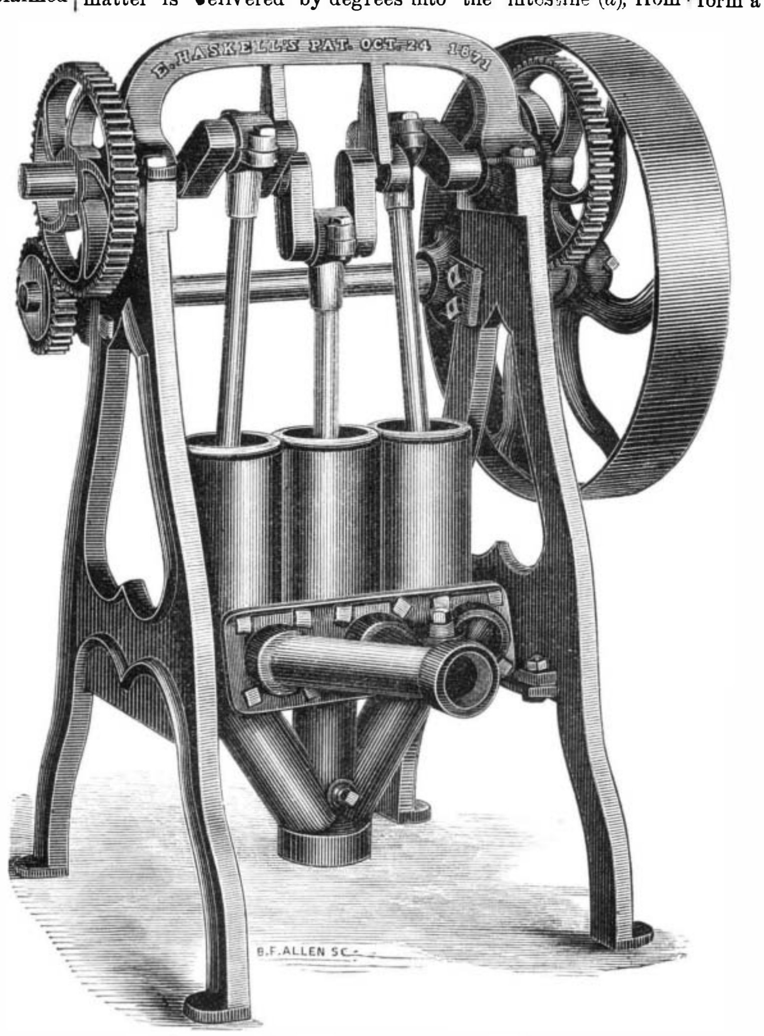
IMPROVED THREE-CYLINDER PUMP.

We illustrate herewith a simple and novel form of three-cylinder pump, the suction of which is continuous, though unaided by an air chamber. Like the rotary pump, its delivery is uniform, but, unlike that machine, it requires no large expenditure of power.

The construction is obvious from the engraving. Three strokes of the piston are caused by one revolution instead of two strokes, as in the double-acting pump, while it is claimed to have the advantage over the latter of being much more free from friction and not to necessitate the stopping and starting of a column of water in the suction pipe at every change of stroke, involving a consequent loss of power. There are, besides, no crooked passages or ports through which the water must be driven; and the construction of the various parts is simple, strong, and lasting. In its smaller sizes, it may readily be worked by hand.

These considerations render the machine useful for railroads, both as a hand pump during the building of lines, and as a permanent power pump for filling tanks where a large volume of water is needed daily. It is also suitable as a fire pump for mills; and since its working parts are but little affected by grit, and it is not liable to choke, it may profitably be employed in quarries. By wind wheels, we are informed, it can be worked at a slow speed with the largest results. It is susceptible to a wide utilization in greenhouses, about farms, and, in fact, wherever a powerful suction and force pump is needed.

Further particulars may be obtained by addressing the Chase Machine Company, manufacturers, No. 36 Charlestown street, Boston, Mass.



HASKELL'S THREE-CYLINDER PUMP.

A Lady Lecturer on Chemistry.

Lately, in Aberdeen, Scotland, Miss Charlotte Napier gave a lecture on chemistry, in connection with the Blackfriars Useful Information Society. There was a very numerous attendance; and the lecture, which was illustrated by a variety of experiments, and was of a highly interesting and instructive character, was listened to with the closest attention, an enthusiastic vote of thanks being awarded to the lecturer at the close. Miss Charlotte Napier is a young Aberdonian. Last winter she studied chemistry in Edinburgh, under the direction of Mr. Falconer King, with a view of assisting her father as an agricultural analyst.

RUDIMENTARY EXISTENCE IN FRESH WATER STREAMS.

