Of Corncobs and Flat Artichokes by Ronald L. Shimek, Ph. D.

Here in the Pacific Northwest many shell collectors tend to think that we have been short-changed with regard to large-shelled snails. A couple of larger snail species are relatively common, *Ceratostoma foliatum* (Gmelin, 1791) and *Fusitriton oregonesis* (Redfield, 1848) come to mind but, by and large, the sizes of most local shelled gastropods range from small to smaller. There is, however, one relatively diverse group that contains several species whose individuals may become relatively large. Even better, depending on the area where they are found, some individuals are spectacularly-colored with interesting sculpture. These animals are, of course, the larger species in the genus *Neptunea*. The mention of *Neptunea* in a recent issue of *The Dredgings*, prompted me to write this essay. For some time I've wanted to contribute a short article and I guess it just took the necessary stimulus.

Figure A. *Neptunea pribiloffensis*. Specimen is about 10 cm (4 inches) long. Collected from the eastern Bering Sea.
Figure B. *Neptunea lyrata*. Specimen is about 12 cm (5 inches) long. Collected from the Strait of Juan de Fuca, south of San Juan Island, Washington.
Figure C. *Neptunea heros* (Gray, 1850) is one of the more "flashy" northern *Neptunea* species. This specimen was about 19 cm (7 inches) long and, when living, the shell color was an intense magenta.
Figure D. *Neptunea pribiloffensis* female depositing her egg-capsule mass. The snail is about 75 mm (3 inches) long. Note the flaccid, baby-sitting anemone in the lower left corner. Taken intertidally near Homer, Alaska.

Neptuneids are by no means rare in the Pacific Northwest; they have been collected well into Puget Sound, and may be quite abundant in areas to the north, particularly in the cooler waters of Alaska and northern British Columbia. In our area they tend to be restricted to the subtidal habitats, a fact that makes them seem uncommon, but I have collected several species by dredging and diving in the San Juan Islands, and some, such as *Neptunea lyrata* (Gmelin,1791*)* or *Neptunea tabulata* (Baird, 1863), are fairly easy to find.

Even though the animals themselves are rarely seen, unlike many snails, they leave behind some long-lasting evidence of their presence. Many of our larger local snails, belonging to the taxonomic families Muricidae and Buccinidae deposit egg capsules in the intertidal zone. Probably the most recognizable of these are the capsules of the various species of *Nucella*, whose capsule aggregations are commonly found in late spring. These egg capsule masses are made of a series of tough proteins that protect the encased and developing embryos until they hatch, often several weeks to a couple of months after their deposition. Consequently, if such egg capsules are found, it is proof-positive that the adults of the species were in the area.

The champion egg-capsule makers turn out to be the various species of *Neptunea*. In some research I did in ancient times, about 30 years ago, I studied a mixed *Neptunea* population in Alaska consisting of individuals of *Neptunea pribiloffensis* (Dall, 1919) (which I have also collected in Puget Sound near Whidbey Island) and *N. lyrata*, commonly found in the San Juan Islands.

Interestingly, the egg capsule masses of each of these species are distinctive. The egg capsule masses of *Neptunea pribiloffensis* look like, and may be about the same size as an old corncob. The egg capsules of *Neptunea lyrata*, on the other hand, are deposited as a flat circular mass that one of my students referred to as "a flat artichoke." Each *N. lyrata* capsule is deposited separately and the resulting aggregation does look somewhat like the leaves of a small artichoke. In *N. pribiloffensis*, the capsules are deposited on top of one another and adhere to one another creating a tall vertically-oriented "corncob." It is worth noting that these egg capsule masses are distinctive; *N. lyrata* cannot make "corncobs" nor can *N. pribiloffensis* make "flat artichokes."

