ON THE POLYCHAETE *GATTYANA DELUDENS* FAUVEL ASSOCIATED WITH THE HERMIT CRAB *DIOGENES DIOGENES* HERBST AND *D. CUSTOS* FABRICIUS

ABSTRACT

The commensal habits of *Gattyana deludens* Fauvel with the hermit crabs *Diogenes diogenes* Herbst and *D. custos* Fabricius is described based on collections from off Kakinada, Madras, Nagapatnam and from Quilon, Azhikode, Calicut and Mangalore. The knowledge of their distribution is extended towards the west coast of India by the present studies.

AMONG polychaetes polynoids form one of the widely reported commensal with other invertebrates in the different oceans. Even though some genera with specific commensalism are reported from different geographical regions, instances of a particular association occurring repeatedly in widely separated areas are rare. The polynoids like *Arctonoe*, *Acholoe*, *Gattyana*, *Polynoe*, *Harmothoe*, *Halosydna* and *Lepidasthenia* are studied in relation to their host response in a series of experiments by Davenport (1950, 1953a, 1953b) and Davenport and Hickok (1951) and species like *Harmothoe lunulata* are observed to have wide variety of hosts. Gibbs (1969) while reporting *Gastrolepida clavigera*, *Hololepidella minuta*, *H. commensalis*, *Scalisetosus longicirra*, *Lepidasthenia elegans*, *L. maculata*, *L. microlepis*, *L. mossambica* and *L. stylolepis* as commensal forms of polynoids from Solomon Islands has mentioned that a good number of *Lepidasthenia* species prefers a commensal habit and 'certain structural modifications can be interpreted as adaptation to a burrow dwelling habit'.

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Gattyana deludens was first described from the Bay of Bengal by Fauvel (1932) from the collections of the R.I.M.S. 'Investigator' and the collections of the Indian Museum, Calcutta, but only mentioned that they may probably be from hermit crab shell. However, in the later work (Fauvel, 1953) no mention is made on their commensal habit. The present report establishes their commensal habit with the hermit crabs and their extended distribution in the west coast of India.

Gattyana deludens Fauvel, 1932

Gattyana deludens Fauvel, 1932 : 18-21, fig. 1 a-g, fig. 2 a-h ; 1953 ; 39, fig. 15 a-g, 16 a-g.
Uschakov & Wu, 1959 : 14, Pl. 6 ; 1963a : 158 ; 1963b : 19.

33 specimens from east and west coasts of India, measuring 9 mm to 23 mm collected in association with hermit crabs, the shells of which are covered by actinians and *Dorippe* sp. carrying bivalve shells occupied by sea anemones. Details of collection are shown in Table 1.

The present specimens agree well with the elaborate description of this species given by Fauvel (1932). Body is very flattened compared to the width of the animal. During the studies on polychaetes from 1966 by the author, *G. deludens* is never collected as free living form either from the intertidal regions or from dredge collections. The highly flattened body in *G. deludens* compared to all other polynoids known, is well suited for their commensal habits and it helps to move freely along the thin space available in between the body of the hermit crab and the shell. By this association the polychaete collects food particles escaping while the hermit crab feeds on other animals. It is supposed that the worms help in keeping the cavity of the shell clean during their movements towards the inner whorls of the shell and while maintaining their respiratory current. In most of the cases two to three worms were collected from a single shell. The association appears to be mutual since the presence of the polynoid does not force the hermit crab to leave the shell contrary to the habits of the hermit crabs changing the shelter when any irritating material enters the shell. A photograph of *G. deludens* commensal with hermit crab *Diogenes diogenes* is given in Fig. 1.

Eleven species of *Gattyana* are hitherto known and *Gattyana deludens* Fauvel and *G. mossambica* Day (1962) are the species reported from the Indian Ocean. *G. pallida* Ehlers (1908) from P. Nias and Bangkam (' Valdivia ' stations 194 and 203) in 614 m and 660 m is referred to the genus *Eunoe* by Fauvel (1932) since they have stout notosetae instead of the slender capillary notosetae in *Gattyana*.

Distribution : Bay of Bengal, Arabian Sea and Yellow Sea.

Discussion

Polychaetes in general and polynoids in particular prefer dark crevices and other protected areas as a general habitat and it is usually difficult to decide whether a particular occurrence with another animal is accidental unless the association is carefully observed and this is true when the wide gap of our knowledge on the association of deep sea invertebrates specially when deep sea expedition material and collections from great depths are studied.

It is worthwhile to consider the general habit of other species of *Gattyana* before studying the degree of commensalism in *G. deludens*. The association of *G. cirrosa* (Pallas) and the terebellid *Amphitrite johnstoni* Malmgren is well known. Various authors have reported this polynoid from different habitats like sandy mud, gravelly sand, old tubes of *Pectinaria* and of Maldanids, in tubes of *Chaetopterus variopedatus* and in burrows of lug worms (Pettibone, 1956, 1963). Davenport's (1953a) series of experiments on *G. cirrosa* using material collected at the estuary of the Yealm and at Salcombe indicate that chemotaxis is less important in attracting these worms to the host and their general habits. *G. mossambica* are reported on the tubes of *Eunice tubifex* from Inhaca Island, Delagoa bay, Mozambique (Day, 1962).

