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A new record of *Craspedacusta sowerbii* (Cnidaria: Limnomedusae) from southern Africa

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The northern hemisphere *Craspedacusta sowerbii* has been recorded recently from temperate regions of South Africa. Its introduction to southern Africa is thought to have occurred in the 1940s, when a number of exotic species were introduced, associated with man's interference in river catchments. A new record from Theewaterskloof Dam, Cape Province, suggests that its spread is being facilitated by inter-basin translocation of the polyp stage. Histological analysis of the gonads of medusae from Theewaterskloof impoundment showed that they were all females, supporting the hypothesis that only one sex of medusa is budded from any one polyp colony.

Die noordelike halfmond *Craspedacusta sowerbii* is onlangs in gematigde streke van Suid-Afrika aangemeld. Hulle invoering in suidelike Afrika het moontlik in die 1940s plaasgevind, waartydens 'n aantal uitheemse spesies, as gevolg van die mens se inmenging in rivier-opvanggebiede, ingebring is. Nuwe inligting vanaf die Theewaterskloof Dam, Kaaprovinsie, dui aan dat hul verspreiding deur die hervestiging van die poliep stadium tussen stroomgebiede vergemaklik word. Histologiese ontleding van die gonades van medusas vanuit die Theewaterskloof opvanggebied het getoon dat almal wyfies was, wat die hipotese ondersteun dat slegs medusas van een geslag van enige enkele poliepkolonie afknop.

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Craspedacusta sowerbii is a limnomedusa which is well known from the Northern Hemisphere with many records of its distribution from Europe, North America and China

(Dejdar 1934; Kramp 1961). Rayner (1988) recorded it for the first time in Africa, although re-examination of earlier records from southern Africa attributed to *Limnocnida tanganjicae* has shown that some were in fact, *C. sowerbii*. Rayner & Appleton (1989), in providing additional records of *C. sowerbii*, elucidated the morphological differences between it and *L. tanganjicae*. Distributional data indicate that *L. tanganjicae* is a tropical species endemic to Africa and extending south to the Vaal River catchment, and *C. sowerbii* a temperate species which is invasive in South Africa. This present contribution assesses the significance of a new record of *C. sowerbii* from Theewaterskloof Dam, an impoundment in the Cape Province of South Africa, and inter-basin transfers. The appearance of freshwater medusae is known to be sporadic and unpredictable and dispersal appears to be limited by the fact that each colony of polyps probably buds off medusae of one sex only (Payne 1926).

Theewaterskloof (34°05'S / 19°18'E; altitude 276 m; dam wall on the Riviersonderend River completed in 1980) (Figure 1) is the seventh largest impoundment in South Africa with a catchment area of 497 km², a surface area at full supply level of 5082 ha, volume 433 × 10⁶ m³ at FSL, maximum and minimum depths 32,4 m and 17,0 m, and is used for potable water and recreation, mainly angling, yachting and power boating (Anon. 1986). A tower within the impoundment, some 13 km from the dam wall, houses the inlet to and outlet from a tunnel system which links the dam with the Berg and Eerste Rivers. This system thus forms part of an extensive water supply scheme designed to transfer water to and from the impoundment as well as to and from different catchments separated from one another by mountains. Water runoff from the Riviersonderend and nearby Berg River catchments is stored in the Theewaterskloof reservoir during the winter rainy season and in the dry summer season can be transferred back to the Eerste and Berg River Valleys by means of the tunnels, for irrigation purposes. The tunnels allow water to flow in both directions between the impoundment and the Berg River catchment. Following the appraisal of the ecological impact of inter-

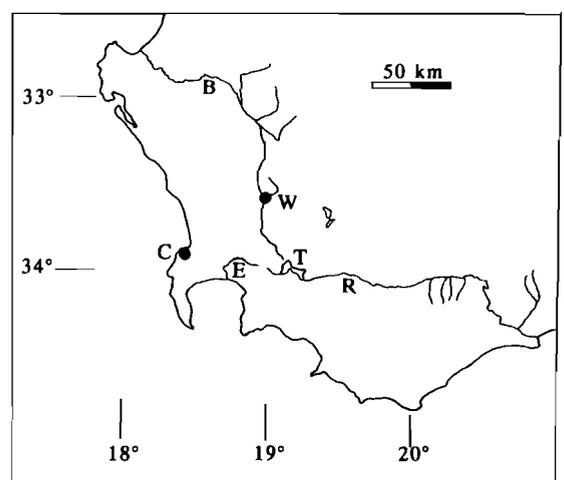


Figure 1 Map of Western Cape Province showing location of Theewaterskloof impoundment (T), the town of Wellington (W), Cape Town (C), and the rivers referred to in the text, Berg (B), Eerste (E) and Riviersonderend (R).

