# ALGAE GROWING ON ZOIC SHELLS

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Upon observing the algal growth in the small artificial pond, located just in front of the morphological laboratory of the Botany Department of National Taiwan University, the writer became interested in the filamentous algae growing on snail shells. He began to collect the interesting epizoic algae from the previous mentioned pond, as well as from rivers near the cities of Nantou and Suao, these were growing attached to the river snail (*Viviparus malleatus*), and he also collected algae from the pond tortoise (*Cyclenus flavemarquetama*) at the Taipei Zoo. The writer has carefully studied these preserved samples and has also cultured these algae for six months, so has had an opportunity to observe them.

On the shell of pond snail (*Radix ollula*), the writer observed that the attached globose or flattened green masses are *Chaetophora elegans.* The dichotomous filaments of this alga spread out from the center of the gelatinous colony; those in the upper part of the tufts are more branched, ending in pointed cells some of the apical cells are extended as long, straight hairs toward the margin of the colony.

The fur-like coat on the river snail is *Cladophora glomerata.* It is attached to the shell and is a dark green, soft, fluffy mass of filaments. The filament branches regularly and is often Y-shaped. Almost all branches have a 45 degree angle to the axial filaments. Cells are cylindrical and their walls are thick, but not laminated. The branches always occur on the uppermost part of the axial cells. The basal cell extends its lower portion as a rhizome to fasten the whole plant by its firm holdfast to the shell. The writer has found young *Ulothrix* as an epiphytic alga growing on the filaments of *Cladophora glomerata.* Small *Ulothrix* plants are attached directly to the shell of the river snail or on the holdfast of *Cladophora glomerata.*

Filamentous algae may serve as a heavy fur-coat to protect the host from damage and from being caught. The "Green-Haired Tortoise" is protected by people. They are reared in the ponds of temple areas. Wang (1935) had found that *Schizomeris Leibleinii, Stigeoclonium tenue* and certain species of *Cladophora* grow on fresh-water mussels. She also found dense growth of *Stigeoclonium tenue* and other species on living toads, in the early spring. Algae living in water can always be divided into two groups, the planktonic and attached forms. Unicellular algae freely float in the water, while the filamentous algae are often attached firmly to the banks, bottom or to floating things.

Potter (1889) described an irregular, roundish, dark-green alga growing on the European tortoise. Collins recorded the new species *Chaetomorpha chelonum* on the back of living turtles.[8] Following his discovery, Yendo (1929) in Japan recorded

a new form of *Chaetomorpha chelonum* on *Chemmy japonica* (a Japanese pond turtle Hoffmann and Tilden (1930) studied carefully the green "back moss" on the snapping turtles and described it as a new genus of *Cladophoraceae, Basicladia.* Up until now there are still only two known species: *B. crassa* and *B. chelonum.*

Wang (1935) distinguished a new variety of *Cladophora glomerata* from *Basicladia* on the Chinese "green haired tortoise" in Nanking. The writer first thought that the sample collected in Taipei on August 5, 1965 would be *Cladophora glomerata* var. *nana* Wang, because of the similarity of the branching to that described by Wang, but fructiferous filaments of *Basicladia* appeared in August, while the *Cladophora glomerata* var. *nana* grew in the winter and spring. A second sample collected on March 1, 1966 shows many reproductive filaments.

The alga is attached to the carapace by a branched holdfast, the upright filaments are borne in tufts. The basal coenocyte cell is very long, its chloroplast often breaking into two parts formed by a pseudo-septum. Vegetative cells (20-24 ×120-200 $\mu$) are short and swollen, barrel-shaped, or globular. The cell wall is very thick, firm, distinctly lamellate and thicker at the nodes (specially at the first node just above the basal coenocyte). Filaments branch alternately, opposite or occasionally whorled. Dichotomous branches are borne on young plants, and even older filaments and fructiferous ones have this type of branching which makes it different from that described by Hoffmann and Tilden. At first the writer thought it was an intermediate form between *Basicladia* and *Cladophora.* While observing some diatoms, *Phormidium, Oscillatoria* and other species of unicellular algae among the filamentous algae, he found zoospores of *B. chelonum* swimming around. The form of the zoospores are exactly the same as that figured by Tiffany and Britton (1951). The writer considers that the reason for the more profuse branching of *B. chelonum* is because of its growing in a subtropical area.

The following is a description of its reproductive structures as given by Tiffany and Britton. "Fragmentation; zoospores or gametes from shortened cells of the filament; gametes, discharged from mother cell through a lateral pore, biflagellate, spindle-shaped, with numerous chromatophores and an eyespot; zygote at first spindle-shaped and quadriflagellate, later spherical, without flagella."

Three kinds of algae in this paper are newly recorded to the Taiwan phycological flora. The writer is indebted to Dr. Charles E. DeVol for reading over the manuscript.

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