

59.—THE EDIBLE CLAMS OF THE PACIFIC COAST AND A PROPOSED METHOD OF TRANSPLANTING THEM TO THE ATLANTIC COAST.**By R. E. C. STEARNS.**

[Letter to Prof. S. F. Baird.]

In pursuance of the general instructions expressed in your letter of March 3, 1882, relating to the economic value of certain edible mollusks of the Pacific coast, and directions to inquire into the special peculiarities of their habitat, for the purpose of determining the feasibility of transplanting the same from the waters of the Pacific to those of the Atlantic side of the continent, both as a scientific experiment and as a resource in case of future contingencies, I took the requisite steps in the latter part of the following May to carry out your wishes, by having the necessary equipment made as referred to in my letter to you dated May 8, 1882.*

In addition to the facts previously of record, with further data obtained from various intelligent persons, supported by my own judgment, I concluded that some point on Puget Sound or within the Puget Sound infratidal region offered many advantages over any locality to the southward of the above and along the exterior or ocean coast, though all of the species which we had in mind occur at various places along the shore, even as far to the south as San Diego, a reach of over 1,100 miles.

Of the many favorable points on the Sound, I fixed upon Budd's Inlet, as the preferable locality, as the three species required were reported as being found there in considerable abundance and within a limited area, and convenient to a good base, namely, the town of Olympia.

The species sought for were *Glycimeris generosa*,† or geoduck as locally called, *Saxidomus nuttallii*,‡ the quahaug of some of the people in the region, and *Schizothaerus nuttallii*,§ which had been particularly recommended.

Besides the above I hoped to find other forms of economic and scientific value.

I finally got my equipment together so as to leave San Francisco on

NOTE.—Previous communications on this subject may be found in the Bulletin of the United States Fish Commission, Volume I, pp. 21, 200: II, pp. 20.—C. W. S.

* Bull. United States Fish Commission, 1882, pp. 20-21.

† By Mr. Hemphill.

‡ By Dr. Dall.

§ In my letter of May 8, and *ante*.

