The Occurrence of the Freshwater Medusa *Craspedacusta sowerbyi* Lankester in Spicer Lake, Saint Joseph County, Indiana

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Introduction

Craspedacusta sowerbyi Lankester (Hydrozoa: Limnomedusae) is a freshwater jellyfish first reported in England from 1880 (5). It probably has an oriental origin (2). Many authors have reported its occurrence in the United States, with most reports centered in the northeastern quarter of the United States (east of the Rocky Mountains and South of the 43rd parallel) (reviewed in 1,2,7 and 8). Particular Indiana sitings were reviewed by Lytle (6). Only a few of these sitings were in natural bodies of water: Elkhart County (Heaton Lake, 1951; Boss Lake-Crandall's Pond, 1918-24), Noble County (Diamond Lake, 1-52), Kosciusko County (Syracuse Lake, late 1920's, early 1930's; Winona Lake, late 1920's, early 1930's), and Marshall County (Myers Lake, 1952-55, 1957). The remainder were in reservoirs, gravel pits, limestone quarries, or other artificial impoundments.

Of the total of 17 Indiana records, six have been in artificial lakes, six in quarries or gravel pits, while only five have been reported from natural lakes (6). In reviewing North American reports for the medusa relatively few are from natural lakes (1,7).

While collecting plankton in Spicer Lake in June, 1983 I first noted the appearance of the *Craspedacusta* medusa. Spicer Lake is a 2 hectare kettle lake with a maximun depth of 6.1 m located in northwestern Saint Joseph County, Indiana (3). The lake is bordered by a uniform floating mat of vegetation, 4 to 8 m wide, that consists primarily of the yellow pond lily *Nuphar advena* and swamp loosetrife *Decodon verticillatus* var laevigatus, with spotty distributions of dodder, *Cuscuta gronovii*, bladderwort, *Utricularia*, and hornwort *Ceratophyllum demersum* in the mat.

This paper reports on weekly collections made during June, July and August, 1983 to determine the concentration of the medusa present in Spicer Lake. Additional information on water chemistry and plankton are also reported to provide possibly useful information on the conditions that support the jellyfish population in Spicer Lake.

Material and Methods

Medusae were collected by a gentle vertical tow with a No. 20 plankton net along the floating mat of the lake at weekly intervals from June 13 to August 26, 1983. All samples were collected between 0900-1200 hours. Samples of the floating mat were also collected in an attempt to locate polyp stages of *Craspedacusta*. Water samples were collected for physical and chemical analysis using an alpha water sampler. The temperature, dissolved oxygen, and pH of these water samples were determined using standard methods (9).

Results and Discussion

Medusae were only collected on June 13, June 20, June 28, July 12, and July 18. No medusae could be located on July 6, July 26, August 2, 10, 17, or 26. Concentrations were estimated at between 1-3 medusae/m^3 in all of these collections. Higher

concentrations, noted on each of the above dates, were found on the inshore bottoms where medusae lay, pulsing slowly, in patches of the filamentous algae *Spirogyra* and detritus. Repeated samplings showed no medusae present in Spicer Lake in early or late July or during the month of August.

Examination of 616 of the medusae showed that 603 were female while 13 (including a few from each sampling date) were male. Almost all field reports indicating sex have indicated that the male and female medusae are rarely reported together (1,7). Lytle (7) and Acker and Muscat (1) noted only three and two reports, respectively, of the cooccurrence of male and female medusae in the United States.

The polyp of *Craspedacusta* is microscopic, sessile and difficult to collect. Despite repeated collection of available substrates at Spicer Lake no polyps could be found. Their presence is almost certain, since they must precede the medusae in the life cycle of *Craspedacusta*. Since the polyp will not grow where there is heavy sedimentation or on surfaces with heavy growths of algae (1) this may explain the difficulty in detecting them in Spicer Lake. A large growth of *Spirogyra* and *Oscillatoria* was present on most surfaces throughout the sampling period.

The medusa has been known to be planktivorous for a number of years (1,4). Medusa stomach contents indicated that they were feeding on the zooplankton roughly in proportion to their abundance in Spicer Lake. The plankton (and hence the medusae gut contents) showed high concentrations of cladocerans (*Bosmina longirostris, Daphnia retrocurva*), copepods (*Diaptomus oregonensis*, mixed nauplii), and rotifers (*Filinia* sp., *Asplanchna priodonta, Keratella cochlearis, Polyarthra vulgaris*, and *Synchaeta* spp.) during the June to August sampling period. Medusae gut contents also showed the presence of the benthic depterans *Tendipes* sp. and *Chaoborus* sp., two genera noted by Dineen (3) as being abundant in benthic samples from Spicer Lake. *Craspedacusta* does not appear to be a selective feeder on planktonic or benthic invertebrates.

Temperature and other physico-chemical factors have been suspected of affecting the appearance of medusae in a particular body of water (1). While some waters regularly produce medusae year after year in the summer and autumn, their appearance in other locations seems unpredictable. The appearance of *Craspedacusta* medusae in June and July represents relatively early reports for Indiana (6) where they are usually located between late July and October. However, surface water temperatures for Spicer Lake from June to August, 1983 ranged from 20 to 24 C, falling within the optimal temperature range (19-30C) reported in the literature (1) for the medusa. Dissolved oxygen in Spicer Lake remained uniformly high in the water column throughout the study period (range 8.8 to 9.0 mg/1). The acidic pH was also relatively stable, being in the range 6.4 to 6.8 from June through August. This may represent the lowest recorded pH in which *Craspedacusta* medusae have been collected. Reviews of the worldwide reports indicate that *Craspedacusta* has not been found in bogs and generally is found in distinctly alkaline environments (1,7). Obviously the lower range pH tolerance of this species has been underestimated.

The disappearance of medusae in early July and my inability to detect them in late July and August cannot be explained. Throughout the sampling period the measured variables (abundance of zooplankton prey, temperature, dissolved oxygen) seemed to be in the optimal range based on literature values from other sites in North America. These new data corroborate earlier lists of conditions favoring the appearance of *Craspedacusta* populations. However, this *Craspedacusta* medusae siting is distinguished from many earlier North American and Indiana reports by: 1) the low pH of the lakewater habitat, 2) appearance of both male and female medusae in the population,

3) occurrence in a natural, undisturbed bog-like environment, and 4) the early seasonal appearance (June vs. previous reports of August) for northern Indiana lakes.

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