With Compliments Florence V. Murray

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SOME OBSERVATIONS ON THE EGG CAPSULES AND EMBRYOS OF *TORVAMUREX TERRITUS* (REEVE, 1845)

By FLORENCE V. MURRAY *

With Field Notes by MARGARET H. GOLDSMITH †

Plates 2-4

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SOME OBSERVATIONS ON THE EGG CAPSULES AND EMBRYOS OF *TORVAMUREX TERRITUS* (REEVE, 1845)

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SUMMARY

T. territus was found spawning on the shells of living *Pinna bicolor* at Shoal Point, Queensland. The eggs are laid in vase-shaped capsules from which the young emerge at the crawling stage. A description of the capsules and embryos is given and some field data included.

Genus *TORVAMUREX* Iredale, 1936, *Rec. Aust. Mus.*, 19: 323.

Murex territus Reeve, 1845, *Conch. Icon.*, 3: *Murex* spec. 167 [Publ. Oct. 1845].

= *Murex turritus* Reeve, 1846, *Proc. Zool. Soc. Lond.*, 1845: 108 [Publ. Feb. 1846] ‡.

Introduction: The life histories of several European species of Muricidae have already been described but the only Australian member of this Family whose life history is known is the oyster drill, *Bedeva hanleyi* (Angas, 1867) which deposits eggs in transparent, lens-shaped capsules (Hedley, 1916). The following account concerns a species whose type locality is quoted as Northern Australia and which produces vase-shaped egg capsules.

Account: A specimen of *T. territus* (Nat. Mus. Vict., No. F.23555) together with its egg capsules attached to the valves of a *Pinna bicolor* Gmelin (Plate 2) were received from Mrs. Goldsmith on 25 April, 1963; all had been taken alive at Shoal Point, near Mackay, Queensland, packed in seaweed and despatched by air. On arrival, the eggs were in early cleavage indicating that they had been newly spawned when collected two days previously. Four weeks later Mrs. Goldsmith forwarded three groups of similar capsules on *Pinna* shells, each with the contents at a different stage of development—cleaving eggs, early veligers and advanced shelled embryos. Each group was suspended by its shell substratum in a small aerated sea-water tank maintained at 20°C. Every few days some capsules were detached and cut open to release the contents for observation.

The egg stages advanced to very early veligers in three or four weeks, then developed a purple discolouration and deteriorated. The embryos which had reached the early veliger or later stages in the field prior to collection progressed normally into fully-shelled young but ultimately failed to hatch. Overall it appeared that the normal embryonic period would probably be in the vicinity of three months.

Description: The capsules (Plates 2 and 3) (Nat. Mus. Vict., No. F. 23556) are 5 to 7 mm. high, pale amber-coloured, vase-shaped and attached by a basal flange to the substratum in closely-set, irregular rows. Each has a thin, fibrous outer covering which may be stripped off to expose the underlying middle layer or main wall which is thick, rigid and semi-transparent. A loosely attached membrane lines the interior and

‡ The description of *M. turritus* in this publication is a repetition of that given for *M. territus* in *Conchologia Iconica* which was issued first. As we have no means of knowing what Reeve intended, the earlier publication is regarded as containing the original description and therefore *territus*, the prior name, is accepted.

* 13 Gaynor Court, Malvern, Victoria.

† 21 Grendon St., North Mackay, Queensland.

