

IDENTIFICATION OF JUVENILE *DREISSENA POLYMORPHA* AND *MYTILOPSIS* *LEUCOPHAEATA*

David B. MacNeill
Extension Specialist

The introduction of the zebra mussel, *Dreissena polymorpha*, into North America is expected to have serious economic and ecological ramifications. As populations of this biofouling bivalve expand, it is predicted that its range expansion will include several temperate estuarine systems along the eastern seaboard, entering the range of a native member of the *Dreissena* family, the dark false mussel, *Mytilopsis leucophaeata*. This euryhaline species has limited biofouling tendencies. Because *Dreissena* and *Mytilopsis* are adaptable to a spectrum of environmental regimes including variable salinity, partially sympatric or overlapping populations of both species are likely. Because of their related evolutionary history, these two species show striking morphological similarities, particularly as juveniles, which may result in field misidentification as sympatric populations are established. This publication is an abbreviated guideline for the definitive identification of these two similar species.



New York
Sea Grant



Cornell
Cooperative
Extension

Based on several studies, *Mytilopsis leucophaeata* generally inhabits and can survive at higher salinities than *Dreissena*. European studies of sympatric populations of these species indicate a partial salinity tolerance overlap between 0.2 ppt and about 3.0 ppt (parts per thousand) total salinity (Table 1). North American sympatric populations may generally be found in estuarine areas having total salinities in this range.

Table 1. Salinity tolerance of *D. polymorpha* and *M. leucophaeata* (values in ppt total salinity).

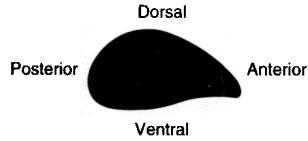
	<i>Dreissena</i>	<i>Mytilopsis</i>
maximum tolerated	1.84–13.40	26.40
optimal salinity	0.93	1.38–12.66
normal ranges	0.21–1.47	0.21–18.08

Species Identification

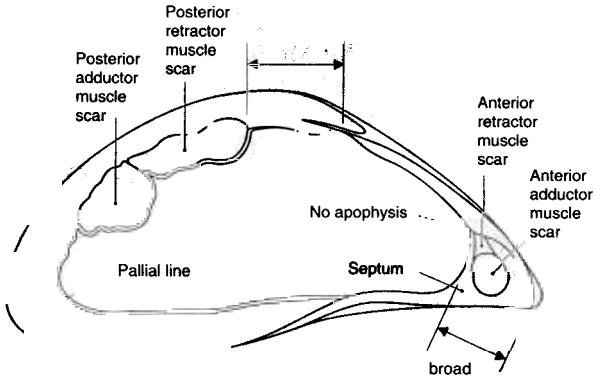
Externally, juveniles of both species are mytiliform — mussel shaped — and often display herringbone striping patterns on the shell. Closer observation will reveal subtle differences in the degree of shell flattening, coloration and integrity of the periostracum, or outer shell layer. *Mytilopsis* is darker and more rounded ventrally, and the periostracum is easily scraped off in dried specimens. *Dreissena* is flattened ventrally, and has a more durable periostracum. During ontogeny, the external morphology changes considerably, with *Mytilopsis* developing a much more elongated shape.

A microscopic examination of the shell structure in the anterior portion of the shell (the “beak” end) is the most definitive means to correctly identify both species. Mussel specimens must be dissected removing the soft tissues from each of the shell halves or valves. A microscopic magnification of at least 10x is recommended for proper shell examination.

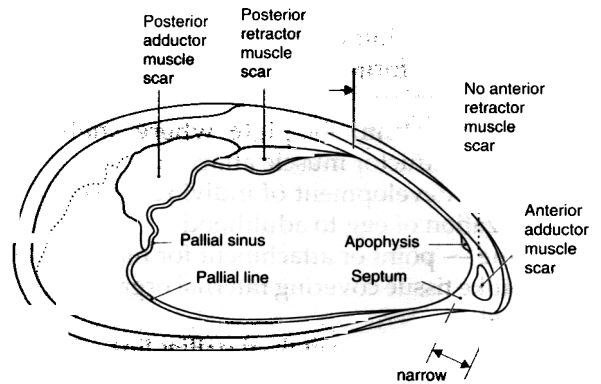
COMPARATIVE SHELL FEATURES



Dreissena polymorpha



Mytilopsis leucophaeata



Internal Microscopic Features of Shell

Posterior Retractor Muscle:

- does not extend to anterior shell margin.
- extends to anterior shell margin.

