

Research Note

A tumbling snail (Gastropoda: Vetigastropoda: Margaritidae)

In August 2015, the NOAA ship OKEANOS EXPLORER conducted deep-sea studies in the northwestern Hawaiian Islands, which now are within the Papahānaumokuākea Marine National Monument. The ship deployed the remotely operated vehicle DEEP DISCOVERER (D2 ROV), whose live video feed was shared with researchers on shore via satellite transmission.

On 5 August 2015, the D2 ROV was exploring angular basalt blocks and sediment patches on the steep inner slope of Maro Crater, an unusual 6 km-wide crater east of Maro Reef (25.16° N, 169.88° W, 2998–3027 m). The cameras recorded what appeared to be a fish attacking or being attacked by some other unidentified animal. When the ROV cameras were zoomed in on the encounter, the twisting elongate structure though to be a fish was determined to actually be the elongate foot of a gastropod mollusk (Figures 1, 2). No potential predator or prey could be seen in subsequent view, so it seems likely that the snail reacted to the close presence of the ROV. The mollusk first moved horizontally before falling down, retracting the foot and resting among the rocks. The camera was equipped with red strobe lights that set a scale of 10 cm. Because the camera's focal length changed, it is difficult to estimate how far the snail moved but 3 m seems to be a reasonable guess.

Examination of the shell of the mollusk (Figure 3) showed that it belonged to the genus *Gaza* Watson, 1879. Species of *Gaza* are among the larger gastropods to be found on the continental shelf and upper slope. They can be recognized by their size (to 40 mm), ivory color with a golden sheen, deep umbilicus, uncalcified operculum, and lack of a noticeable periostracum. Most specimens have been obtained by trawls on mud bottoms.

The mollusk recorded by the D2 ROV was not collected for verification. *Gaza daedala* Watson, 1879 is the only species of this genus known from the central or western Pacific. The only report for which a specimen is known is that of the holotype, collected at 19° 10' S, 178° 10' E (off Kandavu, Fiji), 1100 m. Robert Moffett and Christopher Kelley (pers. comm.) informed me that a specimen of *G. daedala* was collected off Kaulua Point, Big Island of Hawaii (19.34° N, 155.91° W, 600–803 m, 24 August 1988, submersible vehicle PISCES,) but the specimen has been lost. Severns (2011) reported *G. daedala* from 330 m off Oahu but the material on which that report was based also is missing. The mollusk in the photographs has an iridescent shell with radiating lines, as reported for *G. daedala* (Simone and Cunha, 2006).

The width of the shell, based on the camera's scale dots, seems to have been close to 40 mm, with the extended foot as much as 100 mm. The characteristic covered umbilicus can only partially be seen in the photograph, so the identification remains uncertain. Hickman (2012) noted that species of *Gaza* from the Gulf of Mexico might be associated with chemosynthetic communities, but the mollusk in the photographs was living on manganese-encrusted basalt.

Hickman (2003; 2007) reported “foot thrashing” as an escape response to predators and in the laboratory by “mechanical disturbance” in the trochoidean gastropods *Umbonium vestiarium* (Linnaeus, 1758), *Isanda coronata* A. Adams, 1854, and other species of the family Solariellidae. The observations provided here are the first of such behavior in *Gaza* spp. and among the few reports on behavior of non-cephalopod deep-sea mollusks.

Supporting material: video is posted at <http://oceanexplorer.noaa.gov/oceanos/explorations/ex1504/logs/dive4/dive4.html>.

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Figures 1–3. *Gaza* sp. **1, 2.** Individual tumbling with foot extended. **3.** Close-up detail. Photos courtesy of NOAA Office of Ocean Exploration and Research, 2015 Hohonu Moana Expedition.

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