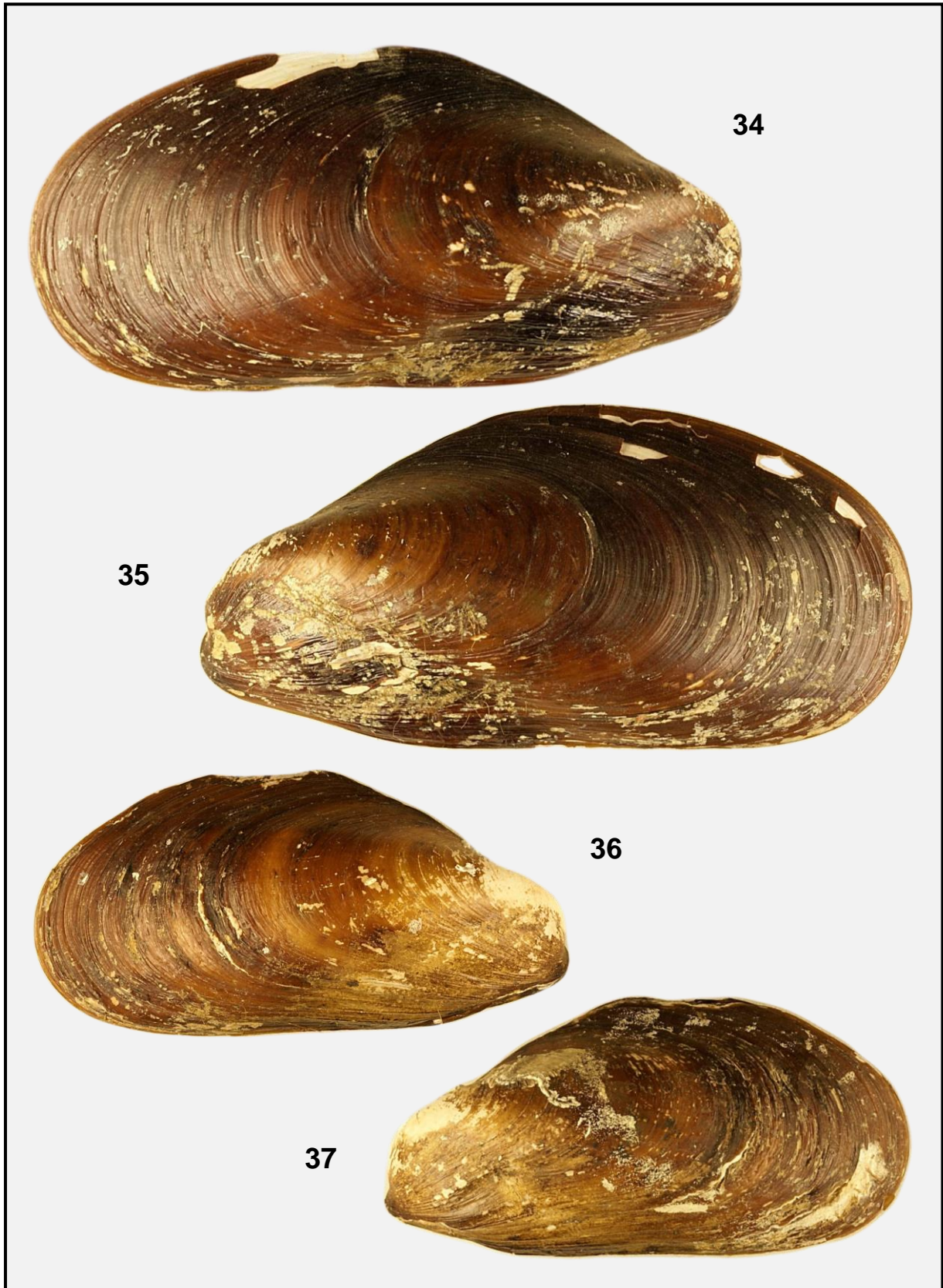
**Pl. IV.** Figs 19-24. *Modiolus* cf. *gallicus* (Dautzenberg, 1895); 19-20: Dredged by fishermen at a depth of 15 m off Gufunes, Iceland. July 1970. H. 15.96 mm L. 29.03 mm. CFN; 19: RV; 20: LV; 21-22: Faxaflói, Iceland. H. 27.69 mm L. 49.43 mm. CJV; 21: RV; 22: LV; 23-24: Plage Goas Trez, Trebeurden, Brittany, France. On seaweed, washed ashore. July 1975. H. 20.42 mm L. 38.83 mm. CFN; 23: RV; 24: LV.



**Pl. V.** Figs 25-29. *Modiolus* cf. *gallicus* (Dautzenberg, 1895). CJV; 25: North Sea. Trawled by Belgian fishermen. H. 26.21 mm L. 46.56 mm. RV; 26-27: The English Channel, SW England, UK. Trawled by Belgian fishermen at a depth of 20-30 m. H. 37.30 mm L. 72.26 mm; 26: RV; 27: LV; 28-29: Loch Creran, near Oban, Scotland, UK. Among stones and seaweed at low tide; 28: H. 33.87 mm L. 63.19 mm. RV; 29: 35.04 mm L. 61.74 mm. RV.

