Mulinia lateralis (Say, 1822) (Mollusca: Bivalvia: Mactridae): comparison between native and introduced populations, and differences with *Spisula subtruncata* (da Costa, 1788)

Speaker: Frank Nolf

Abbreviations:

CFN: Private collection of Frank Nolf (Oostende, Belgium)
CSH: Private collection of Steve Hubrecht (Koksijde, Belgium)
LV: left valve.
pv: pair of valves
RV: right valve.

This study makes a comparison between the native specimens of *Mulinia lateralis* (western Atlantic Ocean, from the Bay of St. Lawrence to the Gulf of Mexico) and its representatives in the coastal waters of The Netherlands and the Belgian coast.

Mulinia lateralis (Say, 1822) is a new non-indigenous bivalve species, first detected in the SW Dutch coastal zone (the Voordelta) in September 2017, and again in June 2018. In the period between March and June 2018 specimens were also found in the Wadden Sea, the Ems estuary (northern Netherlands), and in the Westerschelde estuary.

Since January 2019 small samples have also been reported from the Belgian beaches between Bredene and Knokke.

Family MACTRIDAE

Genus ***Mulinia***

An important character of this genus is the absence of an externally visible ligament. It has a large variability in shell morphology.
It consists of ten recognized species. The shells of six *Mulinia* species have an oval outline, and four species have shells with a more triangular outline, the anterior and posterior margins being more angular and less rounded, a.o. *Mulinia lateralis.*
Typical resident of brackish waters.

Most **important characteristics** of ***Mulinia lateralis***:

- triangular outline, with a curved ventral margin
- shell rather globose
- distinct radial ridge along the posterior end of valves.
- ligament internal
- anterior lateral teeth in right valve of different size, the ventral one longer; two posterior lateral teeth similar in size
- shell surface smooth with very fine concentric growth lines
- shell colour whitish to cream with a thin, yellowish periostracum

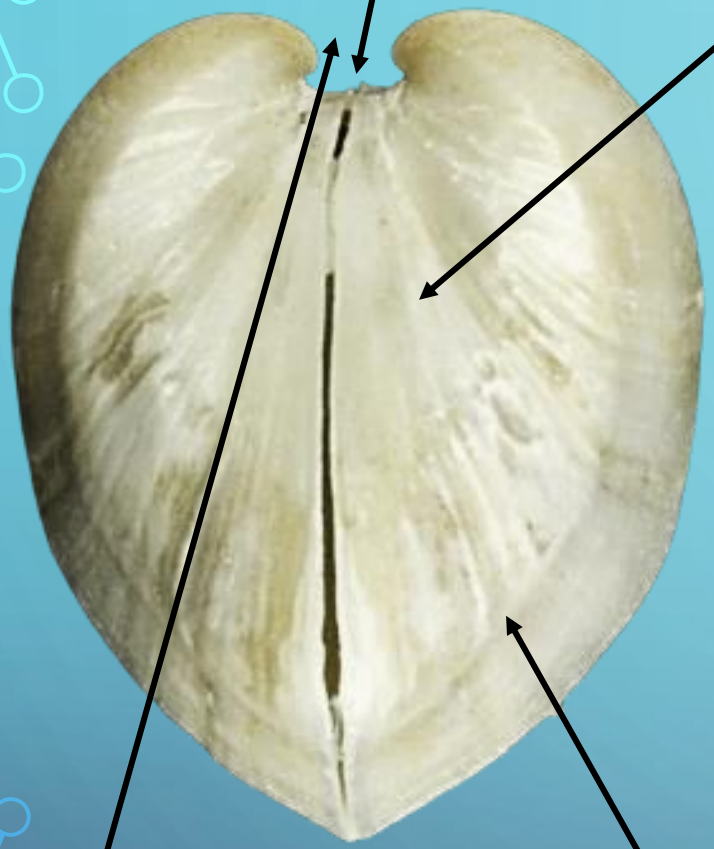
Size: From 12 to 16 mm (W Atlantic), specimens in the Wadden Sea larger (21 mm) than in the Westerschelde (up to 7 mm, maybe juvenile specimens), east Belgian coast (from 5 mm to 21 mm), larger in the Bay of Heist. **No differences in shell morphology between W and E Atlantic representatives were observed.**

Remark: Juvenile specimens of *Spisula subtruncata* (da Costa, 1778) without periostracum can be confused with small *M. lateralis* specimens during beach field work, but the presence of the **radial ridge** along the posterior end of the valves and the **bulbous appearance** of *M. lateralis* are decisive in identification.

