TRANSACTIONS
OF THE
ROYAL SOCIETY OF NEW ZEALAND

ZOOLOGY

VOL. 6 NO 7 MARCH 18, 1965.

Additional Specimens of the Giant Heart-urchin *Brissus gigas* Fell, from New Zealand

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[*Received by the Editor, 17 April 1964.*]

Abstract

SEVEN specimens of *Brissus gigas* Fell are recorded from the type locality. The validity of the species is confirmed and a modified diagnosis is given.

INTRODUCTION

THE spatangoid genus *Brissus* has been reported from New Zealand only once previously, on the basis of the type specimen of *Brissus gigas* Fell, 1947. Recently seven additional specimens of this species were taken from the type locality; the first record of the species since the original collection in 1947.

The true identity of the original specimen has been in doubt for some years, and it has been suggested (Mortensen, 1950) that *Brissus gigas* may be identical with the Indo-West Pacific species *Brissus latecarinatus* Leske. The newly discovered specimens of *B. gigas* confirm that the species is very closely related to, but is in fact distinct from, *B. latecarinatus*. The specimens provide additional information on *B. gigas*, and for the first time give some idea of character variation within this species.

MATERIAL

The material upon which this paper is based was collected in the vicinity of Okahu and Waewaetorea islands in the Bay of Islands, New Zealand. Four specimens were taken by skin-divers in shallow water on a sandy ocean floor, and three specimens were discovered cast ashore on sandy beaches. The sea floor specimens consisted of two almost completely intact tests and two fragmented tests. All four tests were completely denuded and in a clean, unencrusted condition, presumably having not been long dead. The specimens found on the foreshore consisted of three intact tests complete with radioles, and peristome and periproct plates.

Published by the Royal Society of New Zealand, c/o Victoria University of Wellington, P.O. Box 196, Wellington.

