

to solve. To those that are intellectually alive and actively engaged in the affairs of men, the world does not live itself over and over again. Every new day brings a new life with new needs, new inventions to meet them, and new problems for coming days to solve. A large part of all the inventions made are intended merely to improve, to simplify, to cheapen the means and processes of established arts. Others are absolute advances opening up new regions of research, discovery, and invention. The former, in helping to perfect a single art or process, so far help to improve the general conditions of living; and the smallest are often the basis of a competence for the inventor. The latter are germinal, creative; like the steam engine, the telegraph, and numberless other new departures, they open up ever widening spheres of human knowledge and activity; and at every advance an increasing number of newer departures and still newer improvements are called into existence. That portion of the human mind not represented by the *Rural* does not "run in one groove," to anything like the degree the *Rural* imagines. And to one standing where there is a clear view of any portion of human activity—however limited—the marvel is not that inventions are so many and novel, but that they are comparatively so few; that so many inviting fields are wholly or to a great extent unworked; that so few men and women are educated to perceive the urgent necessities of the arts in every direction, or trained in the constructive arts whereby the world's needs in such directions are to be met.

The greatest bars to useful invention are the mistaken notions which papers like the *Rural* take pains to foster—that there is no great need of new inventions, and that few patents are of value to their owners. Both are radically false, as false as the assertion that patented inventions are burdens upon the public and sources of trouble; or that any considerable portions of the patents issued by the Patent Office are, or should be, "unpatentable" for lack of novelty. To argue against such assertions is like bringing evidence to prove that strawberries do not grow on cucumber vines, or wheat on apple trees.

Yet it is well for inventors to know that such absurdities have currency in certain quarters, and that people who listen to such teachings have representatives in Congress who may cater to *Rural* ignorance and prejudice for purposes of their own.

RECENT PROGRESS IN OYSTER FARMING.

BY H. C. HOVEY.

The modern oyster-farm is essentially a Connecticut idea. The laws of other States do not yet make it a possibility elsewhere. In Rhode Island the oyster-grounds are rented at \$10 an acre for a period of ten years, but those who wish to cultivate farms have no guarantee that they can reap the final results of their best endeavors. The law in Maryland and Virginia is that a man having riparian rights, can stake out and have a life-interest in one acre contiguous to his own shore property, not for cultivating, but simply for planting. All else is public property. In Connecticut, however, while the "natural oyster-beds" remain free to all comers, the remainder may be sold to private individuals.

An oyster commission is appointed to hold office for four years, or longer on reappointment, whose duties are of a very general nature, but sufficiently clear on the main points. At the present time these commissioners are Messrs. Wm. B. Hudson, Robert G. Pyke, and G. M. Woodruff. They have drawn a shore-line from point to point, within which all is the property of the several towns along the shore of Long Island Sound. Each town has its own oyster-ground committee, with whose management we need not now concern ourselves. Outside the shore line, and as far as the lately defined State-line between Connecticut and New York, are about 300,000 acres of water territory, a large amount of which is supposed to be suitable for the cultivation of oysters with modern appliances. All this is under the jurisdiction of the oyster commission, who are to map it out and who may designate the portions surveyed to applicants for the purpose of actual cultivation. The price is \$1.10 per acre, for which a deed of permanent possession is given. Among the conditions, however, is one enabling the purchaser to return the ground if it should prove to be worthless for the purpose in view; in which case he gets his money back. But, on the other hand, if he allows it to lie unimproved for five years, it returns to the State as forfeited.

Of course numerous questions arise, some of them sufficiently vexatious, concerning the practical operation of this system. One of these has reference to the reservation of "natural beds," from which any one may remove oysters provided he does not dredge for them by steam. Cases are now pending that will settle many of these disputed matters. Meanwhile the fact remains that in Connecticut waters there is room for enterprise, as shown in the cultivation of what may very properly be styled "oyster farms." There are at this time more than 300 applications before the commissioners for the designation of grounds, varying in size from a few acres up to 1,000 or more; and some of the grounds hitherto sold and now under cultivation include several thousand acres.

