

the twine will break and the instrument can be drawn out sideways. Then the boat is brought up in the wind or "luff her up," the boatman will say, and the dredge is let go, the dredger being careful not to allow the bag or net to become entangled in the frame. Some dredgers place a weight on the rope several feet in front of the dredge in order to keep it near the bottom, and window-weights are excellent for this, though stones will do.

It is impossible to dredge against the tide; one must dredge with it, or across it. Enough rope must be allowed, when dredging, to make an angle of from 45 to 30 with the surface, according to the nature of the bottom. On a smooth and hard bottom the latter angle can be safely used, but on soft mud much less rope must be allowed as the dredge has a tendency to bury itself and anchor the boat. It is, however, a matter which is quickly learned by experience, and a day's mistakes and successes will teach the reader more than I could in writing if the editors of the *Review* were to give up to me this entire number for the purpose, something they are far too wise to do. One very quickly learns to judge the character of the bottom from the feeling of the dredge rope, which by the way, the dredger ought always to hold in his hand. The tight rope acts as a sort of a telephone wire and communicates to him a pleasant smooth grating when the dredge is on gravel, an irregular not jerky pulling when on mud, and abrupt jerks and leaps when amongst ledges and boulders. The other end of the dredge rope should not be fastened to the boat but to a wooden buoy so that if a squall comes up, or the dredge becomes fast on the bottom at a time when wind or tide are not favorable to releasing it by tacking back over it, the whole may be thrown overboard, and picked up at a more convenient time. Ordinarily, the time the dredge is left down depends upon the character of the bottom, and the way it is working, but in general it is profitable to draw it up every fifteen or twenty minutes. Pails and tubs full of salt water are to be ready for its contents. Experienced dredgers use a set of sieves for sifting out its contents, but these are not needed at first.

Then with what eagerness we watch for its appearance as we and our boatmen draw it slowly to the surface, and how our hearts bound when it comes over the side half-filled with the clean salt-water life. There is a perennial cleanness, brightness, and suggestion of healthiness about salt-water animals from clear water. In such places we may find bright orange and pink star-fishes, five, ten, or twelve-rayed Ophiurans of brilliant and variable colors, or Astrophytons with their thousand slender arms. There may be those exquisitely colored Ascidians which

the fishermen call Sea-peaches, and the naturalists Cynthias; Sponges, Sea-anemones of brighter hues than their namesakes of the land; Spider-crabs, and Hermit-crabs in borrowed shells, Molluses, with bevalve shells of divers form and texture, and Gastropods with coiled and sculptured shells, and some with no shells at all; great colonies of Hydroids, with branching stems, feather-like, tree-like, and spiral, but always perfect in their symmetry; colonies of Bryozoa encrusting the rocks; writhing worms and their aristocratic relatives the Brachiopods, dozens upon dozens of forms of life of all sizes, shapes and colors, imitating almost every known object on land, or in the skies, are brought from the bottom of the sea by the naturalist's dredge. It is useless to attempt to describe it; the healthy delights of dredging must be experienced to be understood, and once experienced, one loves them for ever more.

There is yet a fourth method of collecting which should be added to these. Forbes, in his inimitable work, "*History of British Starfishes*," thus indicates it:—

"The stomachs of fishes are often zoological treasures. The haddock is a great conchologist. In his travels through the countries of the mermaids, he picks up many curiosities in the shell way. Not a few rare species have been discovered by him; and the ungrateful zoologist too frequently describes novelties without an allusion to the original discoverer. . . . Like the haddock, the cod also is a great naturalist; and he, too, carries his devotion to our dear science so far as occasionally to die for its sake with a new species in his stomach, probably with a view to its being described and figured by some competent authority."

The best way to get these often abundant treasures from their efficient but hapless collectors, is to enlist the services of the fishermen and ask them to save the stomachs. The work of opening and searching these is not nearly so disagreeable as would be imagined, and all conchologists must sooner or later come to it. There will be many disappointments, but also there will fall to the searcher's lot many rare shells and echinoderms, particularly of small forms, which the dredge would never bring up. The method has the advantage also of being inexpensive, and it can be followed at all seasons.

So much for collecting sea-animals. If we may tax the patience of the readers of the *Review* a little longer, we shall in the next number endeavor to tell them how to preserve their spoils, and how profitably to study and use them.

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