

Cittarium pica (West Indian Topshell)

Superfamily: Trochoidea (Top Snails)

Class: Gastropoda (Snails and Slugs)

Phylum: Mollusca (Molluscs)



Fig. 1. West Indian topshell, *Cittarium pica*.

[http://www.gastropods.com/4/Shell_24.shtml, downloaded 30 March 2015]

TRAITS. Littoral (part of the sea close to the shore) gastropod commonly referred to as the West Indian topshell or whelks, *C. pica* attains the size of 10cm with its shell having black and white markings (Fig. 1). The shell is conical (Sartwell, 2013) with younger specimens being mostly white, but may have a greenish/yellowish tinge due to the staining of blue-green algae (Randall, 1964). The inner shell surface is nacreous (mother of pearl). There are patterns of coarse checkering of alternating white and black per whorl (turn) of the shell. *C. pica* has a muscular foot which assists in its slow crawling and holding on to rocks.

DISTRIBUTION. *Cittarium pica* is widely distributed throughout the West Indies, the Central and South American coast from upper Yucatan to Trinidad. The occurrence of *C. pica* in Florida and Bermuda were found as fossils. An attempt to reintroduce the species in Bermuda was made but was not successful. It is believed that the species in these areas died out in very recent times (Randall, 1964). The entire distribution range is in the Caribbean.

HABITAT AND ACTIVITY. *C. pica* is found on rocky shorelines of tropical and temperate waters. These are commonly found in the intertidal and shallow sub tidal zones (as seen in Fig. 2) and are subjected to wave action (Randall, 1964). *C. pica* are most abundant in areas slightly above the water level to a metre below. Smaller shells, the younger individuals, are mostly found higher in the intertidal zone. Zonation of shells is as a result of predator avoidance and food availability (Debrot, 1990). *Cittarium* spends its time on shores that are moderately sheltered, calcareous and non calcareous rocks, under boulders, stones and rocks in the subtidal region and in holes and crevices (Robertson, 2003). Larger individuals are also known to be found in more exposed areas of high wave energy (Sartwell, 2013). These gastropods are not found in brackish areas like that of mangroves. However in identifying if this occurrence is related to the difference in the salinity, turbidity or lack of wave action of the environments, it is unknown (Randall, 1964). Through observations, these West Indian topshells' activities, such as feeding, take place at night and in the early hours of the morning (Robertson, 2003).

FOOD AND FEEDING. Although *C. pica* ingests detrital material, their diet consumed is ultimately herbivorous and they are low in the food chain. These gastropods feed on a wide variety of filamentous algae with relatively soft thalli. Such non-calcareous algae are scraped off rocks found in the splash zone to about 1m below it. These include blue green algae, green algae, red algae, brown algae excluding *Tubinaria* and *Sargassum* which are coarse. In addition to finding algae in the stomach contents, organic detritus has also been found confirming that these gastropods are non-specific herbivores or detritivores (Randall, 1964). Observations have shown that feeding of *C. pica* takes place mostly at night and early hours of the morning (more active at night) (Robertson, 2003).

POPULATION ECOLOGY. Along the rocky shore of the intertidal and subtidal zone of the *Cittarium* habitat, this species was accompanied by many other herbivorous gastropods including *Tegula*, *Nerita* and Littorinidae. Juveniles live highest on the shore. Experiments carried out showed the highest density of individuals occurred at 5-6 individuals per m² (Herrera et al, 2012). Two types of symbionts dwell on and around *C. pica*, attached symbionts and unattached symbionts. A common unattached symbiont relationship includes the *C. pica* and *Lottia leucopleura*. This species lives exclusively at the base of the *Cittarium*'s shell and also near the snail's anus. The proximity to the anus suggests that the unattached symbiont may be feeding on the gastropod's faecal pellets. Attached symbionts include filamentous, green, calcareous algae (Robertson, 2003).

REPRODUCTION. Sexes of *Cittarium pica* are separate and mature ovaries of the females are green and the testis of the males are a creamy white colour (Robertson, 2003). Research carried out suggests an annual reproductive season from July-October. Changes in oocyte size distribution propose a non-reproductive period between February and July. This is because

between October and January, oocyte sizes were larger compared to the sizes in February and July where there was a decrease in large oocytes (Bell, 1992). Fertilization of eggs is external (Bell, 1992). On substratum, eggs are laid in ribbon/jelly like masses. Both sperm and eggs are let out into the water and fertilization follows. Although the sex initiating spawning is not confirmed, sperm release was an indicator of spawning. In said cases, males initiate spawning whereby sperm is released and in turn this then initiates the spawning of females. The larval stage is short-lived and with the help of water currents are dispersed short distances (Bell, 1992). The young *Cittarium pica* emerge from eggs as trochophores i.e. planktonic larvae, free swimming. In this stage, they contain a shell cap at the posterior ends of their bodies. Planktonic life only lasts for about three and a half to four and a half days.

BEHAVIOUR. While juvenile *Cittarium* react to predators in a motion of flight, adults are relatively unresponsive. Distance chemoreception is primarily the response mechanism of the trochid. Escape reactions were also observed as the snails dropped from its holdfast, falling from the rocky cliff into the water below (Robertson, 2003).

APPLIED ECOLOGY. *Cittarium pica* is second in economic importance to the queen conch, *Strombus gigas* (Randall, 1964). It is known as a staple seafood throughout the Caribbean and because of this is well fished. In areas where heavy fishing takes place, the likeliness of finding whelks there are very low. Coates et al. (2003) mention that reintroduction of these West Indian topshells for example in Bermuda should be carefully done as there can be negative consequences impacting the rocky shores. With no limitations, *C. pica* may become an invasive population (Sartwell, 2013).

REFERENCES

- Bell, J, Lori. 1992. "Reproduction and Larval Development of the West Indian Topshell, *Cittarium Pica* (Trochidae), in the Bahamas." *Bulletin of Marine Science* **51** (2):250-266.
- Coates, K., C. Jantzen-Marson, J. Madeiros, and E. Meyer. 2003. "West Indian topshell, *Cittarium pica*, reintroduction project in Bermuda: Current status." *Integrative and Coaparative Biology* **43**(6): 862.
- Debrot, A.O. 1990. "Temporal aspects of population dynamics and dispersal behaviour of the West Indian Topshell, *Cittarium pica* (L.), at selected sites in the Exuma Cays, Bahamas." *Bulletin of Marine Science* **47**: 431-447.
- Herrera, Correa, Tatiana, Beatriz Toro Restrepo and Javier Rosique. 2012. "Some Aspects of the Bioecology of the West Indian Topshell *Cittarium Pica* (Mollusca: Gastropoda) in the Darien Colombian Caribbean." *Bol. Cient. Mus. Hist. Nat. Univ. Caldas* **16** (2).
- Randall, A, Helen. 1964. "A Study of the Growth and Other Aspects of The Biology of The West Indian Topshell, *Cittarium Pica* (Linnaeus).
- Robertson, Robert. 2003. "The Edible West Indian "Whelk" *Cittarium Pica* (Gastropoda: Trochidae) Natural History with New Observations." *Proceedings of the Academy of Natural Sciences of Philadelphia* **153** (1):27-47.
- Sartwell, Tim. 2013. "West Indian Topshell *Cittarium Pica*." Accessed March 3rd, 2015. <http://www.thecephalopodpage.org/MarineInvertebrateZoology/Cittariumpica.html>

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Fig. 2. Rocky shore habitat of *Cittarium pica*.

[From Randall (1964)]

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