

teeth of which have been figured in the above mentioned useful work.

Plate X, Fig. 5. Profile view of the jaws magnified.

6. Lower jaw, natural size, left side, with the alveolar process removed, to exhibit the roots of the teeth.

7. Molares of the upper jaw, left side, magnified.

8. Molares of the lower jaw, left side, magnified.

ART. XXXIV. *A Monograph of the Tortoises having a moveable Sternum, with Remarks on their Arrangement and Affinities.* By THOMAS BELL, Esq. F.L.S.

WHEN, amongst a group of animals agreeing in their general relations, a number of species are found to differ from the rest in some important character, and that character connected with an essential difference in anatomical structure, we are justified in considering those species as a distinct subordinate group, and, in a systematic arrangement, in applying to it a distinctive appellation. The subjects of the present memoir, were included amongst the *Emydes* of Brongniart, and in their general appearance, as well as in the structure of the different parts, they certainly have considerable affinity with them. But the circumstance of their having the *sternum* separated, as it were, into two or three divisions, moveable upon each other, led Merrem to consider them as a distinct genus, to which he applied the term *Terrapene*. Since his work was published, Mr. Say, the excellent American Zoologist, who appears not to have seen Merrem's book, has, in a paper on the freshwater and land Tortoises of the United States, also formed them into a distinct group, with the generic appellation *Cistuda*. As however the work of Merrem was published long before Mr. Say's paper made its appearance, I have retained the former name for one of the genera into which I have considered it necessary to subdivide them. M. Spix has also applied the

generic term *Kinosternon* to two species, which he discovered in Brazil.

Like the *Emydes*, they may be considered as fresh water Tortoises; and the general appearance of the shell, the distinct and subpalmed structure of the toes, with the length and sharpness of the claws, sanction such a conclusion, even were we unacquainted with their general aquatic habits. The species hitherto confounded under the term *Terrapene clausa*, and its synonymes, appear indeed at first to be exceptions to this rule, yet although known in America by the common name of Land Tortoise, and having in some measure the appearance and habits of the true *Testudines*, we find that their affinities to the rest of the group are sufficiently numerous and important to point out their natural situation amongst them. Schoepff informs us that the *T. clausa*, although sometimes found in dry situations, and from the convexity of the shell, &c. not well formed for swimming, yet loves marshy situations; and M. Say states that it is fond of moisture. There is in fact a natural transition from the Fresh-water to the Land Tortoises of this group, by means of *Terrapene Europæa* (*Testudo Europæa*, Auct.), now first transferred to that genus, which, whilst it has somewhat of the flattened form, and spreading margin of the shell, belonging to the true fluviatile species, yet approaches, in its general structure, the other species of *Terrapene*, which more nearly approximate to the Land Tortoises: it is also found to inhabit wet, marshy, or muddy places, rather than the lakes and rivers in which the more typical Fresh-water species delight.

The important character in which the species of the group now under consideration all agree, is the moveable structure of the sternum. In making a few observations upon the different modifications of this part, I shall consider the *sternum* in all of them, as consisting of three portions or lobes, of which the posterior consists of that part which is covered by the two posterior pairs of plates, the middle one by the next pair, and the anterior by the remaining anterior plates, which, however, differ in number, according as the foremost or *gular* pair, are either united into one single plate, as in *Sternotherus odoratus*, or, on the other hand,

have, interposed between them, a small supernumerary one, as in *S. Leachianus*.

From these observations it will be easy to understand the three different modifications which take place in this part. In the first, the genus *Kinosternon*, the middle lobe is quite fixed to the sides, the anterior and posterior lobes moving upon it, by means of the structure about to be described. In the second form, the genus *Sternotherus*, the middle portion is fixed as in the other, and the posterior one also connected with it by continuous bony union; the anterior lobe only being moveable. In the third, constituting the genus *Terrapene*, the middle and posterior lobes are also immoveably connected together, but forming a single moveable valve, without any bony union with the upper shell,—the anterior lobe being also moveable on the same axis. The only connection between these two valves and the upper shell, is by means of a strong ligament, becoming cartilaginous at the axis.