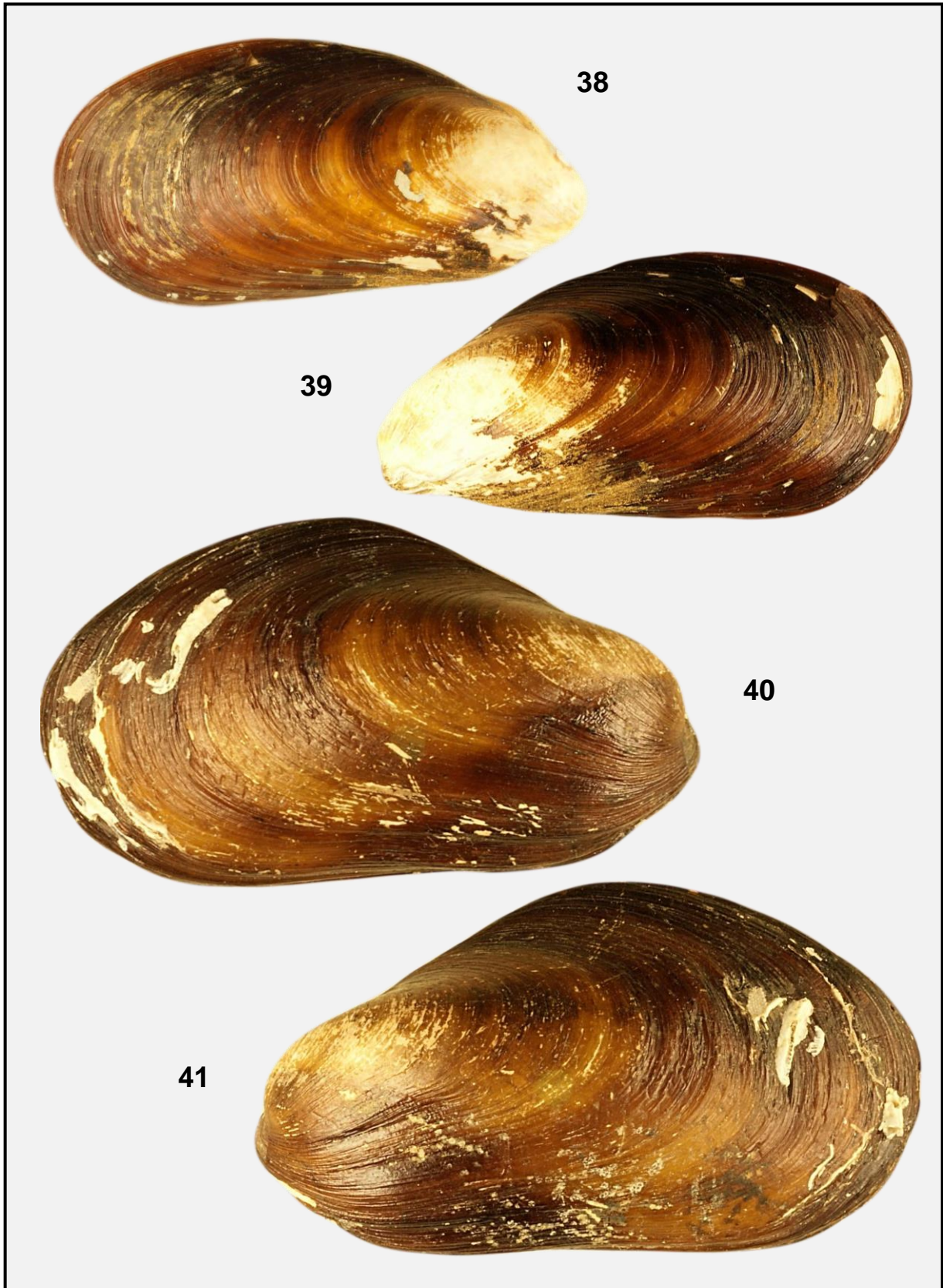


**Pl. VI.** Figs 30-33. *Modiolus cf. gallicus* (Dautzenberg, 1895). CSH; Silverpit, North Sea. Trawled by Belgian fishermen; 30-31: H. 39.42 mm L. 89.70 mm; 30: RV; 31: LV; 32-33: H. 38.62 mm L. 77.08 mm; 32: RV; 33: LV.



**PI. VII.** Figs 34-37. *Modiolus cf. gallicus* (Dautzenberg, 1895). CSH; Silverpit, North Sea. Trawled by Belgian fishermen; 34-35: H. 48.96 mm L. 101.46 mm; 34: RV; 35: LV; 36-37: H. 33.20 mm L. 66.98 mm; 36: RV; 37: LV.