basin transfers in southern Africa by Pettijean & Davies (1988), Rayner & Appleton (1989) identified the existing Riviersonderend-Berg River Project (an inter-basin transfer with donor rivers, the Riviersonderend, Berg and Eerste) as presenting a potential route for the further spread of *C. sowerbii*.

Eighteen specimens of *Craspedacusta sowerbii* from a single collection in 1990 from Theewaterskloof impoundment, Cape Province, were supplied by Mr A.H. Coetzer (Department of Nature and Environmental Conservation, Cape Province). Following his notes, 'The medusae were plentiful on the western side of the Grabow-Villiersdorp Road bridge (34°01'S / 19°10'E), with a few medusae floating 25–30 cm below the surface on the eastern side of the bridge. The water was shallow with a boat-launching jetty nearby'. Mr Coetzer further reported that during the same period, unidentified medusae were noted in the Driehoeks River, a tributary of the Olifants River which rises just North East of the Berg River headwaters. The range of bell diameter of the 18 medusae is illustrated in Figure 2 and details of gonads and developing ova in Figures 3 & 4. The location of the gonads emphasizes an important difference between *C. sowerbii* and *Limnocnida tanganjicae*. The gonads of *C. sowerbii* are suspended from ectoderm below the four radial canals on the sub-umbrella surface (see Figure 3), whereas in *L. tanganjicae* the gonads form a ring around the mouth (Rayner & Appleton 1989).

It is our contention that *C. sowerbii* originated in the Northern Hemisphere from where it has been introduced to South Africa and that its dispersal is being facilitated by human interference (aquatic sports, inter-basin transfers) with rivers and their catchments. The only other record of *Craspedacusta sowerbii* from the Cape Province was from the Wellington Road bridge, Berg River (33°35'S/19°01'E) (Figure 1) collected in 1953 (Harrison & Elsworth 1958) and identified by Rayner & Appleton (1989). The occurrence of *C. sowerbii* in Theewaterskloof is not unexpected, as the impoundment is closely linked to the Berg River (Wellington) locality, where *C. sowerbii* was first collected

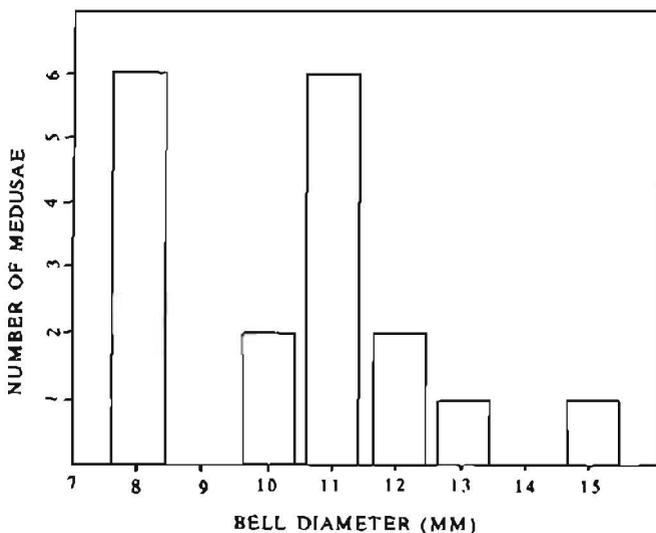


Figure 2 Bell diameter of 18 specimens of *C. sowerbii* collected in a single sampling from Theewaterskloof impoundment in 1990.

