First in-situ observation of the endemic giant clam *Tridacna rosewateri* from the Nazareth Bank, Mascarene Plateau

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Giant clams play an important ecological role in the structure and ecology of coral reef communities (Neo *et al*., 2015) and conducting research on these species is as important as the overwhelming attention being given to coral reefs worldwide. Giant clams (family: Cardiidae; sub family: Tridacninae) are the largest living bivalves; some species can live for a hundred years and reach a length over 1.5 m (Yonge, 1975; Nuryanto *et al*., 2007). Giant clams have a feeding behaviour similar to that of corals, exploiting nutrients in both heterotrophic and autotrophic conditions, thanks to their obligate symbiotic association with photosynthetic dinoflagellates (Jantzen *et al.,* 2008), and are able to concentrate most of their energy into growth (Griffiths and Klumpp, 1994). They usually grow in the warm waters of the Pacific and Indian Oceans (Purchon, 1977) and use substrates such as coral, rock, rubble or sand to attach themselves (Ramah *et al*., 2017). Most species are found within shallow lagoons and on reef flats, usually not deeper than 30 m (Neo *et al*., 2017) due to their relationship with symbionts requiring light. Presently, there are 12 recognized extant species of giant clams worldwide, comprising two species of the *Hippopus* genus and ten species of the *Tridacna* genus (Fauvelot *et al*., 2020; Tan *et al*., 2021).

Limited research on these invertebrates is available from the Western Indian Ocean (WIO) region, notably from the Comoros Islands (Mohamed *et al*., 2016) and from several other WIO countries (Fauvelot *et al*., 2020). Among the 12 species, only two are known to be widely distributed in the WIO (Othman *et al*., 2010); namely *Tridacna squamosa* (Lamarck, 1819) and *T. maxima* (Röding, 1798). Two other species, endemic to the WIO, *T. elongatissima* (Bianconi, 1856) and *T. rosewateri* (Sirenko and Scarlato, 1991), have narrow distribution ranges (Fauvelot *et al*., 2020). The two widespread species within the waters of the Republic of Mauritius, *T. maxima* and *T. squamosa,* have been the subject of ecological studies in Mauritius and Rodrigues Islands (Ramah *et al*., 2019). In addition, Mauritian waters are known to host the endemic species *T. rosewateri*, only known from the shallow bank of Saya de Malha (Sirenko and Scarlato, 1991) and Cargados Carajos archipelago (St Brandon) (Fauvelot *et al*., 2020). The only living specimens of *T. rosewateri* were sampled from Cargados Carajos archipelago and were described as "*Tridacna lorenzi*" (Monsecour, 2016), and recently synonymized with *T. rosewateri* (Fauvelot *et al*., 2020). The EAF-Nansen research survey expedition of 2018 provided an excellent opportunity to carry out some exploratory work within the waters of the Saya de Malha and Nazareth Banks in order to refine the geographic distribution of *T. rosewateri*.

With the aid of the Argus Remotely Operated Vehicle (ROV), it was possible to take stock of the different benthic communities of the Saya de Malha and Nazareth Banks. In this note, the *in-situ* observation of two individuals of the WIO endemic giant clam *T. rosewateri* in their natural habitat at depths of 38.60 m and 39.66 m (Fig. 1 B-H) within the Nazareth Bank are reported. Morphological identification of giant clams *in situ* can be challenging, especially when organisms are young, have different mantle colour, shells that are covered by epibionts, and when relevant morphological traits have not yet been fully developed (Ramah *et al*., 2017; 2019). Well-developed identification guides (Knop, 1996) are nevertheless available to easily identify species using morphological traits such as by observing