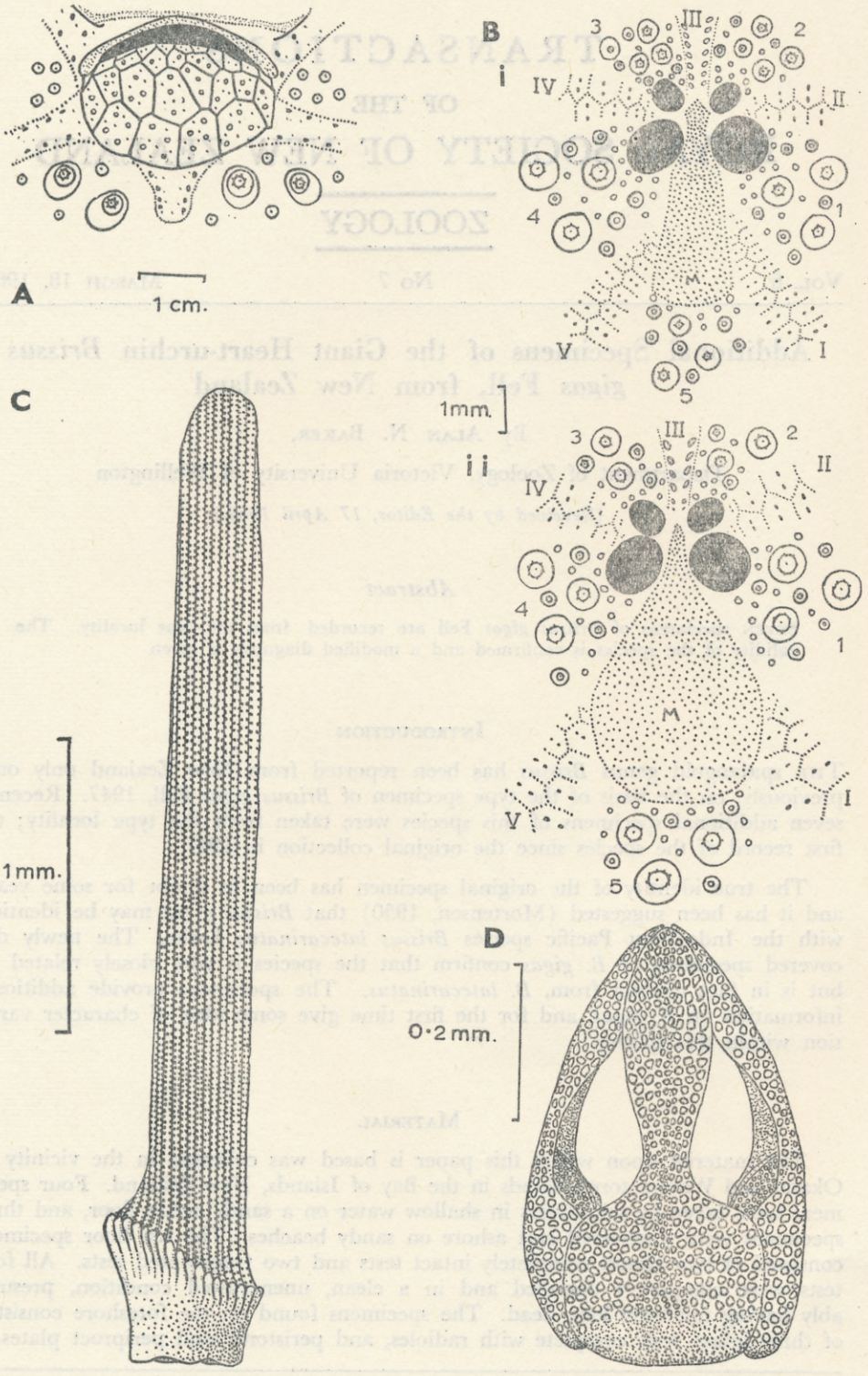


Fig. 1.—*Brissus gigas* Fell. A, Peristome plates; B, Apical region of (i) specimen F, total length of test 140mm, (ii) specimen B, total length 166mm. C, Radiole from adoral region; D, Tridentate pedicellaria from adoral region.

Abbreviations: M., madreporite; I-V, Ambulacral columns; 1-5, Interambulacral columns.

The holotype and the seven new specimens of *Brissus gigas* are all from the same area in the Bay of Islands. Enquiries have elicited that the holotype was found on a shingle beach in Deepwater Cove, Bay of Islands, and not in "deep water" as has been previously stated (Fell, 1947). A survey of the ocean floor in the type locality was made by skin-divers during February of 1964 in search of living specimens of *Brissus gigas*. The area was examined extensively from low tide level to a depth of fifty feet, and although empty tests were found, a living animal was not located.

Possibly *Brissus gigas* has a rather restricted northern distribution in New Zealand. However, with the increasing usage of underwater breathing apparatus as a research tool in coastal waters, further specimens may be found in new localities.

DESCRIPTION

In the present specimens the test is large, wide and inflated, without an anterior notch. A peripetalous fasciole and a sub-anal fasciole are present, but no anal fasciole. Petals are well formed and depressed. The sub-anal plastron is wide and reniform; the sternal plastron is large and possesses a radial arrangement of fine tubercles. Primary tubercles extend within the peripetalous fasciole, and only the primary tubercles are perforate. The highest point of the test is typically situated in interambulacrum 5, where an accentuated hump or keel commonly occurs posterior to the peripetalous fasciole.

In the known specimens of *Brissus gigas* the size range of the peristome is constant and it is not significantly different in shape or relative size from that of *B. latecarinatus*. Thus Mortensen's suggestion that the short peristome of the holotype might be a diagnostic character of the species is not confirmed. The peristome plates are shown in Fig. 1A. The periproct is relatively constant in size.

The pattern of the peripetalous fasciole in interambulacral column 5 varies considerably.

Mortensen also suggested that the broadly elliptical madreporite of the holotype might be a character distinguishing *B. gigas* from *B. latecarinatus*. The present specimens of *B. gigas* exhibit considerable variation in the shape of the madreporite. In smaller specimens the madreporite is more like that of *B. latecarinus*, which is more elongate, oval, and not so broad; but with increase in the size of the test in *B. gigas* the madreporite becomes more broadly elliptical. (Figs. 1 B i and ii). Considering this variability, the author does not regard the shape of the madreporite as a diagnostic feature of *B. gigas*.

