

SERPULAS, OR SEA WORMS.

The rambler along the sea shore will not unfrequently meet with shells, stones, and other objects that have long been immersed in the waters of the ocean, more or less incrusting with masses of white, calcareous tubes, which, from their writhing forms, at once suggest to his mind the idea of worms. The old bottle, covered with these familiar objects, shown in the annexed illustration, will perhaps recall a forgotten subject to the mind of many a reader. These elongated, variously twisted tubes, popularly supposed to be "petrified worms," constitute the dwelling places of certain small marine worms called *Serpula*. In the animal kingdom these little creatures have their place in the lowest class of Articulates. This class, the *Annelida*, embraces an extensive series of animals usually grouped together under the common name of "worms," and comprehends four orders, as types of which we may take, for instance, the (1) sea centipede, (2) the leech, (3) the earth worm, and (4) the marine worm (*serpula*). This class is remarkable as being the only section of invertebrate animals which possess red blood. The worms belonging to three of these orders are erratic, but the fourth (whose type is the *serpula*) includes creatures which inhabit a fixed and permanent residence that serves to inclose and protect them from external injury. This is generally an elongated tube, varying in texture in different species. Sometimes it is formed by agglutinating foreign substances, such as grains of sand, small shells, etc., by means of a secretion which exudes from the surface of the body and hardens into a tough membranous substance, as in the case of the *Terebella*. In other cases, as in *Serpula contortuplicata* (the species shown in the engraving), the tube is homogeneous in texture, formed of calcareous matter, and apparently secreted in the same manner; for this reason the tube keeps increasing in length and diameter as long as its inhabitant continues to grow, the formation of this protecting sheath being the progressive work of the entire life of the animal. The elongated body of these worms is divided into numerous rings, and its anterior portion is spread out in the form of a disk armed on each side with bundles of coarse hairs; in this disk is the mouth opening.

From the sides of the mouth arise the fan-shaped respiratory tufts (shown in the enlarged figures to the right of the illustration), forming most elegant arborescent appendages of a beautiful red color, mixed with yellow and violet, and exhibiting when expanded a spectacle of great beauty. In some species (as in the one illustrated herewith) there is a remarkable provision made for closing the tube when the worm retires within its cavity.

On each side of the mouth of the worm is a fleshy filament resembling a tentacle; but one of these, sometimes the right, sometimes the left, is found to be considerably prolonged, and expanded into a funnel-shaped operculum or lid, which accurately fits the orifice of the tube, and thus forms a sort of door, well adapted to prevent intrusion or annoyance from external enemies.

It has been shown by experiment that if these little creatures be taken from their shell, or the latter be destroyed, they make no attempt to form another, having lost either the faculty or the instinct of doing so.

As it is in the nature of *serpulas* to live in numerous colonies, we usually find their tubes agglomerated into compact masses on all kinds of submarine objects, about which they bend and twist themselves in all sorts of shapes. The curious bottle, the shape of which is so well preserved through the mass of *serpulas* and oyster shells which incrust it, is among the specimens in the Museum of Natural History, at Paris.

KING TODY.

The singular and beautiful bird which is known by the name of King Tody, or Royal Great Crest, is a native of Brazil, and may challenge competition with many of the flycatchers for elegance of form and beauty of coloring.

It is a very rare bird, to all appearance but little known in its native land. This species is chiefly remarkable for its

splendid crest, which is capable of being lowered upon the neck, or raised almost perpendicularly, in which latter position it assumes a spreading and rounded form, like an open fan.

The feathers of the crest are long and slender, and spoon-shaped at their extremities. Each feather is bright chestnut-red for the greater part of its length, a narrow stripe of rich orange succeeds, and the tip is velvet-black, encircled by a band of steel blue. As may be supposed, the effect of its spread crest is remarkably fine and striking. The upper parts of the body are dark chestnut brown, rather deeper on the quill feathers of the wings. The throat, chest,



KING TODY.

and abdomen are pale fawn, warming towards chestnut on the central line. The total length of this bird is six inches and a half. We take our illustration from Wood's "Natural History."

