

MORPHOLOGICAL VARIATION IN THE HYDROMEDUSA
CALYCOPSIS BORCHGREVINKI (BROWNE, 1910)
(COELENTERATA, HYDROZOA).

by

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Résumé

La variation morphologique entre 2 syntypes et 35 autres spécimens est marquée et la validité d'un caractère accepté autrefois est discutée.

Introduction

Morphological variation among the species of the little-known hydromedusan family Calycopsidae Fewkes, 1882, has caused taxonomic confusion. The largest genus in the family, *Calycopsis* Fewkes, 1882, is oceanic but has been collected infrequently. The present study of previously unworked material of *Calycopsis borchgrevinki* (Browne, 1910) gives some indication of the value of the morphological characters traditionally used in assessing species limits of calycopsid medusae.

TAXONOMY

CALYCOPSIS BORCHGREVINKI (Browne, 1910)

Sibogita borchgrevinki Browne, 1910: 17, pl. 2, Figs 1-5.

Calycopsis borchgrevinki Vanhöffen, 1911: 215, pl. 22, Fig. 7, text-fig. 10 a-b; Vanhöffen, 1912: 364; Bigelow, 1913: 21; Hartlaub, 1914: 348, 359, fig. 296; Bigelow, 1918: 377; Thiel, 1932: 477; Bigelow, 1940: 293; Kramp, 1957: 20, text-fig. 4; Kramp, 1959: 24, 26, 126, figs 4, 5, 134.

Syntype material examined

3 specimens from Cape Adare, 71°15'S, 170°15'E, surface; BM (NH) registered number, 1911.3.18.5. One male specimen entire (Pl. I),

the second cut in half, the third dissected and the organs sectioned serially by E.T. Browne.

Other material examined

34 specimens collected during the *Discovery* Investigations, 1926-1937, from the Antarctic Ocean so far north as 48°S, depth range 2000-0m; BM(NH) registered numbers, 1957.2.1.731-759 and 1957.10.3.1. One specimen 8-16km offshore from Marion Island, 46°38'S, 38°04'E, (Prince Edward Island Group, S. Indian Ocean), surface, May, 1980; BM(NH) registered number, 1981.7.23.1. Collected by D.G. Miller.

Distribution

All records of *Calycopsis borchgrevinki* are from the Antarctic Ocean (Browne, 1910; Vanhöffen, 1912; Kramp, 1957; Uchida, 1971).

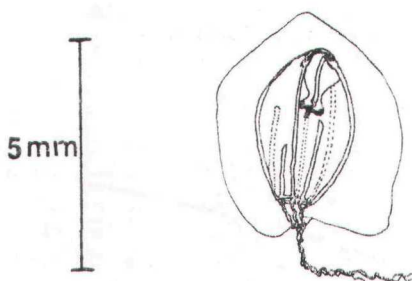
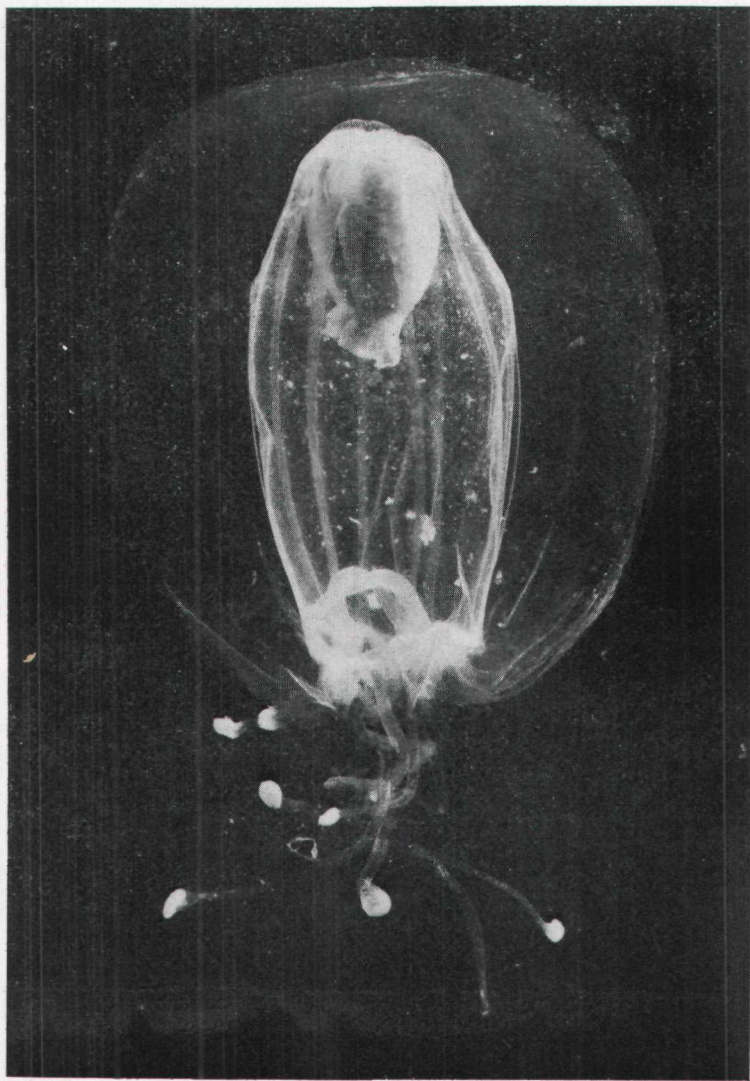


FIG. 1.
Juvenile specimen with pointed apex.

