

A map of Normandy, France, showing the English Channel to the north and west. Labeled locations include Cherbourg-Octeville, Fécamp, Le Havre, Honfleur, Deauville, Bayeux, Coutances, Falaise, Domfront, Alençon, Avranches, and Pontorson. The text 'Pays de la Loire' is visible at the bottom. The map is partially obscured by the title text and two mussel images.

'Modiola gallica' **Dautzenberg, 1895**



... a cryptic mussel from
the English Channel

Description d'une nouvelle espèce
de *Modiola* provenant du littoral occidental
de la France, Dautzenberg, Ph., 1895.
Feuilles des Jeunes Naturalistes, 25^e ann.,
Pl. I. Paris.



The genus *Modiolus* Lamarck, 1799

Type species: *Mytilus modiolus* Linnaeus, 1758

Characteristics:

- rhomboidal outline;
- tumid shape;
- black periostracum;
- juvenile specimens have a brown periostracum.

Brief history:

- 1865 – Caillaud: first mention of '*Modiolus gallicus*' in French waters as *Modiolus modiolus* var. *minor*;
- 1893 – Dautzenberg: reference to this shell as a synonym of *Modiola vulgaris* (Fleming, 1828);
- 1895 – Dautzenberg: description of *Modiola gallica* and allocation of *Modiola vulgaris* as a synonym of *Modiolus modiolus* (L., 1758);
- 2019: what is the difference between *Modiolus gallicus* and *Modiolus modiolus*? One or two species?

***Modiolus gallicus* (Dautzenberg, 1895):**

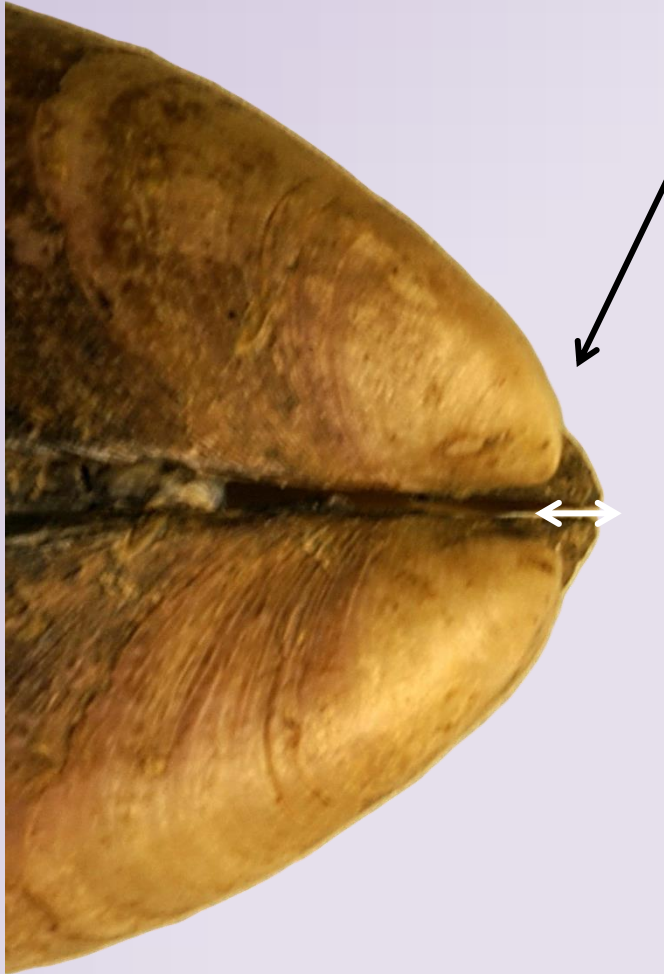
- a controversial species;
- originally described from Normandy (France) in the English Channel;
- nowadays also known from Iceland, Scotland, the Silver Pit (North Sea) and the Pas-de-Calais (northern France);
- almost absent from shell collections;
- habitat: lives together with colonies of *Pecten maximus* L., 1758 off Le Havre (Normandy, France) at depths from 10 to 80 m;
- measurements: from 40 to 90 mm.