All other previously recorded features of the seven recent tests are in accordance with the original description of *Brissus gigas*.

For the first time radioles and pedicellariae were observed in *Brissus gigas*. Radioles are present on three specimens only, and they occur in small patches. They are up to 7.0mm in length and 0.5mm in diameter, and are sculptured with fine longitudinal ridges connected laterally by narrow alternating bars. The radioles of these specimens lack pigmentation (Fig. 1C).

Four types of pedicellariae were observed on those specimens possessing radioles. Large, rostrate, tridentate pedicellariae ranging in size from 0.6mm–1.1mm were common on the tests (Fig. 1D). A small number of ophiocephalous pedicellariae were found on the periproctal areas of the tests. The valves of these

ranged in size from 0.1mm–0.3mm. A third type of tridentate pedicellariae were observed rarely, with long narrow valves and widely serrate edges. The valves measured 0.6mm–0.9mm in length. Small triphyllous pedicellariae were numerous, measuring 0.1mm–0.2mm in length.

These four types of pedicellariae are very similar to, and may be identical with, those found in *Brissus latecarinatus*; the triphyllous type is also similar to a type found in *B. agassizi* Döderlein. Because of the variation in occurrence of the various types of pedicellariae in the genus, the author regards the basing of specific identity on such structures as questionable.

Distinguishing Features

Brissus gigas is undoubtedly very closely related to *Brissus latecarinatus*. However, the material now available of *B. gigas* provides such information that the two species may be distinguished by consideration of the following features:

(a) The obtuse angle formed by the anterior margin of the test in *B. gigas*, as compared with the more semicircular anterior margin in *B. latecarinatus*.

(b) The consistency of the relatively great breadth of the test as compared with *B. latecarinatus*.

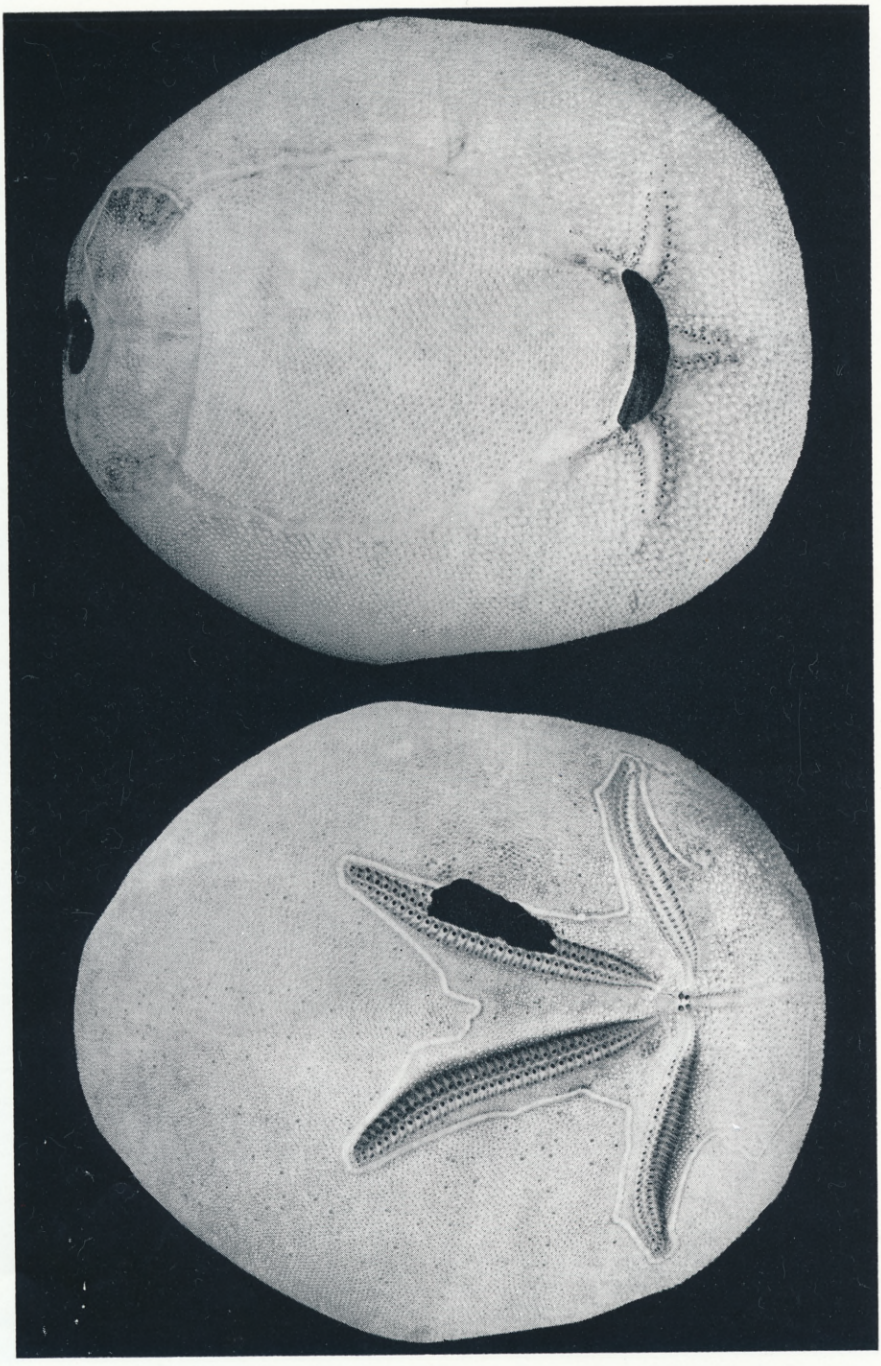
(c) The position of the apical system in *B. gigas* is decidedly more anterior and lower in position on the test than in *B. latecarinatus*.

