Belg. J. Zool. - Volume 126 (1996) - issue 2 - pages 177-180 - Brussels 1996

SHORT NOTE

BIOMETRIC STUDY OF *EDWARDSIA CLAPAREDII* (PANCERI) CNIDOME (ACTINIARIA: ANTHOZOA)

CHARITON CH. CHINTIROGLOU

Aristotle University of Thessaloniki, School of Biology, Dept. Zoology Box. 134
GR-54006 Thessaloniki (Macedonia) (Greece)

Keywords: *Edwardsia*, Actiniaria, cnidome, biometry.

Most of the information concerning the taxonomy of the Edwarsiidae can be found in (Carlgren (2), England (7), Manuel (9) Williams (18)). A large number of the members of this family exhibit problems in their taxonomic classification (6). Of all their biometric and morphological characteristics (external morphology and histological), it appears that only cnidom biometry and composition can provide satisfactory classification characteristics (7). Nevertheless, recent works have shown that cnidom biometry can be influenced by body weight, resulting in a number of cases in an inability to use cnidom as a diagnostic characteristic in the classification of Cnidaria (4). This paper presents the preliminary results of the biometric - allometric study of the cnidom of *Edwardsia claparedii*, a characteristic Mediterranean representative of the Edwarsiidae, recently recorded for the first time in the North Aegean Sea (3).

Samples were collected from Thermaikos Gulf in the North Aegean Sea. All samples were collected from a depth of 20 m using a Van Veen sampler. Ten specimens of various sizes were preserved in 10% formalin/seawater solution. The following two morphological variables were measured for each specimen, after preservation: column height (HC, mm) and wet weight in crude units of biomass (wW). These variables were considered to reflect, with satisfactory credibility, the maturity state of the individuals, their different metabolic levels (e.g. energetic costs) or even their relative age (1, 4, 5, 6, 13). Cnidae measurements were taken on undischarged capsules of squash preparations. The terminology used was based mainly on (7).

Squash preparations, using a drop of 7.5% formalin solution, were prepared from small portions of preserved tissue (approximately 2 mm^3), taken from different functional regions of the anemones' bodies, in order to identify the types of cnidae present and to measure their biometric parameters. The types of cnidae used in our comparative study were: basitrichs from tentacles and column, pterotrichs and t-mastigophores from nemathybomes, and basitrichs, microbasic p-mastigophores and mi. amastigophores from mesenterial filaments. Forty undischarged capsules of each type were measured and their height (L) and width (W) were recorded. The ratio L/W is considered to be a significant parameter of cnidae biometry (16). This procedure was carried out for each anemone and for each examined body part (tentacles, column, nemathybomes and mesenterial filaments) separately. All measurements were taken using an optical microscope (with 10 x 100 objectives) equipped with a camera lucida.

As the distribution of data was unknown, non-parametric testing was required. The presence of any relationship between anemone column height (HC, mm) and wet weight (wW) with the means of the nematocysts' length and the L/W ratio, was determined using the non-parametric test of Spearman's rank correlation coefficient, usually abbreviated as rs. This test has been frequently used, especially for small data sets (15). The sampled station belonged to the VTC biocoenosis (biocoenosis of terrigenous mud).

Tables 1 and 2 contain the results of the correlation tests between cnidae length and L/W ratio, and anemone's morphological variables (HC and wW). These are briefly summarised below.

TABLE 1

Spearman's rank correlation coefficients based on the relationship among length of cnidae and the body variables
(HC=height of column and wet weight [wW]
of *Edwardsia claparedii* [Panceri] individuals.
Bold numbers: there is a positive correlation [p<0.05])

Type of cnidea	*HC (mm)*	*wW (g)*
basitrich of tentacles	0.7	0.6
spirocyst of tentacles	**0.8**	0.7
pterotrichs of nemathybome	**0.8**	**0.9**
t-mastig. of nemathybome	**0.8**	**0.9**
basitrich of column	0.1	0.3
basitrich of filaments	0.7	**0.8**
p-mastig. of filaments	0.003	0.1
micr. amastig. of filaments	**0.7**	**0.7**

The only nematocyst types demonstrating a positive correlation with respect to body weight and column height were nematocysts of nemathybomes and microbasic amastigophores of the filaments. Spirocysts showed positive correlation only with respect to column height (rs = 0.8), whereas basitrichs of the mesenterial filaments were positively correlated only with respect to the organisms' wet weight (rs = 0.8). Similar results were obtained from the correlation of the L/W ratio with the morphological parameters of the body, however a few exceptions existed. One concerned the absence of any correlation between the L/W ratio of spirocysts and column height (rs = 0.4). Another exception was the absence of any correlation between the L/W ratio of the basitrichs of the filaments and HC (rs = 0.7)

According to the data presented, it appears that certain nematocyst dimensions of sea anemones can be affected by various physiological conditions. Even though information about cnidogenesis is very limited (17), the existence of intraspecific variation with respect to cnidom biometry has been reported by various authors (6, 8, 13). Actinians are equipped with a wide range of cnidae which function in food capture, defense and aggression. Mariscal (10,11), Fautin (8) and Robson (13) reported that various biological factors can affect the cnidae categories found in individual actinians. Östman *et al.* (12) reported that differences in the dimensions of the nematocysts from one geographic area to another may be caused by differences in metabolism. Recently Zamponi & Acuna (19) have noted that size variation of cnidae can be employed as a tool for the determination of the cline of a given sea anemone population.