Comparison between *Modiolus modiolus* and *M. gallicus*:

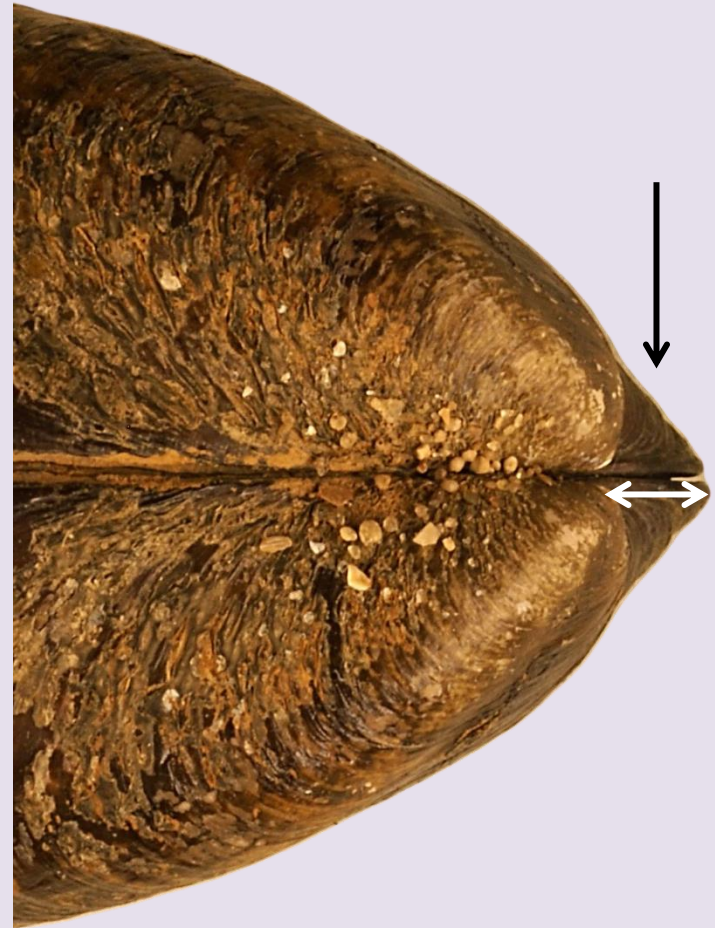
- *M. modiolus* is much larger (100-220 mm);
- the size of *Modiolus gallicus* ends where that of *M. modiolus* begins;
- *M. modiolus* has a broader and swollen shell, the shell of *M. gallicus* is more compressed, protruding and elongate;
- the periostracum of *M. gallicus* is rusty brown and rarely black, while that of *M. modiolus* is mostly completely black;
- the shell of *M. gallicus* is thin and fragile, compared to the thick shell of *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* shows bluish-grey growth lines due to the thin structure of the shell;
- *M. gallicus* has a more rhomboidal shell, with the lower margin of the anterior end twisted upwards and not rounded as in *M. modiolus*;
- the umbones in *M. gallicus* are more terminal.