Summary of differences between *Mulinia lateralis* and *Spisula subtruncata*:

	Mulinia lateralis	*Spisula subtruncata*
Shell outline	triangular, with curved ventral margin	less triangular, broader and more inequilateral, straight ventral margin
Radial ridge along the posterior end of valves	distinct	absent
Ligament	completely internal	ligament visible from outside
Shell surface	smooth with very fine concentric threads	dull with distinct concentric grooves over the whole disc

Shell colour	whitish to cream with a thin yellowish periostracum	yellowish to dirty white with a ‘Isabelline’ periostracum
Shell convexity	distinctly globose in the adult stage, but flatter specimens may occur in the juvenile stage	generally less convex
Cardinal area between beaks	broad in adult specimens	narrow in adult specimens
Size	less than 23 mm	12-35 mm

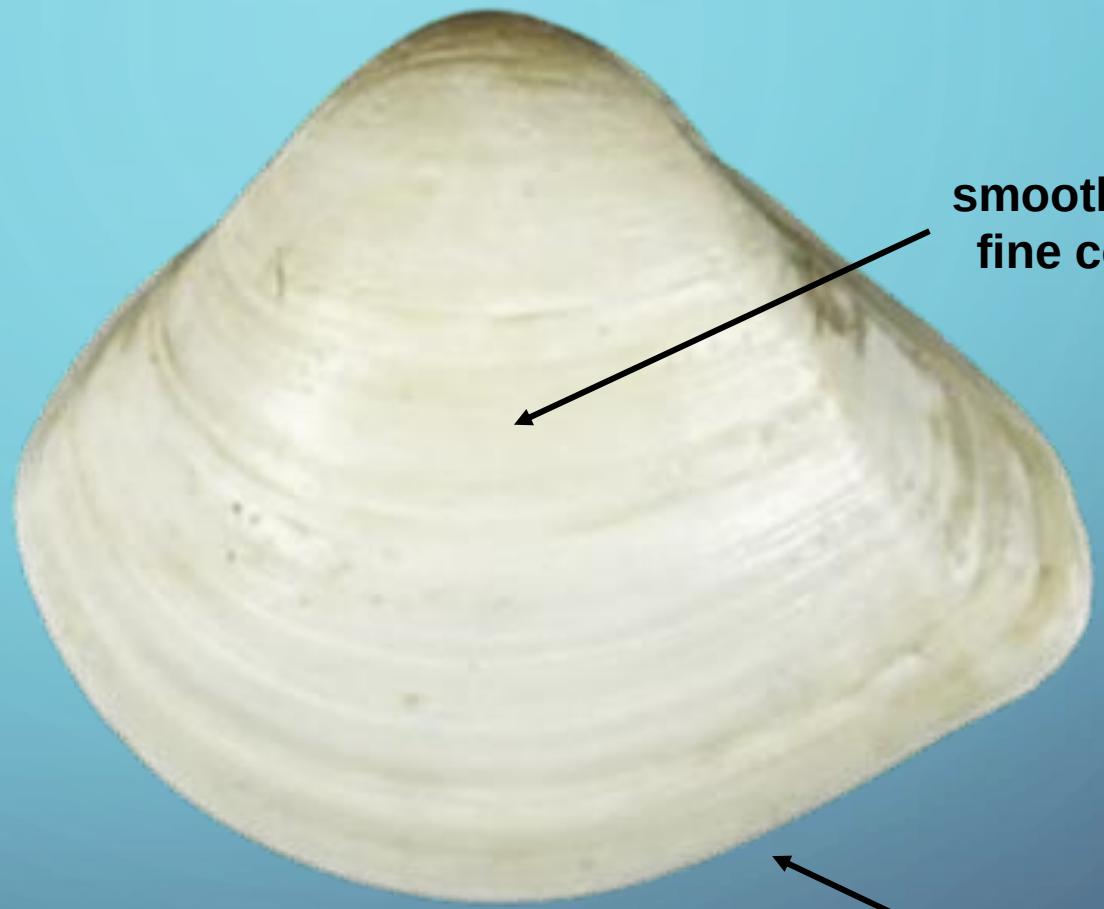


ligament completely internal

lunule and escutcheon: faint ridges or completely absent

broad cardinal area between beaks

distinct radial ridge along the posterior end of valves



globose

smooth surface with very fine concentric threads

triangular outline

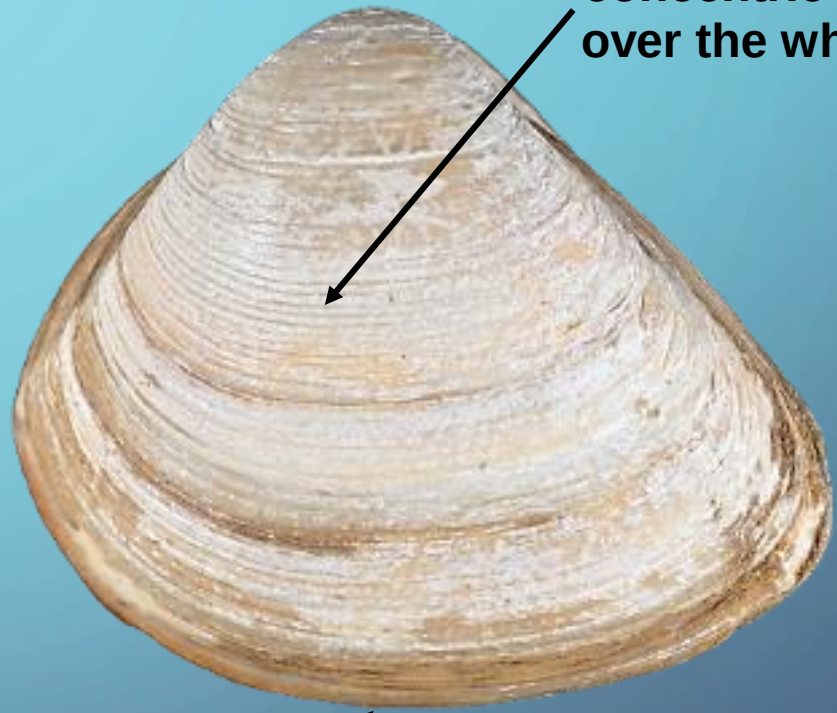
curved dorsal margin

narrow cardinal area

presence of distinct parallel ridges

ligament visible from outside