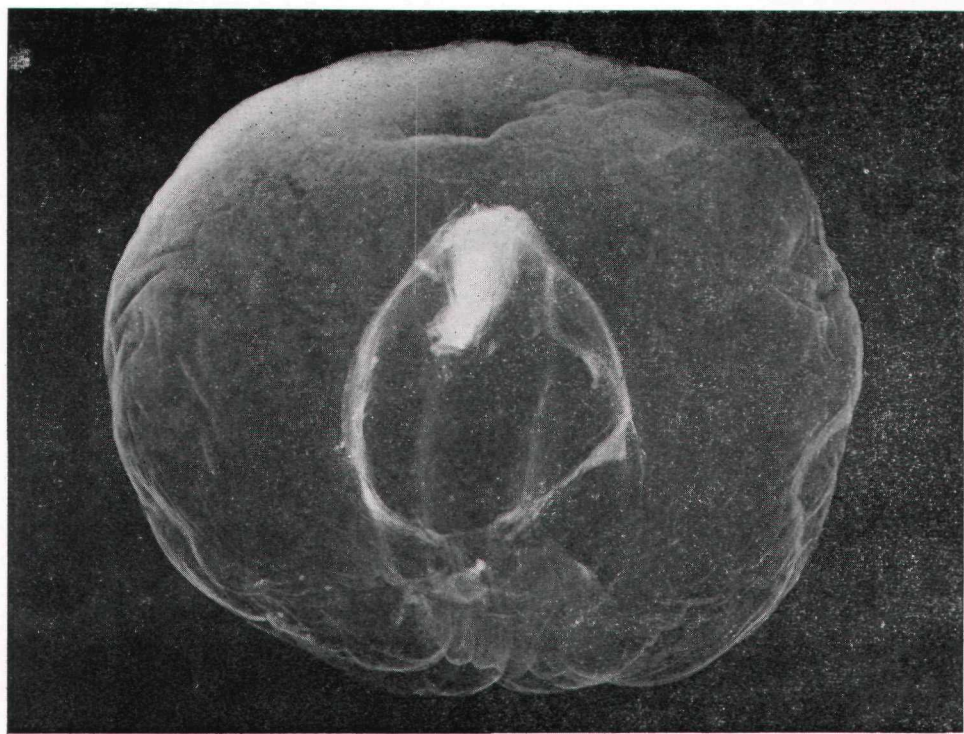
DEFINITION

Medusa stage: exumbrella subspherical, slightly longer than broad, 18mm-20mm X 15mm-18mm; jelly firm, transparent. Velum narrow, c. 1/20 bell diameter. Stomach c. 1/3 height of subumbrellar cavity with 4 superficial radial canals running longitudinally and tapering inwards proximally. Mouth cruciform with lips, in some specimens, folded into 4-8 lobes. Four perradial canals and four centripetal canals, the latter situated interradially, extending upwards from ring canal towards stomach. Gonads of either sex embedded in stomach wall sacs and opening into subumbrellar cavity. Tentacles normally 8-16, hollow capitate, 3mm-50mm in length. Nematocysts confined to tentacular capitula, 35,000-40,000 nematocysts per capitulum in material examined. Comprising homotrichous microbasic euryteles (10.5µm-11.5µm X 5.0µm-6.0µm) and desmonemes (7.5µm X 3.75µm-4.05µm). Desmonemes about half as numerous as euryteles. Hydroid stage: unknown.

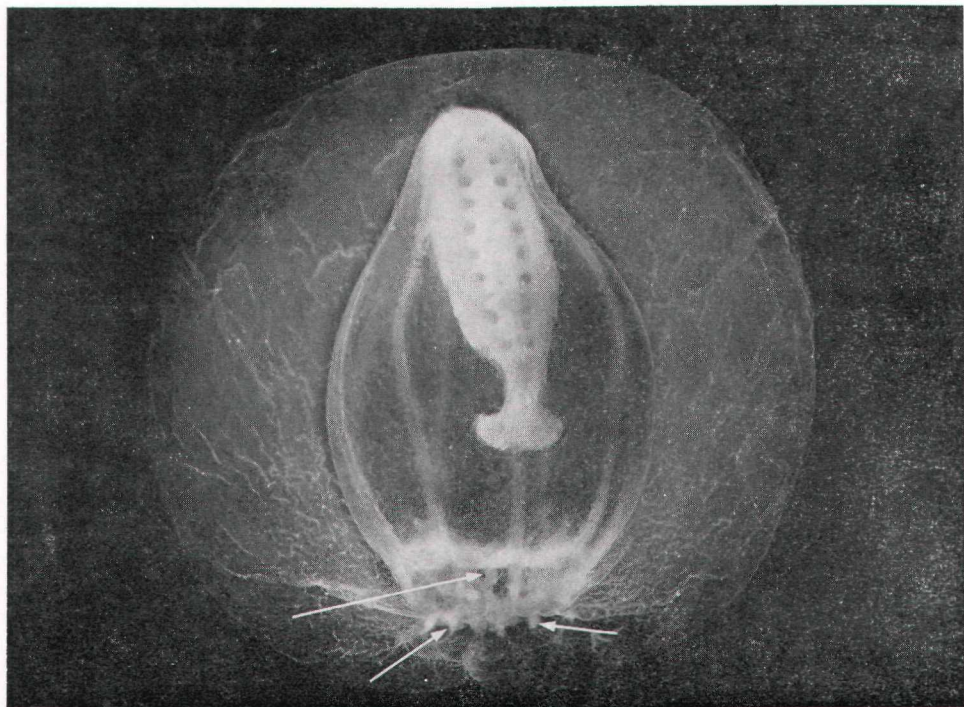


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PLATE I.
Syntype specimen of *Calycopsis borchgrevinki*.