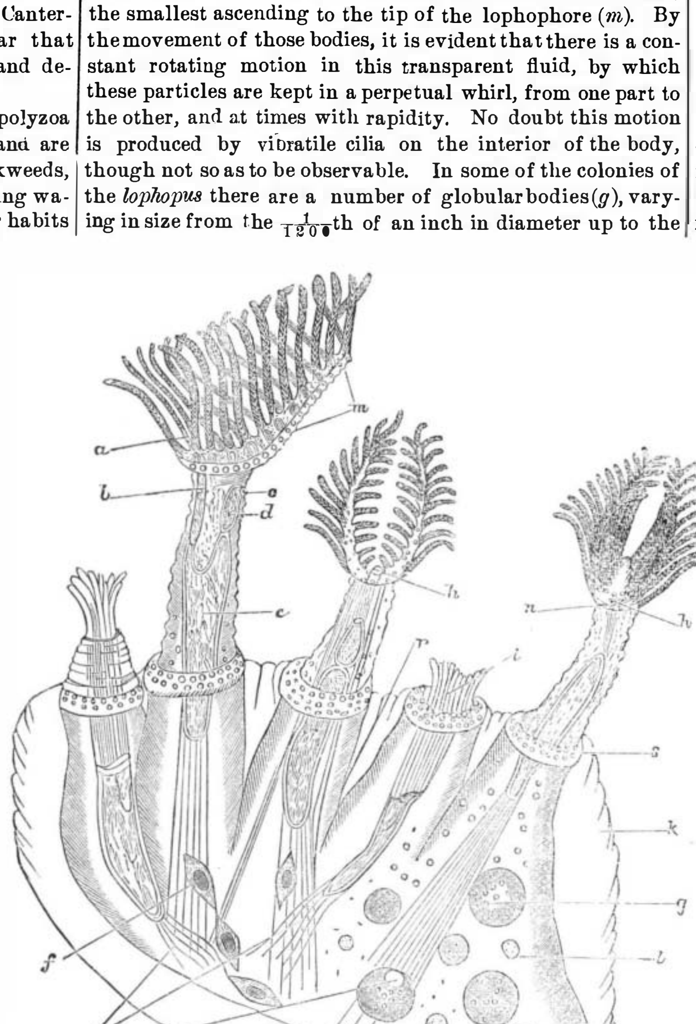
The marine aquarium and its inhabitants have been thoroughly studied by naturalists; but as yet, very little attention has been given to the many beautiful forms of life to be found in rivers and ponds. Mr. James Fullagar, of Canterbury, England, has recently found in a stream near that ancient city a specimen of the *lophopus crystallina*, and describes it as follows in the pages of *Science Gossip:*

"The *lophopi* are among the largest fresh water polyzoa known. They are about $\frac{3}{16}$th of an inch in length, and are found attached to the roots of *callitriche verna*, duckweeds, and other fiberous roots in shady dykes of slow-moving water, under thick masses of floating plants; for in their habits they are light-shunning animals, and are always on the under side of aquatic plants. They are very beautiful microscopic objects, and their being perfectly transparent renders them most interesting animals for examination, as the formation of their statoblast (*f*) can be seen in their different stages of growth, from their first appearance as a little swelling (at which stage they are quite colorless) to their perfect forms, when they become detached and fall free in the perigastric space (*l*), having become gradually colored, the center of a dark brown, and the margin a rich yellow. The process of their propagation by gemmation or budding, by which young ones are added to the existing colony of living polyzoa, can be plainly seen; while the statoblasts (*f*) are designed to propagate the species in the following spring, and are liberated from the polyzoon at its death, when the transparent sac is decomposed, and the statoblast escapes and sinks to the bottom of the water."

In our engraving, *a* is the region of the mouth; *b*, œsophagus; *c*, stomach; *d*, intestine; *e*, muscles; *f*, statoblast; *g*, parasitic globes; *h*, *h*, mouth; *i*, tentacles retracting within cell; *k*, outer transparent envelope; *l*, perigastric space; *m*, lophophore; *n*, tentacles excised to show mouth; *o*, vent; *p*, hollow globe; *r*, place where division commences; *s*, cell.

"The perfect transparency enables us to witness the internal operations of their system. The action of the stomach in the process of digestion can be observed with great clearness. The contents are seen at times to consist of small desmids, and other disk-shaped and globular bodies, together with decayed vegetable matter, etc. The action of the cilia on the expanded tentacles causes a current of water to set in towards the mouth (*a*, *h*, *h*,), bringing with it the food required; and if in the vortex thus formed there should be any large and objectionable pieces, they are prevented from entering the mouth by a quick, lashing motion of the tentacle, which rejects and throws them out of the reach of the vortex. The accepted morsel passes directly into the œsophagus (*b*), and thence into the stomach (*c*), where it is digested by the up and down motions, of a contracting and expanding nature, of this organ. The lower part of the stomach at intervals is seen to be contracted somewhat in the shape of an hour glass, in which for a moment part of the contents of the stomach are retained, then again released to mix with the rest. After being subjected to the action of the stomach for some time, the alimentary matter is delivered by degrees into the intestine (*d*), from whence it is expelled through the vent (*o*), in form of oval or egg-shaped pellets.

