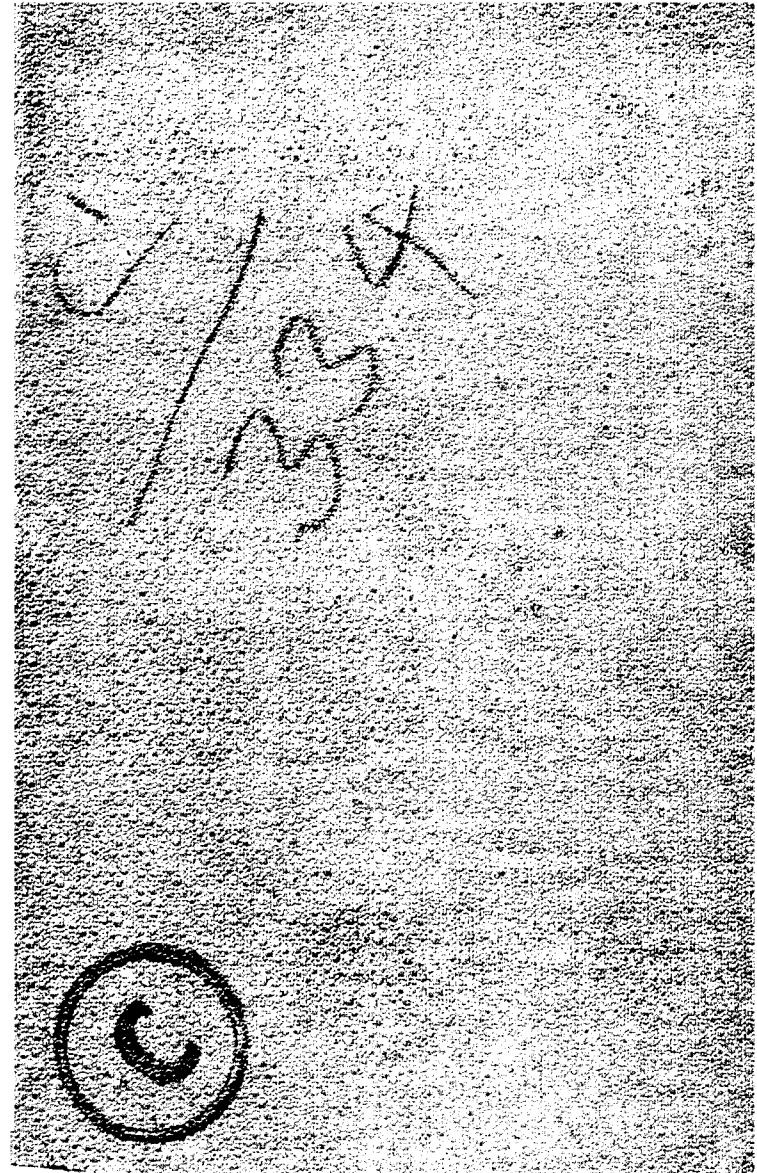




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DEPARTMENT OF FISHERIES, BENGAL, AND BIHAR & ORISSA.

BULLETIN No. 7.

**REPORT ON THE FRESH-WATER PEARL-MUSSEL FISHERIES
IN BENGAL AND BIHAR.**

With 5 Plates.

BY

T. SOUTHWELL, A.R.C.S., F.L.S., F.Z.S.,
Deputy Director of Fisheries, Bengal, and Bihar & Orissa.
Honorary Assistant, Indian Museum.

II.

NOTES ON

THE TERRAPIN AND MUD-TURTLE FISHERIES IN BENGAL.

BY

T. SOUTHWELL, A.R.C.S., F.L.S., F.Z.S.,
Deputy Director of Fisheries, Bengal, and Bihar & Orissa.
Honorary Assistant, Indian Museum,

and

BIPIN BIHARI DAS, M.A.,
Superintendent of Fisheries.



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I.—Introduction.

At the Agricultural Exhibitions which are held at various places in Bengal and Bihar and Orissa every year, we have repeatedly noticed samples of shirt and jacket-buttons, hair-ornaments, etc., amongst the exhibits. These articles are manufactured at certain places both in Bengal and Bihar. We intended long ago conducting an enquiry with reference to the value and extent of the local industry in pearl-buttons, with the object of effecting such improvements as appeared necessary and possible.

Owing to the outbreak of war, the imports of pearl-buttons and the like into this country, from Austria and Germany, ceased. In view of this circumstance it seemed to us that it might be possible to extend the local manufacture of these articles. We accordingly commenced the enquiry at once. The details set forth in this paper represent the results of our enquiry. The conclusion we have arrived at is that, unfortunately, at the present time, little or no expansion is possible. Moreover, it would appear that if the cultivation of certain species of pearl-mussels is not undertaken at an early date, the local button-making industries are likely to gradually disappear, owing to scarcity of shell.

Throughout Bengal, fresh-water mussels are everywhere fished principally on account of the pearls they occasionally contain. The collection and utilisation of the shells is of secondary importance. In the present paper we propose dealing exclusively with the manufacture of buttons and ornaments from the shell. It must not be assumed, however, that the importance of these molluscs as pearl-bearers has been overlooked.

In other parts of the world it has been found that pearls are formed round the dead remains of parasitic Trematode or Cestode larvæ.

Dr. H. Lyster Jameson has shewn that in the edible mussel (*Mytilus edulis*) pearls are formed round the larvæ of parasitic Trematoda. The life-history of the parasite however is a little uncertain. It seems probable that the younger stages occur in the cockle (*Cardium edule*) and that the adult form lives in the Scoter Duck. Jameson (9).*

* These numbers refer to the literature cited at the end of this paper.

jatra party went to perform at the palace of the Raja of Jaydebpur. When the Raja saw the buttons, he purchased them for Re. 1-4. Thus, by working in his leisure hours, and with raw materials which only cost 6 pies, he found he could earn Re. 1-4 in a short time. He then started work in earnest, and accordingly gave up his profession as a clown for which he only earned Rs. 10 per mensem. This happened 35 years ago. He was henceforth able to earn a good living by manufacturing buttons. At the height of the *swadeshi* movement, his income from the sale of buttons was very considerable. At that time he was working at Dacca, at which place other men, with more capital than he had, joined him and started a 'factory.' A large number of men from Barpara and other villages in the district of Dacca also came and worked in the factory, and thus learned the work. These workmen eventually spread all over Bengal, and, as all castes are allowed to engage in button-making, the practice soon became widespread. After the *swadeshi* movement had begun to decline, the price of the local buttons fell greatly, owing entirely to the poor quality which were manufactured locally."

It is clear, I think, that, although mussels have been fished in Bengal for a very long time on account of the pearls they occasionally contain, the utilisation of the shell for the manufacture of pearl-buttons is of quite recent origin. It is further clear that the local industry reached its zenith during the height of the *swadeshi* movement, and that since then, it has steadily but persistently declined.

The origin of the Tirhut Moon Button Factory at Mehshi, in the Champaran district of Bihar, is described by the Superintendent as follows:—

"It was in the year 1905, when on the *Dasahra* day we were going to bathe in the Gandak river which is a mile off from our factory, we found a few thick mother-of-pearls (shells?—T. S.) lying here and there. The brilliancy of these pearls (shells?—T. S.) naturally attracted our attention, and we took them home with a view to see if they could be cut and shaped into buttons which we know are made of the same material. As soon as we reached home, we broke them into pieces with a piece of stone, and, having rubbed them on a grinding stone, made them round, but finding the difficulty of boring them, the help of a blacksmith was at once sought and he instantly bored them. We prepared some 64 buttons that morning and utilised them in our clothes, though they were in an unfinished condition. We sent a few of them to Babu Mati Lal Ghosh, the present Editor of the *Amrita Bazar Patrika*, and he wrote to say that as the buttons were not finished, they could not have marketable value. Since then we tried much to procure machinery for manufacturing buttons from India, America, and England, but we could find no trace of them. We wrote to Mr. Ambika Charan, B.A., M.E., now a Mining Engineer, who was then a student in Japan, to see if machinery for manufacturing buttons could be had there. Be it said to his credit that without having any acquaintance with

us, he left Kyoto for Osaka and there, after inspecting some factories, he sent to us an estimate of the price, and called upon us to remit the amount, amounting to Rs. 200. The money was instantly remitted and in the year 1907 the machinery landed in Calcutta; but the bill of lading was lost in transit. It was not until a month later we heard from Mr. Ambika Charan that the machinery had been already sent. We were in a fix what to do. We wrote to Bombay, Madras, Calcutta and several other places, but we could find no trace until Messrs. Andrew Yule & Co., of Calcutta, wrote to us that a consignment of machinery was lying in the Custom's House for the last several months without any claimant. We wrote again, and upon being convinced, we had to pay demurrage of about Rs. 20 and the machinery was first brought to Muzaffarpur. Although we were very glad to receive the machinery, our trouble became greater, when we found that the machinery could not work as there was nobody who could set it right. It was for months together that several artisans were called in, but none could work it. We were searching for an expert, and fortunately one Mr. Sen, of Dacca, who had returned from Japan as a button expert, was called in at a very heavy cost, and he set the machines and we learnt all the art of manufacturing buttons from him. He remained for about a week. Since then we have been managing the factory. Even after this, there was difficulty of turning out more finished goods, and we had to take the help of other Japanese experts at heavy cost to polish the buttons.

"The factory was started with a small capital of Rs. 1,000 only, which was gradually raised to Rs. 3,000 with the increase of work. This amount was subscribed by friends only, and was not supported by capitalists as it was only an experimental one. The factory has been actually working since July 1908 and nothing has yet been paid to its shareholders as dividend, the capital being very small and what little profit accrues is spent in the improvement of the factory. There was want of raw materials, but this want has been now removed, there being plenty of these in our rivers in the districts of Darbhanga, Champaran, and Muzaffarpur. What we want is funds and the co-operation of rich men and to make it a registered company.

The rules have been framed for its registration and were given to Rai Parmeshwar Narayan Mahtha Bahadur, who took a very lively interest in its welfare. But to our great sorrow, he is no more, and Babu Vishwanath Prasad Mahtha, who also took a keen interest, has also left the world for good. These two pioneers, who helped a good deal, and had agreed to work as Directors of the company, are no more, and their places have not been taken up by anybody in this concern. We are now on the look-out, but have not been able to find a suitable man who can take interest in such commercial enterprise.

"We have worked from sea-shells, the profit is great indeed, but our present means do not allow us to work with them, as it wants a heavy outlay.

"As regards our finish, we are glad to report that we have been specially mentioned by the Allahabad Exhibition and have got a

jatra party went to perform at the palace of the Raja of Jaydebpur. When the Raja saw the buttons, he purchased them for Re. 1-4. Thus, by working in his leisure hours, and with raw materials which only cost 6 pies, he found he could earn Re. 1-4 in a short time. He then started work in earnest, and accordingly gave up his profession as a clown for which he only earned Rs. 10 per mensem. This happened 35 years ago. He was henceforth able to earn a good living by manufacturing buttons. At the height of the *swadeshi* movement, his income from the sale of buttons was very considerable. At that time he was working at Dacca, at which place other men, with more capital than he had, joined him and started a 'factory.' A large number of men from Barpara and other villages in the district of Dacca also came and worked in the factory, and thus learned the work. These workmen eventually spread all over Bengal, and, as all castes are allowed to engage in button-making, the practice soon became widespread. After the *swadeshi* movement had begun to decline, the price of the local buttons fell greatly, owing entirely to the poor quality which were manufactured locally."

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An account of the life-history of the pearl-inducing worm in the Ceylon pearl-oyster is given by Southwell in the following papers :—

Ceylon Marine Biological Reports, Part IV, 1910; Part V, 1911; Part VI, 1912, Colombo.

Spolia Zeylanica, Vol. VII, Part XXVII, May 1911, Colombo.

Parasitology, Vol. V, No. 1, 1912, Cambridge.

Journal of Economic Biology, Vol. VIII, Part I, 1913.

