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PAPERS

RELATING TO THE

PEARL FISHERIES IN CEYLON, &c.

WITH TEN ILLUSTRATIONS.

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CEYLON PEARL FISHERIES FROM 1855 TO 1860.

GENERAL TREASURY,
Colombo, 28th February 1863.

To the Honourable the COLONIAL SECRETARY.

SIR,—My appointment in July last to the office of Acting Treasurer having relieved me from the charge of the Pearl Fisheries, I have the honour to submit a Report on the series of Fisheries which have taken place between 1855 and 1860; and as, owing to the long lapse of them, between 1837 and 1855, little is known or recollected on a subject so generally interesting, and particularly so in the interests of the Colony, I purpose giving a short account of the Pearl Banks, the usages and customs governing the Divers and Boat people, the proceedings at Inspections, the general Regulations and operations under which the Ceylon Fisheries are conducted, and to note the main incidents and results of each year's Fishery from 1855 to 1860.

The Pearl Banks.

Pearl banks are believed to extend all along the N. W. coast from Negombo to Manaar, and the charts and records contain the names and positions of 19 banks, but the larger portion of them have never yielded fisheries either to the Dutch or English governments—

The Condatchy Paar having only been fished in 1801
The Chilaw Paars in..... 1803 & 1815
The Karateevo in..... 1832
and the Peri Paar Karrai in 1833, 1835, 1836

so that the Cheval and Modrigam have been heretofore, as now, the sources from whence the large, although precarious, Pearl Revenues have been derived; and judging from the results of the inspections I made in March 1862 of the entire coast and known banks between Negombo and Jaffna, the particulars of which are summarised in the tabular statement annexed, No. 1, I believe the general productiveness of the Cheval and Modrigam is mainly attributable to their position being within the Kariteevo shoal, a means, especialy to the Modrigam, of protection from the influences of weather and currents—causes to which are attributed the frequent disappearance, before arriving at maturity, of beds of young oysters formed in other banks. But

there may also be other causes to account for these two banks alone rearing oysters to maturity: possibly the ground is favourable for the settling of the spawn, or affords good feeding; if so, and I believe this to be another essential of these banks, then the young oysters formed on other banks may find their way to the Cheval or Modrigam, and in this manner I believe the latter banks to have been recently supplied with a portion of the oysters now thereon from the Kariteevo Paar, which in October 1860 was well filled with young oysters that could not be found at the inspection of March 1862.

Series of Fisheries.

2. Notwithstanding that many long lapses have occurred between each series of fisheries, the Arippo banks have yielded very large revenues to the Dutch and English governments; they were fished by the Dutch so far back as 1667, and with intervals gave fisheries up to 1768. This was the last under the Dutch, as a period of twenty-eight years then passed without a fishery.

3. In 1796, the first year of English government, a series of fisheries commenced, and, continuing with intervals of one to two years to 1809, yielded the large sum of £517,481 4*s.* 1*d.*

The second series, from 1814 to 1816 and 1820, yielded £89,908 16*s.* 7*d.*

The third series, from 1828, continued with only one year's (1834) interval to 1837, and yielded £227,131 13*s.* 3*d.*, and after a lapse of eighteen years the present series commenced, giving in 1855, 1857, 1858, 1859, and 1860 receipts to the amount of £117,453 10*s.* 10*d.*; and having been personally concerned in the conduct of these fisheries, I am enabled to afford fuller details of the particulars of the revenues thereof than the records of former fisheries have allowed.

4. The tabular statement, annexure No. 2, prepared by the cutcherry clerk Mr. B. E. Alvis, affords information upon all the essential points, viz. the estimated and actual number of days fishing, the boats employed, the oysters fished, their sample and sale prices, the earnings of the divers, the expenses and gains of Government, and the number of persons employed at each fishery—information which, I think, will be considered useful and interesting.

Revenue derived.

5 Seeing then that Ceylon has during the last sixty years derived from her pearl fisheries nearly a million of money, viz:—

		£	*s.*	*d.*
1st Series	1796—1809	517,481	4	1
2nd „	1814—1816 and 1820..	89,908	16	7
3rd „	1828—1837	227,131	13	3
4th „	1855—1860	117,453	10	10
		£951,975	4	9

the question naturally arises, Is there the prospect of her continuing to derive large revenues from this precarious but yet productive source?—I believe so.

Future prospects.

6. The Cheval Paar and Modrigam are (as detailed in my inspection reports of November 1861 and April 1862, and as noted in annexure No. 1) abundantly, I may say enormously, stocked with oysters of an age that give the almost certain prospect of arriving at maturity. The Cheval Paar yielded during 1855, 1857, 1858, and 1859, 60,000,000 oysters, the fishing for many days in 1857 being from one million to one and a half million. The extent of ground then covered was very much less than the present, and consisted of three separate patches or beds; now an extent of ground over four miles long and one and a half broad is all fairly covered, excepting one small intervening space, and should yield at the lowest estimate 150,000,000 oysters.

The Modrigam yielded 12,000,000 of oysters at the fisheries of 1859 and 1860. The ground now covered is much larger, being over a mile square, and more abundantly stocked, and should therefore now fish some twenty millions. Thus my estimate of the present condition of these two banks is one hundred and seventy millions of oysters. Of course before they can be fished natural decay will materially reduce this quantity; but comparing their extent and stock with 1855 and 1860, I see every ground for believing, unless circumstances not now fairly to be anticipated should prevent it, that the Cheval and Modrigam will yield within the next five years one hundred millions of oysters and at least £200,000, and I entertain the opinion that if these banks are judiciously fished they will be yearly replenished by the mature oysters, and the present series may be continued, with intervals of one and two years only, without the long lapses which have hitherto occurred.

Presumed source of present beds.

7. The present brood of oysters are no doubt the produce of the mature oysters of 1855 and 1857, as at the fishery of 1857 the coir cable of the guard-vessel at anchor outside the then fishing ground was found to be covered with very young oysters. Seeing this future promise, I required the boats to be strictly kept to the actual fishing ground, to be most careful in their proceedings, taking only mature oysters and throwing back all young ones, and subjected boats disobeying orders and bringing on shore young oysters to loss of their day's fish and future employment; and in 1859 I only used fifty boats per day, and occupied eleven days in fishing the remnant left on the bank. One hundred or 150 boats would have swept the ground clear in four or five days; but such a number of boats being less under control would necessarily have trespassed beyond the narrow limits of the real fishing ground, and disturbed, perhaps destroyed, young oysters.

Causes of destruction and failure of Oyster beds.

8. Fish, snakes, and chanks destroy an enormous number of young oysters. Currents and drifts of sand carry away into deep water or cover beds of oysters. But in my opinion the frequent lapse of fisheries may be mainly attributed to the system under which, years ago, the banks were fished, namely, the *renting* to one or two persons the right of fishing with from 100 to 300 boats daily, with no control over the proceedings of the renter and divers but that of restriction to certain limits and the hours of fishery. So large a number of boats were of course beyond control, and not only may they have fished beyond the proper limits of the bank, but there was no means of knowing either the quantity or quality of the oysters fished—matters that should be carefully watched and recorded as a possible means of regulating and ensuring more continuous fisheries. One hundred boats a day should, in my opinion, be the maximum of any fishery, as the control of all proceedings connected with this number can be maintained. Of course circumstances may arise in connection with a special bank that might necessitate the occasional increase of this number, but as a general rule I consider the fishing with any larger number of boats unadvisable.

Renting system.

9. The renting of fisheries had, besides the special one to which I have alluded, many other disadvantages in the character of its monopoly, its interference with the fair legitimate earnings of the divers and boatmen, the constant disputes with the officers, the assertion of losses, the claims for remission, and the impossibility of ever satisfactorily determining them. These, and the inability of ascertaining correct, I may say any, data of the results of fisheries so conducted, induce me to express the hope that however large a sum may be offered for the renting of a fishery Government will not accept it. The sum offered may exceed all expectations, and possibly what may be actually realised by two or three fisheries, but I am certain the results would be detrimental to future fisheries. I may also quote the opinion expressed in 1854 by Mr. Dyke, in reporting upon an offer to rent the fishery of 1855:—

> "My opinion remains unchanged. It seems to me that Government can never derive any peculiar advantage from the plan of renting; that it must frequently lose much by it; that the proceedings of 1835, 1836, and 1837 [1855 to 1860 may now be added] have established that fisheries can be successfully conducted without having recourse to renting, and that by the sale of the oyster the fair value of a fishery is realised in a straightforward manner, devoid of all mystery, deception and concealment, as purchasers have to a great extent the means of ascertaining the real value."

10. The renting system is the much desired object of the rich Chetties, who, I believe, would now make a large pecuniary sacrifice for its reintroduction, and this was the real purport of their combinations and proceedings at the fisheries of 1857 and 1858.

Removal and transplanting of young Oysters.

11. There is one special subject in connection with the pearl banks which I think deserves consideration and trial, and which, had the opportunity offered during my term of office, I should have given, viz. the removal or transplanting of beds of young oysters to the evidently more protected and favoured grounds of the Cheval and Modrigam paars. That this may be done without injury to the pearl oyster I am satisfied from the proof I have had of its tenacity of life. The practice of transplanting the edible oysters to more favoured localities is very common in England, and has of late years been most extensively and successfully carried out by the French government in the formation of oyster grounds along different parts of the French coasts. As an experiment, and as the most likely means of saving the oysters from the causes which have hitherto so generally befallen all other broods but those found in the Cheval and Modrigam, it is worth the trial, and should be attempted on the first favourable occasion that offers of a healthy bed, say of one or two years old, sufficiently near to the Cheval or Modrigam to allow of their being taken up and redeposited the same day in water. A sufficient quantity should be left on the original ground to test their progress with those removed.

Robbery and Guarding of the Banks.

12. I do not entertain the opinion generally expressed as to the pearl banks being robbed, and the necessity for a steamer constantly to guard them. The majority of the banks are distant from eight to twelve miles from the shore, and the landmarks by which their positions are ascertained cannot be seen from small boats; and if robberies had really been effected either by parties from Ceylon or the coast of India, rumour would certainly have afforded actual proof, as oysters can neither be removed nor opened in a concealed manner, and the display for sale of quantities of pearls by the class of persons thus having them would have led to detection. No proof of robbery has ever been asserted or afforded; but because it is supposed to be easy of accomplishment, which I do not admit, the supposition has been received as a fact. I believe the fishermen who fish along the N. W. coast during the N. E. monsoon do much harm to some of the banks by the use of large drag-nets. This sort of fishery within the precincts of pearl banks is illegal, and a party lately arrested whilst so fishing by Mr. Worsley, the supervisor, having been punished, will, with frequent inspection of their boats and nets by the supervisor, check such proceedings; but an amendment of the law is necessary, and also an efficient guard during the N. E. monsoon: and I consider this service can be

well performed by the Schooner *Ceylon*, lately obtained from England, and the former guard-boat. During the S. W. monsoon the Arippo coast is a dangerous lee-shore near to which no vessel will venture, and nature is thus a most effectual guardian of the pearl banks during many months of the year. A steamer's movements might be quicker, but she cannot, as the two guard-boats may, keep watch upon two points of the coast at the same time, nor could she overtake a fishing canoe; she could bring her to with a gun, or run her ashore, both of which the boats can do, and the latter more effectually. I therefore consider no sufficient advantages are offered to compensate for the very much larger expenditure to be incurred in the upkeep of a steamer for about five months' service in the year, particularly if consideration is given to the contingencies generally connected with steam-vessels of however small a class, viz. machinery, engineers, and repairs—matters which, if the means of remedying are not at once at hand, would probably frequently incapacitate her from service when most needed. Such are not the usual contingencies of vessels, and were considerations which induced me to abandon the auxiliary steam-power with which I originally intended, and recommended the schooner should have been furnished. I think another such a class of vessel as the *Ceylon* in lieu of the barge advisable, say, to be built in England of iron, and sent out in two or three pieces to be fitted up out here. One of these vessels should be kept in employ all the year round so as to cruise about during any fine weather periods of the S. W. monsoon; the other need only be employed from the middle of October to end of April. This guard, under the charge of Mr. Worsley, who has on my recommendation been employed since last year as resident supervisor at Arippo, will, I believe, be sufficient to protect the banks; and the English and the Native diving establishments which His Excellency has been pleased to sanction will enable that officer occasionally to inspect the condition of known banks, to look out for the formation of new beds, and by the observations Mr. Worsley is so well capable of making, obtain that certain information so much needed in respect to the breeding, spawning, growth, and age of the pearl oyster; and I am satisfied from the zeal and interest Mr. Worsley has already shown in all connected with the pearl fisheries that he will, if so directed and encouraged, give his best attention to those important subjects.

Inspection proceedings.

13. The favourable season for this work is the N. E. monsoon, more particularly the month of March, and whenever there is no pearl fishery, the whole coast between Negombo and Manaar should again, as in 1862, be examined to see if the small bed of young oysters then found off Negombo is alive and increasing, or if the banks off Chilaw, Calpentyn, and Kariteevo give any promise. This service might be done in the fine weather of January and February by Mr. Worsley with the schooner and the English and Native divers. Owing to the fisheries

of the last five years occupying the fine weather of February to April, inspections have of necessity taken place between the end of October and middle of November in the lull of weather between the monsoons; but the period is too short and too precarious for any proper inspection, and only fitted for the examination of a known bed of oysters, and the taking of a sample to test their condition and determine when they should be fished. In 1857 I was kept by strong S. W. winds at anchor off Sillawatorre for twelve days, and during some twenty-five days of absence on this duty there were only five workable, whilst in 1858 there were eighteen days of such fine weather as to allow of the examination of the coast from Arippo to Tallamanaar; but in 1861 there was only time to take up a sample from the Cheval Paar, a gale of wind nearly wrecking the *Pearl;* indeed, but for steam power allowing her to get off the land and out to sea, such would have been the case.

14. It is in the work of inspections that a steamer is so necessary and useful, affording, as this power does, quickness and precision of movement in placing vessel and boats in the exact positions needed—a matter often unattainable by sailing craft,—and now that in lieu of the heavy unmanageable native boats the fishery establishment has boats of English build, easily pulled and towed, the work is capable of being done with greater celerity and correctness. With a steamer the superintendent has the means of satisfying *himself* of the extent and condition of all parts of a bed of oysters by running all over the ground buoyed off upon which the inspector and inspection boats may be at work, and sending down the English and Native divers. With the former he can in light weather, by letting the vessel only drift, have the ground thoroughly examined. In March 1862 I had the diver down for above an hour at a stretch, and walking over from one to two miles of ground, thus checking entirely the reports and proceedings of the inspection party.

15. The proceedings of inspections are thus conducted :—The inspector with six boats, each having two divers and buoys in charge of a coxswain, leave the vessel at daylight, when the sea is always calm in the N. E. monsoon, spreading themselves to the four points of the compass, and diving continually in any depth of water not exceeding eight to nine fathoms. If rock is found one flag is hoisted. This attracts attention, as oysters are more generally found on such ground. If oysters are found two flags are hoisted, and a buoy is at once laid down; the other boats then work their way to this point, noting if the ground be rocky, taking down such flags when getting only on sand and placing buoys if oysters are found. The limits N. S. E. and W. are then ascertained, the superintendent in the steamer re-examining and going all round and beyond the buoys. The age, condition, and quantity of the oysters being satisfactorily ascertained, the inspector then lays down the exact position of the bed by the bearings of the landmarks, the most prominent

on the Arippo coast being Kodremalle Hill, Kallar Beacon, Modrigam trees, and the Doric, the two former being the most generally seen and to be relied on. Taking also the bearings of each buoy, he ascertains the extent of the bed, and lays it down on the chart. According to the number of oysters a diver is able to bring up at a time (and the coxswains keep these particulars for the portion of the bed they work upon) the calculation is made of how many five divers with relief, constantly at work for six hours a day, could bring up; and the probable quantity of oysters on the bed and its out-turn, is thus assumed. Of course this estimate is always very much below the actual out-turn at a fishery, but the aid which the English diving system, employed since 1859, affords in inspections, by the ability of remaining longer under water, exploring the bed of the ocean, and giving more precise and explanatory account of the extent, quantity, and condition of beds, not only tends to allow of more correct estimates on these points, but is a great and needed check upon the native divers, whose information could not always be depended upon, because from the short time they remain under water (at most a minute a spell) their observation was very cursory, and it was believed they had reasons for not telling all they did ascertain.

16. The tabular statement annexed (No. 1) of the inspection of March 1862 will give a general view of inspection proceedings, but not of the details of all the work done.

Sample.

17. When a bed of oysters is of an age to be fished a sample of 10,000 or 12,000 is taken up, landed at once, and, being most carefully counted, are placed in a large ballam or boat. The place of deposit is then secured and guarded. After ten or twelve days, when the oyster flesh has become a mass of putrid matter, the washing takes place; sea water is then put into the ballam, and a number of coolies, divested of all clothing that would allow of concealment, are ranged on each side of the ballam, watched by the peons to see that they keep their hands under water when separating and washing the oyster shell, and do not take and conceal any of the pearls they may see or feel. The shells are well rubbed together; those having pearls adhearing thereto are set apart for the pearl to be cut away, and the other shells are placed in heaps alongside each man, and, when all is completed, are counted, to see that none have been taken, and to ensure the correctness of the quantity upon which the estimated value of the fishery is thus based. After all the shells are removed the water is baled out and passed through sieves and cloth to arrest any pearls that might be so taken up, and then a disgusting mass of filthy putrid matter and mud remains, amongst which you see the pearl glistening, and the excitement of looking for and collecting the large ones begins. The superintendent's eyes must be everywhere to prevent any hands but his own picking them out,

for the natives are most quick-sighted and equally quick-fingered. The mass of mud, sand, shells, and putrid flesh is then collected in a heap at one end of the ballam, and after being cleansed by repeated washings is laid upon cloths exposed to the sun to dry; when thoroughly dry the large pearls are picked out by hand and the smaller ones sifted by women. During this process every precaution is taken that no pearls are lost: every article used is washed, and the water passed through sieves of the smallest size, and a vigilant watch kept over all the people employed, as they are adepts at seeing and concealing pearls.

Sorting and valuation.

18. When all the pearls are collected, three or four intelligent, respectable pearl dealers, who are mostly of the Moorman class, are called in to estimate their value, which is done by sizing, classing, weighing; and according to these results the valuation is assigned to each class of pearls by the market rates then ruling. I shall briefly describe these operations which occupy a long time, and, needing great judgment, are causes of much discussion and frequent difference of opinion, to settle which the dumb alphabet is frequently used under a cloth to let the senior or accountant of the party know and decide by such individual opinion. Each of the four has his duties—one sifts, another classes, the third weighs, and the other records these results in manner shown in the valuation paper, annexure No. 3.

Sizing of the Pearls.

19. Sizing or arranging the pearls into ten different sizes, from the largest to the smallest, is done by passing them successively through what are called baskets, *i. e.* small brass sieves, said to be of 20, 30, 50, 80, 100, 200, 400, 600, 800, 1000 holes each, though there is no certainty that all baskets really contain these exact numbers except the larger ones. All pearls are first sifted in the twenty basket, and those retained by it are of the largest or first size, then those retained by the thirty are of the second size, and so on through the whole ten, and those that pass though the last size are what is called "massie thool," small, like powder or dust. There are also shell pearls, excrescences cut from the oyster shell, which are of various sizes and shapes, and not generally passed through the sieves; in fact they are mainly included in the sample, to show that all its out-turn of character, bad as well as good, is fairly exhibited for the information and consideration of the dealers and speculators.

Classing.

20. It will be understood that each of the ten sizes may include those of nearly every class; the twenty to eighty basket may each have Anie, Anatharie, Kallippoo, Krowel; and this necessitates the second operation of classing—one that requires the greatest skill and judgment, and which hardly any two persons will do alike. The perfections in pearls are shape and lustre, viz. sphericity, and a silvery

brightness free from any discoloration whatever; and as the pearl has these two essentials, so do the valuers assign them to their appropriate class, viz:—

Anie—perfect in sphericity and lustre.

Anatharie—follower or companion, but failing somewhat in one point—either sphericity or lustre.

Masengoe—confused, imperfect, failing in both points, especially in brilliancy of colour.

Kallippo—rejected or outcast, as failing still more in both points.

Korowel—nearer or shorter a double pearl.

Peesal—misshapen, and clustered more than two to each other.

Oadwoe—beauty.

Mandangoe—folded or bent pearls.

Kural—very misshapen, small.

Thool—small gains.

21. The pearls having been sized and classed, each class is then weighed and recorded (*see* annexure No. 3) in kalanjie and manjadie. The former is a brass weight, equal, it is said, to 67 grains; the manjadie is a small red berry, having the property, when full sized, of being all exactly of the same weight, and are reckoned as 20 to the kalanjie.

22. The weights being ascertained, the valuation is then fixed to each pearl or set of pearls according to their respective sizes and classes, the inferior classes solely according to weight at market value of such pearls at so many star pagodas, *e. i.* Rs. 3½ each per kalanjie; but the superior classes, *i.e.* Anie, Anatharie, and the Vadivoe, if good, are not valued only by weight, but at so much per chew of their weight—the native pearl dealers' method of assigning the proper value by weight to a valuable article of small weight, and is, I apprehend, akin to the practice of dealers in precious stones who multiply the value per carat by the square of the weight of the article: this is rather a meagre explanation of the, chew, but a fuller one would need illustration by figures.

Pearl Fishery proceedings.

23. When a fishery is to take place, notice is issued in the *Government Gazette* according to the form annexure No. 3, and about the middle of February the bank to be fished is buoyed off, and a sample taken up and valued, so that its out-turn may be compared with that of November, and the latest condition and prospects exhibited; it is this sample, always very much superior in weight and quality, by which the speculators are, until they have washed the purchases, guided. By the end of February, Sillawatorre (an arid, desolate sea-coast village scarcely inhabited, but so situated as to be the exact position from which the fishery boats can daily go to and from the banks, and containing space sufficient to accommodate without interference with private rights all the needs of a fishery, and too far distant from any

place for its results to be the cause of annoyance to any but those whose duties or inclinations bring them there) is densely thronged with thousands of natives of all classes—traders, pearl merchants, divers, boat-owners, boat-men, and coolies, besides visitors, English and Native, whom curiosity may bring to see what may be fairly called a most interesting sight and a wonderful Eastern fair. Then there are the Government establishments, a few troops to guard the treasure and prevent any raid that might be attempted upon the thousands of money and property brought to the fishery; a medical establishment, and a body of police to keep order and, if possible, health amongst this motley assemblage of European, Tamul, Singhalese, Moormen, and the still more varied tribe of the Chetty class and caste, that flock from all parts of Ceylon and India. The largest number of arrivals take place from the 25th February, and I have noted as many as thirty to fifty boats a day coming in with the sea-breeze, in companies of five or six, all fully laden with men, women, and children, and the materials for their huts; and as they passed the doric (the superintendent's residence) they would give a Yo, Ho! cheer of gratification and satisfaction at the termination of the voyage, and perhaps of recognition of their doric for the time being. It is wonderful, considering the long distance they come from the continent of India in open boats and laden as they are that no loss of life occur, or at least is heard of. By the end of February the barren sandy beach of Sillawatorre is filled with some 5,000 or 6,000 persons, who have housed themselves in temporary cadjan buildings of all sorts of character, according to the means or caste of the residents. Kootto sites for the deposit and decomposition of the oysters bought at the public sales are marked out and awarded to intending speculators; these places are placed far to the south and beyond the inhabited ground, which is to the northward; and as the prevailing winds are from the northward and eastward, the stench of the decaying oysters is carried away from all but the parties employed at the koottos guarding, receiving, and washing; but an occasional burst of strong southerly wind of course disperses the aroma over every part of the inhabited quarter. With this come flies innumerable (indeed these are incessant and trying plagues, thought worse with the southerly winds), everything, especially of eating and drinking, is covered with a black mass—a glass of wine or water must be instantly drunk or it is filled with them, and during this time the "Nova Scotian" perfumes were slight in comparison to those of the fishery; but this does not last long; and indeed it seems providentially so arranged that the prevailing winds should aid the needs and purposes of the fishery: the land wind is fair and gentle to carry the fishing boats out to the banks, also the effluvia from the oysters from the land out to sea, thus giving to the inhabitants a somewhat sweetened period for rest; then, as the sea-breeze is from the northward, it brings the boats quickly from the banks to the shore, and carries the oyster smell away from Sillawatorre.

24. As the boats arrive they are registered, and after the day fixed for closing the list they are examined as to size, condition, and fittings. Some are rejected as too small or badly found, but as the residue is always double the number needed, the fortunate privilege of being engaged in a fishery is determined by lottery. Selection would be difficult, certainly unlikely to give satisfaction, and would lead to other consequences, whilst the result of the lottery is borne as the consequence of fate or ill-luck. As this lottery is the first great, I may say momentous, event of the fishery, as the interests of 1, 500 to 2,000 persons are concerned, the divers as well as the boat-owners and boatmen being generally interested in particular boats, I will briefly describe the proceedings. Say that fifty boats are required, and that there are seventy-five from various places on the continent of India and Ceylon, the prizes would be regulated and calculated as near as possible to the proportion, and with the desire that boats from each place shall have employment; then, say there were—

Killacarre boats	14,	about equal to	1-5th	of the	75,	the prize would be	9
Tallamanaar „	13,	do.	1-6th		do.		9
Navantorre „	14,	do.	1-5th		do.		9
Calpentyn „	6,	do.	1-12th		do.		4
Paumben „	5,	do.	1-25th		do.		2
Manaar „	1,	do.	..	..	..		1

and so on. On the day of the lottery the kutcherry grounds are crowded with many hundreds of persons to witness the proceedings, to wish good luck to their friends, and laugh at those who are unfortunate. The superintendent, calling any set of boatmen, counts the number of blank and prize tickets into a bowl, and the tindals, showing there register tickets, come forward to draw. The agitation, anxiety, and eagerness of all are depicted in the countenance; most utter an apparent prayer or invocation, the Catholics cross themselves, and many are almost too nervous to pick up the paper; when done it is handed to the superintendent, who opens and declares blank or prize; and so eagerly do they watch the glance of the superintendent at the paper, and so quick-sighted are they, that I have recognised the disappointment or joy before I gave utterance to the result. If successful, they run off dancing, and are greeted by their friends; if not, they move away slowly, amidst the jeers and laughter of the bystanders. The unsuccessful are, however, frequently afterwards employed; some get the places of boats misbehaving, and if the extra number of boats is large, two divisions of boats are employed. Indeed, as they come from very long distances, and embark all their means in this speculation, I have always made the effort to find employment for all before the fishery closes; but those successful at the lottery have of course the first claim, and the good fortune of longer employ.

25. The crew of a boat consists of 23 persons, and is required and allowed only to have—

5 Diving stones.
1 Tindil or steersman.
1 Saman Oattee, who has charge of the boat.
1 Thody, who bales out water and cleans the boat.
10 Divers, two for each stone.
10 Munducks or Divers' attendants to pull up the stone and oysters and aid the diver.