A
5 mm



B

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PLATE II.

A.—Marion Island specimen showing apical depression, reduced manubrium and canal system, lacking tentacles.

B.—Female specimen, with larger genital pits and longer manubrium. No complete tentacles, but regenerating buds present (arrowed).

Variation observed in morphology

Apical depression. Present in only one specimen (from Marion Island) of the 37 examined. An invaginated apex was regarded by Petersen (1957) and Kramp (1959) as diagnostic of the species *Calycopsis typa* Fewkes, 1882, although Fewkes's rather crudely drawn figure of the

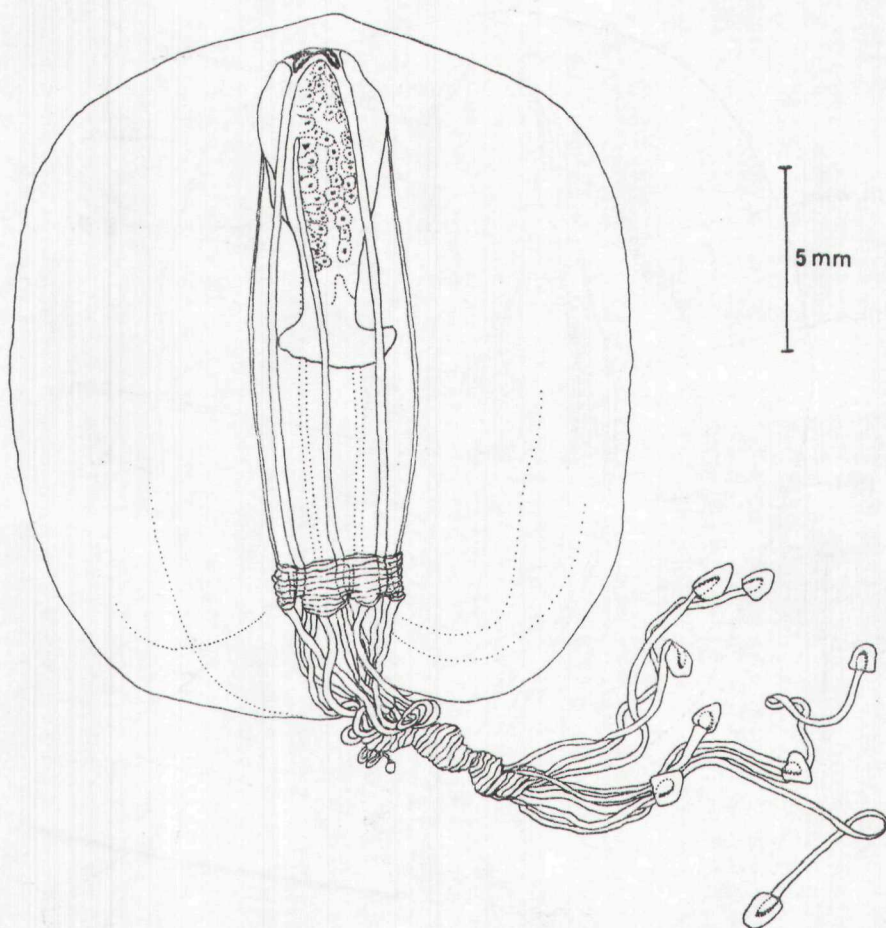


FIG. 2.

Mature female specimen with ring canal drawn up into bell and folded giving the misleading appearance of branching.

type specimen shows no sign of a depression and neither does the finely produced figure in Vanhoffen (1911, pl. 22, no. 6). A live specimen of *C. typa* showing the apical depression is well illustrated in George and George (1979, pl. 12, no. 3). The variation recorded here in *C. borchgrevinki* (Pl. IIA) suggests that the apical depression is common in the genus. The depression is likely to be formed after the medusa has been released from its hydroid stage. This theory is strongly supported by Mills and Rees (1979) who noted "umbilical canals" in the first stage of the calycopsid medusa *Bythotiara stilbosa*

(newly described). Unfortunately the hydroid stage of this medusa was not found so that precise observation of the developing medusa was not possible. Mills and Rees found that the "umbilical canals usually disappeared after a few hours" suggesting that apical depressions were sometimes formed.