The life-history of the pearl-inducing parasite is always complicated and difficult to follow. Even where known, it has not been found possible up to the present to utilise the information for the purpose of directly increasing the pearl-yield. We have no information as to whether the Bengal mussels are prolific pearl-bearers or not; must probably they are not. Moreover, the pearl-inducing parasite in the Bengal mussel has never yet been sought for. It is, therefore, unlikely that any improvement in the pearl-yield will be possible until we have studied, in great detail, the habits of the mussel, and ascertained the factors which favour pearl-production. These observations are bound to occupy long periods of time, and hence no immediate improvements are to be expected.

In America, numerous species of fresh-water mussels are fished for the purpose of button-making, and the value of the fisheries is further enhanced on account of the pearls which are occasionally found.

Dr. Coker, (1) writing on "the protection of fresh-water mussels," states as follows :—

"The history of the fresh-water mussel industry gives illustration of the promptness with which an American industry may be developed once the pathway is found. Undertaken in a small way scarcely more than a score of years ago, the manufacture of pearl-buttons began almost immediately to assume the proportions of an important national industry. As early as 1898, when the enterprise was six years old, there were about 50 factories in more than a dozen towns along the Mississippi. With improved machinery and methods, further expansion occurred, until within a few years, the output approximated 30 million gross of buttons, with a value of many millions of dollars. The growth of the industry has continued in the present time, but exact figures will not be available until the Bureau has completed a statistical survey now in progress.

Coincident with the rise of the manufacturing industry, there developed an important and widespread fishery, directly employing thousands of persons and indirectly affecting persons and communities of varied occupation. Commencing on the Mississippi river, the fishery gradually spread from stream to stream, passing from depleted territory to new and rich fields, until it embraced practically the entire Mississippi Basin and a portion of the Great Lakes drainage, from Minnesota to Louisiana, north and south, and from Ohio, West Virginia, and Tennessee on the east to Arkansas, Kansas, and South Dakota on the west."

In certain of the Scottish rivers, fresh-water mussels are also fished for pearls. As far as I have been able to ascertain, the shells are not utilised.

In passing, it is interesting to note that Bengal used to be a great centre for the manufacture of ornaments from the chank-shell. Even now, ornaments such as rings, bangles, etc., are manufactured at Dacca, Calcutta, Pabna, Dinajpur, Haragash, Nadia, and Chittagong, in considerable quantities, but during the last century the industry has deteriorated considerably. The shells are obtained from Southern India. An account of the present-day industry at the above centres is given by James Hornell in the Memoirs of the Asiatic Society of Bengal, Vol. III, No. 7, Calcutta, 1913.

II.—History of button-making in Bengal and Bihar.

During our visit to Bajrajogini (or Badarjogini) in the district of Dacca, we met a certain Babu Shyama Charan who, according to his own statement, and the statement of all the villagers for miles around, was the first man in Bengal to make buttons from the shells of mussels. We have been unable to corroborate his story, a summary of which we give below :—

"He started life as a professional clown in a *jatra* party. On one occasion the party performed at Comilla. Here he found some very fine large shells. He purchased a number for 6 pies ($\frac{1}{2}$ d.). He knew that shirt-buttons were manufactured elsewhere from shells, and he thought that the shells he obtained at Comilla could be used for the same purpose. Having no other instrument, he used an ordinary *dao* to cut the shells into small—roughly circular—pieces. The irregular edges were ground off with a muller (stone roller). An ordinary nickel or copper coin was employed for marking out circular pieces of the shell. The holes were made by means of a needle made fast into a wooden handle. The shells, being clean and almost white in colour, required no polishing. He kept the buttons he had made and prepared more from time to time. One day the

silver medal there, and several other Exhibitions have also given us various prizes and medals.

"His Highness the Maharaja of Darbhanga has also been pleased to appoint us as the button suppliers to His Highness and takes an interest in our work, but it is difficult for the proprietors to approach him and report all the conditions of their factory and request him for any substantial help or advice.

"The proprietors therefore request that the public men in Bihar should come forward and help the industry, which is yet in its infancy, both by forming a registered company and conducting its business on a grand scale.

"The proprietors have not yet been able to send a man of theirs to Japan for want of funds or to employ a whole-time expert for the efficient working of the factory.

"Until all these improvements are made, the proprietors have undertaken to work the factory on a small scale, and they eagerly wait for the help of our countrymen who have got the welfare of the industry of their country at heart, which is the only means of salvation.

"(Sd.) GANESH LALL,

"Superintendent, Tirhut Button Factory."

"The 5th January 1912.

Since the above was written the capital has been increased to Rs. 8,000. There are ten Indian shareholders. Up to the present no dividends have been paid as all the profits made have been spent on improving the factory.

III.—Species of shells used.

The shells principally used in the manufacture of buttons and ornaments in Bengal and Bihar belong to two genera, viz., *Parreysia* and *Lamellidens* (family *Unionidæ*). Representatives of the genus *Unio* do not occur in India. The various species of the genus *Lamellidens* have shells which are usually not very massive (Plate I, Figs. 1 and 2). Members of the genus *Parreysia*, Conrad, 1853, have shells more rounded in appearance and more massive than is the case in the genus *Lamellidens* (Plate I, Figs. 3 and 4).

The following are the species most commonly used for button-making :—

Parreysia corrugata (Muller).

Parreysia favidens (Benson).

Parreysia daccensis Preston.

Lamellidens marginalis (Lamarck).

Lamellidens marginalis var. *corrianus* Lea

Lamellidens narainporensis Preston.

There are a large number of varieties both of *P. corrugata* and *L. marginalis* in Bengal, and, in all probability many of these varieties are also used. Up to the present, however, we have been unable to prepare a full and specific list.

IV.—Methods of fishing.

(a) In shallow water the fishermen merely stand in the water and, submerging their heads, pick up the shells.

(b) In deeper water, boats are used. The area to be fished is marked by a long smooth upright bamboo which is firmly fixed into the button mud. The fisherman provides himself with a purse-like bag, made of jute or hemp, measuring about 1 foot square. Some of the bags used have round mouths. This is tied round his waist in such a manner that, on pulling one of the ropes, the bag drops off. Before entering the water, the diver anoints his body with mustard oil. In descending, he slides down the bamboo until he reaches the bottom. The shells are picked up whilst the body of the fisherman is in a horizontal position, with one foot lightly holding the base of the bamboo. The shells are placed inside the bag and the fisherman scrambles up the bamboo to the surface. If the diver loses his foothold on the bamboo, he is unable to ascend with his load of shells. Hence, under these conditions, in order to rise, he is obliged to slip the knot holding the bag of mussels round his waist.

This method of diving is very primitive and compares unfavourably with the method practised by the South Indian Tamils and the Arabs.

V.—Situation of the principal fisheries.

Mussels are found all over Bengal. In Eastern Bengal, the principal fisheries are situated in the small rivers, the *beels*, and the canals, throughout the districts of Tippera, Mymensingh, and Dacca. This, however, is not because mussels are necessarily more abundant in these districts than elsewhere, but because these fisheries are not very distant from the central pearl and shell-market at Damera (Dacca district), and the button-making villages in the vicinity. Mussels fished in the rivers, canals, and *beels* in the Sylhet district are also brought to the Dacca markets.

The people who actually fish mussels in Eastern Bengal, and whose forefathers were similarly engaged in years gone by, are a certain class of wandering Muhammadans who appear to have no home except on their boats. When not engaged fishing for mussels, *i.e.*, from June to January, they one and all deal in articles of stationery. During our visit to Damera in November 1914, we found 200 boats of these fishermen, with their wives and families. They had come to Damera in order to effect certain repairs to their boats. The mussels are fished principally for the sake of the pearls they occasionally contain. In days gone by, the shells were sold to lime manufacturers at 4 maunds per rupee, but since the introduction of button-making, the price of shell has risen to about Rs. 3 per maund. The mussels are opened directly they are landed on deck. The flesh is not eaten. Irregularly shaped pearls are sold at from Rs. 2 to Rs. 20 per tola, depending on their size and quality, but round pearls are sold singly and are occasionally found to be worth over Rs. 100 each. The value of the pearls sold at Damera (and Charchanpura) per annum is about Rs. 30,000. During our visit, we saw pearls 1.5 mm. in diameter, of a chestnut colour, selling for Rs. 5 each.

Fifteen years ago a European gentleman named Mr. Fullman started a pearl business at Damera. He employed 10 men and he also had a boat. After one year, the business had to be discontinued owing to his being unable to obtain a sufficient number of good pearls.

In West Bengal the principal fishery is in the Bhandar-dah *beel* in the district of Murshidabad. Here, the fishermen belong to the Bagdi caste and they fish from *Chaitra* to *Ashar*, *i.e.*, from March to June. There are about 15 families engaged. During the rest of the year they make nets and engage in agriculture. They stated that three kinds of mussels are usually available in the *beel*. The small pearls obtained are called *jhuri* (literally dust), and are sold at Rs. 12 per tola. During last season, only Rs. 150 worth of *jhuri* was said to have been obtained. No big pearls were found. As pearl-fishing did not pay them, they were compelled last year to raise the price of the shells from 8 maunds per rupee to 5 maunds per rupee. The owner of the *beel* stated to us that, about 15 to 20 years ago, it was not unusual to fish 50,000 maunds of shell during one season. At that time the fishery afforded employment to large numbers of fishermen from villages 30 and 40 miles

distant. These fishermen used to give their shells to the owner of the *beel* in payment for permission to fish. The local Bagdis, however, were compelled to sell their shell to the owner of the *beel* at 8 maunds per rupee, as compensation for the privilege of fishing. The zamindar either converted the shells into lime, or sold them to lime-merchants at the rate of 2 maunds per rupee.

In Bihar, there is a large button-factory at Mehshi in the Champaran district. In this factory special modern machinery is employed. The output of buttons averages about 60,000 per month. All the shell is obtained from the rivers Gandak, Burh Gandak, and Bagmati which flow through the district and also through the adjoining districts of Darbhanga and Muzaffarpur. The catches of mussels made all along the course of these three rivers are brought, or sent, to the Tirhut factory.

VI.—Description of the village industries and of the Tirhut factory.

(a) The principal manufacturing villages in Eastern Bengal are situated in the Dacca district, about 15 miles from Narayanganj. All the villages are within a short distance of each other. The following is a list of the places where button-making is carried on, and of the number of people engaged at each place :—

			Families.
1.	Nangalbandh	...	10
2.	Barapara	...	15
3.	Kaivtala	...	12
4.	Lalati	...	12
5.	Mallickpara	...	15
6.	Kamargao	...	4
7.	Jidhara	...	20
8.	Kulcharittra	...	2
9.	Tajpur	...	8
10.	Jaharpur	...	10
11.	Rainadi Kalagachia.	...	15
12.	Madhavpasha	...	12
13.	Pañabo	...	10
14.	Phunkul	...	3
15.	Paglamathal	...	7
16.	Hatabo	...	3
17.	Murapara	...	3
Total			161

In each family there are from three to five men, and the same number (or more) of women. Thus there are about 1,500 persons (men and women) employed in the manufacture of buttons. Besides the above, there are large numbers of amateurs who only manufacture buttons in their hours of leisure. It is to be noted that in the above villages, only buttons (of various kinds) are manufactured. The work is done in the home. The shells are either bought direct from the fishermen, or from merchants in Damera (Dacca district). The principal market for shells and pearls is at the latter place, whilst the market for manufactured buttons is at Nangalbandh.

The only instruments in use amongst the workmen are the following:—

- (1) A pair of cutting pliers.
- (2) An ordinary file.
- (3) A small grindstone in a wooden trough, mounted so as to be rotated by a handle (Plate V, Fig. 30).
- (4) A wooden box, about 14 inches high, which serves as a low table for the operator, who works sitting on the ground. This is covered with a piece of gunny sacking, which serves to secure the buttons during the grinding and other processes (Plate V, Fig. 31).
- (5) A hand drill with a punching face as shewn in Plate V, Fig. 31.
- (6) A small hand drill for making the holes.

In preparing the buttons, the operator first cuts small pieces from the shells similar to those shewn in Plate I, Fig. 5. These are next placed on the piece of the gunny cloth which is spread over the wooden box, and which serves as a low table (Plate V, Fig. 31). By drilling, the pieces of shell are marked as shewn in Plate I, Fig. 6. Next, the edges are trimmed by means of the grindstone; the button is held with one hand and the stone is rotated with the other. In some places, the workmen use a file to trim the edges.

