Lordship's stuffer; and has also attached to it the following label in Bates's handwriting:—'Kept this bird alive by cramming it with food upwards of four months. Died while I was at Peten.'

"We have another and better specimen in skin, labelled as follows:—'Purchased of J. Leadbeater, Sept. 3, 1843, from Bogota.'

"I do not know on what grounds Leadbeater gives Bogota for the locality of his specimen, and should much doubt its correctness."

## 6. Revision of the Species of Trionychidæ found in Asia and Africa, with the Descriptions of some New Species. By Dr. J. E. Gray, F.R.S., etc.

In the quarto 'Catalogue of Shield Reptiles in the British Museum' I carefully revised the species of this family, and figured the skulls of the genera as far as they were then contained in the Museum Collection. Since that period I have described, in the 'Proceedings of the Zoological Society,' several other Asiatic and African species.

Very shortly after the appearance of this catalogue, Professor Agassiz, in the 'Contributions to the Natural History of the United States' (2 vols. 4to, 1857), published his observations on this group. He remarks that "a critical revision of the genera of *Trionychidæ* appears a great desideratum in herpetology;" and goes on to say, "I have already satisfied myself that the number of species is much greater than is generally supposed;" and further, "in this connexion I would remark that it is hardly possible to distinguish the *Trionychidæ* by their external characters, and that nothing short of a careful examination of their jaws, and especially of the skull, will reveal their generic characters." (*Contrib.* p. 396.)

These observations are fully justified by the study of the Asiatic and African species contained in the Museum collection.

I have therefore re-examined the materials at my command, and send the result to the Society, referring to the 'Catalogue of Shield Reptiles' and my previous papers in the 'Proceedings' of the Society for the descriptions and the figures of the species before described.

As the American museums appear to have a very small collection of specimens of these animals from Africa and Asia, so the British Museum collection has scarcely any specimens from North America, and unfortunately I have no means of comparing the skulls of any of the American species with those from the Old World.

Professor Agassiz, in the 'Contributions,' shows that they belong to three genera, which he calls *Amyda*, *Platypeltis*, and *Aspidonectes*, containing six species; and I must refer naturalists to his work for the particulars, regretting that he has not given us a figure of the skulls of these and other genera of Tortoises mentioned in his work for comparison.

Referring to the American species, Professor Agassiz justly and philosophically observes, "The external resemblance between *Platy-*

*peltis ferox*, *Aspidonectes spinifer*, and *A. asper* is so great that I am not surprised that they have been confused or even deliberately considered as identical. We have, in fact, a case here, of which a few other examples only are thus far known, in which, under the most surprising similarity of external appearance, marked structural peculiarities amounting to generic differences are hidden. I have already pointed out such cases in the genera *Phoxinus* and *Chrosomus*, and in the genera *Carpiodes*, *Bubalichthys*, and *Ichthyobus* among Cyprinoids." (*Amer. Journ. of Science*, 2nd ser. xix. p. 71.) "Many similar examples might be quoted among the Rodentia." (*Contrib.* p. 410, note.)

I believe that such cases are much more common than has hitherto been suspected; and it is on such superficial resemblances that Mr. Bates's observations and theories respecting the Brazilian Butterflies are founded—notions which will vanish into the air when the insects are more carefully examined by a systematic entomologist.

Professor Agassiz, in the American species, points out a difference in the form and structure of the nostrils:—

Thus, in *Amyda mutica* the nostrils are small, simple, circular, and far apart, rather on the underside of the snout.

In *Platypeltis ferox* and *Aspidonectes spinifer* these are larger, close together, and with a process on the middle inner side of each.

Unfortunately it is not possible to make similar observations on the African or Asiatic species, as one has not the power of observing them alive. Indeed they rarely arrive in a sufficiently good state to make the comparison with certainty in the specimens preserved in spirits. All the African and Asiatic species that I have been able to examine seem to have nostrils as in *Platypeltis* and *Aspidonectes* of Agassiz.

As we have only two adult stuffed and four or five young specimens and no osteological preparations of the American species in the British Museum, I shall not attempt to make any observations of them, but refer the reader to the work of Professor Agassiz before referred to, and proceed to examine with care the specimens of the Asiatic and African species in the Museum collection.

In the Museum Catalogue I showed that the coloration of the young specimens, especially the disposition of the colour on the head, afforded very good specific character for a certain number of Asiatic and African species. But Professor Agassiz, in his account of the North American species, shows most distinctly that, though all the species of *Trionyches*, or Mud-Tortoises, found in that country have a very similar distribution of colour on the head and shield, yet, when the skulls of these animals from different localities are examined, they prove to be very distinct—so distinct that he divides them into three genera.

These observations will furnish an example showing how every zoologist must be hampered at every step in his progress by the limited quantity of the materials at his disposal. I have now, and had when I printed my 'Catalogue of Shield Reptiles,' every wish to examine and arrange the species of this family according to their

organization, both external and internal; but when I printed the former catalogue I had only the skulls of three species. I have been able to add considerably to the collection of skulls; but the number of known species has also extended, and now the skulls of only about half of the species determined on their external form and coloration are known, so that I am not able to make the rigorous examination and comparison between the skulls that I could wish; and I am by no means sure, after what I have seen, and especially after the facts stated by Professor Agassiz, that more than one species may not be confused under one name, from the species having been simply determined by their external form and coloration.

Wagner, in his system, separated the species that had their hind legs covered with moveable valves and the margin of the shield bony, from those which have the hind legs free and the margin of the disk flexible, calling the former *Trionyx*, and the latter *Aspidonectes*. In my Synopsis of Reptiles in the translation of Cuvier's 'Animal Kingdom,' I retained the name of *Trionyx* for the latter group (as it contained the typical species of the genus), and called the former one *Emyda*. Duméril and Bibron, with the usual habit of the French naturalists, gave new names to all the groups, calling the first group *Cryptopus*, and the latter *Gymnopus*.

Dr. Peters, when in Mozambique, discovered a Tortoise (which he at first called *Cyclanosteus*, but afterwards *Cycloderma*) intermediate between these two groups, having the hind leg covered with sternal valves, and the margins of the shields boneless and flexible.

I may here observe that I cannot agree to the changes in the nomenclature proposed by Professor Agassiz in the 'Contributions,' at pp. 396 and 397; indeed I am convinced that, if he had studied the Indian and Asiatic species as he has the American, he would modify his suggestions.

Fitzinger, in his "Systematic Catalogue of Tortoises" in the 'Annals of the Vienna Museum,' published in 1836, divided the *Trionyches* with free feet and a flexible margin into four genera, containing most incongruous species associated together (for example, *Trionyx javanicus* and *T. ægyptiacus* of Geoffroy and *T. indicus* of Gray, *Trionyx muticus*, Lesueur, and *T. subplanus*, Geoffroy) in the same genus. Sometimes he refers the same species (as, for example, *T. ægyptiacus*, Geoffroy, and *T. labiatus* of Bell, which are only states of the same species) to two genera, as the first to *Aspidonectes*, and the latter to *Pelodiscus*.