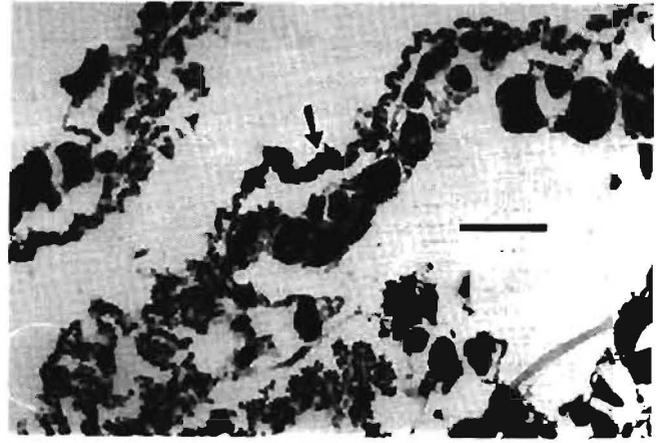


Figure 3 Transverse section through sub-umbrellar surface of *C. sowerbii*, showing ectodermal origin of ova on the gonad. Arrow indicates germinal epithelium. Bar = 0,1 mm.

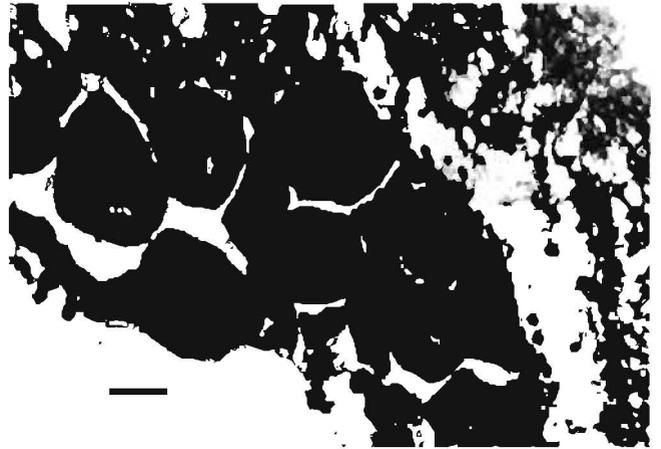


Figure 4 Developing ova on external surface of gonad. Bar = 25 µm.

in 1953 (Figure 1). In the 1930s and 1940s, there seem to have been a number of introductions of alien aquatic species to South Africa, almost certainly including *C. sowerbii*. Allowing for a lag period between introduction and first record, two exotic gastropods were probably introduced during this period, *Lymnaea columella* from Somerset West, Cape, in 1942 (Brown 1980) and *Physa acuta* from Pietermaritzburg, Natal in 1953 (K. N. de Kock, 1989, pers. comm.) as well as several species of 'sport' fish and the mallard duck (de Moor & Bruton 1988). With the constant demands for potable water and recreational facilities for aquatic sports and fishing, man has created an ideal mechanism for the spread of aquatic invasives. *Craspedacusta sowerbii* can be readily transported in its polyp stage, even in a desiccated form. Payne (1926) noted that the hydroid gives rise to planula-like buds, which when detached, develop into new hydroids. The sporadic appearance of medusae may be related to the fact that hydroids do not always produce medusae. Payne (1926) considered the hydroid to be quite widely distributed and that it gave rise to medusae only under favourable conditions. Although medusae can be transported by rivers or inter-basin tunnels, the medusae of

C. sowerbii, unlike the polyps, do not live long when transferred into different water bodies (Payne 1926). The major restriction to dispersal of this species appears to be the fact that it is thought that each polyp produces medusae of only one sex (Payne 1924, 1926). Histological analysis of six of the Theewaterskloof medusae as well as macroscopic examination of the remaining 12, showed that although there were two age classes (Figure 2), all medusae were females (Figure 4). Payne (1926) experimentally completed the life cycle of *C. sowerbii* by obtaining medusae from two different localities. The only locality where male and female medusae were found together was the Kentucky River.

In conclusion, from the initial focus of introduction, *C. sowerbii* is slowly expanding its range in the Western Cape Province, probably by translocation of the polyp on structures associated with recreation, or in vegetation. The significance of the spread of *C. sowerbii* by inter-basin transfers and reverse flow of rivers via tunnels, may become apparent on collection of additional data.

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