After this operation, the button has the appearance shewn in Plate II, Figs. 8 and 9. Many of the makers sell their buttons in this condition. Usually, however, the buttons are finished before being placed on the market.

The method of cleaning and polishing the buttons, practised by the villagers, is as follows:—

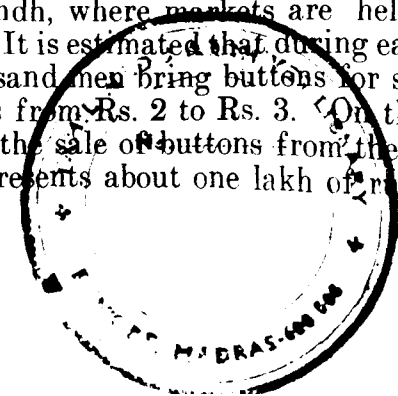
About 400 gross of buttons are placed in an earthenware or metal receptacle, and are covered with kerosene oil. The mouth of the receptacle is closed and the oil is boiled. The buttons are allowed to stay in the hot or boiling oil for about 20 minutes. By means of a wooden spoon, samples are removed and examined from time to time. Unpolished buttons frequently have a reddish hue, and the hot oil is said to remove this. During this process of cleaning, accidents are common.

The buttons are next rinsed in water a few times, after which they are rapidly washed—about 15 gross at a time—in a boiling dilute solution of nitric acid. They are then spread out on a mat, covered by a thin cloth in order to exclude dust, and dried in the sun. When dry, they are mounted on cardboard in the usual way, and are then ready for the market.

The work of button-making is largely done by women and the following table shews the payments they receive for their labour:—

	A. P.
(a) Drilling holes with a small hand drill	0 6 for every 2 gross.
(b) Sewing the buttons on cardboard	0 3 „
(c) Cleaning the buttons with kerosene and nitric acid ...	0 3 „
(d) Cutting the cardboard to size (including the cost of cardboard and the metal leaf) ...	0 3 „
(e) Finishing and brushing ...	0 3 „
Total	1 6

It will be seen from the above that the men merely cut out suitable pieces from the shell, and that the rest of the work is done by women. All the button-makers in the manufacturing villages previously mentioned, bring their products to Nangalbandh, where markets are held every Monday and Friday. It is estimated that during each week not less than one thousand men bring buttons for sale, and that each man realises from Rs. 2 to Rs. 3. On this basis it would appear that the sale of buttons from the villages before mentioned, represents about one lakh of rupees per annum.



Dacca town and suburbs.—In addition to buttons, various kinds of ornaments, such as ear-rings, hair-ornaments, nose-pendants, and watch-chains, are manufactured from shells at Suttrapur, Kalutolah, and Bajrajogini in the suburbs of Dacca town. Buttons (only) are also made at Mandail on the other side of the river Buriganga. As a rule, all the local products are bought by a local agent. During the height of the *swadeshi* movement, this merchant sold buttons and studs to the value of Rs. 1,000 per month. At that time steps were taken to import machinery in order to improve the local method of manufacture, but a rapid decline of the movement precluded this possibility. At present, the agent in question sells, on an average, about Rs. 400 worth of studs and buttons per mensem.

The native ornaments, such as ear-rings, hair-ornaments, nose-pendants, and watch-chains, are not made on an extensive scale. They can be had in small quantities from shops in Dacca, but, if large quantities are required, they have to be ordered either from the makers, or from the agent.

The instruments used for the manufacture of buttons are also used in making the various ornaments detailed above, the only additions being a special drill and a fine file.

Berhampur Court.—The industry here is a small one, as the mussel-fisheries have apparently become almost exhausted. Only about 15 families fish during the season. A workman from Dacca purchases the shells and manufactures buttons in Berhampur, by the same methods practised in Eastern Bengal. All these buttons appear to be sold locally.

Tirhut.—As we have already seen, there is a modern button-factory at Tirhut. The shells obtained from local rivers are bought from fishermen at about $1\frac{1}{2}$ maunds per rupee. About 40 men are employed in the factory. Of these, 25 have been specially trained and are permanently retained. They receive a salary of from Rs. 10 to Rs. 12 per mensem. The remaining 15 are engaged collecting shell, preparing copper attachments for links and buttons, repairing machinery, and fixing the studs and buttons to cardboard, ready for the market. Occasionally the factory is obliged to close on account of the scarcity of shells. As noted previously, about 60,000 buttons are prepared per month, but during the current year an endeavour is being made to produce 3,500 buttons daily. Experiments are also being made by them to obtain shell from Bombay. The cost, however, considerably increases the price of the finished

articles. As an experiment, buttons are also being made from the carapace of mud-turtles.

The buttons are first blocked out from the shell by means of a punching machine, of which the factory possesses 5, only 2 or 3 of which, however, are at work.

The edges and surfaces are then smoothed and polished by means of a file. The buttons are then taken to the designing machine; the factory has 22 such machines, but at present only 15 can be utilised. The holes are then bored by a machine, of which there are 4, only 2 of which are in use. Finally the buttons are polished by a secret process.

The shells obtained locally are so thin that massive buttons cannot be made from them. Many of the machines are lying idle. These facts suggest that there is room for improvement in the local supply of shells, and also that, if thicker shells in quantity were available at a cheap rate, a considerable extension of the industry would be possible. The buttons manufactured from the carapace of turtles and tortoises (*Trionycidae* and *Testudinidae*, see the other paper in this Bulletin) appear to be quite suitable for general purposes.*

VII.—Markets and prices.

Excepting what are required locally, all the buttons made in the Dacca district are sent to the Calcutta market. The various Indian ornaments, made from shell, are, for the most part, available only in Dacca town.

The buttons made by the Tirhut button-factory are disposed of principally in the Punjab, the United Provinces, as well as locally.

We append herewith a table shewing (1) the comparative prices, wholesale and retail, of buttons made in Bengal, England, Austria and Japan, (2) a general statement regarding the prices of various native ornaments, and (3) a price list of buttons from the Tirhut factory.

* In addition to the preceding, there is a small button factory at 254, Upper Chitpur Road, Calcutta.

I.—Statement of comparative prices, wholesale and retail, of buttons made in Bengal, England, Austria and Japan.

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DESCRIPTION OF ARTICLES.	MAKERS' PRICE.		CALCUTTA MARKET PRICE.		Dacca MARKET PRICE.	
	Wholesale.	Retail.	Wholesale.	Retail.	Wholesale.	Retail.
BENGAL MAKE. Small shirt buttons with four holes as in Plate II, Figs. 9 and 11.	Rs. 4-8-0 per 12 gross or Rs. 0-4-0 a gross.	Rs. 0-1-0 to Rs. 0-12-0 a gross.	Rs. 8-0-0 to Rs. 10-0-0 per 12 gross or Rs. 0-10-8 to Rs. 0-12-4 a gross.	Rs. 0-12-0 to Rs. 1-3-0 a gross.	Rs. 9-0-0 to Rs. 12-0-0 per 12 gross or Rs. 0-12-0 to Rs. 1-0-0 a gross.	Rs. 0-12-0 to Rs. 1-0-0 a gross.
AUSTRIAN MAKE. Small shirt buttons of approximately the same quality as above.	Not available.		Rs. 11-8-0 per 12 gross or Rs. 0-18-4 a gross.	Rs. 1-0-0 a gross ...	Rs. 14-0-0 per 12 gross or Rs. 1-2-9 a gross.	Rs. 1-4-0 a gross.
JAPANESE MAKE. Small shirt buttons of the same quality as above.	Not available.		Rs. 11-8-0 per 12 gross or Rs. 0-18-4 a gross.	Rs. 1-0-0 a gross	Not available in large quantity.	Rs. 1-4-0 a gross.
ENGLISH MAKE. Small shirt buttons of nearly the same quality as above.	Not available.		Rs. 3-0-0 a gross ...	Rs. 3-0-0 a gross ...	Not available.	
BENGAL MAKE. Shirt buttons, larger size than above, as shown in Plate II, Figs. 16 and 19.	Rs. 1-0-0 to Rs. 1-4-0 a gross.		Rs. 1-4-0 a gross ...	Rs. 1-8-0 a gross ...	Rs. 1-4-0 a gross ...	Rs. 2-0-0 a gross.
JAPANESE MAKE. Large shirt buttons of approximately the same quality as above.	Not available.		Rs. 2-4-0 a gross ...	Rs. 3-0-0 a gross ...	Not available.	
ENGLISH MAKE. Large shirt buttons of approximately the same quality as above.	Not available.		Rs. 3-4-0 a gross ...	Rs. 4-4-0 a gross ...	Not available.	

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BENGAL MAKE. Jacket buttons as in Plate II, Fig. 18 ...	Rs. 2-1-4 a gross ...	Rs. 3-0-0 a gross ...	Rs. 2-8-0 a gross ...	Rs. 3-12-0 a gross	Rs. 2-10-8 a gross	Rs. 4-0-0 a gross.
AUSTRIAN MAKE. Jacket buttons of approximately the same quality as above.	Not available.		Rs. 3-0-0 a gross ...	Rs. 4-0-0 a gross ...	Not available.	
JAPANESE MAKE. Jacket buttons of approximately the same quality as above.	Not available.		Rs. 10-4-0 a gross	Rs. 18-0-0 a gross	Not available.	
ENGLISH MAKE. Jacket buttons smaller in size than the above ...	Not available.		Rs. 12-0-0 a gross	Rs. 18-0-0 a gross	Not available.	
BENGAL MAKE. Jacket buttons as in Plate II, Figs. 17 and 19 (with rings).	Rs. 2-2-0 a gross ...	Rs. 3-0-0 a gross ...	Rs. 2-8-0 a gross ...	Rs. 3-12-0 a gross	Rs. 2-12-0 a gross	Rs. 4-0-0 a gross.
AUSTRIAN MAKE. Jacket buttons of approximately the same quality as above.	Not available.		Rs. 3-0-0 a gross ...	Rs. 4-0-0 a gross ...	Not known.	
JAPANESE MAKE. Jacket buttons of approximately the same quality as above.	Not available.		Rs. 10-8-0 a gross	Rs. 18-0-0 a gross	Not known.	
ENGLISH MAKE. Jacket buttons of approximately the same quality as above.	Not available.		Rs. 15-0-0 a gross	Rs. 20-0-0 a gross	Not known.	

N.B.—The above prices are those in Radhabazar, Sir Stuart Hogg Market, and in certain European shops in Calcutta. No English-made buttons are available in ordinary shops. The Austrian buttons are also not obtainable in large quantities, but the Japanese buttons are plentiful in the markets.

II.—Prices of various native ornaments.

[The following articles are only available in the Dacca and Narayanganj markets.]

DESCRIPTION OF ARTICLES.	MAKERS' PRICE.		CALCUTTA MARKET PRICE.		DACC A MARKET PRICE.	
	Wholesale.	Retail.	Wholesale.	Retail.	Wholesale.	Retail.
BEN AL MAKE.						
Sacred links and studs, Plate II, Figs. 21, 22 and 23	Rs. 11 to Rs. 15 a gross according to quality.	Rs. 15 to Rs. 20 a gross according to quality.	Rs. 21 to Rs. 25 a gross.	Rs. 25 to Rs. 30 a gross.	Rs. 12 to Rs. 15 a gross.	Rs. 15 to Rs. 20 a gross.
Fairings, Plate IV, Figs. 26 and 27	Rs. 13-5 a gross ...	Rs. 15 a gross ...	Not available.	Not available.	Rs. 15 a gross ...	Rs. 20 a gross.
Ornamented half-plins, Plate III, Fig. 24	Rs. 7-5 a gross ...	Rs. 10 a gross ...	Not available.	Not available.	Rs. 120 a gross ...	Rs. 144 a gross.
Ornamented half-plins, as shown in Plate III, Fig. 25	Rs. 4-5 a gross ...	Rs. 6 a gross ...	Not available.	Not available.	Rs. 84 a gross ...	Rs. 108 a gross.
Watch-chain, Plate IV, Fig. 29	Rs. 14-5 a gross ...	Rs. 16 a gross ...	Not available.	Not available.	Rs. 195 a gross ...	Rs. 216 a gross.

