Indo-Pacific Ascidian Studies[1]

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Ascidians are sessile tunicates which are cosmopolitan, occurring in all seas, at all depths. All the species are generally considered to belong to fourteen families. As with the other small-sized and virtually noneconomic invertebrates, little work is being carried out at present. Older expedition reports were extensive and well illustrated, but, unfortunately, almost none of these are useable in the identification of specimens from the shallow waters of the islands. Studies for ascidians in Japanese waters continues. Tokioka's (1953) work on Sagami Bay is probably one of the most valuable, but it contains no keys to assist in identification.

Certain types of ascidians are relatively common throughout the islands. Tokioka (1967) describes 127 species from the collections of the Smithsonian Institution. These come from many diverse islands, including the Philippines, Japan, and areas in Polynesia. Earlier, Tokioka (1963) in a review of Japanese ascidians lists 302 species. He compares and contrasts the fauna of Japan with the North American coast, the West Indies, the Mediterranean Sea, and so forth.

Specifically, one family—the Didemnidae—has been looked at from an Indo-Pacific and East Pacific viewpoint (Eldredge, 1967). Over 200 species are listed and located geographically by collection sites. Throughout the central Pacific, members of this family are probably the most common ascidian found in the coral reef.

The didemnids are colonial forms, each individual being about 1 mm in length. Colonies may be extensive with hundreds of individuals or may be small with only a few. Additionally, didemnids are the only ascidians with stellate, calcareous spicules, usually being less than 100 μ in diameter. Unfortunately, not all didemnids have them. The genus *Diplosoma* is characterized by their absence. They may or may not be in the other genera.

In older studies, many researchers relied very heavily on spicule morphology and distribution. At the same time other workers disagreed. The following points out a few problems in interpreting spicules. Their density is variable within a single colony. It is not known whether several different colonies will grow together, forming what appears to be a single colony. VanName (1952) suggested that colonies may pass through times of extreme temperature and salinity, or other unfavorable situations and regress, the individual maintaining itself but not actively

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growing. When normal conditions are restored the colony returns to a normal state, budding new individuals which produce spicules and, therefore, doubling the spicule concentration within the same colony. Spicule diameter, number of rays, and the shape of the rays are also features which lead to confusion. Ray shape and number can be altered by improper handling during collection. Unbuffered formalin can cause erosion of the calcareous tips.

Another major problem in interpreting spicules is the fact that their origin is not positively known. Two thoughts have been expressed—that they are products of the colony independent of the individual or that they are produced by the lateral organ of the individual. Interestingly enough, aspicular species often have lateral organs.

Serious analytical studies need to be carried out with spicules. Extensive collecting should be done where animals are common.

Didemnid ascidians are also the only forms which incorporate algal cells with the colony. In at least one examination these have been determined to be zoochlorellae. The fact that the larval transmit the algal cells in specialized pouches (Eldredge, 1967) has been interpreted as sufficient evidence to warrant separation at the species level. However, this is an artificial situation, since so few didemnids contain algal cells.

Larvae studies for all ascidians should be carried out. Most have a very short larval existence. Groups of colonies or clusters of solitary forms may represent one or more generation.

A major problem with studying museum specimens for taxonomic purposes began with the original collection of the animal. Since all forms are sessile, they are difficult to remove from the substrate. Actual collection of the substrate is best, however, not always feasible. The individual or colony should be very carefully peeled or scraped off the surface. In all cases the animal should be narcotized to relax the soft, delicate internal organs. Magnesium sulfate has proved very successful. Permanent storage can be in any of the regularly used preservatives.

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