Professor Agassiz truly remarks, "All these new genera are founded upon delusive characters, as Gray has already stated, which depend only upon the progress of the ossification of the shield, and may be observed in specimens of different ages of one and the same species, as my numerous skeletons of these Turtles clearly show; moreover the difference in the length of the tail is only sexual, the tail being very short in the female, and extending beyond the rim of the shield in the males of all the species that I know."—*Contrib.* 395, 396.

If the generic names which Fitzinger has given are used, it must be with quite a different significance than that attributed to them

by him. They may be retained for some of the species which he referred to his badly characterized groups.

Professor Agassiz, in describing the genera of the North American Terrapins, places great confidence in the form of the alveolar surface of the jaws, and probably correctly, as he seems to have studied this part in a series of specimens of different ages. My observations would lead me to believe that it is of considerable importance in the distinction of the *Trionychidæ*; but there are two specimens which I have received from the same locality (which are in other respects so much alike that I am inclined to believe that they are skulls of the half-grown and adult animals of the same species) that are so different in the form of the alveolar surface as to induce me to believe that this part alters considerably during the growth of the animal, at least in some species of the family; nevertheless additional specimens may show that what I have taken for alterations in growth are, in fact, specific distinctions. The examination of the skulls of the half-grown and the adult *Tyrse nilotica* and *Trionyx gangeticus*, the only species that I have at present the power of examining in more than one state of growth, does not reveal any great change in the form of the alveolar surface as the animal increases in age. But there is no reason why a change of this kind may not take place in one species or genus, and not occur in others or in the generality of the species. I have therefore for the present adopted Professor Agassiz's views.

He seems to use the form of the alveolar edge as of generic importance, and this when he says he has a series of skeletons from animals of different ages. He describes as follows:—

"Thus, the alveolar edges of the lower jaw of *Amyda* and *Aspidonectes* are sharp all round."—*Contrib.* pp. 398 & 403.

In *Platypeltis* "the lower jaw, like the upper, has a very broad alveolar surface; this surface is nearly flat at the symphysis, but has a deep depression near the hinder end."—*Contrib.* p. 400.

Yet these are just the characters that one might expect to occur after examining the skull of *Cyclanosteus senegalensis*, between the young and adult specimens of the same species.

The examination of the series of specimens at my command induces me to place considerable confidence in the characters furnished by the general form of the skull—in the position of the internal nostrils, whether they are placed in a deep or a shallow groove in the palate, and if that groove is situated only behind the internal nostrils, or is continued in front to the edge of the jaws, and, if so continued, whether it is nearly of the same width throughout its length, or more or less contracted in front of the interior nostrils—and also in regard to the position of the internal nostrils themselves, whether they are in the front of the palate or some distance from the front edge, so as to be nearly on a level with the front edge of the zygomatic arches.

The genera, for example, may be divided into two groups by the forms of the skulls, which probably indicate some peculiarity in their

habits, quite as important as the form of the sternum and the flexibility or inflexibility of the edge of the dorsal disks; but so little is known of the habits and manners of these animals, that we have no materials to work from.

A. The skull solid, convex, subtrigonal; nose moderate; eyes lateral; the palate concave, with raised alveolar edges, and a deep oblong concavity enclosing and extending behind the internal nostrils.

*Emyda. Cyclanosteus. Trionyx. Tyrse. Dogania. Rafetus.*

B. Skull oblong, thin, and light; nose very short; eyes anterior; forehead flat, often elongate; palate flat, with scarcely raised alveolar edges, and only a very slight depression before and behind the internal nostrils.

*Chitra. Heptathyra. Pelochelys.*

There is a very considerable difference in the form of the grooves in the palate, and in the position of the internal nostrils.

In *Trionyx gangeticus* the groove is very broad, equally open, and of an equal width, with the circular internal nostril behind on a level with the front of the zygomatic arch.

In *Potamochelys stellatus* the groove is very narrow in front, partly arched over on the sides by the inner edge of the large alveolar margin, with the oblong internal nostrils very close together, in a line with the middle of the upper lip.

In *Rafetus euphraticus* the palate-groove is intermediate in form between that of *Trionyx* and *Potamochelys*, being broad, deep, entirely open, but rather narrower in front, with the large circular internal nostrils rather in front of the zygomatic arches.

In *Cyclanosteus senegalensis* the palate is somewhat like that of *Potamochelys*; but it is not so much contracted in front, and the oblong internal nostrils are larger, broader, and nearly in the same situation.

In *Tyrse nilotica* the palate is regularly concave in front of the internal nostrils, which are in a deep pit, just before the front of the zygomatic arch, and this concavity is separated by a longitudinal ridge between the nostrils.

There is an apparent anomaly in the development of the sternal callosities, which can only be solved by the conjecture that (as Professor Agassiz declares to be the case) there are several species which have very much the same external appearance. In more than one of the species under examination, the sternal callosities are well developed in some specimens, and scarcely visible in others of the same species and, sometimes, even of a larger size.

1. *The typical or naked-legged Mud-Tortoises have the sternum narrow behind, without any valves over the hind legs; only two or four sternal callosities, and margin of the disk flexible, without any internal bones.* GYMNOPUS.

*Aspidonectes*, Wagler, Syst. 1830.
*Trionyx*, Gray, Syn.; Griffith; Cuvier, 1831.
*Amyda*, Bonap. Tab. Anat. 19, 1836.
*Gymnopus*, Dum. et Bib. Erp. Gén. ii. 479, 1835.

A. *Skull solid, subtrigonal; nose moderate; eyes lateral; forehead short, not longer than the face; palate concave, with a well-raised alveolar ridge, and a deep pit before and behind the internal nostrils.* Trionychina.

a. *Lower jaw (of adult) with a broad, flat alveolar disk; palate with a deep, wide concavity in front of the inner nostrils.*

### Trionyx.

Skull oblong, swollen. Nose convex, arched. Forehead convex. Upper jaw with a broad, flat, rugose alveolar plate, which is narrow in front and wide behind. Lower jaw with a broad, deeply concave alveolar edge, which is of nearly equal width in all parts, and with a slight prominence in the middle of the hinder edge. Palate with a broad, deep concavity, which is nearly as wide before as behind, and with the large oblong internal nostrils in the hinder part of the palate, and a deep groove, separated by a longitudinal ridge, behind each of them. Sternal callosities four, well developed.

"The nostrils rather small, far apart, with a lobe on the inner side. Pupil circular."—*Wagler.*

Trionyx gangeticus, Cuvier, R. A. ii. 16; Gray, Cat. Shield Rept. in B.M. 66.

*Aspidonectes indicus*, Fitz.

*Aspidonectes gangeticus*, Wagler, N. Syst. Amph. t. 2. f. 13–18 & f. 20.

*Hab.* India: Ganges.