26. Their remuneration for fishing up the oysters is one-fourth of the quantity daily fished. This system and compact ensures to the Government the certainty of every possible exertion on the part of each boat, such being to their own advantage, and avoids all the consequences that migh arise if the boats were remunerated by daily pay. Indeed it is the speculative character of each day's work that induces the great exertions, and gives to all concerned the personal interest so necessary to carry on the hard and anxious work of a pearl fishery. Each boat's share is divided amongst themselves, according to old established customs, in the proportions noted in annexures Nos. 4 and 5, which papers give the general regulations enforced at the fisheries.

27. The fishery is actually commenced on the first night of the boats going out to the banks, and of course creates great interest and excitement. If the night be moonlight, and if possible I have always selected such, thousands of people assemble on the beach to see the start, and give their good wishes. At about 10 o'clock the tindals, who carry on their right arm a ticket No. corresponding with that painted on the bows of each boat, assemble with crews around them, and as the beach-master has checked each crew, they go to their boat and make the preparations of getting under weigh and into position, ready to hoist the sails and start directly the signal is given. At 12 o'clock the gun is fired, the adappenar (the senior headman) hoists a light at the masthead and leads off. In a few minutes all the boats (on occasions above 100) are under press of sail, and the sight is indeed a very interesting and exciting one: the crews of the boats cheer, and the people on the beach echo them, and the white sails following the signal light of the adappenar's boat may be distinguished for miles out at sea. The inspector's guard-vessel, anchored close to the fishery ground, has a light at the main-topmast head, and in dark nights blue-lights are occasionally burned to show her position. The boats reach the bank, distant the Cheval Paar about twelve and the Modrigam about nine miles, generally about 3 or 4 in the morning and anchor; at 6 A. M. a gun is fired by the inspector as the signal for the boats to get under weigh and follow the inspector and headmen to the fishery ground allotted for each day's work. When in position, and as the sun rises and the day gets calmer and hotter, the

busy hum of 2,000 to 3,000 persons hard at work is heard. As I have before noted, each boat is furnished with five diving stones—three are worked on one side, two on the other—suspended by a thick rope over sticks or outriggers projecting from the boat's sides in such a convenient position as to allow the diver, whilst at the surface of the water, to adjust the stone by lowering or raising it, when he rests his foot upon or rather within a loop affixed to it; these stones are generally about 14 lbs. weight, and are used to accelerate the descent; and I have seen a very celebrated, but corpulent, and therefore buoyant, diver carrying an additional stone affixed to his waist. He then places the loop of his diving net around his neck, and being thus ready gives notice to the two mundugks (the attendants in charge of the rope and line of stone and net), draws in his breath, closes his nostrils with one hand, raises his body to give force to the descent, slips his hold of the bight of the diving cord, and is rapidly carried to the bottom; reaching the bottom he leaves the stone (which the mundugks instantly haul up and make fast), throws himself on the ground, along which he creeps, filling his net as quickly as possible; when obliged to ascend he jerks the *net* cord, which is instantly hauled up by the mundugks, by which time the diver is also at the surface, and again holding on by the diving stone; the diving is then repeated by the first set until their number of turns is over, when they take rest, and the second five divers and mundugks do the work; thus, under the excitement of expected gain, these men continue for six hours without flagging at this most trying and laborious exertion. When regularly at work they remain under water from 60 to 70 seconds. I have timed them 75, 80, 85, and one man 95 seconds; but I believe this to be a special as it was the only instance I ever witnessed of a diver remaining so long under water, and that the working period is about a minute. Of course the number of oysters brought up at each dive depends upon the quantities on the ground. I have known as many as 80, but 40 to 50 is a good average; and this would give from 20,000 to 30,000 as a boat load. At the fishery of 1857, when the daily fish was from 1 to 1½ million oysters, many boats brought 30,000, a few 40,000 a day, and some boats not half the former quantity, and if this is shown to be the consequence of bad divers they are discontinued. At 12 or 1 o'clock, according as the sea-breeze sets in and to the work done, the inspector fires the gun to leave off diving and set sail for Sillawatorre. Soon every boat is under sail, all racing to be first in, to which is attached not only a recorded distinction which gives consideration for employment during extra days, but those also first in get sooner possession of their share of their oysters and obtain the best prices. Between 3 and 4 the boats reach the shore and discharge their load of oysters into the Government kootto—a large enclosed place within which is marked spaces bearing each boat's number. Each boat's fish is arranged into six separate lots, and each lot divided into four smaller lots, the Government

officers giving over to the boatmen one of each four divisions, in all six parcels; and as the people do not know which of the four is likely to be assigned to them, they very carefully and fairly divide them; the other three of each of the six lots are then thrown together, counted, and removed to the sale and delivering portion of the kootto, and the boat's number affixed to each heap. By the next morning a return is furnished to the superintendent of the separate outturn of each boat and the total of the preceding day's fishing. A sale is held at the cutcherry about 12 o'clock, when the oysters are put up in lots of 1,000, with the right of taking at the price knocked down from 1,000 to 20,000 or 30,000. According to the total quantity for sale (which is always declared at the commencement), and when there is no combination, purchases are eagerly made at the larger quantities; but when there is either a combination to lower prices, or opposition between the Chetties and Moormen, the sales are prolonged by lots of 1,000 to 2,000, and all the ingenuity of each party exercised to effect the object in view. As soon as the purchasers pay for their lots, delivery orders are issued to the officers in charge of the kootto, and until the fishery boats arrive the oysters are delivered. This goes on daily, and from the first day of fishery until the conclusion the work is incessant. A break occasionally occurs from a southerly gale or combination practices; sometimes the sea breeze coming in strong and not fair drives the boats to leeward of Sillawatorre, and obliges them to pole for miles along shore, and they do not get in till late at night, perhaps are dropping in all night until morning. On such occasions the shore is lighted up for miles with chools to guide the boats, and guards are set to prevent the crews landing the oysters, and all the establishments are of course obliged to be in attendance. In 1857 the large quantities daily fished, and the combination on the part of the buyers, so retarded the sales that I have been frequently kept at this work until ten at night; indeed there are no regular hours of work, all must attend as the need requires; the occupation is incessant and laborious, and only kept up by the excitement of each day's proceedings.

28. Having briefly described the general operations of a fishery, I shall now note the main incidents connected with them from 1855 to 1860.

Fishery of 1855.

29. Mr. Dyke, the Government Agent of Jaffna, had the charge of this fishery. I acted as his assistant, and Captain Stewart, the Master Attendant of Colombo, was the inspector in charge of the fishery ground. A lapse of eighteen years makes such great changes that these two gentlemen, and Don M. Patchico, the Adigar of Manaar, were the only officials left who had been engaged in former fisheries, and they alone were cognisant of the proceedings for the conduct of the business; but Mr. Dyke, with his usual ability, put matters

in train, and the interest and excitement naturally felt in an occupation so novel as a pearl fishery made all concerned willing pupils and in a few days zealous workers.

30. The bed of oysters fished was on the S. W. part of the Cheval Paar, and, as will be seen by reference to the tabular statement, annexure No. 2, whilst the estimate was for ten days' fishing with a yield of five millions of oysters, twenty days were occupied, and the yield was for Government five millions, and including divers' shares 6¼ millions. The oysters were so scattered over a large extent of ground that the daily boat loads for Government were frequently under 200,000 and never exceeded 350,000. The attendance of persons was not large and mainly confined to the Colombo Chetties, small speculators from Jaffna, a few coast Moormen, and one or two Comattee Chetties from India—speculators at fisheries of 1833 to 1837; there was also one Don Gabriel Appoo, a Singhalese speculator who thought to buy up all oysters and so to make a fortune! For the first ten days the Chetties encouraged this idea of the Don, bidding him up, but only taking lots 1,000 each, whilst the Don, when he got the chance, took the highest number allowed, naming his lots, as he said for luck, to all the members of the royal family; but having spent some £3,000, which it afterwards appeared was not his own to spend, but money advanced upon coffee contract not of course completed, a fiscal's warrant took charge of the Don and of an immense pile of stinking oysters. Gabriel had then to apply to the Chetties, who aided his release from arrest on terms no doubt much to their satisfaction, and having got rid of this opposition they commenced to buy in concert with each other and soon reduced the average of 25 rupees per 1,000 to about 17 rupees, and but for the limited quantity daily fished I have no doubt they would have tried for even lower prices.

31. The outturn of pearls of this fishery was limited in quantity and variety; there were but few of the Vadivoe quality, but there were many large pearls of the Anie and Anatharie class. I saw several that realised at Sillawatorre from £15 to over £20 each, and were said to be worth in India considerably larger sums; but from all I have heard I believe the speculators made more losses than gains. Don Gabriel took his outturn (at least what the Chetties left him) to India, and I met him the following year at Pantura, where he had just landed on his return; he had not been successful, and his ambition to be a monopoliser and make a rapid fortune resulted in much more rapid ruin.

32. Fortunately sickness did not visit this fishery. Small-pox had been very bad in Jaffna, and great fears were entertained of an outbreak at Arippo; but the stringent and judicious quarantine regulations adopted by Mr. Dyke with the few cases that did occur were effectual in preventing the spread of

this dire illness. One sad occurrence alone damped the otherwise successful fishery of 1855, and that was the inhuman murder of two Jaffna dobies, father and son, both in Mr. Dyke's service, the former for a period of some twenty years. The murder was committed the day after the fishery ceased, and many circumstances led to the suspicion that the Malays had done the deed; the wounds were frightful gashes just such as a creese would inflict; the bodies were found between the barracks and the doric; the poor men were last seen at the officers' quarters, where they had been to receive money due for washing done, and it is believed that expectation of this booty induced the deed. Every effort to discover the murderers was made; two men were arrested on fair suspicion of being some of the concerned, but were ultimately discharged for want of evidence likely to have convicted them.

33. My attendance at this fishery, whilst it afforded me the means of becoming acquainted with all the business connected with fisheries, gave me an insight and experience of the anxious responsibilities attached to the office of superintendent, in the directing and controlling the large establishment needed for the varied business of a fishery, and still more so in matters connected with the assemblage of thousands of natives of all classes. A trifle, over which the superintendent may have no control and be in no regard to blame, might cause ill-feeling, confusion, panic, and thus losses and stoppage of the fishery. Too far distant to be aided by the opinions and decisions of Government, and engaged upon a business that allows of no delay, the superintendent must in all matters act promptly upon his own judgment and responsibilty, and should therefore possess the entire confidence of the Government and also the respect and confidence of the natives. These considerations made me hesitate to accept the office; but on Sir Henry Ward's assurance of support, I undertook the charge of the fishery of 1857.

Fishery of 1857.

34. My colleague as inspector in charge of the fishery ground was Captain Higgs, the late respected Master Attendant of Colombo; and as showing the unaccountable manner in which men are thrown together after years of separation, and in places and positions never anticipated, I may mention that more than twenty years before we had been shipmates—I as a youngster for the first time at sea, Captain Higgs as the master of Her Majesty's Ship *Melville*. I had therefore the aid of an experienced zealous officer and of an old earnest friend.

35. Owing to the late arrival of boats and people, which delayed the commencement of the fishery until the 9th March, enormous and unexpected daily yield of oysters, and the tactics and combination of the Chetties to spoil the fishery, in the hope that such would induce Government hereafter to resort to the old renting system in lieu of fishing, and selling the oysters daily by

public auction, this fishery was protracted to the 24th April. Fortunately the season of the N. E. monsoon was unsually long and fine, and mercifully there was no sickness—causes which materially aided the ultimate success of the fishery and the partial defeat of the Chetties.

36. The estimate made by the inspector and fisher headmen in November 1856 was 75 boats per day for fifteen days at loads of 10,000 each, equal to 11¼ millions of oysters, giving a probable revenue of £15,000. The outturn was twenty-three days, a total of 1,624 boats with average daily loads of 19,983, giving for Government over 24¼ millions, and including divers' shares 32½ millions of oysters, and a revenue, as per annexure No. 2, of £20,363.

37. It will be understood how much this unexpected enormous daily yield of one to one and a half million, and on several occasions, including divers' shares, over two millions of oysters, interfered with my efforts to get a fair and legitimate rate, and how materially it aided the operation of the combination party to carry out their avowed intention of bringing prices down to *one* rupee per 1,000. I refused the low prices daily; tried and delayed the fishing as much as possible; but this could only be partially carried out, as the divers' and boatmen's existence depended upon work; and although prices were low, the large quantities they daily shared gave them fair earnings.

38. For the 6th day's fishing five rupees per 1,000 were only offered; but as the estimated value of the November and March samples was 11 and 14 rupees, and so large a reduction was not justified even by the excess of quantity, I refused to sell, and in consequence the Chetties and large buyers ceased purchasing, and the fishery was stayed. At this crisis I had over two millions of unsold oysters in the Government kootto. A few days afterwards an express arrived from Sir H. Ward giving me full powers to close the fishery at once, or to act in any manner I thought best. As regards the immediate closing of the fishery, I felt that whilst the divers and boatmen were willing to work, they had a fair right, and according to the proclamation, a legal claim to fifteen days' fishing, and therefore I could not until the expiration of this term close the fishery; but the announcement of the Governor's intention had the desired effect, and enabled me to sell the residue oysters at 7½ rupees. The opportune arrival of a rather large and influential batch of Moormen speculators from Killacarre allowed also of my going on with the fishery, and for several days the prices realised were from 9 to 11 rupees; but the daily loads having increased, and the Moormen having filled their kootto and emptied their money bags, the combination party were again enabled to reduce prices; and finding on the 15th day of fishing (only completed on the 9th April) that whilst the quantity of oysters fished for Government was over 15 millions, the receipts had not reached the estimated £15,000

by £1,700, and abundance of oysters were still remaining to be fished, I thought it advisable to accept the offer of the Chetties and large speculators of 7½ rupees per 1,000 for the daily contents of sixty boats to the end of the fishery, and thus obtained a certainty of this price for the contents of the remaining 15 boats; and indeed they actually realised more. The absence of all sickness, and the unusual spell of fine weather at this late season, now aided and enabled me in a measure to pay off the Chetties; for as the quantities daily fished continued large, they ultimately asked me to close the fishery. This I refused, telling them that as long as weather permitted and the boat people would work, I should fish, and according to the terms of their agreement require them to take the loads of the sixty boats, and at the same rates all the oysters I could not sell at auction. The weather now became precarious; on several occasions many boats could not reach the banks, and these people now desired to leave off; but as I had not got the £20,000 I was determined to realise, I would not allow a single boat to leave Sillawatorre, and made them now work for my purpose. The 24th April was the last and 23rd day's fishing. I had then oysters sufficient to realise the £20,000, and the boats having suffered much from weather during the last two days, I declared the fishery closed. The biddings at the last sale varied from 8 to 10½ rupees, and 14 rupees per 1,000 was given for the contents of a missing boat driven away towards Kallar by the squall of the day before. She arrived all safe just as the sale was concluded. Thus ended the fishery of 1857, memorable for its unprecedented yield of oysters, and the length of time, over sixty days, occupied with the business. The work had been most arduous for one and all of the officers, and most zealously and cordially did all the establishments work and aid me. The responsibilities, the anxieties, and the fear of failure through the Chetties' proceedings, caused me very great anxiety; but success achieved under unexpected difficulties is the best reward, and this was mine when, after all, I obtained £5,000 above the estimated revenue, and secured the approbation of Government for all I had done.

Temple claims.

39. The representatives of several Indian temples attended to claim the right of fishing on behalf thereof with a certain number of privilege boats, but having obtained the authority of Government to resist the claim, I did so, despite incessant solicitation and assertion of rights. Mr. Lee, in a very able report on this subject, of 16th July 1858, proves that such claims had not really been admitted by the Dutch Government, and was in no regard recognised by the English Government. The rejection of 1857 appears to have been effective as no further claim has since then been made.

Fishery of 1858.

40. This was a continuance of last year's fishery on the N. W. Cheval Paar, and for the quantity of oysters then left I estimated fifteen days' fishing with sixty boats at

daily loads of 16,000 each, equal to over fourteen millions of oysters and a revenue of £20,000. A reference to the tabular statement, annexure No. 2, shows the results to have been eighteen days, 1,084 boats, averaging daily loads of 15,000 each, giving over 12¼ millions for Government, and with divers' shares nearly 16½ millions oysters, and a revenue of £24,000.

41. The attendance was much earlier and more numerous this year; of course all the speculators of 1857 having then made good profits, attending; and a knowledge of this, and the natural expectation of a finer yield of pearls from older oysters, brought a more general and moneyed class of dealers from India. All promised well for a successful fishery, the sale rates for the first three days being 19 to 21 rupees per 1000; but this was not the intention of the combination party of last year; they (the Colombo Chetties) had previous to arrival bound themselves, under serious pecuniary obligations, not to oppose one another, but that one should buy for all and share the quantities. They thus hoped again to reduce prices to the lowest possible rate, prevent the estimated revenue being realised, and so carry out their much-desired object of forcing Government into the renting system; and now by threats of dishonouring the credits that many coast Chetties and Moormen had upon them, and of excommunication from their societies, they made these men join the league, which in a few days consisted of 180 Nattacotta Chetties, representing about forty-five firms belonging to Ceylon and India. They also induced, by promises of loans of moneys and of a fair daily share of oysters bought, the most influential Moormen to join them.

42. The agreement entered into was that the oysters should be purchased only by one person at under 15 rupees, this price to be daily reduced as circumstances admitted; the quantity purchased to be divided into thirty-two shares, of which twenty-six were to go to the Nattacotta Chetties and the other six amongst the Moormen and Jaffna speculators; the penalty for breach of the obligation on the part of the Nattacotta Chetties was the forfeiture of 1,000 rupees subscribed by each firm. Having organised this league, they allowed the small buyers to purchase their needs, keeping them up to a certain price, and then, when these parties had completed their purchases, the Chetties offered 15 rupees. This I refused; so they left the cutcherry in a body, and the consequence was the stopping of the fishery and sales for three days.

43. The proceedings of last year's combination, by no means of so formidable and organised a character as the present, had shown me the power and advantages the Chetties acquired by temporising, and that every fine day not availed of was a loss not to be regained. In 1857 I had an inexhaustible supply of oysters, and although this had hampered my proceedings, it was the ultimate means of making good the deficiency in price; but I was aware that on this occasion the yield of oysters was not likely much to exceed the estimated

quantiy; and if the Chetties carried their point of daily reduction of price, nothing like the expected revenue would be obtained. I therefore determined, unless I could be certain of getting a fair fixed price for the oysters, to assume the serious responsibility of closing the fishery, and accordingly issued notice to this effect, and engaged vessels for the removal of the establishments. This had the effect I had hoped for: the Chetties came forward with an offer of 16 rupees per 1,000 for all the fishery. I knew this rate to be below the real value of the oysters, the November sample being valued at 16 rupees and the March one at 22 rupees, but I felt that I was not justified with such an offer to act so unfairly towards the divers and boatmen as to close the fishery. The proclamation had implied, I may say promised them fifteen days' employment, and therefore, under the peculiar circumstances in which I was placed, and the necessity for prompt decision to save the fine weather, I accepted the offer for the contents of forty boats for twelve days, with the right of requiring them to take all unsold at such rates, and taking a deposit of £2,000 for security of the contract. At the expiration of this period the combination was broken up, and I was enabled to obtain 22 and 23 rupees per boat load, and but for an outbreak of cholera on the 1st April and the 17th day's fishing, I should, with another week of the then fine weather, have fished the whole of the bed and realised possibly £50,000; but nothing would induce the divers to go to sea after the 3rd April, the 18th day, and I was therefore compelled to close the fishery with a receipt of £24,000 and a large residue of oysters on the bed.

44. The deaths by cholera had been confined to the divers' quarters, but ere the establishments left several cases occurred amongst the troops and police, and during the voyage to Colombo of twenty-four hours by the Steamer *Manchester* five men died. Indeed I shall never forget the horrors of that night's passage—every sea-sick man believed he was attacked with cholera, and I believed another twenty-four hours' passage would have frightened many more to death. The commencement of this fishery was all sunshine and hope, but its termination was saddened by sickness and death.

Fishery of 1859.

45. The banks advertised for this fishery were the Modrigam and that portion of the N. W. Cheval Paar left unfished by the outbreak of cholera last year. The estimate for the former was 10 millions and of the residue on the Cheval Paar 2½ millions, and the anticipated revenue £30,000.

46. Owing to the oysters on the Cheval Paar being much scattered, and my desire that the boats should be easy of control so as not to take up young oysters or get on the ground where such were known to be, only fifty boats a day were allowed to fish. The work occupied eleven days; the yield of oysters was over 3 millions for Government, and including divers' share

nearly 4¼ millions; the revenue for this small quantity being £9,448, the lowest rate of sale being £5 4*s.*, the highest £8 8*s.*, and the average £6 3*s.* 9*d.* per 1000.

47. The Modrigam, from which, owing to an outbreak of cholera, only seven days' fishing was had, yielded, with 592 boats, for Government over 6¼ millions, and with divers' shares 8½ millions of oysters, and receipts of £28,768, the lowest selling price being £3 10*s.*, the highest £6 16*s.*, and the average £4 10*s.* per 1000.

48. The high prices at which the Cheval oysters sold resulted from the good outturn of pearls and profits they had yielded to the buyers of 1857 and 1858, more particularly last year the limited quantities now daily fished (*i. e.* from 200,000 to 300,000), and their age, which gave promise of a yield of fine large pearls. That this was really the case is shown by the fact that the higher price of £8 8*s.* was given after the 7th day's fishing, when buyers had been able by washing to ascertain the actual outturn of the oysters purchased on the first and second day. The Moormen were the principal purchasers of these oysters. The Chetties, still striving, still hoping to effect a combination, made but few purchases, and those not singly but for the body they represented. The Comattee Chetties had not joined them, and, with the Moormen, opposed and entirely defeated their proceedings, the consequence, as I heard, of the Chetties having last year failed to carry out fairly the promises and agreement which then induced the Comattee and Moormen to join them.

49. The Modrigam had not been fished for above twenty years, but its old reputation for yielding fine pearls, particularly of the Anie kind, still held good; and although the valuation for the March sample was but 25 rupees, the first day's fish with one hundred boats, of 1,116,000 oysters, sold at prices of 37 to 43 rupees per 1000. This sale was most densely crowded. The Chetties, unable to carry out their tactics with the limited quantities from the Cheval, now hoped to be able to do so with the certain larger daily yields of the Modrigam; and they all attended the sale with the avowed object and determination of keeping down the price, knowing that if any number of buyers were *fixed* on the first day with large quantities, they would not be likely to allow others to buy at less rates at future sales. The Chetties commenced bidding in concert at 16 rupees, but the Moormen opposed, and the first lot was sold, I believe, at 30 rupees; again and continually the Chetties tried 16 to 20 rupees. Seeing this dodge, and fearing that ere so large a quantity was sold they might succeed, I commenced taking down lots when the biddings were at 35 rupees for any quantities the Moormen and Comattee men named, taking no notice whatever of the Chetties. This they could not stand long; the excitement, for all were eager to get a share, in the fear that none would

be left, of hearing lots of 20,000 to 50,000 booked at increasing rates, induced the leading man, Verappa Chetty, to offer 38½ rupees for 50,000. This I accepted, knowing that once in at such a price they would allow none to go at less. The Chetty compact being thus broken, they all bid for themselves, opposing each other and the Moormen. The biddings rose to 43 rupees; and such was now the eagerness and excitement to get oysters, that in less than three hours I had sold over a million for £4,488, and could easily have disposed of double that quanity. The second day's fish was with eighty-four boats, yielding for Government 719,177 oysters, which sold at 40 to 43½ rupees; and notwithstanding the fishery was carried on with from seventy-five to one hundred boats daily, and yields of 700,000 and over a million of oysters, prices continued to rise and range from 44 to 60 rupees per 1000.

50. On the 2nd April the fifteen days fishing advertised was completed, with a receipt of £33,195 ; and there was but one thing likely to interfere with continued success and the obtaining of double this amount, that was the general accompaniment of a fishery—sickness. Cholera had appeared, and in twelve cases had proved fatal. The prompt attention given to each case, and the efforts of prevention on the part of Dr. Charsley and his staff, prevented for the time the further spread of this dire disease. I was also very ill with dysentry, and ought, by the doctor's advice, to have kept my bed; but with daily sales of from £4,000 to £5,000, and so deeply interested as I was in the success, and desire not to lose a single day, I could not remain away, and I was carried to my duties. On the evening of the 5th a very violent gale of wind and heavy rain, which lasted through the night, committed great havoc amongst the divers' quarters. This, and the reappearance of thirteen cases of cholera amongst them, caused the panic and flight of a large number of divers, and I only succeeded in getting another, the 18th day's fishing. Advice and promise of medical assistance was of no avail, and the fishery was closed on the 7th. The 101 boats of that day had brought 1,194,000 oysters for Government, which sold at rates of 43½ to 50 rupees, realising £5,322, making the total receipts £48,215, and leaving a residue of oysters on the Modrigam.

51. Although my condition of health was then very precarious, and the stoppage of the fishery was most necessary and fortunate for me, I was deeply disappointed at so abrupt and sad a termination: another week would have fished the remaining oysters; and as 6¼ millions had realised £28,767, there were fair grounds for my expectation of a like quantity, and at least £20,000 more receipts.

52. By the 10th the military establishments and treasure were away, and the excitement being over, my overtaxed system gave way, and I was compelled to take to my bed. The steamer returned on the 12th, and

reached Colombo the next day. My condition was then so serious as to necessitate my taking leave to England. I returned to Ceylon in March 1861, far from recovered; and I feel that I shall never again be entirely free from the consequences of the illness of 1859.

53. With the dispersion of the divers the cholera ceased. None of the establishment suffered, but one soldier was killed and two seriously injured by lightning striking the roof of the barracks. An attempted robbery of oysters from the Government kootoo by the Malay soldier pensioners, with the connivance of the Malay soldiers on guard, was detected by peons of the kootoo, and punished by the whipping and imprisonment of the guard and thieves. I was able on this occasion to get rid of the shark-charmer. He thought fit to be absent for the first few days of the fishery, and as the divers went to work without objection, and no shark-seizing occurred, I would not afterwards allow him further to exercise his humbug of charming away the sharks. I had long desired to get rid of this piece of charlatanism because I knew the majority of the divers had no faith in it, and that the fellow was not content with Government payment, but extorted oysters from some of the divers. I therefore gladly seized the fair occasion he had given me, as even the divers who believed in the superstition had no grounds for appeal.

54. His Excellency Sir H. Ward's visit to this fishery of a week during the high tide of its success afforded him the opportunity of seeing the interesting sight that a fishery really affords, and of becoming conversant in all the business and questions relating thereto.

Fishery of 1860.