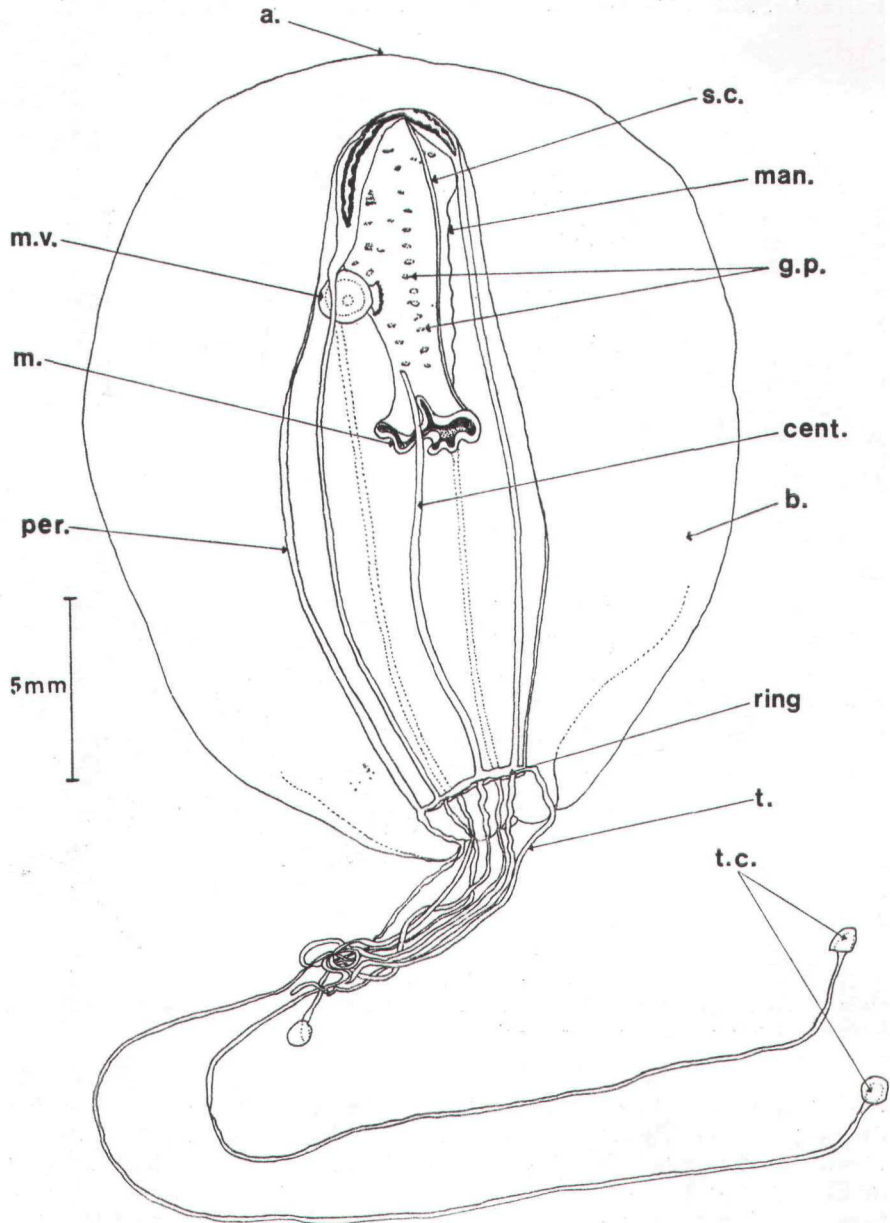


FIG. 3.

Male specimen with manubrial vesicle.

Ket—a=apex; s.c.=stomach canal; man.=manubrium; g.p.=genital pist; m.v.=manubrial vesicle; per.=periradial canal; m.=mouth; cent.=central canal; b.=bell; ring=ring canal; t.=tentacle; t.c.=tentacle capitula.

The hydroid stage of only one species of calycopsid has so far been recorded (Brinckmann-Voss, 1979). The cryptic habit of the hydroid stage of *Bythotiara huntsmani* (Fraser, 1911), in the prebranchial cavity of a species of ascidian, may be a partial explanation of why no other calycopsid hydroid has been discovered.

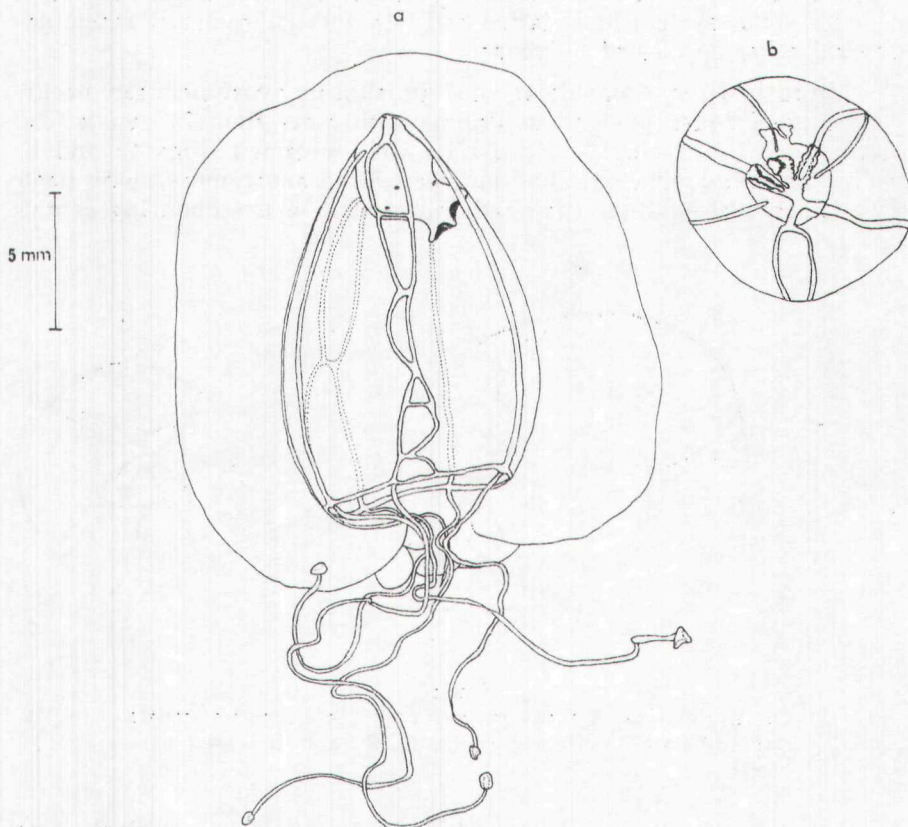


FIG. 4.

