THE OYSTERS AND OYSTER-BEDS OF FLORIDA.

By JOHN G. RUGE.

To treat this subject properly one should be prepared to consider it in all its aspects, relatively and otherwise. I do not offer you anything new, and I even confess plagiarism, yet hope it is so shaped as to engage your attention.

I may observe that oysters of many species are found nearly all over the world: the British Isles, the Mediterranean, Holland, Belgium, Germany, Denmark, Norway, and part of Russia, Australia, China; nearly all parts of the eastern coast of America from Canada to Cape Horn; also the northwest coast of the American continent. Oysters are plentiful in the Hawaiian Islands, and are quite numerous, at least as to variety, on the Asiatic shores. Efforts made to acclimatize the oysters of the Atlantic coast in California waters have been only partially successful.

The oyster no doubt furnished a large part of the food of man while in the primitive era of cave-dwellers, and we have evidence, not only in history but in our own day and generation, that it is sought for food both by savage and civilized man, as well as by the fishes of the sea; even the quadruped animals find it a toothsome morsel. You can prove this at your doors near Tampa Bay, where "coon" oysters grow plentifully, even upon trees and bushes. They derive their name, perhaps, from a fancied resemblance to the tongue of the raccoon, as well as from the habit these quadrupeds have of seeking oysters when the tide is out, cracking the shells and eating the oysters almost as the squirrel does nuts. I have often chased them from the oyster bars.

Plato, some 400 years before the Christian era, regarded the oyster as the typical know-nothing of creation, and he judicially consigned the soul of the ignorant man at death to the occupancy of the oyster. Oysters are unquestionably among the oldest of foods of mankind. Going back into history, we find that they are written of by the ancients as of prime importance in their accounts of feasts of the wealthier Romans, where they figured prominently in the lavish luxury of imperial Rome. Over 1900 years ago one Sergius Orata turned Lake Avernus, in Italy, into an oyster-bed. Sallust, before the Christian era, some 2,000 years ago, seems to have thought the oyster the only good thing that Britons had. Pliny, who died in the year 79 A. D., gives an account of the use of oysters, and mentions that Æsop's son was fond of them. Juvenal, A. D. 60, speaks of the British oyster, which was then in high repute among the luxuries of that day. The oyster has honorable mention in classic song and story and is a favorite theme for naturalists, but is not mentioned in the Bible. A physician, Dr. Baster, as quoted by Dr. Johnson, was of the opinion that the Roman predilection for oysters was a sanitary one, and he says:

> Living oysters are endowed with the property of medicinal virtues. They nourish wonderfully and solicit rest; for he who sups on oysters is wont on that night to sleep placidly. As to the valetudinarian afflicted with a weak stomach, oppressed with phlegm or bile, raw oysters are more healing than any drug or mixture that the apothecary can compound.

This mode of quieting the appetite for dinner appears to continue to the present day. A diet of raw oysters is an excellent remedy for dyspepsia.

The Pilgrims landing on the shores of what is now Massachusetts found oysters in great abundance and used by the Indians, and oysters were served at the first Thanksgiving dinner on this continent. The oyster industry of the world is chiefly in the United States and France. A few natural beds yet remain in Great Britain and France; the latter country has the best conducted oyster-culture, and seems with Holland to monopolize the trade of Europe, especially in oyster seed and the culture thereof.

In the census of 1890 the United States, in a comparative statement, is credited with an annual catch of 5,550,000,000 oysters, France 680,400,000, Great Britain 1,600,000,000, and Canada 22,000,000; the catches of the rest of the countries of the world are comparatively small, with Holland and Italy in respective order, the total for Europe being 2,331,200,000. The eastern coast of North America produces as much as all the rest of the world combined, and this very fact is full of importance to us in the consideration of the matter before us.

About 100 years ago the French and English oyster supply was supposed to be inexhaustible, yet it was not long before they were fighting for legislation, just as we are doing to-day. The first legislation respecting oysters seems to have been during the reign of James I, about 1606. The features of this legislation, cooperated in by both countries on account of the contiguity of their oyster-beds in the English Channel, and in effect to-day, is largely what we have learned by our own experience, not only in the northern waters but in Florida, viz.: No dredging, except in private beds; a closed season, May 1 to September 1; oysters less than 2½ inches thrown back on the reefs; no ballast thrown on any oyster-bars. The customs officers are authorized to enforce these laws.