Neptunea egg capsules take a **LONG** time to hatch. I monitored *Neptunea pribiloffensis* eggs in the laboratory and nature, and they develop for between 12 to 13 months; I don't have definitive data on *N. lyrata*, but they also seem to take over a year to develop. Having eggs that take so long to develop puts them at risk in the environment. Neptuneid egg capsules are large, and filled with eggs; over 2000 eggs are commonly found in each capsule. Most of those eggs are sterile, and provide food for the embryos that develop from the fertile eggs. The infertile eggs, referred to as nurse eggs are, of course, highly nutritious to animals other than snails. Normally, each *N. pribiloffensis* egg capsule will produce only 1 to 9 small snails, which crawl out of the capsules a year after they were deposited.

Eggs that develop for that length of time would be good food for any predator that could find and eat them. In our region, the most abundant such predator is the green sea urchin, *Strongylocentrotus droebachiensis* (O. F. Müller, 1776). Commonly thought of as an herbivore, this sea urchin actually is omnivorous and eats a lot of flesh. Snail egg capsules are prime food for such animals. To protect their progeny from predation, *Neptunea lyrata* females search out and find crevices between rocks to deposit their eggs. The urchins can't get to the eggs in these refugia. *Neptunea pribiloffensis* females, however, have a much more interesting way of protecting their developing babies. They use "babysitters" in the form of sea anemones that will eat the sea urchins. The *N. pribiloffensis* females seek out and deposit their corncob-like egg-capsule masses near individuals of the large green-and-red sea anemone *Urticina grebelnyi* (Sanamyan & Sanamyan, 2006).

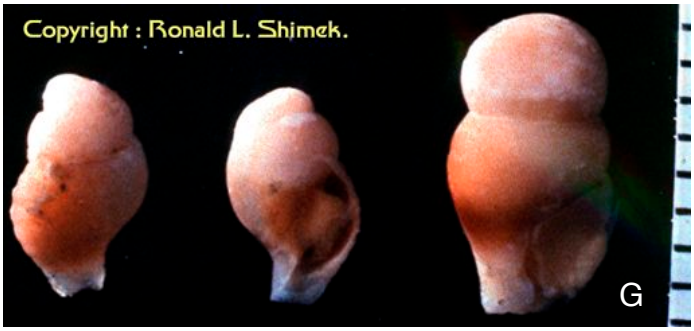

Figure E. *Neptunea pribiloffensis* egg-capsule mass, partially eaten. The babysitter was removed four weeks earlier. Note the sea urchins. Taken intertidally near Homer, Alaska.
Figure F. *Neptunea lyrata* egg capsules in a crevice under a rock in the intertidal zone near Homer, Alaska.
Figure G. *Neptunea pribiloffensis* juveniles just hatched from an egg capsule mass kept in an aquarium in a laboratory for 13 months after deposition. Scale bar is in millimeters.

Any sea urchin that crawls up to and starts to eat the *N. pribiloffensis* egg capsules is likely to be eaten itself by the sea anemone. In the area I studied, the green sea urchins were one of the most common foods of these large anemones. In experiments where I removed the sea anemones, the egg-capsule masses typically lasted less than two months before they were eaten. If the anemones were left in place, there was always a bit of urchin nibbling, but most of each "corncob" survived through the year. Each of the corncob-shaped masses may contain several hundred egg capsules; the whole mass may "fledge" as many as 1000, or more, baby snails if it is not eaten by an urchin.

The next time you are shelling in the outer costal areas of northern British Columbia or southern Alaska and find the "corncobs" perched on a rock, look for the anemone nearby, and remember the tale of the snail that uses babysitters to protect its youngsters. I gave the club at least one copy of my snail and babysitter article cited in the References, but if anyone wants one of their own, email me at ronshimek@wispwest.net and I will send you a digital copy.

Figure H. *Neptunea pribiloffensis* egg capsule masses and their *Urticina grebelnyi* babysitter. Note the snail to the right of the egg capsule rock. Although the substrate here appears sandy or muddy, it is sandstone and is very hard. Taken intertidally near Homer, Alaska.

References :

Shimek, R. L. 1981. *Neptunea pribiloffensis* (Dall, 1919) and *Tealia crassicornis* (Müller, 1776), On a snail's use of babysitters. The Veliger. 24:62-66.

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