III.—Prices of buttons, etc., from the Tirhut Factory.

	Rs. A.	Rs. A.
(1) Local shell production—		
Largest shirt buttons	1 8 a gross.	4 8 a gross.
Smallest ditto	0 12 "	4 0 "
Off links	0 2 per pair.	6 0 "
Studs	0 3 per dozen.	2 4 "
		1 8 "
(2) Buttons made to order from shells obtained from Bombay—		
Jacket buttons, largest size, with thread holes		4 8 a gross.
Next smaller size, with rings		4 0 "
Ditto, largest		2 4 "
Ditto, smallest		1 8 "

NOTE.—These are available at all times.

VIII.—Exports and imports of shell and pearl-buttons between India, and Germany and Austria-Hungary.

As pearl-buttons are shewn undistinguished under "Haberdashery and Millinery," it is not possible to obtain accurate statistics relating to their imports into India. The following is a statement of the quantity and value of all sorts of buttons imported to Bombay from Germany and Austria-Hungary during the year 1913-14 :—

	Quantity.	Value.
	Lbs.	Rs.
From Germany ...	56,346	87,667
From Austro-Hungary ...	202,311	3,18,547

The following details relate to the export of shells (undetermined) for the years shown :—

	1913-14.		1914-15.	
	Quantity.	Value.	Quantity.	Value.
	Cwt.	Rs.	Cwt.	Rs.
From Calcutta—				
To United Kingdom ...	242	1,815	...	...
To Straits Settlements ...	...	28	1	56

	1914-15.	
	Quantity.	Value.
		Rs.
From Bombay—		
To foreign countries ...	?	58,026

IX.—Prospects of the industry.

During our enquiries we were informed at nearly every place we visited, that both pearls and shells are becoming scarce. The deterioration of the fisheries is said to have commenced about 25 years ago. Up to the present, we have made no investigations into the mussel-fisheries beyond what is outlined in the present paper, and hence we are not in a position to define the factors which singly or collectively have re-acted so adversely on the fisheries. There can be no doubt, we think, that a contributory cause has been the extensive and excessive fishing which took place during the *swadeshi* movement. We are further of opinion that the various irrigation schemes and the extensive reclamations of water areas which have been, and are being, made have also been detrimental. Further, as the life of a mussel is intimately

connected with that of certain fish, there is reason to believe that the impoverished fisheries have re-acted directly on the supply of mussels.

The improvements desirable fall under three headings:—

- (1) Increasing the pearl-yield.
- (2) Increasing the number of shells available.
- (3) Improving the local methods of manufacture.

At the present time several species of mussels are fished. It may be found that certain species produce more, and better, pearls than others. This point has yet to be determined. We know that the shells of some species are superior to others for the purpose of making buttons and ornaments. Before any progress can be made it will be necessary to ascertain what are the habits of the various species of mussels fished. We require to know what the conditions are under which they thrive, what they feed on, and their rate of growth; what enemies they have, what protective measures are required, what the parasite is round which pearls are formed, and the life-history of the parasite. We further require to know how often the mussels breed, where and when they breed; and lastly, it is essential that the life-history of the mussel larvæ should be known in great detail. These are all enquiries which have yet to be commenced.

The various species of fresh-water mussels in Bengal are included in the family *Unionidæ*, all the members of which carry their young in their gills during a part of the embryonic development. The female mussels lay eggs which pass into the superbranchial chambers and are there fertilised by the milt from the male which is washed in by currents. In many instances the eggs are glutinous. The superbranchial chamber referred to, acts as a marsupium and various modifications take place in the different genera of *Unionidæ*. In some cases, the outer gill of the parent mussel is utilised for storing the larvæ which are known as Glochidia. In other cases the larvæ only occur in portions of the outer gill, whilst in still other cases all the four gills are utilised as brood chambers. In some genera, the Glochidia or larvæ are discharged into the water immediately they are developed, whilst in other genera they remain in the marsupium for months.

Two types of Glochidia are known amongst the *Unionidæ*. One kind possesses stout hooks on the ventral margin of the valves, and the other is entirely devoid of hooks.

The Glochidia, when liberated from the marsupium of the mussel, attach themselves to certain fishes. If the Glochidium is of the hooked type, it attaches to the outside of the fish and is usually found on the margin of the fins, etc. When the larvæ do not possess hooks, they are usually found in clusters amongst the gill filaments of the fish. If the larvæ fail to attach themselves to a fish, they die. In Bengal, we do not know as yet whether the larvæ possess hooks or not. Neither do we know to which species of fish they attach.* But it will be obvious that with such a close connection between fish and mussel-larvæ, any decrease in the quantity of fish available at any particular place is likely to directly affect the supply of mussels.

It will further be clear that no improvement in the mussel fisheries will be possible until the details of the life-histories of the various species of fresh-water mussels in Bengal have been thoroughly investigated. When once this work has been done, it should be possible to undertake the cultivation of mussels to such an extent as to meet the demands of local button manufacturers. The improvement of the button and ornament-making industry in Eastern Bengal depends largely on the introduction of suitable machinery, and in this particular it is thought possible to achieve the desired end by means of a Co-operative Credit Society. Both in Bengal and Bihar, however, the industries we have described cannot be considered as being established on a sound basis, for the supply of shell is apparently decreasing. The whole industry is thus threatened. Scientific investigations on the lines indicated are urgently required. Until these investigations have been completed—and they may involve work over several years—we cannot hope to improve materially the present situation.

If ever the fisheries in the Bay of Bengal are exploited, it seems certain that suitable marine shell will be discovered, and, if such proves to be the case, the future success of the button-making industry in this country will be doubly assured.

With reference to the pearl-yield of these fresh-water mussels, our experience leads us to believe that a general improvement of the mussel-fishery will have the effect of increasing the number, and improving the quality, of pearls

* Since the above was written, Glochidia have been found in the fins of *Ophiocephalus marulius* (Sal).—T.S., 17-E-15.

available. The nature and life-history of the pearl-inducing worm (if such it be) is of great importance scientifically, but, as previously noted, it is not likely that we shall be able to utilise the information for directly increasing the pearl-yield, even when the history of the parasite is known. At the same time it is desirable that the life-history should be carefully worked out.

I cannot conclude without expressing my indebtedness to Mr. B. Das, M.A., Superintendent of Fisheries, for the help he has given me in a variety of ways during the preparation of this paper. The greater part of the information detailed in sections IV, V, VI and VII has been collected by him during inspections of the mussel-fisheries in Eastern Bengal.

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EXPLANATION OF THE PLATES.

[All figures on Plates I, II, III and IV are natural size.]

PLATE I.

Fig. 1.—One valve of a species of mussel (*Lamellidens marginalis*?) used in the manufacture of buttons. (Exterior.)

Fig. 2.—As above. (Interior.)

Figs. 3 and 4.—Interior and exterior views of one valve of a second species of mussel (*Parreysia favidens*?) used in the manufacture of buttons.

Fig. 5.—First stage in the manufacture of shirt buttons. A and B are pieces of shell showing the interior surface. C and D as above, showing exterior surface.

Fig. 6.—Second stage in the manufacture of shirt buttons showing A and B (*Fig. 5*) after having been marked with the punching drill shown in *Fig. 31* in Plate V. Note the circular area marked by the drill. This is the periphery of the future button.

PLATE II.

Fig. 7.—Third stage in the manufacture of shirt buttons. The edges have been trimmed. This is done with the grindstone shown in Plate V, *Fig. 30*.

Fig. 8.—Same buttons in the fourth stage of preparation. Here the holes have been drilled with the instruments shown on the left of *Fig. 30*, Plate V, and in *Fig. 31*.

Figs. 10 and 11.—Same stage as in *Fig. 9*, but a better or thicker quality.

Fig. 12.—Shirt buttons ready for the market.

Figs. 13 and 14.—Jacket buttons prepared in the same manner as shirt buttons.

Figs. 15 and 16.—Other kinds of shirt buttons of better quality ready for the market.

Figs. 17, 18, 19 and 20.—Jacket buttons of different kinds fitted with fasteners.

Figs. 21 and 22.—Studs and sleeve-links, partly finished.

Fig. 23.—Sleeve-links ready for market.

PLATE III.

Figs. 24 and 25.—Ornamental hair-pins used by Bengali ladies. Manufactured from the shells of mussels.

PLATE IV.

Fig. 26.—A pair of ear-rings made from the same shells.

Fig. 27.—As above, another design.

Fig. 28.—Nose-pendants (different positions) in general use amongst Bengali maidens.

Fig. 29.—Watch-chain made from same species of shell.

PLATE V.

Fig. 30.—A button "factory" with the men at work, showing grindstone, drill, file and pliers.

Fig. 31.—The punch-drill used in the second stage of preparation for marking the periphery of the buttons. By changing the "bit" this instrument is also used for drilling holes in the buttons.



II.

THE TERRAPIN AND MUD-TURTLE FISHERIES IN BENGAL.

BY

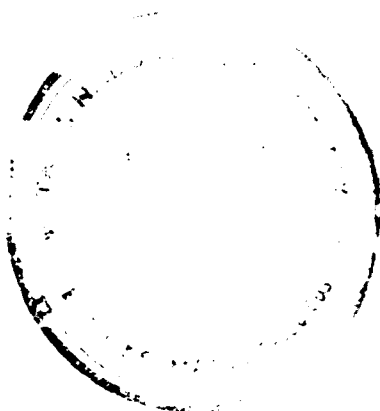
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and

BIPIN BIHARI DAS, M.A.,

Superintendent of Fisheries.



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- I.—Introduction.
- II.—Location of the principal fisheries.
- III.—Species fished.
- IV.—Methods of capture.
- V.—Markets, prices and methods of transport.
- VI.—People who eat turtles.
- VII.—Prospects of the industry.

I.—Introduction.

THE following notes are merely intended to set forth, in a general way, the information at present available with respect to the industry of turtle-fishing in Bengal. The authors are well aware that their account is by no means complete. The statements made by the fishermen themselves are not always reliable, and it is a common experience to find that their remarks do not agree. This is especially the case with reference to the extent and value of the industry. It has been found quite impossible to obtain reliable details relating to the approximate total number of turtles fished per annum, either at any one place, or in Bengal generally, and thus no means are available of enabling us to estimate accurately the value of the fisheries, or the number of men and boats employed. As it is unlikely that any such means will be found in the near future, we thought it desirable to record our preliminary observations now.

II.— Location of the principal fisheries.

Mud-turtles and terrapins (we shall henceforth refer to them collectively as turtles) are fished in rivers, *beels* and *khals* all over Eastern and Western Bengal, as well as in Assam. They are also caught occasionally in some of the large tanks. Fishing begins about the latter part of October, and continues until the end of January. During the rest of the year, the turtle fishermen are usually engaged in agricultural pursuits. In the district of Bakarganj, a large number of turtles are both fished and consumed. In both the sadar and moffusil markets throughout the district, turtles are available nearly every day during the season. In Barisal (the headquarters of the district) there is a very large turtle market.

Turtles are available in all the waterways in the district, but the principal supplies are obtained from the following places :—

(a) *Madaripur (Faridpur district).*—Turtles are here fished from the rivers Ariel-khan and Kumar. These fisheries are under the management of Jogendra Chandra

Matabbar. He holds the lease of the fishery right of the Ariel-khan, from Nilokhi to Fansiatallah, and in the Kumar, from Charmagura to Kalimdira Bazar. The turtle fishermen at Madaripur are not local men, but come from Boalia, Bhagyakul, Bohor and other moffusil villages in the districts of Bakarganj and Dacca. They fish in parties, each party consisting of from 10 to 16 men. The number of parties engaged at Madaripur year by year varies from one to three. Their nets are from 450 to 750 feet long, and from 30 to 40 feet deep. The mesh is usually 8 or 9 inches. These nets are generally worked by a party of fishermen, consisting, as stated, of from 10 to 16 men. They shoot their nets from two widely separated boats, and at each haul they usually obtain from 20 to 50 turtles. These are sold to wholesale dealers, who take them in boats to Barisal, and to the moffusil markets at Gournadi, Saora, Batajore, etc. Each carrier boat can take 700 to 800 turtles per trip, and each party of fishermen supplies from 8 to 10 such consignments during each season. So that from Madaripur alone it would appear that the catch made by each party during a single season is not less than 5,600. As there are usually at least two parties of turtle fishermen, the total catch at Madaripur, per season, is well over 10,000 turtles. Each party of fishermen pays from Rs. 30 to Rs. 35 per season, to the lessee, for permission to fish turtles.