55. This fishery was in my absence from the colony conducted by Captain Pritchard, the Master Attendant of Colombo, and was, as he stated, achieved under very favourable circumstances, the weather being generally fine, the public health, in the absence of all sickness, all that could be desired, and the attendance of pearl merchants and speculators most numerous, all the buyers of previous fisheries being present, besides many others from various parts of India, with cash, including the bank orders for £33,000, computed at £50,000; and as the average of the quantity of oysters daily fished for Government never exceeded 200,000, the total being 2¾ millions, and 3½ millons including divers' shares, there was no opportunity of combination; in fact the buyers exceeded the desired supply, and in consequence, as will be seen on reference to the tabular statement No. 2, the oysters sold as high as £18, and averaged £14-10 per 1000, realising a total receipt of £36,681. These prices are unprecedented, and must be mainly attributed to the limited supply, and the determination of all the numerous buyers present to obtain a share; and this secured an amount of competition hitherto perhaps unequalled. No doubt the outturn of the previous year's oysters had been good, and supported the old estab-

lished character of the Modrigam for Anie pearls of a large kind. The fishing commenced on the 12th March, ended on the 30th, continuing fourteen days without a break from weather or other causes.

56. I had expressed the opinion in 1859 that the oysters on the S. E. of the Modrigam ought not to be fished until 1861, as I believed they were of an age to live, and if left they would have replenished the bank; but it was hardly to be expected that any superintendent could resist such a present large source of revenue for a probable hereafter profit.

Why Fisheries should not be rented.

57. The results which I have endeavoured to explain, and the particulars given in the tabular statement No. 2, show that the fisheries can be carried on by the Government without the renting system; and further that as the Cheval and Modrigam paars yielded in five years a total of 72 millions of oysters, for 54 of which Government received aggregate receipts of £140,302 and a net revenue of £117,453, so the divers and boat people have received as their one-fourth share 28 millions of oysters, and therefore earned at least £46,700. Indeed, as they always sell on the day of landing before the Government sales take place, and mostly obtain higher prices, from 10 to 20 per-cent, their actual earnings may be estimated at £53,700—a remuneration which, being the result of laborious work and special personal exertion, they deserve and are fairly entitled to.

58. The native divers are in reality the bone and sinews of the fisheries. The European system of diving, with all the needed appliances of assistants, separate boats for the pumps and oysters, possible delays by accidents, &c., would not only be attended with very heavy expenditure, but the work daily done could not be half that by the present system.

59. Previous to the resumption of the fisheries the number of native divers was very limited; in fact want of employment and profit had reduced the profession to a very low ebb; now they are a very numerous class, and should be encouraged and protected by Government from the oppression it is known was formerly exercised by the renters.

60. But supposing the fisheries of 1855 to 1860 had been rented, what would have been the likely results?—1*st*, the Modrigam would have been scraped up, young and old, at one fishery; the Cheval in two at most, and the £140,000, as well as the lion's share of the divers' £53,700, together with all the profits made by the numerous speculators, would have gone into the pockets of two or three Chetty firms. Ceylon would not have derived any of the benefits which by the present division amongst speculators belonging to the island she must have. There would have been no encouragement for an increase of the diver's class, and the present prospective series of fisheries, the

first of which is expected to yield *this year* £55,000, and in the next four or five years some £200,000 to £300,000, would not, I believe, have existed. The results of 1855 to 1860 have shown that fisheries so conducted are for the benefit of Government, the divers, and public; and I do hope the same system will now be always continued. Offers have been made through me to rent the fishery of this year (1863) for a very much larger sum of money than the estimated receipts, and as past results prove that *quantity of necessity lessens prices*, and aids combinations for this object, it may be, if the Cheval yields the very large daily fishing I anticipate, that the expected revenue will not be realised this year; but if so, I shall still consider that His Excellency Sir C. McCarthy has exercised great forbearance and sound discretion in refusing to be tempted, and that Ceylon and his successors will reap the benefit in a more continuous production of the banks and pearl fisheries.

I have the honour to be, &c.

G. VANE,
Acting Treasurer.

ANNEXURE No. 1

TABULAR STATEMENT of the Inspection of the Coast and Pearl Banks from Negombo along the North-West Coast, thence on to the North-East Coast, in the Steamer PEARL, *under the superintendence of* G. VANE, Esq., *Superintendent of the Pearl Fisheries, between the 4th and 21st March* 1862.

Date.	Name of Coast and Bank.	Depth of Water.	Nature of Ground.	Bearings.	Results of Examination.	Observations.
1862		Fathoms.				
March 4	Off Negombo Coast.	7	Rocky and Sand.	North end of Keymel river.. W. 50 E.	A few oysters about 4 years old.	Very healthy, but very few in quantity, not more than 20 or 30,000; the main quantity found close to a large rock, but so scattered that some boats found none; there is no hope of a fishery for these few, but they may be the nucleus of future beds, and should be examined next year.
				Sandy point of Island Doewe. S. 38 E.		
				South end Keymel river .... N. 45 E.		
		8	,, ...	Doewe ..... S. 62 E.	Nil.	
		5½	Sand	Keymel river .. E. b N. ½ N.	,,	
		5	,, ...	Extreme point of Doewe ..... S. ¾ E.	,,	
		5	,, ...	Keymel river .. N. 68 E.	,,	
				Doewe Point .. S. 7 E.	,,	
		5	,, ...	Keymel river .. S. 67 E.	,,	
				Point ..... S. 5 E.	,,	
		5	,, ...	Do. ..... S. 6 W.	,,	
		5½	,, ...	Do. ..... S.		
		5	,, ...	Do. ..... S. 2 E.	,,	
		6	,, ...	Do. ..... S. 7 E.	,,	
		7½	,, ...	A single arreca tree ..... E. ½ S.	,,	
				Opening of Negombo lake.. S. ¾ E.	,,	

Date.	Name of Coast and Bank.	Depth of Water.	Nature of Ground.	Bearings.	Results of Examination.	Observations.
1862						
	Oloowattee Paar ..	6	Sand ..	Ooloowattee village ..... S. E. ¼ E.	Nil.	
March 5	Chilaw Paar	6¾	„ ..	Karkopanny tope ..... E. ½ N. ½ N.	....	No signs of oysters upon any of the banks of Chilaw or Calpentyn. At the inspection of November 1860 found young oysters of nine months old upon the Chilaw & Mootoobandy paars. These have all disappeared, and now that I have seen this coast, I am not surprised at this, and that these banks have never yielded regular fisheries; they are exposed to all the influences of the Gulf of Manaar, and the water all along is very various, going from 7 to 15 fathoms; and as the coast of Chilaw is a very exposed one, no doubt the oysters are carried away into deep water during heavy weather and strong currents.
		„	„ ..	Judge's bungalow S. E. ½ E.		
		6½	„ ..	Karko ..... N. 78 E.		
		7	„ ..	Do. ..... N. 87 E.		
		6½	„ ..	Mootoobandy .. N. 22 E.		
		7	„ ..	Do. .. „		
	Karkopanny Paar..	7	Rock ..	Karko ..... E.		
				Mootoobandy .. N. 22 E.		
				Judge's bungalow. S. 25 E.		
		6¾	„ ..	Karko ..... S. 80 E.		
		7½	„ ..	Do. ..... E.		
	Tackenpatty Paar..	9¼	Small sand.	Bungalow..... S. 40 E.		
				Karko ..... E. ¼ S.		
				Bungalow..... S. E. ½ E.		
		10½	„ ..	Karko ..... N. 60 E.		
				Bungalow..... S. 17 E.		
		9	„ ..	Karko ..... N. 65 E.		
				Vessel ..... N. 83 E.		
March 6		8½	„ ..	Karko ..... N. 65 E.		
				Vessel ..... N. 80 E.		
		8	„ ..	Karko ..... N. 70 E.		
		7¾	Rock ..	Do. ..... N. 60 E.		
		8	„ ..	Do. ..... N. 78 E.		
		7½	„ ..	Do. ..... N. 75 E.		
		9½	Sand ..	Motookabandy .. N. 50 E.		
March 7	Do.	8	„ ..	Do. .. N. 55 E.		
		9	„ ..	Do. .. N. 65 E.		

Off Chilaw Coast.

			9½	„ ..	Karko	S. 68 E.		
			„	„ ..	Do.	S. 75 E.		
					Mootookabandy..	N. 65 E.		
					Do. ..	N. E. ½ E.		
		Naval Paar	6½	Sand & Rock	Karko	S. E. ¼ S.		
		Mootookabandy Paar.*	6½	„ ..	Andapany.....	E. by N.		
			9	„ ..	Do.	E. ¼ N.		
					Odopakara	E.		
March 8	Off Calpentyn Coast.	Navakado Paar ..	7¾	Sand ..	Navakado tope.	N. E. by E.	....	No sign of oysters.
				Rock ..	Do. ..	N. E. by E. ½ E.	....	
			4¾	„ ..	Do. ..	E. by N. ¾ E.	....	
			..	„ ..	Do. ..	E. ½ N.	....	
			5¾	„ ..	Do. ..	E.	....	
			8	„ ..	Do. ..	E. ¾ S.	....	
9		Tallavilla Paar....	7½	„ ..	Tallavilla	E.		
					St. Anna's Point.	S. by E.	Nil.	
			9½	„ ..	Do. ..	S. S. E.		
			9¼	„ ..	Tallavilla	E. ½ N.		
			8½	„ ..	St. Anna	S.		
			7	„ ..	Tallavilla	S. 50 E.		
			8	„ ..	Do.	N. 58 E.	....	No sign of the oysters found by Captain Pritchard at the inspection of 1860 on the Kareetivo paar; they have no doubt been drifted away by currents, and I think most likely so upon the Modrigam; the set would take them in this direction, and the coral shoal protecting that bank would preserve them.
March 10		Allantura Paar....	5	„ ..	Peenyatorre	S. 45 E.		
			5	„ ..	Do.	S. 25 E.		
			5	„ ..	Koosadimundel..	N. E.		
	Off Kareetivo Coast.	Karkokody Paar..	5	„ ..	Kodramalee Pt.	N. 48 E.		
					Peenyatorre	S. 30 E.		
			5½	„ ..	Koosadimundel..	N. 42 E.		
		Kareetivo Paar....	8	Coral rock.	Do.	N. 60 E.		
			6¼	„ ..	Kodramalie beacon	—		
				Sand and Shells.	Koosadimundel..	N. 67 E.		
March 11		Modrigam Paar ..	6 to 5½		*North end of Bank.*		Oysters 3½ to 4 years old...	
12				Rock and Sand mainly.	Kallar beacon ..	East.		The extent of this bed is from north to south

Date.	Name of Coast and Bank.	Depth of Water.	Nature of Ground.	Bearings.	Results of Examination.	Observations.
1862			Rock and Sand mainly. Sand and Shells.	Kodramalie beacon ..... S. 31 E. *S. E. end of Bed.* Kodramalie beacon ..... S. 30 E. Kallar do. .... N. 83 E. *N. W. edge.* Kallar beacon .. N. 88 E. Kodramalie do.. S. 33 E.		1900 yards, east to west 2600. There are also outside patches to the north and to the south: the whole extent of the bed may be called about a mile square; the oysters are very healthy, and should be fishable in 1865.
			Rock and Sand.	*South-west edge of Bed.* Kodramalie beacon ..... S. 41 E. Kallar do..... N. 84 E. Of a small patch a mile south of this bed.. .... — Kodramalie beacon ..... S. 47 E. Kallar do..... N. 72 E.	Oysters 3½ to 4 years old.	

				South end of bed, 7 fathoms.			
March 13 — 15	S. Cheval Paar.....	6 to 9½	Rock and sand, mainly rock.	Kodramalie beacon ..... S. 37 E. Kallar ..... S. 82 E		Healthy oysters of 5 to 5½ years.	Not so very plentiful; a large proportion of dead shells of recent date.
				South-east end, 6½ fathoms.			
				Kodramalie beacon ..... S. 36 E. Kallar do ..... S. 84 E.		Do. ..	Not so plentiful, with dead shells.
				Eastern edge, 6¾ fathoms.		Do. ..	Very plentiful, and but few dead.
				Kodramalie beacon ..... S. 32 E. Kallar do ..... S. 80 E. Kodra do..... S. 30 E. Kallar ..... S. 73 E.		Do. ..	On the edge not so plentiful.
				Kodra ..... S. 31 E. Kallar ..... S. 75 E.		Do. ..	Very plentiful; not many dead.
				North-western edge, 9½ fathoms.			
				Kodra beacon.. S. 38 E. Kallar ..... S. 74 E.		Do. ..	Most abundant; somewhat smaller in size and apparently younger. This portion of the bed should be fished last.
				Western edge.			
				Kodra beacon.. S. 38 E. Kallar ..... S. 72 E.		Do. ..	Do. do. do.

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Date.	Name of Coast and Bank.	Depth of Water.	Nature of the Ground.	Bearings.	Result of Examination.	Observations.
		Fathoms.		*Northern end.*		
March 13 — 15	S. Cheval Paar	6 to 9½	Rock and sand, mainly rock.	Kodra beacon.. S. 33 E. Kallar ..... S. 69 E.	Healthy oysters of 5 to 5½ years.	Most abundant; somewhat smaller in size and apparently younger. This portion of the bed should be fished last. The south portion of the bed must be first fished in March 1863, and the condition of the oysters then must determine the extent of that year's fishery.
March 17	Condatchy Paar	3½ to 5	Sand and small rock.	Doric..... E. N. E. Kallar beacon .. E. S. E.	Nil.	No sign of oysters now. In 1857 this bank had millions, and although they contained no pearls (most likely because in shallow water), it was hoped they might hereafter ply other banks.
				North-east end.		
	Kallaltidel Paar	5½ to 6	Sand and rock.	Kallar beacon.. S. E. by E. ½ E.		
				Kodramalie beacon ..... S. by E. ½ E.	,,	
				South-west end.		
				Kallar beacon .. E. S. E.	,,	
				Doric ..... E. N. E.	,,	
	Arippoo Paar.....	6½	Sand	Arippoo tope..... E. ½ S.	,,	
				Doric ..... S. 77 E.	,,	

				South end.			
March 18	Bangali Paar	6½ to 8	All sand.	Adjancolan tope. Arippoo tope ..	N. 81 E. S. 67 E.	Oysters of 4 to 6 months old.	These young oysters are very plentiful, extending about 2½ miles from south to north-west; on the southern half they are in patches; the north-west part of the bed is well covered. The Adigar states that young oysters have before been found on this bank, but they never yielded a fishery; but they never were so abundant before, and they may therefore for this reason hang together and remain; still the nature of the ground, sand, and the exposed position are against this, but they must be yearly looked to.
March 19	Amawolenden Paar....	5 to 6	Coral rock.	Tallamanaar .... Do. Do.	N. ¾ E. N. 8 E. N. 18 E.	Nil.	These 2 banks are in fact one. I examined them in 1858 without results; and the Adigar only knows by ancient report or repute that they ever had oysters.
March 20	Naderkodo Paar.....	....	....	Do.	N. 17 E.	„	

Date.	Name of Coast and Bank.	Depth of Water.	Nature of the Ground.	Bearings.	Result of Examination.	Observations.
		Fathoms.				
March 20	South-east and eastern coast of Island of Delft, Island of Poongereetivo up to Mandeetivo, and all the rocky ground noted in Franklin's chart.	6½ 6½ 5½ to 3	All mud Mud and sand. Do.	....	Nil. "	Two oysters found, one of two years old off Poongereetivo, the other of six months old inside the Poongereetivo reef, in about one fathom.
March 21	Off Paalativo and Kakarativo.	5½ to 6	Sand and little rock.	.....	....	One small oyster of four months old found in shore of Paalativo.

N.B.—The bearings given show only a small portion of the work daily done.

G. VANE, Superintendent.

ANNEXURE No. 2.

ANNEXURE No. 2.

TABULAR STATEMENT showing the date and duration of the Pearl Fisheries on the North-west Coast of Ceylon; the names of the Banks fished; the estimated Produce; the quantity and outturn of the Samples taken; the actual Produce; the highest, lowest, and average price per 1000 *Oysters; the amount and percentage of the Expenditure; and the total number of Persons employed on the Fishery Establishment from* 1855 *to* 1860.

ESTIMATED PRODUCE.								SAMPLE OYSTERS.										
Date and Duration of Fishery.		Names of Banks.	No of Fishing days.	No. of Boats per day.	Quantity per Boat.	No. of Oysters.	Amount.	When taken.	Quantity.	Total weight of Pearls extracted.		Total value.			Average weight per Thousand.		Average value per Thousand.		
										Kalanjey.	Manjadie.	Rupees.	Annas.	Pice.	Kalanjey.	Manjadie.	£	s.	d.
1837 to 1854..	..	*No Fisheries*	..	..	..	....	£ ..	.....	..	..	..	..	..	..	..	..	..	..	..
1855 March to April	12 12	S. W. Cheval Paar. *Divers' Share*	10 ..	50 ..	7,500 2,500	3,750,000 1,250,000	10,000 ..	Nov. 1854 Mar. 1855	4,016 4,500	0 1	$\frac{1}{16}$ $10\frac{3}{4}$	71 61	0 7	3 $\frac{3}{4}$	0 0	$4\frac{3}{16}$ $6\frac{5}{8}$	1 1	15 7	$4\frac{1}{4}$ $3\frac{1}{2}$
			10	50	10,000	5,000,000													
1856..	..	*No Fishery*	..	..	..	....	..	.....	..	..	..	..	..	..	..	..	..	..	..
1857 March to April	9 24	N. W. Cheval Paar. *Divers' Share*	15 ..	75 ..	7,500 2,500	8,437,500 2,812,500	15,000 ..	Nov. 1856 Feb. 1857	10,000 10,000	4 4	$1\frac{1}{16}$ $16\frac{3}{16}$	110 140	9 1	0 0	0 0	$8\frac{33}{320}$ $9\frac{11}{32}$	1 1	2 8	$1\frac{1}{4}$ 0
			15	75	10,000	11,250,000													

1858 March to April	5 to 3	N. W. Cheval Paar.	15	60	12,000	10,800,000	20,000	Nov. 1857	12,000	12	$12\frac{10}{16}$	195	15	0	1	$1\frac{5}{96}$	1	12	8
		Divers' Share	..	..	4,000	3,600,000	..	Feb. 1858	12,000	14	$13\frac{3}{4}$	260	8	2	1	$4\frac{23}{48}$	2	3	5
			15	60	16,000	14,400,000														
1859 March to April	8 to 7	N. W. Cheval Paar	5	50	7,500	1,875,000	£30,000	Nov. 1858	10,000	17	$8\frac{9}{16}$	317	0	2	1	$14\frac{137}{160}$	3	3	5
		Divers' Share	..	..	2,500	625,000		Mar. 1859	10,000	23	5	446	10	0	2	$6\frac{1}{2}$	4	9	4
			5	50	1,000	250,000														
		Modrigam Paar	10	50	15,000	7,500,000		Nov. 1858	12,000	12	$17\frac{3}{8}$	182	5	0	1	$1\frac{43}{96}$	1	10	$4\frac{1}{2}$
		Divers' Share	..	..	5,000	2,500,000		Mar. 1859	12,000	19	$3\frac{15}{16}$	295	11	2	1	12	2	9	$3\frac{1}{4}$
			10	50	20,000	10,000,000														
								N. Modrigam.												
1860 March to April	12 to 31	N. & S. E. Modrigam	5	50	7,500	1,875,000		Nov. 1859	No sample taken.											
		Divers' Share	..	..	2,502	625,000		Mar. 1860	6,500	22	9	463	12	0	3	$4\frac{1}{2}$	7	2	$8\frac{1}{4}$
							£9,000	*S. E. Modrigam*												
								Nov. 1859	1,220	.	..	42	4	0	..	..	3	9	4
								Mar. 1860	10,000	10	$9\frac{133}{204}$	198	6	2	1	$\frac{10}{23}$	1	17	11
			5	50	10,000	2,500,000														

ANNEXURE No. 2—(*continued*).

ACTUAL PRODUCE.

Date and Duration of Fishery.	Names of Banks.	No. of Fishing days.	No. of Boats employed.	Average load per Boat.	No. of Oysters fished.		Sold for Government.	Total Revenue.			Highest rate per 1000.	Lowest rate per 1000.	Average rate per 1000
								£	*s.*	*d.*			
1837 to 1854.. ..	*No Fisheries*	..	....	....	.....		....	....	..	..	..	..	..
1855													
March 12	S. W. Cheval Paar	20	959	5,267	5,057,822		....	....	..	..			
to April 12	*Divers' Share*	..	D Share	1,756	1,685,940		....	....	..	..			
		20	959	7,023		6,743,762	5,051,818	10,922	1	0	£2 18 0	1 10 0	2 3 3
1856.. ..	*No Fishery*	..	....	....	....		....	....	..	..	..	..	..
1857													
March 9	N. W. Cheval Paar	23	1,624	14,987	24,339,790		....	....	..	..			
to April 24	*Divers' Share*	..	D Share	4,996	8,113,263		....	....	..	..			
		23	1,624	19,983		32,453,053	24,380,308	20,363	6	6	£2 10 0	0 12 0	0 16 8½
1858													
March 5	N. W. Cheval Paar	18	1,084	11,404	12,362,146		....	....	..	..			
to April 3	*Divers' Share*	..	D Share	3,801	4,120,715		....	....	..	..			
		Govt. boats.		....	2,000		....	....	..	.			
		18	1,084	15,205		16,484,861	12,353,049	24,120	0	2	£3 2 0	1 12 0	1 19 0

1859 March to April	8 7	N. W. Ceval Paar *Divers' Share*	11	760 D Share Govt. Boats.	4,147 1,382	3,141,933 1,047,311 2,221		....	....	.. .. ..	.. .. ..	£8 8 0	5 4 0	6 3 9
			11	760	5,529		4,191,465	3,143,402	19,448	1	4			
		Modrigam Paar *Divers' Share*	7	592 D Share	10,777 3,592	6,380,247 2,126,749		....	....	.. ..	.. ..	£6 16 0	3 10 0	4 10 0
			7	592	14,369		8,506,996	6,391,549	28,767	17	6			
							12,698,461	9,534,951	48,215	18	10			
1860 March to March	12 31	N. Modrigam *Divers' Share*	5	301 D Share Fished by E. divers.	1,955 652	588,642 196,214 772		....	....	.. .. ..	.. .. ..	£15 10 0	13 18 0	14 10 0
			5	301	2,607		785,628	595,022	8,726	18	0			
		S. E. Modrigam *Divers' Share*	9	617 D Share Fished by E. divers.	3,475 1,158	2,144,478 714,826 62		....	....	.. .. ..	.. ..	£18 0 0	9 4 0	12 17 10
			9	617	4,633		2,859,366	2,148,445	27,954	14	4			
							3,644,994	2,743,467	36,681	12	4			
			Total Pearl Fisheries from 1855 to 1860			......	72,025,131	54,063,593	140,302	18	10			
								Expenditure. .	22,849	0	0			
								Net proceeds. . £	117,453	18	0			

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ANNEXURE No. 2—(*continued*).

Date and Duration of Fishery.		Names of Banks.	EXPENDITURE. Amount. £	s.	d.	Percentage on Revenue.	Percentage on Oysters.	Total number of Persons employed on the Fishery Establishment. Civil.	Military.	Total.
1837 to 1854 ..	..	*No Fisheries*	1,484	..	..		On account of Inspection.			
1855 March to April	12 12	S. W. Cheval Paar *Divers' Share*	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
			2,632	..	..	24·	·05	247	130	337
1856 ..	..	*No Fishery*	906	..	..		On account of Inspection.			
1857 March to April	9 24	N. W. Cheval Paar *Divers' Share*	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
			4,428	..	..	21·7	·01	280	195	475
1858 March to April	5 3	N. W. Cheval Paar *Divers' Share*	.. .. ..	.. .. ..	.. .. ..	.. .. ..	.. .. ..	.. .. ..	.. .. ..	.. .. ..
			4,741	..	..	19·6	·03	271	195	466

1859 March to April	8 to 7	N. W. Cheval Paar	..	..	..	..	..	..	..	..	..
		Divers' Share	..	..	..	..	..	..	..	..	..
			..	..	..	..	..	..	..	..	..
			..	..	..	..	..	..	..	..	..
		Modrigam Paar	..	..	..	..	..	..	..	..	..
		Divers' Share	..	..	..	..	..	..	..	..	..
			4,830	..	..	10	·05	284	171	455
1860 March to March	12 to 31	N. & S. E. Modrigam	..	..	..	..	..	..	..	..	..
		Divers' Share	..	..	..	..	..	..	..	..	..
			..	..	..	..	..	..	..	..	..
			..	..	..	..	..	..	..	..	..
			..	..	..	..	..	..	..	..	..
			..	..	..	..	..	..	..	..	..
			..	..	..	..	..	..	..	..	..
			..	..	..	..	..	..	..	..	..
			3,828	..	..	10·4	·14	233	27	206
			22,849	0	0					

Earning of Divers, Boatowners, and Boatmen between 1855 to 1860 on their share of 18,005,018 oysters, £53,781.

G. VANE, Superintendent.

ANNEXURE No. 3.

GOVERNMENT ADVERTISEMENT.

NOTICE is hereby given, that a Pearl Fishery will take place at Arippo, in the Island of Ceylon, on or about the 2nd of March next 1863; and that the Bank to be fished is the South-East Cheval Paar Bank, estimated to contain oysters sufficient to employ one hundred boats for twelve days.

It is therefore recommended that such boat-owners and divers as may wish to be employed at the said fishery should be at Arippo on or before the 20th February next. And it is particularly notified that the first day's fishing will positively take place on the first day in March that the weather may permit the boats to fish.

The fishery will be conducted on account of Government, and the oysters put up to sale in such lots as may be deemed expedient.

The arrangements of the fishery will be the same as have been usual on similar occasions.

All payments to be made in ready money in Ceylon currency, or in East India Company's rupees.

Drafts on the banks in Colombo, or bills on the agent of this Government in India, at ten days' sight, will be taken, on letters of credit being produced to warrant the drawing of such drafts or bills.

For the convenience of purchasers, the Treasurer at Colombo, and the different Government Agents of Provinces, will be authorised to receive cash deposits from parties intending to become purchasers, and receipts of these officers will be taken in payment of any sums due on account of the fishery.

No deposit will be received for a less sum than fifty pounds.

By His Excellency's command,

W. C. GIBSON,

Colonial Secretary.

Colonial Secretary's Office, Colombo,
12th December 1862.

Statement of the Produce and Valuation of 12,000 *Oysters taken from the South-East part of the Cheval Paar in November* 1862.