Cuvier figured the skull (Oss. Fos. v. 187, t. 11. f. 5–8); and it is also figured in the 'Cat. of Shield Rept. in B.M.' (t. 42. f. 1). Wagler figured some part of the skeleton (N. Syst. Amph. t. 2. f. 13–18 & f. 20).

### Rafetus.

Skull oblong, swollen. Nose convex, arched. Forehead flat. Upper jaw with rather broad rugose alveolar plates, rather wider behind than in front. Lower jaw with a broad, slightly concave alveolar edge, which is rather wider in front. Palate concave, with a broad, deep concavity, which is rather narrower in front than behind, and with the large oblong internal nostrils in the hinder part of the palate, and a deep groove, separated by a central longitudinal ridge, behind each of them. Sternal callosities two, lateral, small.

The skull of this genus is very similar to that of the genus *Trionyx*, as restricted in this paper; but it is at once known from that genus by the absence of the hinder sternal callosities and the small size of the lateral ones.

Rafetus euphraticus.

*Trionyx rafeht*, Gray, Cat. Shield Rept. B.M. 65. t. 30.

*Tyrse rafeht*, Gray, Cat. Tort. B.M. 49.

*Testudo rafeht*, Olivier, Voy. Pers. ii. 452, t. 11.
*Testudo euphraticus*, Daud.
*Trionyx euphraticus*, Geoff.
*Hab.* Tigris and Euphrates.

In the 'Catalogue of Shield Reptiles,' p. 65, I noted that the skull is much shorter and broader than that of *T. niloticus*.

### Dogania.

*Dogania*, Gray, Cat. Tort. B.M. 49, 1844; Cat. Shield Rept. 69.

Head depressed; skull depressed, wide behind. The nose of the skull shelving; the orbit large, subcentral. Forehead small, rhombic, not reaching to over the ear; occipital ridge very much produced, elongate. Palate concave, with a raised margin on each side behind,

Fig. 1.

Fig. 2.

Fig. 3.

*Dogania subplana.*

under the orbits, and with a deep concavity in front of the internal nostrils, which is dilated in front. The internal nostrils very large,

oblong, with a short deep concavity at the hinder edge of each, separated by a central longitudinal ridge. The upper jaw with a broad oblong alveolar plate on each side behind, edging the side of the inner nostrils. The lower jaw rather produced in front; the front alveolar edge simple, sharp-edged, the hinder half rather flattened, broad, but shelving inwards. Sternal callosities two, lateral, linear.

1. Dogania subplana, Gray, Cat. Tort. B.M. 49; Shield Rept. 69, t. 33; Proc. Zool. Soc. 1862, p. 265; Cuvier, Oss. Foss. ii. t. 13. f. 5 (dorsal disk). (Skull, figs. 1, 2, 3.)

*Hab.* China and Formosa. *Terrapin* of the Europeans in China. Sold to make soup.

2. Dogania guentheri, Gray, P. Z. S. 1862, 265.

*Hab.* India.

Face of skull flat, shelving downwards; eyes close together; forehead flat.

### Aspilus.

Head elongate, rather depressed. Skull elongate; forehead convex, short; orbits submedial. Nose shelving, rather convex. The palate slightly concave, with the hinder sides under the orbits rather expanded; narrowed in front, with a narrow deep concavity; grooves of equal width in front of the internal nostrils. The internal nostrils oblong, subposterior, on a level with the front edge of the zygomatic arches, with a deep elongate groove behind each of them, separated by a central longitudinal ridge. The alveolar surface of the upper jaw broad, shelving outwards; the inner edge forming a ridge on the side of the inner nostrils. The lower jaw shallow in front, with a broad flat alveolar surface, with a sharp simple outer edge, and shelving internally. Sternal callosities two, lateral.

The skull of this genus is figured by Wagler (N. Syst. Amph. t. 2. f. 4–9) as *Aspidonectes javanicus*.

1. Aspilus cariniferus. (Skull, figs. 4, 5, 6.)

*Trionyx cariniferus*, Gray, Cat. Shield Rept. B.M. 67, t. 32.

*T. stellatus*, var. *javanicus*, Schleg. Faun. Japon. Chelonia, t. 5. f. 6 (head?).

? *Aspidonectes javanicus*, Wagler, N. S. Amph. t. 2. f. 1, 12 (skeleton and skull).

*Hab.* Java.

Wagler, in his 'N. Syst. Amphib.' t. 2. f. 1, 11, figures a very young *Trionyx* under the name of *Aspidonectes javanicus*. It is not the *Trionyx javanicus* of Cuvier nor of my catalogue. The head, neck, and body are minutely white-speckled; the chin and throat are varied with rather larger white spots, and the dorsal disk is speckled with white, as in *Potamochelys stellatus*; but he represents the dorsal disk as having six rings of white spots on the hinder part near the margin, which I have never seen in this species. Hence

it is probably the young of a species that has not come under my observation.

Fig. 4.

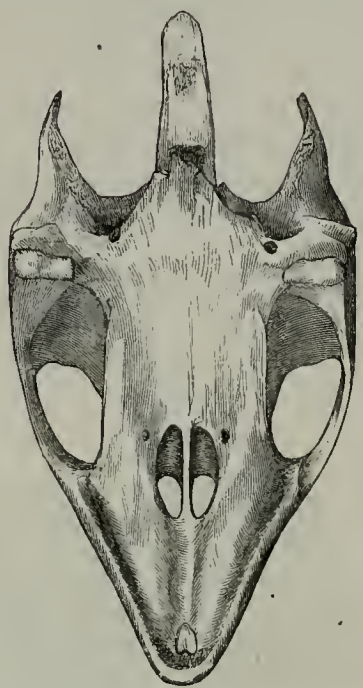


Fig. 5.

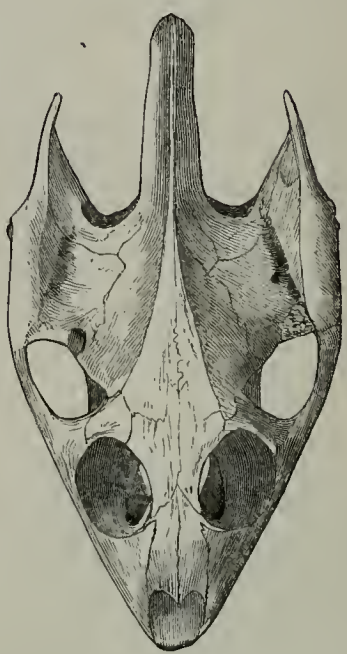
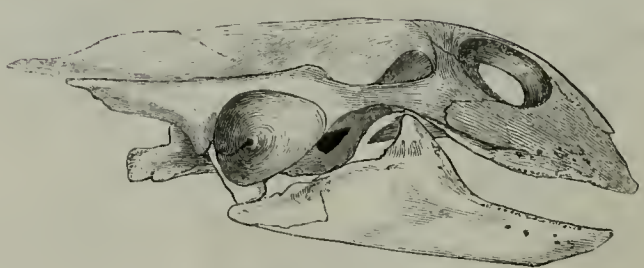


Fig. 6.