- a; Male specimen with branching and anastomosing canals.
b; Apical view of same specimen.

Bell shape. The bell is normally subspherical (see definition), but was more pointed than usual in several juvenile or sub-adult specimens (Figs 1 and 2). A sample of 29 intact specimens with a bell height range of 8.7mm to 21.0mm show that height was not correlated with breadth and that the bell dimension ratio scarcely changed during growth. (Other specimens were not examined since they were damaged.)

Manubrium. Browne (1910) noted a seven-lipped mouth in one of the syntype series and a fifth stomach canal situated interradially. Neither of these abnormalities was noted in the specimens examined, but a spherical growth protruded from a genital pit in one specimen (Fig. 3). Such growths have not been reported previously in *Calycopsis* but the type figure of *C. chuni* Vanhoeffen, 1911 (Fig. 22, 8) shows a

proximally-bifurcated genital ridge on the stomach forming an additional lobe.

Perradial canals. The radial canal system of *C. borchgrevinki* is characteristically elongate spanning three-quarters of the bell height (Figs 2, 3). The Marion Island specimen is exceptional, having a shorter canal system and flatter bell. In this character it resembles several other species of *Calycopsis*.

Branched radial canals are not unusual in hydromedusae, occurring more frequently in those groups with more than 20 canals (e.g. Aequoreidae, Russell, 1953, p. 357). One specimen (Figs 4a and b) showed a radial canal that had bifurcated and anastomosed with itself five times, also another that had joined with a neighbouring centri-

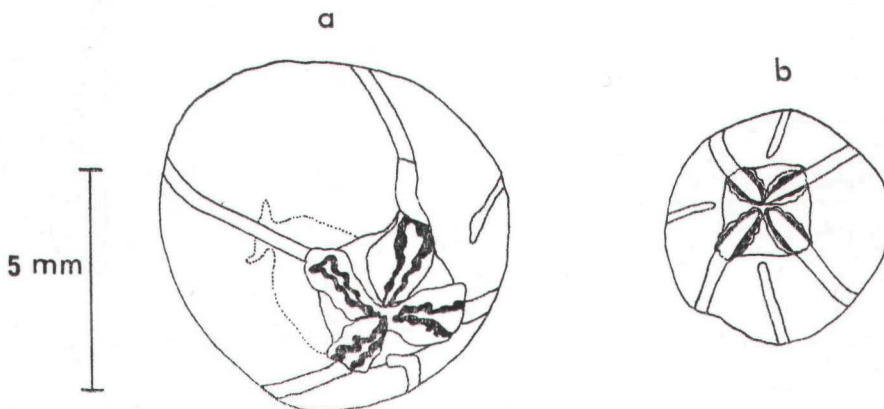


FIG. 5.

a; Apical view of specimen with only two centripetal canals,
b; Apical view of specimen with only three centripetal canals.

petal canal. Kramp (1924) reported similar variation in *Bythotiarra murrayi* Günther, 1903. Fagetti (1973) noted the same in a *Calycopsis* sp. (labelled erroneously as *Bougainvillia fulva*, due to a printing error).

Number of canals. In *Calycopsis* there is normally one centripetal canal situated interradially in each of the quadrants formed by the radial canals. Browne (1910) noted an extra centripetal canal in one quadrant of the syntype specimen which he dissected. The present material included a specimen having only two centripetal canals in all (Fig. 5a) and two further specimens with three (Fig. 5b, PL IIA).

Tentacle number. The lumen of each tentacle in *Calycopsis* is continuous with the ring canal to which it joins at the base of each radial and centripetal canal. The number of tentacles sometimes exceeds the number of canals, the remaining tentacles being joined adradially to the ring canal.

Kramp (1959) noted 8-16 tentacles in *Calycopsis borchgrevinki*. The tentacles of the present material ranged from 0-16 in number,

twelve specimens having tentacles that had been broken off some time before collection. These tentacles had been partly or completely removed from their point of attachment below the ring canal and were being replaced by small buds suggesting regeneration following loss (Pl. IIB). There was no evidence to support any theory explaining how the tentacles might have been removed. The tentacles of **two**