The hinge, or connection between the valves, is formed by a sort of articular cartilage, allowing by its elasticity, of sufficient motion to enable the animal to open the shell so as to move its limbs without inconvenience, or, on the other hand, to bring it into close contact with the upper shell, and thus to enclose itself, particularly in the genus *Terrapene*, within a complete box. At the angles of these valves are small processes of bone, or at least distinct muscular impressions, to which the adductor muscles are fixed; and these, in the anterior valve of *Sternotherus Leachianus* form long spinous processes. It is obvious that in the genus *Sternotherus*, the hinder part of the shell cannot be closed, as that part of the sternum is immoveable.

Upon the whole then, notwithstanding the affinities by which these animals are connected with the *Emydes* of Merrem, are such as to forbid me to consider them as a distinct family, yet the structure which I have been describing is so striking, and appears to me of so much consequence, especially as requiring a considerable addition to, or modification of, the muscular system, that I could not look upon it as forming a less important group than a subfamily, particularly as it includes several subordinate divisions, with distinct generic characters.

Fam. EMYDIDÆ.

Subfam. STERNOTHÆRINA.

Digiti distincti, acuté unguiculati.*Rostrum* corneum.*Scuta* dorsalia, tredecim.

Sternum uni-valve seu bi-valve; valvis ligamento coarticulatis, quasi super cardinem se vertentibus; et testam subindè plus minusve arcè claudentibus.

Tocs distinct, with sharp claws.*Beak* horny.*Scales* of the disk thirteen.

Breast plate consisting of one or two valves, united by a ligament moving as if on a hinge, and thus capable of partially or totally closing the shell.

TESTUDO. Auct.

TERRAPENE. Merrem.

CISTUDA. Say.

 Genus I. KINOSTERNON. Spix.

Sternum bivalve: lobus medius fixus; anterior et posterior mobiles, ligamentis ad lobum medium articulata.

Breast plate, consisting of three distinct lobes, the middle one fixed, to which the anterior and posterior, which are moveable, are articulated by a ligament.

SPECIES I.

SHAVIANUM. *K. testá elongato-ovatá, tricarinatá; scutis omnibus imbricatis, marginalibus 23; sterno posticè bifido.*

Testudo Pennsylvanica var: Shaw Gen. Zool. III. par. I. p. 61. tab. 15.

Habitat — ?

Mus, nost.

Shell elongato-ovate, tricarinated; the plates imbricated, those of the margin 23 in number; sternum bifid behind.

Of this elegant species I have seen but a single specimen, now in my collection, which, as I obtained it from a dealer who had long possessed it, may, not improbably, be the identical one figured by Shaw, and stated by him to have been in the Leverian museum.

The general form of the shell is oblong, very slightly narrowed behind, obtuse before, and subemarginate, but the emargination interrupted by the projection of the central marginal plate. It is gibbous, and much rounded at the sides, as high as the lateral carinæ, between each of which and the central ridge runs a deep even furrow. The plates are polished, and elegantly sculptured; those of the spine rather long and narrow, and of beautiful forms; the posterior edge of each lying over the anterior one of the next. The area or nucleus of each plate, to which the different layers of horny matter are added during growth, is situated at its posterior angle. The *sternum* is considerably narrower than the upper shell, to which the middle lobe is strongly connected by bony union. The anterior and posterior moveable valves are united to the middle portion in an almost straight direction. The hinder part of the sternum is narrowed, and emarginate at the extremity. When shut, this portion does not fit the upper shell, so that it is never so close at that part as in many other species of the group.

The general colour of the upper shell is a very deep blackish brown; the *sternum* and under part of the margin yellowish.

As the brief account given by Dr. Shaw of this interesting species is extremely vague and unsatisfactory, I have thought it necessary to enter into a more detailed description of it; and have named it in honour of that naturalist. It is remarkable that he should for one moment have considered it as a variety of *Testudo Pennsylvanica* (Gmel.) to which it bears scarcely the least general resemblance, and from which it differs in so many essential characters. Of the animal itself unfortunately nothing is known.