(b) *Gopalganj (Faridpur district).*—At Gopalganj turtles are very abundant in the rivers and *khals*. As at Madaripur, the fishermen from other places arrive during the cold season, and the fishery is similar in nature to that at Madaripur. During the hot weather, however, operations are continued by native Christians, who have taken up this work during the last four years. The Station Master of the Steamer Company at Gopalganj informed us that he booked 200 large turtles (each weighing not less than 30 seers) to Siliguri alone during March 1913. The turtles were packed in boxes, and they had their front and hind legs on each side, sewed together. The boxes were perforated with holes to enable the turtles to breathe *en route*. During the season, there are about 20 boats engaged in turtle-fishing at Gopalganj. Each pair of boats, with a party of turtle fishermen, exports not less than 500 turtles per week. So that, during one season (which extends approximately over 12 weeks), the total number of turtles despatched from Gopalganj alone is not less than 6,000.

In the village Kotalipara, south of Gopalganj, there is a class of fishermen ("Namasudra" by caste), who are *bonâ-fide* turtle catchers. These people are known as "Jianis," and their sole occupation is catching and dealing in turtles. They catch and export turtles during the season, whilst during the hot weather they are engaged exporting the stocks which have accumulated during the fishery. The catches are exported principally to Jessore, Khulna and Barisal.

(c) *Chandpur (Tippera district).*—In the Meghna, near Chandpur, turtles are caught in large numbers by dragging with big nets. The chief catches are taken at Narsingpur, which is 5 miles from the railway and steamer station at Chandpur. The catches are sold to wholesale dealers, who take them to Barisal market, and to other markets in the district of Bakarganj. Each carrier boat, owned by the dealers, takes from 600 to 700 turtles. There are some 30 to 35 such consignments during the season. Thus the number of turtles exported from Chandpur in one season is above 20,000.

(d) *Khulna town.*—Turtles are fished in considerable numbers in the rivers near Khulna. The season is the same as at other places. In the Magura and Bagerhat subdivisions of the district, turtles are brought for sale to all the daily and bi-weekly markets. In Khulna sadar, about 700 turtles are sold per week. During the season the catch cannot be less than 10,000. At the subdivisional markets about 500 turtles are sold per week, indicating a catch of about 6,000 per season. Nearly all the turtles are consumed locally. There is very little export trade.

(e) *Sylhet.*—A large number of turtles are exported in boats from the Sylhet district to Ashuganj and Bhairab; at Ashuganj they are sold wholesale, and at Bhairab they are retailed.

(f) *Turtle fisheries in the Dhankunia, Manikganj and Munshiganj beels (Dacca district).*—These *beels* when full of water (*i.e.*, during the rains) are believed to be a favourite resort for turtles. The catches are considerable. The method of fishing in the above *beels*, in Eastern Bengal, is peculiar and will be described later.

(g) There are a few *beels* in the district of Murshidabad (such as the Bhandardah *beel*) where turtles are fished in large numbers. Nets are rarely used; the turtles are obtained by harpooning with a trident-shaped spear. They

generally fish from one boat, into which the catch is deposited. Each party of fishermen (with one boat) pays a rent of from Rs. 30 to Rs. 40 to the owners of the *beel* for the privilege of fishing during one season. As at other places, fishing takes place only during the winter months, viz., from November to February. The turtles fished are landed at a place in the *beel* called Panchbaria, and from there they are carted to the bazars at Berhampur Court and other places. We have been unable to obtain even an approximate estimate of the average catch per season in these *beels*.

In the preceding paragraphs we have merely given the localities where turtle-fishing is carried on to a considerable extent. It must not be assumed, however, that turtle-fishing is limited to these localities. In other parts of Eastern Bengal, turtle-fishing is widely and generally practised, but only to a small extent. Turtle fisheries also exist in the Ganges at Rajmahal (Sonthal Parganas district).

The following table gives a rough summary of the extent of the trade in turtles, per season, as far as we have been able to ascertain and judge:—

Catches at—	Number.
Madaripur	10,000
Gopalganj	6,000
Chandpur	20,000
Khulna district	13,000
Sylhet	12,000
Murshidabad district	500
Dacca district	1,000
<i>Beels</i> in Eastern Bengal	2,000
Elsewhere	5,000
	69,500
Say	70,000

The wholesale price, for all sorts, averages about Rs. 60 per 100. The value, wholesale, of the season's catch thus appears to be about Rs. 42,000. The retail value of the turtles fished is probably quite double this amount.

III.—Species fished.

Nine species of turtles are widely distributed throughout Eastern Bengal. These are all fresh-water forms, but many

of them are caught in brackish water. The fishermen distinguish two principal kinds, viz., the "Kattuas," terrapins, or hard-shelled tortoises (*Testudinidae*), whose eggs are usually oval, and the "Kachhaps," or soft-shelled turtles (*Trionychidae*) with round eggs. Of the latter, four species are common.

(a) *Trionyx hurum*. Gray. (*Gangachhap*), Eastern Bengal.) (*Keora*, Bihar.)—This species is not very plentiful in the Bakarganj district, but it is nevertheless caught frequently. "Adult specimens weigh about 14 seers. They measure 16 inches by 12 inches in disk, and bring forth round eggs. It is said to be very bad eating owing to its rank smell." (5)* In Barisal the soft edges of the carapace are eaten.

(b) *Chitra indica*. Gray). (*Chhim*, Eastern Bengal.) (*Sim*, Bihar.)—This species frequently measures from 4 to 5 feet along the carapace and is said to sometimes weigh as much as 7 maunds. "It does not bite, but disables its victims by blows, often injuring fishing boats by the impact thereof. It is bad and coarse eating." (5) The fishermen state that this species is not a gross feeder but eats fish and snails.

"... The contents of the stomach of a specimen from Ludhiana included the bones of a fish and some small snail-shells."—(Parshad, 4.)

(c) *Trionyx gangeticus*. Cuvier. (*Khalua kachim*, Eastern Bengal.) (*Katsha* or *Kattha* or *Palaiya*, Bihar.)—This species grows to a length of 4 feet and frequently weighs 3 maunds. "It brings forth round eggs, which are found in the mud after the subsidence of the floods. The eggs are perfectly spherical, measuring 2.3 cm. in diameter. ... The species is said to be good to eat." (5) Fishermen state that this species is particularly fond of decaying human flesh. It is said to linger in the vicinity of the various cremation ghats along the banks of the rivers from Khulna to Barisal. We have seen numbers of this species nibbling at a badly decayed carcass of a buffalo stranded along the banks of the Bhairab river. One method of catching *Trionyx gangeticus* adopted by certain fishermen, depends on the fondness of the animal for decaying carcases. The flesh is eaten by the Hindus of Barisal.

"... Food.—On the whole it is carnivorous in habit. A large specimen from the Chota Ravi, on being dissected,

* These numbers refer to the literature cited at the end of this paper.

showed bones of some bird in its stomach, another from the Sutej (Ferozepore) had the complete femur of a large bird in its stomach, while yet another had the nearly complete pelvic girdle and the sacral and two other vertebrae of a frog. *T. gangeticus* is attracted by kneaded flour, which is used by the fishermen for baiting their lines; hence very often they find on examining the line a number of these creatures hanging by the hooks. The fishermen usually bring these out of the river, and, breaking their necks, throw them out of the water, owing to the very large amount of damage that they do to the line; also because the fish avoid the place where there are tortoises. Some specimens from Ferozepore were kept living in a tub of water for about two months. It was found that they preferred old rotten flesh to everything else, though they would not desist from eating any and everything when hungry.

Remarks.—In the Punjab tortoises are not much esteemed as an article of food except by the nomad tribes. The *Sahsies* consume them in quite large numbers. They have a peculiar way of their own for catching them. They take the rotten and foul-smelling flesh of some animal and put it into the river close to the shore. The tortoises are attracted in large numbers by the smell and begin to feed on the flesh. Then a large number of these people, with a peculiar sort of harpoon of their own, go into the river and surround the spot on all sides, and begin making a good deal of noise, uttering shrill cries, and so on. The animals becoming terrified rush away, but are harpooned in large numbers by the *Sahsies*. The harpoon pierces the carapace, and in some cases, when it was wielded by some very strong man, it was seen even to pierce the plastron of quite large individuals.

The flesh is eaten, while the fat is stored and used instead of oil or for making embrocations. The *Sickligars* also eat these animals, but in much smaller numbers."—(Parshad, 4.)

(d) *Emyda granosa*. Schoepff. (*Mulia*, Bihar.)—Chaudhuri states that this species are found peeping out of mud holes in the banks. They are believed to feed on earth.

Testudinidæ, terrapins, or hard-shelled tortoises.

(a) *Hardelli thurgii*. Gray. (*Kali kattua*, Eastern Bengal.) *Kala kaunttha*, *Gaira*, *Kartha* or *Kariyaon*,

Bihar.)—This species grows to a weight of about half a maund, and the carapace of an adult measures about 2 feet by 14 inches. "The eggs of the species are not found in the sand bank on the Ganges, but are occasionally met with in the months of August and September, when the water subsides. The eggs are said to be oval." (5) Our personal observations confirm the latter statement by Chaudhuri. During the transit of numbers of this species from Chandpur to Barisal, some of the females passed eggs in the boat. The measurement of one of the eggs laid was 5 cm. by 3.5 cm.

Certain markings about the mouth are regarded by the fishermen as footmarks of the god "Sri Krishna." The flesh is considered palatable. On 31st October 1914 over 300 specimens of *Hardelli thurgii* were on sale in the Barisal market. None weighed more than 8 seers and they were selling at from Re. 1-4 to Re. 1-12 each.

(b) *Kachuga lineata*. Gray. (*Salgam kattua*, Eastern Bengal.) (*Sal* or *Sail*, Bihar.)—This species attains a weight of over half a maund, and the carapace of a full-grown individual measures about 3 feet by 20 inches. "It is easily distinguished by its larger size and very smooth and oily back, from the *Dhoor*, which is the common medium-sized species with rough back. The *Sal* does not breed and is not found with eggs until it reaches a much bigger size than the adult *Dhoor*." (5) The flesh is considered to be inferior to that of *Hardelli thurgii*.

(c) *Kachuga dhongoka*. Gray. (*Dur* or *Sundi kattua*, Eastern Bengal.) (*Dhoor*, Bihar.)—As noted above, this species is smaller than *Kachuga lineata*. Chaudhuri (5) states that it has a slightly rough back with pointed knobs in the middle line, and that the males are said to be very much smaller than the females. He describes the eggs as oval and very long, measuring 5.5 cm. by 3.3 cm. About 35 are deposited at a time. Chaudhuri dug 28 specimens of this turtle, and several eggs, from sand banks. Some of the females brought forth eggs whilst being packed. The shell of the eggs is very brittle and there is a large air space inside it; the external surface is obscurely pitted. Chaudhuri further states that both *Kachuga lineata* and *K. dhongoka* breed in March, and deposit eggs on the sand bank of the Ganges, but as they leave trailing marks behind, the hiding places of the eggs are easily discovered. Both *Sal* and *Dhoor* have long (oval) eggs, the *Sal*'s being much bigger than those of the *Dhoor*. The young ones come out in May or June.

They are occasionally caught in fine nets in the month of June or July."