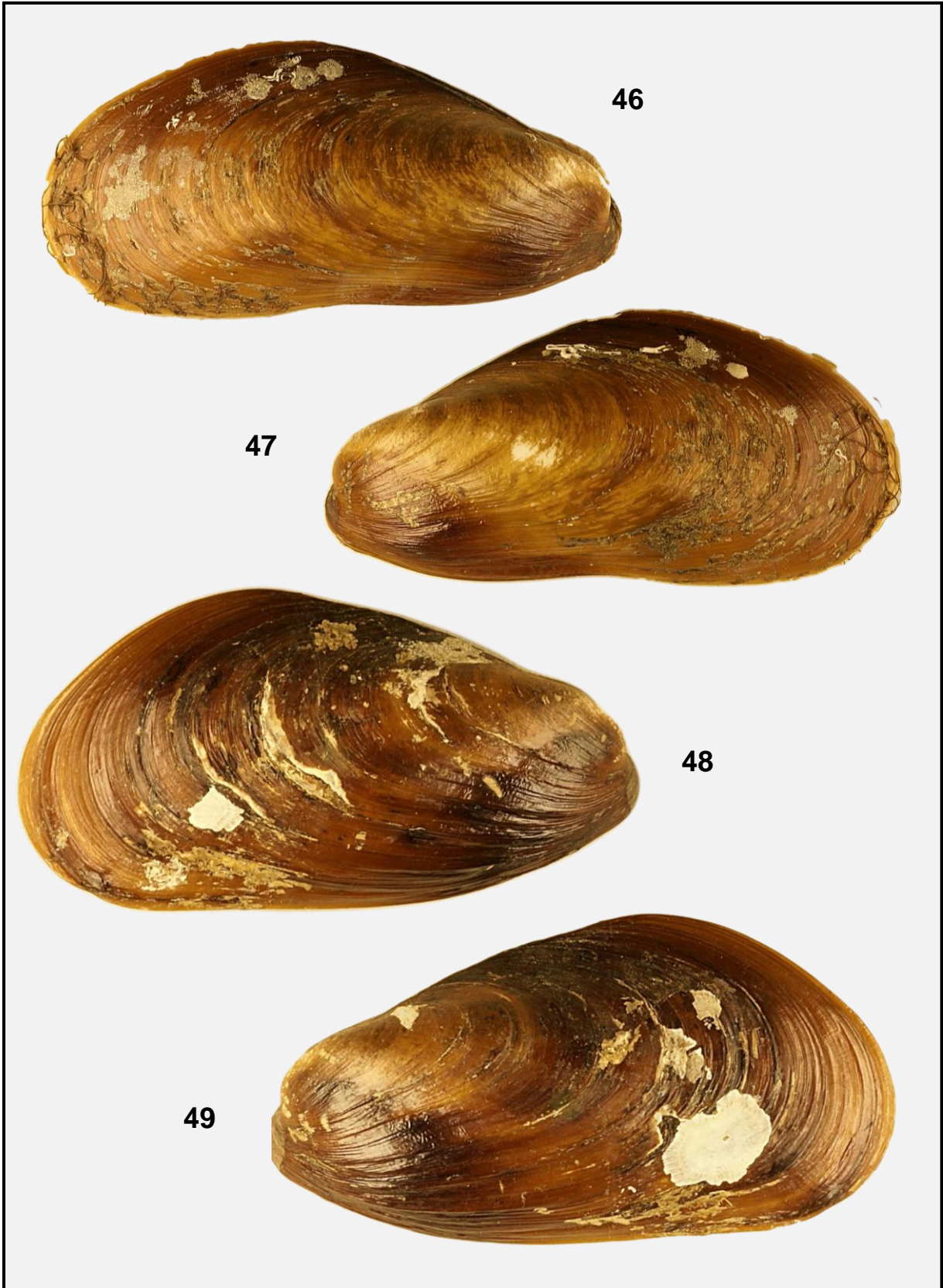




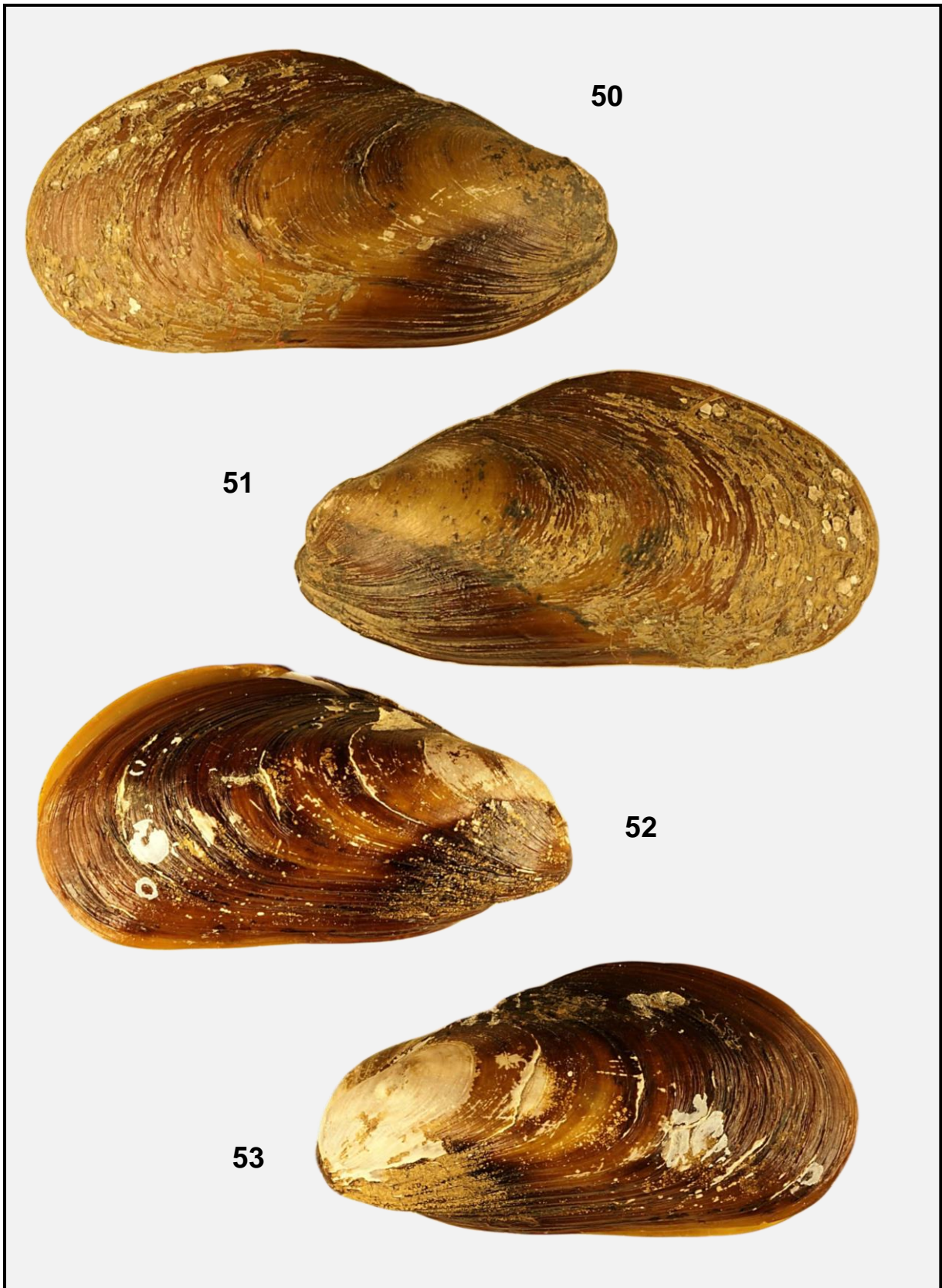
**PI. VIII.** Figs 38-41. *Modiolus cf. gallicus* (Dautzenberg, 1895). CSH; Silverpit, North Sea. Trawled by Belgian fishermen; 38-39: H. 36.09 mm L. 66.67 mm; 38: RV; 39: LV; 40-41: H. 47.26 mm L. 90.85 mm; 40: RV; 41: LV.



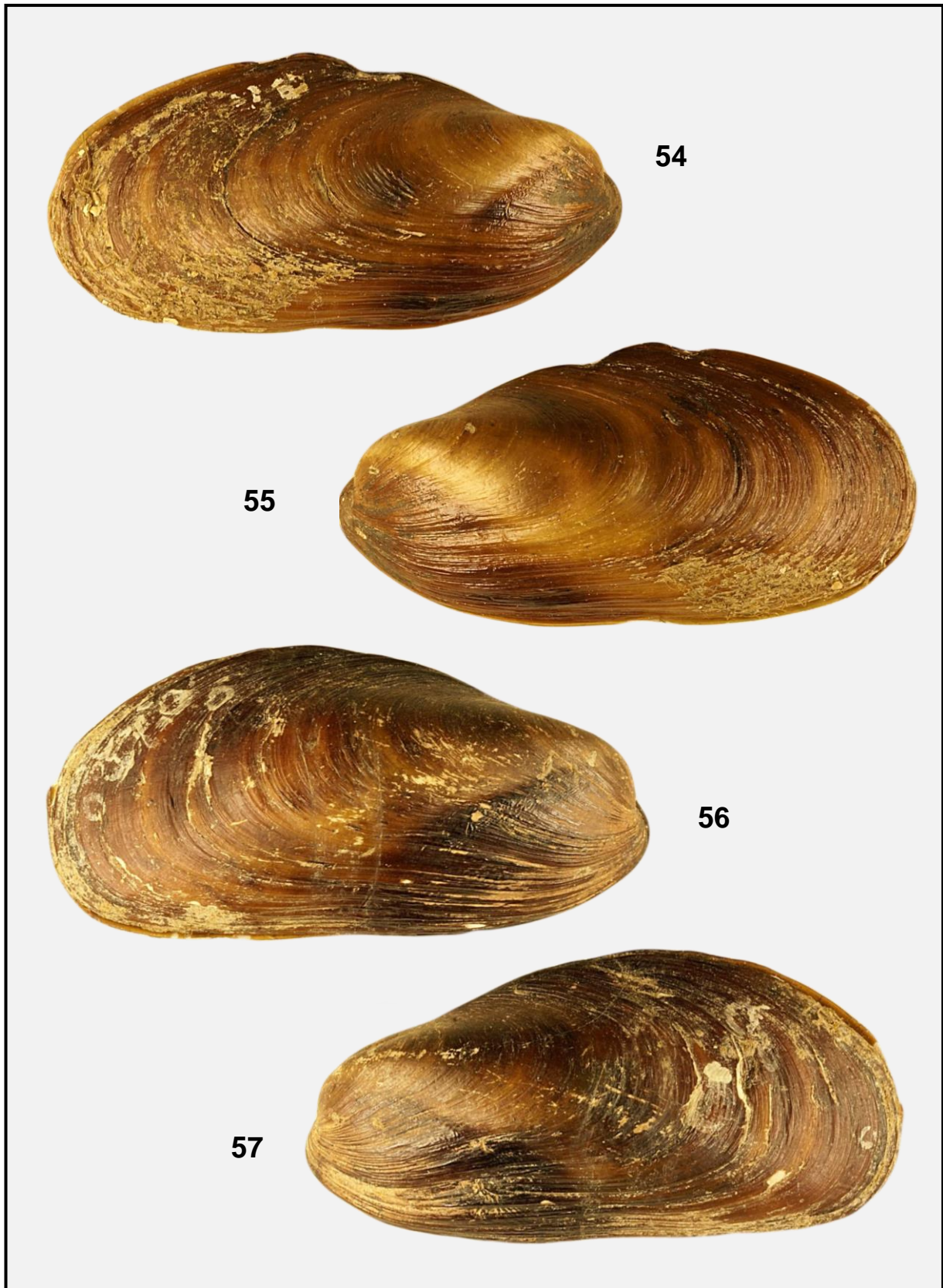
**PI. IX.** Figs 42-45. *Modiolus cf. gallicus* (Dautzenberg, 1895). CSH; Silverpit, North Sea. Trawled by Belgian fishermen; 42-43: H. 34.50 mm L. 73.52 mm; 42: RV; 43: LV; 44-45: H. 30.42 mm L. 60.13 mm; 40: RV; 41: LV.



