

## NEMATOCYSTS IN FOUR SPECIES OF CORALS

### ABSTRACT

The types and distribution of nematocysts in four coral species were studied. Of the 20 major categories of nematocysts recognized in the phylum Cnidaria, five types were encountered in these four corals. They were holotrichous isorhizas, atrichous isorhizas, microbasic mastigophore, microbasic amastigophore and macrobasic mastigophore. The type of nematocysts and their abundance varied from coral to coral and even within a single species, the relative distribution of a given type of nematocyst varied in different parts of a polyp. It is suggested that the differences in the nematocysts could be used in the classification of corals.

Most of the scleractinian corals form colonies which assume many shapes such as rounded and massive, branching, foliaceous and encrusting. In many corals the variation in the shape of the corallum is largely determined by ecological factors and hence it is difficult to differentiate between a growing colony and a species because the final form of certain types of corals is influenced by the environment (Goreau, 1963; Goreau and Hartman, 1963; Yonge, 1968). Specific differences in the morphology and distribution of nematocysts in the body are additional characters which could be used in identifying some species of corals. Nematocysts have been reported to be of importance as a taxonomic feature of corals and these structures have successfully

been used in the systematics of actinarians (Werner, 1965). However, no such use of nematocysts has been made in scleractinian corals. The present study provides some information on the types of nematocysts and their distribution in various parts of the body of four species of corals. This information seems to be of value in their taxonomy.

*Favia pallida*, *Favia valenciennesi*, *Favites abducens* and *Goniopora pectinata* were the corals used in this study. These were collected from the fringing reef of Palk Bay near Mandapam. Tissue squashes were prepared from the tentacles, oral disc and mesenteries. These were examined under a microscope and different categories of nematocysts were identified according to Weill's classification as given by Hyman (1940). Length and width measurements were made

TABLE 1

*Types of nematocysts and their distribution in different parts of the body of four species of corals.*

| Nematocyst category      | Coral species        |    |    |                            |    |    |                         |    |    |                            |    |    |
|--------------------------|----------------------|----|----|----------------------------|----|----|-------------------------|----|----|----------------------------|----|----|
|                          | <i>Favia pallida</i> |    |    | <i>Favia valenciennesi</i> |    |    | <i>Favites abducens</i> |    |    | <i>Goniopora pectinata</i> |    |    |
|                          | T                    | OD | M  | T                          | OD | M  | T                       | OD | M  | T                          | OD | M  |
| Hlotrichous isorhizas    | xx                   | xx | xx | xx                         | xx | xx | xx                      | xx | xx | -                          | -  | -  |
| Atrichous isorhizas      | -                    | -  | -  | x                          | x  | -  | -                       | -  | -  | xx                         | xx | xx |
| Microbasic mastigophore  | -                    | -  | -  | x                          | -  | -  | x                       | -  | -  | xx                         | xx | xx |
| Microbasic amastigophore | -                    | -  | -  | x                          | -  | -  | -                       | -  | -  | -                          | -  | -  |
| Macrobasic mastigophore  | x                    | x  | x  | x                          | x  | x  | xx                      | xx | x  | xx                         | x  | xx |

xx - Occur in abundance. T - Tentacle, OD - Oral disc, M - Mesenteries  
 x - Occur in few numbers or rare.

of undischarged nematocysts using a micrometer eye-piece (these measurements were taken in *Favia pallida* and *Goniopora pectinata* only). All preparations of nematocyst were taken from living specimens. Several specimens of the same species were examined before ascertaining whether a category of nematocysts is present or absent in a particular species.