The perigastric space (*l*) is filled with clear fluid, which also extends up the lophophore (*m*), in which fluid are seen floating numerous particles of very varied forms and sizes, the smallest ascending to the tip of the lophophore (*m*). By the movement of those bodies, it is evident that there is a constant rotating motion in this transparent fluid, by which these particles are kept in a perpetual whirl, from one part to the other, and at times with rapidity. No doubt this motion is produced by vibratile cilia on the interior of the body, though not so as to be observable. In some of the colonies of the *lophopus* there are a number of globular bodies (*g*), varying in size from the $\frac{1}{120}$th of an inch in diameter up to the size of an ordinary *volvox globator*. These bodies are considered to be parasitical, as they do not appear to have any necessary connection with the economy of the polyzoa in whose interior they occur. This would appear to be the case from the fact that in some colonies not one of them is to be seen, while in others they are very numerous. In one instance of a colony under my observation, they were increased in such numbers of all sizes that they entirely filled the perigastric space (*l*), forcing the smaller particles up even into the lophophore (*m*), and ultimately bursting the whole colony and escaping into the water, when all motion in them ceased, and they soon disappeared altogether. When they are few in number, and of various sizes in the animal, they form a novel and pleasing sight as they are carried up and down by the current before mentioned in the perigastric space.



A FRESH WATER POLYZOON.

On being alarmed, the *lophopus* quickly retracts within the transparent cell (*s*), and again protrudes when all is quiet, unfolding its beautiful crown of tentacles, in the course of which movement the action of the muscles is plainly seen (*e*). The expanding of the tentacles, immediately on the protrusion of the polypide from its cell, is one of the most pleasing sights that can be presented to the observer, as the cilia with which they are studded are instantly in full play, passing up on one side of the tentacle from the base to the tip, and down the opposite side, like an endless chain, thereby forming the vortices in the water by which the particles of food are brought to the mouth. Sometimes the colony consists of from six to twelve polypides, and will divide into two, commencing the division at *p*, and slowly separating down to the point where it is fixed to the plant, etc., each part moving in opposite directions. They then propagate by gemmation or budding."

"I would advise," says Mr. Fullagar, "those lovers of natural history who possess a microscope and live in a neighborhood where there are shady dykes or a millpond, etc. to search for them; when found, they will amply repay the trouble in the pleasure they afford in observing and investigating their wonderful mechanism and marvelous beauty. No pencil can portray nor pen describe them. I have had them under observation for over three months. have seen some of the colonies die out, and have their statoblasts in glass cells, from which I anticipate the pleasure of seeing the young polyzoa emerge in due time."

Stagnation in Business the World Over.

It is poor consolation in adversity to know, says the *Commercial Advertiser*, that we are not alone in our misery; such as it is, however, our iron manufacturers may take it to themselves. The depression of the iron trade is general throughout the world. The production of pig iron in Scotland was less in 1874 than in any of the last twenty years. At one time there were only thirty-two furnaces blowing, out of one hundred and thirty-two erected, and the production was 400,000 tuns less than in 1870. Russia, notwithstanding its activity in railroad building, imported only 5,221,000 lbs. of rails, against 7,119,000 in 1873. In Prussia the large steel works of Krupp have discharged some thousand workmen, and the Borsig manufactory of engines at Berlin—the most extensive in Germany —has had to protect itself by taking a similar step. Last month the largest Austrian manufactory of engines (Sigl) dispensed with two thousand hands for the reason that it had neither orders nor sufficient working capital. The government, however, in true Austrian fashion, remedied both misfortunes by advancing capital to the works, and by causing some of the railroads to give extensive orders for rolling stock.

A Queer People.

During the last season, says the *Academy*, Mr. Bond, an Indian surveyor, while at work in the Madras Presidency, to the southwest of the Palanci Hills, managed to catch a couple of the wild folk who live in the hill jungles of the Western Ghauts. These people sometimes bring honey, wax, and sandal wood to exchange with the villagers for cloth, rice, tobacco, and betel nut, but they are very shy. The man was four feet six inches high; he had a round head, coarse, black, woolly hair, and dark brown skin. The forehead was low and slightly retreating, the lower part of the face projected like the muzzle of a monkey, and the mouth, which was small and oval, with thick lips, protruded about an inch beyond the nose; he had short, bandy legs, a comparatively long body, and arms that extended almost to his knees; the back just above the buttocks was concave, making the stern appear to be much protruded. The hands and fingers were dumpy and always contracted, so that they could not be made to stretch out quite straight and flat; the palms and fingers were covered with thick skin (more especially the tips of the fingers); the nails were small and imperfect, and the feet broad and thick-skinned all over. The woman was the same hight as the man, the color of the skin was of a yellow tint, the hair black, long, and straight, and the features well formed. This quaint folk occasionally eat flesh, but feed chiefly upon roots and honey. They have no fixed dwelling places, but sleep on any convenient spot, generally between two rocks, or in caves near which they happen to be benighted. Worship is paid to certain local divinities of the forest.

LEAD pipe will not do to conduct water to fish ponds. It is likely to poison the fish.