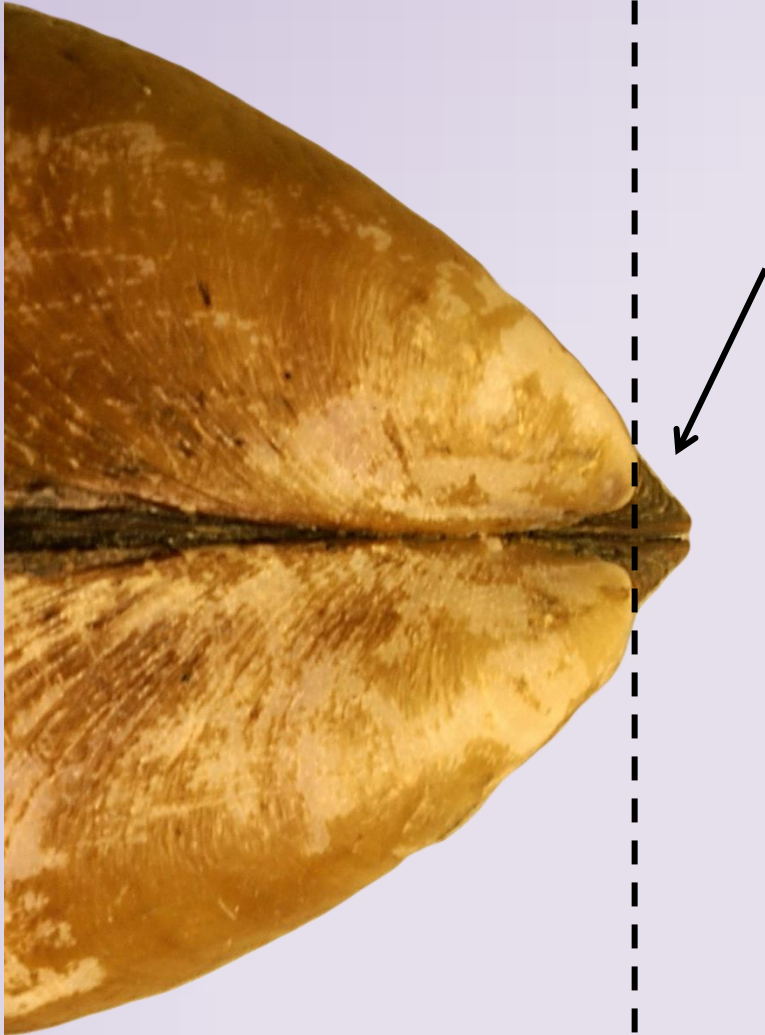
Comparison of the anterior area



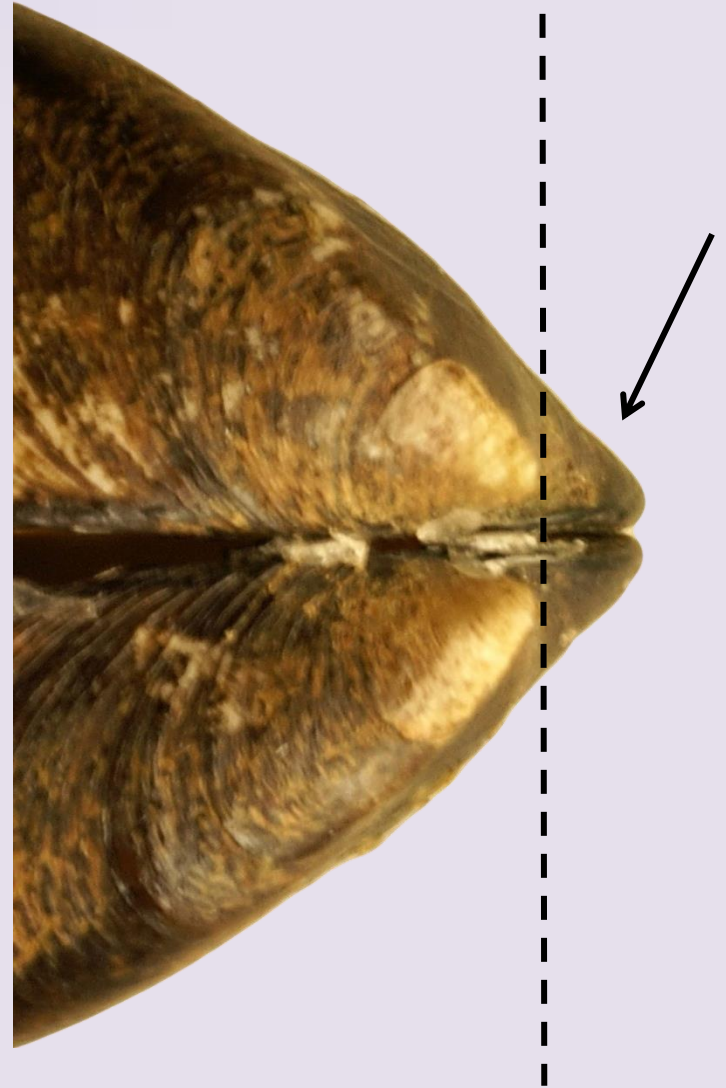
'Modiolus gallicus'



Modiolus modiolus



'Modiolus gallicus'



Modiolus modiolus

Conclusion:

The differences are not constant and not evident enough to separate both 'species'.

Within one sample there is a degree of variation in shape.

Young *M. modiolus* live in clusters bound together by their byssus. These clusters can contain specimens of varying size including adult ones. Steric hindrance leads to some form of distortion. As individuals grow larger, adults tend to live in a solitary way.

