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Note biologiche sui Polycladi: relazioni con i Molluschi (Turbellaria-Polycladida) – English version (Translated by Daniel Marquina)

BIOLOGICAL NOTES ON POLYCLADS: RELATIONSHIP WITH MOLLUSCS (TURBELLARIA- POLYCLADIDA)

INTRODUCTION

In the literature there are numerous data referring to biological associations between numerous marine organisms and Polyclads, both Cotylea and Acotylea. The forms of predatory Polycladida are frequently found near or in the immediate vicinity of the sessile prey, as for example Madreporaria: Jokiel & Townsley (1974) have defined *Proshiostomum* an obligate ectoparasite of the *Montipora* madreporarian. Some predatory polyclads were found in the secretory epidermal tubes from Nemerteans and from tubular Entomostraca (see Prudhoe 1985). In light of the results published up to now, however, the most prized organisms are the Cirripeds, the Ascidians and the Lamellibranch Molluscs.

Representatives of the *Stylochus* genera, such as *S. pilidium* (Goette, 1881) or *Stylochus zanzibaricus* Laidlaw, 1903 *Coronadena*, as *C. mutabilis* (Verrill, 1873) present a dietary regime of Cirripedi (Skerman, 1960 Lawler, 1969). Polyclads of the genera *Pseudoceros* and *Leptoplana* live on Ascidians and depend totally on them, if in fact they are removed from the prey refuse to feed on other ascidians and die within 24 hours or within 48 hours. The settlement of the Polyclads in the gonads, for example in the burse of the Ofiurids, determines the parasitic castration of the host (Kato, 1935). The environmental association with the Molluscs are particularly frequent and still partially documented. In total, four different types of synecological relationships between Molluscs and Polyclads can be defined: predation, commensalism and inquilinism, Batesian mimicry.

PREDATION

A few cases of Prosobranchs and numerous examples of Lamellibranchs preyed on by the Polyclada are documented. It is reasonable to assume that mobility and fixity act

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as discriminating factors in the predatory choices of Polyclads. The Prosobranchia preyed (v Prudhoe, 1985) are reached by means of the evagination of the pharynx plicate and its insinuation into the shell. This type of predation is still little known and there are no data on the mechanisms of tropism and achievement of prey.

The sessile and gregarious Lamellibranchs, on the contrary, are frequently attacked and preyed. Galleni *et al*. (1977) demonstrated a chemotactic orientation for *Stylochus mediterraneus* but in other species orientation has been denied. *S. mediterraneus* normally feeds on *Mytilus galloprovincialis*: the Polyclads straddles the valves (Galleni *et al*. (1977)) in correspondence with the adductor muscle, which has led the authors to hypothesize the predigestion of the muscle. Often *S. mediterraneus* and other forms of Stylochidae shelter, hiding, in the empty shells (pers. Obs.) of the preyed *Mytilus*. On the inner surface of the shells, the embryonated eggs are often laid and grouped in nestings in the shape of very small pads. Some forms of Polyclads are "endemic" to the *Mytilus* banks, such as *Indistylochus hewatti* (Hyman, 1955). *Taenioplana teredini* Hyman, 1944 and *Stylochoplana affinis* Palombi, 1940 live in the wood cavities produced by Teredinidae (see Hyman, 1944, Prudhoe, 1985) but Teredinidae predation is not documented. In the mesolittoral and within the first meters of depth of the infralittoral Polyclads show a clear negative phototacticism. In this way the tendency to take refuge in the shells or in the cavities of the Teredinidae is explained. The most serious damage by the Polyclada is obtained at the oyster banks. The bibliographic data in this regard are numerous (*e.g*. Palombi, 1931; Bytinski-Salz, 1935; Lander & Srhodes, 1970 etc.).

Also in this case there is an external predigestion and the enzymatic activity sometimes determines the erosion of the calcareous layers of the oysters, as shown by *Pseudostylochus ostreophagus* Hyman, 1955. Some AA. believe that the role of the Polyclads as devastating of the oyster banks is not that marginal towards the predatory activity of wandering Polychaetes.

However, it has been demonstrated that the severity of the infestation, hence the predatory activity of the Polyclads, increases in proportion to the increase in temperature and salinity, thus becoming the main responsible for the destruction of oyster banks.

INQUILISIM AND COMMENSALISM

Some species of Polyclads live in cavities of other organisms obtaining advantages of various types: often they are localized in shells of gastropods occupied by Decapod and Anomura. This localization guarantees the Polyclads a continuous flow of water rich in oxygen, conveyed by the action of the gill epipodites, and at the same time guarantees the protection from light and potential attackers. Similar advantages are ensured by localization in the shell and in the pallial cavity of Polyplacophors, Gasteropods and Lamellibranchs molluscs. However, the adaptation leads to a total dependence of the Polyclad: the removal of *Stylochoplana parasitica* Kato, 1935 from the pallid shell of the host determines the death of the Polyclad within a few days, probably because unable to tolerate a drastic variation in the oxygen supply (Kato, 1935). *Notoplana patetlarum* (Stimpson, 1855) is localized, taking advantage of the same advantages mentioned above, in the shell of the South African Archiogasteropod *Patella oculus*. *Hoploplana inquilina* (Wheeler, 1894) has been found, even in number of 6 specimens with a vault, in the pallial cavity of *Busycon* (see Prudhoe, 1985).

Even the pelagic Polyclads can be located in the cavity of molluscs: so, for example, *Planocera simrothi* (Graff, 1892) is found in the shell of *Janthina* but does not seem that *Planocera* feeds on infested molluscs. In fact, in the celenteron fragments of Sifonofors have been observed (Graff, 1892). Numerous species of Polyclads, finally, are adapted to live in the pallial cavities of Lamellibranchs, especially oysters.

BATESIAN MIMETISM

The Polyclads are usually adapted to passive defence, finding shelter, especially during the day, in the rocky ravines, under rocks or among the defensive formations of other organisms. In the Hawaiian and Indonesian waters *Ceratoplana colobocentroti* Bock, 1925 takes refuge under the Echinoid *Colobocentrotus stratus* (see Prudhoe, 1985). As known, numerous species of Polyclads exhibit intense and contrasting colours. The meaning of these colours is double. In most cases, if irritated, the Polyclads secrete a quantity of mucus and there are also poisonous secretions, capable of killing other organisms. Not all the brightly coloured Polyclad species, however, are provided with active type defensive strategies: in particular, it is

possible to envisage a phylogenetic convergence that has led to a whole group of Polyclads, that of Pseudocerotids, to resemble the Doridian Nudibranchs, in the colours and also in the type of reptation on the substrate.

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SUMMARY

Between the Molluscs and Polyclads there are established different types of biological associations, still known in a superficial manner. The data presented in this note have been taken from the literature and integrated with original observations.

The "synecological" relationships between Molluschs and Polyclads often become very complex and can be schematised in four different types: predation, inquilisim and commensalism, and Batesian mimicry.

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