

THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

No. 58. JUNE 1842.

XXXI.—*General Features of Chusan, with remarks on the Flora and Fauna of that Island.* By THEODORE CANTOR, M.D., Bengal Medical Service, &c.

THE island of Chusan, or Great Chusan, is situated on the east coast of China, between lat. 30° and 31° N. and long. 122° and 123° E.* It is the greatest and most important of the group of islands which bear that name, and is separated from the nearest main-land, Keeto Point, by an arm of the sea, about ten miles across, thickly studded with smaller islands, varying in extent from little slightly elevated rocks to islands several miles in circumference. This uninterrupted chain of islands renders it necessary to look upon Chusan, and the whole group indeed, more as a part of the continent than as islands. The extremes of temperature are more like those of a continent than of an island. The aspect of Chusan is hilly, being traversed by steep rocks in all directions, occasionally surmounted by peaks with intervening valleys. The rocks belong to the older volcanic series, chiefly consisting of claystone, porphyry, and a number of varieties, of which Lieut. Ouchterlony in his statistical notes has given the following description:—

“ In portions of the cliffs on the south and north coasts the rocks are observed to assume a columnar structure†, and dykes and masses of greenstone burst through the beds of claystone on various points, indurating and altering them to a considerable extent. On the west coast the claystone por-

* An observatory erected in 1840 near the engineer camp was situated in $30^{\circ} 0' 10''$ N. and $122^{\circ} 14'$ E. The variation of compass was found to be $2^{\circ} 33'$ E., magnetic dip $42^{\circ} 16'$. The circumference of the island is $51\frac{1}{2}$ miles; its greatest length about 20, its greatest breadth $10\frac{1}{2}$ miles. The direction of the island is from N.W. to S.E.

† Columnar structure is also visible on Buffalo Island, a short distance to the southward of Chusan.

phyry assumes a slaty or laminated structure, and appears to be quarried extensively, both for use on the island and for exportation to the main-land, affording excellent slabs for paving and for floors, and good blocks for common building purposes. A coarse conglomerate is also to be seen intervening between beds of the claystone, imbedding angular fragments of many descriptions of igneous rocks and workable porphyry, which is also quarried and made use of for pillars, blocks for corn-mills, basement slabs, &c."—*Calcutta Journal of Nat. Hist.*, vol. ii. p. 136.

As characteristic features in the island, may be mentioned the absence of rivers, lakes and forests. The valleys are fertilized by numerous streamlets communicating with narrow canals, which traverse the island, and serve both for agricultural purposes as well as means of communication for want of carriage-roads. All the canals, at least in several miles distance round Ting-haé, the principal city of the island, discharge their surplus into a common canal, which passing through the city communicates with the sea.

The entire absence of forests appears to be of a comparative recent date, to judge from certain passages in a letter written by Mr. Cunningham in the year 1701, in which *deer* are mentioned as being in abundance, which circumstance would presuppose a woody appearance of some part of Chusan at least. The writer says, "The island in general abounds with all sorts of provisions, such as cows, buffaloes, goats, deer, hogs, wild and tame geese, ducks and hens, rice, wheat, calavances, coleworts, turnips, potatoes, carrots, beetach and spinach. Here also the tea grows in great plenty on the tops of the hills, but it is not in such esteem as that which grows on more mountainous islands. Although this island is pretty well stored with people, it is far from what it was in P. Martini's time, as he describes Chusan. The rest of the circumjacent islands are either desert or meanly inhabited by a few people, but all of them stored with abundance of deer, for it is not long since Chusan began to be peopled. It is true in Martini's days, about fifty years ago, it was very populous for the space of three or four years, at which time the fury of the Tartar conquest was so great that they left it desolate, not sparing so much as the mulberry-trees (for then they made a great deal of raw silk here); and in this condition it continued till about eighteen years ago."—Extracted from Harris's complete collection of *Voyages in Chinese Repository*, vol. ix. p. 133.

Chusan, as well as most of the smaller islands, presented on our first approach in July 1840, a striking and novel appear-

ance; a crowded population manifested itself in the cultivation of every spot which by art of man could be forced to administer to the first necessities of life. To meet the demand of an over-population, every inch of ground is laid under contribution for the greatest possible amount of produce; in fact, industry has increased the original arable land in the rich alluvial valleys by transforming the naked sides of the hills, covered in many places by a barely one-foot-deep crust of disintegrated rock, into cultivated terraces. The highest hill at Chusan is not above 1800 feet above the level of the sea; the rest are of a much less elevation, and admit in most places of terrace-cultivation to their summit.

Position and climate warrant us, as before observed, to draw the inference, that Chusan in its fauna and flora cannot originally have differed materially from the opposite main-land, though the absence of rivers, lakes, and lastly forests, cannot but greatly influence either; in other words, the same animal and vegetable productions may be presumed to exist in the neighbouring regions of the continent, but with greater variety in forms and in numbers, inasmuch as both are affected by the presence or absence of rivers, lakes, and forests. To which should be added another consideration, the changes which the original physical aspect of a country must undergo by cultivation. Thus it may be assumed, that Chusan may afford a criterion of the fauna and flora of the neighbouring regions of China, but only to a limited extent.

In the cultivation at Chusan rice holds the first rank, and of that there seem to be two varieties; one cultivated in the valleys by the aid of irrigation, another on the heights, where the protracted periodical falls of rain afford a substitute for the art displayed by the Chinese agriculturist. During our first occupation of Chusan the rice-harvest commenced in the end of August, but soon after a new crop was observed to spring up between the drills or ridges of the old, which, irrigated partly by the celebrated water-wheels, and partly by the subsequent heavy showers of rain, seemed to promise another harvest before the setting-in of the winter season. The amount of the produce is such as to enable the inhabitants to dispose of a vast surplus, and this is the chief staple commodity, which is exported either as paddy or converted into "sám-shoo," a spirituous liquor distilled from rice. To judge by the number of distilleries and the quantity of samshoo in store at Ting-haé, it would seem that the city exports the greater quantity of rice converted into that commodity. All other kinds of grain occupy a secondary rank, such as *Holcus Sorghum* (Barbadoes

millet), *Polygonum*, of which several species are cultivated, one of them for the sake of the blue dye it yields, Job's-tears (*Coix Lachryma*), and maize. Of vegetables, *Convolvulus Batatas* (sweet potatoe) seems to be the greatest favourite with the Chinese; also *Solanum Melongena* (brinjal), *Chenopodium* (spinach), *Nelumbium*, *Cucurbita maxima* (pumpkin), water-melons, ginger, and turnips. Of fruit-trees, apples, pears, quinces, peaches, walnuts, grapes and citrons. Although both fruit and vegetables thrive remarkably well, they are of a very inferior description; rice, the staff of life, has engrossed all the care of the Chinese agriculturist, who looks upon all other objects of cultivation as secondary. There seems however to be every reason to believe that most European sorts of grain, vegetables and fruit would succeed at Chusan.

To the former vegetable productions are to be added, *Thea sinensis*, *Stillingia sebifera*, *Elæococcus Vernicia*, and *Nicotiana*. Tea is grown exclusively for the consumption of the inhabitants, and most of the houses and farms have either small plots allotted to the shrub, or it is planted in hedges or on the fine stone walls with which the houses are commonly surrounded. The shrub was in flower in July, had ripe fruit at the end of September, and flowered again at the commencement of November. The tea at Chusan when seen in leaves was even by judges considered to be of the black kind, but when made into infusion its colour and flavour were those of the green kind. On my inquiries from the farmers whether they made black and green tea indiscriminately from the same shrub, I was invariably told they gathered the leaves and prepared them, such as they were, without paying any further attention. The fact is, they are evidently not initiated in the secrets of the manufacturing districts, and their tea is of such inferior quality that it cannot form an article of commerce. A gentleman of one of the commercial firms in Macao, who visited Chusan during our first occupation, informed me that with great trouble he had contrived to collect some ninety pounds of tea on the island, for which he paid a price far beyond its value, solely with a view to encourage the inhabitants to establish commercial intercourse.

The fresh leaf is coarse and nearly $2\frac{1}{2}$ inches in length. The capsules either contain a single seed, and their outline is then circular; or two seeds, which make the outline resemble the Arabic character of number 8; or seldom three, in which case the outline acquires a blunt triangular shape.

Stillingia sebifera is cultivated to a considerable extent for the sake of the tallow-like matter which covers the ripe fruit.

It flowers in the month of July and August, and the fruit arrives at maturity in November, when the capsule containing three seeds bursts open. The process by which the vegetable tallow is secured is very simple. The seeds, after having been taken out of the capsules, are thrown into large vessels of boiling water, which, after being allowed to cool, leaves the pure white hardened substance, insoluble in alcohol, on the surface. The latter is again melted and formed into candles over wicks of thin bamboo or straw, which have been lengthways surrounded by a closely fitting spiral of thinner straw. These candles, which are said to form a no small article of exportation, are originally of a beautiful white colour, but sometimes dyed red; they burn remarkably well, without any unpleasant smell, and notwithstanding the rudely made wick, give a very good light. I have kept several of these candles exposed to the influence of the hot season in Calcutta, notwithstanding which they did not lose their original hardness. *Stillingia sebifera* has many years ago been introduced in Bengal, where it seems to thrive remarkably well; but Dr. Roxburgh observes, that the temperature of the winter season is not sufficiently low to allow the substance to congeal. This seems also to be the case in Canton province, where the substance is mixed with animal tallow, and thus fabricated. I have been informed that the tree is found in our northern territories, where there would seem to be no obstacle to prevent the substance from being applied to economical purposes and as a useful vehicle for ointments, but I am not aware of such experiments having been tried.

The cotton plant (with white flowers) succeeds very well, and is grown in many places, but to a very limited extent, and solely for the use of the cultivators; and such is also the case with tobacco. Small plantations of *Elæococcus Vernicia*, Juss., are seen here and there. The varnish it yields, although of inferior quality, is in great demand for furniture, and indeed for all the frame-work of the houses.

On the sides of the hills, where the scantiness of soil or the steepness is such as not to admit the plough, oaks and pines are raised for fuel: either attain to but a small size. The oak, I am informed by Mr. Griffith, is very like one which he discovered in the Khasyah Hills. The leaves resemble those of *Quercus infectoria*, while the sessile flowers approximate it to *Q. sessiflora*. A few very fine large junipers are seen in gardens. Firewood, vegetable and mineral coals, as well as timber, form articles of importation.

