

**99.—PEARLS AND PEARL FISHERIES.\*****By Engineer M. WEBER.**

Many mussels cover the inside of their shell with a layer consisting of animal membranes and carbonated lime. Thereby a peculiar luster is produced on the inside of the shell, which is called mother-of-pearl. A smaller portion of this secretion often forms excrescences shaped like drops or kidneys, which either are imbedded more or less firmly in the inside of the shell, or lie loose in the soft parts of the animal, especially in its so-called beard. These are what are generally known as pearls.

The formation of mother-of-pearl is doubtless a natural process taking place in certain mussels. The formation of pearls, on the other hand, is ascribed to accidents, and probably is caused by a sickness of the mussel, or by some wound inflicted on it. This view has been reached by noticing the circumstance that, when the shells are large, and the inside smooth, clean, and without any holes, so that the mollusks can fully develop, pearls are but rarely found; while the formation of pearls is very frequent when the shells are irregular. Sometimes hundreds of pearls are found in the last-mentioned shells; but frequently scarcely one of them possesses any commercial value.

Real pearls are found only in bivalves; but a useful product is found in some univalves. The products of the following varieties are known in commerce:

(1) *Avicula margaritifera*.—Which produces the most valuable pearls, but whose shell is worthless.

(2) *Meleagrina margaritifera*.—Principally valued on account of the mother-of-pearl. The shells are often 6 to 18 inches long. Its pearls are also of great value.

(3) *Strombus gigas*.—The conch-shell of the West Indies.

(4) *Tridacna gigas*.—The giant clam, with opal white pearls of a subdued luster.

(5) *Pinna squamosa*.—With black and red pearls.

(6) *Placuna placenta*.—Translucent, with lead-colored pearls.

(7) *Ostrea edulis*.—The common oyster.

(8) *Modiola vulgaris*.—The horse-mussel.

(9) *Turbinella scolymus*.—The chank-shell; pale-red pearls.

(10) *Turbo olearius marmoratus*.

\* "Om Perler og Perlefiskeriene." From the *Norsk Fiskeritidende*, Bergen, Norway, October, 1886. Translated from the Danish by HERMAN JACOBSON.

An excellent reference in this connection is to the chapter on Pearls and the Pearl Fisheries, in P. L. Simmonds's *Commercial Products of the Sea*.

(11) *Turbo sarmaticus*.

(12) *Haliotis* (different varieties).—Found in the North Sea, New Zealand, the Cape of Good Hope, and Japan.

(13) *Anodonta herculea*.

(14) *Alamodon, Unio, &c.*—Found in Scotland, Ireland, Lapland, Bohemia, Bavaria, Saxony, and Canada.

The sea pearl fisheries are principally confined to the Persian Gulf the coasts of Ceylon, the Eastern Archipelago, Australia, the lagoons of many islands in the Pacific, and to Central America.

Fresh-water pearls have, as a rule, but little luster, and are consequently of no great value; although one occasionally finds pearls having a value of from 50 to 70 crowns [\$13.40 to \$18.76], and sometimes even of 1,800 crowns [\$482.40]. For a while the Scotch pearls enjoyed a great reputation. From 1761 to 1764 more than 180,000 crowns' [\$48,240] worth of pearls are said to have been brought to London from the rivers Tay and Isla. During the dry summer of 1862 a surprising quantity of pearls was found in Scotland. The average value of these pearls varied between 40 and 45 crowns [\$10.72 to \$12.06], but those valued at 100 crowns [\$26.80] were also quite frequent. Statisticians estimate that the total value of pearls found in Scotland in 1865 was 216,000 crowns [57,838]. Since that time pearls have advanced considerably in value.

During the summer months the Arabs carry on a sort of pearl fishery on the coast of the Red Sea. They catch the mollusks and lay them in the sun, so that they may open quickly. Jedda is the principal place where these fisheries are carried on. The exportation of mother-of-pearl from Jedda *via* Alexandria annually amounts to 1,200,000 pounds avoirdupois, half of which quantity goes to Birmingham.