Such are the avarice and cupidity of man that through all these thousands of years he has not learned that it is the greatest folly to attempt to live on Nature's bank account without providing some return for the drafts made. All America, and Florida especially, with all the experience of the past to profit by, is destroying her natural wealth in every direction.

As before stated, oysters are found along the North American coast all the way down to the western end of the Gulf of Mexico. They are apparently much of the same nature, but some naturalists claim that the southern oyster is different from the northern; yet both varieties are found not only in Long Island Sound but in the Gulf of Mexico, and while growth changes their appearance it is owing to the nature of the surroundings—the bottom, the water, and the food. The principal oyster-grounds of the world are in the Chesapeake Bay. The abundance with which Nature blessed that region may not endure through the next half century without further protection by legislation, yet it is likely that there will be at all times public oyster-grounds in the United States, as in England and France, although any attempt to interfere with the so-called rights of fishermen on the oyster-banks has always met with strenuous opposition.

A hundred years ago oysters were plentiful from Maine to the Delaware Capes, and while some few are still found about the northern coast of New England, they are not sufficient to make the business profitable in that section. Along the Connecticut and Rhode Island coasts and down into Long Island Sound the oyster interests are managed in an energetic and systematic manner. New Haven is the pioneer in Euro-

pean shipments, and that section yet holds that trade, the bulk of their oysters being sold as barreled stock. The oysters there were threatened with the same extermination as their northern neighbors, but the dealers finally realized the condition and successfully propagated and transplanted oysters from Chesapeake Bay. Some of the wealthiest and most extensive oyster firms of the world are located in Connecticut. The first shipping ventures were failures, as the oysters would not keep their valves closed long enough. This was remedied, however, by placing them deep side down or "right" side up, and in some cases the oysters were wired. The industry has increased yearly, and will no doubt continue to increase in that section so long as other sections consent to sacrifice their own oyster farms for the benefit of their rivals. The true secret of their success, however, is that the people respect the rights of others and confide in and respect the courts.

When a reputation has been made for a certain class of oysters in the North, it never dies out. For example, take the "blue points" and famous "saddle rocks." The latter were discovered in the neighborhood of a submarine rock of that name, and the "trade-mark" became famous in the northern metropolis some thirty years ago. The beds were cleaned up in two seasons, yet New York has never lacked "saddle rocks" from that day to this. The term is now only a name for large oysters, as "blue point" is for any small oyster.

The oyster planters of Long Island Sound must continually wage war against that terrible enemy in those waters, the starfish. These pests, like the "borer," will not live in fresh or brackish water. They require a strong ocean brine as their natural home. They are the enemy of the oysters on the ocean front as the army worm is to the crops on land. The "borer" or "drill," as well as the starfish, murders thousands of oysters in a season and causes a constant demand for fresh seed or plants from other localities. It is no infrequent occurrence for oystermen to dredge up as many as 75 bushels of these pests in a single day's work, and a steamer has hauled up several hundred bushels in a day.

Some years ago our Connecticut friends found that the use of bare bushes planted on the beds greatly increased the yield of oysters, as young spat clings to the branches and develops rapidly; but it was claimed that oysters caused typhoid fever, and that it was due to the presence of these bushes, so a law was enacted which prohibited this method of cultivation. The best evidence that this was a mistake is found in the fact that typhoid fever developed in this section after the bushes disappeared, and the blame was then given to the oyster per se rather than to the manner of cultivation. But an expert commission of medical scientists has recently investigated this matter and found that typhoid fever was not traceable to the use of oysters.

The oyster business of the Chesapeake Bay, according to the last census of the United States, represented the larger part of the entire value of the whole American fisheries—more than double the entire value of the cod fisheries of the Newfoundland banks. It employs many thousands of people and is the perennial source of an immense business. There is no question, however, that the catch of oysters of the Chesapeake Bay region has fallen off lately. Just as in Florida, the tide-water counties of Maryland and Virginia look upon oysters and fish as public property. Human nature is the same in the frozen north or the tropic seas. If the State properly managed the matter it would yield revenue enough to pay a large part of the expenses of the State government. Yet adjoining States should cooperate in this legislation.