Spirocysts were observed in fair numbers in all parts of the body of the four species. Five categories of nematocysts, holotrichous isorhizas, atrichous isorhizas, microbasic mastigophore, microbasic amastigophore and macrobasic mastigophore were observed in the

corals under study. Their relative distribution in various parts of the body in the four species is given in Table 1. Holotrichous isorhizas were present in *Favia pallida*, *F. valenciennesi* and *Favites abducens* but were completely absent in *Goniopora pectinata*. Atrichous isorhizas and microbasic mastigophores occurred in good numbers in *Goniopora pectinata* but these were either absent or became rare in the other three species. Macrobasic mastigophores were present in fair numbers in *Favites abducens* and in *Goniopora pectinata* but were rare in *Favia pallida* and *F. valenciennesi*. Microbasic amastigophore was observed only in *F. valenciennesi*. The relative

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TABLE 2

Length and width measurements of nematocysts in two species of corals

| Nematocyst category     | <i>Favia pallida</i> |                     | <i>Goniopora pectinata</i> |                     |
|-------------------------|----------------------|---------------------|----------------------------|---------------------|
|                         | Mean length<br>$\mu$ | Mean width<br>$\mu$ | Mean length<br>$\mu$       | Mean width<br>$\mu$ |
| Holotrichous isorhizas  | 38                   | 18                  | --                         | —                   |
| Atrichous isorhizas     | —                    | —                   | 39                         | 15                  |
| Microbasic mastigophore | —                    | —                   | 35                         | 9                   |
| Macrobasic mastigophore | 29                   | 15                  | 40                         | 9                   |

abundance of these nematocysts also varied from region to region in a given polyp. Macrobasic mastigophores were abundant in the tentacles and in the mesenteries of *G. pectinata* but were rare in the oral disc. In *Favites abducens* these were abundant in the oral disc and tentacles but were few in the mesenteries. In *F. valenciennesi* atrichous isorhizas were sparse in the tentacles and oral disc but were totally absent in the mesenteries; microbasic mastigophores and amastigophores were few in the tentacles and absent from the mesenteries and oral disc.

The length and width measurements of nematocysts from *F. pallida* and *G. pectinata* are given in Table 2. A comparison of these measurements are difficult to make because of the varied distribution of nematocysts in the two species. However, marked differences in the length-width ratio could be noticed

in the macrobasic mastigophores of *F. pallida* (1:0.52 and *G. pectinata* (1:0.23). Holotrichs of *Chrysaora quinquecirrha* and *Rhopilema verrilli* have been reported to differ in their length-width ratio (Calder, 1972).

The observed differences in the types of nematocysts and their relative distribution could easily be used in the identification of those species which are normally difficult to identify from their gross morphology. Nematocysts have been used previously in the taxonomy of Cnidaria (Carlgen, 1945; Cutress, 1955). Calder (1972) used them to distinguish almost identical-looking scyphistoma stages of scyphozoans from the Chesapeake Bay. About 20 major categories of nematocysts have been recognized in the Phylum Cnidaria. However, only five types have been identified in these four corals. Further, their relative occurrences are not constant in the different parts of the

body of the same polyp. Calder (1972) observed variations in the abundance of nematocysts from region to region in *Rhopilema verrilli*. The presence of a particular type of nematocyst is not common in all the species studied. *Favia pallida*, *F. valenciennesi* and *Favites abducens* can be differentiated from *G. pectinata* by the absence of holotrichous isorhizas and by the abundance of atrichous isorhizas and microbasic mastigophore in the latter. Though *Favia pallida* and *F. valenciennesi* have holotrichous isorhizas in good numbers, the latter can be distinguished from the former in the rare occurrence of atrichous isorhizas, microbasic mastigophore and microbasic amastigophore. The relative abundance of these types also vary in different parts of the body and this feature can also be used for the identification of a particular species. From the results obtained in this study, it seems possible to use nematocysts

as additional taxonomic characters in the identification of corals, but further extensive study is needed before establishing them as valid characters for the identification of corals whose shapes are influenced by environment. Subdivisions of a given nematocyst category based on morphological characters (Calder, 1971; Spangenberg, 1964) and staining characteristics (Sutton and Burnett, 1969) have been made and these may prove to be valuable for coral taxonomy.

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