Description, Size, Number, and Quality.					Weight.				Value.		Total Value.		Rate of valuation in Pagodas.	
No.	Description.	Size in Basket.	Number.	Quality in Chew.	Kalengies.	Manjadies.	Total. K.	Total. M.	Rs. a. p.		Rs. a. p.		Per Chew.	Per Kalengy.
1	Aney	20	1	1 5 8 / 3 2 0	..	1 3/16	..	..	28 7 0		..		17 Star Pagodas.	
2	Aney	..	3	1 2 4 / 3 2 0	..	1 5/16	..	..	17 10 0		..		13 ditto.	
3	Masegoe	..	2	..	..	7/8	..	..	2 10 0		..		....	
4	Kalippo	..	11	..	..	4 7/8	..	..	25 9 1		..		....	30 Star Pagodas.
5	Korowell	..	14	..	..	3 5/16	..	..	8 1 2		..		....	14 ditto.
6	Peesel	..	19	..	..	9	..	..	6 4 2		..		....	4 ditto.
							1	0 3/4			88 10 1			
7	Kalippo	30	5	..	..	1 3/4	..	..	7 10 0		..		....	25 ditto.
8	Korowell	..	4	..	..	2 3/4	..	..	5 12 0		..		....	12 ditto.
9	Peesel	..	13	..	..	4 1/2	..	..	1 9 1		..		....	2 ditto.
							0	9			14 15 1			
10	Anoothary	50	14	1 4 4 / 3 2 0	..	3	..	..	21 10 2		..		14 Star Pagodas.	
11	Kalippo	..	20	..	..	47	..	..	12 9 1		..		....	16 ditto.
12	Korowell	..	6	..	..	4 1/2	..	..	7 1 1		..		....	9 ditto.
13	Peesel	..	53	..	..	14	..	..	8 12 1		..		....	3 1/2 ditto.
							1	6			50 1 1			
14	Aney	80	20	1 2 8 / 3 2 0	..	3 1/4	..	..	16 12 2		..		12 Star Pagodas.	
15	Masegoe	..	3	..	..	7/16	..	..	0 8 0		..		....	
16	Kalippo	..	14	..	..	7 1/4	..	..	15 15 2		..		....	13 ditto.
17	Korowell	..	19	..	..	6 1/2	..	..	7 15 1		..		....	7 ditto.
18	Peesel	..	78	..	..	13 1/2	..	..	5 5 2		..		....	2 1/4 ditto.
							1	13 3/4			46 8 3			

Description, Size, Number, and Quality.					Weight.				Value.	Total Value.	Rate of valuation in Pagodas.	
No.	Description.	Size in Basket.	Number.	Quality in Chew.	Kalengies.	Manjadies.	Total. K.	Total. M.	Rs. a. p.	Rs. a. p.	Per Chew.	Per Kalengy.
19	Vadivoe, excluding Madengoe	100	..	$5\frac{40}{320}$	2	$18\frac{3}{4}$	..	..	..	..	....	
20		200	..	$3\frac{268}{320}$	3	$16\frac{3}{4}$	..	..	200 6 0	200 6 0	7 Star Pagodas.	
21		400	..	$1\frac{80}{320}$	2	..	..	..	..	..	....	
							8	$15\frac{1}{2}$				
22	Thools	600	..	..	4	$3\frac{3}{4}$	..	..	..	..	....	
23		800	..	..	2	..	..	..	86 10 0	86 10 0	....	3 Star Pagodas.
24		1000	..	..	2	$1\frac{3}{4}$	..	..	..	..	....	
							8	$5\frac{1}{2}$			....	
25	Masottool	..	..	..	2	$14\frac{1}{2}$	..	..	8 9 1	..	....	3 Rupees.
26	Shell Pearls	..	..	...	5	8	..	..	46 4 0	..	....	$2\frac{1}{2}$ Star Pagodas.
							8	$2\frac{1}{2}$		54 13 1		
					Total..		29	13		542 0 3		

W. C. Twynam.
James Worsley.
H. M. Patchico.

Selavetorre, 30th November 1862.

ANNEXURE No. 4.

NOTICE FOR THE GENERAL INFORMATION OF PERSONS ATTENDING THE FISHERY.

Application for ground for dwelling-houses, boutiques, and kootto to be made to the Assistant Agent of Manaar, who will grant a permit for the ground allotted; and any house or kootto erected contrary to orders, or without permit, will be removed.

2. The arrangements of police will be made by the Assistant Agent; and it is hereby notified for general information that the police establishment is intended exclusively for the protection of all persons attending the fishery, the maintenance of good order, and the preservation of the public peace; that they have no concern in the management of the fishery, or in the collection of any dues, either for Government, for temples, or any other account; and that such employment on their part is positively prohibited.

3. The police and all peons will at all times wear their belts and badges. They are particularly required to be civil and gentle to all persons, and carefully to abstain from interfering with any person, except where it is necessary for the preservation of good order.

4. No persons connected with the establishment will be permitted to receive any present or perquisite whatever, or to engage in any manner in the speculations of the fishery, on pain of immediate dismissal.

5. The boatmen and divers and all persons in general are to take notice that no one is authorised to make any deduction from their shares on account of privilege or charity oysters. All contributions they choose to make for charitable purposes will therefore be perfectly voluntary; and in the case of divers delivering oysters into the Government koottos, it will not be permitted, even with the consent of the divers, that such contributions should be received by any one inside the koottos. The shark-charmer is remunerated by Government, and is not allowed, under any pretence whatever, to receive, demand, or exact oysters from the boatmen, divers, or other persons. Any violation of this rule should be immediately reported to the Superintendent.

6. After they leave the koottos, the divers will be at liberty to do as they please with their oysters; and if molested, they should apply to the police for protection.

7. The fishing-boats will be inspected under the immediate supervision of the Superintendent, as to their sea-worthiness, condition of sails and oars, and complement of crew. The crew of each boat will consist of 23 persons, viz:—

1 Samman oattee,	10 Divers,
1 Tindal,	10 Munducks;
1 Thody,	

and previous to the inspection of the boats the samman oattee will be required to furnish a list containing the names of the above-noted persons.

8. From the boats found to be qualified the number required will take their chance of employment by lottery.

9. The tindals of the boats so selected will receive from the cutcherry certificates, and a copy of the rules for the guidance of their conduct when at sea and on shore. And it is specially notified for general information that those regulations will be strictly enforced, and the wilful breach of them will be dealt with as therein provided for.

10. The tindals of all the boats employed and unemployed are to attend to the orders of the beach-master, particularly with respect to the places where their boats are to be kept, and the mode of securing them, so as to prevent interruption to the passage of other boats to and fro, and of people along the beach. Neglect of these orders on their part will subject them to be excluded from employ. No canoes are to be hauled up on the beach, except at the place assigned for them.

11. No huts of any description are to be erected upon the beach, either for the use of the crews of boats or canoes, without special permission.

12. It will be required that the boat's quarter share of the oysters fished daily be divided according to established customs; viz:—

Samman Oattee—the oysters brought up in two divings for each stone, *i. e.* one diving for each diver.

Tindal do. do.
Thody do. do.
Two Divers, of each stone two-thirds.
Two Mundücks do. one-third.

Thodyvalle or boat-owner the whole of the boat's share of oysters once in six days' fishing; but the share may be taken any day *after*, but not *prior* to the 3*rd day's fishing*, that may be agreed upon. Arrangements with divers to pay them by wages instead of allowing them their share of oysters, according to the established customs, are expressly forbidden.

13. It is particularly notified that the first day's fishing will *positively* take place on the first day in March that the weather may permit the boats to fish. It is therefore recommended to such boat-owners and divers as may wish to be employed at the fishery that they should be at Arippo *on or before* the 20*th February*.

G. VANE,
Superintendent.

Colombo, —— *December* 18—.

ANNEXURE No. 5.

INSTRUCTIONS FOR THE TINDALS AND BOATMEN OF THE DIVING-BOATS IN EMPLOY.

The boats will be numbered by the beach-master; and all orders to the tindals, divers, and boatmen, respecting the boats to proceed to sea each night, and the banks to be fished on, will be communicated to them through the beach-master, to whose orders they are to pay attention, and any wilful disobedience thereof will subject them to discontinuance from employ.

2. The signal to proceed to sea will be, as usual, a gun fired at midnight.

The adappanaar will proceed ahead with a light, and all the boats are to follow him, and on no account to take any other course, but keep as close as possible to the headmen's boats.

3. The signal to commence diving will be, as usual, a flag hoisted to the main top-gallant masthead of the Government vessel. This signal will be made at half-past six in the morning, and no diving is to take place until it is made. The tindals are to keep their boats within the boundary of the buoys and the place pointed out by the headmen as the fishing ground for the day. Boats fishing beyond these limits will be discontinued from employ.

4. The signal to cease diving will be a gun fired from the same vessel at noon, when all diving is immediately to cease, and the boats to return to shore, following the course taken by the headmen's boats.

Difficulty having been heretofore experienced in enforcing proper attention to this signal, the boatmen are warned that notice will be taken of the numbers of the boats in which diving is continued after the signal is made, a report of which will be made to the superintendent, who will impose a fine on the boatmen for such disobedience, or, if the offence be repeated, discontinue the boat from employ.

5. The boatmen are to pay strict attention to the orders of the superintendent of the kootoos, and of the peons and other officers acting under him in respect to the business of landing and counting the oysters.

6. Upon proof of oysters having been opened in any boat, such boat will be immediately discontinued from employ, and none of the boatmen or divers that may have been in it will be allowed to enter into any other boats. The finding of knives, sticks, or other implements for the opening of oysters, will subject the party on whom found, and the boat to which he belongs, to discontinuance from employ; and all knives or other implements whereby oysters may be opened, and three-fourths of all pearls found concealed on the persons of the boatmen or in the boats, will be given to the finder or informer.

7. The crew of each boat to consist of—

1 Tindal.
1 Samman oattee.
1 Thody.
10 Divers.
10 Munducks.

The division of the boat's quarter share of the oysters fished daily will be according to established customs—

Samman oattee—the oysters brought up in two divings for each stone, *i. e.* one diving for each diver.

Tindal do. do.
Thody do. do.
2 Divers, of each stone two-thirds.
2 Munducks, do. one-third.

Thodyvalle or boat-owner, the whole of the boat's share of oysters once in six days' fishing, but the share may be taken any day *after* but not *prior* to the 3*rd day's* fishing that may be agreed upon. Arrangements with divers to pay them by wages instead of allowing them their share of oysters, according to established custom, are expressly forbidden.

8. Divers deserting from the boats in which they are engaged before the fishery is over, tindals and samman oattees extorting from the divers more than the share they are entitled to, will be subject to punishment.

9 The boats are not to leave without the permission of the Superintendent, and they are to give notice of their wish to do so to the beach-master.

No. 64.

MANAAR CUTCHERRY, 19*th September* 1863.

To the Honourable the COLONIAL SECRETARY, Colombo.

SIR,—In reference to your letter No 71 of the 29th ultimo, enclosing an original letter from the Secretary to the Government of Bombay (herewith returned), I have the honour to forward a paper of information on Pearl Fishery matters, as requested therein, with copies of Regulations, Notices, &c. connected therewith.

I have the honour to be, &c.

W. C. TWYNAM.

PAPER REFERRED TO.

Measures taken for the protection of the Banks.

All that is done is to send a small schooner of fifteen tons and an open boat of about ten tons to cruise on the banks during fine weather in the N.E. monsoon, from about the middle of October till the end of April.

The former is manned by a native crew consisting of—

1 master	at	£4	0	per mensem.
1 mate	„	2	10	„ „
4 seamen, each ..	„	1	10	„ „
1 boy	„	0	18	„ „

The latter by a crew consisting of—

1 coxswain	at	£4	0	per mensem.
4 seamen, each ..	„	1	10	„ „
1 boy	„	0	18	„ „

The crew of the schooner are kept on during the whole year. The crew of the boat are discharged when the S.W. monsoon sets in.

The master and coxswain act on warrants signed by His Excellency the Governor, issued under Regulation No. III. of 1811, copy of which is

annexed. No measures are taken for the extension of the banks, except indirectly by preventing as much as possible the fishing of young oysters during a fishery, and confining the fisheries to those portions of the banks where the oysters have in general come to maturity, and also by preventing the banks being disturbed or injured by passing boats and vessels, and by fishermen who are not allowed by the Ordinance No. XVIII. of 1843, copy of which is also enclosed, to use or possess a certain description of net within the limits as therein defined.

Measures for the extension of the Pearl Fishery Banks.

Since the revival of the fisheries in 1855 they have not been let, but the banks have been fished in on many, and the oysters sold by the thousand by public auction.

Rules under which the Fisheries are let.

All the oysters are brought by the divers and boatmen into an enclosure called the Government kootoos, and there counted by the boat-load.

The boatmen and divers receive one-fourth of each boat-load as their share, and the rest go to Government.

Printed copies of the conditions of sale on which the oysters are sold, notices for the general information of persons attending the fishery, and instructions to boatmen and tindals of the diving boats are enclosed. I cannot trace on what rules the fisheries were formerly let. The Adigar informs me that the fishery of 1831 was the last one rented.

A small bed of oysters in Tamblegam Bay, near Trincomalie, is, I believe, annually rented, but I do not know on what conditions.

W. C. TWYNAM.

Manaar, 19*th September* 1863.

By His Excellency Sir HENRY GEORGE WARD, *Knight Grand Cross of the most distinguished Order of St. Michael and St. George, Governor and Commander-in-Chief and Vice-Admiral in and over the Island of Ceylon in the Indian Seas, with the Dependencies thereof.*

To

Whereas by a Regulation of Government, No. III. of the year 1811, entitled " A Regulation for the protection of His Majesty's Pearl Banks of Ceylon," it is enacted that it shall and may be lawful for any person or persons holding a commission or warrant from the Governor for the purpose of that Regulation to enter and seize any boat or other vessel offending against the said Regulation, and the same to carry to some convenient port of this island for prosecution.

Now, We the said Governor, confiding in the prudence, courage, and vigilance of you ——— do hereby authorise, warrant, and commission you, the said ——— to be guardian and keeper of the said pearl banks, according to the limitations and directions contained and set forth in the said Regulation, of which a copy is hereunto annexed; and do hereby give you full power and authority to enter into, examine, and seize all boats or other vessels found offending against the said Regulation, and the same to carry to same convenient port of this island for prosecution. And We do hereby give you full power and directions to employ force, if necessary, for stopping, entering, and carrying away any such boat or vessel, and for so doing this shall be your sufficent warrant.

And We do hereby command and enjoin all Her Majesty's liege subjects to be aiding and assisting to you in carrying the purposes of this commission and warrant and the said Regulation into full effect.

Given at ——— in the said Island of Ceylon this ——— day of ——— in the year of Our Lord One thousand Eight hundred and Sixty.

By His Excellency's command,

———,

Colonial Secretary.

REGULATION OF GOVERNMENT.

Present:

His Excellency the Governor in Council.

REGULATION No. III. of 1811.

For the protection of His Majesty's Pearl Banks of Ceylon.

Whereas there is reason to suspect that depredations are committed in the pearl banks of this island by boats and other vessels frequenting those places in the calm season without any necessity or lawful cause for being in that situation.

For the protection of His Majesty's property and revenue, His Excellency the Governor in Council is pleased hereby to enact and declare—

That if any boat or other vessel shall be hereafter, between the 10th of January and the end of April, or between the 1st of October and the end of November, in any year, be found within the limits of the pearl banks, as described in the schedule hereunto annexed, anchoring or hovering and not proceeding to her proper destination as wind and weather may permit, it shall be lawful for any person or persons holding a commission or warrant from His Excellency the Governor for the purposes of the Regulation, to enter and seize such boat or other vessel, and carry the same to some convenient port or place in this island for prosecution; and every such boat or other vessel is hereby declared liable to forfeiture by sentence of any Court having revenue jurisdiction of sufficient amount, and shall be condemned accordingly, two-thirds thereof to the use of His Majesty and one-third to the person seizing or prosecuting, unless such boat or other vessel shall have been forced into the situation aforesaid by accident or other necessary cause, the proof whereof to be on the party alleging such defence.

By order of the Council,

JAMES GAY,
Secretary to Council.

By His Excellency's command,

JOHN RODNEY,
Chief Secretary to Government.

Colombo, 9th March 1811.

SCHEDULE REFERRED TO.

Vessels navigating the inner or along shore passage are not to hover or anchor in deeper than four fathoms water.

Vessels navigating the outer passage are not to hover or anchor within twelve fathoms water.

No. XVIII. of 1843.

To declare illegal the possession of certain Nets and Instruments within certain limits.

Whereas it is expedient to prohibit the possession, within certain limits, of certain nets and instruments which might otherwise be used to the detriment of Her Majesty's pearl banks:—

Preamble.

1. It is therefore hereby enacted by the Governor of Ceylon, with the advice and consent of the Legislative Council thereof, that from and after the passing of this Ordinance the possession on land of any drifting net, or other nets not being such as are used by men walking in the sea, or of any dredge, or similar instrument, at any place within twelve miles of Tallawelle or Tallemanaar, or at any place within twelve miles of any part of the shore at low-water mark, between Tallawelle and Tallemanaar, shall be unlawful, and every such net, dredge, or instrument that shall at any time be found within such limits shall be forfeited; and every person who shall at any time have had any such net, dredge, or instrument in his possession, or shall have moved or concealed, or assisted in, or procured the movement or concealment of any such net, dredge, or instrument within such limits, shall be guilty of an offence, and be liable, on conviction thereof, to a fine not exceeding ten pounds, or to imprisonment, with or without hard labour, for any period not exceeding six months.

Possession of certain Nets, Dredges, and other instruments within certain limits illegal.

Penalty.

2. And it is further enacted that it shall be lawful for every officer of the Customs and every Peace officer to search any house or premises within any such limits as aforesaid where he shall have good reason to believe any such net, dredge, or instrument as aforesaid to be kept or concealed, and to take the same into his charge, and to seize and take every person offending against this Ordinance before any competent Court or Justice of the Peace to be dealt with according to law.

Peace officers may make search for such Nets, &c. and seize offenders.

Passed in Council the Thirtieth day of November One thousand Eight hundred and Forty-three.

Kenneth Mackenzie,
Acting Clerk to the Council.

Published by order of His Excellency the Governor,

P. Anstruther,
Colonial Secretary.

INSTRUCTIONS FOR THE TINDALS AND BOATMEN OF THE DIVING-BOATS IN EMPLOY.

The boats will be numbered by the beach-master; and all orders to the tindals, divers, and boatmen, respecting the boats to proceed to sea each night and the banks to be fished on, will be communicated to them through the beach-master, to whose orders they are to pay attention; and any wilful disobedience thereof will subject them to discontinuance from employ.

2. The signal to proceed to sea will be, as usual, a gun fired at midnight.

The adappanaar will proceed ahead with a light, and all the boats are to follow him, and on no account to take any other course, but keep as close as possible to the adappen's and inspection boats.

3. The signal to commence diving will be, as usual, a flag hoisted to the main-top-gallant-masthead of the Government vessel. This signal will be made at half-past six in the morning, and no diving is to take place until it is made. The tindals are to keep their boats within the boundary of the buoys, and the place pointed out by the supervisor, adappen, and coxswains, as the fishing ground for the day. Boats fishing beyond these limits will be discontinued from employ.

4. The signal to cease diving will be a gun fired from the same vessel at noon, when all diving is immediately to cease, and the boats to return to shore, following the course taken by the headmen's boats.

Difficulty having been heretofore experienced in enforcing proper attention to this signal, the boatmen are warned that notice will be taken of the numbers of the boats in which diving is continued after the signal is made, a report of which will be made to the superintendent, who will impose a fine on the boatmen for such disobedience, or, if the offence be repeated, discontinue the boat from employ.

5. The boatmen are to pay strict attention to the orders of the superintendent of the kootoos, and of the peons and other officers acting under him, in respect to the business of landing and counting the oysters.

6. Upon proof of oysters having been opened in any boat, such boat will be immediately discontinued from employ, and none of the boatmen or divers that may have been in it will be allowed to enter into any other boats. The finding of knives, sticks, or other implements for the opening of oysters, will subject the party on whom found, and the boat to which he belongs, to discontinuance from employ; and all knives or other implements whereby oysters may be opened, and three-fourths of all pearls found concealed on the persons of the boatmen or in the boats will be given to the finder or informer.

7. The crew of each boat to consist of—

1 Tindal.
1 Samman oattee.
1 Thody.
10 Divers.
10 Munducks.

The division of the boat's quarter share of the oysters fished daily will be according to established custom— .

Samman oattee—the oysters brought up in two divings for each stone, *i. e.* one diving for each diver.

Tindal do. do.
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2 Divers, of each stone two-thirds.
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Thodyvalle or boat-owner the whole of the boat's share of oysters once in six days' fishing; but the share may be taken any day *after* but not *prior* to the 3*rd day's* fishing that may be agreed upon. Arrangements with divers to pay them by wages instead of allowing them their share of oysters, according to the established customs, are expressly forbidden.

8. Divers deserting from the boats in which they are engaged before the fishery is over, tindals and samman oattees extorting from the divers more than the share they are entitled to, will be subject to punishment.

9. The boats are not to leave without the permission of the Superintendent, and they are to give notice of their wish to do so to the beach-master.

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3. The police and all peons will at all times wear their belts and badges. They are particularly required to be civil and gentle to all persons, and carefully to abstain from interfering with any person, except where it is necessary for the preservation of good order.

4. No persons connected with the establishment will be permitted to receive any present or perquisite whatever, or to engage in any manner in the speculations of the fishery, on pain of immediate dismissal.

5. The boatmen and divers and all persons in general are to take notice that no one is authorised to make any deduction from their shares on account of privilege or charity oysters. All contributions they choose to make for charitable purposes will therefore be perfectly voluntary; and in the case of divers delivering oysters into the Government koottos, it will not be permitted, even with the consent of the divers, that such contributions should be received by any one inside the koottos. The shark-charmer is remunerated by Government, and is not allowed, under any pretence whatever, to receive, demand, or exact oysters from the boatmen, divers, or other persons. Any violation of this rule should be immediately reported to the Superintendent.

6. After they leave the koottos, the divers will be at liberty to do as they please with their oysters; and if molested, they should apply to the police for protection.

7. The fishing-boats will be inspected under the immediate supervision of the Superintendent as to their sea-worthiness, condition of sails and oars, and complement of crew. The crew of each boat will consist of 23 persons, viz:—

1 Samman oattee,	10 Divers,
1 Tindal,	10 Munducks;
1 Thody,	

and previous to the inspection of the boats the samman oattee will be required to furnish a list containing the names of the above-noted persons.

8. From the boats found to be qualified the number required will take their chance of employment by lottery.

9. The tindals of the boats so selected will receive from the cutcherry certificates, and a copy of the rules for the guidance of their conduct when at sea and on shore. And it is specially notified for general information that those regulations will be strictly enforced, and the wilful breach of them will be dealt with as therein provided for.

10. The tindals of all the boats employed and unemployed are to attend to the orders of the beach-master, particularly with respect to the places where their boats are to be kept, and the mode of securing them, so as to prevent interruption to the passage of their boats to and fro, and of people along the beach. Neglect of these orders on their part will subject them to be excluded from employ. No canoes are to be hauled up on the beach, except at the place assigned for them.

11. No huts of any description are to be erected upon the beach, either for the use of the crews of boats or canoes, without special permission.

12. It will be required that the boat's quarter share of the oysters fished daily be divided according to established customs; viz:—

Samman Oattee—the oysters brought up in two divings for each stone, *i. e.* one diving for each diver.

Tindal do. do.
Thody do. do.
2 Divers, of each stone two-thirds.
2 Munducks, do. one-third.

Thodyvalle or boat-owner the whole of the boat's share of oysters once in six days' fishing; but the share may be taken any day *after* but not *prior* to the *3rd day's fishing* that may be agreed upon. Arrangements with divers to pay them by wages instead of allowing them their share of oysters, according to the established customs, are expressly forbidden.

13. It is particularly notified that the first day's fishing will *positively* take place on the first day in March that the weather may permit the boats to fish. It is therefore recommended to such boat-owners and divers as may wish to be employed at the fishery that they should be at Arippo *on or before* the *20th February*.

Colombo, —— *December* 18—.

PEARL FISHERY.

Conditions of Sale.

The oysters will be put up in lots of one thousand, and the highest bidder for each lot will be allowed to take at the same rate a further quantity, according to the number which may be brought on shore daily.

The maximum quantity allowed to be taken in one lot will be made known daily before the commencement of the sale.

The biddings are to be in Madras rupees.

Payments to be made as provided for in the advertisement.

Twenty per-cent to be paid immediately, and the full amount of the purchase within four hours, in failure of which the deposit will be forfeited, and the oysters sold at the risk of the purchaser as to any loss that my arise, but the purchaser will have no claim on account of any increase that may take place.

The oysters to be removed from the koottoo before noon on the day following the sale, in default of which they will be resold in manner above stated.

Attention is particularly called to this last provision, as it will necessarily be strictly enforced.

Written permits will be given to the purchasers for the delivery and removal of the oysters.

The oysters will be delivered partly by the heaps as counted on receipt, partly by actual counting, at the discretion of the koottoo surperintendent.

INTRODUCTORY REPORT ON THE NATURAL HISTORY OF THE PEARL OYSTER OF CEYLON.

Having understood that some account of my researches into the Natural History of the Pearl Oysters of Ceylon is desirable, even at this early period of my labours, I shall endeavour briefly to sketch a report that can only be considered in the light of an Introduction to a more extensive and prolonged series of observations which, if means are afforded me, may be brought to a more speedy conclusion than I have any prospect of doing at present.

2. Before I proceed to detail the results of my researches since I was commissioned by His Excellency the Governor, in March last, to undertake this desirable investigation, I have to acknowledge the great facilities which the *aquarium* gives for the investigation of the natural habits of Molluscs and other moderately-sized fresh and sea water animals. Without glass aquaria and a powerful microscope I should not, perhaps, have obtained even that information on the minute anatomy and habits of the pearl oyster which is embodied in this introductory report. Soon after my appointment I ordered out large glass aquaria and other apparatus, which will be of service hereafter to myself or to those who may be engaged years hence in reporting to Government from time to time the natural condition of the oysters in their various banks. In the meantime I have made use of large glass globes and Ceylon-manufactured aquaria, made of thick crown glass, roman cement, and slate purchased from the naval stores. Large chatties too and tubs are also in use. The oysters thrive best in chatties, but these do not afford the same opportunity of seeing their habits as glass-sided aquaria. I have also, in addition to the above-named means of observation, had perforated wooden boxes, with a few oysters in each, deposited in various depths of the sea; and latterly I have used large canoes (ballams) for the same purpose; lastly, though perhaps of most importance, I have had unexpected facilities of observation among the several small beds of oysters found in the inner harbour of Trincomalie. They are found of all ages and sizes, at various depths, and different kinds of banks; so that no naturalist has, perhaps, ever had the same opportunities of observing the habits of the pearly mollusc as I have at present.

3. I cannot do better than correct at the outset some popular errors regarding the anatomy of the pearl oyster, and this I may, perhaps, do most simply by describing in a popular form the external and internal structure of the species of mollusc producing the best pearls of Ceylon.

