International Journal of Fisheries and Aquatic Research
ISSN: 2456-7248; Impact Factor: RJIF 5.44
Received: 04-06-2020; Accepted: 19-06-2020; Published: 04-07-2020
www.fishjournals.com
Volume 5; Issue 3; 2020; Page No. 14-16

First record of *Cladonema radiatum* Dujardin, 1843 (Hydrozoa: Cladonematidae) from northern Arabian Sea, Pakistan

Farhana Shafiq Ghory[1], Qadeer Mohammad Ali[2], Quratulan Ahmed[3]
[1-3] Marine Reference Collection and Resource Centre, University of Karachi, Karachi, Pakistan

Abstract
The hydrozoan species *Cladonema radiatum* Dujardin, 1843 was found in an aquarium kept with seawater from the intertidal zone at Buleji (Karachi, Pakistan). The medusae were first seen on June, 03, 2016 and kept under laboratory conditions. They survived 74 days at room temperature 35°C, water temperature 33°C, salinity of 35-37‰ and pH 7.5-7.9. The species *Cladonema radiatum* is reported as a new record for Pakistan.

Keywords: first record; *cladonema radiatum*; cladonematidae

1. Introduction
Hydroids and hydromedusae (phylum Cnidaria, class Hydrozoa) are one of the poorly known groups of marine animals from the coast of Pakistan [1] (Haque, 1977). Despite the poor knowledge, there are few data published about hydroids from Pakistani waters.We know 46 species of hydrozoans from Pakistan [2]; from these 5 are anthoathecates, 11 leptothecates, and 30 siphonophores. Such studies include: Haque [1], Ahmed *et al*. [3], Haq *et al.* [4], Javed and Mustaquim [5], Ahmed and Hameed [6], Ali- Khan and Shehnaz [7, 8], Moazzam and Moazzam [9] and Gul and Gravili [10].

The Cladonematidae are a family of anthoathecate hydrozoans which contains 3 genera (*Cladonema, Eleutheria* and *Staurocladia*). Members of the family with known life cycle, have stolonal hydroid colonies with their medusa being benthicand crawling over the substrate [11]. The genus *Cladonema* Dujardin, 1843 is composed of 6 species [12]. Medusae of the genus are capable of swimming in the water column, but mostly stay attached to surfaces [13, 11].

2- Materials and Methods:
Sea water from Buleji coast (tide 1.13m) was collected on 06th March, 2016, andused to fill an aquarium (kept with aeration) in the laboratory. On 16th June, 2016 the first hydromedusae were seen swimming in the aquarium. The hydromedusae were picked and placed in a separate aquarium (also with aeration) for additional observations. On 25th July, 2016 several hydropolyps were found in the same aquarium. Young hydromedusae were kept in 250 ml glass jar. The sizes of the young hydromedusae were ~0.3 mm when released butthey reach to ~0.7 mm bell height in mid-August 2016. The specimens were observed under a binocular microscope (Olympus BX51) with 10x/21 magnification. The medusa survived in aquarium for 74 days at room temperature (~35°C); aquarium water temperature was around 33°C, salinity ranged from 35-37‰, and pH was 7.5-7.9 during the course of the study.

2.2. Material Examined
13 specimens examined.
Size. - ~0.3 mm-~0.7.

2.3. Systematics:
Phylum: Cnidaria
Class: Hydrozoa
Subclass: Hydroidolina
Order: Anthoathecata
Suborder: Capitata
Family: Cladonematidae
Cladonema radiatum Dujardin, 1843

2.4. Habitat
Pelagic, often near shore.

3. Key to the genera
1. Medusa tentacles branched more than once.....***Cladonema***
2. Medusa tentacles branched once.....**2**
3. 2a- Medusa tentacles with a single nematocyst knob.....***Eleutheria***
4. 2b- Medusa tentacles with several nematocyst knobs.....***Staurocladia***

4. Description
C. radiatum medusa had a bell-shaped umbrella that reached 0.7 mm in diameter. The velum is quite broad. The whitish manubrium is spindle-shaped, somewhat shorter than the bell cavity and bears the gonads. The club-shaped hydranth has two whorls of tentacles: one oral whorl, below the mouth, consisting of four to five capitate tentacles (ending in bulbs); and a lower (aboral) whorl, near the base of the hydranth, consisting of few small filiform (threadlike) tentacles. On the margin of the umbrella, there are nine elongated bulbs from where branched tentacles stretch out.At the base of each tentacle there is a redocellus. Under each one of these bulbs, 1 to 4 stalked buttons are used to attach on the substratum. The root-arm medusa frequently settles on seaweeds (Fig.1). Belonging to planktonic species, it has a hopping way of swimming, and then it suddenly folds its tentacles and let itself fall.

The polyps were about 0.6 mm in height and having four capitates tentacles surrounding the hypostome in the aquarium wall. After 6 days we were able to see buds in the hydropolyps, and these buds were released as young

hydromedusae. After polyp detection, 16 young hydromedusae were count in the aquarium.