The Formation of Quartz.

A San Francisco engineer and metallurgist, J. Mosheimer, writes to the *London Mining Journal* as follows:

A further proof of the formation of quartz from aque-

the bottom of the boiler a soft sediment was found, which was overlaid by another hard crust. The flues were incrusting on top with silicate of lime, and had at the bottom a coating of solid transparent crystals of quartz; the crystals were of rhomboidal shape, about one half inch in length, and as perfect as any other natural quartz crystals. The formation of quartz crystals of considerable size in boiling water in but a few years leads me to the belief that the large quantities of granulated quartz which were found in early days in the burning Moscow mine, on the Comstock lode, were of the same origin.

Quartz may thus be decomposed and made soluble by the action of steam in combination with an alkali, and then used as soluble silicate.

Fragarine.

Dr. T. L. Phipson finds in the root of the strawberry several substances closely allied to some which are contained in the cinchona barks. One of these is a compound very similar to quinovine; another, which he calls fragarianine, from the botanical name of the strawberry is a kind of tannin closely allied to quinotannic acid, but, instead of yielding cinchona red like the latter, it yields a somewhat similar substance called fragarine. To obtain the latter about 50 grms. of the strawberry root, in thin slices, are left for forty-eight hours in a stoppered bottle, with water acidulated with about 5 per cent of hydrochloric acid. The solution filtered off is of a pale golden-yellow color; it is strongly acidified by addition of more hydrochloric acid and boiled for an hour or two. As the temperature rises towards the boiling point the pale yellow liquid becomes darker and redder, and finally takes a splendid orange-red color. On boiling it becomes cloudy, and after some time fragarine is abundantly precipitated in flocks of a reddish-brown color. After allowing the liquid to become quite cold it is filtered, and the new substance collected is washed with cold water. The filtered liquid contains glucose.