*Aspilus cariniferus.*

The following species probably belong to this genus, but I have not been able to examine the skulls of them :—

2. Aspilus ? punctulatus.

Dark grey brown ; back of the shield with numerous minute white specks, and a narrow thin white margin ; beneath white. Head dark, with minute white specks above, and larger white spots on the chin and throat, with a large irregular-shaped spot on the side of the neck behind the angle of the gape ; the specks and spots on the head regularly dispersed ; sternal callosities not developed.

*Trionyx cariniferus*, spec. *d* & *e*, Cat. Shield Rept. B.M. 67.
*Hab.* Amboina or Ceram (*Madame Ida Pfeiffer*).

3. Aspilus? ornatus.

*Trionyx ornatus*, Gray, P. Z. S. 1861, p. 41, t. 5; Ann. & Mag. N. Hist. 1860, vi. p. 218.
"*Trionyx javanicus*, juv., Dum. & Bib." Mus. Paris.
*Hab.* Camboja.
Young specimens from Siam have rudimentary, narrow, linear, band-like callosities on the lateral sutures. Head minutely white-speckled (no large spot at angle); the first vertebral bone transverse, broad, with a prominence on the middle of hinder edge. The hinder part of the disk with close large tubercles.
A stuffed young specimen from Sarawak, which appears to belong to the same species, has no indication of callosities. Head white-spotted, like young from Siam. The first vertebral bone separate, transverse, smooth, not rugose. The hinder part of the disk smooth, with a central elongated streak, and two oblique converging short lines of small tubercles.

b. *Lower jaw with a simple sharp shelving edge in front, and a flat shelving alveolar disk on the hinder half.*

* *Palate concave, with a narrow deep groove of equal width in front of the large internal nostrils, which have two very large grooves behind them, and which are contracted, and overlapped on the sides by the alveolar plates.*

Potamochelys.

Head elongate, rather depressed; nose rounded; forehead flat; orbits submedial. Sternal callosities four. The palate of the skull rather convex behind, with a slight expansion on each side under the orbits, concave, contracted and bent down in front, with a short, very narrow, deep groove of equal width in front of the internal nostrils. The internal nostrils medial, large, oblong, hooded over by the dilated side of the alveolar plates, and with a very long deep groove behind each of them. The alveolar surface of the upper jaw rather convex in front, shelving outwards behind, and with a raised inner edge, which hoods over the cavity of the internal nostrils. The lower jaw low and produced in front, with a simple sharp edge in front, and a subtrigonal, elongate, flattened, rather concave alveolar disk occupying the hinder half of the inner side.

1. Potamochelys stellatus. (Skull, figs. 7, 8.)

*Trionyx javanicus*, Geoff. Ann. Mus. xiv. 15, t. 3; Gray, Cat. Shield Rept. B. M. 67.
*Potamochelys javanicus*, Fitz.
*T. stellatus*, Geoff. Ann. Mus. xiv. 13 (junior).
*Hab.* India: Deccan (*Sykes*).

I have changed the name of this species because it has been applied to a number of species on the Continent, and I have never seen a specimen from Java. It is known in the young state from all the other species by the broad black streaks radiating on the crown of the head; and they are to be seen in the half-grown specimens.

Fig. 7.

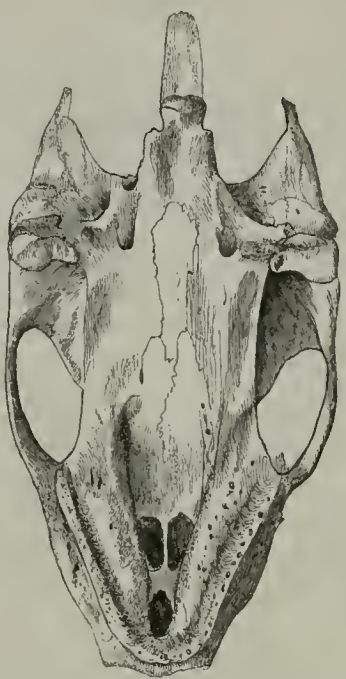
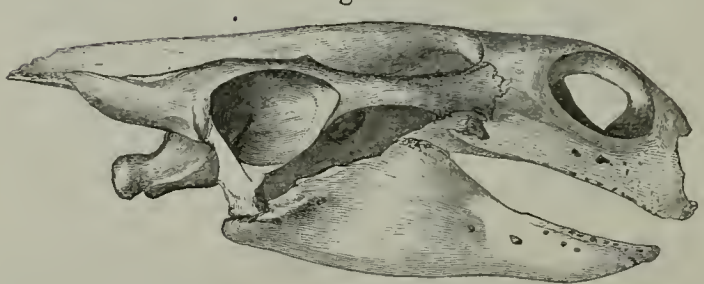


Fig. 8.



*Potamochelys stellatus.*

The following species, which have four sternal callosities, appear to belong to this genus, but I have not been able to examine the skulls of them :—

2. Potamochelys? perocellatus.

*Trionyx perocellatus*, Gray, Cat. Tort. B. M. 48 ; Cat. Shield Rept. 65, t. 31.

*Hab.* China and Chusan.

Face moderately long, subconical, rather convex; forehead and crown flat (length from back of orbit to nose and to occiput the same), longer than in *P. stellatus*; nostrils large, rather close, with a very small lobe on the inner side of each.

The neck of the young specimens with a dark-edged pale streak on each side, which is bent down towards the throat behind; head brown, black-speckled, with a narrow line across the forehead on the front edge of the eye.

3. Potamochelys? frenatus.

*Trionyx frenatus*, Gray, Cat. Shield Rept. 67.
*Hab.* Singapore (*Wallace*).

4. Potamochelys? tuberculatus.

*Trionyx tuberculatus*, Cantor; Gray, P. Z. S. 1861, p. 42.
*Hab.* Chusan.

5. Potamochelys? microcephalus, n. s.

Olive-brown. The hinder part of the disk nearly smooth, without any rows of tubercles. The first vertebral bones transverse, short, rugose, with two circular pits behind, between it and the second vertebral plate (probably disappearing in the adult); sternal callosities four, evenly rugose; head small, slender, rather elongate; nose slender, conical, tapering.

*Hab.* Sarawak (*Wallace*).

This species differs from all the other Mud-Tortoises from Asia in the small size, slender and tapering form of the head. It is evidently a young specimen, from the extent of the ribs, which are still free, and the separate state of the bones of the head; but the dorsal bony disk and the sternal callosities are well developed.

This Tortoise will probably be found to form a genus by itself, when the adult animal has been examined.

See also—

1. *Trionyx maackii*, Brandt, Bull. Acad. St. Petersb. xvi. 110, 1857; Institute, xxvi. no. 1288, p. 298; Arch. f. Nat. 1858, p. 63.
*Hab.* N. China: Amoor River.