The agricultural implements at Chusan are of a description

superior to those used in the southern provinces, particularly the plough, the winnow, and the chain-pumps. Although the Chinese may be said to be pre-eminently an agricultural nation, and it has been the policy of their government to encourage and acknowledge agriculture as one of the most honourable pursuits, the eminence it has attained has been somewhat overrated. In the mere mechanical parts, such as the distribution of human labour in the cultivation of rice, and in a few instances of adopting the simplest means, the Chinese may be said to have arrived at perfection; but in the higher branches the Chinese are far behind the best European rural æconomists. It has been observed, that the small allotments of land in China must necessarily preclude any attempt at extensive operations, and while the individual is confined to raise a crop barely sufficient to maintain his own family, accommodation of the crop to the soil is almost entirely out of the question. As for the rest, nothing can be said of the agriculture at Chusan that has not already been noticed elsewhere, with one exception, and that is the unheard of and equally repulsive means to which the inhabitants resort to obtain manure for the fields. Suffice it to say, that in Ting-haé the inhabitants make a point of collecting the offal, which in a city it is the first duty to the health of the public to carry away, as it is to decency to hide. Here every house-owner not only makes this a source of traffic, for it is sold to the tillers of the soil, but the consequence of this custom has manifested itself in the social state of the people and obliterated all feeling of decorum*.

The period of our first occupation of Chusan, from the commencement of July 1840 till March 1841, was too short to afford data sufficient to obtain the annual mean tempera-

* In a short and interesting topographical account of Chusan, published in the 'Chinese Repository,' vol. x. p. 328, the following description of Ting-haé is given :—"The city possesses no large gardens or squares, but a considerable extent of open ground on the eastern side is devoted to the cultivation of rice. The canal, which nearly surrounds the city, sends a large branch through a water-gate near the southern gate, which, dividing into many branches, traverses the greater part in all directions. These branches form several large pools of foul stagnant water, into which every description of filth was thrown, and the street-sewers also opening into the canals rendered the latter extremely offensive, and during the warm weather caused a most unpleasant smell throughout the city. Added to this source of malaria, great numbers of large jars were placed at the corners of most of the streets and in all vacant places, which were filled with a fermenting mass of animal and vegetable offal, gathered from the houses and preserved for manuring the fields in the neighbourhood; as may be supposed, in some of those places the stench was dreadful."

ture and that of the four seasons. As the day however is not far distant when China will be no longer a field of speculation but one of research, it is preferable to await the sure results of continued meteorological observations, although the following few extremes may suffice to show the range of the thermometer. The observations were made in the open air in the shade.

	Highest.	Lowest.
July	86°	79°
August	93	76
September	100	71
October	84	58

On our first arrival in July the weather was very pleasant; the heat became oppressive towards the end of August, particularly at night, and remained so till the end of September, when heavy and protracted showers of rain made their appearance and did not cease till the end of November. The winter season commences in November, and I am informed that snow fell in the end of December, and that the thermometer sunk in January to 22°.

These great vicissitudes in climate manifest themselves in the absence of the brilliancy of the Indian flora and the frequent occurrence of true European forms. The Indian forms are of stunted growth, and many of them, such as the palms and the plantain, which are cultivated, do not arrive at maturity. Among the beauties of the wild flowers are a cærulean *Comelina* and *Plumbago*, *Ipomœa cærulea*, a delicate lilac *Aster*, *Nelumbium*, *Oxalis stricta*, a white *Clerodendron* and a lilac *Lycium*. In August ripe brambles and raspberries were found on the sides of the hills. The strawberry, which is very plentiful, was ripe in the commencement of August; the fruit is insipid, and by the Chinese fancied to be poisonous*. The plant was again in flower (of a rich gamboge colour) in the middle of September.

The hop plant, which may almost be said to cover Chusan and such of the surrounding islands as I had an opportunity to visit, flowered in August, and was in fruit in September and the commencement of October. When first I observed the *Humulus*, I became anxious to ascertain if it might not originally have been introduced by the English during the time of the Factory; but the inquiries which Mr. Gutzlaff was kind enough to make among the inhabitants, who, although it is

* A *Fragaria*, probably the same, has been observed at Nagree, in Sikim, by J. W. Grant, Esq.

not used, have several names for the plant, have established it beyond doubt to be indigenous. A group highly characteristic of the flora of Chusan attracted my attention in a tea-plantation; it consisted of a tea-shrub entwined by a hop-plant and surrounded by a strawberry, a bramble, *Artemisia vulgaris*, *Hypericum perforatum*, *Viola canina*, a pine, an oak, a plantain, and a fan-palm.

The following list of plants, collected at random, some of which I identified, with their genera, on the spot, while for the rest I am indebted to the kindness of Mr. Griffith, will serve to give some features of the flora.

Plants flowering at Chusan in July, August and September.

A. EXOGENÆ.

<i>Ranunculaceæ.</i>	<i>Xanthoxylaceæ.</i>
Ranunculus sceleratus.	Xanthoxylum.
<i>Nelumbiaceæ.</i>	<i>Oxalidaceæ.</i>
Nelumbium.	Oxalis stricta.
<i>Cruciferae.</i>	<i>Celastraceæ.</i>
Thlaspi.	Ilex.
Brassica.	Euonymus.
Sinapis.	<i>Rhamnaceæ.</i>
<i>Resedaceæ.</i>	Zizyphus.
Reseda luteola?	<i>Anacardiaceæ.</i>
<i>Tamaricaceæ.</i>	Rhus.
Tamarix.	<i>Fabaceæ.</i>
<i>Violaceæ.</i>	Phaseolus.
Viola canina?	Melilotus.
<i>Sterculiaceæ.</i>	<i>Rosaceæ.</i>
Sterculia.	Rosa sinica.
<i>Malvaceæ.</i>	<i>Potentilleæ.</i>
Gossypium.	Potentilla.
Hibiscus.	Rubus idæus.
<i>Aurantiaceæ.</i>	— Chamæmorus.
Citrus.	Fragaria.
<i>Ternstræmiaceæ.</i>	Geum rivale?
Thea chinensis.	<i>Amygdaleæ.</i>
Camellia.	Amygdala persica.
<i>Hypericaceæ.</i>	Prunus.
Hypericum perforatum.	<i>Pomeæ.</i>
— montanum?	Malus.
<i>Aceraceæ.</i>	Pyrus.
Acer.	Cydonia.
<i>Vitaceæ.</i>	Eriobotrys japonica.
Vitis vinifera.	<i>Lythraceæ.</i>
<i>Balsaminaceæ.</i>	Lagerstrœmia indica.
Balsamina.	

Myrtaceæ.

Myrtus.

Punica Granatum.

Cucurbitaceæ.

Cucumis Melo.

(Red and white water melons.)

Cucurbita maxima.

——— lagenaria.

Actinostemma (nov. gen.),

Griffith.

Portulacaceæ.

Portulaca.

Illecebraceæ.

Herniaria (prope glabram).

Crassulaceæ.

Sedum.

Sempervivum.

Hamamelaceæ.

Hamamelis.

Araliaceæ.

Hedera Helix.

Panax aculeatus.

Apiaceæ.

Daucus Carota.

Carum.

Caprifoliaceæ.

Sambucus japonica.

Cinchonaceæ.

Pæderia foetida.

Gardenia.

Compositæ.

Aster.

Bidens.

Lactuca.

Gnaphalium.

Inula.

Senecio ?

Chrysanthemum.

Artemisia sinensis.

Oleaceæ.

Olea fragrans.

Jasminaceæ.

Jasminum.

Convolvulaceæ.

Convolvulus Batatas.

Ipomæa cærulea.

Solanaceæ.

Solanum nigrum.

——— Dulcamara.

Solanum Melongena.

——— Lycopersicum.

Datura fastuosa.

Nicotiana.

Capsicum.

Lycium.

Primulaceæ.

Anagallis.

Lamiaceæ.

Rosmarinus officinalis.

Mentha.

Origanum.

Marrubium.

Verbenaceæ.

Verbena.

Clerodendron.

Sesameæ.

Sesamum.

Plumbagineæ.

Plumbago.

Plantagineæ.

Plantago.

*Chenopodiaceæ.*Chenopodium Bonus Henri-
cus.

Celosia cristata.

Begoniaceæ.

Begonia.

Polygonaceæ.

Polygonum Fagopyrum.

Rumex Acetosa.

Rheum.

Eleagneaceæ.

Eleagnus.

Euphorbiaceæ.

Stillingia sebifera.

Elæococcus Vernicia.

Phyllanthus.

Chloranthaceæ.

Chloranthus inconspicuus.

Salicaceæ.

Salix babylonica.

——— ?

Urticaceæ.

Urtica.

Cannabis sativa.

Morus.

Ficus.

Humulus Lupulus.

Cupuliferæ.

Quercus.

Juglandaceæ.

Juglans regia.

Taraceæ.

Salisburia adiantifolia.

Coniferæ.

Pinus.

Juniperus.

Cupressus.

B. ENDOGENÆ.

Hydrocharaceæ.

Hydrocharis Morsus ranæ.

Scitamineæ.

Zingiber officinale.

Orchidaceæ.

Herminium?

Musaceæ.

Musa.

Iridaceæ.

Iris.

Pardanthus.

Liliaceæ.

Lilium.

Allium.

Commelinaceæ.

Commelina.

Palmaceæ.

Raphis flabelliformis.

Areca Catechu.

Alismaceæ.

Alisma Plantago.

Sagittaria.

Pistiaceæ.

Lemna.

Graminaceæ.

Triticum.

Zea Mays.

Saccharum officinarum.

Bambusa.

Oryza.

Poa.

Coix Lachryma.

Holcus Sorghum.

Setaria.

Panicum.

Andropogon.

Lycopodiaceæ.

Lycopodium.

Filices.

Filix.

Pteris.

Aspidium.

Lygodium.

Nephrodium.

Asplenium.

Pleopeltis.

Musci.

Muscus hypnoides.

Lichenes.

Bæomyces?

Algæ.

Conferva.

Sargassum.

Fungi.

Agaricus.

The causes which affect the fauna of Chusan have been noticed in the preceding pages, and we may, from these, infer its poverty in variety of forms. It has been asserted that scarcely any large wild beasts are found in the Chinese empire; a dense population, which may be said to be *par excellence* agricultural, would *à priori* corroborate this opinion. At Chusan, which is comparatively a young colony, deer*, which

* It may as well be mentioned that two fine deer, *Cervus Axis*, of which the Chinese are very fond, were brought in 1840 in a junk from Formosa to Chusan. One of them, which I kept, died in the commencement of November, apparently from the vicissitudes of the weather.

were plentiful in Mr. Cunningham's time, are at present entirely unknown. Over-population cannot admit of the co-existence of the larger domesticated animals: thus, the few bullocks which were found on our first occupation were solely used for agricultural purposes; but there were neither buffaloes nor sheep, which latter (a broad-tailed kind) are said to be plentiful all over China. The food of the people is chiefly vegetable, and fish may be said to form the principal animal food. Among the Mammalia there is at least one Indian species, for several skins of the scaly ant-eater which I examined at Chusan, and were said to have been procured on the island, belonged to *Manis pentadactyla*, Linn. "This," Mr. Ogilby observes in his interesting memoir on the Mammalogy of the Himalayas, "the only species of the family known to inhabit the continent of Asia, is found in the lower and less elevated parts of the central regions; but all the *Edentata* are essentially inhabitants of the warmer parts of the earth, more especially of tropical America, and we cannot therefore expect to find their forms reproduced in the Himalayas."

