

they hold the first place. The ear-shells belong to conchological genus *Haliotis*, and there are almost a hundred species of them scattered about the world, our own Atlantic shore being almost the only coast where the haliotis is not represented. In many countries the animals are eaten, and everywhere the shells are highly valued. This group of mollusks, therefore, has surely enough interest about it to fill a leisure column.

In Southern California the gathering of haliotis affords employment to a large number of persons, and a considerable commerce has sprung up. There the mollusks are called "abalones"—a word of doubtful Spanish-Indian derivation. The business is chiefly in the hands of the Chinese, and that it should be so is very natural. At home the Chinese were, and yet are, accustomed to dry the flesh of their own haliotis (which is abundant from Malaya to Kamtchatka) as a food luxury. Finding in California practically the same mollusk, they at once began to gather the abalones for the sake of the meat, the surplussage of which they dried in salt, and shipped home to China at a good profit. After a time white men began to pick up the shells thrown away, and to work them over into ornaments and objects of jewelry. Thus apprised of their value, the Chinese also saved all the shells they got, and soon found this half of the catch brought more money than the dried flesh. For three or four years past the business in these shells has been extensive, but fears are felt that the mollusks may soon become exterminated. Late information concerning the abalone fishery has been received by the United States Fish Commission from Messrs. D. S. Jordan and W. N. Lookington, their agents on the Pacific Coast. They tell us that the abalone-producing region extends from San Francisco to Lower California, San Diego being the principal depot outside of the capital, receiving largely from Mexican waters. For a long time Mexico paid no attention to this trespass upon her shores, but now she charges a license duty of sixty dollars a year upon every abalone boat from the United States.

Abalones thrive best among rocky, weed-grown crags and reefs alternately exposed and submerged with every tide, and in a warm climate. They are vegetarians, feeding upon the sea vegetables, of which there is always an abundance

in such places. Their fleshy base or "foot," upon which the convex, ear-shaped shell is carried, concealing and protecting the vital organs, is "very large, rounded at the ends, and fringed with thread-like tentacles, which, when the animal is protruded from the shell below the surface of the water, are gently swayed."

They move very little, and with great moderation of gait. The broad muscular foot is adapted less to locomotion than for adhesion, and so strong is the force with which they cling to the rock—withdrawing their protracted lobes, and squatting flat-down at the least disturbance—that it often is exceedingly difficult to detach them, even with the aid of the trowel or spade which is usually carried by the fishermen. Another method is to pour over them a small quantity of warm water, and then give a sharp push sideways with the foot. The warm douche surprises and disgusts them into relaxation.

The tenacity of life in this mollusk seems equal to its hold upon the rocks. Mr. R. C. Stearns, of San Francisco, writes that he has frequently removed the animal from the shell, by means of a sharp knife, and thrown it back into the water, when "it would at once descend and place itself in its normal position upon a rock, to which it would adhere with apparently as much tenacity as before it was deprived of its shelly covering."

The meat of abalone has long formed an article of food in various parts of the world—the Channel Islands, French coast, and along the Mediterranean (where they beat it to make it tender), Senegal, the South-sea Islands, Malaya, China, Japan, and our Pacific coast. It was described by old Athenæus, centuries ago, as "exceedingly nutritious, but indigestible," and holds its reputation well. Mexico exports it to us under the custom-house heading "dried oysters." In San Francisco and the coast towns it is rarely eaten except by Chinese, who are the only ones who gather it. A simple process of salting and drying is all that is necessary for its preservation, in which shape it is sent to China. In order to get a ton of meat, about six tons of living animals must be collected, but there is no telling how many individuals this represents. After being cured, abalone meat is worth from five to ten cents a pound, and the value of

the crop which reached San Francisco last year approached \$40,000, distributed among some hundreds of men. The coast is now so stripped of the haliotis that the Chinese fishermen are compelled to resort to unfrequented islands, transportation to which is afforded them by American capitalists, who take their pay in shells, while the Chinese retain the meat.

The trade in abalone shells, indeed, is of twice as much importance, financially, as that in the flesh, since it amounted to nearly \$90,000 last year. Some Americans also are engaged in this business, and the finishing off of the shells for market is wholly in their hands.

The shell of the haliotis is one of the most brilliantly beautiful in its interior of any known. The lustrous, iridescent curves of the nacre, reflecting ever-varying and prismatic colors in endless profusion delight every eye. In aged specimens the part to which the adductor muscle is attached is raised above the level of the rest of the interior, and presents a roughened or carved surface of irregular shape, often fancifully imitative of some other object. The writer has seen one which thus contained a singularly correct profile or medallion of Napoleon I.

Outside, the shells are usually rough and unattractive, except to the marine zoologist, who finds them supporting a small forest of minute vegetable and animal forms, and harboring microscopic life of great interest. A curious case of a larger parasite is mentioned by Mr. Stearns, where a haliotis had been attacked by another mollusk—a boring bivalve known as *nacca*, which had cut its way through the shell. Advised of this enemy, the haliotis had defended itself by adding coating upon coating of nacre as a bulwark between him and his foe, until, as the *nacca* progressed, a large knob was built in the interior of the abalone's shell.

The shells are usually sent to San Francisco from the lower counties in the rough, and are the means of considerable speculation among the captains of coasting ventures. The price paid for them by merchants varies greatly; an average last year would be \$50 or \$60 a ton. From San Francisco they are shipped both to China and to the Eastern States. In China they are broken up and used for inlaying in connection with the lacquer work for which the Chinese