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First record of a mature stauromedusa *Stylocoronella* (Cnidaria) in nature

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Abstract: Members of the scyphozoan genus *Stylocoronella* were initially described as polyps living in the interstitial water of sands, with the medusa stage unknown. Although the life cycle to mature stauromedusae has subsequently been shown by laboratory rearing, the medusa has never been found in nature. This contribution reports the first record of the mature medusa stage of *Stylocoronella riedli* in its natural habitat in the northern Adriatic Sea. This finding confirms laboratory results on its life cycle and the epibenthic habitat of this lucernariid medusa.

Résumé: *Première observation d'une stauroméduse* Stylocoronella *(Cnidaria) mâture en milieu naturel.* Les membres de *Stylocoronella* furent décrits initialement comme des scyphopolypes interstitiels mésopsammiques sans connaissance de la phase sexuelle médusoïde. Jusqu'à maintenant, le cycle de vie a été exploré jusqu'aux méduses à maturité sexuelle par élevage au laboratoire, les méduses n'ayant jamais été trouvées dans la nature. Cette contribution décrit la première observation d'une stauroméduse de *Stylocoronella riedli* dans le biotope naturel, à maturité sexuelle en juin dans le nord de l'Adriatique. Cette découverte confirme les résultats sur le cycle de vie obtenus en laboratoire, ainsi que l´habitat épibenthique de ces méduses de Lucernariidae.

Keywords: Scyphozoa; Lucernariidae; *Stylocoronella*; Mesopsammon; Maturation; Habitat of medusae

In 1966 a unique mesopsammic scyphozoan, *Stylocoronella riedli* (Salvini-Plawen, 1966), was described based on polyps found off Rovigno/Rovinj in the northern Adriatic Sea at 4-8 m depth. These scyphopolyps, which live interstitially within coarse sand with shell gravel, were already known in 1957 from Bloscon near Roscoff/Brittany at 20 m (Salvini-Plawen, 1966, Swedmark in Salvini-Plawen, 1987) and some years later close to Banyuls-sur-Mer/southeastern France at 5-22 m as well as off Marseille at 20 m (Monniot, 1962); later records came from the Ria de Ferrol/Galicia/Spain at 14 m (Besteiro & Urgorri, 1988). In 1987, the second *Stylocoronella* species, *S. variabilis* Salvini-Plawen 1987*,* was described from the mesopsammon of the Plymouth Sound/England at 11-13 m (later found at 9-22 m). This species probably also occurs at Terenez (8-10 m) and Camaret close to Roscoff (Salvini-Plawen, 1987). All these findings represented the polypoid generation only, defined as a proper genus because of the interstitial existence (the only known mesopsammic scyphozoan, cf. Clausen & Salvini-Plawen, 1986), the high number of 24-32 tentacles, and the presence of subumbrellar ocelli

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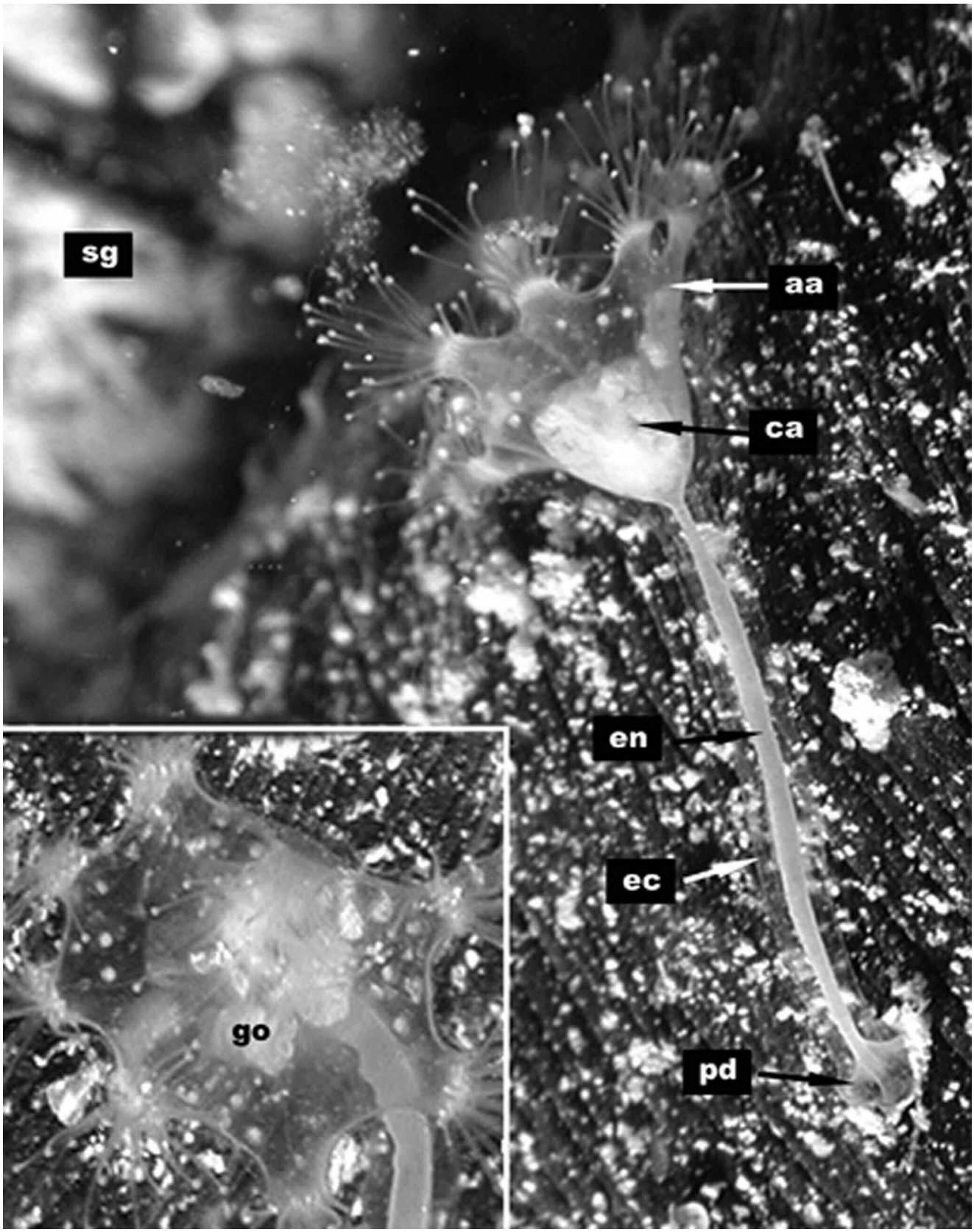
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(Blumer et al., 1995); individual size reaches a maximum of 800 µm, but reproduction at most included a vegetative cycle by planuloid budding. The absence of sexually mature animals in the interstitial biotope and some earlier findings of immature epipsammic individuals led to the assumption that the medusa stage lives outside the mesopsammon (Salvini-Plawen, 1987); the elucidation of the medusoid generation, therefore, was needed to allow a precise classification of the animals within the Scyphozoa. In the attempt to establish the definite systematic affinities and position, polyps of both species were successfully reared in the laboratory where they metamorphosed to sexually mature animals; these represent sessile, long-stalked medusa stages of up to 20-25 mm in total length living attached (or occasionally ambulatory) outside the substratum (Kikinger & Salvini-Plawen, 1995). Close observations and histological investigation of these medusae showed that *Stylocoronella* belongs to Stauromedusae-Lucernariidae, being closely related to *Lucernaria* O.F. Müller, 1776.