4. The mollusc, generally known as the pearl oyster, found in the banks of Arrippo, Chilaw, Trincomalie harbour, and other parts of the island does not belong to the same *genus* as the edible oyster of Europe, although

in its internal structure it has a resemblance to it. The pearl mollusc resembles more the mussel tribe than the oyster, more particularly as it has, like the mussel, a byssus or cable by which it attaches itself to foreign substances or to others of its kind. The only source of information that I know of on this subject available to the Ceylon student is to be found in "Lebeck's Account of the Pearl Fishery of Ceylon, 1797," to be seen in the appendix to Captain Steuart's book. The description Mr. Lebeck gives is very imperfect, and excites a smile in the modern naturalist; but this imperfection is excusable in any account written in the infancy of the science of Conchology, and when the microscope was scarcely ever applied to anatomical studies of shells—at least not in Ceylon. The most glaring error in that description is the mistaking of "bluish spots" on the foot for "eyes," and the "ovaria" for "lungs." This mollusc has no eyes; and the lungs or gills are in the front far away from the stomach, and occupy the middle space between the hinge and the anterior edge of the shell, easily seen when the valves are open; they look like four, or two pairs of whitish (in a few specimens the gills are of a black colour) semi-lunar combs or bands stretched from side to sade.

5. I have carefully examined oysters of all ages, and have noted the structure of the shell and of the animal within it, which will form the subject of illustration in a future report. In this I shall briefly describe the animal, as it is of the greatest importance that a correct knowledge be first obtained of the animal structure before a physiological account of its habits can be properly understood.

Synonymes.

Meleagrina margaritifera, *Lamarck.*
The Pearl Oyster, *Pintadine mèreperle.*
Mootoo Chepee, *Tamul, Sing.*
Mytilus margaritiferus, *Linn.*
Margarita sinensis, *Leach.*
Avicula margaritifera, *Roissy.*
Avicula meleagrina, *Blain.*
Avicula margaritifera, *Sowerby.*
Avicula radiata, *Leach.*

Conchologists have long agreed that *Lamarck* was right in separating the "Pearl Oyster," *par excellence*, from the old genus *Avicula*, of which there are several species in Ceylon, some producing valueless pearls of a dusky blue and blackish colour. The only description of the pearl oyster of Ceylon I have access to is Lamarck's, in his "*Histoire Naturelle sans Vertebres*," and that too is only of the shell.

"*Meleagrina testa, subquadratâ, superné rotundatâ, fusco virente. Albo radiata, lamellis per series longitudinalis imbrecatis, superioribus majoribus.*"—Lamarck, vol. vii. page 107.

6. The Ceylon shell is a variety of that above described. The white radiating lines are alternated with rays of a red or black colour. Doctor Templeton made it appear that the Ceylon variety corresponded with Leach's description of his *Avicula radiata*. I am more inclined to believe that they are only accidental or occasional varieties. The shell, however, appears to attain a larger size in America and in the Persian Gulf than in the seas of Ceylon. In the largest Ceylon shells the red or black radiating lines become obsolete. If they are permanent varieties, they are both found in Ceylon. I have a faint recollection of having seen both varieties on the pearl banks of Arrippo. I had also a small perfectly white pearl oyster; this may be an Albino specimen, or Lamarck's *Meleagrina albina*. *M. testa albida irradiat, absolete squamosâ; auriculus duabus semper distinctis*, originally found on the coasts of New Holland and Van Diemen's Land.

7. On removing the animal from the shell, the whole of the internal parts is seen enveloped in a membrano-muscular covering called the "*mantle*," and known popularly in Ceylon as the "*skin*." The free border of the mantle lining each valve dips downwards, to meet a similar veil on the opposite side, thus forming a kind of double-fringed veil. The one set of tentacular fringe in immediate contact with the shell is composed of hairy tentacles, looking horizontally forwards; the other, about three-eighths of an inch apart from the former, and lining the edge of the mantle from side to side, looks downwards, and dove-tails with the tentacles of the opposite flap of the mantle. These tentacles consist of a series of long and short flat filaments, the long ones having lateral filamentous projections. The tentacles are exceedingly sensitive, and one would almost give them the power of seeing, for not only the touch of a feather, but the approach of one, when the animal is lively and in good health, makes them draw forwards and perfectly shut out the intruder. As these molluscs have no organ of sight, I have no doubt that the delicate nerves which are distributed through the mantle and its tetancular processes possess in some degree the sense answering to vision in other animals, as well as of touch; for an oyster will be observed rapidly to close its valves on the approach to the aquarium of a lighted candle, or even the approach of a hand or the shadow of a person near the glass sides of a vessel in which it is confined. I should not in a popular report advert to this physiological subject but that the senses of the oyster have a great deal to do with its habits, not only in the aquarium but also in its native bed. Were it not for these delicate fringes surrounding the mantle, the softer parts of the oyster would easily become the food of a host of carnivorous creatures, abounding in the sea, and many more pearls would drop out of the shell than do now with such sentinels at the entrance of its external rim. The mantle is the only organ the animal has for the formation of the shell, the increase of the lateral dimensions of which, and the formation of the pearly nacre and pearls, depending upon the

condition of this important investment. If it is injured, the pearly matter is not secreted in such abundance over the shell, or if by some cause it becomes retracted, the shell does not grow rapidly, and the mother-of-pearl lining is jagged at the edge and is not of the usual brilliant colour. However, its temporary retraction facilitates the ingress of sand and other irritating particles, which doubtless become the nuclei of many a pearl, as will be hereafter observed. The forepart of the mantle is coloured and rayed like the shell. The colouring matter is secreted by glands found in these parts. This glandular secretion serves the purpose of increasing the lateral and longitudinal dimensions of the shell. It is after this is deposited that the pearly secretion (nacre) is applied to the inner wall of the shell, which, concreting or solidifying, increases its thickness. The pearly fluid is secreted by nearly the whole external surface of the mantle. It will be thus clearly understood that when a grain of sand or the larva of an insect is introduced betwen the mantle and shell, it will become covered over with the pearly secretion, which, always going on, is augmented at the part where the foreign matter lies. This phenomenon I have detected with the aid of the microscope in its very earliest stage.

8. About one and a quarter inch from the rim of the shell is seen a pair of gills, like four segments of a circle, or semilunar combs, stretching transversely from one side to the other, the convexity looking forwards. There is a vacant space between the concave surface of the gills and the body of the oyster. The *adductor* muscle, called "*grizzle*," is now seen, covered over with a delicate membrane. This muscle is attached to the inner surface of both the shells. On one side (the left, when the oyster is placed with the hinge next the observer) is seen a short, conical, tubular, sharp-pointed prolongation; this is the terminal end of the intestines; it looks like a sharp-pointed claw. The intestine is short; leaving the stomach, it winds round the *adductor* muscle, and terminates, as I have just remarked, on the side opposite to where the mouth is placed. There is always an unclosed space between the edges of the mantle, when the tentacles are brought together, admitting of the free passage of excrementitious matter, and it was through the same opening between the mantle that I observed on one occasion the ova escape in a cloudy stream, which continued to pass into the water for nearly fifteen minutes. I failed to detect the immediate part of the animal through which the ova found their exit, and I have not been able to detect a regular oviduct. The ovaria, when distended with ova, cover nearly the whole of the stomach, heart, and liver, and project even on the conical cæcal process of the stomach, and also on the base of the foot. The stomach is very small, placed in the centre of the liver; the œsophagus is very narrow, scarcely admitting a moderate sized probe; it is about three lines long. The mouth, situated near the hinge, behind the foot and byssus, is a horizontal slit of about three lines

in length, in the duplicature of the lower pair of labial palps. These palps are large, broad, truncated anteriorly and rounded on the sides; the inner surface plaited, or rather grooved. The sense of feeling or touch is no doubt by this rugose structure greatly increased. The palps serve the animal as organs of touch, if not of taste; they also serve to collect food, and give the animal the power of rejecting indigestible particles of matter, or such substances as might prove injurious.

9. I have through the microscope ascertained the kind of food pearl oysters live on. This consists of minute algæ or weeds, animalcules and shells called Foraminifera. *Diatoms* also (those minute vegetable forms which can scarcely be detected with the naked eye) are found growing on the external surface of the shell, where a host of infusorial and microscopical objects likewise find a pasturage, so that the oyster may be said to carry on its back the food upon which it lives. The siliceous internal skeletons of these diatoms I have detected in the excrementitious matter of the oyster. It will be a subject for future inquiry whether any of these sharp-pointed *skeletons* do not permeate the coats of the mantle, and thus become nuclei of pearls. I have on examination of "seedling" pearls found the skeleton of a *Navicula* (species of diatom) among the *ova*; but whether this proceeded from the stomach of the animal, or got there by passing under the mantle, it was not possible for me to determine.

10. The pearl oyster, like other bivalves (Conchiferæ), are all monœceous, or rather hermaphrodites; though properly speaking they can neither be said to belong to one or two sexes, for, with the exception of the presence of *ovaria* (or egg-bags), no other sexual organ has been yet discovered. Doctor Johnson, in his valuable work on Conchology, remarks on *Conchiferæ*, "that every individual is sufficient to its own felicity." But however correct this may be regarding the feeling of sexual gratification, it is clearly established by M. Rudolph Wagner that in some Acephalous bivalves, as likewise in *Tunicata*, *Gasteropods*, and *Polyps*, the ovaries of some individuals contain a milky fluid instead of *ova*, and that this milky fluid contains *spermatozoa* (seminal animalcules). I have now to add the pearl oyster (Meleagrina margaritifera) as another of the bivalves species of Mollusc, which has individuals with spermatozoa, or seminal fluid, in organs similar to those which in a larger number of individuals contain ova or eggs. It will not, perhaps, be necessary further to discuss this important subject than to remark that the native divers' idea that "*there are male and female pearl oysters*" is not altogether fabulous. The important part which the male oyster must play in the formation of banks of oysters is self-evident, if it can be clearly established that the ova absolutely require the vivifying influence of a male fluid. I have not seen more than three or four individuals with this milky fluid in 100 oysters, nor have I yet satisfactorily made out any difference in the characters of the

shells of the two supposed sexes. The native divers' opinion quoted by Captain Steuart and Mr. Lebeck, viz. that "the large flat ones they call males, and those that are thick, concave, and vaulted they call females or Peedo chippy," is not borne out by my microscopical observations. I found well-formed ova in oysters which where broad and flat. It is quite possible, however, that in the course of this investigation some external marks may be discovered by which the male oyster can be distinguished from the female. From the very small number of males (about 3 to 100) to females, I can easily fancy that if by some natural or artificial cause the males are destroyed, the banks will not be enlarged, and that in time they will become extinct, *i. e.* supposing the majority of naturalists are correct in their present view of the diœceous character of oysters. It is just as likely that Mr. Garner's opinion will ultimately prevail, viz. "that the organs called *ovaria* do at certain periods secrete the seminal fluid, which impregnates the ova contained in them, and is then discharged as an excretion by the oviducts." To this observation of Garner I have to oppose the fact that not a trace of ova was seen in the ovaria of the supposed male pearl oysters which were distended with the milky fluid at the time when the ovaria of other oysters were distended with ova.

11. The last though not the least important part of the animal is the foot. This important member, which has so many useful services to perform in acephalous molluscs, requires a more than ordinary consideration. It is that long, brown, leech-like member which is seen when the animal is at rest coiled up in a corner on the right side above the byssus, which, when protruding out of the shell and moving about, gives one the popular idea of a tongue. It is of dark-brown colour above and whitish beneath; in middle age it is speckled. It is composed of longitudinal and transverse muscular fibres, the latter interlacing between the former, which proceed in two columnar masses from each side of the *adductor* muscle; between the bundles of fibres are placed the abdominal viscera. From its base is sent off, posteriorly, a glistening white fibrous band; this is attached to the duplicature of the mantle, near the angle of the valves. Thus the foot is seen to be admirably adapted for locomotive powers, and also serves, by its connection with the *adductor* muscle, to lengthen or shorten the cable or byssus. The foot in a full-sized oyster is about two and a half inches long when extended; at rest it is not more than one and a half inch in length. It is broad at the base, tapering to a conical point; the upper surface is rounded and smooth, the lower flattened and grooved. The groove, extending from the base, terminates at the point in an oval cup-like fosset. This groove is lined by a secreting membrane, and is an exact mould for the formation of the byssus at the will of the animal. When it finds a necessity for making one, the foot is protruded out of the shell, and with the tip it seeks out a spot where it can rest the terminal disc of the

groove. If not satisfied with the substance or position of the stone or any other matter on which it rests, it removes to another more suitable spot; for a few minutes (say five or six, if the animal is strong) it rests, and is then retracted within the shell, leaving behind a strong fibre with an oval disc, of the form of the groove in the foot. This whitish fibre is attached to the base of the foot at one end, and to the rock, or to the shell of another oyster, at the other. In a day or two this fibre becomes of a bronzed greenish colour, and looks like hair, with a broad flattened oval root attached to the rock. This process is again and again repeated at intervals of a few minutes till a sufficiently strong cable is formed. In a large oyster removed from the sea upwards of fifty such fibres form a thick strong cable or byssus, which is attached to the base of the foot by a bifurcated fleshy root. The animal cannot detach the byssus from the rock to which it is attached, but it has the power of casting it off its own body and leaving it behind (like a ship letting slip her cable and anchor in a storm and sailing off to sea) in order to make another byssus, either on the same rock or on any other convenient place.

12. I observed all this process in the aquarium at a very early period of my investigation, and was not surprised to find that the pearl oyster, having nearly the same organs as the mussel, should form and reform its byssus. But I was agreeably satisfied in learning by these observations that Captain Steuart, in his valuable and interesting Monograph on the Pearl Fisheries of Ceylon, was incorrect in denying to the pearl oyster this faculty. He states that "*it is not believed that pearl oysters have the power to detach themselves or to remove at their own will.*" I have not only satisfied myself and many friends who have seen the oysters in the aquaria which I have established that the pearl oyster can detach or unmoor itself, but likewise that it walks away with its foot foremost and the shell behind, and does not, as Captain Steuart observes, "*move with its hinges in advance.*" This "shuffling" movement alone attracted Captain Steuart's attention, but it is an unimportant one, as all bivalves without a byssus have it, and it is independent of the will of the animal, owing to the valves being opened and closed for the purpose of respiration. How imperfect must Captain Steuart, a candid inquirer, now say have been his long observations when the oyster is seen night after night taking a walk round the inside of a chatty or mounting the glass side of a vivarium, forming here and there a byssus. It is most unfortunate that he and others should not have made these observations, which are so simple in their nature, but yet conclusive of the possibility "*of translating pearl oysters from their original rocky beds to other more convenient locations.*"

13. Who can tell what the results might have been had Dr. Wright's views been carried out? I know of my medical brother's report (made I believe in 1803) only from the brief notice taken of it in Mr. Boyd's observa-

tions and quoted by Captain Steuart in the appendix to his work (page 53). Mr. Boyd's observations clearly indicate that Dr. Wright proposed some thirty years ago the transplanting the animals to places convenient for fishing them when they arrive at maturity. Either Dr. Wright did not observe the facility with which the oyster reforms its byssus, or he was misunderstood by Mr. Boyd, who remarks further on "that surely as the animal has not the power of regaining its adhesion after it is once detached, it cannot, when once broken away from its attachment, fix itself again, and must either perish or be carried away by the current."

14. Now, it is very gratifying to me to be able to speak positively on this subject, and this I do hopefully, as I have observed the pearl oyster detaching itself spontaneously from its old moorings in a glass vivarium and attaching itself to another part of the glass vessel, not once only, but have noticed that some oysters will go through this process a dozen times in less than a month. In addition to the above-related facts, I have successfully established a colony of pearl oysters near Fort Frederick, in the open sea, at various depths, and have also oysters which have been living for several months in wooden boxes, finger-glasses, glass globes, chatties, and large canoes sunk in the sea. Some were thrown into the sea after being removed from the inner harbour and kept in my house in chatties and tubs for two and three days. The byssus of most of them had been broken and torn from the rock. These they have cast off, and are now living attached to each other and to pieces of coral and to rocks, exposed to all the influences of the sea.

15. When an oyster is first put into a vivarium it sickens, *i. e.* the mantle becomes retracted, and a collapse is observed; in a few hours it revives; but with few exceptions it is on the third or fourth day that the portion of byssus attached to the foot of the animal is shaken or cast off, and the animal puts out its foot and forms another near the spot where it lies or walks, by a snail-like motion of its foot, to or up the side of the glass to the level of the water, and there fixes itself. Some of the oysters which were thrown into the sea are now seen growing on the sides of rocks four and five feet from the bottom.

16. I am not surprised at these results, for the edible oysters, without a byssus, have been known for ages to bear translating with advantage. If oysters in artificial beds in England can live and breed, I see no reason why the pearl oyster should not do the same, and, like the edible oyster, yield a large revenue, or prove remunerative to private individuals who may undertake the establishment of new banks.

17. I have one other subject connected with the interior economy of the pearl oyster to report upon, and which the miscroscope which Government aided me in procuring has enabled me to investigate very satisfactorily.

18. My observations commenced about the middle of March last, although I was not officially connected with the Ceylon Government till the 1st of May. I have ever since made monthly observations regarding the fecundation of oysters, with the following results:—In March, and all through April, May, and June, every oyster I opened, young and old, contained ova in the ovaria, except the few which had the seminal milky fluid; so that the *Meleagrina*, like the edible oyster, is in spawn almost from its birth—a precocity serving a useful purpose no doubt, and its practical bearing easily understood. From July to the present date the oysters examined dit not all contain ova; some of the ovaria were only half full; others contained a very small quantity. It will be very interesting to proceed with these monthly examinations, and to ascertain whether the oyster is only in spawn at certain periods of the year, and, if possible, to determine whether it spawns more than once in twelve-months. Nearly all the 100 oysters from the pearl banks of Arrippo, kindly sent to me by Mr. Vane, contained ova, their form preserved, although saturated with arrack. Under the miscroscope the ovum is seen to be pear-shaped; each measured $\frac{3}{100}$ part of an inch in diameter at its broadest part; longitudinally it is $\frac{6}{100}$, with a short pedicle attached. I have calculated with the micrometer the number of eggs contained in the ovaria of an oyster of five or six years of age, and I find that there cannot be less than twelve millions. Leuwenhook states that ten million eggs exists in one European edible oyster. If we consider how few of these millions of eggs can arrive at the mature condition of a living oyster, and the great demand that man makes upon the species for his gratification, we can only see in this great fact the bountiful provision made by the Creator for a wise and beneficial purpose.

19. In concluding this first report I shall briefly recapitulate the important discoveries I have already made—

1*st*.—The pearl oyster is more tenacious of life than any bivalve mollusc I am acquainted with. It can live even in brackish water, and in places so shallow that it must be exposed for three or four hours daily to the sun and other atmospheric influences.

2*nd*.—That it has locomotive powers beyond any idea which can be formed from former observations.

3*rd*.—That the power of moving from place to place is inherent, and absolutely necessary in early life for the due performance of the animal functions. This is obvious from the fact that if a cluster of young oysters stayed permanently in one place adhering to each other, the growth of the animal, and particularly of its shell, would be prevented.

4*th.*—That the pearl oyster will move about in search of food if the locality in which it is originally placed is not rich in its natural supplies.

5*th.*—That it will move from its original situation if the water becomes impure, either from the decomposition of vegetable or animal matter, or muddy, and probably too if there is a large influx of fresh water.

6*th.*—That if the water is agitated to an inordinate degree, the oyster will leave its old mooring place and seek another.

7*th.*—That a thunderstorm will kill some in an aquarium. (Query, if thunderstorms have similar fatal effects on oysters lying deep in the sea?)

8*th.*—That the animal can unfix itself froms its byssus; and that crabs, shrimps, and other creatures force them to form a new byssus by nibbling through the old one.

9*th.*—That it can reform its byssus at pleasure if in good health and condition.

10*th.*—That it can live for a long time without forming a byssus; and that it will reform a byssus when it has recovered its strength.

11*th.*—That the power of reforming its byssus is not confined to the young animal, but that the largest living oyster I have seen can reform it in an aquarium as well as in the depths of the sea, but not so actively as the young and middle aged.

12*th.*—Pearl oysters are gregarious in their habits. In placing several young oysters in different parts of an aquarium they will sooner or later be found attached to each other. The older ones have also this desire; but their heavy shells impede their motion, and they are contented to remain apart from their fellows.

13*th.*—That taking the foregoing facts into account, there appears to be no reason why pearl oysters should not be translated from their native beds and made to colonise other parts of the sea.

14*th.*—That the young, as well as the old, are in spawn from March to September; and that probably there is no stated period for spawning.

15*th.*—The whole occupation of the oyster when fixed to a spot appears to be keeping its valves open and admitting food to its mouth. For several hours the valves remain open, they then close for a few minutes or for an hour or two, then open again. At night the valves remain generally open till towards daylight, then they close, and remain so till the sun shines brightly over the horizon. It is during the early part of the night, or soon after sunset, that they exercise, *when required,* their locomotive powers. I have watched the oysters in aquaria for nearly a whole night, and they appear to be then active in moving and attaching themselves to new localities. During

the day I have only seen on one occasion an oyster form a new byssus. This nocturnal habit is doubtless an instinctive precaution; for should oysters move during the day, they are more likely to become the food of fishes and other animals which prey upon them. Their movements are instinctive, and guided by the sense of touch. Darkness suits them better than daylight, of the difference of which they are very sensitive.

16*th*.—Most of the oysters in which I have found pearls had external marks of having been retarded in their lateral growth, and displaced in early life from their fixed position on a bank. I am inclined to believe that oysters which have abundance of food and are not disturbed, remain fixed for the last two or three years of their growth to one spot. These are less likely to have a large proportion of pearl-bearing individuals among them. This of course requires more extensive practical observation, either on the beds in the harbour of Trincomalie or on the pearl banks of Arrippo.

17*th*.—With reference to the formation of pearls I have nothing new to add to the accounts found in the best modern books on the subject; except that one which modifies the view taken by Sir E. Home, viz. that pearls are formed from abortive ova. I believe the ova left behind in the ovaria are not the nuclei of pearls, but that the ova which escape through the distended coats of an over-grown ovarium, and are imbedded in the interstices of the mantle, become nuclei of pearls, formed in this situation. I have repeatedly examined seed, or young pearls, in process of formation, and with a magnifying power of 1-5 inch lens I was able to see distinctly the outlines of two and three ova through the first or superficial layer of nacre surrounded by groups of ova. It can be readily understood how an overcharged ovarium will by some accident or spontaneous evolution have its coats ruptured, allowing the ova to escape and become inserted in the contiguous attenuated parts of the mantle. As pearls are more usually found imbedded in the mantle near the hinge (the most likely place where the ovarium is liable to rupture), I consider this very conclusive of the new theory I have here proposed. I may also observe that I have seen the vestiges or cicatrices in the mantle where the pearls once existed. Though pearls originate in the mantle, when large they work their way out, and lie loose between it and the shell, or become attached to the "mother-of-pearl" surface of the latter. I have no doubt that pearls can work their way out from this position, and be found entangled in the meshes of the byssus. I also consider it very possible that an over-distended ovarium is one of the causes of pearls being discharged

from the oyster and lost. If this be really the case, it will easily account for the. singular fact that a sample of oysters fished in the month of October will yield a larger proportion of pearls than a patch of oysters fished from the same bank in the months of April and May of the following year. These observations are somewhat suggestive, and can be improved upon by future investigation.

20. I have now drawn to a conclusion this report, which I fear has extended to a greater length than will suit the patience of the reader. But the subject being one which has been so long neglected and so little understood, I hope that the Government which has engaged my services, if they do not consider my endeavours as already productive of some practical results, will at least see in these researches glimpses of future success. It is due to Sir Henry Ward here to acknowledge my grateful thanks, in which my brother naturalists in all parts of the world will, I am sure, join, for the gracious manner in which my humble services have been retained for investigating, fundamentally and practically, the Natural History of a species of shells which from the darkest ages of the world to the present has been considered of inestimable value in producing one of the richest of gems. Time was when the product of pearl-oyster fisheries founded cities in South America and the Red Sea. But what is the state of the islands of the Red Sea, "whose merchants were princes"? They are now thinly inhabited by a miserable race of fishermen. The cities of some of the oyster banks in South America are not even now known; they have been destroyed by being over-fished. New beds are doubtless forming in localities to be yet known to future generations. Ceylon pearl banks were once on the point of sinking into the same fate but for the subsequent observance of more caution. I was present at two of the largest fisheries ever made off Arrippo in 1835 and 1836. The oysters fished during the first half of the fishery were full-sized, and yielded a good price, most of the speculators making handsome profits. Government was encouraged to pursue the fishery; young oysters were taken up; many of the purchasers, inflated with former gains, purchased readily, and were ruined; and I believe to this day these over or prematurely fished banks have not been very productive, although twenty years have since elapsed. If the same incautious and unscientific plan were adopted on the oyster banks in England, similar results would soon be perceived there. Not a "native" would be had in London, nor even a cultivated one seen anywhere. If Government desires to have a steady and not a precarious revenue from pearl-oyster fisheries, let good laws protect the beds already known and those that are now forming, and let means be adopted to secure their increase and growth. In one year more oysters are consumed in England than were fished on the banks of Arrippo last year, and this consumption is repeated year after year without exhaustion, simply because the natural laws having been once found out, they

are allowed to operate fairly. It will indeed be a very great source of satisfaction to me if any of the natural laws I have described in this report suggest to Government an improved system of management.

21. My attention has also been directed to the natural history of the Tamblegam oyster, *Placuna placenta.* I have a few still alive, which were translated in May last. If this oyster can be successfully translated, the whole of Batticaloa lake might be converted into a large ostrearium. *Placuna placenta* has no byssus, and can therefore be more readily transported. Their removal from their native beds does not necessarily destroy the internal parts. About one-third of the pearl oyster (*Meleagriana*) die from being injured by the force necessarily applied when detaching them from the rocks to which they adhere.

22. I have also lately "*doctored*" some pearl oysters, according to the plan adopted by the Chinese in the case of the large fresh-water mussel, but which method, I believe, has never been attempted with the real pearl oysters. Time and further experience are required to ascertain the results of this practice in Ceylon. Dr. Gray, of the British Museum, has, I believe, by the application of the same means succeeded in producing pearls in the edible mussel or oyster of England. It may therefore be hoped that I shall eventually succeed with the pearl oyster of Ceylon. All that I can at present say is that they do not die under the operation, and that they are still living, having also re-formed new byssuses. This is the only way the period required for the formation of good-sized pearls can be ascertained. There are some other points in the natural habits of the pearl oyster which I reserve for future reports, as precipitate conclusions may mislead the Government.

E. F. KELAART, *M.D.*,
Fellow of the Linnæan Society.

Trincomalie, 24th September 1857.

Report on the Tamblegam Pearl Oyster Fishery.