The oyster catch of Maryland and contiguous waters has in the past decade shrunk to about half of what it once was, but the steadily increasing population of this country and the consequent increased use of oysters, together with the decreasing yield of Chesapeake oysters, have of late years resulted in creating a demand from other fields; so Virginia, North Carolina, Georgia, and especially Florida, Mississippi, and Louisiana, have come into prominence in this industry. There was a time in the history of the oyster trade of the Chesapeake when the catch was so considerable that the oyster-canning plants of Baltimore were really the salvation of prices to the oyster shippers and dredgers. Such is the case no longer, as Baltimore has now numerous competitors, not only in raw, but cove oysters, and not only in Maryland and Virginia, but in all the Southern States that border on the Atlantic and Gulf. I think that no State south of North Carolina has been more successful in this respect than Mississippi and Florida. The Mississippi oysters from Biloxi and those from Louisiana seem in a fair way to take possession of the western markets along the Mississippi River. Chicago has become especially interested. The sounds and bayous that border on the American coast all the way to the mouth of the Rio Grande are more or less productive of oysters, but many of them are of so delicate a nature, on account of the warmth of the water, that when steamed they seem to evaporate, and the shells in some cases are so soft and thin that they will not stand transportation. Where oysters grow naturally in localities which are favorable as regards salinity, lime, warmth of water, and abundance of food, the flavor and firmness are finer than when they have to be changed, and this is the spot on which to transplant and which should be cultivated.

There is nothing of interest, as I understand, to be said of the Pacific coast in respect to oysters other than that already spoken of; but some authorities say that excellent oysters are found on the coast of Bering Sea, so that at no far-distant day Alaska—besides her gold and salmon—may yet become the oyster region of that great Northwest.

Oysters are commonly believed to be unfit for food except in the months containing the letter R. This comes from the idea—and the fact also—that it is usual to find most oysters in spawn from May to September. As a matter of fact, oysters spawn at different times on different beds, according to the depth and temperature of the water. In deep water the temperature is less, hence the spawning begins later in summer and ends later in fall. On the other hand, the shoaler or warmer the water, the earlier the spawning takes place. Although wholesome oysters can almost always be found at some point from May to September, yet it is safest to be governed by this direction of the "R."

NATURE AND GROWTH OF THE OYSTER.

This palatable and nutritious animal, while apparently very simple, has a complex anatomical structure, manifestly a beautiful adaptation to the creature's necessities. There is no certain method of telling the age of an oyster from its appearance, but it can be approximated quite closely by those accustomed to handling them. It is said that they have been found twenty years old. Dr. W. K. Brooks, of the Johns Hopkins University, of Baltimore, and the late Professor Ryder, of the United States Fish Commission, are recognized authorities in the United States whose researches as to the anatomy and physiology of the oyster are accepted and followed by those interested in the propagation or culture of this bivalve. Their observations and

conclusions are set forth in a recent article in the United States Fish Commission Report for 1897, by Dr. H. F. Moore, to which students of this subject should refer.

It has been estimated that a large female American oyster in perfect condition can furnish 60,000,000 eggs in one season, yet it is possible that only a dozen of these will reach adult age. The European oyster produces only about 2,000,000 eggs. Oysters are fond of the tranquil waters of gulfs formed by the mouths of rivers. They are sensitive to light, as is proven by their closing the valves when reached by the shadows of a boat.

ENEMIES.

The oyster has many enemies. The starfish and borer are not found in Florida, but the oysters of this State are exposed to storms that cover them with sand; to freshets that deposit mud upon and kill the young as well as the mature; to freezing, which destroys those exposed by the tide, yet if the tide covers frozen oysters before thawing they will not be killed; to droughts, which starve them. Mussels grow with such rapidity, wedging themselves closely between the shells, as to starve the oysters to death by preventing them from opening their mouths to take food. The adult oyster also feeds upon the spawn. The drumfish, the sheepshead, the crab, the oyster bird, are all destructive influences and tend to prevent the development of more than a minute percentage of the fertilized eggs. Even a heavy storm, as well as thunder, checks spawning and often destroys the spat.

OYSTERS IN FLORIDA.