The largest oyster-farm in Long Island Sound, if not the largest anywhere in the world, belongs to Mr. H. C. Rowe, of Fair Haven, a gentleman whose sagacity has done much to shape the legislation of Connecticut, and whose shrewdness has enabled him to profit by opportunities as they presented themselves. Mr. Rowe now controls between 10,000

and 11,000 acres of oyster-ground, and has it all staked off by buoys, so that he can go from one field to another, as a farmer would traverse his wheat-fields and grass-lots. For the successful cultivation of such extensive grounds resort has been necessary to steam dredging, but not without strenuous opposition from those who feared that such a method would injure the natural beds. Several other persons have now entered farms rivaling his in size, including from 2,000 to 6,000 acres, and more will be staked out as soon as the surveys can be completed. There is quite a contrast between the old method of "tonging," and even the more effective but uncertain mode of dredging by sail-boats (often at the mercy of wind and tide), and the trim, wide-awake little steamers that run four large dredges and rake up a thousand bushels of oysters a day. With the facilities thus furnished, grounds are managed under water from 25 to 50 feet deep.

Not long ago the Connecticut Academy of Arts and Sciences accepted an invitation to visit the oyster-farms, on the new steamer the *Gordon Rowe*, in company with the commissioners, and Lieut. Francis Winslow, U.S.N., of the U. S. Fish Commission. The day was favorable, and a large party went, including Profs. Dana, Brewer, Waldo, Platt, and others learned in geology, agricultural chemistry, astronomy, law, and theology, but confessedly having much yet to learn as to the growth of shell-fish. Omitting the incidents of the excursion, it is my intention to explain to the reader the facts exhibited to us by Lieut. Winslow.

Preliminary to doing so, it should be stated that fishing without restriction tends to destroy the source of supply. This fact seems so obvious as to be self-apparent. Yet a wrong impression has prevailed that the millions of eggs annually laid would repair any waste resulting from human invasion. Under this wrong impression they did away with the "closed season" in England some time ago, and in consequence their oyster-beds were nearly destroyed in six years, and it was found necessary to restore the old usage.

Count Pourtales made observations for a single season, ten or twelve years ago, in the Great South Bay and in the Hudson River. In 1877 the Maryland oystermen began to make inquiries as to how far up stream oysters could be raised in brackish water. About the same time Lieut. Fred. Collins made investigations as to the density of the water of the Chesapeake Bay. These steps were designed to be preparatory to similar investigations to extend over the entire area of national oyster-grounds. In 1878, Lieut. Winslow relieved Lieut. Collins in the Chesapeake Bay, and began his inquiries as to the conditions having special reference to domestic economy. They were continued in 1879, and the results, in part, have been published by the Maryland Fish Commission, but are to appear in full in the report of the U. S. Coast Survey, next fall. Dr. Brooks, of the Johns Hopkins University, began and successfully concluded, in 1879, his experiments in artificially fertilizing the egg of the female oyster, and raising the embryo from the period of segmentation through various stages up to the formation of the shell. An account of these interesting experiments was published in the proceedings of the Johns Hopkins University Laboratory. In 1880, Mr. J. H. Ryder, of the Philadelphia Academy of Science, investigated further, but with no results of especial importance. In the same year, Lieut. Winslow, following Dr. Brooks' methods, succeeded in raising from the egg, artificially, the Portuguese variety of the European oyster, the first attempt of the kind abroad.

During the present year, Lieut. Winslow has been able to reduce the period required for the hatching operation from six or eight days to two or three; and has been trying to devise methods of raising oysters artificially that would be of practical value. His investigations show that the Chesapeake beds are rapidly disappearing, and it remains to be decided whether experiments for restocking them are to be carried on by individuals or by the States. The latter seems to be impracticable, because the young brood will unavoidably attach themselves to localities, instead of benefiting the public oyster grounds at large. Hence Lieut. Winslow has been carrying on his experiments in Connecticut waters, where he can put large quantities of newly hatched oysters directly on the beds where they are to stay.

The parent oysters are first cut up by knives, or more usually ground fine in a small mill, and mixed in glass jars holding sea water. As soon as the particles have settled somewhat, the excess of spermatozoa is drawn off by a siphon, and the remaining mixture is set away to await further developments. The principal difficulty thus far is to supply the young with a sufficient quantity of food and lime in suitable proportion to aid in the formation of the growing shell. It is now known that the male and female oysters differ little in their appearance to the eye, but the "milk," as it is termed, differs greatly under the microscope, that of the male consisting of an infinitude of minute particles gyrating among themselves, while that of the female contains true eggs. In the mixture each egg is forthwith attacked by the spermatozoa, afterward taking the form of globules. All this takes place in a few minutes after the chopped particles are stirred together. The process of segmentation lasts for perhaps twenty-four hours, after which numerous cilia are put forth, and the young oyster uses them to enable it to swim about during its brief life of freedom. The sight is a strange one of a hundred of these diminutive creatures darting about in a drop or two of water, executing a sort of dance under the magnifying glass. The shell on its first appearance is single, then it parts into two valves, at first separate from each other, and afterward

joined by a hinge. The cilia grow into a sort of hairy tuft, by means of which it is conjectured that the final attachment is made to the old shells, or other objects at the bottom where the shell fish is to stay. When this has been accomplished, the upper valve grows far more rapidly than the under one.