Not any combination of parameters could be established to make a difference between '*Modiolus gallicus*' and juvenile specimens of *M. modiolus*.

Dautzenberg did not figure any specimen of *Modiolus modiolus* to compare with *M. gallicus* and the characteristics which he described are not constant enough to distinguish two different species.

Therefore, we mean that the name '*Modiola gallica*' refers to juvenile specimens of *Modiolus modiolus* with a brown periostracum and a fragile shell.

***Modiolus gallicus* (Dautzenberg, 1895) has to be considered as a junior synonym of *Modiolus modiolus* (Linnaeus, 1758).**



***Modiolus gallicus* Dautzenberg, 1895**
off Dunkerque, North France – trawled by MSI “Hasselt”
at a depth of 35 m - March 1972
H. 32.76 mm L. 57.26 mm - coll. F. Nolf



***Modiolus gallicus* Dautzenberg, 1895**
off Dunkerque, North France – trawled by MSI “Hasselt”
at a depth of 35 m - March 1972
interior side - H. 32.76 mm L. 57.26 mm - coll. F. Nolf



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***Modiolus gallicus* Dautzenberg, 1895**
off Dunkerque, North France -
trawled by the MSI 'Hasselt' at a depth of 35 m -
March 1973
H. 39.97 mm L. 82.84 mm – coll. F. Nolf



***Modiolus gallicus* Dautzenberg, 1895**
off Villers-sur-Mer, Normandy, France –
trawled by fishermen – 5 November 1895 –
coll. Ph. Dautzenberg (RBINS)
H. 36.79 mm L. 72.01 mm



***Modiolus gallicus* Dautzenberg, 1895
off Cherbourg, Normandy, France -
trawled by fishermen - 12 January 1913 -
H. 24.63 mm L. 47.64 mm - coll. Ph. Dautzenberg (RBINS)**



***Modiolus gallicus* Dautzenberg, 1895
off Cherbourg, Normandy, France –
trawled by fishermen – 12 January 1913
interior side - H. 26.94 mm L. 54.33 mm – coll. Ph. Dautzenberg (RBINS)**



***Modiolus gallicus* Dautzenberg, 1895
off Cherbourg, Normandy, France –
trawled by fishermen –**

H. 26.94 mm L. 54.33 mm – coll. Ph. Dautzenberg (RBINS)



***Modiolus gallicus* Dautzenberg, 1895
off Cherbourg, Normandy, France –
trawled by fishermen – 12 January 1913 -
H. 26.70 mm L. 53.93 mm – coll. Ph. Dautzenberg (RBINS)**



***Modiolus gallicus* Dautzenberg, 1895**

off Cherbourg, Normandy, France –

trawled by fishermen – 12 January 1913 -

interior side - H. 26.70 mm L. 53.93 mm – coll. Ph. Dautzenberg (RBINS)



***Modiolus gallicus* Dautzenberg, 1895
off Cherbourg, Normandy, France –
trawled by fishermen – 12 January 1913
H. 31.30 mm L. 55.82 mm – coll. Ph. Dautzenberg (RBINS)**



***Modiolus gallicus* Dautzenberg, 1895**

North Sea

H. 26.21 mm L. 46.56 mm – coll. J. Verstraeten



***Modiolus gallicus* Dautzenberg, 1895**

North Sea

H. 26.21 mm L. 46.56 mm – coll. J. Verstraeten



***Modiolus gallicus* Dautzenberg, 1895**
Loch Creran, near Oban, Scotland, UK
H. 33.87 mm L. 63.19 mm – coll. J. Verstraeten



***Modiolus gallicus* Dautzenberg, 1895**
Loch Creran, near Oban, Scotland, UK
H. 35.04 mm L. 61.74 mm – coll. J. Verstraeten



***Modiolus gallicus* Dautzenberg, 1895**
off Gufunes, Iceland – July 1970 -
dredged by fishermen at a depth of 15 m –
H. 15.96 mm L. 29.03 mm – coll. F. Nolf



***Modiolus gallicus* Dautzenberg, 1895**

Faxaflói, Iceland

H. 27.69 mm L. 49.43 mm – coll. J. Verstraeten



***Modiolus gallicus* Dautzenberg, 1895**
Plage Goas Trez, Trébeurden, Brittany, France –
on seaweed, washed ashore – July 1975
H. 20.42 mm L. 38.83 mm – coll. F. Nolf