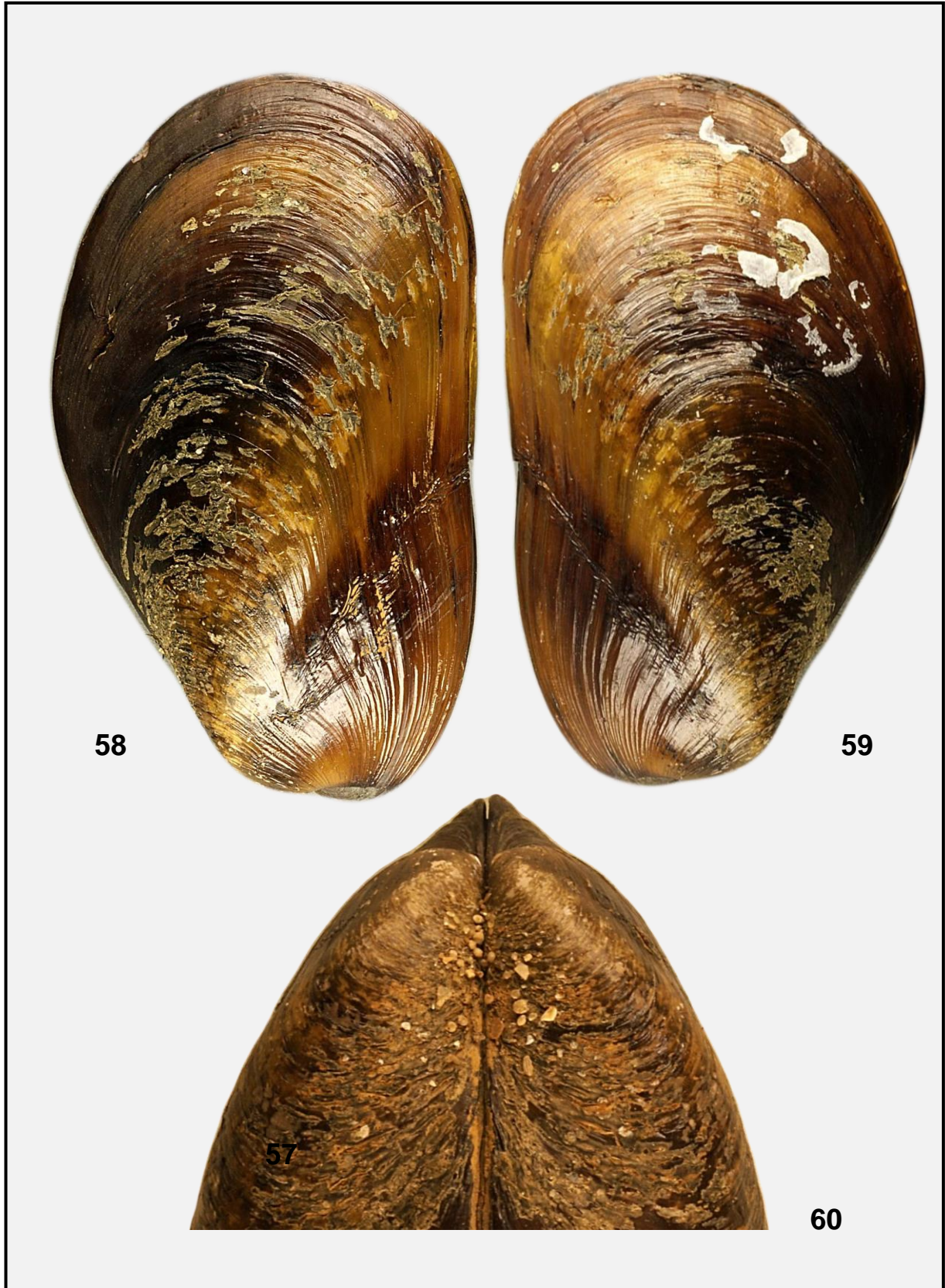
**Pl. X.** Figs 46-49. *Modiolus cf. gallicus* (Dautzenberg, 1895). CSH; Silverpit, North Sea. Trawled by Belgian fishermen; 46-47: H. 26.91 mm L. 55.70 mm; 46: RV; 47: LV; 48-49: H. 29.52 mm L. 60.20 mm; 48: RV; 49: LV.



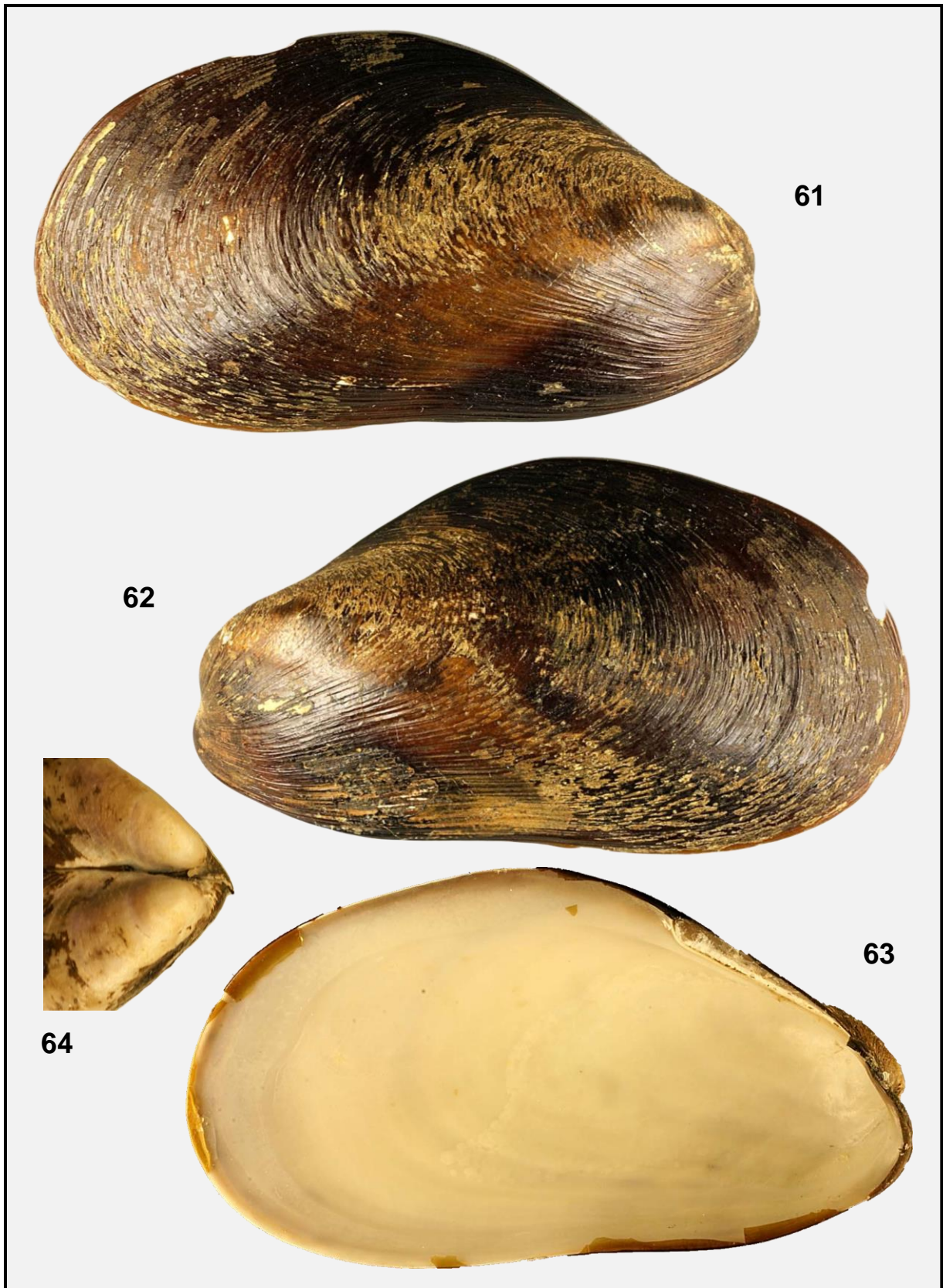
**Pl. XI.** Figs 50-53. *Modiolus cf. gallicus* (Dautzenberg, 1895). CSH; Silverpit, North Sea. Trawled by Belgian fishermen; 50-51: H. 48.38 mm L. 98.28 mm; 50: RV; 51: LV; 52-53: H. 37.10 mm L. 93.45 mm; 52: RV; 53: LV.