(d) *Kachuga smithii*. Gray. (*Haldi kattua*, Eastern Bengal.) (*Chapaut*, *Chauputa*, Bihar.)—This is a very small species and rarely attains a length of more than nine inches. Adults weigh about 1 seer. Chaudhuri states that it deposits 5 to 8 eggs at a time and buries them in sand. The flesh is considered to be excellent. The animal chiefly feeds on rotten flesh. On enquiring from fishermen at Ferozepore, it was found that the animal is never attracted by the flour bait which they use in fishing, but is often caught by the small prawns which they sometimes use as bait. Specimens kept living in a large tub were seen to like flesh much better than anything else. Large amounts of vegetable matter found in the stomach of a specimen cut up in the Museum at Calcutta show, however, that it takes vegetables also. Thus it appears that the animal is omnivorous. A young specimen of this form was found buried in mud with the head projecting, on the side of the river Ravi at Lahore. The water had retracted from this place about three months before, yet the animal was found living. It appears, therefore, that this form can hibernate like *Emyda granosa*.—(Parshad, 4.)

(e) *Kachuga tectum*. Gray. (*Pora kattua*? Eastern Bengal.) (*Panchuria*, Bihar.)—This species is a little larger than *Kachuga smithii*, and is common in the tanks of Calcutta. It is said to grow to about 3 seers. The flesh is not so highly prized as that of *Kachuga smithii*.

"The animal is herbivorous; it desists from flesh, but eats blades of grass and other vegetables very readily.

"It is a very active animal, moving at a very rapid rate on land though thoroughly aquatic, and swimming very quickly in water."—(Parshad, 4.)

(f) In Eastern Bengal certain species of turtles are known by the following local names:—

<i>Dholly kattua</i> .	<i>Nona kattua</i> .
<i>Champa kattua</i> .	<i>Sinduria katta</i> .
	<i>Goluia katta</i> .

As far as we have been able to ascertain, these are merely young forms of the species already described.

The *Dholly kattua* is said to be exactly similar to *Kali kattua* except in colour, and in being slightly smaller.

The *Champa kattua* is said to be similar to *Kachuga smithii*. No features distinguishing the two could be obtained. The fishermen, however, stated that "the head is like that of a bird, and the meat like that of a chicken."

The *Nona kattua* (*Pilochelys cantori*?) was said to grow to half a maund in weight.

The *Sinduria katta* (*Kachuga tectum*?) is stated to have a red head, and red bands on the neck, whilst *Goluia katta* has a "raised rib in its back."

It will be noted that in Eastern Bengal, the mud-turtles and tortoises are divided by the fishermen into two classes, viz., the *Kattuas*, (*Testudinidae*), and the *Kachhaps* (*Trionychidae*), and that in each case, several kinds or species are recognised. Chaudhuri (5) states that "the Santals, the great patrons of tortoise-consumption, recognise only two kinds. One is called *Lepra*, under which name fall *Kattha*, *Keora*, *Sim*, and *Abhua* of the Gondris, and the other *Hurum*, under which Santali name fall the *Dhoor*, *Sal*, *Goira*, *Panchuria* and *Chapaut* of the catchers. Thus the distinction made by the Santals is a general one, whereas those of the catchers are evidently specific. It may be remarked here that the name *Hurum* is not applied to any of the soft species of water-tortoises in the Santali language."

IV.—Methods of capture.

(a) *Harpooning*.—The harpoon used in turtle-fishing consists of two parts. First, there is tapering bamboo, usually 11 feet long, having a diameter of $1\frac{1}{2}$ inches at one end, and a diameter of $\frac{1}{4}$ inch at the other end. The bamboos are so cut that there is a node near each extremity which serves to prevent the bamboo from splitting. The node at the thicker end of the bamboo is usually situated $1\frac{1}{2}$ to 2 inches from the extremity. Between the node and this extremity there is a hollow cavity into which the second part of the mechanism fits. This consists of a solid piece of steel, and it is inserted into the cavity of the bamboo like a cork into a bottle. This solid piece of steel bears a barbed, trident-shaped, steel spear. A piece of very strong twine connects the arrow-heads to the handle of the bamboo. This string is about 60 feet long and is coiled round the bamboo when the harpoon is ready for use. Great skill is required in using this instrument. When the fisherman discovers

a turtle at a distance, he slings his harpoon into the air in a direction such that, on descending, it is calculated to strike the animal on the carapace. The points of the spear being made of steel, easily penetrate the flesh. The turtle when hurt in this manner, descends to the bottom, but the handle being now detached from the arrow-head, floats up, and the fishermen are thus able not only to locate the position of the wounded turtle, but also to drag it up to the surface up means of the stout twine before described.

(b) *Fixed nets*.—In small rivers, turtles are fished by means of a grating of bamboo having a central opening, into which a net, with a pocket, is fixed. The turtles wander into the net and finally into the pocket. They are thus entangled and finally captured.

(c) *Drag-nets*.—There is a special kind of drag-net used for turtle-fishing in Eastern Bengal. This net has a mesh of 8 or 9 inches, and is fitted with a very heavy foot rope. It is dragged along the bottom of rivers by means of two boats.

(d) *Dragging with weighted ropes*.—This method of turtle-fishing is adopted by fishermen who cannot afford either to buy or prepare nets. We have seen the method in operation in the Pussur river, near Khulna. A long rope is weighted by tying bricks along it, at more or less regular intervals. It is then dragged along the bed of the river, either from both banks, or by means of boats. When turtles come in contact with either one of the bricks or with the rope, they retract their head and legs, and are carried along the bottom of the river with the rope. When the fishermen feel that dragging has become difficult, they bring the two ends of the rope together to one side of the river and haul the catch to the bank. It is said that only *Hardelli thurgii* (*Kali kattua*) is caught in this manner.

(e) *Angling with or without bait*.—Turtles are caught by means of hooks and line. For certain species these hooks are baited with any kind of flesh. The only essential feature in this case appears to be that the bait must be highly putrid and evil-smelling.

It is said that there are some specially skilled persons who are able to dive and actually hook the turtles under water.

(f) A peculiar method of catching turtles is practised near Khulna. Only one species of turtle, viz., *Trionyx gangeticus* (*Khalu kachim*), which is a very gross feeder,

is caught by this method. We have ourselves seen this species feeding on the highly putrid carcass of a buffalo. The fact that certain turtles are fond of eating human corpses, left partly burnt in the Hindu cremation grounds, is well known amongst the fishermen, who actually utilise this fact in capturing them. The method is as follows:—A man is covered from head to foot with a white sheet, and is placed at a short distance from the water. A trench is dug between the man and the water. The party of fishermen then cry out "*Hari Bol*"—a phrase usual when the dead body of a Hindu is brought for cremation. At this cry the turtles come out of the water, and, in their attempt to get at the supposed dead body, fall into the trench and are taken by the fishermen.

(g) *Method of fishing in beels in Eastern Bengal*.—During the rains, and for some time subsequent, these beels are connected to the main river or rivers by a series of narrow, shallow, tortuous channels. As the rains recede, the turtles follow these channels in order to reach the main rivers. The turtle fishermen select a place along the course of such a channel, where there is a sudden bend. A small excavation is made in order that the water may have a fall of about one foot. The turtles migrate to the rivers during the night, and on account of the narrowness of the channel at the site selected, they are obliged to travel in single file. The method of fishing is as follows:—A fisherman stands in the water close to the "fall." His hands are outstretched in such a manner that any turtle moving downstream falls into his hands. When caught, the fisherman immediately makes over his catch to a second fisherman, who is waiting near by. After a time he is relieved by other fishermen. The catches are placed in the hold of a boat which is kept in readiness. The success of this method depends on everything being done quietly, so as not to frighten other turtles in the rear. It is said that by this method as many as 600 turtles have been caught in one night, at one place, but the average catch is usually about 100. It is further stated that only *Kali kattua* (*Hardelli thurgii*) are caught in this manner, and this species is docile when caught.

The following note by Chaudhuri (5) is of interest:—
"The following fishing tribes were found catching tortoises in the bed of the Ganges near Rajmahal. The Binds and Banpars catch them by *hausis* (hook and line), the Teors

harpoon them, but the Gondris make a speciality of catching them in nets manufactured for the purpose. Tortoises, great and small, are often caught in the *Bara jal* along with all kinds of fish, but this is an accident, and tortoises so caught are often thrown back into the river, as the Malas and Myfarases do not take any interest in them. It is forbidden to the latter people to eat them, while the former consider them unclean.

V.—Markets, prices, and methods of transport.

(i)—MARKETS.

(a) *Bakarganj district*.—Excepting Calcutta, the principal turtle markets of Bengal are situated in the district of Bakarganj, which is also the principal centre of consumption. Turtles from the districts of Dacca and Faridpur are exported into Bakarganj by means of country boats. The *Kali kattuas* (*Hardelli thurgii*) are carried in the holds of boats. The holds are then covered with planks so that the men can live on deck. The turtles are not fed during transit. Water, however, is usually available in the hold. The animals are extremely hardy, and but few die on the way. The *Kachims* (*Trionychidae*) are very ferocious, and during transport the front and back legs on each side of the animal are sewed together. Even thus secured they sometimes prove quite dangerous, and the boatmen have to be very careful in moving about the boat. They bite at everything near by, and are capable of inflicting very severe wounds.

(b) *Dacca town*.—Turtles are brought to Dacca market for sale, but the imports are not so regular as at Barisal. The local catch is insignificant.

(c) *Khulna town*.—At Khulna, turtles are available in both the bi-weekly and daily markets. About 600 to 700 are sold per week.

(d) *Ashuganj and Bhairab*.—Turtles are frequently brought for sale to the markets at Bhairab and Ashuganj. They are, however, not available every day. At Ashuganj there is a wholesale market, and at Bhairab a retail market. During the season, about 10,000 to 12,000 turtles are sold in the above markets. Besides the preceding markets in Eastern Bengal, turtle flesh is sold in certain of the Calcutta markets and also in the suburbs.

(ii)—PRICES.

At Calcutta Natin Bazar, at Kidderpore, at Sandhya Bazar in Ramkrishnopur, and at Entally Bazar, turtle flesh is available every day. The retail price is about 8 annas to 10 annas per seer. The turtles available at these markets are generally *Kachhaps* (*Trionychidae*), and each individual turtle weighs about 20 to 30 seers. The entire animal is not sold, as it is usually too large to be consumed by one family.

The price of turtle flesh varies according to the demand in the market, and according to the species of the turtles on sale. At Barisal the retail prices are as follows:—*Chitra indica* (*Chitra*) is sold at from 12 annas to Re. 1-8 each, according to the size, but at times Rs. 5 is charged for a large specimen. The very small specimens are sold for 4 annas only. *Kattuas* (*Testudinidae*) are sold at from 12 annas to Rs. 4 each, according to size and species. The wholesale turtle markets are at the places of capture, viz., Madaripur, Chandpur, Gopalganj, etc. Here the price varies from Rs. 50 to Rs. 80 per 100 turtles, according to the size and species. The *Kali Kattua* (*Hardelli thurgii*) is said to be more palatable than other species.

At Dacca and other places in Eastern Bengal, the price is about 10 per cent. less than at Barisal. In Western Bengal, and in the Calcutta markets, the price, as previously noted, is from 8 annas to 10 annas per seer. In Berhampur Court and vicinity, the supply is usually irregular, as is also the price. Turtles are sometimes very cheap—a large specimen being sold for Re. 1, while at other times the price of a large specimen is Rs. 4 or Rs. 5.

(iii)—METHODS OF TRANSPORT.

Turtles are generally carried from the place of capture, to the local markets, in boats. The *Kali kattua* (*Hardelli thurgii*) is said to be the most docile, whilst the *Kachhaps* (*Trionychidae*) are often very ferocious. When boats are not available, or when the journey is of necessity by road, the fishermen take the turtles in bullock carts.

The importation of turtles to Calcutta in very recent years was of an extensive nature. Dr. Annandale (1) states that he saw a consignment of over 500 individuals of *Trionyx hurum* (*Gauachhap*) from Khulna being unloaded at the

railway station. ". . . In the Gangetic delta, and I believe in the other parts of India, *Trionyx* is regarded as an important article of diet. Very large numbers are caught, chiefly in the Khulna district, for the Calcutta market and are sent to town by train. They are captured in nets in autumn, when the rivers begin to sink, and are stored in the vicinity of Calcutta in small ponds, their fore and hind feet being sewed together and a hole, to which a string is attached, bored in the cartilaginous part of the disk. In this condition they live for many months. The only species I have actually seen treated in this way are *T. hurum* and *T. gangeticus*, but I understand *Chitra indica* is dealt with in a similar manner." Dr. Annandale also states that at Siliguri he has seen frozen turtles, said to have come from Saraghat, being put in the Darjeeling Mail.