TABLE 2

Spearman's rank correlation coefficients based on the relationship among the ratio length/width (L/W) of cnidae and the body variables (HC=height of column and wet weight [wW] of *Edwardsia claparedii* [Panceri] individuals. **Bold numbers**: there is a positive correlation (p <0.05)

Type of cnidea	*HC (mm)*	*wW (g)*
basitrich of tentacles	0.005	0.0004
spirocyst of tentacles	0.4	0.5
pterotrichs of nemathybome	**0.9**	**0.9**
t-mastig. of nemathybome	**0.7**	**0.7**
basitrich of column	0.1	0.1
basitrich of filaments	**0.7**	**0.8**
p-mastig. of filaments	0.2	0.4
micr. amastig. of filaments	**0.8**	**0.7**

Results from the present paper indicate that for *E. claparedii* the following nematocysts must be considered as taxonomically reliable and constant : a) column basitrichs , b) tentacle basitrichs and c) mesenterial filament micr. p-mastigophores. Consequently, only these can be adequately used as diagnostic characteristics for classification, since the rest of the nematocysts, nemathybomes' pterotrichs and t-mastigophores, tentacles spirocysts, filament basitrichs and micr. amastigophores, appear to be influenced by several physiological and environmental factors. These results contradict those of England (7), who considers the nemathybome pterotrichs and t-mastigophores as significant characteristics for the classification of Edwardsiidae. Therefore it becomes obvious that the classification keys used for species determination in the Edwardsiidae family need to be reviewed under the new biometric methods based on cnidom analyses.

(*Received 13 June 1995*)

REFERENCES

1. BOURNE, G.C. (1918) – On some new Phelliinae from New Guinea. Q. Jl. Microsc. Sci., 63 (1): 31-90.
2. CARLGREN, O. (1949) – A survey of the Ptychodactaria, Corallimorpharia and Actiniaria. K. svenska Vetensk. Akad. Handl., 1: 1-121.

3. CHINTIROGLOU, Ch. and J. C. DEN HARTOG (1996) – Additional records of Actiniaria (Anthozoa) from Greece. Zool. Med. Leiden 69. 353-364.

4. CHINTIROGLOU, Ch. and M. SIMSIRIDOU (1996) – Biometric investigations on the cnidae of the sea anemone *Actinia equina mediterranea* Form I sensu Schmidt, 1972. Istrael J. Zool., 42: (in press).

5. CRISP, D.J. (1971) – Energy flow measurements. In: methods for the study of marine benthos. Ed. Holme, N.A. and McIntyre A.D., I.B.P. Handbook No 16, Oxford, 197-279.

6. DOUMENC, D., CH. CHINTIROGLOU and A. FOUBERT (1989) – Variabilite du genre *Telmatactis* Gravier, 1918 (Actiniaria, Acontiaria, Isophelliidae). Bull. Mus. nat. d'Hist. nat. Paris 4e ser, 11 section A (3): 5-45.

7. ENGLAND, K.W. (1987) – Certain Actiniaria (Cnidaria, Anthozoa) from the Red Sea and Tropical Ind-Pacific Ocean. Bull. Br. Mus. Nat. Hist. (Zool.)., 53: 205-292.

8. FAUTIN, D.G. (1989) – Importance of nematocysts to Actinian systematics. In: Hessinger & Lenhof., eds. The Biology of Nematocysts, Academic Press. 487-500.

9. MANUEL, R.A. (1981) – 18. British Anthozoa. Synopses of the British fauna, Academic Press, London, 241 pp.

10. MARISCAL, R.N. (1973) – The control of nematocyst discharge during feeding by sea anemones. Pub. seto Mar. Biol. Lab., Proc. Second Int. Symp. Cnidaria, 20: 695-702.

11. MARISCAL, R.N. (1974) – Nematocysts. – In L. Muscatine & H.M. Lenhoff (eds), Coelenterate Biology: Reviews and New Perspectives. Academic Press, NY: 129-178.

12. ÖSTMAN, C., S. PIRAINO and I. ROCA (1987) – Nematocyst comparisons between some Mediterranean and Scadinavian Campanulariids (Cnidaria, Hydrozoa). In: BOUILLON, J., BOERO, F., CICOGNAT F. & CORNELIUS, P.F.S. eds. Modern Trends in the Systematics Zoology and Evolution of Hydroids and Hydromedusae. Clarendon Press. Oxford, 299-310.

13. ROBSON, E.A. (1989) – Problems of supply and demand for cnidae in Anthozoa. In: HESSINGER, D.A. & LENHOFF, H.M., eds. Symposium on the Biology of Nematocysts, August 24-29, 1986, University of California.179- 207.

14. SHICK, J.M. (1992) – A functional biology of sea anemones. Chapman & Hall., 395 p.

15. SIEGEL, S. (1956) – Nonparametric statistics for the behavioral sciences. McGraw-Hill Kogakusha, Ltd. 312 p.

16. THOMASON, C.J. (1989) – The allometry of nematocysts. In: HESSINGER, D.A. & LENHOFF, H.M., eds. Symposium on the Biology of Nematocysts, August 24-29, 1986, University of California. 575-588.

17. WEILL, R, (1934) – Contribution a l'étude des Cnidaires et de leurs nématocystes. II : Valeur taxonomique du cnidome. Trav. St. Zool. de Wimereux, 10/11 : 1-701.

18. WILLIAMS, R.B. (1981) – A sea anemone, *Edwardsia meridionalis* sp. nov., from Antarctica and a preliminry revision of the genus *Edwardsia* de Quatrefages, 1841 (Coelenterata: Actiniaria). Recordos of the Australian Museum, 33(6): 325-360.

19. ZAMPONI, O.M. and F. H. ACUNA (1994) – La variabilidad de los cnidocistos y su importancia en la determinacion de clines. Physis (Buenos Aires), 49 (116-117): 7-18.