Scantiness of forms is a striking feature in the ornithology of Chusan, and it can scarcely be doubted that the absence of forests is one of the principal causes. During my stay on the island, I never saw nor heard of others having observed a bird of prey. As before mentioned, the Chinese exist upon vegetable food; and when, which is very seldom the case, carrion is exposed, it is soon discovered by the numerous half-reclaimed dogs. The great care which the Chinese bestow upon the burial of the remains of their dead may also be here noticed. Nearly all of the birds which will be enumerated below are very numerous, and among them there are some common European forms, such as the magpie, tree-sparrow (both also occur in Japan), blackbird, and some which are equally common in Bengal, such as the little kingfisher, the drongo or king crow, both of which were observed by Col. Sykes in the Dukhun; where also the common swallow of Chusan, which leaves in August, *Hirundo erythropygia*, Sykes, "appeared in millions in two successive years in the month of March in the parade ground at Poona; they rested a day or two only, and were never seen in the same numbers."—Catalogue of Birds in the Dukhun, Proceed. Zool. Soc. 1832, Pt. II. p. 83.

Of Chelonian Reptiles but two forms were found, one of which, *Trionyx tuberculatus*, approaches closely to *T. javanicus*. None of the large Saurians occur, nor Monitors; but both the little *Hemidactylus*, which is very numerous, and the *Tiliqua* are nearly allied to species inhabiting Bengal and other parts of India. It has generally been believed, that

China is infested with very few serpents. At Chusan, although few in species, they are remarkably numerous. *Naja*, which appears to be the only terrestrial venomous serpent, as well as the species of *Lycodon*, *Coluber* and *Tropidonotus*, are, as pointed out in the descriptions, closely allied to Indian species. *Python Schneideri* has hitherto been found only in Java, Banca, Amboyna, and once at Malacca. All these, however, are forms which characterize tropical Asia. I am told that several species of Pelagic serpents occur in the Chusan Archipelago. Although none have come under my observation, there seems to be no doubt about their existence in the latter locality, as they have been found at Japan; and it may be observed, that certain species of fish which form their favourite prey are as plentiful as in the Bay of Bengal. The serpents of Chusan are different from those of Japan, where their specific strength is in the same proportion to their numerical as in the former island. M. Schlegel observes, that the terrestrial serpents of Japan seem chiefly to represent European forms, while a species of the genus *Trigonocephalus* is the only form establishing analogy between the fauna (?) of Japan and that of India or the tropical regions in general. (Fauna Japonica, Ophidii, p. 82.) This is partly correct in as far as the genus is concerned. But M. Schlegel has described another Japanese serpent, *Tropidonotus Vibakari*, which, to judge from the description and figure, is very closely allied to *T. surgens* and to *T. mæstus*, both found in Bengal (Proceed. Zool. Soc. 1839), and perhaps, by the peculiarity of its integuments, also to *T. rufodorsatus* of Chusan. In the Batrachian Reptiles there exists a striking resemblance between the fauna of Chusan and Japan: in both the frogs are European forms, the toads not; *Bufo gargarizans* approaches to the Indian toad, figured as *B. dubia* in General Hardwicke's 'Illustrations.'

With the Pelagic fishes but little opportunity was afforded to become acquainted, as unfortunately the fishermen had followed the example of most of the other inhabitants, who had fled on our first occupation of Chusan in 1840. No other nation derives so much nourishment from the sea and the rivers as the Chinese. On the passage in June 1840 through the Formosa Channel, along the provinces of Fokeen and Chekeang, we daily fell in with hundreds of boats, a certain number of which accompanied each fishing-junk of 200 to 300 tons burden. These craft anchor and send out their small but fine-sailing little boats, each manned with four to six men, who act in concert so as to form one long line of nets, distinguished at intervals by little flags attached to floating pieces of bamboo. The time which must elapse before the nets can

become filled with fish is employed in angling with hook and line. A few hawls were sufficient to fill the boats, which then repair to their junk, the common receiver of their harvest. To judge by the list of fishes of Macao given in Mr. Bridgman's 'Chrestomathy,' the Chinese sea must be rich in forms. The following few came under my observation at Chusan :—

Labrax japonicus, Cuv.	Clupea affinis, Gray Illust. Ind.
Nebria.	Zool.
Umbrina.	Engraulis Hamiltonii, Gray Illust. Ind. Zool.
Hæmulon.	Solea Zebra ?
Stromateus albus, "Pomfret."	Carcharias.
———— niger, "Pomfret."	Trygon.
———— securifer, Cuv.	
Trichiuris savala, Cuv.	

To this may be added another small collection from the entrance of the river Peiho, for which I am indebted to Dr. George Playfair :—

Labrax japonicus.	Calliomorus Chaca, Ham.
Mugil parsia, Ham.	Engraulis Hamiltonii.
Gobioides rubicunda, Ham.	Tetrodon.

Nearly all these forms inhabit also the Bay of Bengal and other parts of the Indian Ocean.

Among the fishes inhabiting fresh water and estuaries, the greater number are Indian forms : two species inhabit Bengal, viz. *Anabas scandens*, Cuv., and *Cyprinus daniconius*, Ham.; one is Javanese and three are European; among the latter is an eel, which seems to be identical with *Anguilla latirostris*, Yarrell.

The terrestrial and fluviatile Mollusks are remarkably rich in forms, not only in point of variety but also in interest, which will be seen by the excellent descriptions from the pen of W. H. Benson, Esq. A few approach to European forms; three are identical with Indian, viz. *Helix* tapeina*, Benson, *Planorbis compressus*, Hutton, and *Helix naninoides*, which last is also found at Singapore.

Among the Annelides occurs a remarkable form, with the anterior part drawn out to the sides like the head of *Zygæna* or *Cerambyx Fichtelii*; another, but of a different species, was first discovered by Mr. Griffith in 1836, found under stones in the Naga Hills; a third species has been observed in Bengal.

Of the Crustacea, one approaches to an European form, the rest are tropical.

* *Helix cestus*, Benson, which inhabits the N.E. frontier of Bengal, is very common about Macao and the islands in Canton river.

The Arachnida are remarkable for their numerical strength, their habits, and the size to which some of them attain. *Epeira fasciata*, Walckenaer, appears to be the only European species inhabiting Chusan.

With regard to the Entomology of Chusan (a collection of insects having been despatched to the Museum of the Hon. the Court of Directors, and a duplicate series by order of Government to the Entomological Society of London), it must suffice to state, that Indian forms prevail and European forms are not numerous. Many identical species occurred in the extensive collections formed in the Khasyah Hills and Assam* in 1835–36, by Messrs. McClelland and Griffith. Among the forms characteristic of Chusan were a species of *Tingis*, a *Centrotus*, and a brilliant golden green *Agrion* with black wings.

[To be continued.]

XXXII.—Notice of the Genus Murchisonia.

By M. D'ARCHIAC†.

ON taking a survey of the numerous genera of the Gastropodous Mollusca, we find in many cases, especially in the fossil genera, shells possessing the peculiar character of a more or less deep sinus or notch on the right lip. Thus, amongst the *Naticæ* we find *Natica cincta* (Phill. Geol. of Yorksh., pt. 1. pl. 4. fig. 9), and perhaps *Buccinum vittatum* (Phill. Geol. of Yorksh., pt. 2. pl. 16. fig. 14), as well as several other shells of pl. 15 of the latter work. Between *Solarium* and *Euomphalus* we find the genus *Schizostoma* of Bronn, and certain shells not yet classed from the lower oolite of Calvados and the carboniferous limestone of Belgium. The latter certainly do not present a proper notch on the last whorl, but a certain number of holes, which close as the shell advances in age, nearly in the same manner as in *Haliotis*. Between *Trochus* and *Turbo* we find *Pleurotomaria* and *Seisurella*; between *Cerithium* and *Fusus* the great genus *Pleurotoma*. Lastly, *Nerineæ*, the situation of which does not

* The richness and interest of the fauna and flora of the province of Assam, which from its position is of our Indian dominions the one most calculated to throw light upon the south-western part of China Proper (Yunnan), may be inferred from the reports and collections of the two above-named naturalists: Mr. Griffith has added further to our knowledge by the botanical and zoological collections which he has continued forming by native collectors, trained and privately maintained by himself, in the Khasyah Hills.

† From the Bulletin of the French Geological Society, vol. xii. 1841.—We are indebted for the translation to Thomas Johnson, Esq., of Hexham.

THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

No. 59. JULY 1842.

XXXVIII.—*General Features of Chusan, with remarks on the Flora and Fauna of that Island.* By THEODORE CANTOR, M.D., Bengal Medical Service, &c.

[Continued from p. 278.]

WHILE engaged in examining and collecting objects of natural history in China, microscopic zoology did not altogether escape my attention. Sketches and notes were taken as often as my scanty time would permit, with a view to obtain some information about the geographical distribution of these minute animal forms, the very existence of which would have been a secret but for the revelation of the microscope. Previous use of instruments enabled me to delineate faithfully what I saw, and I have had the satisfaction to test the correctness of my sketches by comparing them after my return to Calcutta with the beautiful plates of M. Ehrenberg. To attend to anatomical structure, or the measurement of the animals themselves, lay not in my plan; partly because this branch of zoology is not sufficiently familiar to me, but chiefly because the bustle of a camp-life is anything but calculated to afford the otium indispensable to such studies. From comparison with M. Ehrenberg's great work upon Infusoria, it would appear that most of the forms observed at the island of Lantao, situated in the mouth of Canton river, and at Chusan, also inhabit Europe*. A detailed list of the localities given by Ehrenberg has been prefixed to those places where the Chinese animalcules were found.

The method I invariably followed in the examination was this: I first took a sketch of the animalcules through single lenses, of which my highest power was $\frac{1}{50}$ th of an inch, and then examined the object through a compound of 210 linear, when I nearly always found the sketch to correspond. Unless the powers of the single lenses are added in the sketches, they

* See Dr. Ehrenberg's reflections on the extensive diffusion of species among the Infusoria and their insensibility to climatic variations.—Taylor's Scientific Memoirs. Part X.—Ed.

have been taken through the medium of $\frac{1}{30}$ single lens and 210 linear compound.

The few forms I have added as "dubia" are those to which I have found none corresponding among Ehrenberg's. To G. W. Grant, Esq., an indefatigable microscopical observer, who has kindly examined my sketches and notes of Chinese animalcules, I am indebted for the following list of forms described by M. Ehrenberg, which he has recognised as also occurring in fresh water in and near Calcutta:—

Sphaerosira volvox.	Navicula fulva.
Closterium turgidum.	————— turgida.
Euglena longicauda.	Vorticella patellina.
Epipyxis utriculus?	Coleps hirtus.
Arcelina aculeata.	Lepadella emarginata.
Arthrodesmus quadricaudatus.	Brachionus urceolaris.
Micrasterias hexagona.	