(d) In *B. gigas* the anterior petals II and IV are curved posteriorly proximally, and anteriorly distally. This feature is particularly constant in the eight known specimens. The anterior petals of *B. latecarinatus* point anteriorly and may have a slight posterior curve distally.

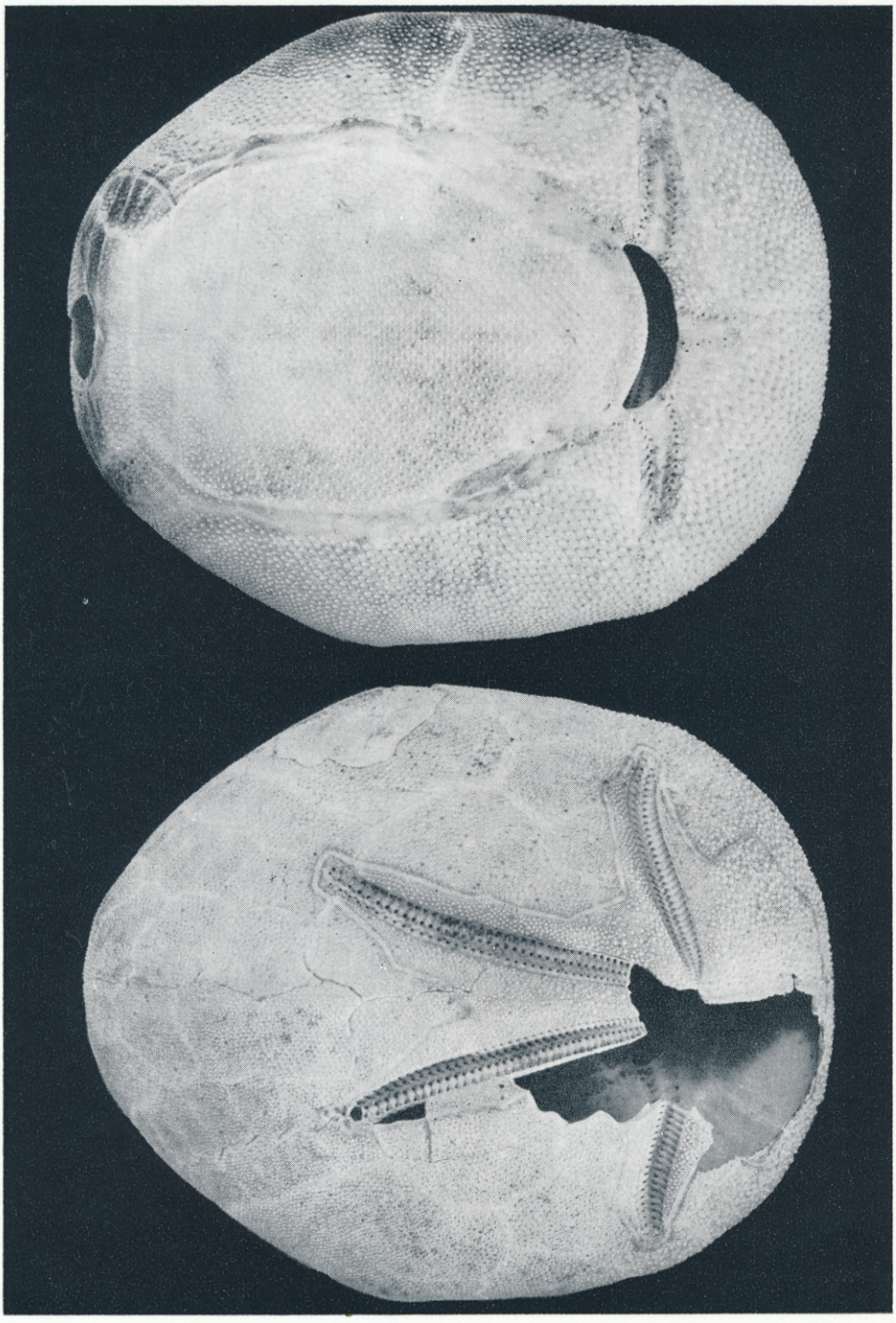
(e) In *B. gigas* the sub-anal plastron is larger in relation to the size of the test than in *B. latecarinatus*.