5. Discussion

C. radiatum, differs from the other *Cladonema* species in the lack of filiform tentacles at the base of the polyp [14]. The authors consulted Dr. Peter Schuchert, Natural History Museum of Geneva, according to him *C. radiatum* polyps have filiform tentacles. However, they might not always develop depending on cultivating conditions. The differences in morphology between the existing records of *Cladonema* species are shown in Table 1.

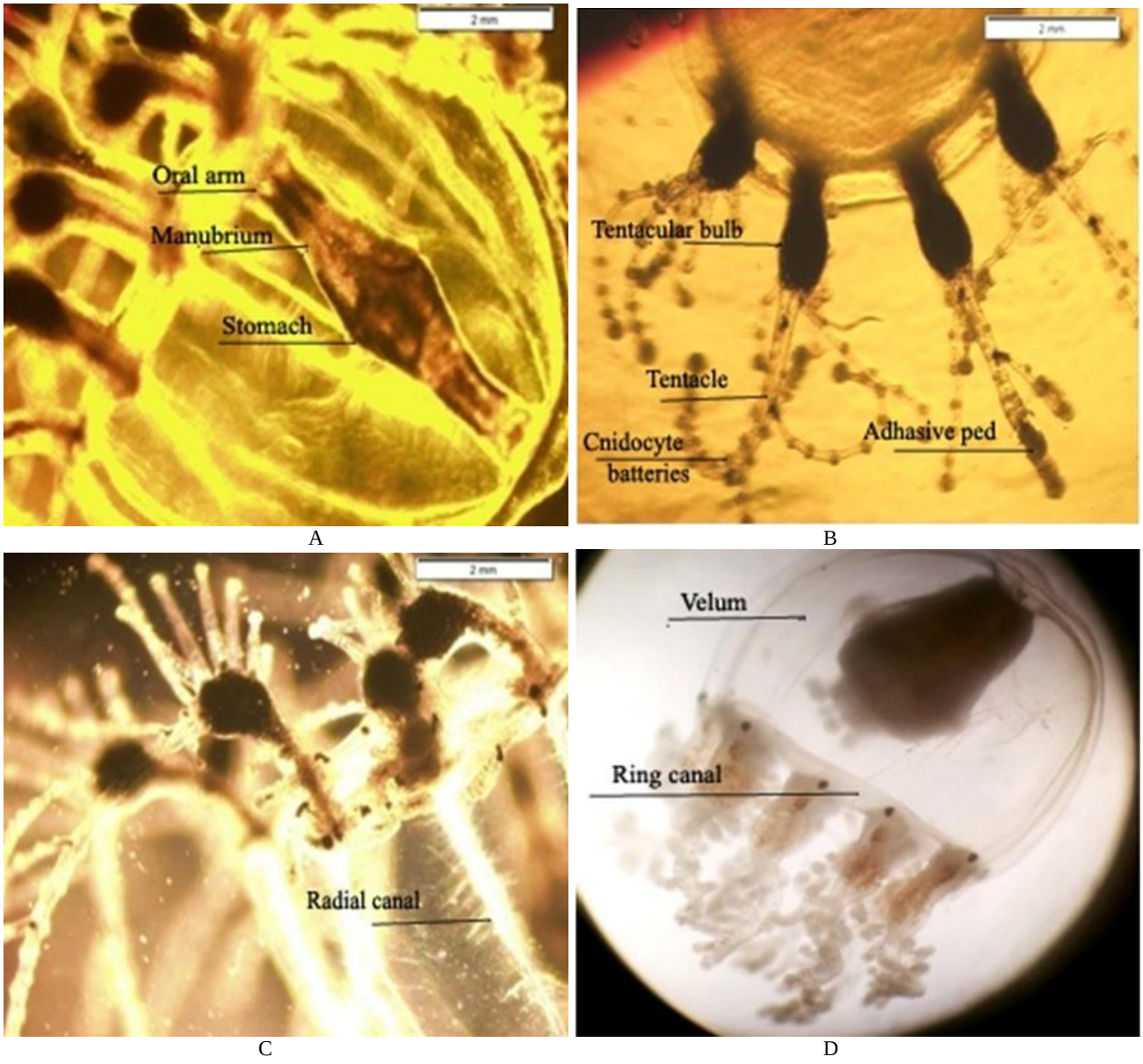

Fig 1: *Cladonema radiatum* Dujardin, 1843. A-D, Growth stages and morphological features.

Cladonema radiatum Dujardin, 1843 is a species considered to be native to coastal European waters where it can be found from Norway to the Mediterranean and Black Seas [11] (Schuchert, 2006). Also it has been reported from different parts of the world as Bermuda, Florida, the Bahamas, Puerto Rico, Belize, and Brazil [15, 16, 17, 18]. The species was considered non-indigenous, and introduced populations of medusae have been reported from Padilla Bay (Washington), Oahu (Hawaii), and Wellington (New Zealand) [19]. It is possible that this wide-ranging hydrozoan comprisesa complex of cryptic species [11] but further data should be considered on detailed morphological and molecular aspects to discuss it.

Table 1. Comparison of morphological differences of the species of *Cladonema* [20] (after Rees, 1982).