The pearl fisheries in the Persian Gulf, especially on the coasts of the Island of Bahrein, are also in the hands of the Arabs. The best beds are said to be on fine white sand and in clear water. Nearly 5,000 boats are employed in these fisheries, and their annual value is estimated at 1,080,000 crowns [\$289,440]. Beds of pearls are found at various depths as far down as 18 fathoms. The general depth at which they are found is, however, from 4 to 8 fathoms. The season lasts from April to September. Most of the shells are brought to the little harbor of Lingah; thence a considerable quantity of mother-of-pearl is shipped direct to London, only a small quantity going to the continent of Europe. Many pearls, especially those of a yellow color and those having a complete cone-shape, are sent to Bombay. Bagdad is a considerable market for white pearls. The shells which come to England from Persia are mostly small and have a subdued luster; but as a rule they bring higher prices than the Panama and Tahiti shells. The annual quantity imported is rarely less 300,000 pounds. The total value of the pearls exported from the Persian Gulf during 1879 was 7,500,000 crowns [\$2,010,000].

The Ceylon pearl fisheries are carried on on the west coast of Ceylon, in the Gulf of Manaar, south of the island of the same name, and also on the west coast of India, near Tuticorin. The beds lie in groups. One of these is opposite the town of Arippu, and comprises the so-called Paria-par, Paria-par Karai, Cheval-par, Kallutidel-par, and Modaram-par. The famous Karaitivu bed is opposite the town of that name. Other well-known beds are the Karakupanai-par, and the Jekenpedai-par. All these beds lie at a distance of at least 6 to 8 miles from the coast, and at a depth of  $5\frac{1}{2}$  to  $8\frac{1}{2}$  fathoms from the surface. They have a rocky bottom protruding from the sand, and are exposed to the currents of the sea. The beds are under the supervision of an inspector appointed by the local government, which has the exclusive working of them. The laborers and divers are natives, who as payment receive 25 per cent of all the pearls they find. Experience has shown that few pearls, and these of little value, come from mussels which are not older than five years. During the fifth and sixth year the value doubles, and in the seventh year it becomes fourfold. The pearls are not fully matured if they are taken out too soon; and on the other hand, the animal dies, if the pearls remain too long in the shells. For these reasons pearl fishing is prohibited at certain periods.

Up to the year 1863 there was no system in these fisheries. The results were as follows:

Years.	Crowns.	Equivalent in United States currency.
1796-1809.....	9,314,658	\$2,496,328
1814-1820.....	1,618,362	433,721
1826-1837.....	4,088,376	1,095,685
1855-1860.....	2,114,172	566,598

In 1863 there were caught on twenty-two fishing days 11,695,000 pearl-oysters, yielding pearls to the value of 918,324 crowns [\$246,110.83]. The next fisheries were in 1874, when 1,700,000 pearl-oysters yielded 182,160 crowns' [\$48,818.88] worth of pearls. In 1877 there were caught on thirty fishing days 6,850,000 pearl-oysters, yielding pearls to the value of 341,136 crowns [\$91,424.45]. The yield in 1879 was unusually good, as twelve fishing days yielded 7,650,000 pearl-oysters. In 1880 the fisheries lasted from March 19 till April 2, and during these eleven days 11,000,000 pearl-oysters were caught. In 1881 as many as 60,000,000 were caught, yielding pearls to the value of 1,080,000 crowns [\$289,440]. These fisheries are now carried on according to a well-regulated system. The divers receive their wages as soon as they reach the coast.

When the pearls have been gathered, they are classified in the following manner:

(1) "Anie," pearl-eyes; that is, pearls of perfectly round shape and pure luster.

- (2) "Anathorie," that is, pearls which have a slight defect in either of these respects.
- (3) "Masengoe," pearls which have defects in both these respects.
- (4) "Kalippo," pearls which are flat, and have other great defects.
- (5) "Korowel," faulty pearls, especially double pearls.
- (6) "Peesal," misshaped pearls.
- (7) "Codwee," misshaped pearls of tolerably fine form.
- (8) "Mandongoe," split pearls.
- (9) "Kural," very small misshaped pearls.
- (10) "Thool," seed-pearls.

In sorting the pearls they are first passed through a row of baskets, 10 or 12 in number. The eighth basket in the row has 20 holes, and the pearls which do not pass through these are said to have the "twentieth measure." The following baskets have 30, 50, 80, 100, 200, 400, 600, 1,000 holes, &c., and each basket has its special name. After the pearls have been sorted in this manner, they are weighed, and their value is noted.