These reared medusae attained sexual maturity during winter time at an average temperature of about 14-16°C (*S. riedli* females from October to January, males from January to May; they then degenerated/died). All intensive efforts before and during the laboratory work to find *Stylocoronella*-medusae epibenthically in the presumed natural habitat (coarse sand with shell-gravel) or close by (secondary hard bottom) were negative; even the employment of specially constructed equipment (lighted underwater magnifying glass) by R. Kikinger for scuba diving searches at Rovigno/Rovinj remained unsuccessful. Thus, no solid evidence of the medusae in their natural environment was available; it remained open whether the reared long-stalked medusae – despite some findings of epipsammic individuals (Salvini-Plawen, 1987) – perhaps reflected laboratory results only.

In June 2005 the author was contacted through the kind intermediation of Dr. Yayoi M. Hirano (Kamogawa/Japan) by the Dutch sport diver and nature enthusiast Mat Vestjens (Kàpolnásnyék/Hungary) asking for identification of a stauromedusa on enclosed photographs (Fig. 1). This 10-15 mm long (depending on contraction), glassy-transparent animal with equidistant calyx arms (and no anchors) represents a mature specimen of *Stylocoronella*; the short calyx and very long stalk (as well as the geographic provenance) characterizes it as a member of the species *S. riedli*. It was found on 18 June 2005 at 8 m depth (coarse sand with shell-gravel) attached to a *Holothuria tubulosa* Gmelin, 1788. The locality was off the Diving Base Mihuric at Selce (about 40 km south of Rijeka/Croatia), close to Crikvenica on the Vinodolski Kanal (45º09'07.8"N, 14º43'15.0"E), the northern Adriatic Sea; the temperature of the bottom-water was 15.6°C.

This first finding of a mature medusa stage of *Stylocoronella* in the field confirms the life cycle determined by rearing in the laboratory. Second, it demonstrates that the medusa stage does indeed exist in the natural environment of coarse sand and shell gravel, as originally suggested. Third, it supports the view that mature adults of this species live attached to some larger, fairly hard substrate (secondary hard bottom, sessile or slow-moving organisms such as in the present case a *Holothuria*). Fourth, it suggests that in its natural environment, *Stylocoronella* is reproductively mature in early summer, in contrast to winter results found by Kikinger & Salvini-Plawen (1995) in the laboratory; this latter condition may thus reflect the fairly high aquarium winter temperature (about 14-16°C), which probably accelerated maturation.

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Figure 1. *Stylocoronella riedli*. Mature medusa stage (15 mm in total length) upon *Holothuria tubulosa.* Insert: oral view of calyx showing the eight equidistant adradial arms with tentacles and the four pairs of opaque gonads. Abbreviations: **aa** = (adradial) arm with knobbed tentacles; **ca** = calyx; **ec** and **en** = ectoderm and endoderm of stalk; **go** = gonad; **pd** = pedal disc; **sg** = shell gravel of bottom. Photographs by Mat Vestjens, 18.06.05.

Figure 1. *Stylocoronella riedli*. Méduse à maturité sexuelle (15 mm) adhérant sur une *Holothuria tubulosa*. Insertion : vue du disque oral montrant les huit lobes adradiaux équidistants avec les tentacules par groupes et les quatres paires de gonades. Abréviations: **aa** = lobe (adradial) et tentacules capités; **ca** = calice; **ec** et **en** = ectoderme et entoderme du pédoncule; **go** = gonade; **pd** = disque pedieux; **sg** = sable coquillier du fond. Photographies par Mat Vestjens, 18.06.05.

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