History and Longevity's Secret Hunted in Clamshells

By BAYARD WEBSTER

PRINCETON, N.J.

EVERY two weeks, Ida Thompson gets a couple of bushels of clams, not to eat them but to look at their flesh under a microscope and to saw their shells in half. By examining the sawed edges of the shells, she obtains a feast of scientific lore.

Dr. Thompson, an assistant professor of geological and geophysical sciences at Princeton University, has become the first scientist to learn some things suggesting that clams are more complex and interesting animals than had commonly been thought.

Her research has shown, for example, that the bands of a clamshell, grown each year like the rings of a tree trunk, can determine a clam's age. And by examining the bands she has found that some kinds of clams live for as long as 150 years, making them the longest-lived of all invertebrates.

She has also discovered that, despite its antiquity, such a clam shows no signs of aging, has healthy reproductive organs and remains sexually active throughout its life. Thus far, it is unclear whether clams die of old age.

In addition, she has found that the yearly growth bands of long-lived clams vary their width in 20-year patterns that correlate with the 20-year sunspot cycles, which are believed to influence the earth's climate.

•

Seated in her plant-filled office on the third floor of Princeton's Guyot Hall and holding a five-inch-long, 90-year-old clamshell, Dr. Thompson explained that her discoveries eventually may help marine biologists conduct more precise ocean climate research and lead them to a deeper knowledge of the causes of senility or perennial youthfulness in many animals, including man.

Dr. Ida Thompson of Princeton University has discovered that the bands of a clamshell correspond to its age

Her research, which has been published in the scientific journal Marine Biology, has also attracted the attention of the shellfishing industry, which is anxious to know where and how clams live and how long it takes them to grow to an economically useful size.

For 10 years, Dr. Thompson has concentrated her studies on three common types of hardshell clams that grow along the Atlantic coast from Maine to Florida. These are the common, or American, quahog; the surf clam, and the ocean quahog, sometimes called the sea clam. Though similar in appearance, they are entirely different species.

The common quahog grows in sandy bottoms close to shore, usually in bays or other protected areas. About the same size as the ocean quahog, but smaller than the surf clam, it is usually dug by hand or raked and is not harvested on a large commercial scale, although it often winds up as a Little Neck or Cherrystone cocktail on East Coast dinner tables.

Surf clams, whose handsome shells are often used as ashtrays in summer cottages along the shore, live farther out to sea, beginning at about the low tide mark. Shellfishermen dig them for bait, rake them and dredge them in great quantities for commercial use in canned chowder and other foods.

The ocean quahog lives even farther out on the sea bottom, from 50 to 600 feet below the surface. Similar to the common quahog, the ocean species, when mature, ranges in length from two to six inches. Although the ocean quahog has a slight iodine taste, it is increasingly being harvested with drag scoops for use in canned chowder, canned minced clams and, recently, as the fried clams served in some restaurants.

To pursue her research, Dr. Thompson, who teaches zoology and paleoecology — the study of ancient animals and their environment — often hires a boat or hitches a ride on a trawler that drags for clams off the New Jersey coast. Taking samples from each haul, she carefully extracts the meat, or body, of some of the clams for microscopic examination.

But the shell holds the most interest for her. "To cut a clamshell open and be able to read there something about its life and how long it has lived is a fascinating notion," she said.

She carefully cuts a shell from the hinge section to the outer edge, polishes the sawed edge and makes an acetate "peel" of it — a thin transparent sheet that shows the annular rings.

The rings are believed to be formed by a decrease in calcium deposits that leaves a concentration of organic material in the shell. That concentration is picked up by the acetate peel. Radiometric assays have confirmed that clams produce a ring each year.

Dr. Thompson's discovery of an ocean quahog that lived to the age of 150 meant that the title of "longest-lived invertebrate" no longer belonged to a European fresh-water musssel that was believed to have lived 60 to 100 years.

•

The scientist noted that other invertebrate animals such as sea anemones, which used to be kept as pets in glass jars, often live for 70 or more years. Among vertebrates, Galapagos tortoises are known to live for almost two centuries.

The bands of a clam, which can be differentiated with the naked eye on the outer shell of a surf clam, but not on most others, vary in width as a result of annual environmental changes. Dr. Thompson thinks that clam shells may thus provide an environmental chronology similar to that provided by the rings in trees.

The width of a tree's rings are determined by the temperature and wetness each year uring its life. In a similar way, Dr. Thompson believes, the width of clamshell rings is probably determined by yearly conditions such as water temperature, food supply and the oxygen content of the water.

If correlations can be made with accurate records of marine conditions each year, it would eventually be possible to use a clamshell as an environmental calendar of the ocean's subsurface "weather" for periods as long as 150 years or more.

A large portion of Dr. Thompson's clam research is funded by the Federal Sea Grant program, which sponsors scientific studies of the nation's marine resources. Her projects are administered by the New Jersey Marine Sciences Consortium, which has its headquarters in Princeton's Forrestal Center.