The association in *G. deludens* and the hermit crab appears to be mutual. Hermit crabs usually eliminate any foreign body entering the shell or select a different

shell if they cannot remove the irritating material and, moreover, they frequently change their shells as they grow and to have an association with an animal with this habit is risky unless the partner also accompanies the host to the new shelter. The habits of *Polydora commensalis* Andrews (1891) accompanying the host (hermit crab) until the crab selects a new nassid shell is described by Hartman (1965) and if a

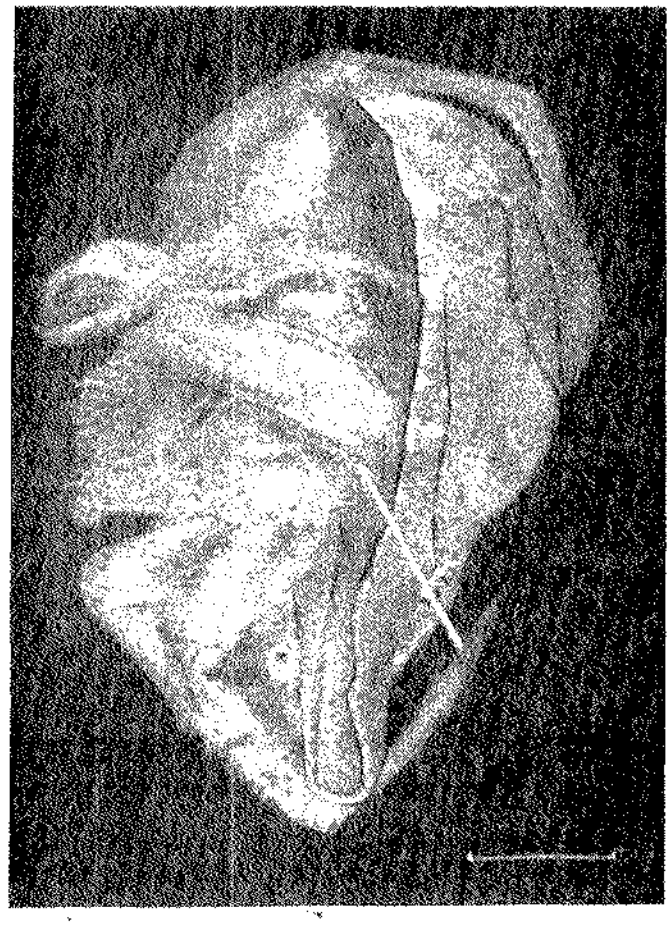

Fig. 1. *Gennia deludens* Fauvel commensal with Hermit-crab *Diogenes diogenes* Herbst (Arrow indicates the polychaete, scale one cm.)

dioecious sedentary form like *P. commensalis* with dwarf males show so close an association with its host, it is reasonble to think that *G. deludens* may show similar habit when the host shifts to a new shell.

The stimuli which attracts the commensal to the host is still under study and Dales (1966) states that the 'specific recognition factor is chemical'. Devaney's (1967) studies on the cetocommensal polynoids associated with brittle stars of

Hawaiian waters indicate that the host may be releasing a diffusable chemical metabolite. However, in the present study the host and the commensal response could not be studied but as has been given in Table 1, the majority of *G. deludens* are collected from the host, *Diogenes diogenes* from the Bay of Bengal and Arabian Sea and, as such, there is more preference noticed in the selection of the host compared to other hermit crabs occurring in this region.

TABLE 1. *Hosts of* Gattyana deludens *Fauvel, from Indian region*

Date of collection	Place of collection	Number of specimens	Length range in mm	Host	Remarks
11-1-1968	Azhikode, North of Cochin	3	14 to 17	*Diogenes diogenes* Herbst	
30-1-1968	Calicut	5	9 to 18	Do.	
———*	Quilon	12	9 to 21	*Diogenes diogenes* and *Dorippe* sp.	Few specimens collected from bivalve shell occupied by sea anemone and carried by *Dorippe* sp.
6-2-1968	Mangalore	1	18	*Diogenes diogenes*	
8-4-1968	Kakinada	3	16 to 17	Do.	One specimen anterior part of 12 mm.
20-5-1969	Nagapatnam	3	14	*Diogenes custos* Fabricius	Two specimens anterior part of 11 and 12 mm.
5-11-1969	Madras	6	14 to 23	*Diogenes diogenes*	One specimen anterior portion of 14 mm.

* Collection from Quilon was kindly lent by Mr. K. R. Purushothaman Nair, Marine Station, Quilon, collected at different times.

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