The oyster found in the Tamblegam lake, and from which pearls are obtained, is the *Placuna placenta*, "Vitre Chinoise" of some French writers, and the "Window oyster" of English travellers in China, the shells, from their semi-transparency, being used for windows. The *Placuna* belongs to the same family of Conchiferous molluscs, as the edible oysters of Europe and of this country. It has no resemblance, except slightly in the animal structure, to the shells of the Arrippo oyster *Melleagrina.* When full-grown the valves (shells) measure at their broadest transverse diameter from 6 to 7 inches, and their longest longitudinal diameter is about the same, some half

an inch more. They arrive at maturity sooner than the *Meleagrina margaritifera*, and, like the Arrippo pearl oyster, the young also have ova. · I am not able from my own observation (having been only a few months engaged in these researches) to say in how many years this oyster arrives at perfection. But from the appearance of shells of all sizes, and the history of the Tamblegam pearl fisheries since 1839, I should say that in three years this bivalve mollusc attains its adult age, and that after that it dies. It appears to thrive best in brackish water, but a large influx of fresh water (from rivers) kills them. Instances have been known when a large number of young and old oysters died in Tamblegam lake during some very rainy seasons, when the rivers which empty into the lake brought down an unusual quantity of fresh water. If ever the channel, which was once proposed to be cut through the neck of land which connects the lake with the Trincomalie harbour, is made, this cause of mortality will more rarely occur, perhaps never again exist.

2. From the flattened formation of the shells, pearls are very liable to drop out when the animal reaches its full growth. I would therefore fix, as the best period for fishing, the time when the animal has closed its supposed two years' age, or when the shell measures from 5½ to 6 inches in transverse diameter.

3. I have inspected the Tamblegam bank this week, and am sorry to report that there is no prospect of even an average good fishery before the middle of 1859. The banks have been over-fished. The Natcha Cooda bank is completely destroyed. The renter in 1856 left scarcely any oysters behind, and this portion of the bank will consequently be unproductive for many years, possibly never again, unless Government should re-stock it.

4. Nothing could have been more prejudicial to the interests of the Government than to have leased out the bank by the year. The Government Agents who could have acted so unwisely as to lease out to native renters a small bank of pearl oysters for three consecutive years, without any stipulation as to the *size* of the oysters to be fished, must have lost sight of the natural laws of reproduction and multiplication of species, known even to the native divers. It is therefore very gratifying to observe that the present Government Agent, Mr. Morris, takes great interest in my researches; that he is alive to the importance of the naturalist's opinion, and has recommended that all young oysters be thrown back into the lake—a measure which I had the opportunity of suggesting to His Excellency the Governor in March last, but which, I believe, was only partially acted upon during the last pearl fishery at Arrippo.

5. I watched the number of oysters fished during the two days I was lately at Tamblegam (Keenear), and have to report that there could not have been less than 30,000 on each day. More than two-thirds of this number

were young, and had better have been left in the lake for another year or more. The renter is evidently making the most of the few months he has yet liberty to fish, or *rather ruin the bank.* The Tamblegam Wanniah, and all the divers whom I questioned on the subject, stated that in the early part of the present year more than 50,000 oysters were fished daily. It is therefore impossible to arrive at any other conclusion than that the former renters misrepresented the state of their finances from the pearl banks when they got Government to remit some portion of the rent, and had the fishery resold for a smaller sum to another native—a relative, I am informed, of one of the original renters.

6. All oysters are very prolific, and the *Placuna* is not an exception to the rule ; for at the lowest calculation in three years there must have been fished from this bank upwards of 18 millions of oysters, supposing that there were *only* 200 fishing days in each year. The renters' share must have been (allowing five shillings for each thousand oysters) nearly £2,250, from which, deducting the three years' rent, viz. £901, they must have derived a profit of at least £1,250. To this profit must be added another source of gain (a very ingenious one) from the divers' share of oysters. The diver is allowed half the quantity fished, but he is not permitted *to sell* the oysters at the best market or to the highest bidder. He is obliged to open the oysters when fresh, and sell to the renter all the pearls at a fixed rate, which the renter takes good care shall be below the market value. Any plan therefore which may relieve the diver of this grievance will, I am sure, be thankfully welcomed by at least 200 individuals, whose chief means of living is by diving for pearl oysters.

7. Oysters of upwards of two years of age (*i. e.* about six inches broad) are worth *at least* ten shillings a thousand; but if there is any competition, they may be sold for even fifteen shillings a thousand; for although the pearls they produce are about two-thirds less in value than those from the Arrippo pearl oyster (*Meleagrina*), the quantity obtained in 1000 oysters is at least three times more than what is obtained in a similar number from the Arrippo banks.

8. Upon these considerations, I have to submit for the future guidance of Government the following proposals:—

1*st.*—That the banks be allowed to remain undisturbed for eighteen months after the termination of the present fishery.

2*nd.*—That future fisheries be conducted by Government officers, and the oysters sold to the highest bidder.

3*rd.*—That the fishery be held only for two or three months in the year, say April, May, and June, and that a sufficient number of boats be employed daily so as to have the matured oysters fished during this period.

4*th*.—That the banks be carefully watched, and placed under the immediate supervision of the Tamblegam Modliar, to whom a percentage might be promised on the net profits of each fishery which yields to Government more than £500. I suggest this percentage, well knowing that any extra work thus thrown upon a native official will be badly performed unless paid for according to the value of his labour.

5*th*.—That no oyster under 5½ inches broad be allowed to be removed from the banks.

6*th*.—That a fourth share of the oysters fished be *bonâ fide* the divers' share, which they shall be at liberty to dispose of to the best advantage for themselves.

7*th*.—That those parts of the Tamblegam lake which have been denuded of oysters by over-fishing be restocked with young oysters found in the shallow parts of the lake or near its margin, which if left in their present position are very likely to be clandestinely removed at night, although the banks may be strictly watched.

8*th*.—That Government endeavour to fish up the oysters by dredging, instead of the present pernicious method of divers walking over most parts of the bank, searching for them with their feet, by which means they crush the young oysters and destroy the spawn.

9. This oyster, having no byssus, is not attached to any hard substance, nor is it cemented, like some of the edible oysters, by the hinge, or by one of the valves, to any object, but lies either flat on the mud, or is fixed loosely in a semi-vertical position, with the wedge-shaped hinge buried in the mud. It follows therefore that they can be removed with great facility with the ordinary oyster-dredge.

10. The young oysters taken up by the dredge can be returned immediately to the lake or collected, and then deposited in some suitable place previously selected by the supervisor.

11. I have no doubt in my own mind that by proper supervision and care the Tamblegam lake oyster fishery may be made to yield in a few years at least £1,500 every second year. For the last eighteen years the average annual revenue to Government was only £344.

12. In order to secure this revenue for future years, it is necessary that the present renter's proceedings be watched, and that he be obliged strictly to observe the condition of his bond, viz. "that the fishery of the said pearl banks shall be *carefully* and *providently* carried on by the renter and others, his servants, so as to cause no *damage* or *injury* to the said pearl banks."

13. If in the opinion of the Government the above condition does not enjoin the renter to prevent divers taking up *young* oysters, I think it will be

worth while to pay him £50 or more and take his lease from him; for at the rate he is now fishing and bringing up daily 5,000 or 6,000 young oysters, scarcely more than eight months old, and which cannot yield more than sixpence worth of pearls in each thousand, even if they do that, the bank, which now promises to give a tolerably good fishery in June 1859, may, like the Natcha Cooda bank, be unproductive for many years. I would therefore suggest that a Government officer be immediately sent to the fishery to prevent further mischief being done.

14. I cannot help again observing in this report that it is worthy the attention of Government to stock the various salt lakes of Ceylon with this species of oyster. The lakes of Calpentyn, Putlam, Batticaloa, and Hambantotte, if stocked with the "window oyster" will yield a very handsome revenue. I have availed myself of the present opportunity to remove about 1200 middle-aged oysters (which the renter gave me) to *Yard Cove* in Trincomalie harbour, where the muddy bottom promises to be suitable for breeding them. But the experiment should be made on a larger scale, to test the full value of translating these oysters to new localities. This I am not able to do from want of funds to meet the necessary expenses. I have already, in my former report on the natural history of pearl oysters, reported that some of the oysters which were placed in other parts of the sea in May last are still living.

E. F. KELAART, *M.D.*

Trincomalie, 3rd October 1857.

Report on the Pearl Banks of Arrippo for season 1858,
by E. F. KELAART, M.D., F.L.S.

Having concluded my researches for this season on the pearl banks of Arrippo, I have the honour to submit the following report to His Excellency the Governor.

2. The Condatchy bank, which was reported to contain last year a large quantity of oysters in shallow water (three fathoms), does not at present contain many matured oysters. A few only of a middle size are found there. But in deeper water, near the former bed, oysters of various sizes are found in small clusters on stones, and a few large ones attached to sea-weeds. This looks as if the oysters are spreading into deep parts of the sea. There not being sufficient quantity of large oysters in this bank, I have not been able to determine what quantities of pearls these oysters yield. One out of about twelve opened contained a few small pearls.

3. A few small oysters are found scattered in various parts of the sea in all depths. But it will be years before large beds can be formed from these scattered ones.

4. The Cheval Paar bank, fished this year, has in my opinion oysters of two different ages, but so intermixed one with the other that it is impossible to fish for the larger without bringing up also the smaller ones. The proportion of small to large ones is in some part of the banks 1 to 3, in other parts as 1 to 2.

5. I totally differ in opinion from the adigar of Manaar as to this large number of small oysters being of the same age as the larger ones. His comparison of them to "small men and women, and large men and women, though of the same ages," may hold good in few cases. But when we find so large a proportion of oysters whose shells and internal parts positively demonstrate their youth, I am certainly disposed to place more confidence in my own opinion, and that of the maniagar of Jaffna and natives who are purchasers of the oysters, viz. that the oysters found in this bed are of more than one age. The oysters whose growth has been stunted have very different characters—their shells are thick, and there is not the same length of pliable edge which young oysters have; the adductor muscle and other parts of the oyster bear also the marks of age. The muscle is hard and stouter in the adult, and further removed from the hinge; the foot is firmer and more speckled, and the groove under the foot is irregular; the liver cuts firmer; and the nacreous part of the shell has a thick edge in the adult oyster.

6. The fact that good pearls are also found in these second-sized oysters does not show that they are as old as the larger ones. There are other causes which doubtless come into operation here, part of which only can in this second stage of my inquiry be demonstrated. The presence of a worm (a species of Filaria) found in the oysters has, I am positive, much to do with the formation of pearls. I would rather reserve this part of my investigation for longer experience. But this much I can say at present with perfect safety, that whenever I found good pearls in a batch of oysters, I found this worm and its eggs in large numbers in the liver, ovary, mantle, and other parts of the oyster.

7. My researches here have quite proved to me, and will also prove to others who will carefully and without prejudice examine for themselves, that the ova of the oysters and the ova of worms form the nuclei of many pearls found in the soft parts of the animal, and that sand, portions of sea-weed, larva of insects, &c. form the nuclei of the shell-pearls or pearls attached to the shell. I have specimens demonstrating this even to the naked eye.

8. It was the celebrated Sir Everard Home who, I believe, first started the doctrine of eggs being the nuclei of pearls. But this theory has been contradicted by other writers. I have, however, in my report of last year stated how escaped-ova could readily form such nuclei, and now I have the pleasure of announcing to the scientific world that I found the ovaries of a

pearl oyster filled with pearls of various size and shape. I have preserved the specimen for transmission to Professor Owen, to be by him placed on the shelves of the Museum of the Royal College of Surgeons as a proof of the accuracy of the late Sir Everard Home's doctrine, which has for many years been exploded. I obtained from one of the ovaries as many as thirty-two pearls, and the other egg-bag, still unopened, seems to contain as many more. It will now indeed be a curious question where the pearly matter forming the pearl found in the ovaries was derived from. Sections of these pearls show the same form of nuclei as pearls found in some parts of the mantle, and the large irregular ones have more than one such nucleus. The mantle was found adhering to the ovaries as if it was the result of adhesive inflammation. And as the mantle is acknowledged to be the secreting organ of pearly matter, could this matter have been introduced into the ovaries; or is it likely that other parts of the oysters, such as the walls of the ovaries, occasionally secrete pearly matter under abnormal circumstances? It will be premature now to decide upon this interesting physiological subject.

9. The Modregam bank, which is intended for fishing next year, contains oysters in clusters of three, four, or five, attached to each other. In most parts of the bank the clusters are formed of oysters of the same size, but in other parts oysters of various sizes are clustered together. In one or two places very small oysters adhere to larger ones; some of these small oysters could not be more than a few months old. This is a very favourable sign. Very rarely indeed was a young oyster fished up this year in the Cheval Paar bank. This difference leads us to an inquiry of a very practical nature, which may, perhaps, require years for its solution, viz. why there are so few young oysters in the old banks? What became of the spawn which even middle-sized or young oysters certainly have? Are the spawn of young oysters of speedy decay? Analogy leads me to think that the progeny of the old oysters are more likely to reach maturity. This indeed will form the subject of further inquiry, particularly as in banks in shallow water oysters of all ages are found together. It is reported to me that some years since the clusters found in the Modregam bank were formed of more oysters. If so, it is natural to conclude that as oysters grow large, they detach themselves and form smaller clusters. Their faculty of doing this I have proved by my investigation in Trincomalie, which is recorded in my report of last year. The larger oysters of the Modregam bank are at the present moment of about the same size as those fished this year from the Cheval Paar, but there are other marks of difference of age about them which make me inclined to believe that they are younger than the larger-sized oysters found in the Cheval Paar. The shells of the generality of them, although broad and long, are very thin. These oysters also have the worm above mentioned. But I have not been able, as there is no fishery of this bank, to open a suffi-

cient number to ascertain what is the relative proportion of pearls to the worms found. The pearls I have found in these oysters are in general small, less irregular shaped, of a whiter and more brilliant lustre than the pearls found in the Cheval Paar oysters. The superintendent of the pearl banks has washed 5,000 or 6,000 of these oysters, but I have not yet ascertained the result of this washing.

10. Had there been inspections by the inspectors of other parts of the sea during my stay here, I could, perhaps, have ascertained many other facts. But as the inspector has neither time, nor can I, single handed, without boats find out other banks with oysters, I must hope for other opportunities. It would have been more satisfactory to have extended my researches to large banks with *smaller* oysters than at present found in the Cheval Paar and Modregam, but as there are no such banks known, even to the inspectors or native headman, my observations have been so far limited. But as I hope that Captain Higgs and his assistants will bring to light other banks before next year's fishery, I may have the opportunity then of completing my researches and bringing them to a conclusion.

11. I cannot close this report without expressing my thankful acknowledgment for the facilities offered to me for making these researches by Mr. Vane, Captain Higgs, and other officers connected with the pearl fishery.

12. I have thought it necessary to make certain suggestions to the superintendent of the pearl fishery for the better preservation of the pearl oyster banks, which I had already the honour of communicating to the Honourable the Colonial Secretary for the information of the Ceylon Government. The unfortunate visitation of Providence (prevalence of cholera among the divers) has closed the fishery sooner than expected; but it is to be hoped that as some large portions of the bank have not been fished at all, and there are many young oysters among the older ones, Government will be able to have a small fishery next year on this bank. For further information on this subject I have to refer to my former reports.

E. F. KELAART, *M.D.*

Suggestions for the better preservation of Pearl Oysters, by Dr. E. F. KELAART.

Being convinced from what I have seen, heard, and read on the subject of pearl banks, that the method of fishing them from one end to the other, and only leaving small patches or detached masses behind, is not the most likely one of keeping up the breed of oysters, or rather of encouraging the formation of banks worth fishing, or from whence even a moderate revenue

could be derived, I have therefore advised Mr. Vane, the superintendent of the pearl banks, to reserve a portion of the bank, say about half a day's fishing, for breeding purposes; in fact to do that as a rule, which he, to use his own words, " unwillingly" did last year. Owing to bad weather and other causes, the fishing was brought to a conclusion sooner than intended, and consequently a tolerably large part of the bank was left unfished.

2. As Mr. Vane, and Captain Higgs, the inspector, while agreeing to do what I recommended, have thought proper to record their dissent from my opinion on this subject, I shall briefly give, in writing, my reasons for making this proposal, as I have already done verbally to the superintendent and inspector, I regret to say, without convincing them.

3. It is my opinion, and that also of abler men, that while oysters have no sexual differences, the ovaria of some secrete a seminal fluid, and that this fluid is the fertilising fluid; or to use a popular phrase, there are male and female oysters; and as I have found the former bear a very small proportion to the latter, having frequently examined 50 oysters without finding a single one with the seminal fluid, I believe therefore that the chances of females reaching the influence of males will be far greater in a large portion of oysters than in small ones.

4. Supposing even the fertilised ova are formed in small clusters of oysters, such as those which Captain Higgs and others allow to remain in the banks after fishing for the season, these eggs, comparatively small in number, are likely to be drifted about in various directions, their contiguity destroyed, and they are likely to settle down in small numbers in various parts of the sea; but it may take many years, till the patience of Government is exhausted, before, by the aggregation of small clusters, a large bank be formed out of these small original elements. The contrary is observed, when the ova proceed from a large area, the spawn is seen floating in hundreds of yards, and wherever it settles large banks must be formed; and the history of the banks now being fished, and the one to be fished next year, show that they were formed by large deposits of oyster spawn, and not by the gradual introduction of small quantities. When the condition of the small banks of Trincomalie is compared with that of the larger banks of Arrippo, the cause of the difference is very evident.

5. There have been for years no deposits of spawn in large masses in these waters; and why? Because for years these banks have been fished on the old plan—a plan older than the period when Cleopatra obtained the famous pearl, and under which plan and regimen the banks of the Red Sea, North America, and India failed, and are now mere matters of history. And I must add that under this plan the Negombo, Chilaw, and Calpentyn banks were lost to the Ceylon Government, and this plan, long pursued by Captain

Steuart, terminated in the failure of the fisheries at Arrippo for nearly twenty years. Would it do now, when science has thrown some new light on the subject, to persist in what is objectionable? Captain Higgs may say he leaves a sufficient number of oysters, perhaps even a larger number than that which can be found in the patch which he has reluctantly spared for this year; but in what condition will he leave the small clusters?—In a condition anything but natural. It is true that the oysters I have shown him were in spawn, but he did not wait until I could explain to him under what conditions the oyster spawn could come to maturity or become fertilised.

6. I have reason to believe that the injury done to the bank by the divers and the anchors of their boats has a fatal effect, from which it does not recover for years.

7. In my former report I stated that the oysters will die if the water is impure. Now, let us examine what takes place when the divers have kicked, splashed, and torn everything before them while in the water. Not only do some oysters left behind die immediately, but other molluscs, zoophytes and sea-weeds die, and must necessarily stagnate the water at the bottom of the sea. The result of all this must be the gradual dying off not only of the old oysters left on the bank but also of the young. I have seen sufficient numbers of fresh dead oysters brought up from that portion of this year's bank already fished to show what the higher rate of mortality must be in a very short time. Captain Higgs, in his letter to the superintendent, states that the oysters I thought had died since the fishery began looked as if they had been recently opened. The matter is too serious to remain uncommented on, and I take this opportunity of giving the *post mortem* appearances of gradual decay of oysters, and those dead from death caused by the divers or other men in the boat killing an oyster with the hope of obtaining pearls. When an oyster dies, the two valves of the shell remain for months united at the hinge. When an oyster is opened, the valves are disunited. The so-called recently-opened shells brought up from the fished part of the pearl banks had all the shells with the valves united at the hinge; a few were separated by me after they were brought into the boat.

8. I have recently gone through most part of the bank fished last year in company with the maniagar of Jaffna, and was not surprised to find grounds of oyster-shells of all sizes, and dead shells of so young oysters as to be considered of one or two years' growth. From amid this wreck and ruin the divers brought up occasionally a large live oyster, but no small ones. But on coming to that part of the bank which was "unwillingly" left unfished last year, the oysters were alive and in good condition, and very rarely was a dead shell brought up.

9. I have also gone through many of the parts of this year's banks, and found, wherever the divers have been, there were many dead shells, and only a few dead ones were obtained from those parts which have not yet been fished.

10. The above facts require no further comment from me in this report, and I shall therefore draw to a conclusion, hoping that the adoption of my suggestions will be approved of by the Ceylon Government, especially as the loss to the revenue by reserving a part of the bank can be made up by sending a large number of boats, again and again, over the fished parts, but which, perhaps, will not be found necessary after so very handsome a return as is expected this year. I only claim for the future interests of Government the observance of those natural laws of God, a part only of which He has permitted man to know, and which, when known, it is but just that we observe them, especially when any natural production is required, year after year, for economical or ornamental purposes. I need scarcely remind the reader that the non-observance of such laws has before this brought down its own punishment in other matters than pearl oysters.

11. When we examine the old method pursued in pearl fisheries, we must acknowledge it to be sadly defective, as too much is left to the divers and the interests of native headmen. Sixty or more boats, manned by ten divers each, are sent on a bank to dive for oysters. The divers go on, from day to day, fishing up oysters from one end of the bank to the other, and after the whole bank is gone through, a larger number of boats are employed for two or more days to go over the bank again, and it is only when the boats do not bring up a remunerative quantity that the fishery is closed. By this method the quantity of oysters left cannot be regulated. It all depends on the divers' exertion. In some fisheries a large number may in the aggregate be left in small patches, or single ones widely scattered ; but it may happen sometimes that very few are left. The quantity cannot be well regulated by the inspector or his assistants, for all the information is got from the divers, who are interested in giving a false impression; whereas by buoying out a portion of the bank at the commencement of the fishery, the inspector can calculate almost to a nicety the quantity he reserves for reproductive purposes. Surely it is not too much to claim for this wise purpose 1-40th portion of the bank.

12. For the sake of meeting the objection of some to my plan, on the score that I cannot be sure of the spawn proceeding from one bank being deposited on the banks of Arrippo, I would ask them where did the spawn which formed the oyster banks of Arrippo come from ? The answer given is, I believe, that they came from a distance—from banks unknown. Supposing this to be really the case, are we not to reciprocate the benefit? How are other banks from whence Ceylon derived the spawn to be kept reforming if we do not preserve our banks on reciprocal principles ? My opinion is that while some

of the spawn is carried to some distance, other portions find prepared beds in the neighbourhood of the old banks. To no other conclusion can we come if even we only consult Captain Steuart's maps, on which are inserted the the dates of fishing, and the distance of one fished bank from another.

E. F. KELAART, *M.D.*

Arrippo, March 1858.

Report on the Natural History of the Pearl Oyster for season 1858-59, *by* E. F. KELAART, M.D., F.L.S., *Staff Surgeon.*

It was my intention to make my third report on the natural history of the pearl oyster a final one, and to present it to the Ceylon Government at the end of the year, or after the fate of the matured oysters left unfished this year had been ascertained; but finding since that determination was made that the exigencies of the military medical service might possibly withdraw me from the scene of my present zoological researches sooner than I expected, I have the honour to submit the following report of my recent investigations.

2. The oysters fished this year at the Cheval Paar bank, and the oysters fished in other parts of the Cheval in the years 1857 and 1858, appear to me to have been the product of the same brood of oysters, though deposited in various seasons of the same year, *i.e.* that they were derived from the spawn of the same year, and that the general difference of size in the oysters is no more than what may be expected in oysters developed in various periods of the same year, or within one twelve months. The oysters formed from the spawn deposited in the month of January or February will, *cæteris paribus*, be of larger dimensions than the oysters developed from spawn deposited in the month of November or December following. This is very evident in the great difference observed in the various large masses of young oysters found this year in the Cheval Paar bank, and which doubtless have been deposited since the fishery of 1858, when, if these extensive beds of young oysters had existed, the numerous native divers employed could not have failed to have seen them. These beds were first observed by Mr. Vane, and Captain Duncan of the Colonial Steamer *Pearl*, in October 1858, when none of the young oysters (judging from the shells Mr. Vane sent to me for examination) could have been more than six or seven months old;—most of them under six months.

3. The observations made on the shells of the fisheries of 1857, 1858, and 1859 lead me to infer that the fishery of 1857 was premature. The same series of observations lead me to conclude that the last fishery of the Cheval Paar oysters, in March 1859, was the latest safe period that oysters could have

been left unfished in this bank, and that these oysters could not have been less than seven years old. The general appearance of the shells, their weight, and the characters of the internal soft parts of the oyster, showed very distinctly to one who has carefully observed the oysters fished in 1858, that the oysters of 1859 were older and near the termination of their life. These external and internal characters will serve for guidance hereafter to all employed in the pearl fisheries of Ceylon, and will be faithfully detailed in my final report or treatise on the natural history of the pearl oyster. In the meantime I can assure those sceptical of the possibility of the zoologist determining the age of the oyster, as the veterinary surgeon does the age of the horse by looking into its mouth, that the age of the pearl oyster can only be determined satisfactorily by looking into the contents of its two valves, and remarking the characters of the internal parts, and their relative position in different periods of their life. I am only waiting for some more information on this head before full particulars are laid before Government. In such an important matter a zoologist cannot be two cautious in giving an opinion, which, if found hereafter to be erroneous, may not only affect his reputation but likewise make the Ceylon Government a pecuniary loser. It is my object and wish to give at the conclusion of my labours such rules for the guidance of future inspectors of pearl banks (who, I hope, will be intelligent persons, with even a little taste for natural history) that the pearl banks of Ceylon will have in future less chance of being prematurely or over-fished.

4. From information conveyed to me by Mr. Worsley (the late inspector) and the English divers employed under him, I find that I was quite correct in stating in my former reports that the rude and rough process of native diving caused the destruction of the old oysters. No old oyster was found in that part of the Cheval Paar bank fished in 1857 and 1858, and as there were many oysters left there at the end of those fisheries (though not in aggregate masses), it is natural to infer that had they not been disturbed, some of them would have lived as long as oysters brought up this year from unfished portions of the same paar, which doubtless were of the same ages. It follows therefore that my proposal to leave portions of banks unfished for breeding purposes is a justifiable one, and of great practical importance. From the prevalence of cholera, the fishery of 1858 was abruptly stopped, consequently large masses of oysters were left unfished in portions on which divers had not worked. How large this quantity, so fortunately reserved, must have been, can be imagined when it afforded a revenue the following year of upwards of £19,000.

5. I have no doubt in my own mind that the myriads of young oysters now found in the Cheval Paar were formed from the spawn of these reserved

oysters. He would, indeed, be a bold naturalist who, in order to establish a favourite theory, would maintain that the spawn floating about the sea, and derived from banks far off, found a resting place last year on the Cheval Paar, when he finds, contrary to former observations, that the majority of the old oysters were covered this year with young ones of from four to twelve months' growth, and that few of the old oysters examined had eggs in their ovaries or genital glands. At the end of the fishery of 1858 the oysters on all the banks were in a most favourable condition for the multiplication of species and replenishing the seas. The ovaries of all the thousands of oysters examined by me were full of spawn or spermatozoa.

6. Owing to the reappearance of cholera this year also, a very large quantity of matured oysters full of eggs were left unfished in the Modregam bank, and it is to be hoped that no unforeseen or untoward circumstance will prevent the spawn of these oysters being deposited in or near the already known banks. Whether the divers detect this expected new brood or not, the Ceylon Government may feel assured that the product of the spawn will not be very far off the present Modregam; at all events it will be a very satisfactory result if these oysters too, after performing their natural functions, yield next year a revenue of £20,000. Had cholera not prevailed, this amount would probably have been added to the already collected revenue; but then the millions of young oysters which the old ones are likely to have produced would have been lost. Now there is a very fair prospect of not only securing the value of the old oysters, but a new generation of the species for future years, when this colony may be more in want of money than at present.