S. No.	Species	Polyp filiform tentacles	Number of radial canals	Branching of radial canal	Branching of regular tentacles
1	C. *radiatum* Dujardin, 1843	Present	7-11	Yes	Much branched
2	C. *californicum* Hyman, 1947	Present	Usually 9	No	Bifurcated
3	C. *myersi* Rees, 1949	Absent	5-7	No (?)	Much branched
4	C. *pacificum* Naumov, 1955	Not known	9	No	Much branched
5	C. *uchidai* Hirai, 1958	Absent	8-9	Yes	Much branched

6. Acknowledgments
The authors are grateful to Dr. Andre C. Morandini, University of São Paulo, Brazil and Dr. Peter Schuchert, Natural History Museum of Geneva for reviewing the article and gave valuable suggestions.

7. References

1. Haque MM. Some littoral coelenterates of Bangladesh and Pakistan coasts. Bangladesh Journal of Zoology. 1977; 5:33-40.
2. Gul S, Morandini AC, Häussermann V, Pörschmann U. Checklist of cnidarians from Pakistani waters. Check List. 2015; 11(2):1-8.doi: 10.15560/11.2.1609
3. Ahmed M, Niaz-Rizvi, SHN, Moazzam M. Final technical report on the studies on the settlement and control of marine organisms in the cooling systems of coastal installations. Institute of Marine Biology, University of Karachi, Karachi, 1978, 141.
4. Haq SM, Moazzam M, Niaz-Rizvi SH. Studies on the marine fouling organisms from Karachi coast. I. Preliminary observations on the intertidal distribution and ecology of fouling organisms at Paradise Point. Pakistan Journal of Zoology. 1978; 10:103-116.
5. Javed M, Mustaquim J. The occurrence of fouling organisms on navigational buoys in the Manora Channel, Pakistan. In: The Arabian Sea: Living Marine Resources and the Environment (eds. M.F. Thompsonand N.M. Tirmizi), 1995, 99-106. Vanguard Books (Pvt.)Ltd. Lahore.
6. Ahmed M, Hameed S. A comparative study of the biomass of animals and seaweeds of the rocky shore of Buleji near Karachi, Pakistan. Pakistan Journal Biological Sciences. 1999; 2:365-369.
7. Ali-Khan S, Shehnaz F. Siphonophores of the Arabian Sea (families: Diphyidae, Abylidae). Pakistan Journal of Marine Biology. 2001a; 7(1-2):15-25.
8. Ali-Khan S, Shehnaz F. Counts of siphonophores (Cnidaria: Hydrozoa) in the Arabian Sea with remarks on families: Agalmidae and Hippopodidae. Pakistan Journal of Marine Biology. 2001b; 7(1-2):27-36.
9. Moazzam N, Moazzam M. On some hydroids (Cnidaria) from the coast of Pakistan. Pakistan Journal of Zoology. 2006; 38:225-232. http://zsp.com.pk/pdf38/225-232%20_9_.pdf
10. Gul S, Gravili C. On the occurrence of *Porpita porpita* (Cnidaria: Hydrozoa) at Pakistan coast (north Arabian Sea). Marine Biodiversity Records, 2014; 7(e24): 1–3. doi: 10.1017/S1755267214000189
11. Schuchert P. The European athecate hydroids and their medusae (Hydrozoa: Cnidaria) Capitata Part 1, Revue Suisse de Zoologie. 2006; 113:325-410.
12. Schuchert P. World Hydrozoa Database. *Cladonema* Dujardin, 1843. Accessed through: World Register of Marine Species, 2019. at: http://www.marinespecies.org/aphia.php?p=taxdetails&id=117049 on 2019-11-09
13. Bouillon J, Medel M, Pagès D, Gili F, Boero JF. Gravili C, *et al*. Fauna of the Mediterranean Hydrozoa, Scientia Marina. 2004; 68:5-438.
14. Rees WJ. On *Cladonema myersi*, a new species of hydroid from the California coast. Proceedings Zoological Society London. 1949; 119:861-865.
15. Mayer AG. Medusae of the World. In: (Eds.) Washington, D.C. 1910; 231:276-278.
16. Migotto AE. Benthic shallow-water hydroids (Cnidaria: Hydrozoa) of the coast of Sao Sebastiao, Brazil, including a checklist of Brazilian hydroids, Zoologische Verhandelingen. 1996; 306:3-125.
17. Calder DR. Shallow water hydroids of Bermuda. The Athecatae. Royal Ontario Museum Life Sciences Contributions. 1998; 148:1-107.
18. US. National Museum of Natural History. Invertebrate zoology collections database, 2002-2019. http://collections.nmnh.si.edu/search/iz/
19. Fofonoff PW, Ruiz GM, Steves B, Simkanin C, Carlton JT. National Exotic Marine and Estuarine Species Information System. 2018. http://invasions.si.edu/nemesis/.
20. Rees JT. The Hydrozoan Cladonema in California: A Possible Introduction from East Asia. Pacific Science. 1982; 36(4):439- 444.