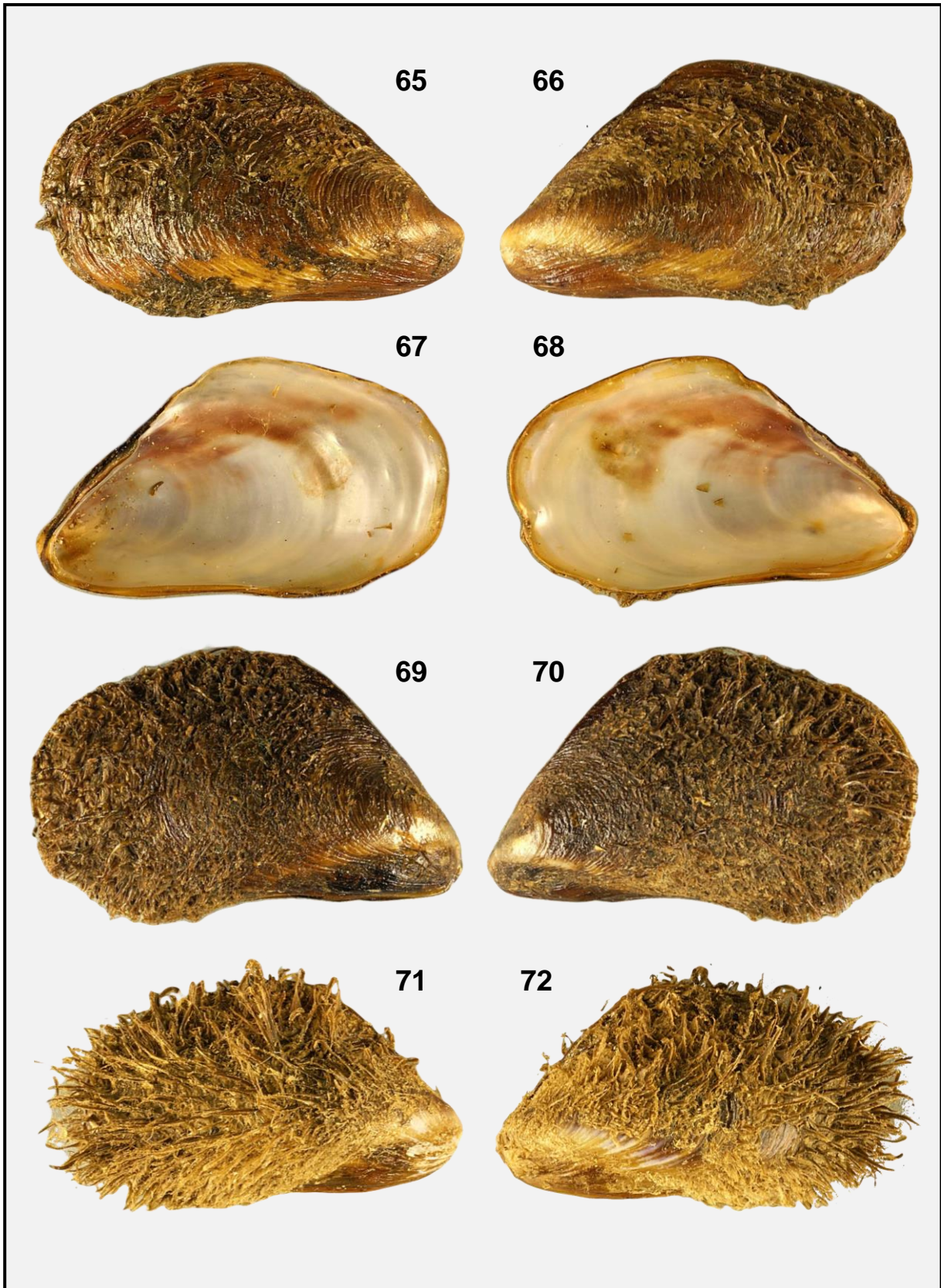
**Pl. XII.** Figs 54-57. *Modiolus cf. gallicus* (Dautzenberg, 1895). CSH; Silverpit, North Sea. Trawled by Belgian fishermen; 54-55: H. 44.08 mm L. 85.48 mm; 54: RV; 55: LV; 56-57: H. 45.50 mm L. 87.68 mm; 56: RV; 57: LV.



**Pl. XIII.** Figs 58-60. *Modiolus modiolus* (Linnaeus, 1758). CJV; Holme-next-the-Sea, North Norfolk, England, UK. Washed ashore during storms. February 1990. H. 34.90 mm L. 61.44 mm; 58: RV; 59: LV; 60: view on the umbones.

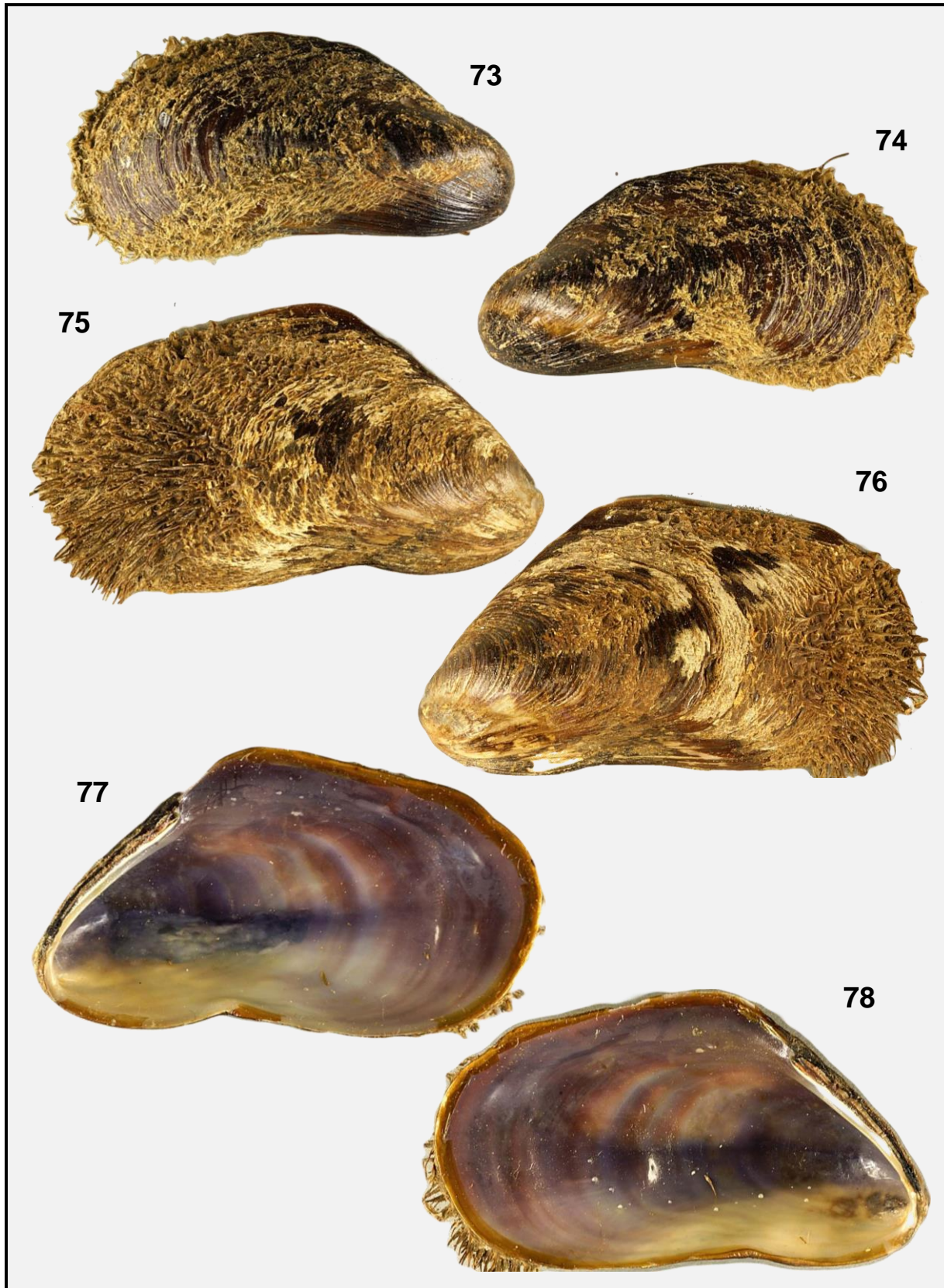


**PI. XIV.** Figs 61-64. *Modiolus modiolus* (Linnaeus, 1758). CFN; Trawled by Belgian fishermen from Devil's Hole, North Sea, off Scotland, UK. 1974. H. 34.90 mm L. 61.44 mm; 58: RV; 59: LV; 60: view on the umbones.