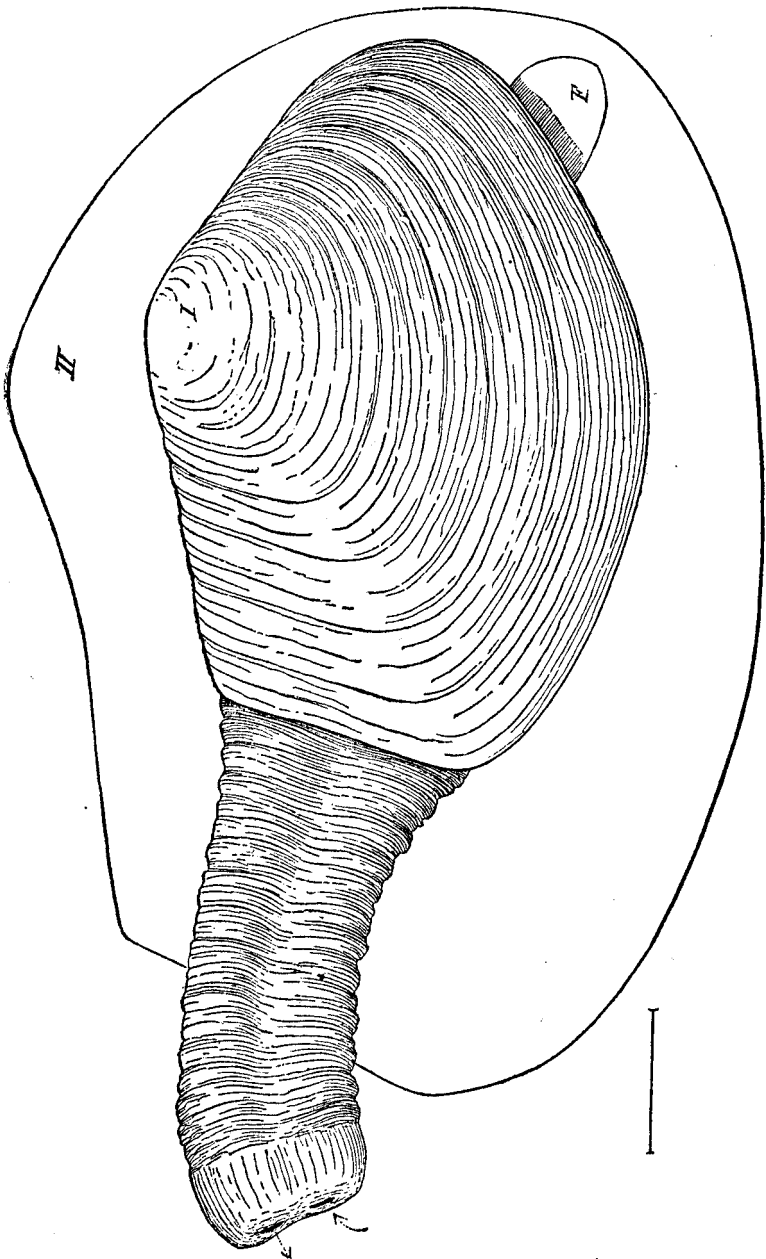


FIG. 1.—*Schizothærus nuttallii* Conrad. *Tresus maximus* Midd.; Gray. *Lutraria capax* Gould. West Coast, United States; Puget Sound to San Diego, California.
 I. Specimen of ordinary size, reduced about one-fourth in length. The siphons are somewhat contracted; the foot (F) expands about as usual.
 II. Outline of the left valve of a larger specimen, reduced to the same extent. The straight line below the siphons represents a length of one inch on the figures.
 Drawn from nature by R. E. C. Stearns.

the third of June, and after arriving in Portland, Oregon, where I remained several days, seeking for such information as might be of value hereafter, I arrived at Olympia on the afternoon of the 12th and the next morning proceeded to business. Unfortunately the persons to whom I had letters were out of town, but Captain Doane, an old Californian whom I came across, kindly placed at my service, rent free, a part of his building on one of the wharves, which, after a few slight repairs, made a convenient laboratory, where I arranged my tanks and other implements.

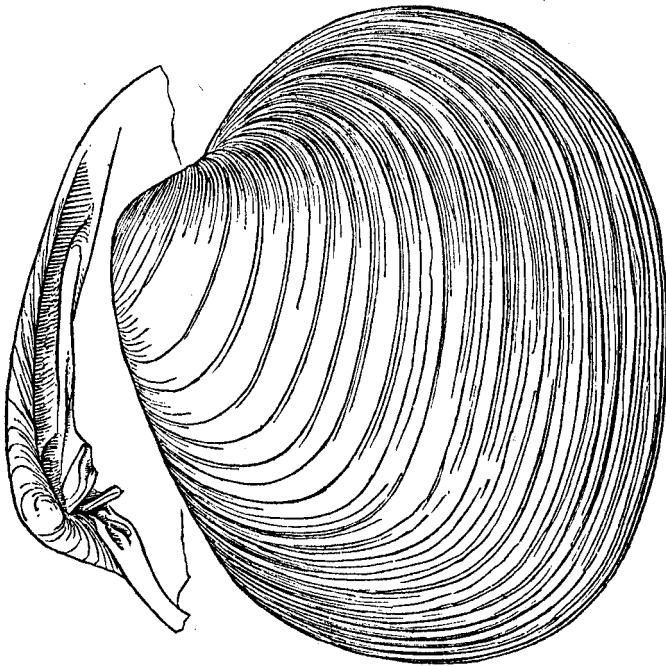


FIG 2.—*Saxidomus nuttalli* Conrad. *Saxidomus aratus* Gould. *Saxidomus squalidus* Dosh. *Saxidomus brevisiphonatus* Cpr.

West Coast, North America; Alaska to San Diego, Cal.

Natural size of a large specimen.

Drawn by J. H. Emerton.

I found it quite difficult to obtain intelligent assistance, and also felt somewhat embarrassed from not knowing how large an expenditure I might be justified in making. So I confined myself to the use of one man and a boat, and otherwise employed some of the Indians to bring in such clams as they could find. I discovered, however, that the red man of this region, as elsewhere on the coast, is particularly apathetic regarding anything like labor, and that many of the pale faces hereabout are not anxious to work.