From what has been stated, it will appear that Indian forms (to which may be added a few Javanese) prevail in the fauna of Chusan, and that European forms make but a secondary feature. The climate of Chusan, as before observed, being that of the nearest continent, it may be inferred that Indian forms occur in central China (in those parts of course which, *cæteris paribus*, correspond with Chusan), the longitude of which is less easterly, at least up to the 30th degree north, or the latitude of that island. As the annual mean temperature of Chusan is considerably below that of tropical countries, it follows, that certain forms, and these among the lower classes of animals, which hitherto have been considered peculiar only to a tropical climate, are able to exist under a much lower temperature, and thus possess a much less limited geographical range. In what exact latitude and longitude European forms commence, is, in the present state of our knowledge of the physical condition of China, impossible to determine.

The following ably drawn up paper, which appeared in the 'Chinese Repository,' vol. iii., will serve to give a precise idea of the attention paid by Europeans to the natural history of China, from the days of the Jesuits up to the time of its publication (1834). It contains matter of general interest to naturalists, and may prove useful to those, who we may hope will ere long be enabled to engage in active investigations in that empire. "The Jesuits were the first Europeans, except Marco Polo, who made any investigation in this field. For nearly two centuries these men resided in China, and in the course of their attempts to establish themselves here, they travelled extensively throughout all the provinces. During

the reign of Kanghai, a period of sixty-one years, they were permitted to investigate everything they deemed worthy of notice, and the voluminous works they left bear testimony to their diligence. Missions were established in all the principal cities, and they were ably conducted by men who were well versed in literature and in the arts and sciences, and who would not have suffered by comparison with the best scholars of Europe: and what might we expect to find in their works concerning the natural history of China? Judging by their success in other departments, as topography, history, &c., we might reasonably hope for full and faithful narrations of the vegetable and animal productions, and also of the agriculture. Concerning some of the more remarkable productions, as bamboo, tea, &c., we have details of such length as to tire the reader. They were not the men who would let anything pass by them which could adorn their pages, or excite the wonder of readers in other countries. But what do we find on perusing their accounts? So far as those descriptions are mere translations of native authors, the defects are not to be charged to the Jesuits. They wished to tell all they could concerning China, and in their desire so to do, recorded many things which further research would have convinced them were not facts. These exaggerated statements have conspired to create ideal notions of the character, policy and country of the Chinese, which future travellers, we apprehend, will find erroneous. Among all their remarks on natural history we do not find a single continued narration of facts which the author asserts as having come under his own eyes. There was no Linnæus or Cuvier who would be satisfied with faithfully recording the results of his own observation. If such had been the case, the united labours of these 'fathers' would have presented rich materials for compiling a work on the natural history of China, but which must now be reserved for others. In considering the merits and demerits of these writers, however, we must remember that they lived in an age when the public taste was satisfied with nothing but tales almost beyond the bounds of belief. Their accounts are not more improbable than what we find in Buffon; and these men flourished long before his time. Besides, it was for their interest to portray this country in as favourable an aspect as possible: their situation was such as required all the aid that interesting description could bring. The want of any well-digested work on natural history also presented itself as a serious obstacle against pursuing the science in a useful way. If observations were made, how could they be compared with previous ones and their relative importance ascertained? This was a hindrance

of which we can hardly have a full conception in the present advanced state of the science. With the want of books the precarious tenure of the establishment of the Jesuits here may also be adduced as a reason why so few turned their attention to such subjects. Liable every moment to be driven out of the country, the leaders would naturally bend all their energies to secure that which had already been gained, and leave others to narrate what was seen. The erroneous ideas concerning the natural history of this country which have become current among the great mass of readers in the West is a serious evil, and one which has been occasioned chiefly by the exaggerated statements of these early writers. Every author for the last century who wished to write concerning China needed only to open the volumes of the Jesuits, and long descriptions on every subject met his eye. These he wrought into his own phraseology, and spared not to enlarge or reduce them to suit his own convenience. The consequence is, that the same thoughts, being presented in many lights and by authors of reputation, are received as accredited truths. An instance of this is found in Malte-Brun's 'Geography,' who states, on the authority of a member of the Dutch embassy, 'that the Chinese farmer yokes his wife and ass together at the plough;' and this is said in such a manner as to convey the idea that it is a common occurrence; while the instances of such brutality are as rare in China as in Persia or India, or any other country in the same state of civilization. Concerning the accounts of the Jesuits in general, we may observe, that when they are satisfactorily proved or disproved, and the truth sifted from the rubbish which surrounds them, they will be found to contain much valuable information; but until they have been carefully compared with renewed investigations, they must be cautiously received. We will now proceed from the works of the Jesuits, which for the most part were written before the eighteenth century, to consider what has been done by more recent observers. In 1750 Peter Osbeck came to China as chaplain to a Swedish East Indiaman, and made some discoveries in the vicinity of Canton. He was a disciple of Linnæus, and had imbibed his master's love for the works of nature. The freedom allowed to foreigners at that time enabled him to extend his researches in this hitherto unexplored field to a considerable distance round the city. He collected many plants in the vicinity of Canton and the anchorage at Whampoa. The remembrance of his zeal and success was perpetuated by Linnæus in the *Osbeckia chinensis*; and a friend and assistant was remembered in the *Torenia asiatica*. These, we believe, are the only instances of any persons who

came to China for only a single season, that improved the opportunity to extend the knowledge of its natural history. Other ports, as Shanghai and Amoy, were once open to foreigners, but the desire for gain was then so strong as to engross all the time of those who visited them. From the time of Osbeck till the embassy under Macartney in 1793, we read of none who explored these wide fields. No Tournefort or Pursh was found who would willingly endure the fatigues and dangers of visiting China from a love of natural history. The embassy under Lord Macartney was provided with competent naturalists, and the advantages enjoyed were many; yet the results do not appear to have been considerable. In a journey from Teentsin to Jeho (Zhehol) and then through Peking to Canton, abundance of opportunities must have been presented to enlarge our knowledge of this country. But the same causes which will retard future labourers hindered the researches of the members of this embassy; the jealousy of the Chinese government prevented them from examining most of the interesting objects which came in their way while travelling through the country. The works of Staunton and Barrow, however, contain many valuable notices of the natural history of China; and if the embassy did not open a more favourable trade to its projectors, it enabled us to form more correct ideas of the real aspect of the country, both in a political and natural point of view. The remarks were such as would naturally be made by those travelling in a circumscribed manner, and relate principally to agriculture and the natural scenery. The Dutch embassy to Peking in 1795 under Van Braam does not appear to have made many remarks concerning the natural history of the districts through which it passed. From the time of that embassy to the one under Lord Amherst in 1816, very little was done in this branch of knowledge in China. When that expedition was proposed, the advantages that would accrue from having an able and scientific naturalist were duly appreciated by the projectors. Such a one was found in Dr. Abel, and the result showed that the expectations of those who recommended him were not ill founded. Everything necessary to enable him to transport the specimens, whether on shore or on board the ship, was done, and no expense spared in affording him all the facilities possible during the journey. From Teentsin to the capital the way was closely examined; but from Peking to Canton few observations were made or specimens collected, on account of the rapidity of travelling. Besides, Dr. Abel was taken sick on his return and prevented from personal research to the extent he wished. The gentlemen of the embassy, however,

brought him every specimen they saw worthy of notice. At Canton, the whole collection of plants, minerals, and other objects which had been collected were put on board H.M.S. *Alceste*, the ship that brought the embassy to China. The loss of that vessel in Gaspar Straits, and with her Dr. Abel's entire collection and the notes appended to it, deprived the world of much valuable information. Except a very few specimens he gave to some friends at Canton, everything he had collected perished with the *Alceste*. Among these preserved specimens Sir Joseph Banks found some new plants, one of which, *Abelia chinensis*, commemorates the zeal of the naturalist. Since this expedition nothing of importance has been done in any department of natural history, excepting botany. To this branch a few of the gentlemen attached to the Hon. E. I. Company's factory have paid some attention. The Horticultural Society of London in 1819 sent out Mr. Kerr, a gardener, to collect and buy living plants and send them home, but his success was only partial. Many new plants have been discovered among those which have been sent home by the residents at Canton. The steady demand for these, both among foreigners and natives, has induced the Chinese to bring rare plants to this city; they are kept for sale at Fahte, the 'flower-gardens' near Canton. The number of plants shipped to Europe and America yearly is considerable, and the demand is increasing. According to Livingstone, not one in a thousand reaches their destination; yet from the immense number sent in a long course of years, we may safely infer, that one-half of all known Chinese plants have been discovered and named in this way. Great care is necessary to preserve them on board ship in a voyage of such length, and from the want of this care consequently many of them die. Different plants require such different attention, that what saves one kills another. But the number of names probably far exceeds the number of species, for the Chinese gardeners are skilful in altering the appearance of flowers, and finding it for their interest so to do, they devote much time to the pursuit. From this short sketch it appears, that in the natural history of the Chinese empire much remains to be done. The Chinese works on this subject are voluminous, and they contain dissertations on plants of all kinds and qualities, chiefly those used in medicines; on gems, of which they are fond; on quadrupeds, birds, fishes and insects; and even shells and mollusca are not overlooked by them. On the same pages we also find accounts of tiger-elephants, dragons, and other similar fantasies. The entire range of natural science in the Chinese empire will require thorough investigation, for what has been done needs to be

done again. Botany has attracted most attention, and the progress made in it from various sources is considerable; but the grasses, the cryptogamic plants and some other branches of the study, are nearly unknown. The works of the Jesuits contain notices of the larger animals of China, but with the other branches of zoology we are imperfectly acquainted. The birds and the fishes, the insects and the mollusca, will each afford sufficient materials for many interesting volumes. Mineralogy is on the same level; but the precious gems, the beautiful crystals of quartz, the white copper and the gypsum seen in Canton, show the abundance of its mineral treasures; the variety of metals cannot be small, but their full extent cannot be yet known. Of the geology of this empire very little knowledge has been gained by Europeans; and of the organic remains, which we may expect to be considerable from those found in Ava and Siberia, still less is known. It will be apparent then, that the investigation of China and its dependencies will open a field of research that is unequalled in the world. From Samarcand to Formosa and Japan, and from Saghalien to Camboja, is a field, which is nearly unknown. Peopled from the remotest antiquity with wandering nomades, who have despised agriculture and employed themselves in enslaving their neighbours, Tartary is about the same now as it was a thousand years ago. China has undergone many alterations, and the face of the country, by increase of population, has assumed the appearance of an extended garden, when compared with the countries on the western boundary. We hope this interesting and wide field will soon be carefully surveyed in all its departments. The Chinese are not so savage as the Arabs, nor so deceitful as the Moors, nor so wandering as the North American Indians, in whose countries travellers have passed many years. From the appearance of the times, we expect the Chinese empire will soon be open to foreigners, and we trust that the naturalist will not be slow to enter on a field abounding with objects worthy of his attention."