***Modiolus modiolus* (Linnaeus, 1758)**
off Aberdeen, Scotland, UK
trawled by Belgian fishermen - 1974
H. 39.97 mm L. 82.84 mm – coll. F. Nolf



***Modiolus modiolus* (Linnaeus, 1758)**
off Aberdeen, Scotland, UK -
trawled by Belgian fishermen - 1974
interior side - H. 39.97 mm L. 82.84 mm – coll. F. Nolf



***Modiolus modiolus* (Linnaeus, 1758)**
Holme, North Norfolk, UK -
washed ashore during storms – February 1990
H. 34.90 mm L. 61.44 mm - coll. J. Verstraeten

Differences from *Gibbomodiola adriatica* (Lamarck, 1819):

- '*Modiolus gallicus*':

- * larger;
- * a heavier and thicker shell;
- * provided with more protruding and swollen beaks;
- * more cylindrical in outline;
- * a distinct hairy periostracum.

- Typical for *Gibbomodiola adriatica*:

- * 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 variously coloured with pink, orange, bluish-grey and white blotches and stripes → many colour forms described by 19th century authors;
- * the interior with a bluish blotch or completely very dark blue coloured.



***Gibbomodiola adriatica* (Lamarck, 1819)**
Hirel, Bay of Mont St. Michel, Normandy, France
washed ashore at low tide – August 2004
H. 17.60 mm L. 34.15 mm – coll. F. Nolf



***Gibbomodiola adriatica* (Lamarck, 1819)**
Hirel , Bay of Mont St. Michel, Normandy, France -
washed ashore at low tide – August 2004
H. 18.02 mm L. 35.99 mm – coll. F. Nolf



***Gibbomodiola adriatica* (Lamarck, 1819)**
Hirel , Bay of Mont St. Michel, Normandy, France -
washed ashore at low tide – August 2004
H. 18.75 mm L. 40.10 mm – coll. F. Nolf



***Gibbomodiola adriatica* (Lamarck, 1819)**
Isle of Islay, Inner Hebrides, Scotland, UK -
H. 17.46 mm L. 34.81 mm – coll. F. Nolf



***Gibbomodiola adriatica* var. *ovalis* (G.B. Sowerby II, 1839)**

Rhône Delta, Provence, South France

H. 11.84 mm L. 23.55 mm – coll. F. Nolf



***Gibbomodiola adriatica* var. *ovalis* (G.B. Sowerby II, 1839)**

**Kerhostin, Quibéron, Morbihan, Brittany, W France –
in sand on the beach – 4 April 2004 -**

H. 14.41 mm L. 24.47 mm – coll. F. Nolf



***Gibbomodiola adriatica* var. *lamarckiana* (Locard, 1886)**
Kerhostin, Quibéron, Morbihan, Brittany, W France –
in sand on the beach – 4 April 2004 -
H. 23.77 mm L. 50.99 mm – coll. F. Nolf



***Gibbomodiola adriatica* var. *lamarckiana* (Locard, 1886)**
Kerhostin, Quibéron, Morbihan, Brittany, W France –
in sand on the beach – 4 April 2004 -
interior side - H. 23.77 mm L. 50.99 mm – coll. F. Nolf



***Gibbomodiola adriatica* var. *lamarckiana* (Locard, 1886)**
Kerhostin, Quibéron, Morbihan, Brittany, W France –
in sand on the beach – 4 April 2004 –
H. 28.23 mm L. 56.06 mm – coll. F. Nolf