As anticipated, I find *Glycimeris*, *Saxidomus*, and *Schizotharus* all here, also the common *Tapes* (properly *Cuneus*) *staminea*, *Cardium corbis*, and

Mytilus edulis; the latter wonderfully abundant, adhering to the piles all around the town, and in broad patches covering the flats exposed at low tide. They are not eaten to any extent, the clams of the neighborhood being abundant and preferable. *Zirphœa crispata* is also found and attains the extraordinary size of 12 to 13 inches from anterior extremity to end of siphons, the shell being 5 inches of the above length, while the girth is 9 inches just posterior to the umbos. The only gasteropods noticed were *Littorina scutulata* Gld., *Lunatia lewisii* Gould, and *Purpura crispata* Chem.; of the latter numerous finely foliated specimens were obtained, and a curiously dwarfed variety of *Acmaea pelta* on the local oyster, which latter is small, dark colored, and inferior. I found that the peculiar occurrence of the lowest tides would not permit me to give my attention to other species than those which I had especially in view at the time I started.

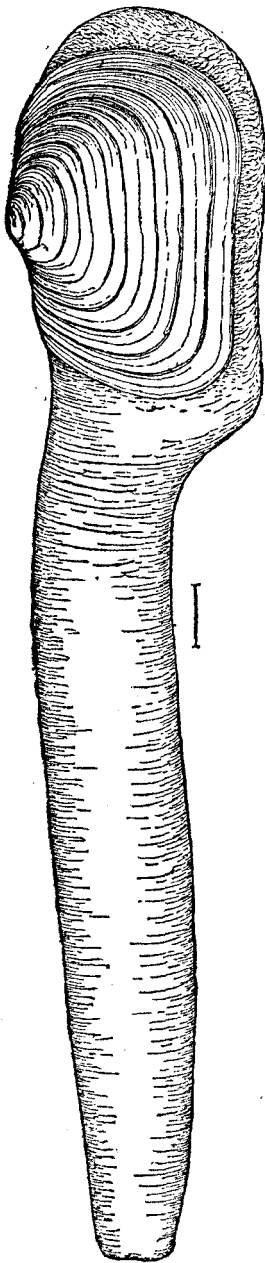


FIG. 3. *Glycimeris generosa* Gould.

West Coast, United States; Puget Sound to San Diego, Cal. Specimen with siphons extended; weight when alive 5½ pounds. The line underneath the figure represents a length of one inch. Drawn by R. E. C. Stearns.

As Budd's Inlet is to Puget Sound, namely, an arm thereof, so are several smaller bays or minor estuaries to Budd's Inlet. These latter are variously known as South Bay, Mud Bay, &c., and the character of their beds varies but little, one compared with the other, the variation being expressed by the terms "muddy sand" or "sandy mud." At the head of the inlet and in the front of the town, for considerable distance toward the mouth, the alluvium brought down by the stream known as Tumwater, combined with more or less drainage and refuse matter from the town, causes a deposit of ordinary slimy mud along and on both sides of the channel; but this, as elsewhere, overlies a yellowish sand, the same as may be seen in the hills and wherever a cut has been made in the neighborhood; this sand in some places contains more or less gravel, pebbles, and small bowlders.

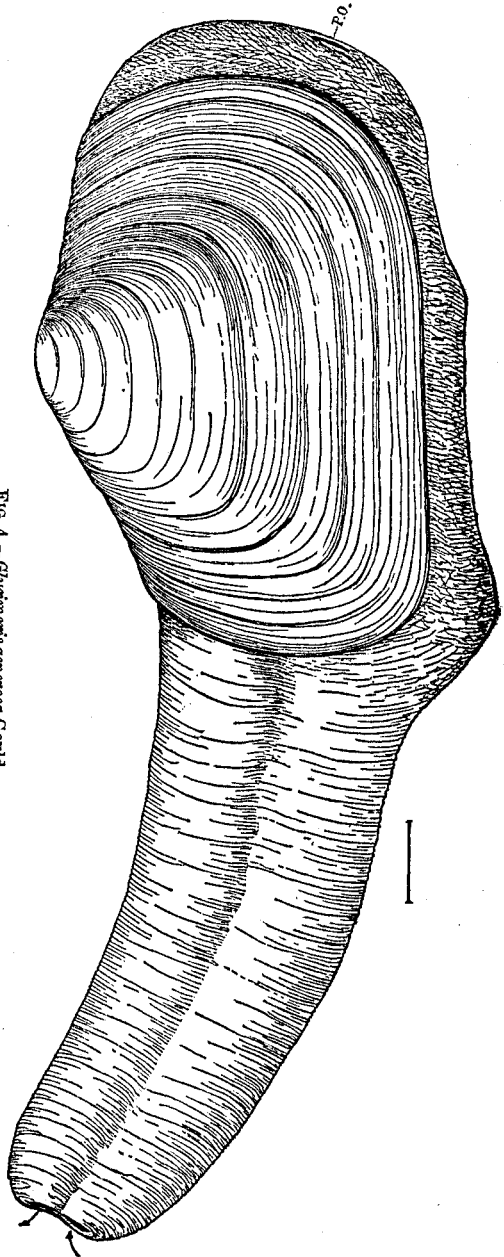
The principal clam used here by the whites is *Saxidomus*,* next to this *Cuncus* or *Tapes*, sometimes called the "little round clam," and occasionally only the mammoth *Glycimeris* or geoduck.