It may perhaps not be deemed irrelevant to offer a short account of the auspices under which the objects of the following descriptive catalogue were collected. In the earlier part of 1840 the Supreme Government had determined upon despatching forces to China. The opportunity thus offered of seeing service, and at the same time of visiting a field hitherto closed to science, was too tempting to be allowed to pass, and I ventured to solicit of the Rt. Hon. the Governor-General that I might become attached as Assistant-Surgeon to one of the regiments about proceeding on the Eastern expedition. In the mean time I had been ordered to march to the northern pro-

vinces with a detachment of H.M. troops, part of which had been under my charge on their passage from England, and had arrived in the vicinity of Hazareebaugh, when I was relieved with orders to proceed to the Presidency. On my subsequent return to Calcutta I received intimation that H.E. the Commander-in-chief had been pleased to post me to H.M. 49th regiment, then *en route* to join the expedition to the eastward. In an interview with the Rt. Hon. the Governor-General, I was honoured with his Lordship's commands, that I should collect objects of natural history for the Museum of the Honourable the Court of Directors, to which effect I was to be furnished with materials and instructions, that I should inquire among the medical officers of the expedition if there were a botanist capable and willing to undertake the botanical part of the future inquiries. I was further instructed to correspond upon matters connected with my charge with his Lordship's private secretary. Fully imbued as I was with a sense of the high honour which his Lordship had been pleased to confer, I became also aware of the responsibility it devolved upon me. Hitherto my labours in natural history had been of a strictly private nature, and to this as well as to the difficulties which I have had to encounter, I have always attributed the liberal encouragement with which my humble exertions have been received by some of the first philosophers. During the few days which elapsed after my interview with his Lordship, I was vigorously engaged in making arrangements connected with the execution of my scientific mission, when I was ordered to assume the medical charge of a detachment of H.M. 26th regiment, with which I, the following day, embarked for China. My sudden departure from Calcutta prevented me from obtaining his Lordship's instructions, and also a number of articles absolutely necessary for preserving objects of natural history, all of which were now to follow. Our visits to Penang and Singapore enabled me indeed to obtain a few of those necessities, which, however, notwithstanding their exorbitant prices, proved to be utterly inefficient. Nearly during the whole month of June 1840 we were detained at the island of Lantao, in Canton River (Choo-keang or Pearl River), which afforded me an opportunity of becoming somewhat acquainted with the leading features of the flora and fauna, and I commenced forming botanical and zoological collections during the hours of leisure left by my military duty. On our arrival at Chusan in July we had the good fortune of landing our original number of troops, all in fine state of health, which I chiefly attribute to the excellent arrangements of the commanding officer, Captain Paterson, of

H.M. 26th regiment. Shortly after I became exempted from military duty as long as my services could be spared, agreeably to instructions upon the subject from H.E. the Commander-in-chief of India. From the state in which I by this time found the collections I had made shortly before at Lantau, I was disagreeably apprised of the bad quality of my materials for preserving, though this was only the commencement of subsequent mortification, felt on witnessing the destruction of objects nearly as fast as I contrived to collect them. Time becoming precious as the season for collecting was rapidly advancing, and the prospects of the arrival of a supply of materials from Government being uncertain, I had only one course left, to sketch the living objects. The illustrious Mr. MacLeay has observed, that the use of the pencil and brush is as necessary to a naturalist as the power of reading and writing. I felt the truth of these words at this juncture, when I had no hopes of success in preserving collections, though I was determined upon not altogether losing the opportunity. Not having received the instructions of the Rt. Hon. the Governor-General as to the objects of my inquiries, I directed them to general features, on the same principle as the artist does who intends to produce a familiar likeness. An entire though hasty outline will better serve the purpose than if he were to produce an elaborate representation of single parts or features. I do not mean to deny that a thorough study of any single branch of zoology may prove of the greatest importance to throw light upon the physical condition of a country; but I am alluding to the peculiar position under which I was placed in a field new to science. About the end of August I was fortunate enough to receive a quantity of spirits of wine and bottles, timely enough to save part of the zoological collections from destruction. As I had not succeeded in my search for a botanist, I trained my servant to assist me in collecting plants and seeds, while my own time was divided between searching for specimens, sketching them, and taking notes. At this period the dreadful extent of sickness, ravaging during our first occupation of Chusan, rendered the assistance of every medical officer necessary, and I was ordered from my residence to perform regimental duty with H.M. 26th regiment. The Cameronians were encamped on the slope of a steep hill, at a considerable distance from the house in Ting-haé where I lived, among the collections. The large building had been appropriated to the office of the chief magistrate, and during my stay there I had the pleasure of affording medical assistance to the European establishment as well as to a number of cases among natives connected with

that office, which latter circumstance afforded some opportunity of more closely observing the habits of the people. The difficulties which the Chinese language imposes upon the foreigner, the kindness of the Rev. Mr. Gutzlaff had in some measure enabled me to obviate. I had put down and numbered all questions upon which I wished information, opposite to which Mr. Gutzlaff had furnished the Chinese version. The latter I produced in my excursions to the Chinese, who, as they nearly all can read and write, seldom failed to write a reply on a blank paper, to which I attached the number corresponding to my question, and was afterwards favoured by Mr. Gutzlaff with a translation. That information of such a kind must be used *cum grano salis*, it is scarcely necessary to add. The bodily fatigue I had daily to encounter in the execution of my duty, the beyond description distressing nature of the duty itself, I have reason to believe laid the foundation of my subsequent severe illness. I had scarcely been relieved from military duty and busily engaged in turning the short remaining season to the best possible account, when I became a victim to a violent cerebral fever, and was subsequently ordered to sea by the Medical Board at Chusan, in a state, I am informed, which held out but slight prospect of my surviving. I have now but to perform the pleasing task of expressing my gratitude to Sir Gordon Bremer, K.C.B., Col. Mountain, C.B. of H.M. 26th regiment, in addition to those officers on the expedition mentioned in the descriptions, to whose kindness, during my sojourn at Chusan, I feel myself greatly indebted. To G. A. Bushby, Esq., Chief Secretary to the Government of India, I beg to express my best thanks for his great liberality, which the important avocations of a high office never prevented from rendering every assistance to facilitate my scientific task. To J. W. Grant, Esq., B.C.S., I take this opportunity of acknowledging the repeated and through years unaltered benefits which I have derived from his extensive, but unassuming knowledge of the natural history of India. In placing the Mollusks at the disposal of W. H. Benson, Esq., B.C.S., I was guided by the conviction, that I could not turn them to greater advantage to science; and while I beg to offer my best thanks for the liberality with which that distinguished naturalist has met my request, his own descriptions carry the best proof of the correctness of my estimate.

[To be continued.]

straminea, spathulato- v. obovato-oblonga, obtusa, integerrima, vel apicem versus obsolete crenulata. Stamina 30-45 : filamenta libera v. pentadelpa, ovarium sericeum vel tomentosum. Stylus glaber vel basi barbatus, post anthesin 2 lineas longus. Stigmata obtusa, demum sæpè patentia. Nux 2-4 lineas alta, diametro $\frac{1}{2}$ -3-lineari; costæ plus minusve prominentes, sæpissime crassæ. Semen ovatum v. obovatum, fusco-castaneum.

Habitat in Europâ, præsertim mediâ et australiori. Parisiis florescit medio Junio : individua tamen reperiuntur singula jam initio Junii vel tantum initio Julii florida.

LIII.—*General Features of Chusan, with remarks on the Flora and Fauna of that Island.* By THEODORE CANTOR, M.D., Bengal Medical Service, &c.

[Continued from p. 370.]

Animals observed at Chusan.

1. MAMMALIA.

CHEIROPTERA.

* *Vespertilio irretitus*†. V. auriculis capite brevioribus, rotundatis ; trago lanceolato ; rostro brevi, obtuso, nigro ; labiis mentoque crinibus longioribus sparsim tectis ; vellere dorsi capitisque molli, brevi, griseo-brunnescenti, abdominis pulvericolore ; membro virili maximo ; caudâ corpus longitudine æquante, e membranâ interfemorali, subtus sparsim hirsutâ, paululum exsertâ.

Ears rounded, shorter than the head ; tragus lanceolate ; muzzle short, obtuse, black, the lips and chin with scattered, lengthy, bristly hairs ; fur of the back and head short, soft brownish gray, that of the abdomen dust-coloured ; male genital organ highly developed ; tail as long as the body, slightly protruding from the interfemoral membrane, the abdominal surface of which is thinly covered with short hair.

Dentition :—Incis. $\frac{2-2}{3-3}$; canin. $\frac{1-1}{1-1}$; molar. $\frac{4-4}{5-5}$.

	DIMENSIONS.	inch.	lin.
Length of the head		$\frac{1}{2}$	0
————— body		$1\frac{1}{2}$	1
————— tail		1	1
————— ear		0	$2\frac{1}{2}$
Breadth of the ear		0	2
Length of the tragus		0	1
Extent of the wings		8	0

* Animals marked with an asterisk have been sketched at Chusan in 1840 by Dr. Cantor, who has supplied the names unless otherwise observed.

† *Irretire*, from its being frequently arrested in the strong web of two large spiders, *Epeïra bilineata* and *heraldica* (vide infra), which circumstance has given rise to the common erroneous belief that those and similar spiders feed upon bats.

CANINA.

Canis sinensis, Auct.

FELINA.

Felis domesticus, Auct.**Felis* ——— ?

EDENTATA.

Manis pentadactyla, Linn.

PACHYDERMATA.

Sus (var. *sinensis* Auctor.).**Equus caballus*, Auct.—— *asinus*.

RUMINANTIA.

Capra*.Bos taurus*, Auct.

2. AVES†.

PASSERINÆ.

Dentirostres.

Lanius erythronotus, Vigors.*Dicrurus balicassius*, Vieillot.*Turdus merula*, Auct.*Philedon* ——— ?*Sylvia hippolaïs*, Temminck.

Fissirostres.

Hirundo erythropygia, Sykes.

Conirostres.

Pyrgita montana, Auct.*Pastor cristatellus*, Temm.*Pica vulgaris*, Auct.

Syndactyles.

Alcedo bengalensis, Gmelin.

GRALLÆ.

Culirostres.

Ardea ——— ?

3. REPTILIA.

CHELONIA.

**Trionyx tuberculatus*. T. testâ triste olivaceâ, ocellis nigris tuberculisque crebris tectâ; infrâ albo-viridescens; laminis osseis quatuor.

Dark olive; carapace with ocellated black spots and numerous tubercles; beneath greenish white; four callosities.

**Emys muticus*. E. testâ fuscâ; fasciâ lætè flavâ pone oculos notatus; sterno scutis duodecim composito, fusco-maculatis.

The shell brown; behind the eyes a bright yellow band. Sternum composed of twelve plates, with brown spots.

SAURIA.

**Hemidactylus nanus*. H. supernè cinereus, strigis sagittalibus nigris 5—6; caudâ annulis 6—7 ejusdem coloris cinctâ. Infrâ margaritaceus.