dull surface with distinct concentric grooves over the whole disc



generally less convex

less triangular, broader and more inequilateral, straight ventral margin

Mulinia lateralis is widely reported from its native geographic distribution area, from the Gulf of Lawrence to the Gulf of Mexico on Atlantic and Gulf coasts of the U.S., in a broad range of salinities. Actually, it prefers estuarine situations with a freshwater influence.

The Voordelta (The Netherlands) is mostly saline just like the Belgian east coast between Oostende and Knokke. The Westerschelde and the Wadden Sea (The Netherlands) can be characterised as estuarine environments and the eastern part of the Westerschelde is brackish.

Several molluscs have been introduced from W Atlantic and Pacific waters in the past century: *Mya arenaria* Linnaeus, 1758; *Petricolaria pholadiformis* (Lamarck, 1818); *Rangia cuneata* (G.B. Sowerby I, 1832); *Ruditapes philippinarum* (A. Adams & Reeve, 1850) either from oyster cultures [for instance *Magallana gigas* (Thunberg, 1793)] or by ballast water discharge

Particularly, *Ensis leei* Hubert, 2015 has been an invasive species occupying West European coasts from the German Bight to the beaches of Brittany, in less than a few decades.

Apparently, *M. lateralis* seems to be very adaptive to different environmental conditions.