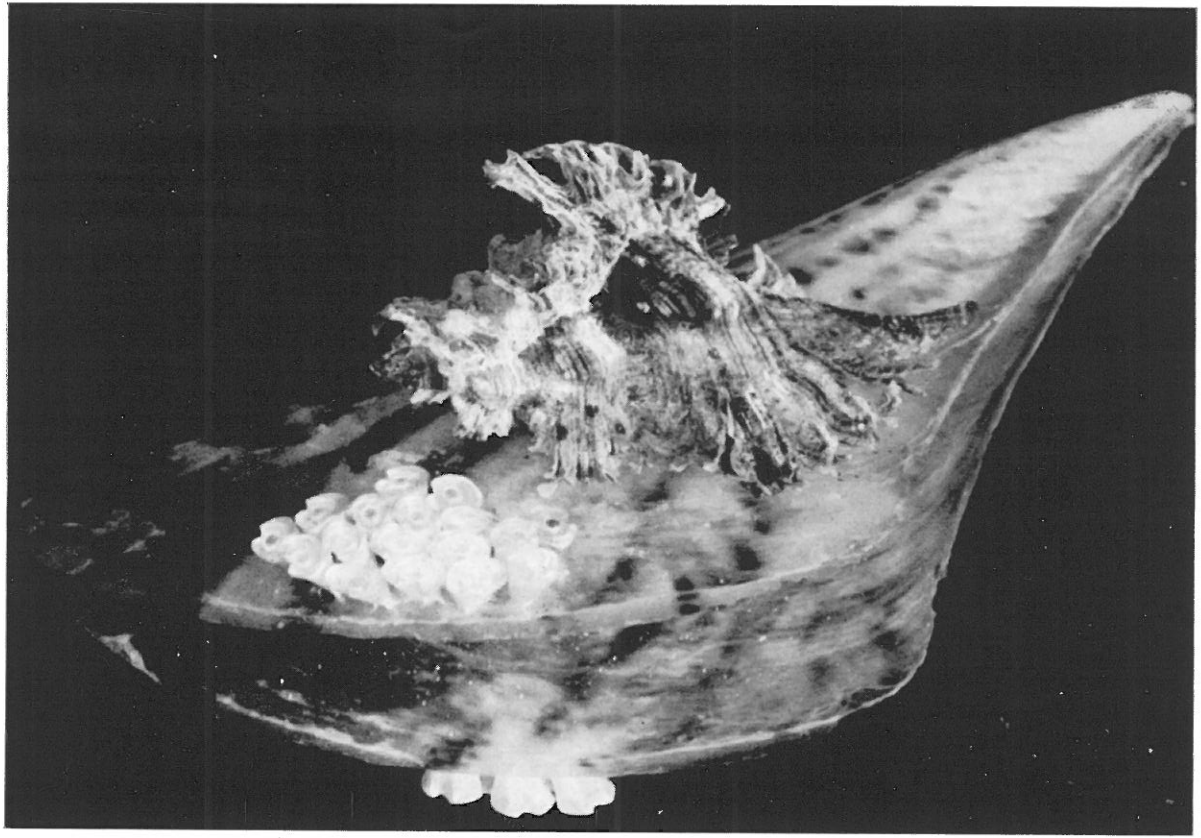

PLATE 2

completely surrounds the contents; it is transparent, iridescent and cellophane-like in quality. In transverse section the capsule is approximately oval. On one side the medial portion of the wall is inflected; at first shallow and narrow, this inflection deepens and widens towards the distal end forming a crescent-shaped indentation in the periphery. The roof of the capsule averages about 5 mm. across the widest part and is slightly depressed below the level of the surrounding walls: it has an orifice or exit hole in the centre, and between this and the rim it is raised into a narrow concentric ridge which merges with the rim at the indentation. A thickening of the middle layer forms a broad, sloping border round the exit hole so that the diameter of the opening is greater at the interior of the capsule than at the exterior where it is 1.2 mm. across and flush with the surface. Filling the opening, between the outside fibrous covering and the inner lining, is a thick, hyaline-like plug which loosens and becomes lost in the hatching process. A suture runs across the roof of the capsule and down each side.

A capsule may contain from 9 to 25 eggs suspended in a viscous material; all usually developed, none serving as nurse eggs. Each is spherical, 0.675 mm. in diameter and covered by a fine vitelline membrane. Early cleavage results in quadrant 4D becoming a large passive yolk cell: subsequent divisions of the micromeres and small macromeres give rise to a blastula which is more or less a solid sphere. A ciliated embryo develops within two weeks and transforms into an early veliger stage during the following two weeks. This larva, which precedes torsion, is elongated and consists of an anterior cephalopedal mass of transparent cells and a posterior visceral hump over which the developing shell extends. The embryonic shell is at first colourless and transparent, but after reaching about one whorl in the post-torsional veliger it becomes straw-coloured and then darkens with growth to a rich brown. Within each capsule, however, several remain a golden shade. After approximately two months the shell consists of about one and a half whorls with a well developed canal, a glazed inner lip and a sculpture of spiral, beaded lines. At this stage the animal is colourless with a large bi-lobed velum, two black eyes at the sides of the tentacles near the base and a foot with paired otocysts and an operculum; it is able to retract well within the shell. During the next few weeks shell growth appears to be static while internal organogenesis proceeds at the expense of the yolk reserves: at the same time the foot increases in volume and the velar lobes degenerate. The embryos at this stage could crawl slightly when removed from the capsule, but although the exit holes became unplugged, none emerged and all gradually died. Their shells (Plate 4) (Nat. Mus. Vict., No. F.23557) averaged 1.55 mm. x 1.2 mm. in length and width: comparison with the protoconch on the apex of the adult indicated that they had completed their embryonic development.