Gray above, with five to six black arrow-shaped marks, and six to seven rings of the same colour on the tail. Beneath pearl-coloured.

**Tiliqua rufo-guttata*. T. supernè ænea, lineis serratis nigris quatuor ornata; lateribus pallide flavis, rubro permaculatis; abdomine pallide flavo.

Bronze-coloured above, with four black zigzag lines; the sides pale yellow, with numerous red spots. Beneath pale yellow.

OPHIDIA.

a. Venomous.

**Naja atra*. N. supernè atro-iridescens, lineis duplicibus transversalibus flavis cincta; abdomine in nonnullis margaritaceo, in aliis schistoso.

Iridescent black, with a number of distant transversal double lines

† Identified by Edward Blyth, Esq.

of a yellow colour. The abdominal surface in some of a pearl, in others of a slaty colour.

b. Innocuous.

**Lycodon rufo-zonatus*. L. supernè brunneus fasciis pluribus transversalibus rubris ornatus; superficie abdominali margaritaceâ, caudali nigro-maculatâ. 193 + 72.

Brown, with numerous transversal crimson bands; the abdominal surface pearl-coloured, spotted with black on the tail.

**Coluber dhumnades*. C. supernè niger, fasciâ flavâ mediâ, similibus duabus utrinque anticè inclusus; abdomine schistoso. 189 + 98, 199 + 92.

Black, with a longitudinal yellow band in the middle and two on either side, terminating with the anterior half of the back; the abdominal surface of a bluish black colour.

**Coluber mandarinus*. C. supernè lætè scarlatinus, rhombulis flavis, oris nigris albo-marginatis, crebro ornatus, guttis nigris irregularibus albo-marginatis utrinque inclusus; scutis abdominalibus margaritaceis, alternè nigris. 222 + 63.

Bright scarlet above, with numerous yellow lozenges, surrounded with broad black brims, relieved with white edges; on either side a number of small irregular black marks edged with white; the abdominal surface pearl-coloured, chequered with black.

**Tropidonotus rufodorsatus*. T. (scutis lævibus tectus) suprâ brunneo-cinereus, fasciis quatuor nigris anticè interruptis seriebusque tribus summis rubro-marginatis; subtùs lætè flavus alternè niger. 178 + 52.

(Covered with *smooth* scales.) Brownish gray above, with four longitudinal black, on the anterior part interrupted, bands, and the three upper rows of scales on the back edged with red; beneath gamboge chequered with black.

Python Schneideri, Merrem.

BATRACHIA.

**Rana temporaria*, var. R. supernè brunneo-viridis; superficie internâ femorum parçè nigro-maculatâ; infrâ pallidè flava.

Brownish green above, with a few dark spots on the inner surface of the thigh; pale yellow beneath.

**Rana esculenta*, var. R. supernè brunneo-viridis, lineis tribus pallidè flavis, æquidistantibus, fasciisque pluribus irregularibus nigris ornata; abdomine flavo albescenti.

Brownish green above, with three parallel faint yellow lines, and a number of irregular black transversal bands. The abdominal surface whitish yellow.

**Hyla arborea*, var. H. supernè aureo-viridis, lineâ laterali nigrâ utrinque inclusa; subtùs albo-flavescens.

Golden green above, with a brownish black lateral line; beneath yellowish white.

**Bufo gargarizans*. B. supernè brunneo-canescens, tuberculis conicis magnis, nigro-acuminatis tectus; lateribus violaceo-canescentibus; abdomine albescenti nigro-maculato.

Grayish brown above, with numerous large conical tubercles with black points; the sides grayish lilac; the abdominal surface buff, speckled with black.

4. PISCES.

ACANTHOPTERYGII.

Pharynginæ labyrinthiformes.

Anabas scandens, Cuv.

**Macropodus ocellatus*. M. brunneus, lateribus violaceis, postoperculo nigro ocellato; alâ dorsali analique longissimâ ejusdem ferè magnitudinis, rufâ, ærugine marginatâ necnon punctatâ, radiorum mollium apicibus nigris; alâ caudali latè lanceolatâ, scarlatinâ ærugine maculatâ.

D. 17 + 8; C. 12; A. 20 + 12; V. 1 + 5; P. 11; Br. 4.

Habitat. Streamlets and canals.

Brownish, with lilac sides, and a black ocellated spot on the gill-cover; the dorsal and anal fins very elongated, nearly of equal size, of a reddish colour edged and spotted with verdigris; their soft rays with black points; the caudal fins broad, lanceolate, of scarlet colour with verdigris spots.

**Ophicephalus argus*. O. dorso lateribusque viridi-brunnescentibus, abdomine albo-rufescenti, ocellis crebris nigris lateralibus, supra lineam lateralem albo-marginatis; pinnis flavis, nigro-maculatis.

D. 49; C. 14; A. 33; V. 1 + 5; P. 16; Br. 5.

Habitat. Streamlets, estuaries.

Brownish green back and sides, reddish white abdomen. Numerous black ocellated spots edged with white above the lateral line; fins yellow, spotted with black.

MUGILIDÆ.

Mugil cephalotus, Cuv.

Habitat. Estuaries and sea.

GOBIOIDES.

**Periophthalmus modestus*. P. brunneus, cinereo marmoratus; abdomine albo-cærulescenti, alis pallidè flavis; dorsali anteriori fasciis nigris duabus ornatâ; radiis alarum nigro-punctatis.

D. 15 + 1.12; C. 13; A. 1 + 11; V. 1 + 5; P. 11; Br. 2.

Habitat. Along the coasts and banks of canals.

Brownish marbled with gray, minutely spotted with black. Abdomen bluish white. Fins faint yellow. The first dorsal with two black bands, the second with a black band and the rays with black spots. The caudal, ventral and pectoral with similar spots.

**Eleotris flammans*. E. supernè violaceo-brunneus; alâ dorsali anteriori fasciis tribus undulatis violaceis, flammeo-marginatâ; posteriore fasciis undulatis quatuor nigris, radiis alarum aurantiacis, apicibus nonnullis flammeis, aliis nigris; alâ caudali violaceo-canescenti, fasciis tribus cæruleis, radiorum flavorum apicibus flavis; alâ anali aurantiacâ, fasciis quinque nigris undulatis, radiorum brunne-

orum apicibus nigris; alis ventralibus pectoralibusque pallidè violaceis, radorum flavorum apicibus nigris.

D. 6 + 1·10; C. 15; A. 1 + 9; V. 1 + 5; P. 18; Br. 6.

Habitat. Canals, estuaries.

Dark lilac brown above; the dorsal fins with orange spines and rays, the anterior with three waved lilac bands and with flame-coloured margin; the second with four waved black bands; the extremities of the rays partly black, partly flame-coloured. The caudal grayish lilac, with three blackish blue arched bands; rays yellow, with black extremities. Anal orange-coloured, with five waved black bands; brown rays with black extremities; the pectorals with five arched black dotted lines.

MALACOPTERYGII.

Cyprinidæ.

**Cyprinus gibeloides*. C. suprâ viridi-nigrescens, scutis lateralibus majoribus argenteo-viridibus, viridi-nigrescenti marginatis, squamis infra lineam lateralem argenteis oblitteratis; pinnarum radiis flavis, apicibus nigris.

D. 2 + 18; C. 19; A. 2 + 5; V. 9; P. 15; Br. 3.

Habitat. Streamlets, canals, estuaries.

Dark green above. The large scales on the sides silvery green, edged with dark green; below the lateral line the scales are silvery, indistinct; the rays of the fins yellow with black extremities.

Cyprinus auratus, Linn.

Leuciscus (Cyprinus) daniconius, Hamilton. Hab. Streamlets, canals.

**Cobitis anguillicaudata*. C. supra lineam lateralem, flava, olivaceo-maculata, infrâ cinerea nigro-maculata; abdomine flavo; pinnarum radiis flavis, nigro-punctatis, apicibus rubris; pinnâ caudali longissimâ, cirrhis decem.

D. 9; C. 9; A. 7; V. 6; P. 10; Br. 3.

Habitat. Ponds, streamlets, canals.

Yellow, with olive-brown clouded spots above the lateral line; below the latter gray, minutely spotted with black. Abdomen yellow. The fin rays yellow, spotted with black, and with red extremities. The caudal fin much elongated. Cirrhi 10.

ESOCIDÆ.

**Hemiramphus intermedius*. H. supernè lætè viridis, lateribus argenteis, abdomine albo, alis pallidè flavis.

D. 14; C. 15; A. 16; V. 6; P. 11; Br. 10?

Habitat. Sea, estuaries, canals.

Light green above, with silvery sides; abdomen white. Fins faint yellow.

SILURIDÆ.

**Silurus punctatus*. S. supernè nitidè olivaceo-viridescens sive brunnescens, seriebus duabus punctorum nigrorum infra lineam late-

ralem; abdomine albo-flavescenti; alis dorsalibus, caudalibus analibusque nigris; ventralibus albo-flavescentibus; pectoralibus latè nigro-marginatis. Cirrhi $\frac{2}{2}$.

D. 5; C. 15; A. 80; P. 1 + 5; V. 14; Br. 5.

Habitat. Fresh and brackish water.

Shining olive-green or brown, with two rows of black minute dots below the lateral line. The abdominal surface yellowish white. The dorsal, caudal and anal fins black; ventrals yellowish white; pectorals the same colour, with a broad black brim.

APODAL MALACOPTERYGII.

Muraenidæ.

**Anguilla latirostris*, Yarrell.

Habitat. Fresh and brackish water.

**Synbranchus grammicus*. S. suprâ flavo-rufescens, infra lineam lateralem albo-flavescentis, toto corpore lineis nigris inscripto.

Habitat. Streamlets, canals, estuaries.

Reddish yellow above the lateral line; beneath buff, with numerous black inscription-like lines all over the body.

5. MOLLUSCA.

(Described by W. H. Benson, Esq., Bengal Civil Service.)

GASTEROPODA.

Pulmonifera. Terrestria.

Incilaria †, nov. gen. Corpus elongatum, posticè attenuatum, repens, undique velo marginatum. Tentacula quatuor, superioribus oculiferis, inferioribus integris. Foramen commune in latere dextro, non procul ab extremitate anticâ veli situm.

**Incilaria bilineata*. Corpore livido, velo punctis maculisque fuscis conspersis ornato, lineis duabus lateralibus, nigrescentibus, unicâ obscuriore medianâ strigatâ. Long. ad poll. $1\frac{1}{2}$.

Habitat. The earth, under roots, on trees and plants.

**Helix ravida*. Testâ subglobosâ, umbilicatâ, epidermide olivaceâ, anfractibus sex transversè subplicatis, ultimo ventricosus, suturis impressis, umbilico mediocri; aperturâ suborbiculari elongatiusculâ, labio reflexo, tenui explanato, labro acuto. Axis 1.3, diam. 1.33.

Habitat. Trees, stones, rocks, earth.