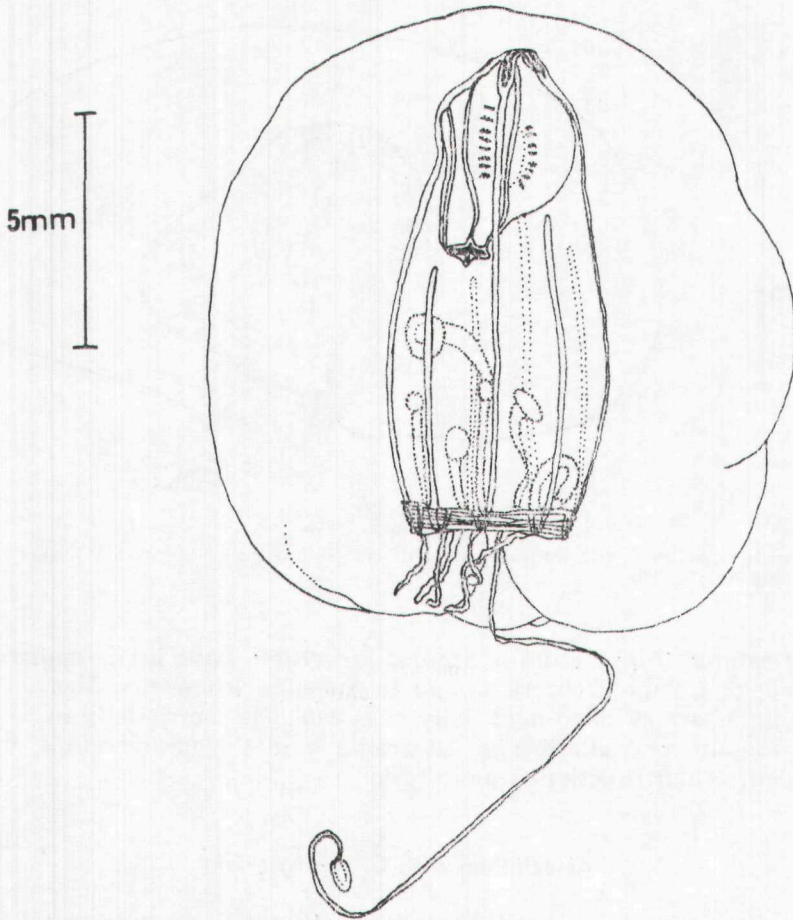


FIG. 6.

Sub-adult specimen with many tentacles retracted into bell.

Since many other tentacles are damaged, it is possible that the medusa retracted its tentacles during collection.

further specimens were damaged but, since there were no regenerating buds, they were probably damaged during collection (Figs 6, 7). The histogram (Fig. 8) shows the possible number of tentacles in each of the specimens examined. The peaks indicate that the most frequently occurring numbers of tentacles in the sample were 8, 10 and 12, decreasing to 16, mainly multiples of 4; 9 being an overspill between the peaks of 8 and 10. There were so few odd-numbered counts that they seemed adventitious. The result corroborates Kramp's observation

that the number of tentacles varies between 8 and 16, but normally equals the number of canals.

Proximal tentacle bulbs. Browne (1910) reported 'slight enlargements' of the canal junctions near the tentacle bases, which were just noticeable in the syntype specimen which Browne cut into two halves. A more distinct series of bulbs was noted in a specimen from the *Disco-*

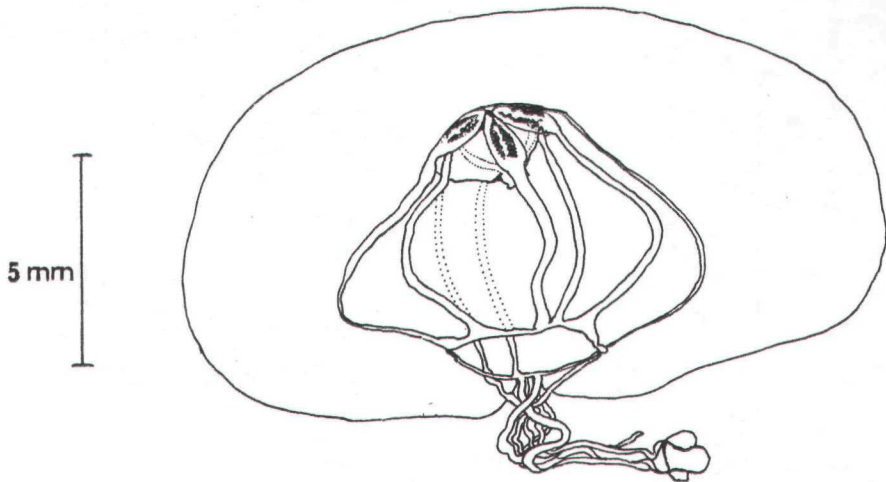


FIG. 7.

Flattened specimen with radial canals distorted during fixation. Six tentacles on one side only.

very sample (Figs 9a, 9b). Similar structures have been reported in *C. bigelowi* Vanhöffen, 1911, and in *Sibogita geometrica* Maas, 1905. The bulbs are situated adradially in *C. bigelowi*, perradially in *S. geometrica* and perradially and interr radially in *C. borchgrevinki*, when present. Their function is unknown.

Associations with *C. borchgrevinki*

Specimens of a parasitic amphipod, *Hyperia* sp., and several free-living calanoid copepods, including a species of *Rhincalanus* Dana, were found in the subumbrellar cavity of several specimens (Fig. 10). A single hyperian was found in the subumbrellar cavity of the Marion Island specimen. The presence of the copepods is noteworthy since they have not yet been recorded as having any association with medusae. They could not be considered as food: none of them showed any sign of having been digested nor was any found inside the mouth or stomach.