The first landing of white men in this State found the Indians acquainted with the edible value of oysters, which had no doubt always furnished food for the aborigines, as evidence has been found showing the prehistoric use of oysters in this State. The principal oyster-beds on the Atlantic side of Florida are found at or near Fernandina, where oysters are plentiful; the Indian River region comes next, with the best condition at the southern end of the river. New Smyrna, at the mouth of Mosquito Inlet, is especially adapted to oysters, but very few are found in Lake Worth, and none of any consequence until the gulf at Hillsboro Bay is reached, where the natural conditions are excellent; then Sarasota Bay and Charlotte Harbor; then Cedar Keys and Crystal River, in which vicinity the physical features are preeminently favorable for oyster cultivation. Experiments in transplanting were tried near here some few years ago and with some success, but were abandoned on account of depredations. Some oysters are found near St. Marks and in Ochlocknee Bay; none in St. Joseph Bay; St. Andrews furnishes a fine oyster to a limited extent, but they will not bear shipment on account of their soft thin shells. Escambia Bay has some good oysters and here transplanting was also tried, but failed on account of depredations. Oyster-planting can not flourish in any community where the moral rights of the owner are not respected. Favorable oyster-grounds formerly existed in Perdido Bay, but a hurricane in 1896 virtually destroyed the oysters in this region. There are also isolated beds along the Atlantic and Gulf coasts. The more extensive beds have been of late years near Apalachicola, but they have been impaired by gales, freezes, and freshets. The extent, conditions, and peculiarities of the oysters of the west Florida coast I shall not comment on, but leave to Lieutenant Swift, who has carefully studied the region.

The influences threatening the permanency of the oyster supply of this section, as elsewhere in Florida, are not so much the consumption of full-grown oysters as the destruction of the young and the failure to protect the spat in the spawning season.

It is every man for himself and it is no man's business to protect the young and spawning oysters. Oysters are sold throughout the entire spawning season. This is like plucking the blossom and expecting full ripe fruit to appear. Oysters from a tropical climate have usually less firmness, but generally equal in flavor those of a more temperate zone. The southern oyster seems to develop more rapidly when transplanted to northern waters. The Florida Gulf oysters have a more massive shell and are of a more rapid growth than those on Atlantic shores. Prof. G. Brown Goode says oysters are here found fully equal to those of the North. The bottom favorable to the growth of oysters must not be too sandy or too muddy. The water must contain enough of lime to grow the shell and enough vegetable matter for food and nutriment. There should be a flow of fresh water carrying additional lime and food. The most favorable temperature during the spawning season is from 60° to 80° F.

CANNING.

The first record we have of hermetical sealing is about 1810, by Appert, whose successful experiments were made under the auspices of the French Government. We owe to him not only the discovery but the demonstration of principles at the bottom of preserving processes; yet his methods are not followed by the practical canner of to-day.

Maine, I think, claims the credit for the first success in canning fish in the United States; yet I am quite sure it is a mistake. Oysters were first packed in Baltimore by Thomas Kensett in 1825, who then opened them by hand, cooked and packed them in cans, sealing hot and boiling in water, to which was added salt or pearl ash to get an increase of heat. These sold at the rate of $6 per dozen; to-day they can be bought for $1.25. From 1860 to 1865 began the opening of oysters, inaugurated by Louis McMurray, by placing in boiling water. After this, oysters were opened by the present method of steaming. They were until about 1880 preserved by heating the water with calcium to give 240 degrees heat, which experience demonstrated was sufficient to destroy the germs of fermentation. The closed retort or process kettle was first used about 1880. The first attempt at canning in Florida was made in Apalachicola in 1860 by one Stacy, whose experiments were a failure, owing to the fact that no knowledge was had as to the proper heat required to destroy the germs of fermentation. At that time the packers kept their knowledge secret. Stacy worked on the assumption that 212 degrees, the boiling heat, was sufficient. The war came on during the next oyster season, so the experiments were abandoned. The thousands of tin cans served as cups for soldiers and fishermen.

Again in Apalachicola in 1883 James Hunt, from Baltimore, put in a small plant and started a business of what is now a favorite and popular brand, but gave it up as it was not profitable. He then established a plant at Fernandina, and has since that time started other canning plants. Other canneries were built at Apalachicola, but not continued. A small plant was built at St. Andrews Bay, but never operated. Recently a plant started on Manatee River at Gulf City, and there are two at or near Fernandina. Canned oysters are not only found in the Tropics, but explorers have carried them as far as man could go to the North Pole. The tin cans do duty in decorating huts away from civilization, and are even worn by natives as ornaments. Canned oysters are used in the lumber camps of the forest, the mining regions of the mountains, on ships at sea, and in the parching deserts.

SHELLS.

These have always been an item for consideration—usually given away, but in some cases used at a profit. The uses are increasing—for roads and filling in land, for making lime, making coal gas, for beds of railroads, ground up for chicken food, and for fertilizers, employed in making some grades of iron, and as "cultch" for spat.