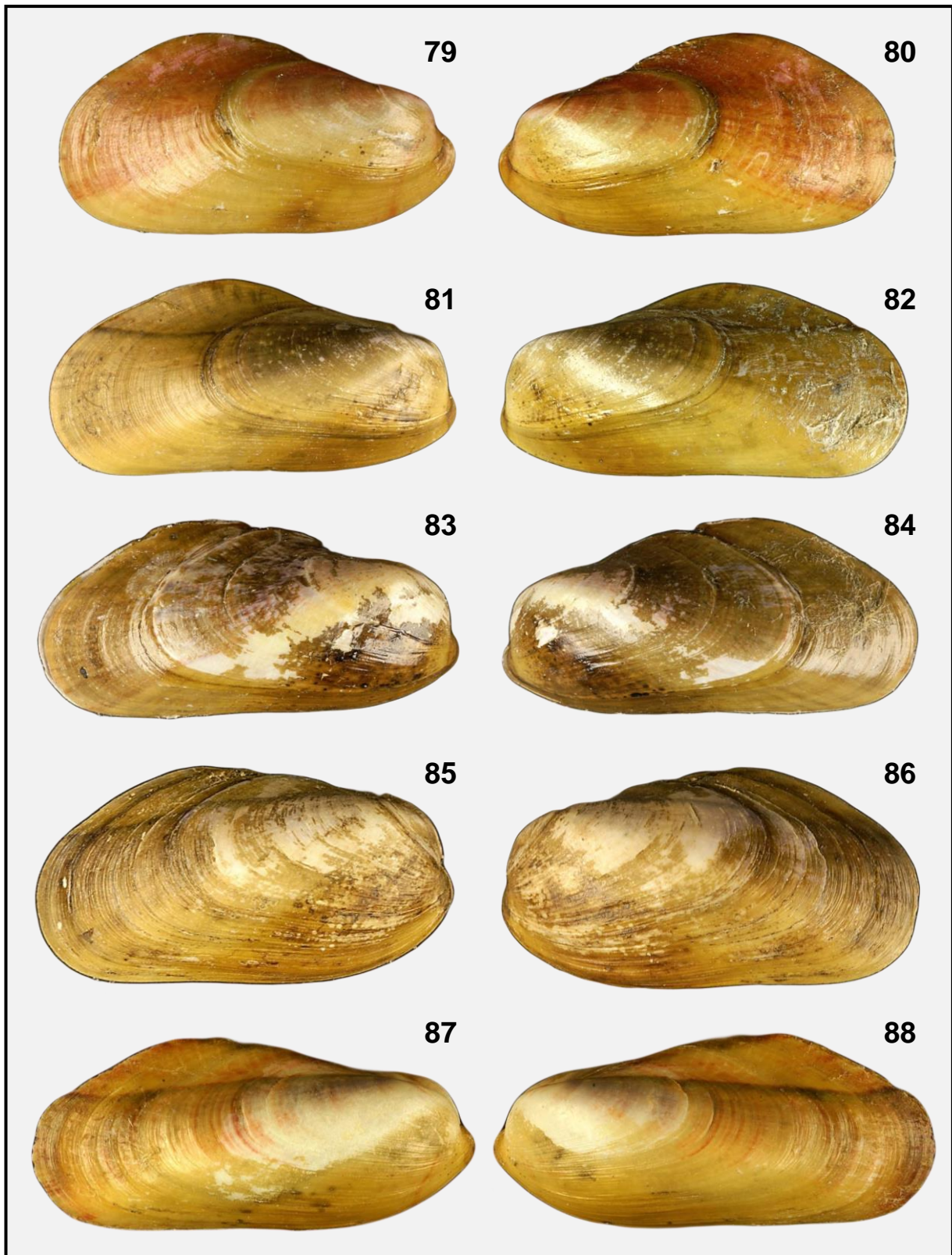


**Pl. XV.** Figs 65-72. *Modiolus barbatus* (Linnaeus, 1758). CFN; 65-70: Le Val-André, Brittany, France. Among sea urchins, in tidal pools on rocks. 28 March 1971; 65-68: H. 26.60 mm L. 46.30 mm; 65: RV; 66: LV; 67: interior side of RV; 68: interior side of LV; 69-70: 27.72 mm L. 45.83 mm; 69: RV; 70: LV; 71-72: Chatellaillon-Plage, Charente-Maritime, W France. In clusters, in sand among rocks. 25 September 2007. H. 22.98 mm L. 40.88 mm; 71: RV; 72: LV