Systematic position of *C. borchgrevinki*

Browne (1910) described the species *borchgrevinki* and followed Bigelow (1909) in referring it to the genus *Sibogita* Maas, 1905, rather

than to the earlier-proposed genus *Calycopsis* Fewkes, 1882. Fewkes's description of *Calycopsis* was brief but the genus was re-defined in greater detail by Vanhöffen (1911) who referred *S. borchgrevinki* Browne, 1910, to *Calycopsis*. In his description Browne compared *S. borchgrevinki* with *S. nauarchus* Bigelow, 1909. He added that the specimens of *borchgrevinki* lacked an apical depression, a character on which Bigelow had (partly, proposed the species *nauarchus*. Bige-

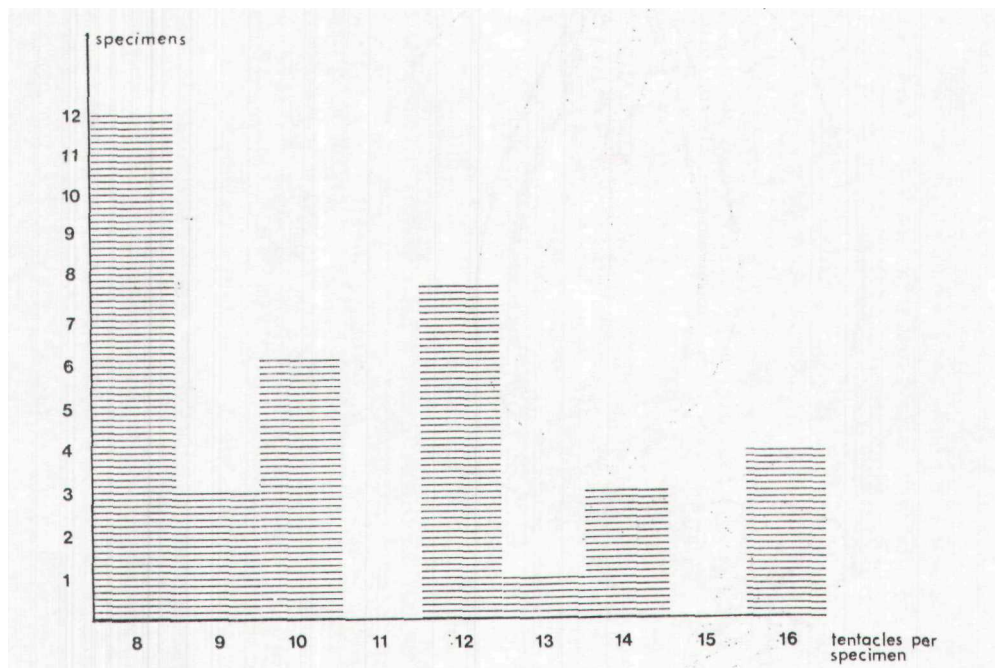


FIG. 8.

Histogram showing range of tentacle numbers, including damaged and regenerating tentacles, in sample of 37 specimens.

low did not recognise the newly-proposed species *nauarchus* as belonging to *Calycopsis* until he referred all the species of *Sibogita* to *Calycopsis* (Bigelow, 1918) by which time *nauarchus* had been referred to *C. typa*. The confusion between the two genera was eventually resolved by Kramp (1957) who referred nearly all species of *Sibogita* to *Calycopsis*. The type species, *geometrica* Maas, 1905, was retained in *Sibogita*, separated from *Calycopsis* by the regular fusing of the radial and centripetal canals.

CONCLUSIONS

Calycopsis borchgrevinki has proved to be a useful subject for the study of morphological variations in hydromedusae. Seven variations were recorded in the present material and three others were

noted in literature. A species character, the apical depression, that was a previously accepted species character of *C. tupa*, has been found to be invalid.