7. The future prospects of the pearl oyster banks are very brilliant indeed, although the fisheries (after the probable one of next year) are not likely to be resumed before the year 1864.* It does not appear on record that such numerous and extensive deposits of young oysters were ever known to exist in almost one continuous layer, as the two intelligent and skilful English divers have discovered this year on the banks of Arrippo. There were few oysters fished this year on the Cheval Paar that had not from ten to twenty or more young oysters attached to their upper shells. On one *pinna* (fan-shell) I counted as many as sixty, and on one piece of coral, about two feet in circumference, there were at least 300 one year old oysters. At the lowest calculation, the quantity of young oysters now on the Cheval and Modregam banks, according to the reports made by the divers, cannot be less than fifty times as many as were fished during the last three fisheries. If then even half this number arrive at maturity and reach the age of six or seven years, the revenue that will be derived from this

* There may be a fishery near the Modregam in 1863 of oysters found by Captain Higgs in 1858.

source (if present prices are maintained) will be more than sufficient to pay the cost of the Ceylon railway. But I shall not be performing my duty as naturalist if I do not also place before the Ceylon Government the dark side of this bright future. The mortality among oysters, from natural and violent causes, is very great, as has been observed in small banks in Trincomalie harbour. Scarcely half of them reach the third year. The ratio of mortality decreases after that, and among older oysters it is probably not more than five or six per-cent per annum, until they arrive at the last year of their existence, when they die off very rapidly. So that it cannot be expected that more than a fourth or fifth of the young oysters discovered this year on the banks of Arrippo will live to maturity or to the age fit for fishing. Even this is a good prospect for the future; but there are other causes which may operate in diminishing this number. Oysters, particularly the young, are liable to be smothered by sand. Although the divers report that there is scarcely any ground current on the banks, there is reason to believe that at some seasons the force of water is increased, and that oyster banks may be partially covered over by sand or sea mud. I have no doubt in my own mind that the sudden disappearance of young oysters from banks is owing sometimes to these sand or mud deposits. I have seen the fatal effects of even a few inches of sand on my artificial beds in shallow water; and that such deposits will kill even old oysters is evident, as I have ascertained that they cannot live for more than a day or two when thus covered. That such sudden deaths do occur on the pearl banks of Arrippo is more than probable from the fact that the divers frequently bring up large quantities of dead oyster-shells of all sizes from parts of the sea where no living ones were found the year before, and sometimes when I have asked for sand or mud, they brought up oyster-shells with it. The natural inference follows that living oysters were at one time buried under the sand, and that subsequently, the sand being washed away, the shells were left exposed. This I have observed in the harbour of Trincomalie, where some clusters of oysters that I translated had disappeared, but in a few months their shells were discovered on the spot where they had lived.

8. Recent observations corroborate the statement I have previously made, that pearl oysters exert their locomotive powers frequently, and that in the act of doing so they may be washed away to some distance, while their progress is only arrested by meeting with impediments, such as a stony surface or shell, and that there, after a time, they refix themselves by forming new beards. One of the reasons for the oyster casting off its beard is doubtless that it may form a longer one more suited to its enlarged body. If we consider that the beard (fibres so-called) when once formed does not grow longer or thicker, the fact is of importance to the naturalist, who first maintained

that oysters change their position by casting off their old beards or cables and forming new ones. In an old oyster a young beard is not found.

9. A deficiency of hard substances on which the oyster can re-attach itself must sometimes occur, from either a natural scarcity of coral, stones, or shells, or from these substances being covered over for a time with sand. This probably is also a temporary hindrance to the formation of new banks. Taking all these well-ascertained circumstances, and also the probable ones, into consideration, I have to propose to the Ceylon Government not only the adoption of Monsieur Coste's plan of placing fascines on oyster beds, for the collection of the spawn, but that a barrier be placed round each bank, in order to prevent the oysters from being forced away by currents or other causes to regions unknown.

10. That young oysters will attach themselves to any hard substances placed in the sea cannot be doubted. An iron boat anchor accidentally dropped overboard during the fishery of 1857 was brought up this year by one of the English divers covered with young oysters; and in my experiments at Trincomalie I found that even very old oysters will reform their beards and refix themselves to old shells, wood, iron, coir-matting, zinc-plates, cocoanut-shells, chatties, &c. The piles supporting the piers in the harbour are covered with young edible oysters. We have thus every encouragement for the adoption of the method I beg to suggest for the future conservation of the pearl banks of Ceylon and India.

11. The plan proposed is to girdle or barricade the oyster banks with coir-matting supported on iron frames, and placed round each bank about ten yards beyond the edge of the oyster bed, fascines, dead oyster shells, corals, &c. being deposited between the barricade and edge of the bank. The interspace will allow of sufficient room for the roaming disposition of the oysters, and the impediments thrown in their way will give new surfaces for their attachment, while at the same time they will form a sufficient barrier to prevent the oysters escaping to distant parts of the sea where they would not readily, if ever, be found again. This barricade of coir and iron, with the fascines, will also attract and fix any spawn that may be floating about. I placed last year, with the aid of the English divers, a few wicker-work and coir fascines, or rather cages, on both banks, and I shall be very glad to have their condition examined and reported upon by the divers after their next inspection of the banks.

12. It will be of little value to carry on any experiments of the above kind in Trincomalie harbour, for the nature of the Arripo banks is very different, and the influences of the sea on the two banks are not the same. I have therefore to propose that before Government decides upon my plan, a fair trial of it be made in one of the Arrippo banks; say even on one of those large scattered

masses of young oysters near the large banks; a trial of six or twelve months will, perhaps, be sufficient to test its value. I hope to be able before the next inspection takes place to show personally to His Excellency the Governor, or to any authorised person, the kind of barricade and fascines I have proposed.

13. Before concluding this report, I have another proposal to submit for the better preservation of oyster beds.

14. It is now quite established that young oysters will live after being once removed from the sea. I had the pleasure of exhibiting to His Excellency the Governor, when he visited Arrippo during the last fishery, a quantity of young oysters living attached to a glass vivarium. These I had picked up at the *coottoos* after they had been out of water for more than four or five hours. It is therefore more than probable that young oysters detached from the old ones during a fishery, if properly cared for and translated to some favourable parts of the sea, will live and grow to perfection; but to do this satisfatorily there must be some well organised system adopted in future. It was lamentable to see the myriads of young oysters committed to almost certain destruction by the divers throwing them overboard immediately under the boats, and in the very places where the diving-stones were crushing and bruising the delicate creatures. On my representing the matter to His Excellency the Governor and to Mr. Vane, the divers were ordered to desist from this cruel and destructive practice, and to collect the young oysters (of which I should say that there were more than two millions brought up daily from the Cheval Paar bank), and after the day's fishing to deposit them in a part of the sea, previously buoyed out by the inspector, as the boats were leaving the banks. From the want of proper officers to see this order carried out, I fear many hundreds of thousands of young oysters met with an untimely end. To avoid this in future, I would suggest that every preparation be made beforehand for the safe removal of the young oysters, whenever they are found to be attached to old ones brought up by the divers. Let each diving boat be provided with a large basket suspended in the sea from the side or stern of the boat, and let strict injunctions be given, and the divers compelled carefully to remove the young oysters from the old and place them in these baskets, which can be emptied into any part of the sea previously selected by the inspector, or let boats be employed during the diving to collect the oysters for deposit elsewhere.

15. For the better security of these young oysters, let the part selected for the formation of a new bed be surrounded with coir-matted fascines; and let the part so selected be ascertained to have a large quantity of coral and dead shells, that the young oysters may not be forced away from the spot owing to the want of holding-ground.

16. In conclusion I beg to observe that although my plans may appear chimerical, especially the one of girdling or barricading banks in six or seven fathoms of water, it will not appear to be so impracticable if the services of the English divers now in the island are made available for the purpose. Nothing of this kind should seem impossible to a nation that can lay down wire cables across the Atlantic or in the beds of the Red Sea and Persian Gulf. The expense likely to be incurred is very trifling compared with the value of the oysters that may be preserved. The present market value of a bed of pearl oysters two miles in circumference is say from £30,000 to £40,000, and the expense of fencing a bed of this size cannot be more than £200, or say £300. If then the experiment I have proposed should prove successful, such an outlay is too small to deter any government from undertaking the work on a greater scale. I hope that the presence of young oysters in such large quantities on the pearl banks of Arrippo will not make the Government less anxious about the better conservation of the banks. Who can tell what may happen during the next four or five years ?—That many of the oysters will die a natural death, and that many more will be used as food by thousands of voracious marine animals, in the interim, is a certainty; but we should not forget that there is a probability of whole masses being carried away from other causes. What may now appear likely to yield a revenue of many hundred thousands, may not produce more than a few thousands at the end of five or six years. It is time, now that the Emperor of France has acted upon the suggestion of a French naturalist, and thereby increased the production of the edible oysters of France, that the Ceylon Government should treat the pearl oyster with more care and consideration than it has hitherto done, so that the profits derived from this source may become a permanent or less fluctuating revenue; and that the plan proposed by their naturalist should be at least fairly tried, even on a small scale, before any decision adverse to it be adopted.

17. I have not in this paper detailed some very interesting discoveries made since my last report on the anatomy and physiology of the pearl oyster, believing that they are better fitted for a treatise on the subject, than to be embodied in a report to the Ceylon Government, which must necessarily be written in a popular form. However, as this report may, like the preceding ones, fall into the hands of scientific men, I shall merely mention here that Monsieur Humbert, a Swiss zoologist, has, by his own microscopic observations at the last pearl fishery, corroborated all I have stated about the ovaria or genital glands and their contents, and that he has discovered in addition to the filaria and circaria, three other parasitical worms infesting the viscera and other parts of the pearl oyster. We both agree that these worms play an important part in the formation of pearls; and it may yet be found possible to infect oysters in other beds with these worms, and thus

increase the quantity of these gems. The nucleus of an American pearl drawn by Mobius is nearly of the same form as the circaria found in the pearl oysters of Ceylon. It will be curious to ascertain if the oysters in the Tinnevelly banks have the same species of worms as those found in the oysters on the banks at Arrippo.

E. F. KELAART, *M.D.*

Trincomalie, Fort Frederick, 13th July 1859.

ABSTRACT of proceedings regarding Oysters containing Pearls found at Bellapoor in the Tanna Collectorate.

With his Memorandum No. 2153, dated the 30th July 1863, the Revenue Commissioner, Northern Division, forwarded a letter from the Acting Collector of Tanna, together with a small box containing some pearls, as also two shells.

2. The Acting Collector stated—

"The oysters containing these pearls were found at Bellapoor in the Salsette talooka, and exist in large quantities in that locality.

"The oysters appear to be of the same description as the China window oyster called 'Placena.' I found that pearls were to be discovered in about every third oyster opened. At present the fishermen at Bellapoor, at low tides, catch the oysters, examine them, take out the pearls, and eat the oyster. The pearls they sell to Banians who come over from Bombay to purchase them, paying Rs. 2-8 per tola for them.

"Most of the oysters were picked up at low spring-tides, and I have little doubt that oysters taken in deep water would be found to have larger pearls than the seed pearls now sent.

"I beg to solicit instructions."

Government Resolution No. 2985, dated 3rd September 1863.

3. A reference was made to the Marine Department to ascertain whether any divers could be engaged in Bombay to examine these oyster beds.

Memorandum from the Secretary to Government, Marine Department, dated 23rd September 1863.

4. The reply received was to the effect that there were a few divers in Bombay whose services could be obtained, that each of them demanded sixty rupees a month as wages, besides provisions, which would cost about six rupees more, and that the diver who was attached to the Dockyard for about thirty years, and who was expert in the calling, guaranteed that these men would do their work properly.

5. On receipt of this information Government recorded the following Resolution *:—

"It is not intended to entertain divers permanently, unless the oyster beds are found productive enough to warrant their being regularly fished. All that is required at present is to have the beds examined. For this purpose it would be, perhaps, sufficient to place the diver who was formerly attached to the Dockyard, along with another diver, for ten days or a fortnight, under the orders of the Acting Collector of Tanna. The Acting Collector should place himself in communication with the Superintendent of Marine, and enter into such arrangements as he may find necessary, submitting a contingent bill for the wages of the divers."

No. 1491 of 1864.

Revenue Department,
Bombay Castle, 20*th April* 1864.

MEMORANDUM.

The undersigned presents compliments, and requests the Commissioner in Sind will have the goodness to state whether there is any correspondence on record about the Kurrachee pearl banks, and to quote it if it had been submitted to Government; but if not, to forward a copy thereof for the purpose of being printed as a volume of Government Selections along with other papers received from the Ceylon Government on the same subject.

H. E. JACOMB,
Officiating Under-Secretary to Government.

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* No. 3744, dated 27th October 1863, communicated to the Marine Department, the Revenue Commissioner N. D., and the Civil Paymaster.

No. 135 OF 1864.

MEMORANDUM.

In reply to Government Memorandum No. 1491, dated 20th April last, in the Revenue Departntent, the Commissioner in Sind has the honour to forward Memoranda in original by Mr. Macleod on the Sind Pearl Banks, and to state these are the only papers on the subject among the records of this office, excepting the Memorandum published in volume No. XVII. Government Selections, entitled "Miscellaneous information connected with the Province of Sind."

2. It would appear from a report by the Collector of Customs that in the year 1844-45 the pearl banks were placed under Mr. Macleod's charge, and that the fishery from that year to 1848 realised Rs. 3,838; that in 1849 it was sold by public auction for Rs. 6,265 and in the following year for Rs. 5,275; that in order to prevent the beds from being exhausted, fishing was suspended for a period of four years, when the fishery was again put up to auction and sold for Rs. 4,900, but that in the following year it realised Rs. 1,500 only.

3. It would further appear that fishing was then interdicted until the year 1862, when Mr. Coates secured the right for Rs. 5,000 at a public auction; that subsequently Mr. Coates offered to pay Rs. 10,000 for the use of the pearl banks for a further period of four years, and that this offer was accepted by Government.

4. Mr. Dalzell reports that Mr. Coates' profits have been insignificant, and that he will in all probability be a considerable loser by the transaction.

5. The specimens of pearls are said to be very small, the larger ones being the size of No. 4 shot.

6. Since 1844-45 the pearl fishery has realised Rs. 54,719-5-10, averaging Rs. 2,487 per annum.

S. MANSFIELD,
Commissioner in Sind.

Commissioner's Office, Camp Dhuryaro, 4th July 1864.

MEMORANDUM.

Since the receipt of instructions to take charge of the pearl fishery, I have visited the sites of the two best known banks.

Pearl fishery.

The first, called Kingur, is situated to the eastward of the entrance to Gharra creek. It is an extensive mud flat, dry in great part at low water. Two years ago it was let out to Koondaw, the contractor, who had 200 men employed in removing the oysters.

Kingur, its site.

The coolies state that after the fishery had been fairly exhausted, they were obliged to continue at work until all the oysters that could be got at had been removed, and as they were paid according to the quantity of pearls collected, this course was injurious to them; their gains merely sufficed to provide them with the means of existence, and hence their discontent and opposition when called upon during the past year to proceed with the fishery.

Cause of the discontent of the coolies.

2. I beg leave to bring this fact to prominent notice. It is to the interest of a contractor to make as much as he can out of his contract; exhausting the fishery ground costs him nothing, the labourers being paid according to the produce. The Government are alone the sufferers. Should it therefore at any future period be deemed advisable to let out these fisheries by contract, some stipulation would appear to be necessary to protect them from injury. It takes three years, I am informed, for a bank to recover itself after severe treatment.

Injurious effect of letting the fisheries out on contract.

3. In this bank there are now twenty men engaged in prosecuting the fishery under the surveillance of a jemadar and a custom office peon.

Number of coolies now employed.

4. I continued on to beyond the Pilleeanee mouth of the river, a few miles on the other side of which is a deep creek called the Kameesa in which the pearl oyster was formerly found in great quantities, and where it would still appear to be plentiful. Here I commenced getting divers together, and while the jemadar was completing the necessary number, I tried the creek in various parts and found it productive.

Kameesa.

5. At this period I received information of an extensive oyster bank, which had never been disturbed, near the Hujamree mouth of the river. I was, however, obliged to return, as the establishment were employed in the annual accounts, and required supervision.

Bank hitherto not worked.

6. The next banks for examination are those in the neighbourhood of Kurrachee, which had the character under the government of the Meers of being the most productive known on the Sind coast.

Kurrachee banks.

7. Where the annual returns have varied from Rs. 39,000 to Rs. 500, it becomes difficult to give an estimate of the return of these fisheries. The known banks have never yet been systematically worked, and there are doubtless many to be yet discovered. I am informed by Captain Pready that some divers from Baherin were introduced by the Meers, who for a time carried on their occupation in the deep water beyond Munoora, but were deterred from continuing by the fear of sharks which abound in that locality. Of their success I have been able to learn nothing. The value of this outside fishery will be ascertained by a dredge on the construction of that made use of on the coast of England.

Probable value of the Fishery.

8. I have to apologise for this imperfect sketch, but at the present period I felt called to give all the information regarding these fisheries which I have been enabled to collect.

J. MACLEOD,
Superintendent Pearl Banks.

5th July 1845..

SIND PEARL BANKS.

The history of this source of revenue appears to have been hitherto but little known. The late Government, I am informed, became for the first time aware of the existence of pearl banks within their territory at the close of the year 1836, and in accordance with their policy, when a prospect of gain presented itself, the right of fishing for the following year was farmed out to the highest bidder, and realised Rs. 650 Kashanee or Bombay Rs. 500. The ground fished under this contract appears to have been to the eastward of Gisree Creek, including the Kenjur bank, the most productive at the present date.

2. In the year 1838 this contract was put up to sale, and brought Rs. 1,300 Kashanee or Bombay Rs. 975. An idea having, however, become general that the fishery was of much higher value, the original contractor was soon outbid and his contract cancelled. The new contractor was soon after outbid in his turn. This process was several times repeated, the Meers accepting every increased tender and ejecting the former holder. The greatest offer was Rs. 1,900. The parties who tendered this sum soon found they had mistaken the value of the fishery, and after a few instalments begged to be released from the contract, which was happily for them acceded to.

the Meers continuing the fishery on their own account, but finding the returns fall far short of their expectations, it was abandoned.

3. Five years thereafter, that is in 1843, this fishery was disposed of by the Collector of Land Revenue to one Coondun, a Banian, for one year for Rs. 2,500 Kashanee or Bombay Rs. 1,875.

4. In the following year it was again let out to Coondun, in connection with another Banian, for Bombay Rs. 2,400, but owing to the fishermen refusing to work, the contract was cancelled by Government.

5. Thus, taking all circumstances into consideration, the probability is that the actual receipts for the last eight years from this division of the pearl fishery has been under Rs. 500 per annum.

6. The second division of the pearl fishery is that within Munora Point.

Kurrachee.

It was given for the first time in contract at the close of 1839 for Rs. 1,100 Kashanee or Bombay Rs. 825, but owing to the process of out-bidding already described, in the seventh month a tender of Rs. 35,000 was received and accepted. The contractor after a period failed, and a composition of Rs. 20,000 was accepted of. The Ameers continued the fishery for several months, when between Rs. 7,000 and Rs. 8,000 are said to have been realised.

7. Nothing more is said of this fishery until the year 1844, when it was let out by the Collector of Land Revenue for Rs. 3,700, and for a breach of the agreement was soon after resumed, and the fishery was commenced on account of Government. At the end of the first month the fishermen struck work, alleging as the cause for doing so that the fishery was exhausted. I believe this to have been the fact. The sum realised during this month by the sale of the produce, after deducting expenses, was Rs. 2,278-9, being nearly Rs. 30,000 in five years.

8. The various items of information here detailed were obtained from a Memorandum by the Collector of Land Revenue.

9. The pearl banks at Ceylon have for a considerable period had the

Ceylon pearl banks.

best attention of the Government of that island, and it may therefore be fairly presumed that the system of fishing adopted there may with modification be safely followed here. In a work bearing on the subject I find it stated that the pearl oyster of Ceylon is considered to arrive at perfection in its seventh year; if taken before that period it is only imperfectly developed; if taken after that period, it is found to have decayed, the oyster dies, the shell opens, the fleshy part in which the shell is imbedded wastes away, and the pearls disappear, either having been washed into the sand or perished by decay.

The *act* of fishing pearl banks.

The act of fishing for Ceylon pearls consists therefore in keeping up the most rigid inspection of the pearl

banks, so that each bank may be fished "precisely at the period of its perfection, each bank being available for about twenty days in seven years."

10. From the description as here given of the act of fishing pearl banks, it is a fair presumption that had the Sind system been in operation at Ceylon (that is of letting the banks out to cnotractors for twelve months at a stretch without any restriction as to the mode of fishing) they would have long since ceased to be a source of revenue to the State.

11. An examination of the sites has been completed of all the banks producing the pearl oyster known to exist on this coast, viz. Kinjur, Kumbrana, and Kumeesa, together with the harbour of Kurrachee, at one time very productive.

Kinjur.

12. Kinjur is situated near the entrance of the Gharra Creek, and extends over a considerable space. It was included in the contract for 1843, and on that occasion was severely used: the divers were kept at work until the bank was exhausted, and hence their discontent when called on last year.* The oysters now found are few in number, and in deep water but full grown.

Kumbrana.

13. Kumbrana is at the Kedeewaree mouth of the river. It has hitherto been fortunately but little known, and promises well. There are forty men now employed on it.

Kumeesa.

14. Kumeesa is situated in a salt-water creek about three miles beyond Kumbrana. It was fished by Coondun in 1843, at which time all the productive oysters were destroyed. Those now found are not half grown, and on an average about one in five is found to produce a seed-pearl of the smallest size. It requires three years' rest to render it productive.

Kurrachee Harbour.

15. The sites of the pearl banks in Kurrachee harbour are known, but as yet the oysters discovered are insufficient in number to pay for the expense of collecting them. The boat's crew with a dredge are now employed in examining the deeper reaches.

16. I shall here take the liberty of closing this Memorandum. At the end of another month I hope to be prepared with sufficient information to enable my submitting a proposal for the periodical fishing of these banks so as to reap a revenue from them without exposing them to certain deterioration or may be destruction.

J. MACLEOD.

12*th August* 1845.

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* The divers are paid three rupees for each tola of pearls produced. When the oysters begin to fail, the labour increases and the profits decrease.

No. 410 of 1864.

Agri-Horticultural Society's Office, Town Hall, Bombay, 23rd August 1864.

To the SECRETARY to GOVERNMENT,
General Department, Bombay.

Sir,—In reply to your Memoranda of 31st May, No. 2063 of 1864, and of 20th August, No. 3182 of 1864, I have the honour herewith to return the work entitled "Voyage d' exploration sur le littoral de la France et de L'Italie par M. Coste."

The practical portions of this work are the chapters on Lake Fusaro, and on the Industry of Marennes (Charante Inférience), and the Appendix No. 4 on apparatus for receiving young oysters.

3. The plans detailed in those places for the cultivation of oysters are very simple, and might easily be tried by persons in earnest for the work in the back waters of the Malabar Coast.

4. The great object is to secure the young oysters by providing for them suitable and ready beds when detached from the parent shell.

5. More simple plans—

(*a*) One plan is, in oyster waters to make a rockery and to fix stakes in a circle round it, high enough to show above water at all times. (Fig. 1.)

(*b*) Another plan is to fix stakes in oyster waters in lines, bound together by cords, from which faggots of wood are suspended. This plan is simpler than the last, and also better, because the faggots of wood are, with the attached oysters, readily drawn up. (Fig. 2.)

(*c*) Another plan is to erect a staging in still-waters of piles and planks, the planks being above the water level, and broad enough for men to walk along them; and from these planks to suspend baskets of various structure, which as soon as covered with oysters can be drawn up. A fisherman's hut can also be erected on the staging. (Figs. 3 and 3 A.)

(*d*) More simple than this is the small floating staging used in Marennes for propagating "muscles." By a rope it can be moved about at will. (Fig. 4.)

More complex plans—

(*e*) Tiles fixed in various ways along the [illegible] bottom a tent ways —flat, sloping. (Figs. 5, 6, 7, and 8.)

(*f*) A perforated box fitted with open wire-trays, and fixed at the sea bottom, the wire work of the trays presenting innumerable points of fixture ; even the smallest oysters are likely to be thus secured. (Figs. 9 and 9 A.)

6. This is really the whole book, and a rough copy of the engraving seen in it of each apparatus above given is the only assistance a person in earnest to try oyster cultivation need care to have. The experiment should only be made in oyster grounds.

7. The last number of "Good Words" contains an article on "Oyster Culture" which might be substituted for this summary of M. Coste's lengthy compilation.

I have the honour to be, &c.

G. C. M. BIRDWOOD,
Secretary to the Society.

DRAWINGS

FROM THE

FRENCH WORK ENTITLED "VOYAGE D'EXPLORATION,"

ILLUSTRATIVE OF THE VARIOUS

PLANS FOR THE CULTURE OF OYSTERS.

Fig. 1.

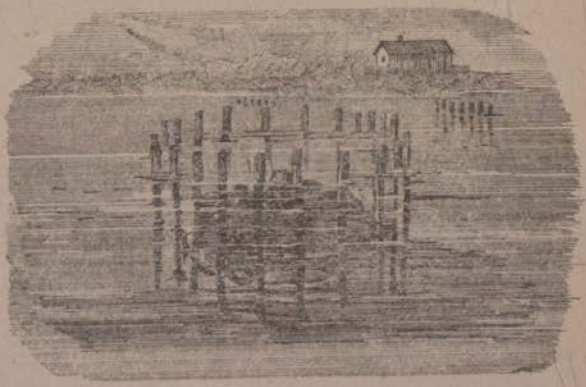


Fig. 2.

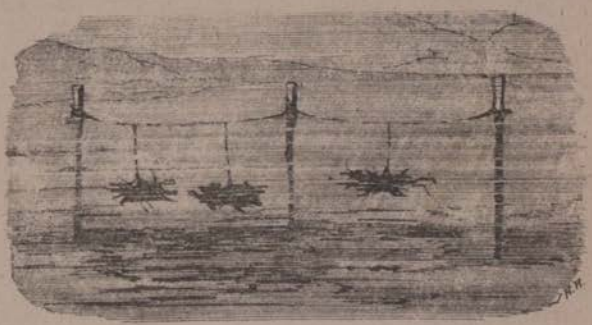


Fig. 3.

