March 26, 1844.

The Right Hon. William Sturges Bourne in the Chair.

A letter was read from Anthony White, Esq., describing the morbid appearances which presented themselves on examining the body of the Lion (*Felis Leo*) which died in the Society's Gardens on the 15th inst.

A communication was made by Dr. Falconer, conveying the substance of a paper by Capt. Cautley and himself on the osteological characters and palæontological history of the *Colossochelys Atlas*, a fossil tortoise of enormous size, from the tertiary strata of the Sewalik hills in the north of India—a tertiary chain apparently formed by the detritus of the Himalaya mountains.

A great number of huge fragments, derived from all parts of the skeleton except the neck and tail, were exhibited on the table, illustrative of a diagram by Mr. Scharf of the animal restored to the natural size.

The communication opened with a reference to the reptilian forms discovered in the fossil slate, among which colossal representatives have been found of all the known tribes, such as the *Iguanodon*, *Megalosaurus*, *Labyrinthodon*, &c., besides numerous forms of which no living analogues exist, such as the *Enaliosaurian* reptiles and *Pterodactyles*. No fossil *Testudinata* remarkable either for size or deviation from existing forms, have hitherto been found in the fossil state. The *Colossochelys* supplies the blank in the first respect, while it differs so little from the land-tortoises in the general construction of its osseous frame, as hardly to constitute more than a subgenus of *Testudo*.

The plastron or sternal portion of the shell affords the chief distinctive character. The episternal portion in the adult is six and a half inches thick, and contracted into a diameter of eight inches, bifid at the apex, and supplied with a thick cuneiform keel on its inferior side: this keel constitutes one of the principal features in the fossil. The entosternal portion exhibits exactly the form of *Testudo*, the same being the case with the xiphiosternal or posterior portion. The plastron in the adult animal was estimated to be nine feet four inches long.

The carapace or buckler of the shell coincides exactly with the general form of the large land-tortoises, of which it exhibits only a magnified representation, flattened at the top and vertical at the sides, with the same outline and recurved margin. The shell was estimated to have been twelve feet three inches long, eight feet in diameter, and six feet high.

The extremities were described as constructed exactly as in the land-tortoises, in which the form of the femur and humerus is marked by peculiar characters. These bones in the fossil were of a huge size, corresponding to the dimensions of the shell. The ungueal bones indicated a foot as large as that of the largest Rhinoceros. The humerus was more curved, and the articulating head more globular and deeper in the fossil, from which it was inferred that it had a stronger articulation, greater rotation, and that the *Colossochelys* was enabled to bring its anterior extremities more under its weight than is the case with existing tortoises.

The affinities with *Testudo* shown in the shell and extremities were found to hold equally good in the construction of the head, of which a comparatively small-sized specimen, inferred to have belonged to a young or half-grown *Colossochelys*, was exhibited. The head of the adult to correspond with the dimensions of the shell, and according to the proportions furnished by a large *Testudo Indica*, was deduced to have been two feet long.

There were no ascertained cervical vertebræ to afford direct evidence as to the length of the neck, which was constructed in the diagram relatively to the proportions of *Testudo Indica*. The entire length of the *Colossochelys Atlas* was inferred to have been about eighteen feet, and that it stood upwards of seven feet high.

The generic name given by the discoverers has reference to the colossal size of the fossil (κολοσσὸς et χέλυς), and the specific one to its fitting representation of the mythological tortoise that sustained the world, according to the systems of Indian cosmogony.

The anatomical details occupied so much of the evening, that space was not left for Dr. Falconer to enter on general points connected with the fossil, such as its possible connexion with the mythological fables of the Hindoos and the æra of its extinction, which will form the subject of another communication.

The results of a chemical analysis of the bones by Mr. Middleton were communicated, showing that they contained a very large quantity of fluorine. Some rough sketches of the *Colossochelys* were exhibited, etched on glass by means of the fluorine yielded by its own bones. The analysis indicated the presence of 11 per cent. of fluoride of calcium.

Mr. Gould exhibited a series of Birds from Australia, collected partly by himself and partly by Mr. Gilbert, viz. :—

Fam. Columbidæ.

Geopelia placida. *Geop. facie et gutture cinereis ; occipite, dorso alisque e cinereo-fuscis ; singulis plumis ad apicem nigerrimo fasciatis, alulis spuriis primariisque saturatè fuscis, humeris subtùs castaneis, pectore, lateribus, et nuchâ cinereis lineis angustis nigris crebrè fasciatis, et lateribus vinaceis.*

Face and throat grey ; occiput, back and wings ashy brown ; each feather with a band of deep velvety black at the extremity ; spurious wings and primaries dark brown ; under surface of the shoulders

chestnut; chest, sides and back of the neck grey, crossed by numerous narrow bands of black; abdomen and flanks vinous; four centre tail-feathers ashy brown, the remainder black, largely tipped with white; irides light ash-grey; bill and orbits bright greyish blue, becoming much paler before and behind the eye; frontal scales of tarsi and feet dark greenish grey; remainder of the legs and feet reddish flesh-colour.