In consequence of the cruel manner in which the transport of turtles was effected, the various railways have ceased to carry turtles over their line. The traffic Manager of the Eastern Bengal State Railway in a letter to us (No. F. 227-1, dated the 31st March 1915) stated that his "attention had been drawn to the cruelty inflicted on live tortoises carried over the Eastern Bengal State Railway. The creatures were usually sent with their feet sewn together through the webbing. Owing to their vicious habit of biting, the tortoises could not be handled easily by the railway staff, and the suggestion to carry them in bags or crates could not be given effect to. After due consideration, on and after the 1st September 1914 live tortoises were not accepted at any station on the Eastern Bengal State Railway for carriage by rail. The restriction was extended to bookings to, and from, the Bengal and North-Western Railway, and East Indian Railway, as well as the steamer services. Several references have been made by fish merchants, but no means of conveying live tortoises without pain to the creatures, has been suggested."

On referring to the India General Navigation and Railway Company, Limited, we were informed as follows:—"No shipments of live turtles have been made in the past over our services as far as we are aware.* We are prepared to accept live turtles for carriage over our steamer services provided the animals are packed in either tanks or crates, and that each shipment is accompanied by an attendant.

* N.B.—This is evidently a mistake. —T. S.

The charge for the conveyance of live turtles will be at half parcels rate, at owner's risk."

It is clear that the refusal of the railway authorities to carry live turtles will interfere considerably with the industry. There can be no question that the transport by railway involved great cruelty. The only method of transport from Eastern Bengal to Calcutta, at present, is by boat. The journey will occupy several days. In the cold weather, predatory fish in large numbers, are brought to Calcutta alive, from Eastern Bengal, and the transport of turtles could be effected in a similar manner. The long journey, and the crowding together of large numbers of turtles (necessary to make the undertaking profitable), involves considerable cruelty, and means have yet to be devised of transporting the animals under less revolting conditions. The India General Navigation and Railway Company, Limited, are prepared to carry turtles under suitable conditions, and I have no doubt that the railway authorities would also follow suit if the exports could be made under favourable circumstances. At the same time, turtles are difficult creatures to deal with, and are not easily secured.

VI.—People who eat turtles.

As far as we know, mud-turtles are not eaten by Europeans.

The Chinese in Calcutta are said to be fond of the flesh of certain species.

Amongst Indians, the Santals are the great patrons of turtle consumption. Various species of tortoises are allowable as clean food for Hindus. There are Hindus who are absolutely vegetarian, but the majority of them do not object to fish or meat. As regards tortoise meat, that of some species is considered clean, and that of some unclean. The meat of that species of tortoise which is called *Dandi* is allowable even for Brahmans. It has a hard shell above and a hard cartilage below. It has a ridge on its back. It is the species called *Dhoor* in Mr. B. L. Chaudhuri's note, i.e., *Kachuga dhonqoka* (Gray). The eggs are considered a delicacy. These are found inside the tortoise in the form of a garland several yards long. There is another species called *Sundi*, a small land tortoise, which is also eaten by the higher classes. *Keto* (that is 'wooden') is another species the meat of which is allowable. But the

big tortoises, all called *Burkole* (*Trionychida*? T. S.), are never used as food except by the lower classes. These are very big, sometimes containing maunds of meat. In one of Asoka's inscriptions he prohibited the use of *Dudr's* meat, that is, the meat of *Dudr* or *Dhoor*.² (3).

Certain Muhammadans eat turtles and others do not. The Shafi school teaches that all animals living in rivers may be eaten. This includes mud-turtles. The adherents of the Hanifi school, however, do not, as a rule, eat turtles although turtles are not definitely forbidden in the same sense as the pig.

VII.—Prospects of the industry.

Although one hears a great deal about the increasing shortage in fish in Eastern Bengal, and in Bengal generally, the writers have never heard it stated that turtles are becoming scarce. As far as we have been able to observe, the conditions under which the turtles live, in the waterways of Eastern Bengal, are eminently satisfactory. Food is apparently plentiful. As far as we know, they have few ^{at young} turtles and monitor lizards probably dig out and eat the eggs. They are also tenacious of life. These three circumstances combine to more than repair amply the ravages of man, during the seasons of turtle fishing.

The various species of turtles lay their eggs in mud or sand. The eggs are not difficult to obtain. The collection and cultivation of the eggs of the larger species in tanks, appears to be an industry worth the consideration of individual fishermen. The only features necessary to make such an enterprise successful appear to be (1) the erection of barricades to prevent the escape of the turtles, and (2) an abundance of food. If gross-feeding turtles are cultivated, the question of food is not a difficult one.

With reference to the general industry, it does not appear likely that the supply of turtles will materially decrease in the near future.

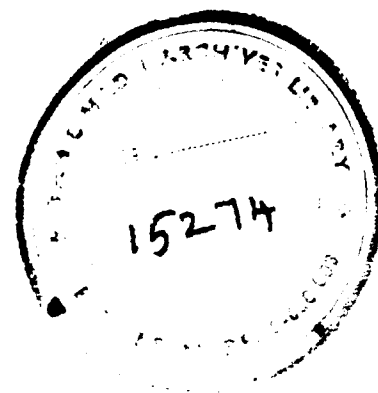
Improvements in the industry will depend on the fishermen being better equipped for their work, and on means being devised of exporting turtles under more humane conditions. The better equipment of the fishermen will probably be found possible under a system of co-operation,

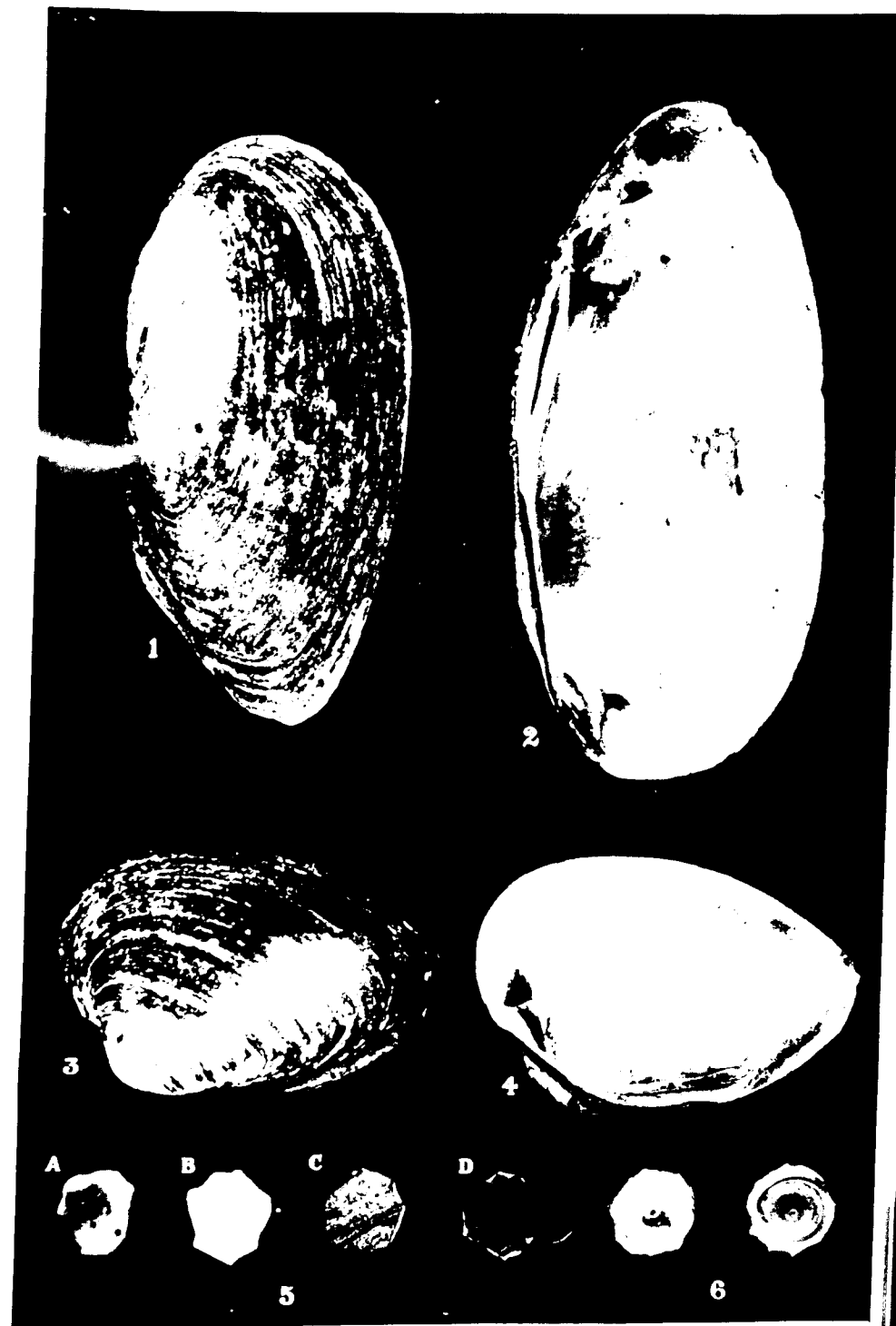
but up to the present no satisfactory method of exporting large numbers of turtles, cheaply, and without cruelty, has been devised.*

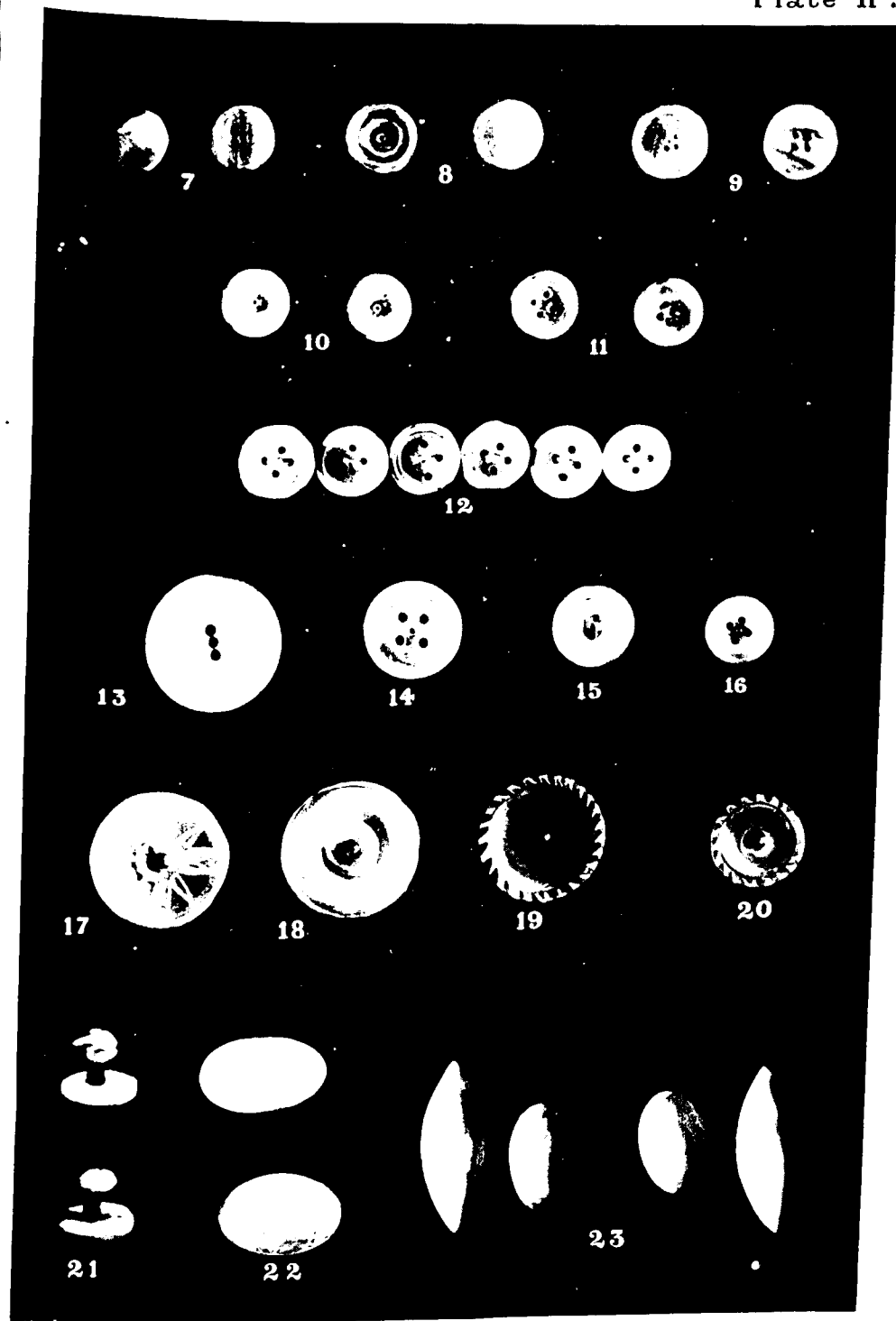
RECENT LITERATURE ON INDIAN TURTLES.