**Helix tapeina*, Journ. Asiatic Society, vol. v. p. 352. No. 7.

Habitat. N.E. frontier of Bengal. Rare at Chusan.

**Helix naninoides*. Testâ solidiusculâ, subdiscoideâ, supernè radiatim tenuiter striatâ, infra striis lævigatis, distantibus; spirâ depresso-conoideâ, apice obtusato, planulato; aperturâ transversè lunatâ, labro obtuso, crasso, infâ subreflexo.

Habitat. Singapore; scarce at Chusan.

**Clausilia pluvialis*. Testâ fusiformi pallidè olivaceâ; spirâ attenuatâ, crystallinâ, apice papillari; anfractibus 14, medianis ventricosioribus, omnibus leviter transversè striatis; peristomate valdè

† From *incile*, a gutter, with reference to the gutter-like channel which divides the mantle from the foot.

reflexo planato, ad labii basin plicâ obliquâ solidâ, sulcoque concurrente munito. Axis 1.1 poll.

Habitat. In the earth.

**Clausilia aculus*. Testâ subulatâ nitidâ, epidermide fuscescenti, anfractibus 10 aut 11, oblique leviter striatis; aperturâ dentibus duobus vel tribus munitâ, peristomate reflexo. Axis longior 0.65, minor 0.5 poll.

Habitat. In the earth, on mossy stones, walls and trees.

**Achatina erecta*. Testâ albidâ solidiusculâ subulato-turritâ, epidermide fœdâ, scabrâ; anfractibus octo, planulatis, suturis impressis; apice obtuso.

Habitat. Same localities, and in company with *Clausilia aculus*. Common at Macao, where however *C. aculus* is not found.

AQUATICA.

**Planorbis papyraceus*. Testâ compressâ, olivaceo-corneâ, subpolitâ, minutissimè radiato-striatâ; anfractu ultimo latiori, suprâ infrâque æqualiter convexo; peripheriâ carinatâ, spirâ basique ambabus depressis, umbilicatis, umbilico inferiori arctiori; labro superiori valdè prominente, semicirculari, inferiori recedente, recto. Diam. 0.4 poll.

Habitat. Canals, ponds, attached to *Chara*.

**Planorbis hemisphærule*. Testâ nitidâ, olivaceo-corneâ, suprâ convexâ, apice planulatâ, infrâ excavatâ, umbilico coarctato, peripheriâ obtusâ, nullo modo carinatâ. Diam. 0.25 poll.

Habitat. Same localities as *P. papyraceus* on *Chara* and *Lemna*.

Planorbis compressus, Hutton.

Habitat. Same localities as the preceding. Inhabits also Bengal.

**Lymnæa plicatula*. Testâ elongato-ovatâ, corneâ, scabriusculâ; anfractu ultimo transversè plicatulâ, suturis impressis; spirâ mediocri, apice acuto plerumque ferrugineo; aperturâ infrâ patulante, basi evasâ.

Habitat. Ponds.

**Lymnæa minor*. Testâ ovato-acutâ, corneâ, politâ; spirâ vix dimidium testæ efformante, apice obtusiusculo; anfractibus quatuor, suturis leviter impressis; aperturâ ovatâ, plicâ columellæ obsoletâ.

Habitat. Same locality as the latter.

TECTIBRANCHIATA.

**Bullæa caurina*. Testâ ovato-oblongâ, albâ, tenuissimâ, papyraceâ, transversè eleganter minutissimèque striatulâ; aperturâ auriformi suprâ angustatâ, infrâ patulante; labro apicem superante; spirâ nullâ.

Habitat. Said to inhabit canals.

PECTINIBRANCHIATA.

**Paludina quadrata*. Testâ elongato-conoideâ, crassâ, epidermide viridi-olivaceâ, anfractibus sex planulatis, leviter transversè plicatis, longitudinaliter liratis; liris subquinis; aperturâ mediocri, intus albidâ violaceâ; umbilico arcto, peritremate nigrescente.

Habitat. Canals and ponds.

**Paludina lecythoides*. Testâ ovato-acutâ, olivaceâ, anfractibus sex aut septem rotundatis, transversè subplicatis; suturis excavatis; aperturâ oblongâ, peristomate subreflexo, nigro; apice acuto; umbilico ætate evanescente.

Habitat. Ditches and ponds.

**Paludina (Bithynia, Gray) longicornis*. Testâ ovato-conoideâ, corneâ, politâ, spirâ aperturam longitudine vix superante; anfractibus quatuor, ultimo convexo, suturis minimè depressis; aperturâ subrotundâ, suprâ angulatâ; peristomate subreflexo, nigrescente; labio crassissimo; operculo testaceo, umbilico evanido; apice obtuso.

Habitat. In canals, attached to aquatic plants, stones, piles.

**Paludina (Bithynia) striatula*. Testâ ovato-acutâ, corneâ, politâ; spirâ elongatâ; anfractibus quinque convexiusculis, liris pluribus, interdum inconspicuis, circumdatis; suturis depressiusculis; apice obtusato; peristomate reflexo nigrescenti, undato; umbilico evanido; operculo calcareo.

Habitat. Same localities as the latter.

Laguncula, nov. gen. Testâ turbinatâ, subglobosâ, aperturâ majori, integrâ, oblongâ; peristomate interrupto; labio subreflexo; umbilico profundo tortuoso.

**Laguncula pulchella*. Testâ albido-glaucâ, ovato-globosâ; anfractibus convexis, lineis longitudinalibus elevatiusculis aliisque obliquis decussatis instructis; suturis impressis; aperturâ intus fasciâ latâ pallidè castaneâ ornatâ columellâque intus concolore.

Habitat. Said to inhabit canals.

**Melania cancellata*. Testâ elongato-turritâ, olivaceâ, solidiusculâ, anfractibus novem convexiusculis, omnibus costulis frequentibus, ultimoque fasciis tribus elevatis basalibus munitis; costulis liris plurimis cancellatis; suturis mediocriter excavatis; apice eroso. Axis 1.0 poll. v. paulò plus.

Habitat. Canals.

**Melania (Hemisinus? Swainson) crebricostis*. Testâ elongato-turritâ, olivaceâ, tenui, anfractibus plurimis leviter convexis; costis frequentissimis albidis, lævigatis, munitis, ultimo costulis evanidis, balteo submediano, rugisque plurimis basalibus circumdato; suturis impressis; columellâ subrectâ; basi leviter canaliculato-effusâ; labro tenui, lævi, subreflexo, apice decollato. Axis testæ decollatæ 1.05 poll.

Habitat. Found with the preceding, but scarce.

Batillaria†, nov. gen. Testâ turritâ, insculptâ, rudî; anfractibus plurimis; aperturâ oblongâ, infrâ angustiore, basi truncatâ, evasâ; labro sinuato, suprâ emarginato, infrâ propecto, labio suprâ callo munito; columellâ planatâ, basi incrassatâ, obliquè truncatâ, canalem vix efformante; operculo corneo, tenui, spirali, multiverticillato.

Batillaria zonalis (syn. *Cerithium zonale*, Lamarck, L'Océan des Antilles; *C. zonale*, Gray, China, Griff. Cuv. xii. pl. 14.). Testâ elongato-turritâ, scabrâ, albidâ, fasciis fuscis ornatâ; anfractibus tredecim,

† *Batilla*, a shovel, from the lengthened form of the shell, and the conformation of the base of the aperture.

mediocriter convexis, costulis liris longitudinalibus decussatis, suprâ subnodulosis; aperturâ intûs fasciis fuscis strigatâ; columellâ albâ. Axis 1·4 poll.

Habitat. The coast.

ACEPHALA.

Testacea.

**Arca galactodes*. Testâ subrhomboideâ, tumidâ, subæquilaterali, anticè subangulatâ, posticè rotundatâ, multiradiatâ; radiis exilissimis auctûs rugas decussantibus; cardine mediocri terminis exterioribus angulatis; natibus lævibus remotiusculis, incurvatis; margine lævi; epidermide fuscâ. Lat. 0·75, long. 0·5 poll.

Habitat. Said to inhabit canals.

**Mytilus niger*. Testâ oblongâ, trigonâ; cardine unidentato; natibus subincurvatis, decorticatis, sub epidermide albis, marginibus purpurascentibus; intûs margaritaceo-splendidâ, margine purpureo. Long. 3·4 poll, lat. 1·7.

Habitat. Said to inhabit canals.

**Dreissena purpurascens*. Testâ oblongâ subquadratâ, radiato-plicatâ, sub epidermide albo purpureoque ornatâ; intus margaritaceâ; epidermide brunneâ; apice subincurvato, compressiusculo. Long. 1·5, lat. 0·8 poll.

Habitat. Said to inhabit canals.

**Modiola Senhousia*. Testâ transversè oblongâ, subalatâ, gibbâ, læviusculâ; anticè angustatâ, posticè dilatâ, intûs iridescente; epidermide olivaceâ, obscurè radiatâ; alâ natibusque strigis flexuosis spadiceis ornatis; basi leviter emarginatâ. Long. 1·2, lat. 0·6 poll.

Habitat. Coasts of Chusan and Canton Province.

**Anodon gibbum*. Testâ fragili, ovatâ, tumidâ, anticè rotundatâ, posticè subalatâ, extremitate posticâ subangulatâ; natibus concentricis rugosis, rugis parallelis, subdistantibus, areâ posticâ radiis tribus approximatis, leviter elevatis, rugosulis munitâ, margaritâ interius albidâ versus apicem aurantio-tabescente, versus marginem purpureo viridique splendidè margaritaceâ; margine fusco; epidermide olivaceâ, obscurè radiatâ. Long. 2·0, lat. 3·2 poll.

Habitat. Canals.

**Unio (Theliderma, Swainson) Leaii*, Gray. Testâ crassâ, sub-ovatâ, compressâ, umbonibus dentibusque cardinalibus extremitati anticæ angustiori approximatis; valvæ sinistræ dente cardinali interiori margineque cardinali penè parallelis, illâ versus dentem lateralem mediocriter productum spectante; valvæ dextræ dente cardinali unico crenato; valvis intûs minimè profundis; margaritâ iridescente, pallidè salmonis colore tinctâ; natibus minimè prominentibus; rugis seriebus duabus e lineâ umbonali divaricatis, posterioribus simplicibus, anterioribus, basalibusque nodulosis, testam anteriorem munientibus; epidermide flavo-olivaceâ. Long. 2, lat. 3 poll.

Habitat. Said to inhabit fresh water at Chusan, and also Canton River.

**Unio (Theliderma) divergens*. Testâ crassâ, angulato-ovatâ, sub-

alatâ, tumidiusculâ, facie externâ tuberculato-plicatâ, rugis seriebus duabus e lineâ umbonali divaricantibus, posterioribus simplicioribus, anterioribus basalibusque plerumque nodulosis; natibus mediocriter prominentibus; epidermide nigrescente, striis subimbricatis. Valvæ sinistrae dente cardinali interiori versus angulum marginis posterioris basalisque spectante, ad latus exterius lamine pluribus munito, dente exteriori penè obsoleto, brevi, a basi interioris divaricato; dente laterali brevi crasso. Long. 2·65, lat. 3·5 poll.