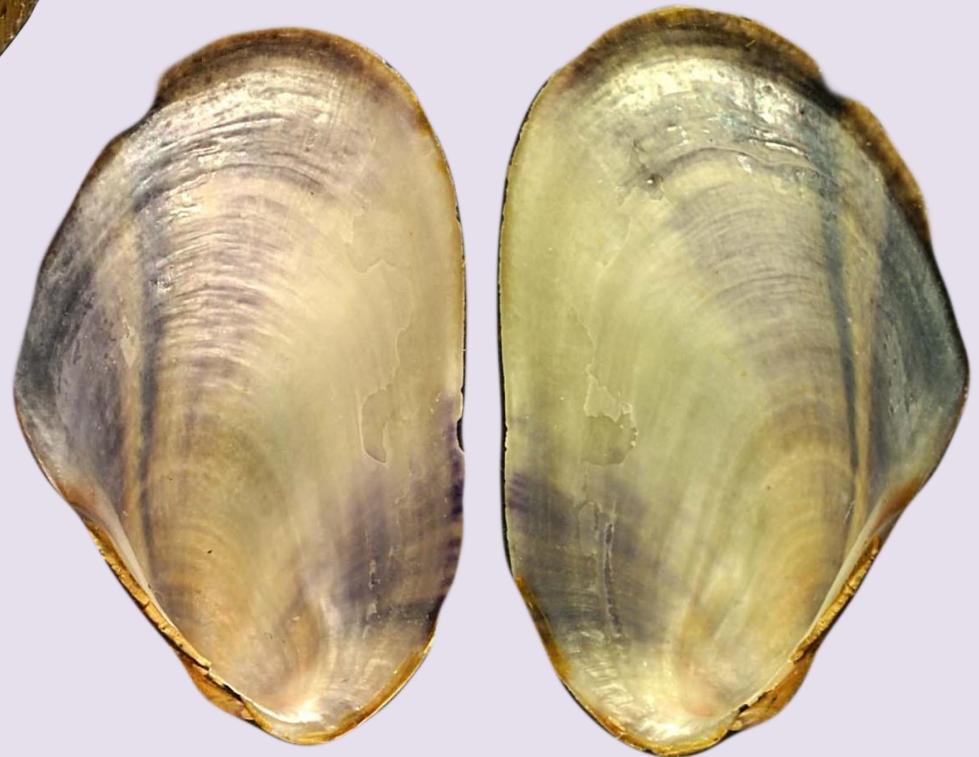
***Gibbomodiola adriatica* var. *lamarckiana* (Locard, 1886)**

Croatia

H. 25.01 mm L. 47.78 mm – coll. F. Nolf



***Gibbomodiola adriatica*
var. *brachyterus* (Locard, 1888)
Kerhostin, Quibéron,
Morbihan, W France –
on sand on the beach – July 1976
H. 19.55 mm L. 30.24 mm
coll. F. Nolf**





***Gibbomodiola adriatica* var. *brachyterus* (Locard, 1888)**
Kerhostin, Quibéron, Morbihan, W France
on sand on the beach - July 1976
H. 20.35 mm L. 35.20 mm - coll. F. Nolf



***Gibbomodiola adriatica* var. *radiata* (Brown, 1827)**

**Plage Goas Trez, Trébeurden, Brittany, France –
in sand on the beach – July 1977**

H. 14.17 mm L. 24.65 mm - coll. F. Nolf



***Gibbomodiola adriatica* var. *radiata* (Brown, 1827)**
Kérity, off Penmarc'h, Finistère, Brittany, W France
on sandbar at extreme low tide – August 1994
H. 16.38 mm L. 36.89 mm - coll. F. Nolf



***Gibbomodiola adriatica* var. *radiata* (Brown, 1827)**

Iles Chausey, The English Channel

H. 21.92 mm L. 42.45 mm - coll. F. Nolf

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

- '*Modiolus gallicus*':

- * more oval and elongate;
- * less compressed at the dorsal side;
- * provided with less terminal beaks situated behind the anterior extremity of the shells;
- * less numerous and less regular growth lines;
- * a glossier epidermis with a small number of hairs.

- *Modiolus barbatus*:

- * much smaller: 50-65 mm;
- * irregularly triangular in outline;
- * mostly richly tinged with reddish purple, certainly on the interior side;
- * provided with a very hairy periostracum.