China has pearl fisheries near Pakhoi. The beds are divided into four districts which lie between the south coast of the peninsula of Pakhoi, the island of Weichow, and the peninsula of Leichow. In 1875 these fisheries yielded pearls to the value of about 162,000 crowns [\$43,416]. Cochin China carries on an extensive trade in mother-of-pearl, most of which comes from the Bay of Tirwar. On the north coast of Japan considerable quantities of *Haliotis gigantea* are caught, which is highly prized by both the Japanese and Chinese.

The Philippine Islands produce large quantities of mother-of-pearl. In 1877, 155 tons were exported; in 1878, 152 tons, valued at 307,314 crowns [\$82,360.15]; in 1879 the yield amounted to 288,810 crowns [\$77,401.08]. The entire region from the island of Tawi-Tawi and Sulu to Baselan is one continuous bed of pearl-oysters. Here the Malays and Chinese fish in common. The Sulu fisheries, near Tawi-Tawi, are, according to the statement of an Englishman, Mr. Moore, the largest and most productive of all the pearl fisheries in the East Asiatic seas. The pearls which are caught here have always been famous, and the mother-of-pearl is distinguished by its yellow luster, which makes it suitable for many purposes. Labuan is the principal market for the products of Sulu. In 1868 the value of these pearl fisheries was 207,972 crowns [\$55,736.50]; in 1870 it fell to 102,348 crowns [\$27,429.26]; and up to 1878 it fell still more. Macassar is the principal market for the natives from Bayos. In the Kau Bay there are found pearl beds belonging to the Sultan of Ternate. Pearls and mother-of-pearl are found near the island of Aru, and are brought to market at Debbo. The principal place where these fisheries are carried on, however, is Blakong Tanah, opposite the island of New Guinea; and these are really the most important fisheries in the entire archipelago. The yield in 1860 amounted to 133,000 crowns [\$35,644]. The island of Timor has pearl beds, but the yield is small.

The most important pearl fisheries in Queensland are in the hands of Sydney capitalists. The fisheries are carried on by Malays, who dive to a depth of 6 fathoms. The pearl-oyster from Torres Strait generally weighs from 3 to 6 pounds, and sometimes as much as 10 pounds.

The value and weight of the mother-of-pearl exported from Queensland was as follows:

Years.	Weight.	Value.	Equivalent in United States currency.
	<i>Pounds.</i>	<i>Crowns.</i>	<i>Dollars.</i>
1874	2	216	57 89
1875	11,200	14,382	3,854 88
1876	288,600	281,970	75,567 96
1877	776,800	877,014	235,039 75
1878	953,000	974,682	261,214 78

The pearl fisheries on the northwest coast of Australia employ a large number of Malays and natives as divers. The fisheries last from the end of September till the end of March. It has not yet been possible to ascertain the extent of the beds; it is supposed, however, that they extend as far as the Gulf of Carpentaria. The fisheries are carried on for the shells, but frequently yield pearls of considerable value. These shells are the best which are known. They weigh from 1½ to 6 pounds a pair. The export duty is 72 crowns [\$19.30] per ton. The oldest fisheries in West Australia are carried on in Sharks Bay. The shells which are caught here are those of the *Avicula margaritifera*. They are very thin, but their inside surface is transparent and has a beautiful pearl-like luster. At present they fetch a good price at Havre. Formerly they were but little esteemed on account of their thinness, and for this reason they were taken principally on account of their pearls. These have a brilliant luster, although they are not larger than a pea. The oysters are caught with a wire drag-net, which is drawn across the beds, and which piles them in a heap; thereby the mollusk is killed, and the shells are easy to open. The West Australian pearl fisheries increase from year to year. In 1874 mother-of-pearl was exported to the value of 1,060,707 crowns [\$284,269.48], and pearls worth 108,000 crowns [\$28,944]. In 1876 there were exported to London 140 tons, and to Singapore 67 tons, the price varying from 4,500 to 4,840 crowns [\$1,206 to \$1,297.12] per ton. Recently the English papers have reported the discovery of pearls and mother-of-pearl near New Zealand.