2. *Trionyx schlegelii*, Brandt, *l. c.* 1857.
*T. stellata*, sive *javanica*, var. *japonica*, Schlegel, Fauna Japon. t. 8 (animal), t. 5. f. 7 (head).
*Hab.* Japan.

** *Palate flat, with a broad shallow groove of equal width in front of the large posterior internal nostrils, which have two short deep grooves behind them.*

Tyrse.

Sternal callosities four. Nose elongate, conical, shelving. Fore-

head flat. Eyes submedial. Upper jaw with a broad concave alveolar plate of nearly equal width in all parts. The lower jaw with a sharp edge, with only very slight indications of a flattened alveolar edge on the hinder part of the inner side; the front of the jaw shelving forwards, and with a large concavity on the upper surface behind the edges. The palate flat behind, with a broad concavity in front of the internal nostrils, which is continued behind on both sides of them. The internal nostrils large, oblong, far back, nearly in a line with the front of the zygomatic arches, and with a large deep concavity, separated by a central longitudinal ridge, behind each of them. The nostrils large, rounded, with an internal lobe on the inner edge (see Wagler, N. Syst. Amph. t. 2. f. 19).

The skull of this genus is at once known from those of the genus *Trionyx*, by the nose being elongated, shelving, and not rounded, and by the form of the palate. The skull of a young specimen from the Nile is figured in the 'Cat. of Shield Reptiles,' t. 42. f. 2.

Tyrse nilotica, Gray, Cat. Tort. B. M. 48.

*Trionyx niloticus*, Gray, Syn. Rept. 48; Cat. Shield Rept. 68.
*Testudo triunguis*, Forsk.
*Trionyx ægyptiacus*, Geoff. Egyp.
*Gymnopus ægyptiacus*, Dum. & Bibr.
*Trionyx labrosus*, Bell, Test.
*Aspidonectes ægyptiacus*, Fitz.
*Aspidonectes aspilus*, Cope, Proc. Acad. Nat. Sci. Philad. 1859, p. 295 (adult).

*Hab.* Africa, North and West: Fernando Vas River (*Cope*); Sierra Leone (*Bell*).

The young specimens have the head, limbs, and edge of the shield dusky, with round white spots.

The very large specimen of *Trionyx* from Western Africa, obtained from M. Du Chaillu, agrees with Mr. Cope's description of *Aspidonectes aspilus*; I can see no difference between it and the half-grown specimens of *Trionyx niloticus* from Egypt in the British Museum. In the two Egyptian specimens the hinder callosities are separated from the lateral ones, and the hinder part of the inner edge of the lateral callosities is regularly rounded. In the very large adult West African specimen the front edge of the hinder callosities is furnished with a process that fits into a notch in the hinder edge of the lateral callosities; and the inner edge of the lateral callosities is straight, and then bent off at an acute angle at the hinder part.

But this is only a difference depending on age; for a more adult specimen collected at Chartoum by Mr. Petherick, in the British Museum, has the lobe and notch in the hinder edge of the lateral callosity well marked, and the hinder part of the inner edge of the lateral callosities approaches more nearly the form of the callosity in the larger and more adult West-African specimen.

There is a large skull and other bones of a species of the genus in the Museum of the College of Surgeons, which was presented by Captain Sir Everard Home. The locality of the species is not

stated, but it is probably from the Indian or Australian Seas. It is very like the skull of *Tyrse nilotica*; and if it came from Africa, it may probably belong to that species. It is described in detail by Professor Owen in the Catalogue of the Osteological Specimens in that Museum (see p. 181, nos. 922, 923).

In the 'Knowsley Menagerie' I described a species of *Trionyx* living in Knowsley Park, which was said to have been sent from Sierra Leone, under the name of *Tyrse argus*, Gray, Cat. Tort. B.M. 48; Knowsley Menagerie, t. ; *Trionyx argus*, Gray, Cat. Shield Rept. B.M. 68. When I compare this specimen with the specimen of *Trionyx spiniferus* which I have received from North America, I am very doubtful whether there must not have been some confusion about the habitat of the specimen, and whether it is not more probably a North American species—especially as since our increased intercourse with West Africa we have not received any more specimens.

The head of the specimen figured in the 'Knowsley Menagerie,' which is now in the British Museum, has the nose elongate-conical; and the forehead, as shown in the dry specimen, is elongated, lozenge-shaped, much longer than broad.

B. *Skull oblong, thin; nose very short; eyes anterior; forehead elongate, longer than the face; palate flat, with a scarcely raised alveolar edge, and only a very slight depression before and behind the internal nostrils.*

a. *Skull short and broad, much depressed; alveolar edge of both jaws flat, simple.*

### Pelochelys.

Head depressed, moderate-sized; the face very short, shelving; eyes rather close together, superior; the forehead flat, rather concave; skull much depressed, broad; nose very short, shelving; orbits very large, subanterior; forehead depressed, rather concave; præfrontal bones large; præmaxillary bones none; the maxillar bone circumscribing the lower edge of the exterior nostrils. Palate nearly flat, very broad, rather convex in the centre behind, slightly concave (but without any central groove) in front of the internal nostrils. Internal nostrils oblique, oblong, with a rather wide, deep, short groove behind each of them. The alveolar edge flat, simple, with an acute scarcely raised edge. Lower jaw very slender, weak, with a simple sharp edge, with a slightly thickened internal rib. The first vertebral plate of the shield as broad as the front edge of the second one.

Professor Owen, in the account of the skull of this genus which is in the College of Surgeons, named *Trionyx bibroni*, no. 954, describes the difference between it and the skull of *Trionyx gangeticus*, and a *Tyrse* allied to *T. nilotica*, and he also describes some peculiarities in the formation of the dorsal disk (see Cat. Osteol. Spec. Mus. Coll. Surg. p. 185, nos. 954–959).

1. Pelochelys cantorii. (Skull, figs. 9, 10.)

*Chitra indica*, Blyth, J. A. S. 1863, xl. 77; Günther, Indian Rept. t. (not *Gray*).

*Gymnopus indicus*, Cantor, Rept. Malacca, 10.

*Hab.* Malacca, marine (*Cantor; Blyth*).

Dr. Günther, who soaked Dr. Cantor's specimen, says he observed some black lines on the head and throat, and some dark marbling on the edge of the dorsal disk as in *Chitra indica*.

Fig. 9.

