BIOMETRIC STUDY OF THE *ACTINAUGE RICHARDI* CNIDOME *(ACTINIARIA: ANTHOZOA)*

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Abstract :

The cnidome is characteristic of the Cnidaria phylum. The type and dimensions of nematocysts can be used as criteria for the identification of actinians at the species level. This is demonstrated here in the case of *Actinauge richardi.* Biometries of the cnidome and statistical analysis revealed that tentacle and acontia basitrichs possess constant characteristics.

Key-words: Aegean Sea, Bathyal, Cnidaria, Zoobenthos

Introduction

Nematocysts are found in all Cnidaria and are diagnostic of the phylum. They cannot be renewed and after discharge are extruded from the epithelium. In one species of actiniarian the cnidome of different functional regions (tentacles, pharynx, filaments, column, basal disc) may differ in composition and size and be used taxonomically (1-9). Satisfactory classification characteristics can also be provided by cnidome biometry (9). Even though the biometry of the cnidome can contribute significantly to the classification of Cnidaria, authors occasionally questioned the extent to which it can be used to distinguish among species. It has been reported that the size of cnidae can vary with age or size of the individual (10, 11). Variation was found in cnidom biometry for hydrozoan *(Campanulariidae)* populations from Mediterranean and Scandinavian shores (12). It was also noted that the biometry of some types of cnidae (*e.g.* length and width) was significantly associated with age in the genus *Telmatactis* (13). Experiments on cnidogenesis in anemone tentacles have revealed little evidence for migration. In *Calliactis tricolor* it was shown a decrease in nematocyst discharge with increase in the amount of food ingested (14, 15). It was also found that depleated tentacles of Anemonia viridis regained their normal complement of cnidae after 5-6 days (16).

Although these data seem to indicate that physical and biological parameters can influence the cnidae types present in the tissues (both qualitativly and quantitatively), few researchers have analysed the influence of these parameters on the biometry of the cnidae.

Recent works have shown that cnidome biometry can depend on body weight, resulting in a number of cases in an inability to use the cnidome as a diagnostic characteristic for classification (17, 18). This work presents a biometric study of the cnidome of *Actinauge richardi,* a bathyal species of the *Hormathiidae* family, occuring in the Eastern Aegean Sea (19). The aim is to investigate correlations between cnida biometry and either size or age of individuals and to find out whether the species can be characterized by these means.

Material and methods

Samples of *Actinauge richardi* (Marion, 1882) were collected with fishboats from the North Aegean Sea, from a depth of 260-450 m. The sampled stations were between Thasos and Samothrake and between Mount Athos and Limnos. They belong to the biocoenosis of the muddy detritic bottoms (23).Ten specimens of various sizes were preserved in 10% formalin /sea water solution. The following morphological variables were measured for each specimen, after preservation: column height (HC, mm), wet weight in crude units of biomass (wW), diameter of the column's base (DB, mm). These variables were considered to reflect, with satisfactory credibility the maturity state of the individuals, their metabolic level (energetic costs) and their relative age (17,18, 20). Cnidae measurements were taken on undischarged capsules of squash preparations. The terminology used was based mainly on England (1987) (9).

For squash preparations, (in a drop of 7.5% formalin) small portions of preserved tissue (approximately 2 mm^3), were taken from different functional regions. The types of cnidae used basitrichs from the tentacles and the acontia. Other types of cnidae were very rare or not found at all. Thirty undischarged capsules of each type were measured and their length (L) and width (W) were recorded. The ratio L/W is considered to be a significant parameter of cnidae biometry (17, 21). This procedure was carried out for each anemone and for each examined body part (tentacles, acontia).

All measurements were taken using an optical microscope (with 10 x 100 objectives) equiped with a camera lucida.

As the distribution of data was unknown, non parametric testing was required. Relationship between column height (HC, mm), column base diameter and wet weight with the means of the nematocyst length and L/ W ratio was investigated 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 (22).

Results and discussion

Tables 1 and 2 and figure 1 contain the results of the correlation tests between cnidae length and L/W ratio, and the morphological variables (wet weight, coloumn height, diameter of the pedal disc). They show that the basitrichs of the tentacles and of the acontia do not demonstrate a correlation with the morphological parameters of the body.

TABLE 1. Spearman's rank correlation coefficients based on the relation-ship between length of cnidae and the body variables. (HC = height of column, wW = wet weight, DB= base diameter of Actinauge richardi individuals)

Type of cnidae	HC (mm)		wW (g)		DB (mm)	
	Rho	p	Rho	p	Rho	p
Basitrichs of tentacles	0.6	0.1	0.3	0.34	-0.1	0.78
Basitrichs of acontia	0.1	0.69	-0.2	0.6	-0.4	0.18

TABLE 2. Spearman's rank correlation coefficients based on the relation-ship between the ratio length/ width (L/W) of cnidae and the body variables. (HC = height of column, wW = wet weight, DB= column base diameter of Actinauge richardi individuals)

Type of cnidae	HC (mm)		wW (g)		DB (mm)	
	Rho	p	Rho	p	Rho	p
Basitrichs of tentacles	0.04	0.9	-0.2	0.64	-0.1	0.8
Basitrichs of acontia	0.2	0.4	-0.2	0.65	-0.4	0.23

Actinians have different types of cnidae which are functional in food capture, defense and aggression. It has been reported that various biological factors can affect the categories of cnidae present in an individual actinian (15, 24, 25, 26). During everyday activity (*i.e.* feeding) nematocysts may greatly decrease in number or even disappear (17, 18).

The absence of certain types of nematocysts from the tissues may lead to classification problems. No correlations between physiological functions of the organism (reproductive period, food gathering ability, defense etc.) and nematocyst biometry have been found. Nevertheless, most taxonomists regard cnidae biometry as essential for classification. Some authors have suggested to use certain statistical tools for the study of cnida morphology (mean, standard deviation, and range) in order to overcome differences resulting from evaluation methods (6, 13, 19). Unfortunately, no concise comparative method has yet been put forward and parametric data cannot been used for classification and taxonomy.

In an identification key, stressing presence versus absence of certain types of nematocysts can induce into error (24, 25). This can be overcome by the combined use of biometrics and statistical analysis (17, 18, 27, 28).

It has been shown here that the basitrichs of the tentacles and the acontia can be considered as taxonomically reliable and constant and can be adequately used as diagnostic characteristics for the species *Actinauge richardi.*