**Corbicula fuscata*. Testâ cordatâ subinæquilaterali, fusco-virente, tumidiusculâ, politâ, intus et ad nates violaceâ, extrinsecus sulcis crebris circumdatâ, rugis intersitis subimbricatis; margine interiori plerumque nigrescente; natibus decorticatis. Lat. 1·3, long. 1·15 poll.

Habitat. Canals.

Venus sinensis, Auct. Testâ orbiculatâ, convexâ, albidâ, marginibus violaceis, denticulatis, extrinsecus radiis violaceis plicisque concentricis exilissimis ornatâ; disco plerumque ferrugineo, dente cardinali postico bifido, sæpè bilobato, laminæ cardinalis extremitate posticâ concavâ. Long. 1·7, lat. 1·65 poll.

Habitat. Said to inhabit canals.

**Sanguinolaria iridescens*. Testâ subellipticâ, compressâ, albidâ, iridescente, versus apicem incarnatâ, exilissimè transversè striatâ, striis obsoletis radiatim decussatâ; latere postico subrostrato, subangulato, antico longiore, rotundato.

Habitat. Said to inhabit canals.

**Novaculina constricta*. Testâ albâ, tenui, transversè oblongâ, læviusculâ, extremitatibus rotundatis, radio mediano subconstrictâ, epidermide olivaceo-flavescente, posticè quasi capillis intertextis adhærentibus vestitâ. Lat. 2·45, long. 0·75 poll.

Syn. *Solen constrictus*, Lamarck.

6. ANNELIDES.

HIRUDINIDÆ.

**Bdella lineata*. B. supernè brunneo-viridescens, lineâ dorsali mediâ aurantiacâ, infrâ griseo-flavescens.

Greenish brown above, with an orange-coloured dorsal line; beneath yellowish gray.

———? ———?

7. CRUSTACEA.

DECAPODA BRACHYURA.

**Carcinus olivaceus*. C. suprâ olivaceo-viridescens; infrâ albus; parte anteriore marginis interni femoris spinâ armatâ.

Greenish olive above; beneath white, with a single spine on the anterior part of the internal margin of the femur.

**Sesarma tetragona*. S. supernè viridis, infrâ griseo-viridescens; brachiis manibusque rubris.

Carapace green; sternum and legs greenish gray; arms and claws red.

Sesarma quadrata, M. Edwards.

DECAPODA MACRURA.

**Palemon ornatus*, Olivier. P. lætè griseo-viridescens; suprà nigro-maculatus.

Light greenish gray; carapace minutely dotted with black.

STOMAPODA UNIPELTATA.

Squilla mantis, Fabricius.

ENTOMOSTRACA PÆCILOPODA.

Xyphosura.

Limulus ——— ?

8. ARACHNIDA.

ARANEIDÆ.

**Attus chlorommatus*. A. villosus brunneus, oculis anterioribus mediis lætè viridibus; cephalo-thoracis maculâ oculiferâ latâ nigrescente, fasciam albam mediam hastæformem circumdante, abdomine fasciâ lanceolatâ albâ ornato. Long. poll. dimid.

Hairy, brownish; the anterior centre pair of eyes light green; the broad oculiferous spot blackish, surrounding a white spear-shaped mark; the abdomen with a white lanceolate streak in the centre.

**Thomisus albinus*. T. cephalothorace albo-virescenti, cristâ oculiferâ triangulari, aurantiaco-marginatâ, oculis ambobus anterioribus rubris; palpis maxillaribus pedibusque albo-virescentibus; abdominis albidî trapezoidis superficie superiore punctis quinque marginibusque violaceis, angulis ambobus posterioribus castaneis. Long. ad lin. tres.

Cephalothorax greenish white, with a triangular raised oculiferous crest with orange-coloured margins; anterior pair of eyes crimson; maxillary palpi and feet greenish white; abdomen whitish, in the form of a trapezium; the upper surface edged with lilac and with five lilac points, the two posterior angles chestnut-brown.

**Thomisus bicoloratus*. T. cephalothorace, palpis pedibusque hirsutis, gramineis, abdomine albo-virescente, lineâ longitudinali mediâ duabusque transversalibus nigris, punctisque quinque nigrescentibus ornato. Long. ad lin. duas.

The hairy cephalothorax, palpi and feet grass-green; abdomen greenish white, with a longitudinal black line in the middle, divided by two short distant transversal lines and with five dark points.

**Hypoplatea fasciata*. H. schistosa, cephalothorace nigro radiato, abdomine brunneo indistinctè fasciato, lineâ apicali nigrâ emarginatâ terminato, femoribus tibiisque nigro-fasciatis. Long. lin. sex.

Slate-coloured; cephalothorax with black radiated lines; abdomen indistinctly marked with brown, posteriorly terminated by a black notched line; femora and tibia black-banded.

**Latrodectus* (?) *limacida*†. L. flavescens-griseus, cephalothoracis maculâ oculiferâ majore arcuatâ nigrâ, thorace rhombulis duobus brunneis, anticè divergentibus, ornato; abdomine fasciis brunneis

† From the circumstance of its having been observed to seize the slug, *Inciliaria bilineata*.

transversalibus quatuor diviso; femoribus tibiisque nigro-fasciatis; pedibus brunneis. Long. poll. 1.

Yellowish gray, with a large black arched oculiferous spot; on the thorax two anteriorly diverging brown lozenges; the abdomen with four brown transversal bands; the legs black-banded; the feet brown.

**Uloborus curvicaudus*. U. cephalothorace, palpis maxillaribus pedibusque hirtis, flavo-brunnescentibus; abdominis cylindrici, albo-flavescentis, indistinctè nigro-marmorati extremitate posteriore acuminatâ recurvâ. Long. lin. 5.

Cephalothorax and the hairy palpi and feet brownish yellow; abdomen cylindrical, yellowish white, indistinctly marbled with black; the posterior pointed extremity bent upwards.

**Tetragnatha ænea*. T. cephalothorace palpisque maxillaribus hirsutis, flavo brunnescentibus; femoribus tibiisque viridibus, tarsis nigris, hirsutis; abdomine conico æneo, maculis nigris duabus basalibus, lineisque nigris septem, quarum tres summæ lineâ basali anticè junctæ, ornato. Long. ad poll. dimid.

Cephalothorax and the hairy palpi brownish yellow; the femora and tibiæ green; feet black; abdomen conical, green, bronze-coloured, with two black spots near the base, longitudinally striped with seven black lines, the three upper ones of which are united at the base by a black transversal line.

**Epeïra bilineata*. E. cephalothorace femoribus pedibusque ambobus anterioribus brunneo-nigrescentibus; abdomine subfusco-canescenti, lineolis duabus undulatis nigris, posticè convergentibus, infra quas punctis summis sex; palpis maxillaribus tibiisque ambabus anterioribus subfuscis, femoribus tibiisque ambabus posterioribus subfuscis bifasciatis. Long. poll. 1.1.

Cephalothorax, thighs and feet of the two anterior pair brownish black; abdomen light grayish brown, with two waved, black, posteriorly converging lines, within which are six distant points; the maxillary palpi and tibiæ of the two anterior pair light brown, with two black bands on the joints.

**Epeïra heraldica*. E. maculis oculiferis cephalothoracis, cano-hirsuti, nigris; abdomine brunneo-flavescente nigro-punctato, fasciis tribus, quarum anteriore coronæformi, albo-flavescentibus transversè ornato; punctis sex summis; pedibus nigris hirsutis femoribus tibiisque ambabus anterioribus albo-fasciatis. Long. poll. 1½.

Cephalothorax gray, hirsute; oculiferous spots black; abdomen yellowish brown dotted with black, with six points above and with three transversal whitish yellow bars; feet black, hirsute; the two anterior pair of femora and tibiæ with white bands.

Epeïra fasciata, Walckenaer.

HOLETRA.

**Phalangium spiniferum*. P. supra brunneum, protuberantiâ oculiferâ triangulo flavo inclusâ, dorso flavo marginato, spinâ forti summâ armato; subtùs flavo-albescens. Long. lin. 2.

Brown above; the oculiferous protuberance enclosed within a yel-

low triangle; the margins of the back spotted with yellow; the upper part of the back surmounted by a strong spine; whitish yellow beneath.

9. INSECTA.

MYRIAPODA CHILOGNATHA.

Iuloidæ.

**Polydesmus bicolor*. P. nitidè niger, lineis dorsalibus transversalibus rubris 19, mucroneque segmenti penultimi rubro. Long. ad poll. 2.

Shining black, with nineteen red transversal lines, and the point on the penultimate segment red.

SCUTIGERIDÆ.

**Scutigera rufipes*. S. pallidè schistosa, segmentis dorsalibus carinatis novem, abdominalibus sedecim; tarsis rufis. Long. poll. dimid.

Pale slate-coloured, with nine keeled dorsal, sixteen abdominal segments; tarsi red.

Scolopendra morsitans, Auct.

10. ANIMALCULA.

VOLVOCINA.

**Gyges granulum*, Ehrenberg.

**Sphærosira volvox*, Ehr.

CLOSTERINA.

**Closterium trabecula*, Ehr.

* ——— turgidum, Ehr.

* ——— ? falcatum.

ASTASILÆA.

**Euglena longicauda*, Ehr.

DINOERYINA.

**Epipyxis utriculus*, Ehr.

ARCELLINA.

**Arcella aculeata*, Ehr.

BACILLARIA.

**Desmidium Schwartzii*, Ehr.

* ——— hexaceros, Ehr.

**Xanthidium coronatum*.

* ——— hirsutum, Ehr.

**Arthrodesmus quadricaudatus*, Ehr.

**Micrasterias hexagona*.

**Euastrum margaritiferrum*, Ehr.

* ——— Jovis.

* ——— integerrimum, Ehr.

**Navicula fulva*, Ehr.

* ——— gracilis, Ehr.

**Navicula sigma*, Ehr.

* ——— curvula, Ehr.

* ——— S romanum.

* ——— turgida, Ehr.

**Bacillaria vulgaris*, Ehr.

**Cocconema gibbum*, Ehr.

* ——— cymbiforme, Ehr.

**Gomphonema truncatum*, Ehr.

**Cocconeis pediculus*, Ehr.

**Gaillonella nummuloides*, Ehr.

* ——— distans, Ehr.

VORTICELLINA.

**Vorticella patellina*, Ehr.

ENCHELIA.

**Leucophrys patula*, Ehr.

COLEPINA.

**Coleps hirtus*, Ehr.

TRACHELINA.

**Trachelius vorax*, Ehr.

* ——— anas, Ehr.

* ——— lamella, Ehr.

EUCHLANIDOTA.

**Lepadella emarginata*, Ehr.

BRACHIONÆA.

**Brachinus urceolaris*, Ehr.

DUBIA.