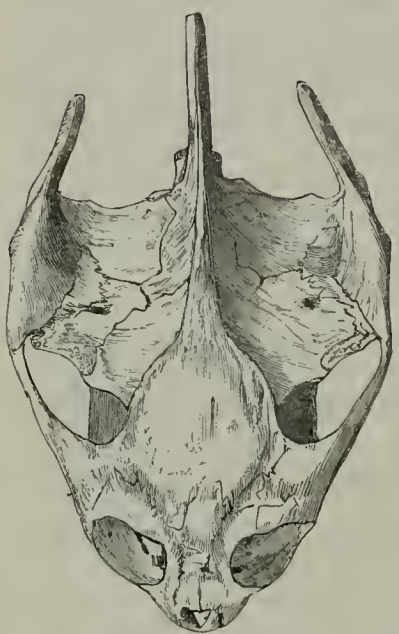
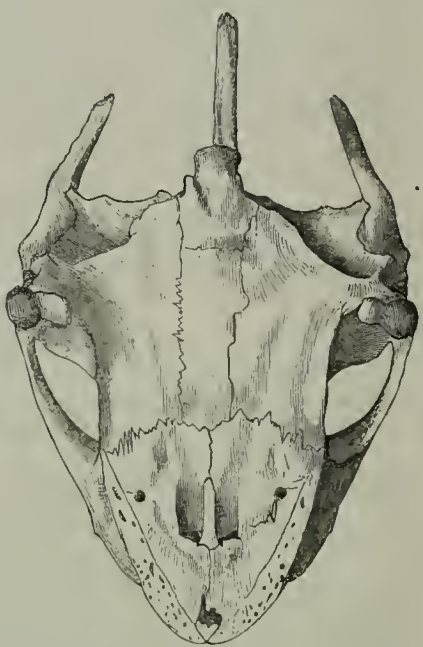


Fig. 10.



*Pelochelys cantorii.*

2. Pelochelys cumingii.

*Chitra indica* (part), Gray, Cat. Shield Rept. B.M. p. 70.

*Hab.* Philippines (*Cuming*).

Much larger than the preceding, which has the sternal callosities fully developed.

The young specimens that Mr. Cuming brought home, apparently belonging to the same species, have the head olive, minutely black-dotted; the throat olive, minutely white-speckled.

3. Pelochelys bibronii?.

*Trionyx* (*Gymnopus*) *bibroni*, Owen, Cat. Osteol. Spec. Mus. Coll. Surg. p. 185, nos. 951–959.

*Hab.* ?Australia (*Capt. Sir E. Home, F.R.S., fide Owen*).

This is only known from a skull, a dorsal disk, and some other bones in the Museum of the College of Surgeons.

Prof. Owen, in the 'Catalogue of the Osteological Specimens in the Museum of the College of Surgeons,' describes the skull on which this species is founded. It differs from the skull of the young specimens of *P. cantorii* in the Museum collection from Malacca in being rather longer compared with its width; but then that may depend on the age of the specimen, for its size and the bones of the dorsal disk show that it belongs to a more adult specimen than the young one with which I was able to compare it.

There is some doubt as to the skull in the College of Surgeons having been obtained from Australia, as I have never heard of any Mud-Tortoises being found in that country; and it is not unlikely that the specimen was obtained from Singapore, or if obtained from Australia may have been carried there.

b. *Skull elongate; forehead shelving, much produced behind; nose very short, convex; alveolar edge of both jaws with a deep groove.*

### Chitra.

*Chitra*, Gray, Cat. Tort. B.M. 49; Cat. Shield Rept. 70.

The head elongate, depressed; nose very short; eyes near the front margin; forehead elongate, slightly convex, shelving. Skull elongate, ventricose, thin, light; the nose very short, convex; orbits very large, near the front margin; the forehead very much elongated, several times as long as the face, shelving, slightly convex (see Cat. Shield Reptiles, t. 41). Palate flat, concave in the centre; internal nostrils anterior, with only a very slight, very broad depression behind each of them; alveolar edge with a deep angular groove, concentric, with sharp outer edges. Lower jaw strong, with a deep angular alveolar groove, concentric with the sharp outer edges (see Gray, Cat. Shield Rept. B.M. t. 41). The first vertebral plate of the dorsal disk is rather broad and transverse, arched in front; but (in the younger specimen at least) it is not so broad as the front edge of the second vertebral plate of the disk.

This genus and *Pelochelys* are so similar externally, especially in the dried or stuffed specimens, that the specimens were named alike in the British Museum, and so remained for years, though in the meantime they had been examined by several herpetologists, both English and foreign. It is only by a slight difference in the length of the head, compared with the width and the flatness and slight convexity of the forehead, that they can be distinguished, different as the forms of the skulls are.

1. Chitra indica. (Skull, figs. 11, 12.)

*Testudo chitra*, B. Hamilton, Icon. ined.

*Trionyx ægyptiacus*, var. *indicus*, Gray, Illust. Ind. Zool. i. t. 80.

*Trionyx indicus*, Gray, Syn. Rept. 47.

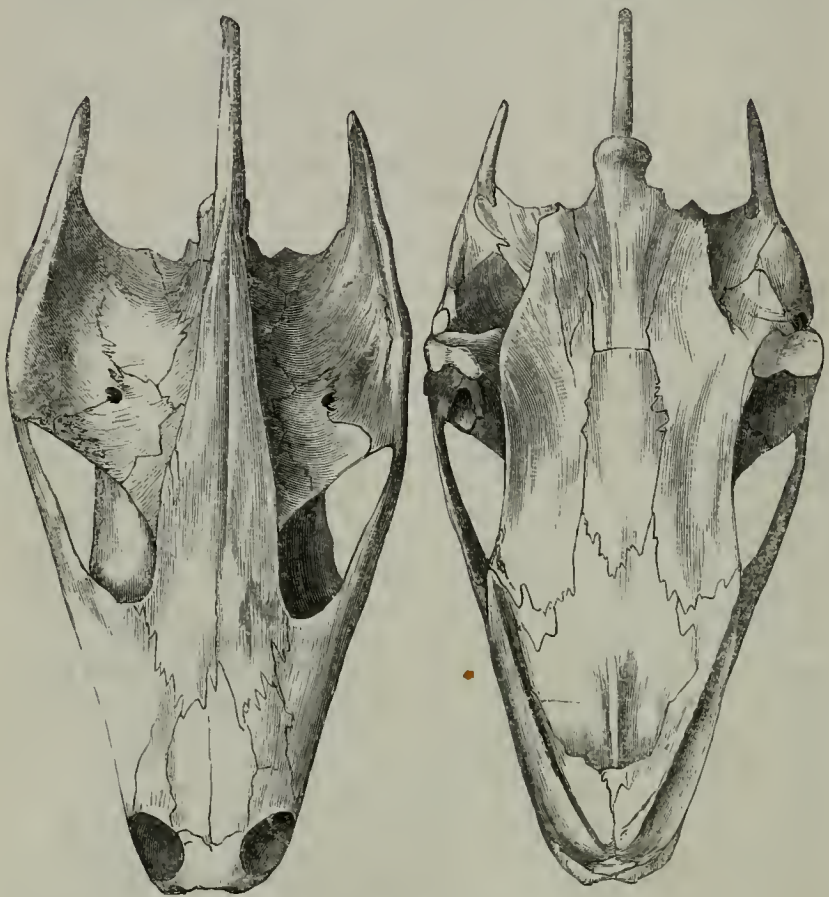
*Chitra indica*, Gray, Cat. Tort. B.M. 49; Cat. Shield Rept. B.M. 70 (part), t. 41 (skull).