Diving for pearls is one of the principal employments for the natives of the Pacific Ocean. Here, likewise, mother-of-pearl is the principal object of the fisheries. The oysters live in large colonies, close together, and are firmly attached to each other; they are attached to the bottom by a ligament or band, starting from their body and running through the shell. In the live animal this band is of a dark green, and sometimes gold-bronze color, and the fishermen can tell from its color whether

the shells contain pearls or not. The shells reach their full size when they are seven years old. The average weight of the empty shell at that time is about 1 pound, and the length varies from 10 to 18 inches. When the animal has reached maturity, it tears itself loose from the stones, opens its shell, and dies. The shells are then covered with corals and parasites. They become worthless and the pearls are lost. These mollusks also have a number of enemies, the most dangerous of which is a kind of *Scolopendra*, which opens the shells and eats the mollusks. All grown mussels are, moreover, infested by crustacean-like parasites, which penetrate into the shells and there lay their eggs.

After the oysters have been caught and brought ashore by the divers, they are sorted. The shells are opened with a steel knife. A skilled hand can open a ton per day, and not miss a single pearl. The mother-of-pearl is laid in a shady place, that the colors may not fade. When there is a famine, the mollusks are eaten by the natives. The pearls are generally found in the place where the band before mentioned starts. In shells where many pearls are found, they are generally small and misshaped. Occasionally pearls are found loose in the shells. These are always of a very fine quality, perfectly round, and often very large. But there is hardly one in a thousand oysters which contains such pearls. The natives often lose them, owing to the careless way in which they open the shells.

Fine and calm weather is most favorable for pearl fishing. The divers wear no special suit, but simply rub their body with oil, so the sun may not blister their skin. They remain under the water one to two minutes, and bring up oysters from a depth of 20 fathoms. They rarely go to such a depth, but the finest oysters are found there. Thus in many fishing-grounds, which were supposed to be exhausted, a great many pearl-oysters are found in deep water.

In the Southern Pacific, pearl fisheries are principally carried on near the Navigator's Islands in the Tuamotu Archipelago. Many of these fishing-grounds are partly and some are entirely neglected. Thus the Island of Manihiki twenty years ago yielded 100 tons of shells in eighteen months; but since that time no pearl fisheries have been carried on there. The Hogolen Lagoon is also known as a vast unexplored pearl-oyster bed. So far the Tuamotu Archipelago is said to have produced 25,000 tons of mother-of-pearl, valued at 18,000,000 crowns [\$4,824,000]. Nearly the entire quantity goes to Tahiti, to be exported thence. In 1873 2,000 tons of shells were exported; the pearls having a value of about 140,000 crowns [\$37,520]. In 1878 Tahiti exported 591 tons of shells, valued at 638,280 crowns [\$171,059.04], and pearls valued at 108,000 crowns [\$28,944]. In 1879 there were exported 470 tons of shells, valued at 507,600 crowns [\$136,036.80], and pearls valued at 72,000 crowns [\$19,296]. In 1875 an export duty of 30 crowns [\$8.04] per ton was levied; this duty, however, was abolished in 1878, and since that time the exportation has again increased.

On the islands of the Pacific the pearls are classified as follows:\*

(1) Pearls of a regular form and without faults; in value, those weighing a decigram, are worth about 2.7 crowns [\$0.72]; those weighing from  $1\frac{1}{2}$  to  $2\frac{1}{2}$  grams, from 1,800 to 2,600 crowns [\$482.40 to \$696.80].

(2) Round white pearls of great luster; 30 grams, containing 800 pearls, would be worth only 72 crowns [\$19.30]; while the same weight in 50 pearls would be worth 1,080 crowns [\$289.44].

(3) Irregularly formed pearls, not without faults; 30 grams of this kind would be worth 55 to 75 crowns [14.74 to \$20.10], according to their condition.

(4) Pearl-bulbs, which are found attached to the shells; 30 grams are worth from 25 to 36 crowns [\$6.70 to \$9.65], according to their regularity of form and brilliancy.

(5) Seed-pearls, which are worth from 36 to 55 crowns [\$9.65 to \$14.74] per pound.

Mother-of-pearl fetches from 25 to 50 öre [ $6\frac{1}{2}$  to  $13\frac{1}{2}$  cents] per pound. The principal markets for pearls from the Pacific are Hamburg, Amsterdam, London, and St. Petersburg.