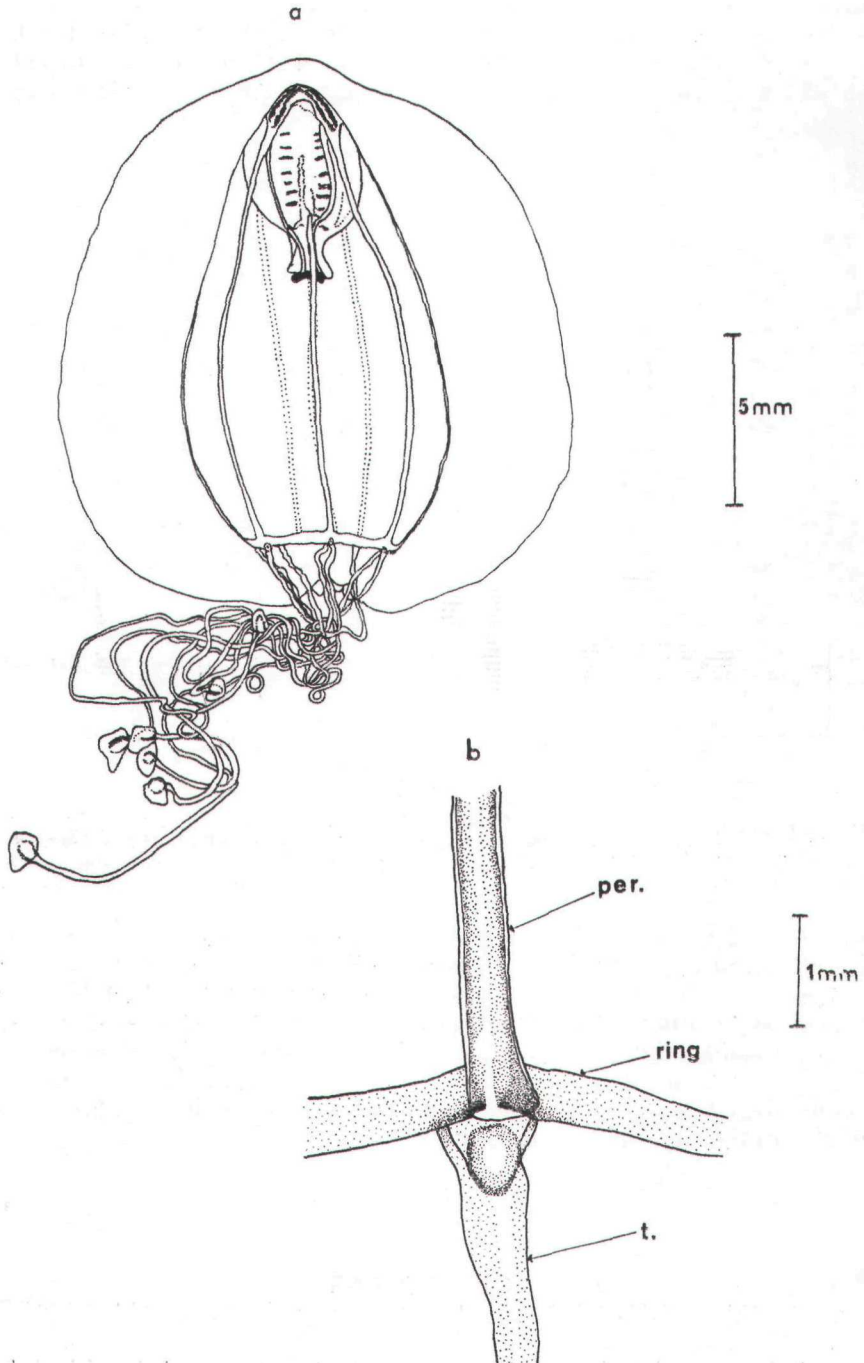


FIG. 9.

a; Male specimen with tentacle bulbs on lower edge of ring canal,
b; Tentacle bulb showing its relation to the radial and ring canals.

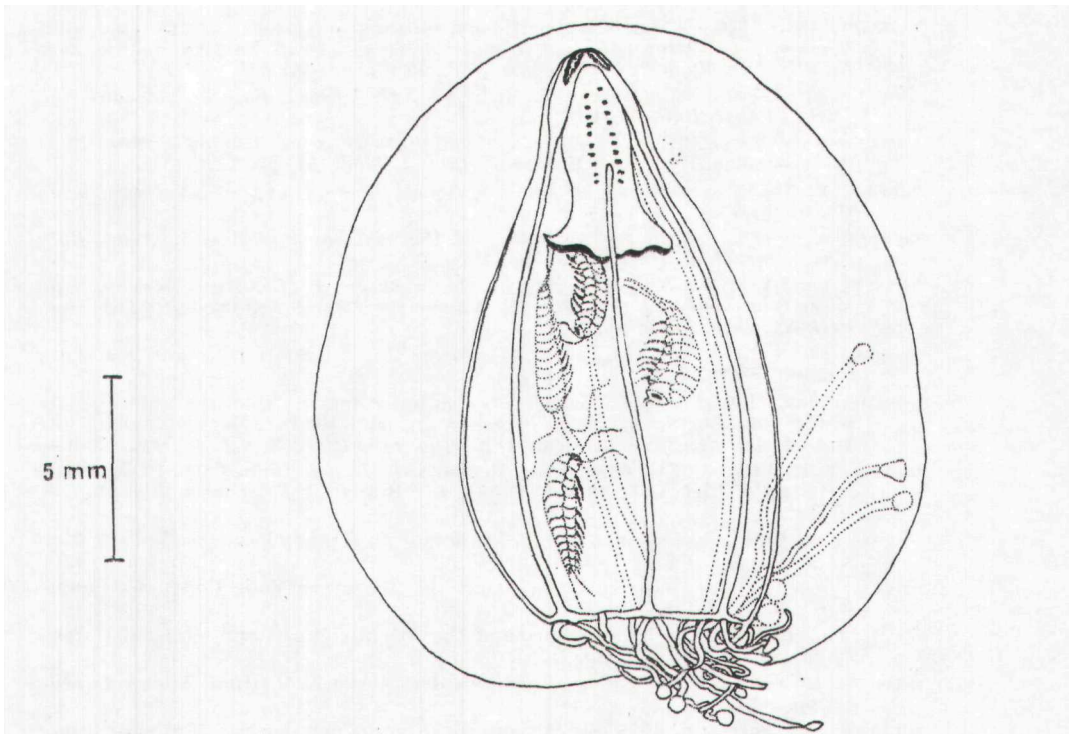


FIG. 10.

Male specimen with 16 tentacles, some retracted into bell. Specimens of *Hesperia* and *Rhincalanus* present.

Acknowledgements

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Summary

Morphological variation in 2 syntypes and 35 other specimens is recorded and the validity of a previously accepted taxonomic character is discussed in the genus *Calycopsis*.

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