MEANS OF PROTECTING AND PRESERVING THE NATURAL AND ARTIFICIAL BEDS AND PROMOTING AN INCREASE.

While the natural beds can and should be protected to a certain extent, yet protection is a very perplexing problem, as the requirements of one set of people in one part of the State differ from those of the other parts. Still, there can be no question that efforts should be made to not only protect and preserve oysters but to encourage and promote their cultivation as a separate industry. To secure good results in this direction will require the efforts of more than one generation. The oystermen who are directly dependent on the public oyster-beds for food for themselves and their families must be educated to the idea that any protection of natural and artificial beds is not an infringement upon their rights, but for their interest and ultimate benefit. While they recognize that such laws are made as a rule in their interest, yet the moral sentiment of the oystermen in some sections, North and South, is not in favor of protection because they do not understand the subject. They feel and believe that any law to promote, encourage, and protect the natural oyster or the cultivation thereof is a monopoly and an encroachment upon their rights.

In considering the question of oyster protection it should be borne in mind that oyster-beds are the property of the State and that the legislature can make any regulation concerning them as may seem for the best interests of the State at large. Yet the conditions of nature in the extended bodies of water are so varied that it is very difficult to secure a general law which will suit all sections and do injustice to none. Local laws are equally uncertain, as some legislators may be affected by local influences, even to the injury of the State, as is shown elsewhere. Let the commissioners of fisheries of the State, as the law now contemplates, regulate this subject. The statutes on oysters are in the main very favorable and commendable, with some slight amendments, but not properly constructed in some cases and never enforced in any part of the State. It is not possible, in my opinion, to convict anyone under the law, for the reason, no doubt, that the fishermen feel that it is against their procuring a living. Take, for instance, the catching of oysters for "home consumption" in the closed season. It is a wide loophole and used as an infringement of the law; so the laws are of practically no value.

There is one other and more serious legal defect relating to the planting and cultivating of artificial beds. This is the matter of riparian rights, which is not uniform in different parts of the State, and is yet open for judicial determination by the supreme court. Inasmuch as no claim for rights can be made for something which does not exist, in the cases where the suitable grounds are outside of any riparian interest (that is, between the low-water mark and the public highway or ship channel, and beyond any but the State's control) the law must be formulated for the absolute control by the State. No man at present will put his money in oyster-beds. In my opinion the laws and system in force in Connecticut are the best in the world, but they will not in all cases apply to Florida, owing especially to the riparian privileges and

the land tenure, which are very uncertain and liable to be changed by any legislature. Without specifically outlining any law, I beg to suggest that from my extended practical experience and special personal observation within and without the State, as also my observation in legislation on this subject, a statute is required that will do the greatest good to the greatest number in protecting the natural beds or reefs.

The State should exercise exclusive jurisdiction and control over all fisheries. A positive and lasting definition should be made as to natural reefs and barren bottoms. In this it must be determined precisely by metes and bounds what areas can be used for cultivation. It takes an investment of money with energy and labor to engage in oyster-planting.

An oyster and fish inspector should be appointed in the coast counties without the influence of local politics, requiring a graded license tax for boats, as well as a tax on the catch to defray the expenses of inspection and the due enforcement of laws.

The use of dredges should not be permitted.

If a bar is exhausted it should be closed to all fishermen for a time.

No oysters under 2½ inches should be marketed. The practice of the older States is to permit not exceeding 5 per cent of small oysters or culls when marketed.

Oysters should be culled on their natural beds, small oysters or culls and shells being returned to the water.

Last, but not least—in fact, the most important of all—no oysters should be permitted to be used for any purpose whatever during the closed season except for transplanting. Although the spawning season varies, depending on the depth of the water and temperature of the air as well as conditions of food, a fair and reasonable limit is from April 15 to October 15. I will tell the oystermen it is folly for them to attempt to cure these ills by law, for they know by experience it can not be done without their aid. I do not see any other way to bring it about except by public sentiment. The State can not do anything on this line without the cooperation of the oystermen, for it has so far in other States proved a failure. At no time has this subject received so much attention as now. It has for many years been a subject for legislation, yet no system has been established equally satisfactory to oystermen and the public at large.

An opinion prevails that the State should sell the natural reefs and let the owners thereof look to the protection or improvement. This would be against the interests of those dependent on the oyster industry for support, and it would not promote or encourage peace and good order and should not be considered.

APALACHICOLA, FLORIDA.