*Gymnopus lineatus*, Dum. et Bib. Erp. Gén. ii. 491.

*Hab.* India: Ganges; Futtaghur (*Hardwicke*); Nepal (*Falconer, Boys*).

The young specimens are olive, with short black lines on the head, and dorsal disk marbled with darker bands and streaks.

Fig. 11. Fig. 12.



*Chitra indica.*

II. *The aberrant Mud-Tortoises, with covered hind feet, have a broad sternum, furnished with a moveable valve on each side behind, which covers the hind feet when they are contracted; and there are seven or nine sternal callosities.*

a. *The margin of the dorsal disk flexible, without any internal bones; the skull short, depressed, flat above; the palate flat, with scarcely any alveolar ridges, and only a very slight pit before and behind the internal nostrils.* Heptathyrina.

HEPTATHYRA.

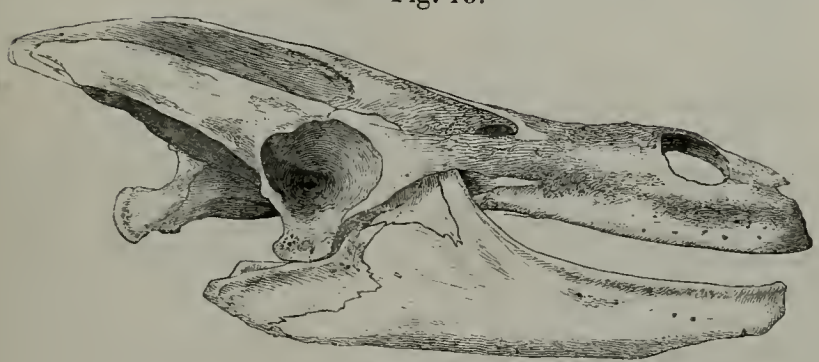
*Heptathyra*, Cope.
*Aspidochelys*, Gray, P. Z. S. 1860.

Face of skull very short, flat above; forehead flat, rather concave, slightly swollen between the hinder parts of the eyes. The palate flat, slightly concave in the middle behind the posterior nostrils. The edge of the maxilla nearly flat, with a narrow slightly raised edge.

Fig. 13.

Fig. 14.

Fig. 15.



*Heptathyra frenata.*

The genus *Cycloderma* of Peters was instituted to contain all the *Cryptopi* of Duméril, which had a boneless flexible margin to the shield, without paying any attention to the number of the callosities, which are also coexistent with a very differently shaped skull and, doubtless, different habits in the animal.

The skull of this genus is analogous to the skull of the genus *Pelochelys* among the naked-footed *Trionychidæ*, as the skull of *Cyclanosteus* resembles that of the more typical *Trionychidæ*.

1. Heptathyra frenata. (Skull, figs. 13, 14, 15.)

*Cycloderma frenatum*, Peters, Monatsb. 1854, p. 216.

*Cyclanosteus frenatus*, Peters, MSS. 1848; Gray, Cat. Shield Rept. 64 (1855).

*Cryptopus aubryi*, A. Dum. Rev. Zool. 1856, p. 37, t. 20.

*Heptathyra aubryi*, Cope, Proc. Acad. N. S. Phil. 1859, p. 296; Gray, P. Z. S. 1860, p. 315.

*Hab.* Africa: Gaboon (*Duméril*); Mozambique (*Peters*).

The similarity of the descriptions of the bands on the head shows that the *Cyclanosteus frenatus* of Peters and the *Cryptopus aubryi* of Duméril most probably belong to the same species.

2. Heptathyra livingstonii.

*Aspidochelys livingstonii*, Gray, P. Z. S. 1860, pp. 6 (pl. xxii.), 315.

*Hab.* Central Africa: River Zambesi.

This may be the same as the former, not quite so full-grown; but the hinder pair of callosities are oblong and united by their hinder edges only, and the colour of the head is not known. Dr. Peters's name, however, and his description of the specimen he had from Mozambique show that one of the *Heptathyræ* found on that side of Africa has the black streak and cross bands that are characteristic of the Gaboon species.

b. *Margin of the dorsal disk flexible, without internal bones; the skull oblong, swollen, convex above; palate concave, with large distinct alveolar plates, and a deep central pit before and behind the internal nostrils.* Cyclanosteina.

Cyclanosteus.

*Cyclanosteus* (restricted), Gray, P. Z. S. 1860, 315.

The face of the skull short, convex, arched in front; orbits rather lateral, shelving; forehead flat, rhombic, elongate. Palate concave, flat behind; in front with a large, broad, deep concavity behind the very large oblong internal nostrils, and a small central, deep, triangular concavity in front of them. The alveolar plate very broad and flat, broader behind, and hooding over and continued far behind the internal nostrils. Lower jaw strong, flattened, very broad, simple, depressed, and sharp-edged in front, with the hinder half flattened out internally into an ovate, rather concave alveolar disk.

1. CYCLANOSTEUS SENEGALENSIS. (Skull, figs. 16, 17, 18.)

*Cyclanosteus petersii*, Gray, Cat. Shield Rept. 64, t. 29 ; Proc. Zool. Soc. 1860, p. 315.

*Cyclanosteus* (*Cyclanorbis*) *petersii*, Gray, P. Z. S. 1852, p. 133 ; Ann. & Mag. N. H. xv. 69.

Jun. *Emyda senegalensis*, Gray, Cat. Tort. B.M. 47 ; Cat. Shield Rept. B.M. 64 ; P. Z. S. 1860, p. 316.

Fig. 16.

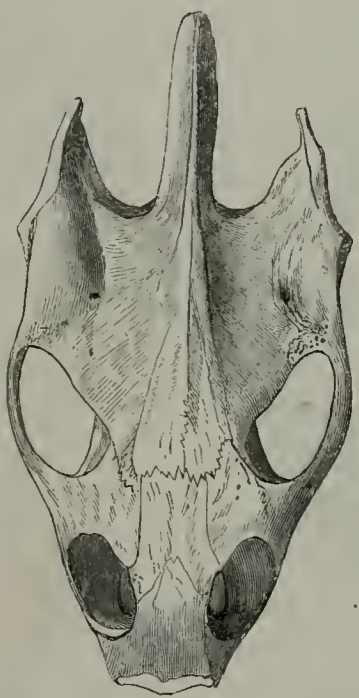


Fig. 17.

Fig. 18.

*Cyclanosteus senegalensis*, jun.

Fig. 19.