**Saxidomus* is fully equal, if not superior, as many persons think, to the Atlantic quahaug. It occurs plentifully not alone around Puget Sound, but at many points on

The cockle, *Cardium corbis*, is also used to a limited extent by the whites; all of the above are eaten by the Indians, while *Schizothærus*, which is certainly superior for its flavor and delicacy, closely approaching the best oysters in these respects, is not eaten by the whites in the immediate neighborhood, though preferred by the Indians above all the others. I except the geoduck, for this species is not sufficiently abundant to cut much of a figure as a constant source of supply. It is, however, a real delicacy, and, skillfully cooked, would completely puzzle persons who tasted it for the first time as to whether they were eating fish, flesh, or fowl. The nearest guess that I have heard was by a person to whom I gave a piece, "that it tasted a little, perhaps, like nicely stewed crab," which hits the mark as nearly as possible. The proper way to cook geoduck, or one way, is to parboil thoroughly, then remove the skin and cut in strips about one inch and a half wide by a third of an inch thick, and fry the same in batter, in very, very, hot salt-pork fat. I dare to say that parboiled, then stuffed and baked, or

Specimen with siphons partly contracted; weight when alive 6½ pounds. P. O., pedal orifice. Drawn by R. E. C. Stearns.

FIG. 4.—*Glycymeris genivosa* Gould.



the coast of California, especially at Bodega and thereabouts and San Diego. It is more nearly like the Atlantic quahaug than it is to *Mya arenaria*, which is becoming plentiful on the Pacific Coast, and is now the principal clam in San Francisco market. As heretofore stated by me in the American Naturalist, *Mya* is an introduced species, having been planted in San Francisco Bay with Atlantic oysters. Should California packers be able to compete with their eastern competitors the *Saxidomæ* will furnish a good source of supply.

roasted, geoduck would prove highly satisfactory to the daintiest epicure. Mr. Hemphill thought the taste like that of poached eggs. If fresh and well cooked, it is suitable food for very good men of scientific proclivities.

While the other clams are obtainable during the recession of the ordinary tides, during the year, *Glycymeris* can only be secured during the extreme tides which occur in this region from the middle of May to the latter part of June, when the difference between high and low water is about 20 feet; that is to say, with rare exceptions. It burrows in muddy sand, or apparently prefers such a place, and the depth of its burrow is from two and a half to three feet. To take one out uninjured requires careful digging and the removal of at least a barrel of mud. Mr. Hemphill remarks: "It is very rare at San Diego. I have not found a dozen specimens during the several years I have collected here, while at Olympia three men could secure a dozen at one low tide or in one day." To this I would add, provided that the exact site of each individual had previously been ascertained and marked with a stake. As many as three men would be required to work economically.

By the 23d of June, the "long-run outs," as these extreme low-tides are called, had ceased, and the weather for several days had been quite warm. The Indians whom I had sent out a day or two before, and one white man also, returned in the morning with some of the common species, but none of the geoducks. I had previously col-

lected nine or ten specimens, and hoped to get more, as some of the others had died. While in Olympia, only one lot had been brought into town during a fortnight—about a dozen; of these I bought six, the