On the basis of the eight known specimens of *Brissus gigas* it appears that the above-mentioned characters are constant for the species, and the diagnosis may be thus modified to read:

Test very large and inflated, without anterior notch, broadly ovate with great relative breadth, truncate posteriorly. Angle of anterior margin of test obtuse. Apical system and peristome precentral in position; periproct situated on obliquely truncate postero-ventral border of test. Petals I, II, IV and V narrow and deeply sunken, as wide as deep. Petals II and IV curved posteriorly proximally, and anteriorly distally. Ambulacrum III flush with test. Interambulacrum 5 keeled obliquely above, posterior to the peripetalous fasciole, and less markedly so below the subanal fasciole. Primary tubercles extending within the peripetalous fasciole in interambulacra 2 and 3.



Brissus gigas Fell, specimen B, total length 166mm. Lower: Abactinal view of test; Upper, Actinal view of test.



Brissus gigas Fell, specimen C, total length 151mm. Lower: Abactinal view of test. Upper: Actinal view of test.

ACKNOWLEDGMENTS

I am deeply indebted to Mrs C. F. Baker, of Russell, and Mr Don Millar, of Papatoetoe, who kindly provided several specimens for this study from their personal collections. I also wish to thank Dr A. W. B. Powell for allowing the re-examination of the holotype in the Auckland War Memorial Museum, and Miss M. King for permission to examine a specimen held in the Russell Museum.

I am extremely grateful to Professor H. B. Fell, Dr P. M. Ralph, and Dr D. L. Pawson, who gave valuable criticism and advice during the preparation of this paper. My thanks are also due to Mr M. D. King, who took the excellent photographs reproduced here.

REFERENCES

CLARK, H. L., 1917. Hawaiian and Other Pacific Echini, 2. *Mem. Mus. Comp. Zool.*, 46 (2), pp. 217–220.

FELL, H. B., 1947. A Giant Heart-Urchin. *Rec. Auck. Inst. Mus.*, 3, (3), pp. 145–150, Pls. 13–14.

MORTENSEN, TH., 1951. *Monograph of the Echinoidea* (Copenhagen), V, (2), pp. 505–523, Pls. XXXIII, XXXIV, LXII, LXIII.

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