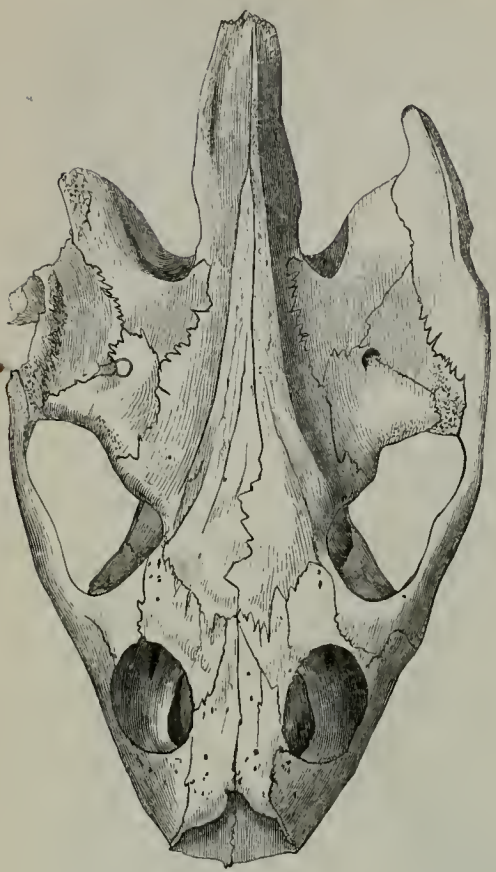


Fig. 20.

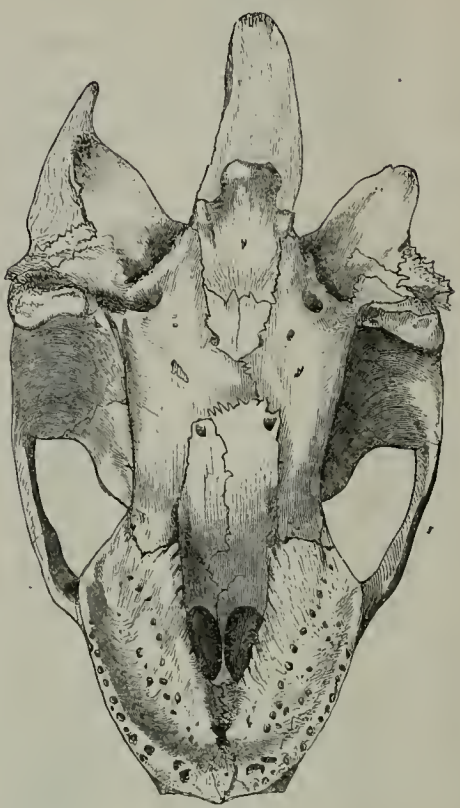


Fig. 21.

*Cyclanosteus senegalensis* (adult?).

*Cryptopus senegalensis*, Dum. et Bib. Erp. Gén. ii. 504; Gray, P. Z. S. 1860, p. 316.

*Hab.* W. Africa: River Gambia.

The young specimens in the British Museum from the River Gambia have the head pale grey, with some pale roundish spots (and without any indication of black streaks).

The specimen of *Emyda senegalensis* which we have received from Paris, as coming from Senegal, is evidently the young of a *Cyclanosteus*, and not of an *Emyda*; and as it agrees in many particulars with the young specimen which we have received from the Gambia as *Cyclanosteus petersii*, it is most probably the young of that species. It differs from the specimen which we have from the Gambia, of the same size, in having a few scattered black specks on the hinder part of the dorsal shield; but this probably arises from the Senegal specimen having been better preserved by being placed and kept in stronger spirits.

In the British Museum there is a skull (figs. 19, 20, 21) which was received from the River Gambia without the animal, and which appears to be that of the adult *Cyclanosteus senegalensis*. The whole upper edge of the lower jaw is very much dilated and moderately concave; while in the skull of a half-grown specimen, apparently of the same species, the front half of the lower jaw is high, narrow, with a simple sharp edge, and the hinder portion of the upper edge is more and more dilated and flattened as it approaches the condyle, so as to form an oblong, concave, flattened disk on the surface. Unfortunately I have not the skull of a young specimen to compare with the other two; but I should not be surprised to find that the whole upper edge in the young specimen is simple and shelving, like the adult state of *Tyrse nilotica*.

I may observe that I have not seen any observations in Professor Agassiz's work which show that he has observed such a change of form of the lower jaw in any of the North American species of this family. In his account of the general characters of the family he simply observes, "the lower jaw grows more flattened towards the front end." (Contrib. i. 332.)

c. *The margin of the dorsal disk strengthened with a series of internal marginal bones; skull oblong, swollen, convex.* Emydina.

### Emyda.

*Emyda*, Gray, Syn. 1831; Cat. Shield Rept. 63.
*Trionyx*, Wagler, 1830.
*Cryptopus*, Dum. et Bib. 1835.

The face short, convex; forehead and crown flattened above.

The skull, as figured by Wagler (N. Syst. Amphib. t. 2. f. 24–31), has a high arched nose, rather flattened over the eyes, and a flat forehead. The palate with a narrow groove, rather narrowed in front of the oblong internal nostril, placed in front of the middle of the alveolar margin. The alveolar margin of the upper jaw is flat, rather

dilated behind. The lower jaw is strong, angular on the sides, with a narrow flat alveolar edge.

1. Emyda punctata, Gray, *l. c.* f. 3.

*Trionyx coromandelicus*, Geoff.; Wagler, N. Syst. Amph. t. 2. f. 21–23 (anat.).

We have lately received specimens from Allahabad and Sikkim, collected by the brothers Schlagintweit.

2. Emyda ceylonensis, Gray, *l. c.* f. 4. t. 29 *a*.

*Emyda vittata* (Peters, Monatsb. 1854, p. 216), from Goa, appears to be the same as *E. ceylonensis*, Gray, Proc. Zool. Soc. 1855, p. 201; Cat. Shield Rept. 64. t. 29 *a* (1855). This animal is also figured by Mr. Bell as the true *Emyda punctata*, in his 'Testudinata,' t. 1, 2.

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March 8, 1864.

Dr. J. E. Gray, F.R.S., in the Chair.

Dr. E. Crisp read a paper, entitled "Contributions to the Anatomy of the Eland."

The following papers were read:—

1. On the Mammals Collected and Observed by Capt. J. H. Speke during the East-African Expedition. By P. L. Sclater; with Notes by Capt. J. H. Speke.

(Plates XII., XIII.)

Owing to the serious difficulties encountered on the route, the specimens of Mammals collected by Capt. Speke and Capt. Grant during the East-African Expedition are not so numerous, and those that have reached England are not in so perfect a condition, as might have been wished. They consist principally of heads and horns of Antelopes, and fragmentary parts of these and other species of animals killed for food—powder and shot having been too precious to admit of its habitual use for the purpose merely of procuring specimens. These, however, together with Capt. Speke's notes as to several well-known species, supply us with indications of the existence in Eastern Africa, between Zanzibar and Gondokoro, of species of Mammals belonging to the following orders:—

| | | | |
|---|---|---|---|
| Quadrumana | 1 | Ruminantia | 19 |
| Chiroptera | 2 | Pachydermata | 4 |
| Carnivora | 6 | Proboscidea | 1 |
| Rodentia | 6 | | |