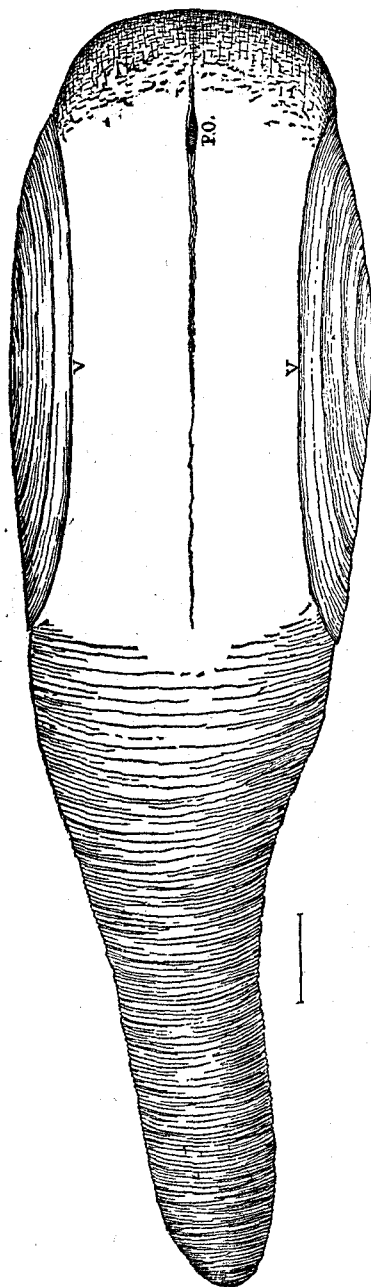


FIG. 5.—*Glycymeris generosa* Gould. Ventral view of preceding specimen, showing pedal orifice (P. O.), and lower edges of valves (V V). Drawn by R. E. C. Stearns.

others were in a damaged condition. Some of those purchased had been handled too roughly for transportation alive. I found by experiment that the geoduck, carefully dug and handled, would, with proper change of water and cool weather, keep alive ten days packed in rock-weed, first

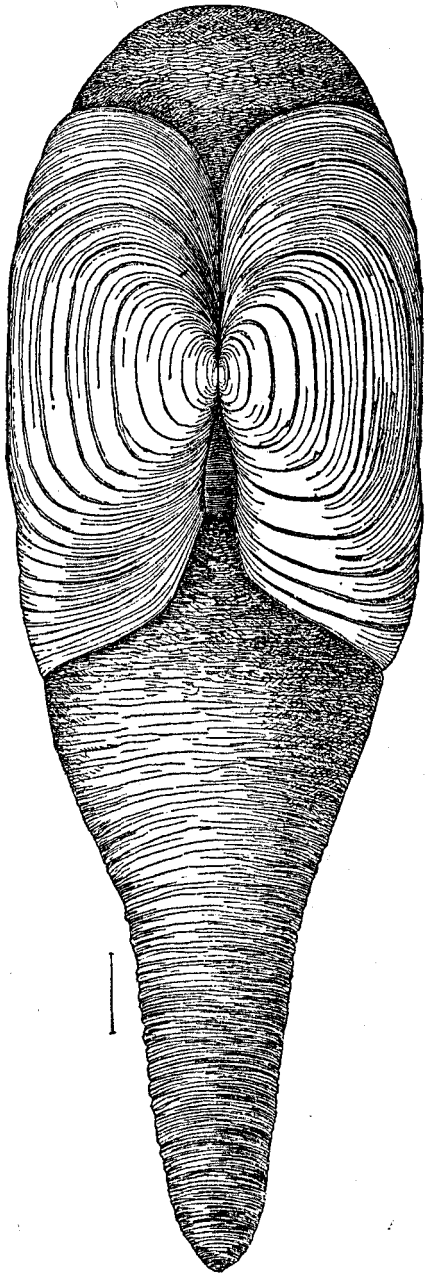
being protected by winding and tying a band of brown sheeting cloth, an inch and a half in width, to support the animal and take the place of the natural support which the mud furnishes when the mollusk is in its native bed. The coincident occurrence of the extreme low tides necessary to collect living specimens, and of warm weather; as usual here and along the coast at the time when these low tides occur, is unfortunate, as heat is the principal source of danger. The intention of packing in mud in the tanks had to be abandoned, as I found the means for handling the loaded tanks were wanting, the boats being too small, and a certain amount of tackle being required for the purpose; so rock-weed was used instead. I found, also, that *Schizothærus* was the least tenacious of life, and survived removal from the clam-beds but about three days, at farthest, even when carefully attended to, water changed, &c.

