

Calcified gastropod operculum: A symbol of luck and prosperity

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Calcified opercula of marine gastropod range from thin and flat, rigid flat to thickened; lid-like structures composed primarily of calcium carbonate that seal the shell's aperture upon retraction. These heavily mineralised plates serve as defensive armor against predators attempting to breach the shell and provide a hermetic seal that significantly mitigates water loss. Additionally, they shield soft tissues from extreme environmental stressors, including high temperatures and intense UV radiation. Like the mantle, the opercular pad deposits consecutive layers of material to form the operculum. The calcified operculum can be also

categorised into two main categories.

1) Paucispiral: The structure is slightly elongated, showing few coils and an inferior nucleus; this opercular type is prevalent in Neritimorpha and mesogastropod/Caenogastropoda.

2) low multispiral: The structure exhibits few spiral coils and slightly inferiorly displaced nucleus; this form of operculum is common in some Neritimorpha, basal Caenogastropoda and Vetigastropoda. The outer, exposed side of the operculum is typically smooth



Turbo sp., Outer and inner view of low multispiral calcified operculum and Gomati Chakra in various dimension for sale

and strongly convex or domed. It is often glossy, with colored, swirling, or patterned designs. The inner side, which faces the snail's foot, is flat, white, and often reveals the spiral growth lines (suture lines).



Natica sp., outer and inner view of paucispiral calcified operculum

The low multispiral calcified operculum with spiral coils is considered as a symbol of luck and prosperity in Hindu Culture. Living species (about 164 recognised species) coming under Turbinidae possess a thick, spirally-coiled calcareous operculum. Turbinate gastropods are distributed globally in various habitats including rocky, sandy and seagrass beds predominantly in calcareous habitats from the intertidal zone to at least 500m depth at tropical to polar latitudes. The heavily calcified opercula of turban snails (Turbinidae) are sold as Sudarshan Chakra Stone/Gomati Chakra/ Gomati stone/ Vishnu Chakra in spiritual shop or shell craft outlet particularly in religious city of India like Dwarka, Tirupathi, Rameswaram, Ujjain etc.

Individual sacred chakra stones are available in various dimensions, categorised as small (up to 1.5 cm), medium (1.5-2.5 cm), and large (exceeding 2.5 cm). These items are organised in separate trays for retail sales. Prices of the Gomati chakra is fixed based on the sizes or diameter of the disc. This Gomati Chakra is also used to make various kind of jewelry pieces such as necklaces, bracelets, pendant, and rings. Gomati chakras are also used to make various shell craft items such as tree, pyramid, ball, etc. Prices of the Gomati Chakras and shell craft items will vary place to place.

In India, main species which can contribute to this Gomati Chakra are *Turbo (Turbo) petholatus*, *T. argyrostomus*, *T. bruneus*, *T. intercostalis* and *T. marmoratus* etc. Owing to its protected status under the Wildlife (Protection) Act, 1972, *T. marmoratus* cannot be utilised for the Gomati Chakra. Due to the low incidence of these specific turbinates at Indian

landing sites, Gomati chakras are likely imported from international sources, often categorised under general shell imports. The largest, thickest operculum are found in *T. marmoratus* (diameter > 5 cm; thickness > 1.5 cm). Within a single species, opercular thickness is greater in populations inhabiting tropical waters compared to those in cold-temperate regions.