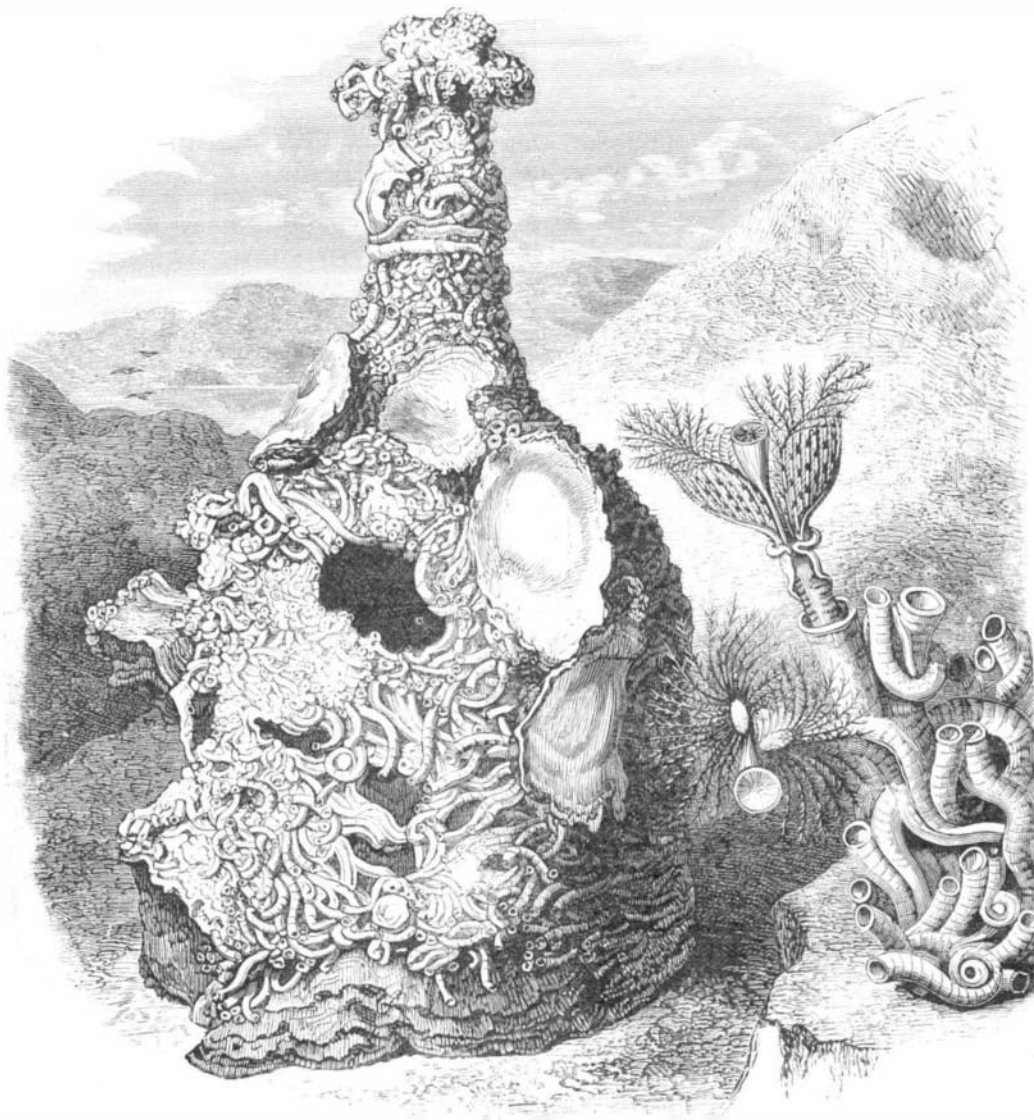
Fragarine thus obtained has the following properties: It is an amorphous reddish brown powder, highly electrical by friction, soluble to some extent in water, alcohol, and ether, dissolving in potash with a fine reddish purple color. It dissolves in concentrated sulphuric acid, and forms a conjugated acid the solution of which is brownish-purple. Boiling hydrochloric acid does not affect it. Treated with nitric acid it forms a brilliant yellow nitro-compound, different from picric acid, yielding no picramic acid when reduced by sulphide of ammonium. Chlorate of potash and hydrochloric acid mixture yields a bright yellow chlorine compound, insoluble in water, decomposed by ammonia.

Heated in a tube fragarine yields water, is decomposed without fusion, depositing much carbon, and producing a white volatile substance which condenses in the tube and is soluble in water; the solution produces a green color with salts of iron; it is probably pyrocatechin. Melting hydrate of potash decomposes fragarine with production of dark brown substances and a little protocatechuic acid, which can be isolated by ether from the acidulated solution of the products of this reaction, and also colors iron salts green.

While fragarine is being produced by boiling with hydrochloric acid as above, there is diffused through the laboratory a very agreeable odor of essence of cedar. When the same experiment is made with an acid decoction of red and yellow cinchona barks (obtained in the cold) there is produced an odor of heated spermaceti. It is curious that both essence of cedar and cetene of spermaceti contain 32 equivalents of carbon. Instead of giving a dirty green color with potash, as cinchona red does, fragarine dissolves with a reddish or brownish purple color. This is the best way of distinguishing between these two substances.

The Stiffening of Plant Stalks.

The presence of silica in the stalks of grain has long been claimed as a proof of design in the structure of such stalks. The soft fiber of the growing grain would not be stiff enough to support the head; accordingly a stiffening of silica was added to the outside. Chemical analysis has shown, however, that at the time when the stalk most needs stiffening it does



SEA WORMS OR SERPULAS INCRUSTING AN OLD BOTTLE.

[The figures to the right show the animals enlarged.]

ous solutions has presented itself in a steam boiler in use in one of the Nevada mines. A boiler of four feet in diameter and provided with five flues had been in use for some years; but little attention had been paid to cleaning it or blowing it off, as it is called, and a sediment accumulated until it reached the first two flues. The whole of the interior was heavily incrusting, and as it conducted too little heat the boiler had to be replaced by a new one. After cutting the former to pieces my informant, Mr. E. Watkins, M. E., found a heavy incrustation all around the inside. At