This clam occurs in quantities sufficient, quality considered, to warrant packing in cans. The clams now canned, while perhaps meeting a limited sale on the Pacific coast, cannot compete with the clams (*Mya arenaria*) and quahaugs (*Mercenaria violacea*) of the Atlantic packers in the markets of the World, though *Saxidomus*, which is not yet canned, is really of most excellent quality. *Schizothærus*, after removing the neck or siphons,

Dorsal view of a specimen weighing about 7 pounds; siphons contracted.

Drawn by R. E. C. Stearns.

FIG. 6.—*Glycymeris generosa* Gould.



considering the comparatively small size of the adductors, is as tender as an oyster. Being nearly all belly, it is of sufficient size, when shelled, for two to eight to fill a two-pound can.

I am of the opinion that this species, carefully packed and properly put upon the market, would soon be regarded as next to the best packings of the Virginia oyster, and would find a ready sale.

On the 24th of June I left Olympia, with tanks, etc., via Portland, Oreg., for San Francisco, and arrived at the latter place June 27, at 8.30 a m. Weather warm.

Through the kindness of the officers of the steamer, extra care and attention was given to the tanks and contents; but upon examination, after getting the same ashore, *Glycimeris*, *Schizothærus*, and *Saxidomus*, all were dead, though still quite fresh and sweet.

Aside from other information and experience derived from this experiment, the route via Portland, owing to the frequent handling required, is impracticable. If future attempts are made before the completion of the North Pacific Transcontinental Railroad admits of a special car being run through to Puget Sound, then the best route will be by some one of the Puget Sound steamers to San Francisco direct. The clams can be obtained at some other point on the sound, or else dug in Budd's Inlet and replanted in the immediate vicinity of some regular shipping station; or some other locality, perhaps, where *Glycimeris* occurs, may be found nearer to the points where the sound steamers touch in the course of their usual trips. I am however, inclined to doubt the practicability of handling these clams successfully, via San Francisco, for the reason heretofore given, namely, the coincidence of these low tides with the warm weather which pertains to that time of the year.

I should have mentioned before that, though *Glycimeris* sometimes attains the weight of 16 pounds, as I am informed by Capt. J. S. Lawson, of the United States Coast Survey, to whom I am indebted for kind assistance, the largest obtained by me weighed $6\frac{1}{2}$ to $7\frac{1}{2}$ pounds. There is no doubt, however, that individuals reach and even exceed the weight mentioned.

Herewith are drawings of two specimens of different weights, and in different positions, such as are usually presented by the geoduck, which is probably the largest *Saxicavid* known, and next to the true clam of the Indo-Pacific seas, *Tridacna gigas*, the largest clam in the world.

I have also provided drawings of *Schizothærus nuttallii*, and of the tanks which I had prepared for the special object of my mission, and which I believe are well adapted for the purpose.

DESCRIPTION OF THE STEARNS TANK FOR THE TRANSPORTATION OF CLAMS, ETC., FOR TRANSPLANTING.

The tanks, which were made in San Francisco under my direction for the above purpose, are of heavy galvanized sheet iron; the upper edge and bottom further strengthened by a stout hoop or band, marked

B in Fig. 7; the lower hoop projects below the bottom sufficiently to receive the wear.

At the bottom, and at a point about one-third the height of the tank from the top, are outlets O O, nozzled out an inch or so for drainage; these nozzles are reinforced with a shoulder of solder all around the outside, next to the body of the tank. When the clams are to be packed in mud or sand the lower outlet is stopped with a bung or a cork, the mud filled in to a line even with the upper outlet; said outlet is stopped and the space between the level of the mud and the top of the tank filled with water, and the screen, Fig. 8, placed upon the

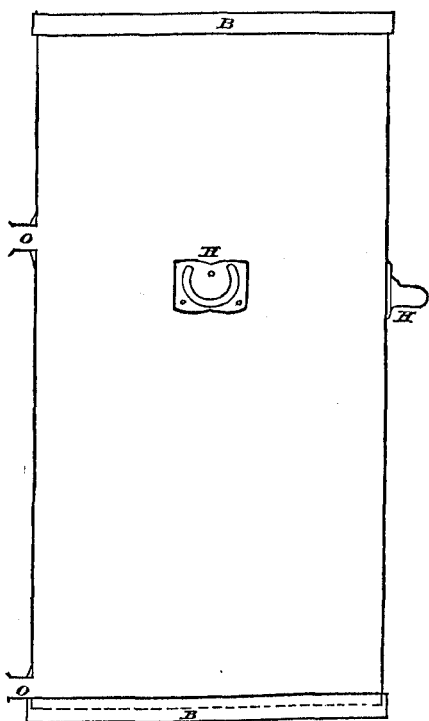


FIG. 7.—The Stearns tank.