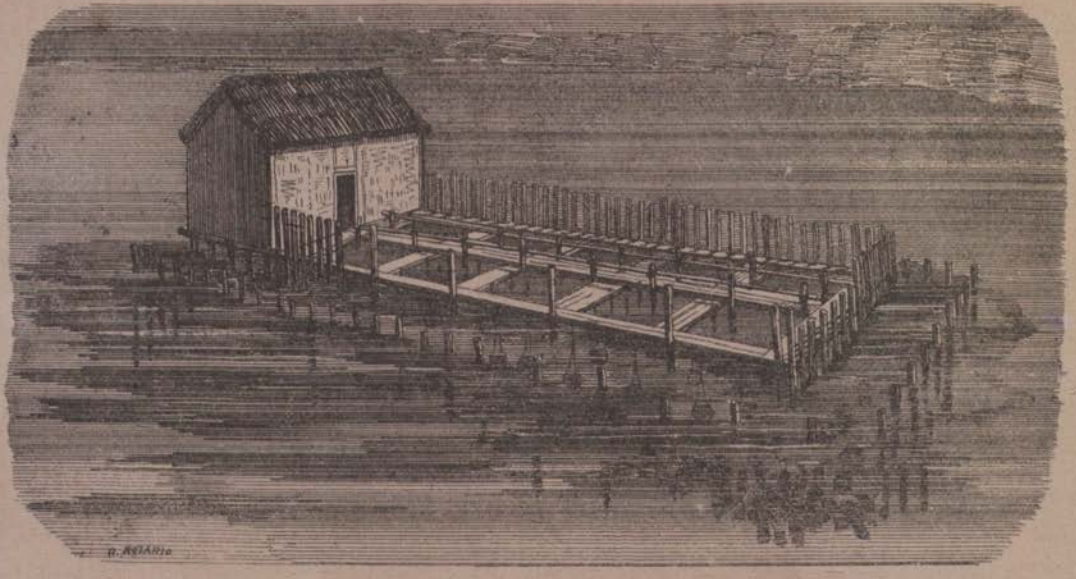


Fig. 3. *a.*

Fig. 4.

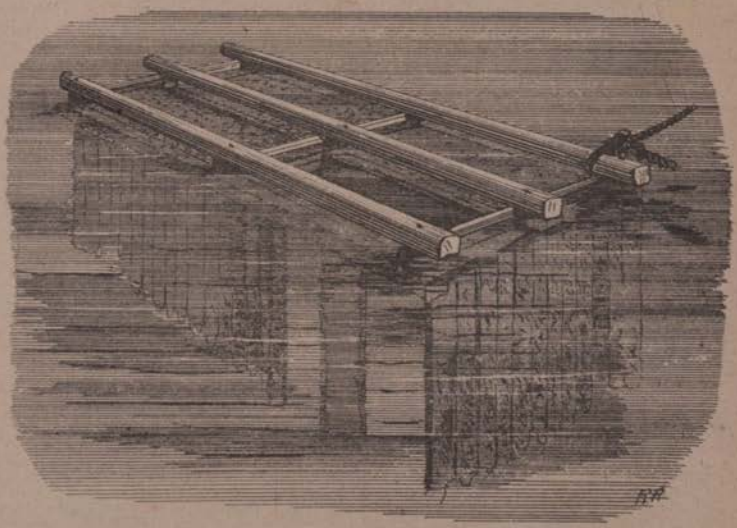


Fig. 5.

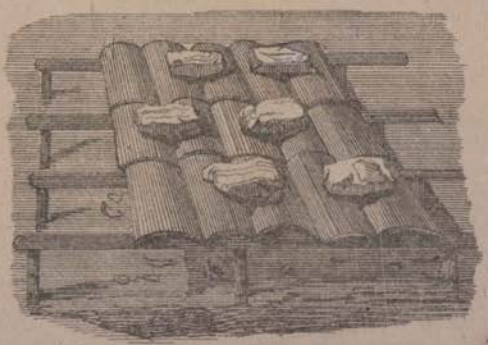


Fig. 6.

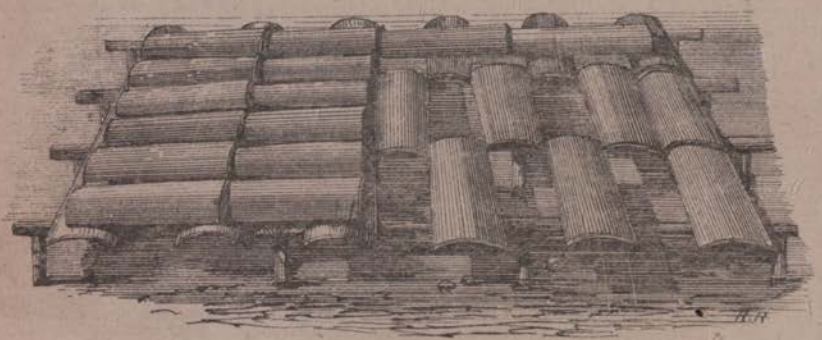


Fig. 7.

Fig. 8.

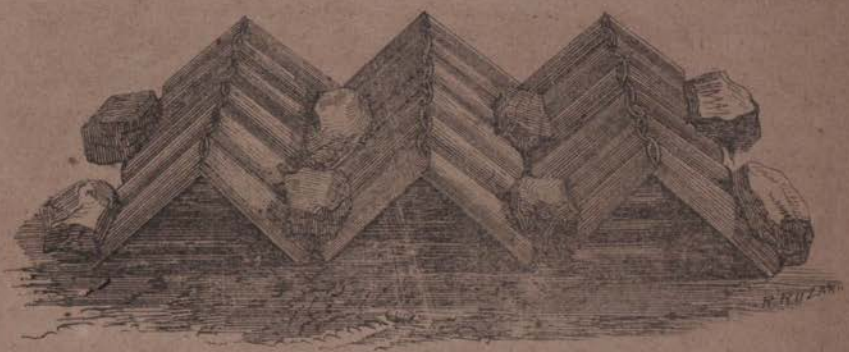


Fig. 9.

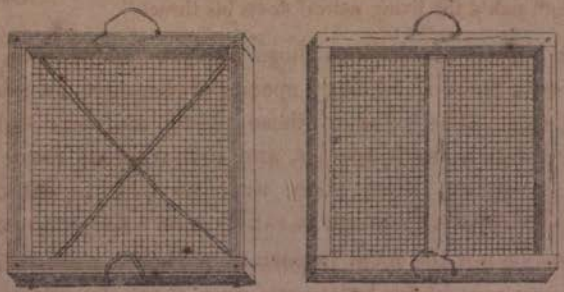
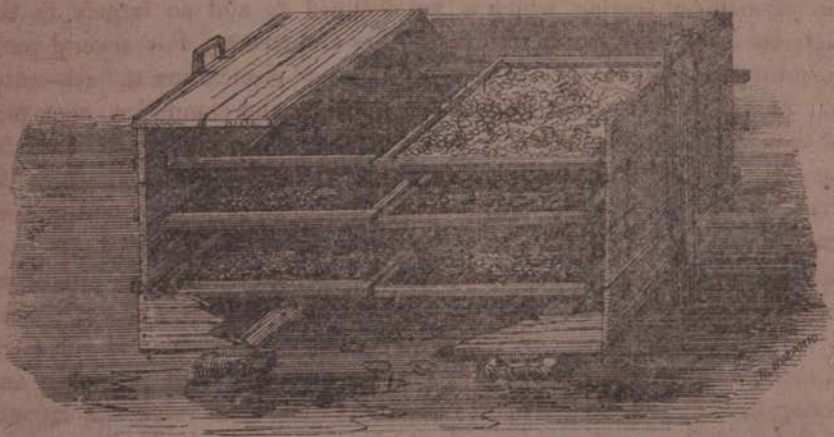


Fig. 9 *a*.



OYSTER CULTURE.

One of the old heathen poets celebrates the courage of the man who first ventured out to sea. The Scottish Solomon, King James, was wont to declare that he was a very valiant man who first ventured on the eating of oysters; and a modern poet thus expresses his admiration of the valorous exploit:—

> "That man had sure a palate cover'd o'er
> With brass or steel, that on the rocky shore
> First broke the oozy oyster's pearly coat,
> And risk'd the living morsel down his throat."

The world has altered much since those ancient epochs when within the area of the British seas there lived many species of elegantly formed and apparently well-fed oysters. The lover of these prized molluscs sighs to think that now he is limited to a single species, and that whereas there was a time, according to the geologists, when there were no men to eat oysters, the difficulty now is to get oysters enough to satisfy man's desire to eat them.

Though oysters be not the most important of British shell-fish—this rank being due to those employed for bait,—we give them the place of honour, because to them in particular has been applied with remarkable success that system of artificial rearing which is yet destined to add so largely to the productiveness of the ocean as well as of lakes and rivers. For several years the government of France limited the application of pisciculture to fresh-water fishes. M. Heurtier, director-general of agriculture and commerce, soon perceived that by this limitation the problem, how shall we best supply food for the people? was only partially solved. In a report to the Emperor he observes, "It is equally important to extend the application of this discovery to sea-fish. Now especially when our great lines of railway have to a certain extent destroyed distances, sea-fish will be readily sent to almost all towns, even the most distant; to only a few will they be carried in a preserved state. While endeavouring to multiply sea-fish, crustacea, and molluscs, it will then be equally useful to inquire into the best modes of preparing and preserving them." He then proposes that M. Coste shall visit the lagoons in the South of France, the waters of which, generally salt, but sometimes mixed with fresh water, will, he observes, "furnish the means of interesting fecundations and naturalisations, and, if the prognostications be verified, might be converted into valuable reservoirs of all kinds of fish." He also suggests that the distinguished naturalist shall visit the lagoons of the Adriatic, near the mouths of the Po, the Adige, and the Brenta, and, above all, Comacchio, where from time immemorial there has existed a singular community, whose doings in the capture and preservation of many kinds of valuable fish are of the greatest interest and importance.

Fortunately for science, as well as for the material interests not France of only, but of all other nations, the sagacious mind of the Emperor instantly appreciated the importance of the subject, and M. Coste was despatched on that exploratory voyage along the coast of France and Italy, the report of which is now before us, along with two other more recent reports to the Emperor. Science being the common heritage of nations, whence each nation may borrow those appliances and usages which suit it best, the publication of M. Coste's investigation is a boon to the world, and particularly important to a maritime people like us, whose colonies, moreover, comprise the most extensive fisheries in existence.

Accustomed to hear of the amazingly prolific powers of oysters; assured by competent observers that a single oyster produces at least one million two hundred thousand *ova*, and may thus give birth to the contents of twelve thousand barrels, our readers may fancy it very unnecessary to be apprehensive of a possible depopulation of oysterdom; and this all the more when it is believed that oysters are veritable hermaphrodites, and wont to begin propagating their species at the age of four months.* But it is to be borne in mind that the sea in many places would cease to be navigable if the prolific powers of the oyster were not restrained by various agencies divinely contrived for the very purpose of preserving in equipoisé the balance between them and other creatures, and inorganic matter. Pick up that oyster-shell riddled with holes. What has made it such a wreck that it looks like a bit of pearly lace-work? Seaworms, several kinds of which may be seen crawling on oysters brought to table, bored the unfortunate mollusc to death by their persevering assaults upon his shell. He resisted their attacks by depositions of pearly matter interposed between his naked body and their greedy mouths. But his pearls were thrown away on such assailants, who turned away to attack another unprotected spot, till his strength was wasted in the constant struggle. Then in the holes made by these worms (*Annelides* probably) a parasitic sponge established itself, eating further into his vitals, rotting the softer parts of the shell, and spreading through its whole substance, like the dry rot fungus through timber, until, under his accumulated misfortunes, the poor oyster perished; and as you walk on the beach, you see his shell gaping widely, and possibly suggesting a profitable *memento mori*, instead of a mere savoury reminiscence of oyster suppers.

The effects of the human appetite are by no means the most redoubtable of those agencies which prevent the seas being overstocked with oysters. So long ago as 1849 it was estimated that the capacious maw of omnivorous London received a hundred and thirty thousand bushels of oysters during the

* Johnston's "Introduction to Conchology."

season: during eight months 2,027,520 oysters are supposed to be dredged in the Frith of Forth; the average daily consumption in Edinburgh being 7,346.

But the millions of oysters which man eats are as nothing in comparison with the uncountable myriads which he reckiessly destroys, by fishing at improper seasons, by taking them before maturity, and by dragging his murderous dredge over the breeding beds; the last operation in its cruel folly rivalling that of the gardener who should hire all the harrows in the neighbourhood to go over and over the seed-bed surest to be damaged by such rude usage.

When we explain the mode in which the oyster produces its young, we add a still more powerful restraint upon its numbers becoming excessive. Oysters generally spawn from June to the end of September, but do not leave their *ova*, like many marine creatures. They incubate them in the folds of their coverlet (or mantle) and among the laminæ of the branchia (or lungs). There they remain surrounded by mucous matter necessary to their being developed, and within which they pass through the embryo state. The mass of *ova* in consistence and colour resembles thick cream, and breeding oysters are therefore termed *milky*. The pale tint which first characterises them changes gradually in the process of development to bright yellow, and then to a darker yellow, and ends in a greyish-brown, or a very marked greyish-violet. The whole mass, which meantime is losing its fluidity, probably by the absorption of the mucous matter enveloping the *ova*, is then like a piece of compact mud. This indicates the near termination of the development, and the expulsion of the embryos, and their independent existence; for by this time they can live well enough without the protection of the maternal organs. On leaving the mother they are furnished with a swimming apparatus (its singular nature has been discovered and described by M. le Docteur Davaine), enabling them to move to a distance in search of solid bodies to which they may attach themselves.

The oyster produces from one to two millions of young, so that the animated matter escaping from all the adults in a breeding bank is like a thick mist dispersing from the central spot from which it emanates, and so scattered by the waves that only an imperceptible portion remains near the parent stock. All the rest is dissipated; and if these myriads of wandering animalculæ, borne about by the waves, do not meet with solid bodies to which they may attach themselves, their destruction is certain; for those which do not become the prey of the lower creatures living on the *infusoriæ* fall at last into some place unsuitable to their ultimate development, and are frequently smothered in mud. So enormous, from these causes, is the destruction of young oysters, that M. Coste declares that even in a plentiful year we cannot hope that more than a dozen shall adhere to the shell of the mother.

Left to themselves, this destruction is inevitable, because, as already explained, it forms a portion of those complex agencies by means of which the existing arrangements of the ocean are preserved unchanged. But in a thousand instances man, for his own benefit, finds it necessary to interfere with the processes of nature, to modify the instincts of the lower creatures, and call them into operation under novel conditions demanded by his convenience or necessity. We are familiar with the modifications thus arising in many species of plants and animals. To us, ignorant of what in old time has been accomplished on the shores of Italy, it may seem overbold to hope that similar modifying processes may be applied to the fish swarming in "the great and wide sea." If they may not, *actum est*, it is all over with the oyster in many a once-populous bank. Nature effectually provides against its excessive multiplication; human ignorance, greed, and folly supply additional sources of growing diminution. The deplorable result is the falling away of a valuable maritime industry through the almost utter ruin of many of the most productive oyster banks. Bad as has been the deteriorating process in the British seas, it has been more fatally visible along the shores of France, where the oyster fishery had so decayed that its extinction, M. Coste declares, could be averted only by the prompt application of a remedy, suggested by what he had witnessed at Lake Fusaro.

This mud-bottomed, volcanic, black, salt lake (the veritable Acheron, in fact, of the old heathen mythology) has from the remotest times been the scene of a singular industry, which received a new impulse when Sergius Orata (whose guzzling Pliny asserts was equalled by his greed) set himself to the work of making oysters famous, and himself amazingly rich. The new industry which he developed is still pursued for miles round the locality selected for his operations. The whole vicinity is occupied by spaces, generally circular, covered with stones piled in imitation of rocks, and planted with oysters from Tarentum. Round these artificial mounds, generally of the diameter of from six to nine feet, stakes are fastened so near each other as to inclose the central space occupied by the oysters. These stakes are a little above the water, so that they can easily be pulled up when this is desirable. There are also other stakes arranged in long rows, and bound together by a cord, by which are suspended little twigs, destined to increase the number of movable pieces waiting the gathering season.

A glance at our Illustrations (Figs. 1 and 2) will enable our readers to understand these arrangements of ostreo-culture, as followed at Fusaro. These enclosures, stakes, and suspended twigs are intended to arrest the young oysters, by supplying them with points of attachment, just as bees, swarming from the hive, settle on neighbouring bushes. These oysterlings—though molluscs rank low in the scale of intelligence—have sense enough to appreciate the nursery thus provided for them. They instantly get attached to it—

(we are not describing their emotions, but simply narrating the fact that they *stick* to it), and, which is more important, they so thrive that in two or three years they become edible. The oyster of the British seas is reckoned fit for market when about four years old, we believe. The precocious edibility of those reared in Lake Fusaro is probably owing to its higher temperature. But this benefit, derivable from its being the crater of an extinct volcano, is accompanied by the risk of destruction to the oysters from occasional increase of sulphureous exhalations.

M. Coste actually witnessed stakes drawn up from the artificial banks, and covered with three distinct crops of oysters, which had been fixed about thirty months. The first of these was fit for the market, while the last, said to be thirty or forty days old, was about the size of a large lentil; "a growth," he observes, "sufficiently surprising if we remember that at the time of their expulsion they were only of the diameter of the fifth of a millimetre (0·03937 inch). When the fishing season has arrived, the stakes and branches are pulled up, and, one by one, relieved of all the oysters reckoned marketable, and then, after the fruit of these artificial grapes has been gathered, the apparatus is replaced till a new generation yields another crop. At other times the stakes are not pulled up, and the oysters are merely detached by means of a branched grapnel."

No wonder that the observing naturalist was struck with the ease with which this kind of industry could be transferred to the shores of France, and so modified and extended on natural beds in the ocean as to attain the proportions of an enterprise of general utility. The modifications which he suggested on the mode followed at Fusaro were these:—timber-work loaded with stones might be made of many pieces, covered with stakes firmly attached, and armed with iron-cramps, &c. Then, at the spawning season, this apparatus could be let down into the sea, either upon or round the oyster-beds; it might be left there till covered by the reproductive seed; and cables, indicated by a buoy, might permit it to be drawn up when it was judged convenient.

Very feasible-looking, no doubt! "But," cried the obstructives, fast-bound by routine, "will oysters stick to stakes and sham rocks in order that M. Coste's brilliant vaticinations to the Emperor may not be falsified." And while the more polite and prudent enemies of pisciculture shrugged their shoulders, the more out-spoken declared that *ostreo-culture à la Coste* was mere fanciful rashness ("*une chimérique témérité*"). Fortunately the Emperor's willingness to receive new ideas defeated the evil auguries of the ill-informed and the un-enterprising; and the resources of the naval administration were placed at the disposal of the sanguine but most sagacious and scientific experimentalist.

It is worth while to relate his ingenious method of re-stocking the exhausted oyster bank in the bay of St. Brieuc. The immersion of thirty millions of oysters on ten previously designated sites began in March and ended in April. To ensure their being regularly deposited at such distances as not to interfere with each other, a steamer towed a fleet of boats laden with oysters in baskets, which were emptied in the spaces marked by buoys. The gravid mothers found M. Coste's subaqueous arrangements ingeniously complete. Shells of oysters and other shell-fish had been collected from various quarters, and thrown down on the banks to be operated upon: on these the newly transported oysters speedily fastened. The excluded embryos were thus supplied with points of attachment; and, to prevent their being scattered, long lines of hurdles were ranged across the banks, and retained in their places, floating above the spawning oysters, by being suspended from ropes fastened to ballast-stones. Galvanised iron chains are now substituted for ropes, which rotted quickly. Hardly six months elapsed when the promises of science were astonishingly verified. Nothing but oysterlings everywhere! the breeding oysters, the shells on the banks, the very strand, were covered. "Never," exclaims M. Coste, "did Cancale and Granville, in their highest prosperity, exhibit such a spectacle of productiveness. Every part of the hurdles is loaded with clusters of oysters in such profusion as to resemble the trees in our orchards when, in spring, their branches are covered with a profusion of blossoms. They should be termed actual petrifactions. Seeing is necessary to believing such a wonder. I have sent to your Majesty one of these apparatus for collecting seed, in order that with your own eyes you may judge of the riches of these hurdles. The young oysters are already of the size of from two to three centimetres. These are fruits which only require eighteen months to ripen into an immense harvest. There are even twenty thousand in a single hurdle, which does not occupy more space in the water than is occupied by a stalk of corn in a field. Now, twenty thousand edible oysters are worth 400 francs; their current price, when bought on the spot, being twenty francs the thousand. The revenue from this species of industry will consequently be inexhaustible, for we can submerge as many seed-collecting apparatus as we please, and each adult forming part of the deposit produces at least two or three millions of embryos. The bay of St. Brieuc will thus become an actual granary of abundance, if, by the union of the banks already created, we convert the whole of it into a vast field of production."

This assuredly is an experiment suggestive of physiological problems of the highest importance, and furnishing most practical hints as to the improvement of oyster fishings. It proves by a brilliant result that the asserted powers of pisciculture are not follies, and justifies the belief that wherever the bottom is free from mud, and not already occupied by the mussel, with

which the oyster lives not in accord, industry, guided by science, can create, in the bosom of oceans fertilised by its care, harvests more abundant, and very much less expensive than are yielded by the land. The clamours of the ignorant, mistaking the noise of their own nonsense for the roaring of lions in the way, have been succeeded by the felicitations of learned colleagues congratulating the Professor of Comparative Embryogony (for such is M. Coste's position in the College of France) on the complete success of an experiment of great public utility.

Large quantities of oysters are sent from Scotland to fatten in bays near the mouths of the Thames and the Medway. Scotch oysters, like Scottish maidens, are, it seems, attracted to the metropolis for the perfection of their education. The pity is that, unlike young ladies, they do not return to gladden Scottish eyes by the display of their fully developed virtues. As advocates of home training we object to the "natives" of Scotland being domiciled in English "parcs" for the sole use and comfort of English palates. As the Scotch cannot hope to make acquaintance with them by their being sent back to them, why do they not rear them at home, according to the most approved methods;—to the mutual satisfaction of eaters and vendors, their improved qualities commending them to the tastes of the English, while filling the purses of the Scotch? Why should any branch of native industry be left undeveloped? When storms keep the fisherman unwillingly on land, and so long occasionally that he is equally ill off for something to do and something to eat, why not find a remedy for this misfortune in the semi-aquatic and very profitable employment of rearing oysters? As they thrive best in estuaries and bays, there is no lack of suitable localities. And if correct in the belief that the estuary of the Clyde is oysterless, or, at all events, but ill supplied with oysters, we commend to some energetic fishmonger the enterprise of supplying Glasgow with "the food that feeds, the living luxury," by imitating the processes by means of which their ancient productiveness has been more than restored to the exhausted oyster-banks along the coasts of France. Oyster culture has been taken up earnestly by the people of Guernsey, and several companies are already formed. And "The Fish and Oyster Breeding Company" at Southend are about to carry out their project on an extensive scale.

Possibly, from a gastronomical peculiarity, there may be some of our readers unable to appreciate the merits of an oyster, in the simplicity of bearded rawness, in artifically induced greenness, or in the savoury comeliness of a *paté*. Such readers may frown upon *ostreo-culture*, and be disposed to join in the fierce censure of an old author who maintains that "oysters are ungodly, uncharitable, and unprofitable meat—ungodly, because eaten without grace; uncharitable, because they have nothing but shells; and unprofitable, because they must swim in wine." But an oyster having two sides, like a disputed question, it is but fair to look at it as seen by other eyes. The

Roman epicures held oysters in high esteem, for sanitary reasons, thinks Dr. Baster. "Living oysters," he asserts, "are endowed with the proper medicinal virtues, they nourish wonderfully, and solicit rest, for he who sups on oysters sleeps placidly, and to the valetudinarian afflicted with a weak stomach, oppressed with phlegm, or bile, eight, ten, or twelve oysters in the morning, or before dinner, are more healing than any drug or mixture that apothecary can compound." In like manner speaks that Epicurean oracle, Dr. Kitchener, "oysters being of a mild balsamic and cooling nature, are peculiarly adapted as an article of food to those who are subjected to face-flushings, and other feverish symptoms, appearing in nervous and irritable, or consumptive constitutions." The number of the nervous, the irritable, and the consumptive having undergone no sensible diminution, so far as we are aware, the inference seems to be either that Doctors Baster and Kitchener are romancing, or that the public should eat more oysters. As the demand for them is already in advance of the supply, we are possibly doing a benefit to the public health when indicating reasons for the systematic application of pisciculture to the rearing of these esteemed molluscs. We do not anticipate that the people of this country will submit to the government taking the initiative in such an industrial enterprise as the regeneration of the British fisheries, after the fashion which prevails in France. But while relying on individual energy to render profitable the rich domain of the sea, we must restrain the reckless cupidity of the uneducated fisherman senselessly ruining the field of his industry. We must welcome the labours of the naturalist acquainted with the laws of generation peculiar to fishes, and able to turn them to account by the resources of an ingenuity like that of M. Coste. And as private individuals, or companies engaged in the fisheries, are little likely to employ the services of such a man, we have a right to demand that the government shall promote inquiry into the habits of fishes, and the best modes of supplying with a valuable species of food those vast sections of our people who are underfed, to their great misery and to the serious detriment of the State.

Very important questions of social economy are intimately connected with the amount of food easily accessible to the mass of the people. *Ostreoculture* is the application of science to a small department of that extensive investigation which seeks to determine how human beings shall, to the greatest possible extent, avail themselves of the exuberant bounties of the beneficent Creator who has given us all things richly to enjoy.

D. ESDAILE.

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REVENUE DEPARTMENT.

Bombay Castle, 25*th February* 1865.

RESOLUTION OF GOVERNMENT.

Dr. Birdwood's epitome may be published with the papers already ordered to be printed, and extracts from "Good Words," accompanied by drawings from the French work to illustrate and make clear the various plans for the culture of Oysters. It is only in respect of the Pearl Oyster that it seems desirable that Government should undertake any experiments. With the view of introducing this variety on the coasts of the Presidency, the Commissioner in Sind, and the Collectors of Ahmedabad, Surat, Tanna, Rutnagherry, and Canara, should be furnished with copies of these papers, and should be requested to select suitable localities for the formation of the Oyster Banks; and the Government of Ceylon and the Resident in the Persian Gulf should be applied to to procure supplies of Oysters for distribution to the Collectors by sinking faggots on the Pearl Banks to which the young Oysters would attach themselves, or by some of the other plans described in the treatises on the subject. The Oysters might then be forwarded in casks full of salt water, or by other suitable means.

2. In this way it is probable that a commencement in culture of the Pearl Oyster in this Presidency may be made, and that it might be gradually extended.

3. The faggots for the Oysters to attach themselves to should be sunk in about six fathoms water, with weights attached to them,

and drawn up at the proper season by means of the cable with which they would be attached to buoys to indicate their position. By this means the expense of large Diving Establishments would be obviated.

E. W. RAVENSCROFT,
Offg. Chief Secretary to Government.

To

The SECRETARY AGRI-HORTICULTURAL SOCIETY,
The COMMISSIONER in SIND,
The COLLECTOR of AHMEDABAD,
The COLLECTOR of SURAT,
The COLLECTOR of TANNA,
The COLLECTOR of RUTNAGHERRY,
The COLLECTOR of CANARA.