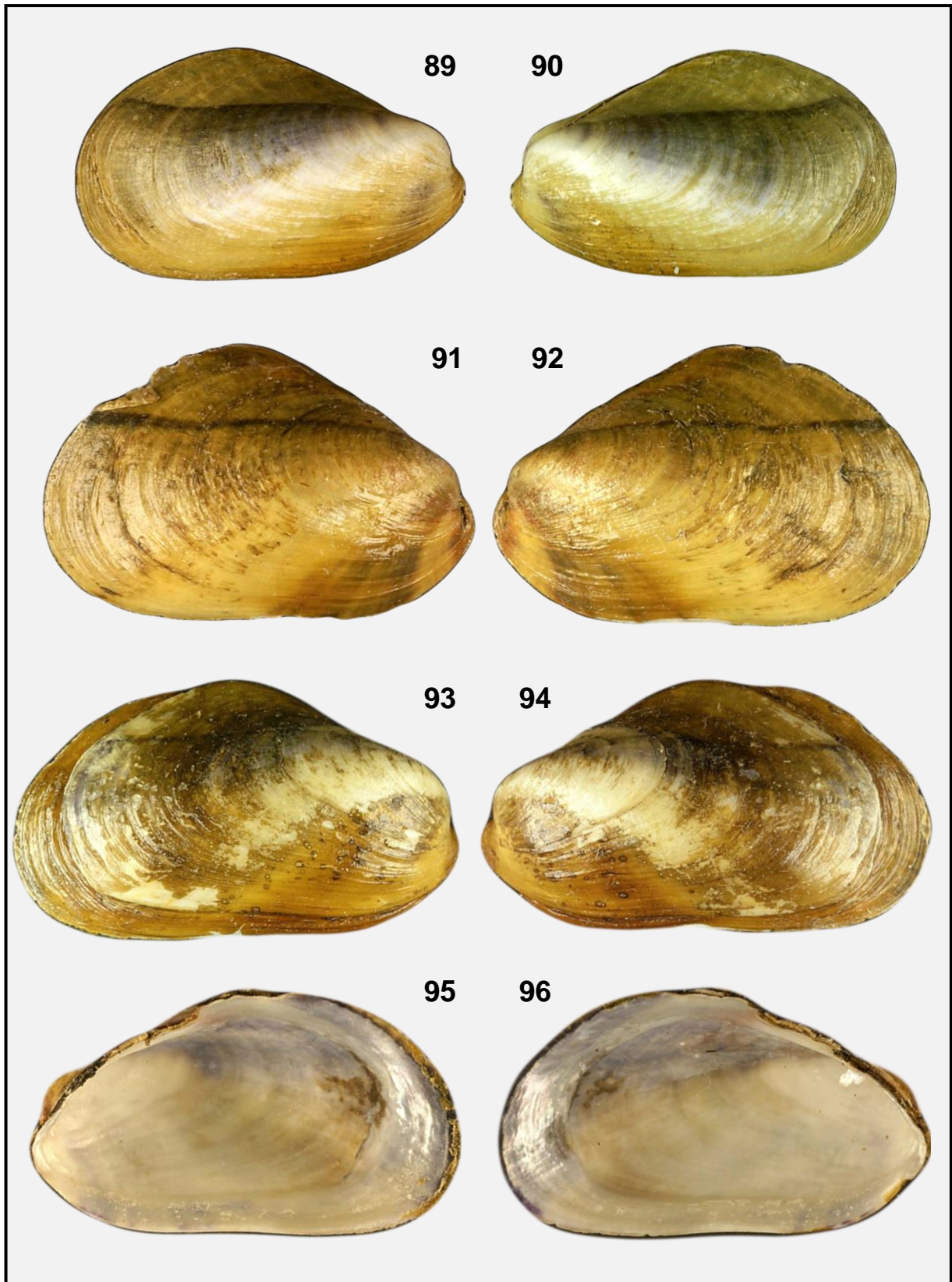




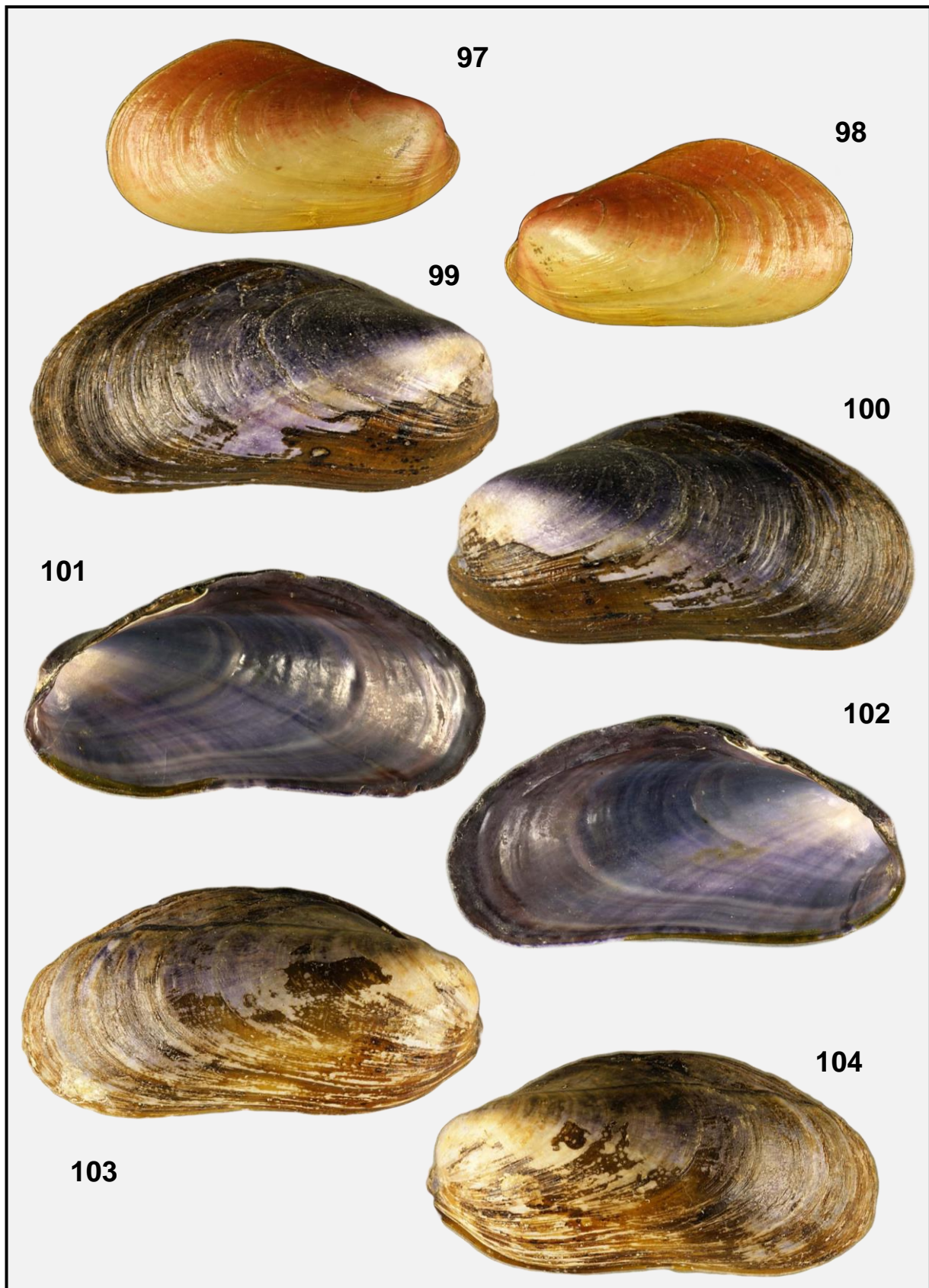
**Pl. XVI.** Figs 73-78. *Modiolus barbatus* (Linnaeus, 1758). CFN; 73-74: Chatelaillon-Plage, Charente-Maritime, W France. In clusters, in sand among rocks. 25 September 2007. H. 26.36 mm L. 50.89 mm; 73: RV; 74: LV; 75-78: La Flotte, Ile de Ré, Charente-Maritime, W France. In sand on buried rocks at low tide. July 1976. H. 36.21 mm L. 64.96 mm; 75: RV; 76: LV; 77: interior side of RV; 78: interior side of LV.