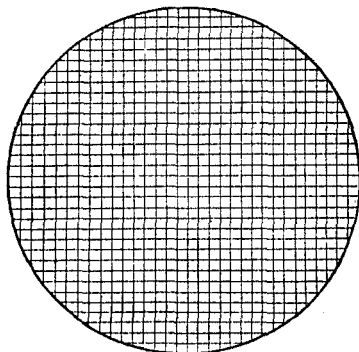


FIG. 8.—Screen for tank.

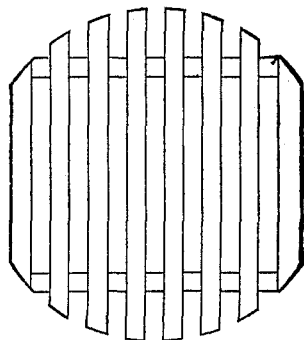


FIG. 9.—Slatted platform for tank.

top, resting upon angle-irons, L, just below the edge, to prevent the contents of tanks being molested by inquisitive persons during transportation. All that is required when change of water is necessary is to withdraw the bung or cork, run off the stale water, and again stop the outlet and refill with the water from a pail, etc.

When clams are to be carried in rock-weed, &c., then a slatted platform, of strips of wood, nailed to cross-cleats of sufficient height or thickness as to permit a space of three or four inches above the bottom, to receive the water and to keep the rock-weed packing above the bottom of the tank, so as to facilitate drainage when the water is changed, which is readily done by pulling out the cork or plug which stops the

lower orifice or nozzle. This permits giving the clams an occasional douche or bath of salt water while in transit, and the ready removal of stagnant or stale water. The tank is 3 feet in height by 1 foot 6 inches in diameter. It is provided with three stout handles which turn up, and when so turned, stop at a right angle with the side of the tank, so as not to pinch the hands when the tank is lifted. One of these handles is placed opposite the upper nozzle, the other two at points equidistant, on each side, between the first handle and the upper nozzle.

These tanks, substantially made of galvanized iron, handles of the same, also screen cover of galvanized wire, cost complete in San Francisco \$7.80.

BERKELEY, CAL., *October 14, 1882.*

60.—RETURN TO GLOUCESTER OF YOUNG CODFISH HATCHED BY UNITED STATES FISH COMMISSION IN 1879.

By BENJAMIN H. SPINNEY.

[From a letter to Prof. S. F. Baird.]

I have made inquiry about the codfish taken in Gloucester Harbor, and find several of the boat fishermen who are of the opinion that they are the ones that you hatched here in 1878. They are of a gray color and resemble somewhat a deep-water fish. They came in schools about May 1, and staid till the middle or last of July. Sometimes they are very plenty. I saw one man who said that he caught 70 or 80 pounds on a mackerel line while at anchor just off Five Pound Island, and that they would weigh from a half pound to two and a half pounds each. I have seen schools of them myself alongside of my wharf at the head of the harbor. I will try to get a sample and send you.

EAST GLOUCESTER, MASS., *August 18, 1883.*

NOTE.—Compare report of the return of these cod in 1882: Bull. United States Fish Commission, 1882, Vol. II, p. 112.—C. W. S.

61.—THE CULTIVATION OF CROPPIES IN PONDS.

By S. P. BARTLETT.

[From a letter to Prof. S. F. Baird.]

In 1880, Colonel Don. Morrison built upon his farm a reservoir and placed in it a few croppy of that year's spawning, which were sent to him by the Illinois Fish Commission. August 30, 1883, he undertook to seine it and take out the catfish. In this he partially failed, and among the fish taken were a number of croppies which weighed nearly two pounds each. One of these he kept and showed me the next day. So in a number of instances as great growth has been shown.

QUINCY, ILL., *September 18, 1883.*