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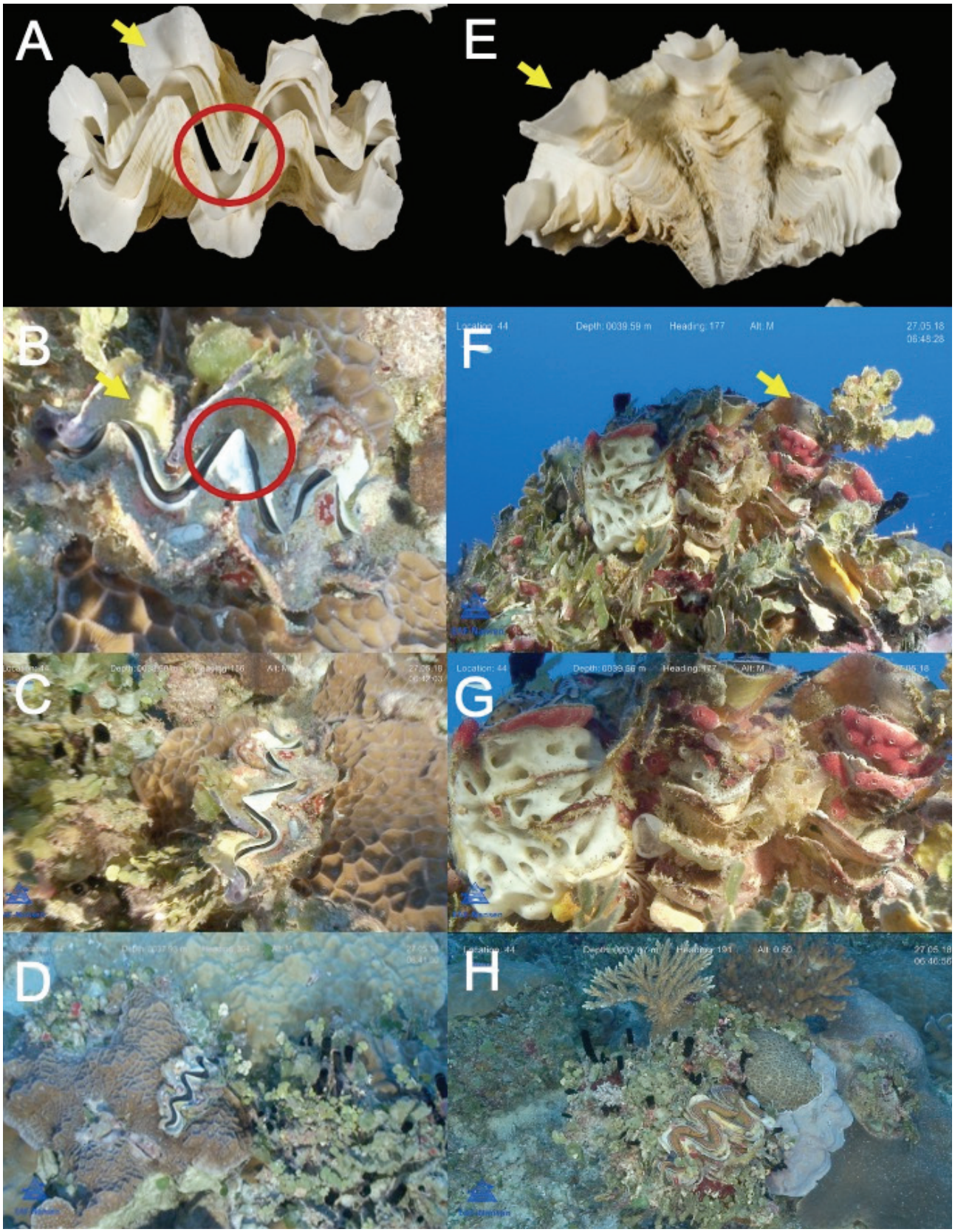

Figure 1. *T. rosewateri* from Musée national d'Histoire naturelle (MNHN) and *in situ* from the Nazareth Bank. A and E: Specimen photos from MNHN (photos adapted to show salient features only). B-D: Individual 1 recorded from Nazareth Bank at 38.60 m encrusted in coral. F-H: Individual 2 recorded from Nazareth Bank at depth at 39.66 m encrusted in coral and green coralline algae. Red circles indicate the shape of the valve margins, and the yellow arrows show the scutes projection on the primary folds.

the lateral, back and upper view of the organism's shell, the rib interstices and the byssal orifice (Norton and Jones, 1992). Photographs available from the Musée national d'Histoire naturelle (MNHN) of one *T. rosewateri* paratype (MNHN-IM-2013-49129, Fig 1A, E) were used for morphological comparison with the two individuals observed *in situ* (Fig. 1 B-D and F-H). Based on the Sirenko and Scarlato (1991) morphological description, a high number of similarities in morphological traits were easily observed between the two individuals recorded from the Nazareth Bank and that from the Saya de Malha Bank kept at the MNHN. Both specimens from the Nazareth Bank have an elongated shape, and the valve margins are large and sharp in a triangular shape (red circle in Fig. 1. A and C). The scutes at the primary folds are large and widely spaced (yellow arrow in Fig. 1 A, B, E and F) very similar to that of *T. squamosa*. However, as compared to the latter, *T. rosewateri* was found to be semi-encrusted in coral (Fig. 1 D and H) which is not a trait of *T. squamosa* in Mauritian waters (Ramah *et al*., 2017). *T. rosewateri* have 4 to 9 dense convex rib-like folds which become more concentrated on the ventral slope. This can be seen from the lateral view of the specimen observed in Fig. 1 F and G. The shells of giant clams are often used as a substrate and shelter by other organisms such as sponges, corals, molluscs, and coralline algae, among others (Neo *et al*., 2015). As recorded previously by Sirenko and Scarlato (1991), these were also observed for the two individuals recorded from the Nazareth Bank (Fig. 1 B, C, F and G).

This observation backed up by morphological evidence presents new data on the occurrence of *T. rosewateri* in the waters of the Republic of Mauritius, especially on its fishing banks. *T. rosewateri* that was previously thought to occur only at the Saya de Malha Bank and more recently in St Brandon is more regionally spread. It is noteworthy that no individuals of giant clams were observed in the surveyed water of the Saya de Malha Bank during this expedition, while two individuals of *T. rosewateri* were observed on the Nazareth Bank at a depth of about 40 m, which is quite unusual as giant clams prefer shallow waters for their symbiotic zooxanthellae to photosynthesize. The occurrence of *T. rosewateri* in the waters of Nazareth Bank is not improbable. Saya de Malha and Nazareth Banks and St Brandon are dominated by the South Equatorial Current (SEC) (New *et al*., 2013) which may play a role in the connectivity of the marine flora and fauna of the Banks and St Brandon. With this new observation, it can be confirmed that the distribution of this endemic species of giant clam likely covers the entire Mascarene Plateau and not only the Saya de Malha Bank.

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