SPECIES 2.

LONGICAUDATUM. *K. Testá oblongá subtricarinatá; scutis dorsalibus striatè sulcatis; marginalibus 25; caudá elongatá crassá.*

K. longicaudatum, Spix. Test. Nov. Braz. p. 17. tab. XII.

Habitat in Brazilíá.

Shell oblong, slightly tricarinated; dorsal plates striated; marginal plates 25; tail long and thick.

This species is readily distinguished from the former by the number of marginal plates, as well as by the much slighter degree in which the shell is carinated.

SPECIES 3.

BREVICAUDATUM. *K. Testá ovata-subglobosá; scutis dorsalibus non striatis; marginalibus 25; caudá brevissimá.*

K. brevicaudatum, Spix. Test. Nov. Braz. p. 18. tab. XIII.

Habitat in Brazilíá.

Shell ovate-subglobose; dorsal plates without striæ, marginal plates 25: tail very short.

These two species form part of the rich Zoological treasures, which are the result of the labours of Mons. Spix in Brazil.

SPECIES 4.

PENNSYLVANICUM. *K. testú ellipticá lævi; dorso planiusculo; scutis marginalibus 23.*

Testudo Pennsylvanica, Gmel. 1042. Schoepff, p. 107. t. 24. fig. A.

Terrapene Pennsylvanica. Merrem, p. 27.

Cistuda Pennsylvanica. Say, Journ. Ac. Sc. Phil. IV. p. 206.

Habitat in Americá Septentrionali.

Shell elliptical, smooth; back flattened; marginal plates 23.

The species, called by Schœpff a variety of *Testudo Pennsylvanica*, with an *immoveable* sternum, is of course an *Emys*.

SPECIES 5.

AMBOINENSE. *K. testâ ovali lævi; scutis marginalibus 24.*

Testudo Amboinensis. *Daud. II. 309.*

Terrapene Amboinensis. *Merrem, p. 28.*

Habitat in Amboinâ.

Shell oval, smooth; marginal plates 24.

SPECIES 6.

NIGRICANS. *K. testâ suborbiculatâ, carinatâ, scutis marginalibus 24.*

Testudo subnigra. *Latr. I. 89. Daud. II. p. 197.*

? La noiratre. *Lacep. I. p. 175. t. 13.*

Habitat —?

Shell suborbicular, carinated, marginal plates 24.

Genus II. STERNOTHERUS. Mihi.

Sternum uni-valve: lobus anterior mobilis, lobi duo posteriores connexi, immobiles.

Breast-plate having but one moveable valve; formed of the anterior lobe. The middle and posterior lobes immoveably connected and fixed.

SPECIES 1.

TRIFASCIATUS. *S. collo elongato: testâ ovali, carinatâ; scutis vix imbricatis, rugoso-striatis; marginalibus 25.*

Habitat —?

Mus. nost.

Tab. Supp. XIII.

Neck very long; shell oval, carinated, slightly wrinkled; plates almost imperceptibly imbricate; marginal plates 25.

Description.

The head long, narrow, and somewhat depressed; of a yellow colour, with two deep brown bands on each side, passing from

the nostril across the orbit to the back part of the head, where they unite. The nostrils anterior, situated close together. Beak sub-elongate. The neck very long, cinereous above, yellow beneath. The fore feet have five long and sharp claws, the hinder ones four. Tail rather long and slender, and without any horny appendage at the extremity. The shell oval, broader behind, the margin slightly indented. The back carinated. The plates very thin, slightly wrinkled, and striated towards their margin. Those of the spine very slightly imbricated. The marginal plates, which are 25 in number, are of considerable proportional size, and the posterior angle of each a little projecting, so as to give an indented outline to the circumference of the shell. The pectoral plates are twelve in number, and nearly smooth. The hinder lobe of the sternum is flat, horizontal, emarginate, and placed with its edge so near to the upper shell as barely to allow of the passage of the slender tail and flattened legs. The anterior valve is very entire, and capable of completely closing that part of the shell. The general colour is a light dull yellow, intermixed with reddish and black markings. The carina is black, and there is on each side, at the distance of about three quarters of an inch, a black longitudinal band running parallel with it down the back, which gives the shell the appearance of being tricarinated. The prevailing colour of the sternum is black, with a light edge; and towards the centre it assumes also a light ground, with distinct black radiations from the area of each plate.