Besides the pearl-oyster, there is often found in the lagoons of the Pacific Ocean a kind of *Venus* shell, which often contains pearls of great value. The fishermen do not look for these pearls at all, but it is presumed that it would pay to examine these shells more systematically.

In the Pacific there is found another pearl-producing mollusk, whose shells greatly resemble those of the common oyster. They are always found attached to rocks, invariably one by itself; and they are quite rare. Their pearls are always perfectly round, with a fine luster and a gold color, of about the size of a pea.

The Central American pearl fisheries are carried on on both sides of the Isthmus of Panama. In the Bay of Panama are located the Pearl Islands, of which San José is the most important, yielding every year from 800 to 1,000 tons of mother-of-pearl. In 1869 the English imported pearls valued at about 800,000 crowns [\$214,400] from New Granada and St. Thomas; while the average annual yield of the Panama fisheries is about 500,000 crowns [\$134,000]. In the lower part of the Bay of Mulege, in the Gulf of California, and near Los Coyntes, pearls of great value have been found. It is generally supposed that a row of pearl beds extends from the Gulf of Darien to California. In the last-mentioned bays, and on the coasts of Costa Rica and Central Mexico, pearl fishing has long been a remunerative employment. The principal fisheries on the Mexican coasts are carried on between Mulege and Cape San Lucas. Near the Islas Tres Marias and in the neighborhood of Acapulco the fisheries are not near so important. The mollusks found are *Meleagrina margaritifera* and *Haliotis rufescens*.

The fisheries are carried on from July till October; during the rest of the year storms and cold weather prevent fishing. Diving suits are

\* See Simmonds's Commercial Products of the Sea, p. 425 (Part III, Chap. III).

generally used. The mother-of-pearl from the Gulf of California is white, with bluish-black or yellow bands. The fisheries were carried on to such an excess that the size of the shells decreased from year to year; fishing is therefore now permitted only every fourth year. The California shells are sent almost exclusively to Hamburg, whence they go to England, Austria, and France. The largest quantity goes to Paris, but a great deal also to Frankfort on the Main. The entire California fisheries are said to produce from 600,000 to 700,000 pounds of mother-of-pearl per annum. In 1879 Costa Rica exported 3,540 pounds. In the same year Panama sent pearls to the value of 126,000 crowns [\$33,768] to the New York market. Guayaquil, in 1871, exported 13 to 14 tons of mother-of-pearl. In the Bahamas the snail fisheries form an important industry. The pearls found in them are rose-colored, yellow, or black; the first mentioned alone possess any value. The market for these pearls is Nassau, in the Bahamas; and it frequently happens that a pearl fetches as much as 400 crowns [\$107.20]. The average annual yield is 180,000 crowns [\$48,240]. In the State of Ohio pearl fisheries are carried on in Little Miami River. The season lasts from June till October. Men and boys wade in the river and bring up the pearl-oysters with their feet. The shells are opened with a knife; and seldom are more than 2 pearls found in 300 oysters. Pearl fisheries are also carried on in the rivers of Norway, Bavaria, and Bohemia.

---

100.—NOTES ON THE NEW ENGLAND FISHERIES IN OCTOBER, 1886.

By W. A. WILCOX.

During most of the month the weather was favorable for fishing, the exceptions being high winds that held mackerel seiners in the harbors of Cape Breton a large part of the month, and a long storm off the New England coast the last week in the month.

Codfish show an increase of 474,758 pounds in the amount landed at Gloucester over the corresponding month of last year, the receipts being mostly from Western Bank. One year ago cod were very abundant on George's Bank, but few if any were caught on Western Bank; this season affairs are reversed. For several months fish have been reported scarce on George's and very plentiful on Western Bank. Off the New England coast cod have been more abundant than of late years. Many vessels engaged in cod-fishing could show a large amount of fish caught during the year. Among others we notice that the schooner *Finance*, of Gloucester, from October 2, 1885, to October 15, 1886, with a crew of 11 men, including the master, has landed 600,000 pounds of codfish and 20,000 pounds of halibut, most of the catch being taken on George's and Brown's Banks.

Vessels engaged in the halibut fishery have found fish fairly plentiful on Grand and Quereau Banks, Gloucester vessels having arrived