Field Notes (By Margaret H. Goldsmith): At Shoal Point, Queensland, on 23rd April, 1963, the tide fell to a very low level exposing a large expanse of reefs, rocks and sand. At the edge of a reef near the low tide limit, in a sandy patch where the rocks were small and sparse and which was uncovered for about an hour and a half, three specimens

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PLATE 2

Torvamurex territus and its egg capsules attached to the valves of *Pinna bicolor*.

T. territus. Shell: Length 58 mm., width 37 mm., height 38 mm.

P. bicolor. Shell: Length 130 mm., width 53 mm.

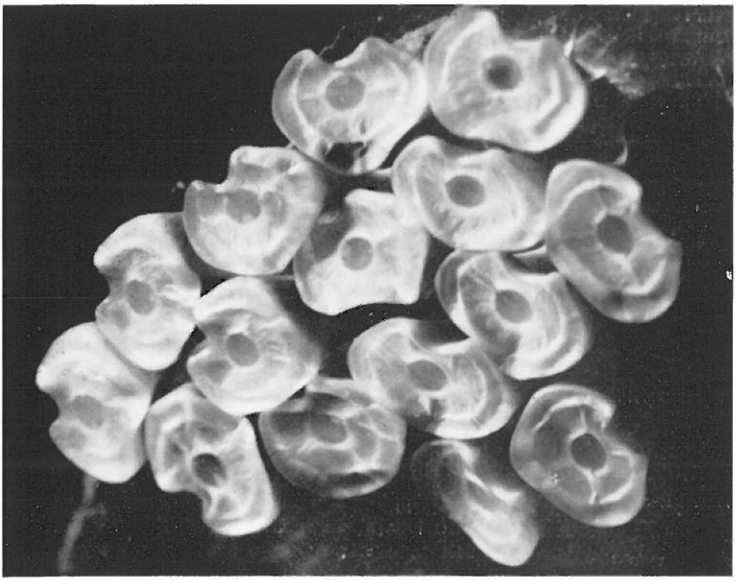

PLATE 3

T. territus: egg capsules, viewed from above. x 4.

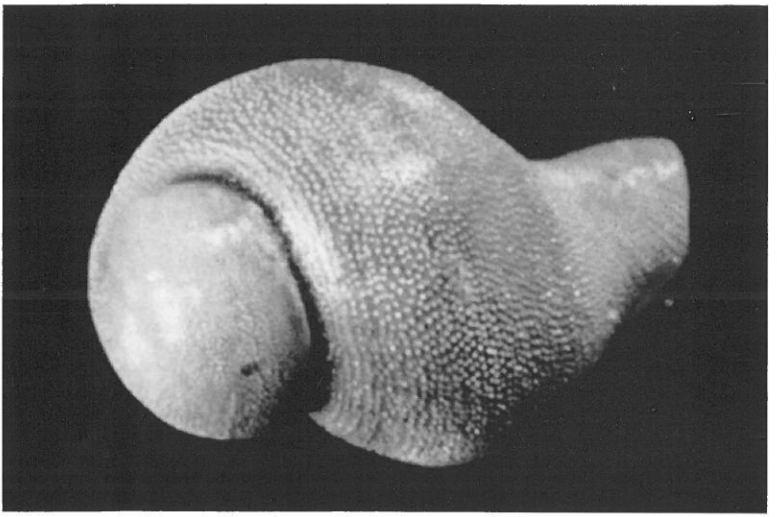

PLATE 4

T. territus: shell of mature embryo. x 55.

of *Torvamurex territus* were found depositing egg capsules on the posterior margins of the valves of live *Pinna bicolor* shells which were in their usual living state—vertically embedded in the sand with only an inch or two of the shell exposed. In each case capsules had been deposited on both right and left valves, but many more on one valve than on the other.

One month later, on 20th May, when the tide was again suitably low, a search of the same area revealed about 20 groups of similar capsules all on *Pinna* shells except two which were on the sides of small rocks. All but one or two of the *Pinna* shells had capsules on both valves; the greatest number noted on any one valve was about 80. Some of the groups appeared darker than the others and contained brown shelled embryos. Only one specimen of *territus* was found depositing eggs on this occasion. The parent shells varied in size, the largest being 58 mm. and the smallest 30 mm. in length.

Over the years I have taken only three or four living specimens of this species in the Shoal Point area, always on sand and not always near rocks. Dead specimens, often in good condition, with hermit crabs are frequently found.

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