The question is whether the new non-indigenous mollusc will be invasive or not and will have negative ecological and/or economic impact. Much will depend on factors such as generation lifetime, lifespan, fecundity and degree of salinity

In **The Netherlands**, *M. lateralis* seems to have found the perfect conditions to become a real invasive species and to suppress eventually the development of other sand dwellers, a.o. *Abra alba* (W. Wood, 1802), *Cerastoderma edule* (Linnaeus, 1758), *Macoma balthica* (Linnaeus, 1758), *Mactra stultorum* (Linnaeus, 1758), *Spisula solida* (Linnaeus, 1758) and above all *Spisula subtruncata* (da Costa, 1778).

Mulinia lateralis is found in high salinity waters from Jersey to Texas (USA), the North Sea waters of the Voordelta (The Netherlands) together with *Spisula subtruncata*, and in low-salinity environment of the Westerschelde together with *Cerastoderma edule*.

On the **Belgian coast** it can be found together with *Macoma balthica* and *Spisula subtruncata* after storms. A population of a dozen specimens was found living in pure sand at mid-tide level at Bredene.

Because *M. lateralis* prefers brackish waters with muddy bottoms, low in oxygen (Shumway, 1983) - in contrast with *S. subtruncata* which lives in sandy areas with higher salinity - it could be expected that both are not real competitors in their habitats.

Mulinia lateralis has established large populations in waters with different salinity in **The Netherlands**, sometimes in huge quantities. However, the dispersion in **Belgian coastal waters** is going much slower and above all at a much lower degree. Specimens are only sporadically found during field work, except in the vicinity of the harbour of **Zeebrugge**, where a larger population may be introduced by ballast water discharge.

This species has the potential to become a permanent resident on the Belgian coast. As yet, *M. lateralis* seems not to compete with the native *S. subtruncata* and not to become invasive at the disadvantage of other sand/mud dwellers on the Belgian coast.

Bredene (Belgium)

Among millions of *Macoma balthica*, *Ensis leei*, dozens of *Donax vittatus*, *Mytilus edulis*, *Spisula subtruncata* … a few ***Mulinia lateralis*** can be found at low tide.


Zeebrugge
Knokke-Heist
Blankenberge
Wenduine
De Haan
Bredene
Oostende
Brugge
Middelkerke
FLEMISH BANKS
FLEMISH COASTAL PLAIN


Zeebrugge, BE - Hull, UK
Zeebrugge, BE - Hull, UK
Albert II-dok
Zeebrugge, BE - Hull, UK
Harbour of Zeebrugge (Belgium)
Bay of Heist

Mulinia lateralis **(Say, 1822).**
Cumberland Island, Georgia, USA. On the beach at low tide.
4 February 1989. CSH. 12.25 mm.

***Mulinia lateralis* (Say, 1822).**
Cumberland Island, Georgia, USA. On the beach at low tide. 4 February 1989. CSH. 11.63 mm.

Mulinia lateralis **(Say, 1822).**
Whitfield, Sarasota Bay, Florida, USA. On sandbar at low tide. 7 February 1982. 11.60 mm