***Modiolus barbatus* (Linnaeus, 1758)**

**Le Val-André, Brittany, France –
among sea urchins, in tidal pools on rocks –
28 March 1971**

H. 26.60 mm L. 46.30 mm - coll. F. Nolf



***Modiolus barbatus* (Linnaeus, 1758)**
Le Val-André, Brittany, France –
among sea urchins, in tidal pools on rocks –
28 March 1971
H. 26.60 mm L. 46.30 mm - coll. F. Nolf



***Modiolus barbatus* (Linnaeus, 1758)**
La Flotte, Ile de Ré, Charente-Maritime, W France -
in sand at very low tide – July 1976 -
H. 27.72 mm L. 45.83 mm - coll. F. Nolf



***Modiolus barbatus* (Linnaeus, 1758)**
La Flotte, Ile de Ré, Charente-Maritime, W France -
in sand at very low tide – July 1976 -
H. 36.21 mm L. 64.96 mm - coll. F. Nolf



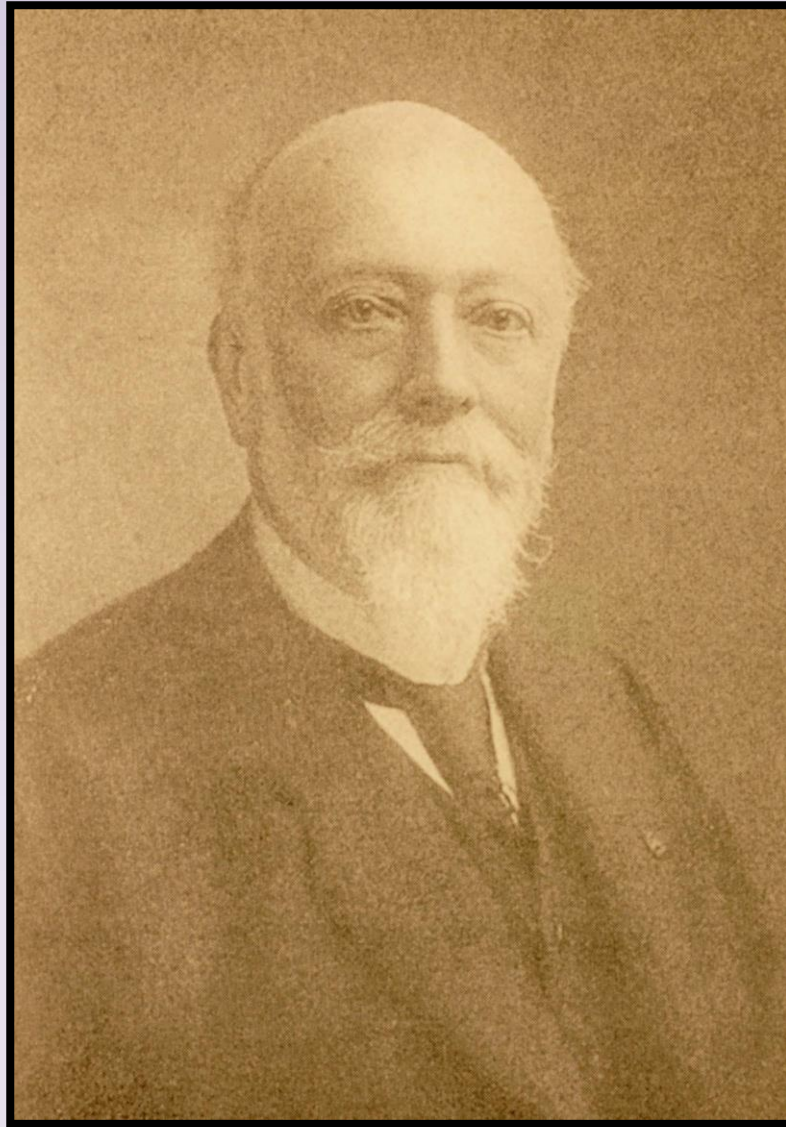
***Modiolus barbatus* (Linnaeus, 1758)**
La Flotte, Ile de Ré, Charente-Maritime, W France -
in sand at very low tide – July 1976 -
interior side - H. 36.21 mm L. 64.96 mm - coll. F. Nolf



***Modiolus barbatus* (Linnaeus, 1758)**
Chatellaillon, Charente-Maritime, W France -
in clusters, in sand among rocks at low tide -
25 September 2007
H. 22.98 mm L. 40.88 mm - coll. F. Nolf



***Modiolus barbatus* (Linnaeus, 1758)**
Chatellaillon, Charente-Maritime, W France -
in clusters, in sand among rocks at low tide -
25 September 2007
H. 26.36 mm L. 50.89 mm - coll. F. Nolf



**Philippe Dautzenberg
(1849-1935)**