SPECIES 2.

LEACHIANUS. *S. testâ ovatâ carinatâ: scutis radiatim striatis, vertebralibus imbricatis; marginalibus 24, sterni 13.*

Habitat — — ?

Mus. nost.

Tab. Supp. XIV.

Amico meo carrissimo Dri. Leach, sit hæc species dedicata.

Shell ovate, carinated; the plates with striæ radiating from the area; vertebral plates imbricate; marginal 24, pectoral 13.

Description.

Shell ovate, rounded before and behind, moderately convex, carinated. The plates of the back much thicker than in *S. trifasciatus*, with numerous striæ radiating from the area, and crossed at the margins by concentric rugæ. The general colour of the scuta of a very deep brown or rich blackish colour, the costal plates fulvous in the centre. The first vertebral plates quadrilateral, broad before, narrowing behind, with an elongated tubercle towards the posterior part, forming as it were the commencement of the carina. The second and third hexagonal; the fourth subpentagonal; the whole imbricated and carinated; the carina becoming more elevated to the termination of the fourth plate. The fifth subhexagonal, very narrow before, very broad behind, slightly carinated anteriorly. Lateral plates of the disk with the area smooth, the margins concentrically rugose, crossed with numerous radiating striæ. Marginal plates only 24 in number. A small portion only of the lateral ones is seen on the upper surface of the shell. Sternum rounded anteriorly, bifid behind, having 13 plates, of which seven belong to the anterior lobe. The first or single one is acutely lanceolate, the point directed backwards; the next on each side very small, and subequilaterally triangular. The anterior lobe or valve is united to the middle portion by a ligamento-cartilaginous hinge, and to the upper shell by a small membranous ligament. It is furnished internally with a long spinous process on each side, close to the angles, for the attachment of the muscles that serve to close the shell. The middle and posterior portions which are fixed to the upper shell, are connected together by bony union. The posterior portion is narrower, uni-dentated on each side, and bifid at the extremity. The plates are yellowish, passing at the edges into deep brown. They are marked with concentric and radiated striæ like those of the back.

SPECIES 3.

ODORATUS. *S. testá ovali, convexá, subcarinatá; scutis marginalibus 24; sterni 11.*

Testudo odorata. *Latr. Hist. Rept. I. p. 122. Daud. II. p. 189, pl. 24. f. 3.*

Terrapene odorata. Merrem, p. 27.

Cistuda odorata. Say, *Journ. Ac. Sc. Phil.* IV. 206.

Habitat in Americâ Septentrionali.

Mus. Brit.

Shell oval, convex ; sternum with only eleven plates.

SPECIES 4.

BOSCHII. *S. testâ ovatâ lævi ; scutis marginalibus* 20, *sterni* 11.

Testudo Pennsylvanica, var. 3. Daud. II. 128.

Terrapene Boschii. Merrem, p. 27.

Habitat in Americâ Septentrionali.

Shell ovate, smooth ; marginal plates 20, pectoral 11.

I give this species from Merrem's description, not having seen a specimen of it. It is not mentioned by Mr. Say in his account of the Land and Freshwater Tortoises of the United States, in the *Journal of the Academy of Natural Sciences, of Philadelphia.*

Genus III. TERRAPENE. Merrem.
CISTUDA. Say.

Sternum bivalve ; valva utraque eodem axe mobilis ; valva posterior portionum duarum posteriorum sterni sistens.

Sternum bivalve ; the two valves moving on the same axis ; the posterior valve consisting of the two posterior portions or lobes of the sternum.

SPECIES 1.