Pallial Line:

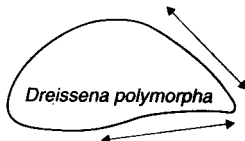
- rounded at posterior portion, no sinus.
- may be invaginated forming a sinus.

Myophore Plate (Septum):

- broad, scars of both anterior muscles present on septum; no apophysts present.
- narrowed, only anterior adductor scar present on septum; anterior retractor attached to inward-facing apophysis.

External Shell Characteristics

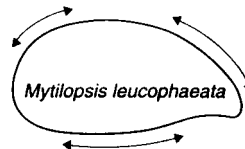
more flattened at anterior margin and ventrally.



∴

typically have herringbone patterns, may be radially striped or show diffuse striping.

- more rounded and broad laterally.



- often have herringbone pattern; generally darker coloration.

Glossary

- adductor muscle** — muscle that closes shell during contraction
- apophysis** — inward-facing “toothlike” structure that functions as point of attachment for anterior adductor muscle in *Mytilopsis*
- euryhaline** — having wide salinity tolerances
- morphology** — form and structure of individual organism
- myophore (septum)** — plate where shell anterior adductor muscle attaches
- ontogeny** — development of individual from fertilization of egg to adulthood
- pallial line** — point of attachment for mantle, sheetlike tissue covering internal organs of mussels
- pallial sinus** — an ingrowth of pallial line
- periostracum** — outermost covering of shell
- retractor muscle** — when contracting, withdraws foot structures of mussel into shell

References

- Castagna, M. and Chanley, P. 1973. Salinity tolerance of some marine bivalves from inshore waters and estuarine environments in Virginia waters on the western mid-Atlantic coast. *Malacologia*, 12:47–96.
- Marelli, D. C. and Gray, S. 1983. Conchological redescription of *Mytilopsis sallei* and *Mytilopsis leucophaeta* of the brackish Western Atlantic. *The Veliger*, 25(3):185–189.
- Marelli, D. C. and Gray, S. 1985. Comments on the status of recent members of the genus *Mytilopsis* (Bivalvia: Dreissenidae). *Malacological Review*, 18:117–122.
- Morton, B. S. 1969. Studies on the biology of *Dreissena polymorpha*: I. General anatomy and morphology. Proceedings of the Malacological Society of London, 38:301–321.
- Morton, B. S. 1970. The evolution of the heteromyarian condition in the Dreissenacea (Bivalvia). *Palaeontology*, 13(4):563–572.
- Morton, B. S. 1981. The biology and functional morphology of *Mytilopsis sallei* (Recluz)

(Bivalvia: Dreissenacea) fouling Visakhapatnam Harbour, Andhra Pradesh, India. *Journal of Molluscan Studies*, 47:25–42.

- Ristich, S. S., Crandall, M., and Fortier, J. 1977. Benthic and epibenthic macroinvertebrates of the Hudson River. I. Distribution, natural history, and community structure. *Estuarine and Coastal Marine Science*, 5:255–266.
- Wolff, W. J. 1969. The Mollusca of the estuarine region of the rivers Rhine, Meuse and Scheldt in relation to the hydrography of the area: 2 The Dreissenidae. *Basteria*, 33(5–6):93–103.
- Yonge, C. M. and Campbell, J. I. 1968. On the heteromyarian condition in the Bivalvia with special reference to *Dreissena polymorpha* and certain Mytilacea. *Transactions of the Royal Society of Edinburgh*, 68(2):21–42.

Acknowledgments

The author would like to thank the following for their critical review of this publication: Dr. W. D. Russell-Hunter, Syracuse University; Dr. James Carlton, Maritime Studies Program of Williams College; Dr. Dan Marelli, Florida Marine Research Institute; Cornelia Schlenk and Diana Puglisi, New York Sea Grant Institute. Thanks are also due to Pat Peterson for the design and layout.

For additional information on *Dreissena polymorpha* and *Mytilopsis leucophaeta*, please contact:

New York Sea Grant Extension
248 Hartwell Hall
SUNY College at Brockport
Brockport NY 14420-2928
(716) 395-2638

Zebra Mussel Information Clearinghouse
250 Hartwell Hall
SUNY College at Brockport
Brockport NY 14420-2928
(716) 395-2516