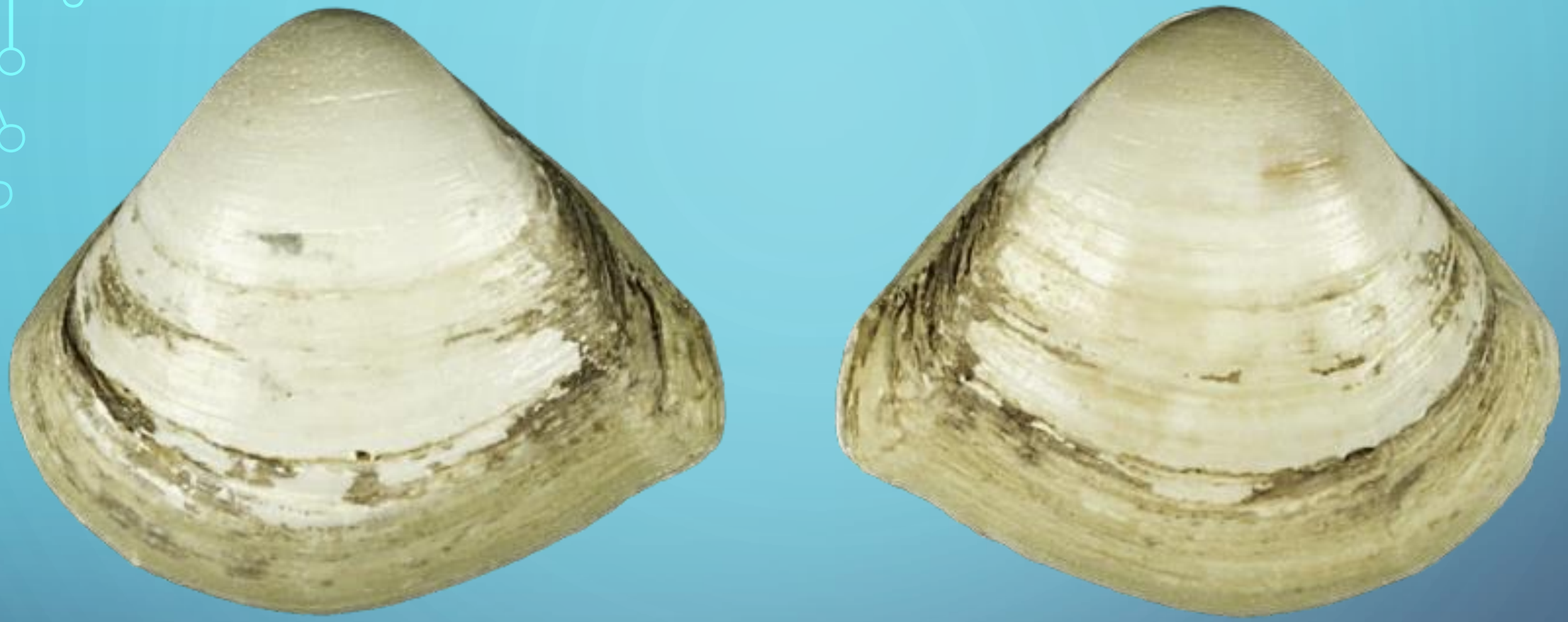
Mulinia lateralis **(Say, 1822).**
Quintana Beach, Brazoria County, Texas, USA. In drift at low tide. 2 December 1981. 16.17 mm

Mulinia lateralis **(Say, 1822).**
Quintana Beach, Brazoria County, Texas, USA. In drift at low tide. 2 December 1981. 15.03 mm

Mulinia lateralis **(Say, 1822).**
Sea Isle City, New Jersey, USA. In sand at low tide.
October 1966. CFN. H. 10.37 mm L. 13.59 mm

Mulinia lateralis **(Say, 1822).**
De Haan, Belgium. On the beach at low tide.
CFN. H. 12.23 mm L. 14.69 mm.

Mulinia lateralis **(Say, 1822).**
Bredene, Belgium. Alive on the beach at low tide after storm "*Odette*". 29 September 2020.
CFN. H. 13.24 mm L. 15.99 mm.



Mulinia lateralis **(Say, 1822).**
Bredene, Belgium. Alive on the beach at low tide after storm "*Odette*". 29 September 2020.
CFN. H. 14.91 mm L. 17.78 mm.

Mulinia lateralis **(Say, 1822).**
Bredene, Belgium. Alive on the beach at low tide after storm "*Odette*". 29 September 2020.
CFN. H. 16.38 mm L. 20.47 mm.

Spisula subtruncata **(da Costa, 1778).**
Bredene, Belgium. Alive on the beach at low tide after storm “Odette”. 29 September 2020. C FN. H. 21.46 mm L. 25.54 mm.
From left to right: anterior region; RV; LV; posterior region.

Spisula subtruncata **(da Costa, 1778).**
Bredene, Belgium. Alive on the beach at low tide after storm “Odette”. 29 September 2020. CFN. H. 19.99 mm L. 27.07 mm.
Left: RV. Right: LV.