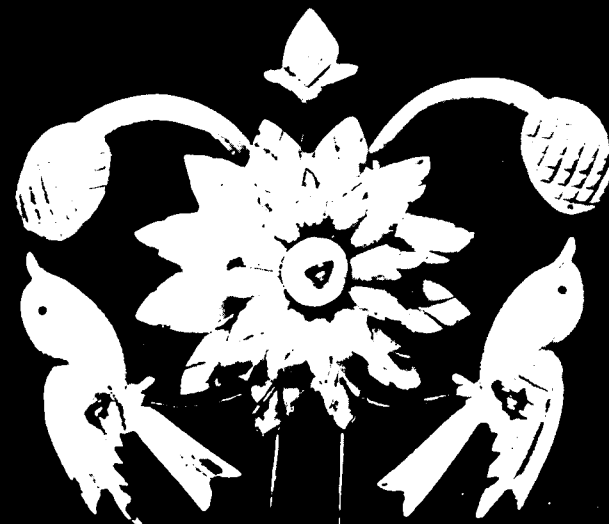
1. ANNANDALE.—The Indian Mud-turtles (*Trionychidae*). *Records, Indian Museum, Vol. VII, Part II, No. 16*. Calcutta, May 1912.
2. ANNANDALE.—The Aquatic Chelonia of the Mahanaddi and its Tributaries. *Records, Indian Museum, Vol. VII, Part III, No. 25*. Calcutta, July 1912.
3. ANNANDALE and HARAPRASAD SHASTRI.—Relics of the Worship of Mud-turtles (*Trionychida*) in India and Burma. *Journal and Proceedings, Asiatic Society, Bengal, New series, Vol. X, No. 5*. Calcutta, 1914.
4. PARSHAD, BAINI.—Notes on Aquatic Chelonia of the Indus System. *Records, Indian Museum, Vol. XI, Part IV*. Calcutta, August 1914. Miscellaneous.
5. CHAUDHURI.—Aquatic Tortoises of the Middle Ganges and Brahmaputra. *Records, Indian Museum, Vol. VII, Part II*. Calcutta, May 1912. Miscellaneous.

* Turtle soup is prepared from a marine species—*Chelone mydas* (Linn.)—which occurs in the Bay of Bengal, and off the coast of Ceylon. None of the species described in the preceding papers are suitable for the purpose of making soup for European tables.

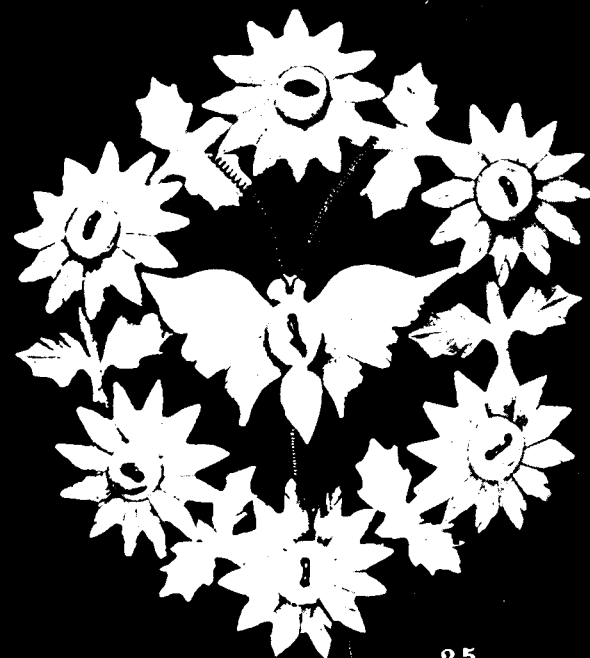




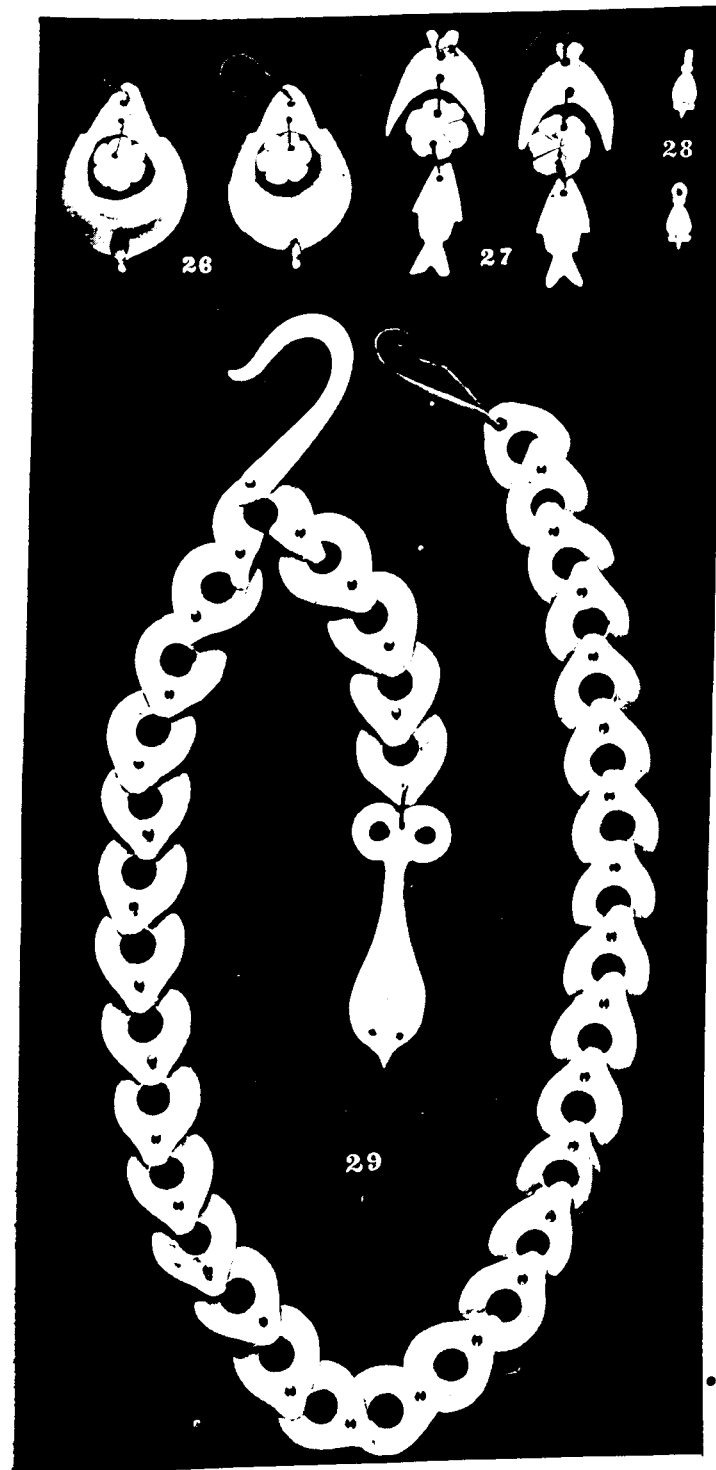


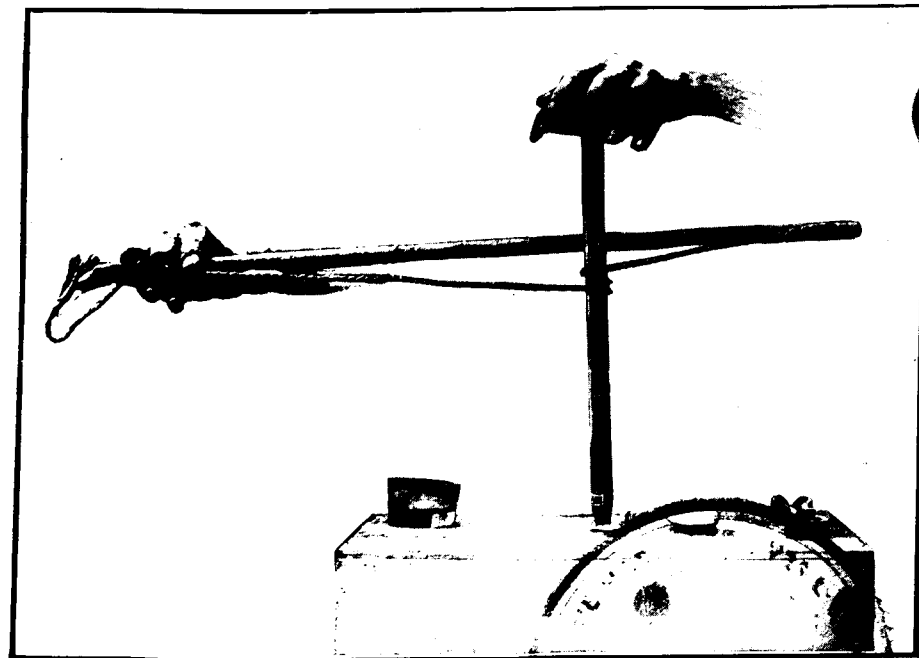
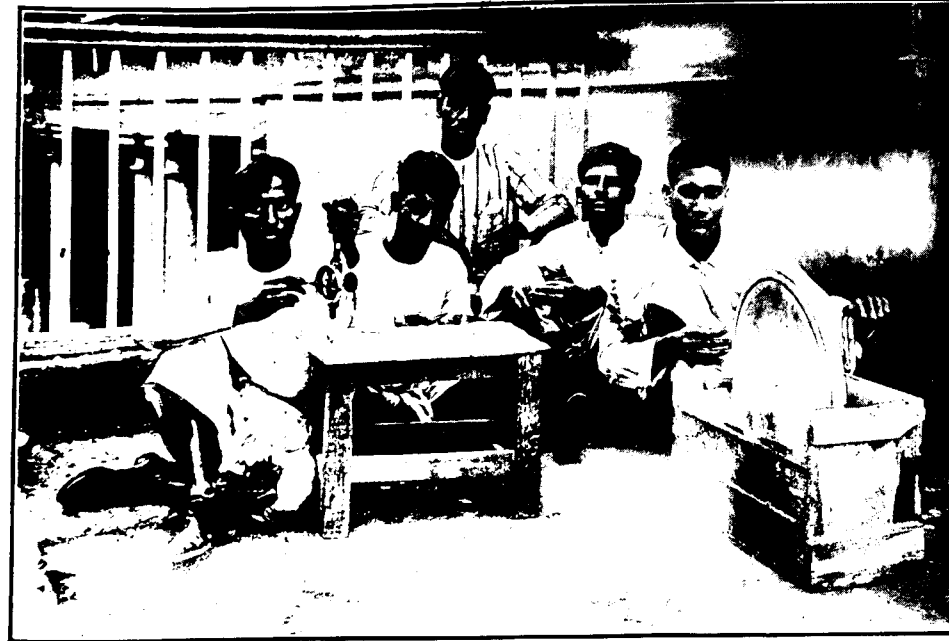


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