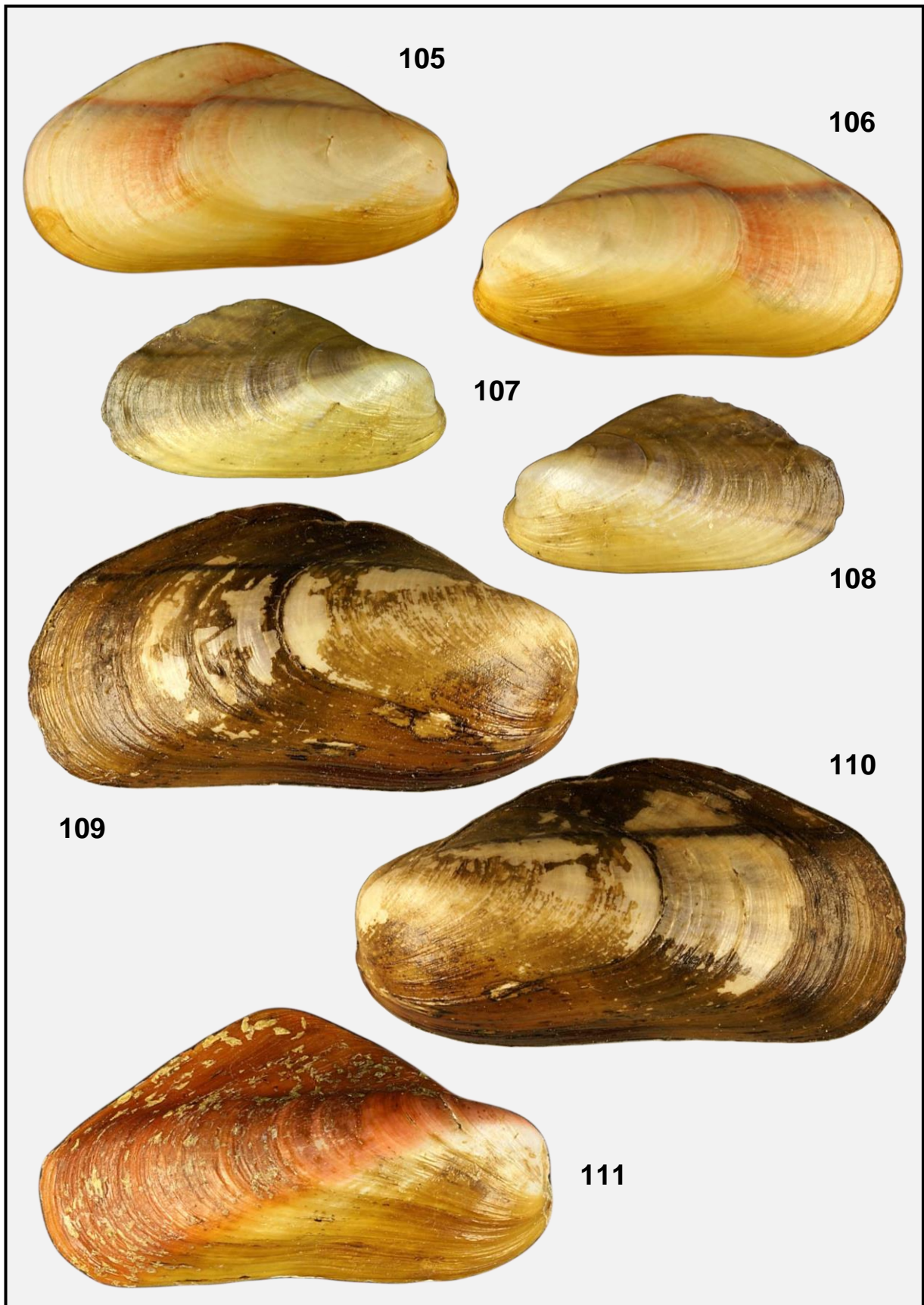
**PI. XVII.** Figs 79-88. *Gibbomodiola adriatica* (Lamarck, 1819). CFN; 79-84: Hirel, Bay of Mont St. Michel, Normandy, France. Washed ashore at low tide. August 2004; 79-80: H. 17.60 mm L. 34.15 mm; 79: RV; 80: LV; 81-82: H. 18.02 mm L. 35.99 mm; 81: RV; 82: LV; 83-84: H. 18.75 mm L. 40.10 mm; 85-86: Isle of Islay, Inner Hebrides, Scotland, UK. H. 17.46 mm L. 34.81 mm; 85: RV; 86: LV; 87-88: Penmarc'h, Finistère, Brittany, W France. On sandbar at extreme low tide. August 1994. H. 16.38 mm L. 36.89 mm; 87: RV; 88: LV.



**PI. XVIII.** Figs 89-96. *Gibbomodiola adriatica* (Lamarck, 1919). CFN; 89-90: Kerhostin, Presqu'île de Quiberon, Morbihan, W France. Washed ashore after storm. 4 April 2004. H. 14.41 mm L. 24.41 mm; 89: RV; 90: LV; 91-96: Kerhostin, Presqu'île de Quiberon, Morbihan, W France. Washed ashore after storm. July 1976; 91-92: H. 19.55 mm L. 30.27 mm; 91: RV; 92: LV; 93-96: H. 20.35 mm L. 35.20 mm; 93: RV; 94: LV; 95: interior side of RV; 96: interior side of LV.



**PI. XIX.** Figs 97-104. *Gibbomodiola adriatica* (Linnaeus, 1758). CFN; 97-98: Plage Goas Trez, Trébeurden, Brittany, France. In sand on the beach. July 1977. H. 14.17 mm L. 24.65 mm; 97: RV; 98: LV; 99-104: Kerhostin, Presqu'île de Quiberon, Morbihan, W France. In sand on the beach. 4 April 2004; 99-102: H. 28.23 mm L. 56.06 mm; 99: RV; 100: LV; 101: interior side of RV; 102: interior side of LV; 103-104: H. 28.23 mm L. 56.06 mm; 103: RV; 104: LV.



**Pl. XX.** Figs 105-110. *Gibbomodiola adriatica* (Lamarck, 1819). CFN; 105-106: Iles Chausey, The English Channel. H. 21.92 mm L. 42.45 mm; 105: RV; 106: LV; Rhône Delta, Bouches-du-Rhône, South France. H. 11.84 mm L. 23.55 mm; 107: RV; 108: LV; 109-110: Croatia. H. 25.01 mm L. 47.78 mm; 109: RV; 110: LV; 111: Oliveri, Messina, Sicily, Italy. In sand at low tide. 1991. H. 24.67 mm L. 46.50 mm. RV.



## Instructions to authors

We invite any author to publish articles with a taxonomical and nomenclatural content about Mollusca in our magazine 'Neptunea'. Yet, all conchological and malacological articles with serious content such as book reviews, announcements, short notes or reports of shelling expeditions are also accepted. Well-illustrated articles have priority over pure text. There is no limitation on the number of colour figures or photographs. Membership is not mandatory for authors. Publishing is totally free, independent of the number of pages or photographs.

Taxonomic papers must be in agreement with the recommendations of the International Code of Zoological Nomenclature (4<sup>th</sup> edition). Papers describing new species (subspecies) will be accepted only if primary types are deposited in a recognized public Museum or scientific Institution.

**Manuscripts** can be submitted in Dutch, French or English, either by e-mail, CD-ROM/DVD (as \*.doc documents in Arial 10pt., preferably in Word – PC or Macintosh) or even in readable hand written or typed form on plain paper. Text must be typed in one column. The sequence of sections will respect the following order: **title, name of author(s), address(es) of author(s), a list of key words** (no more than ten) under which the article should be indexed and a brief **summary (abstract)** in **English**, not exceeding 200 words. Generic and (sub)specific names should be typed in *italics*. Names of levels higher than genus-rank should not be typed in upper case letters. The first mention in the text of any taxon must be followed by its author including the year.

The following pages should be divided into sections under short headings. Whenever possible the text should be arranged as follows: **Abbreviations** (grouped in alphabetical sequence), **Introduction, Type material, Type locality, Measurements, Materials and Methods, Description, Derivation of name, Habitat, Geographic range, Results, Discussion, Conclusions, Acknowledgements** and **References**. Please, refer to a recent issue of 'Neptunea' for the lay out. All articles should be aimed at a general audience and authors should include definitions for technical terms or abbreviations.

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Aartsen, J.J. van, 2002. Indo-Pacific migrants into the Mediterranean. 1. *Gibborissoa virgata* (Philippi, 1849). *La Conchiglia*, **34**(303): 56-58.

Alf, A. & Kreipl, K., 2004. A new *Bolma* from Madagascar (Mollusca, Gastropoda, Turbinidae). *Spixiana*, **27**(2): 183-184.

CLEMAM, 2003. Check List of European Marine Mollusca, <http://www.somali.asso.fr/clemam/index.clemam.html>.

Dautzenberg, P. & Fischer, H., 1906. Mollusques provenant des dragages effectués à l'ouest de l'Afrique pendant les campagnes de S.A.S. le Prince de Monaco. In: Richard, M.J. (Ed.): *Résultats des Campagnes Scientifiques accomplies sur son yacht par Albert 1<sup>er</sup> Prince Souverain de Monaco*. Imprimerie de Monaco, Monaco, **32**: 1-125, pls 1-5.

Okutani, T., 2000. *Marine Mollusks in Japan*. Tokai University Press. Tokyo. 1173 pp.

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