Each female oyster is estimated to contain from one to ten million eggs, not a tenth of which are vitalized in the course of nature. But by the artificial process, when perfected, it is hoped that fully one-half may be safely brought through the embryo state and then left to take care of themselves. As the matter now stands, each five-gallon planting can used by Lieut. Winslow, when finally lowered with its load of young oysters, is thought to contain about fifty million alive! These cans are provided with double caps, one at each end, which are removed by cords attached to them, after the can has been let down to the spot to be occupied by the young colony. Care is taken to mark the location exactly, so that it can be found again; and thus in a few months we can tell if the experiment has been followed by practical results.

It may as well be added, for the information of those not familiar with the mysteries of the oyster trade, that "seed oysters" are those that have attained the age of one or two years, when they are about as large as a dollar; the size varying according to the waters. At this stage they are gathered by ship-loads from the Connecticut beds and sold to oyster-raisers in New York and Rhode Island and elsewhere, at fifty cents a bushel. This is a profitable operation to both seller and buyer. For, while it thins out the beds of the former, it allows what are left to grow to better advantage, on the same principle that thinning a bed of beets will benefit the plants that remain; and for the latter it is profitable, because the third year of an oyster's life witnesses an extremely rapid growth, ending in a fine and marketable bivalve. Those that are four years old, and have been properly cared for, are the so-called "saddle rocks," for which the consumer must pay a fancy price.

The Comet.

An observation, unprecedented in the history of comets, was made, says *Knowledge*, at the Cape Town Observatory, on Sept. 17, at 4 h. 50 min. 58 sec. Cape mean time, corresponding to 3 h. 37 min. 3 sec. Greenwich time. "The comet was followed," writes Mr. Gill, "by two observers with separate instruments, right up to the sun's limb, where it suddenly disappeared," at the hour named. To be seen under these conditions the comet must at the time have been intensely brilliant—partly, no doubt, the effect of solar heat and light, but partly also, we conceive, on account of the resistance it experienced in its onward rush at the rate of certainly not less than 340 miles per second! The time when Mr. Gill's assistants saw the comet reach the sun's limb, preceded by 1 h. 35 min. the time of perihelion passage as given below.

The Emperor of Brazil telegraphs to the Academy of Sciences that the comet was visible in full daylight on the 18th, 19th, and 20th September. The spectroscope showed the presence of sodium and carbon. On the 26th, from 4 h. 10 min. to 5 h. 40 min. in the morning, it was a splendid object.

Mr. R. A. Proctor has made calculations which satisfy him that the period of the comet and the length of the greater axis of its orbit are rapidly diminishing, that it will return to us within a few months, and that it will soon be destroyed by being absorbed into the sun.

Electrical Glass Cutting.

At present large glass cylindrical vessels for scientific and commercial purposes are cut during manufacture by surrounding them with a thin filament drawn out from the molten glass, and then cooling them suddenly by contact with a cold substance. A more sure and perfect method has been devised by Herr Fardt, of Dresden, who surrounds the glass vessel with a copper wire, connected by binding screws with the two poles of a galvanic battery, and made red-hot by forming contact. The rough edges are then rounded off by turning the object in a blowpipe flame; and, to prevent any unequal contraction of the parts subjected to this action, a slight annealing is effected in the furnace.—*Iron*.

Orange Wine.

A writer in the *Semi-tropic California* describes his experience in making orange wines from the wild orange of Florida years ago. He says that it cannot be surpassed for medicinal purposes, and sold when only eight months old for \$3 per gallon. The oranges must be perfectly ripe. Peel them and cut them in halves, crosswise of the cells; squeeze into a tub. The press used must be so close that the seeds cannot pass into the must. Add two pounds of white sugar to each gallon of sour orange juice, or one pound to each gallon of the mixed sugar and juice. Close fermentation is necessary. The resultant wine is amber-colored, and tastes like dry hock with the orange aroma. Vinegar can be made from the refuse, and extract from the peels.

Vaccinating a Train Load of Passengers.

The New York Express train on the Erie Railroad, passing east at noon, was held at Elmira, Nov. 9, till physicians could vaccinate all the passengers not already safe from contact with small-pox, as a passenger afflicted with symptoms of that disease was taken from the train at Hornellsville.