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Veined Rapa Whelk, *Rapana venosa*, Found in Virginia Waters

A non-native gastropod mollusk (*Rapana venosa*) is being found in Virginia waters. The single-shelled mollusk, visually similar to the native whelks (*Busycon carica*, *B. sinistrum*, *Busycotypus canaliculatus*, Fig. 1), turned up during a routine Virginia Institute of Marine Science (VIMS) trawl survey on the lower James River this summer. A gastropod mollusk is a single-shelled mollusk and is often referred to, for simplicity's sake, as a snail.

VIMS is interested in any sightings of this large snail in Virginia waters; these reports will aid scientists in developing a model which will define potential impacts.



Figure 1. Native knobbed whelk

Figure 2. Non-native rapa whelk

Physical Characteristics

R. venosa can be distinguished from the native whelk by three pronounced characteristics: small teeth along the edge of the shell, orange coloration along the inner edge of the shell, and a pronounced channel (columella). Notice, also, the ribbing at the lower end of the shell (Fig. 2).

The coloring of the outer shell can vary from gray to red brown, with dark brown dashes on the spiral ribs. The animal can grow to be quite large; VIMS scientists located a record of 18.3cm shell height (7.2 inches) from Taiwan, and 12.1cm (4.8 inches) from the Black Sea. The size of snails being found in Virginia waters is between 10-15cm (4-6 inches).

Range

R. venosa is native to Japanese waters. Three species of *Rapana* are recorded in Chinese waters: *R. venosa*, *R. bezoar* and *R. rapiform*. It appears that *R. venosa* is restricted to the Yellow Sea, the East China Sea, and the Bohai Sea, whereas *R. bezoar* occurs off the southern provinces bordering the South China Sea and is more widely distributed in the Western Pacific, the Indian Ocean and,

reportedly, occurs off the coast of California. *R. rapiformis* occurs in the East and South China Seas. This is a region of wide annual temperature ranges, comparable to that of the Chesapeake Bay. In winter, populations may migrate from estuarine waters into deeper water—possibly to avoid freezing surface water, although this is not explicitly stated.

In the 1940s, *R. venosa** was introduced into the Black Sea, probably via ballast water. Within a decade it had spread along the Caucasian and Crimean coasts and to the Sea of Azov. Between 1959 and 1972, the range was extended into the northwest Black Sea to the coastlines of Romania, Bulgaria and Turkey. *R. venosa* is thought to be very fertile, tolerant of low salinities, water pollution, and oxygen deficiency. In the Black Sea, *R. venosa* is responsible for significant changes in the waters' benthic (bottom dwelling) ecology.

The *R. venosa* introduced into the Black Sea has had the greatest influence on populations of large bivalve mollusks, decreasing their densities many times. The whelk's expansion is regarded as one of the main reasons for declining mussel populations in Bulgarian waters, the Kerch Strait, and the Caucasus. On one oyster bank, the appearance of *Rapana* caused almost complete extinction of large bivalve mollusks. In other areas, the whelk had little impact on the marine ecosystem. Specifically, in the northwestern part of the Black Sea, the *Rapana* population is not numerous. The causes of this low density are unknown. Food resources are abundant there and the levels of water contamination are lower than in other areas where the mollusk is very common.

From the Black Sea, the range of the mollusk extended to the Adriatic Sea, and finally into the Aegean Sea.

Biology

R. venosa is a predatory gastropod and it feeds upon mollusks. In plain language, a gastropod is a mollusk with a head bearing tentacles and eyes, a foot, and a one-piece shell. The scientific literature indicates that *Rapana* attacks bivalves by rasping around the hinge region rather than boring a distinct hole. *R. bezoar*—closely related to *R. venosa*—also preys on mollusks, and attacks other shallow burrowing mollusks by boring the edge of the shell.

R. venosa become sexually mature at a "small size" in the Black Sea. Reproduction is by egg capsules that produce pelagic larvae. Egg capsule number varies with female size. After a single mating the following numbers were observed to be laid in laboratory specimens of *R. bezoar*: a female of 85mm (3.3 inches) produced 66 capsules; a female of 75mm length (3.0 inches) laid 132 capsules; and a female of 70mm (2.75 inches) laid 138 capsules.

*In the scientific literature, the whelk was referred to as *R. thomasiana*. VIMS scientists believe it is *R. venosa*.

Scientific information for this advisory was provided by Roger Mann.

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