EUROPEA. *T. testâ ovatâ planiusculâ, subcarinatâ ; subradiatim punctatâ.*

Testudo Europæa. Schneid. *Schildkr.* 323. Schoepff, p. 1. t. 1. Shaw, *Gen. Zool.* 30. t. 5.

T. lutaria. Linn. *S. N.* p. 352.

? *T. orbicularis.* Linn. *S. N.* p. 351.

T. Meleagris. Shaw, *Nat. Misc.* 4. p. 144.

Emys lutaria. Merrem, p. 24.

Habitat in Europâ temperatâ.

Mus. Nost.

Shell ovate, flattish, subcarinated; spotted in a radiated manner.

On examining some time since a shell of this species, the first I had seen, which had lost the sternum, I was struck with the appearance of the articular surface from which that part had been removed, and immediately concluded that it must belong to the present group, having a moveable breast plate, notwithstanding Merrem, to whom belongs the credit of having separated the "Box Tortoises" under his subgeneric division *Terrapene*, retains this species amongst his *Emydes*, the character of which, in contradistinction to *Terrapene*, is, that the sternum is entire and fixed. On consulting Schoepff, I found that, with his usual accuracy, that author had mentioned the moveable structure of the sternum, and subsequent observations have established my first conjecture that it belongs to this genus.*

SPECIES 2.

CAROLINA. *T. ovato-gibbâ, livido-fuscâ, luteo subconfertè maculatâ; scutis rugosis. Sterno postice rotundato.*

Testudo Carolina. Linn. S. N. I. p. 352. Gmel. 1041. Schneid. 334.

T. clausa. Gmel. 1042. Schoepff, p. 32. t. 7.

Terrapene clausa. Merrem, p. 27.

Cistuda clausa. Say, Journ. Acad. Sc. Phil. IV. p. 205.

Habitat in Americâ.

Mus. Nost.

Shell ovate-gibbous, of a livid brown colour, with yellow subcontiguous spots; plates wrinkled: sternum rounded behind.

SPECIES 3.

MACULATA. *T. testâ subglobosâ, subcarinatâ, nigrâ albo-maculatâ; scutis distanter sulcatis. Sterno postice integro, rotundato.*

Habitat ——— ?

Mus. Nost.

* "Sutura sterni transversalis media laxior est reliquis, et mobilitatem aliquam concedit, ita ut uterque lobus, magis tamen anterior, ad superiorem testam nonnihil propius admoveri possit."—Schoepff Hist. Test. p. 3, de Test. Europeâ.

Shell subglobose; subcarinated, black with whitish spots; plates sulcated, the sulci distant: sternum entire, and rounded behind.

SPECIES 4.

NEBULOSA. *T. testâ ovatâ, interruptè carinatâ, fusco flavoque nebulosâ; scutis striatis. Sterno postice subcoarctato.*

Habitat — ?

Mus. Nost.

Shell ovate, interruptedly carinated, clouded with brown and yellow; plates closely striated: sternum contracted towards the back part.

It is difficult to establish the synonymes of the last three species. They have hitherto been so completely confounded, if indeed they have all been described, that it is scarcely possible to ascertain which species is intended by any particular authour who has mentioned either of them. They are however sufficiently distinct, and I have endeavoured in the specific character given to each, to obviate as far as possible the confusion which has hitherto attached to them. As the term *clausa* is equally applicable to them all, and indeed to all the Tortoises capable of completely shutting the shell, I have omitted it wholly; and have retained the trivial name *Carolina*, (which was first applied by Linneus to the species since designated by the former term) for that species which in form and markings is in some measure intermediate between the other two. *T. nebulosa* is much longer than the others in proportion to its breadth; the plates are more prominent, and finely striated. The markings, instead of being distinct, are clouded, and in some measure softening into each other. The sternum also differs remarkably in not being capable of entirely closing the shell, in consequence of being narrowed at the posterious part. *T. maculata* differs from *Carolina* principally in the want of striæ on the scales, and in the line between the lateral and vertebral rows of dorsal scuta, which in the former is nearly straight, and in the latter is very deeply indented, in consequence of the more angular form of the scuta.