Total length, $7\frac{3}{8}$ inches; bill, $\frac{5}{8}$; wing, $3\frac{7}{8}$; tail, $3\frac{5}{8}$; tarsi, $\frac{5}{8}$.

Hab. Port Essington.

This and the next species are very nearly allied, but on comparison of numerous individuals I find that size invariably points out the locality from which they have been procured; the larger birds (*G. tranquilla*) being an inhabitant of the interior of New South Wales, and the smaller (*G. placida*) of the north coast; besides which, the bands crossing the chest are broader and more distinct in the latter than in the former.

Geopelia tranquilla. *Geop. facie et gutture pallidè cinereis, occipite dorso alisque e cinereo-fuscis, singulis plumis ad apicem angustè nigerrimo fasciatis; alulis spuriis, primariisque saturatè fuscis, pectore, lateribus, et nuchâ pallidè cinereis, lineis angustis nigris crebrè notatis, abdomine et lateribus pallidè vinaceis, abdomine medio crissoque albis; humeris subtùs castaneis.*

Face and throat pale grey; occiput, back and wings ashy brown, each feather bounded at the end with a narrow band of deep velvety black; spurious wing and primaries dark brown; chest, sides and back of the neck pale grey, crossed by numerous narrow, irregular bands of black; abdomen and flanks pale vinous; centre of the abdomen and under tail-coverts white; under surface of the shoulder deep chestnut; four centre tail-feathers greyish brown, passing into black at the tip; the lateral tail-feathers black, largely tipped with white; irides transparent bluish white; base of bill and nostrils light blue; tip of the bill bluish black; naked skin of the orbits deeply wrinkled and of a beautiful light greenish blue; frontal scales of the tarsi and toes dark purple; hind part of the legs flesh-colour.

Total length, $8\frac{3}{4}$ inches; bill, $\frac{5}{8}$; wing, 4; tail, $4\frac{3}{4}$; tarsi, $\frac{5}{8}$.

Hab. Liverpool plains and banks of the Namoi, interior of New South Wales.

Family Rallidæ.

Genus Eulabeornis.

Gen. char.—*Rostrum* capite longius, ferè rectum, et leviter incurvum, lateraliter compressum; naribus elongatis, apertis, singulis in sinu per mandibulæ tres ferè partes a basi excurrente positis. *Alæ* paulò breves atque debiles, valdè rotundatæ; tertiariis elongatis, ferè ad apicem alæ. *Tarsi* paulò longi, et robustiores quàm in genere 'Rallus;' digitis attamen brevioribus. *Cauda* longa, cuneiformis, pogoniis laxis et effusis.

Eulabeornis castaneoventris. *Eul. capite et collo cinereis;*

corpore superiore in toto olivaceo; pectore et corpore inferiore e cinereo-castaneis.

Head and neck ash-grey; all the upper surface, wings and tail olive; breast and all the under surface greyish chestnut; bill yellow at the base, horn-colour at the tip; legs and feet brown.

Total length, 19 inches; bill, $2\frac{1}{4}$; wing, $9\frac{1}{2}$; tail, 6; tarsi, $2\frac{1}{2}$.

Hab. North coast of Australia.

The "*Morduggera*" of the aborigines at Port Essington.

Family Procellaridæ.

Puffinus carneipes. *Puff. castaneo-niger; rostro e carneo albo, culmine apiceque fuscis; pedibus flavescenti-carneis.*

All the plumage chocolate-black; bill fleshy white; culmen and tips of the mandibles brown; legs, feet and membranes yellowish flesh-colour.

Total length, 15 inches; bill, $1\frac{3}{4}$; wing, 12; tail, 5; tarsi, 2; middle toe and nail, $2\frac{1}{2}$.

Procellaria Solandri. *Proc. capite, nuchâ, humeris, primariis et caudâ saturatè fuscis; dorso, alarum caudæque tectricibus e plumbeo-cinereis, plumis fusco marginatis; facie, corporeque subtùs fuscis, abdomine cinereo lavato.*

Head, back of the neck, shoulders, primaries and tail dark brown; back, wing-coverts and upper tail-coverts slate-grey, each feather margined with dark brown; face and all the under surface brown, washed with grey on the abdomen; bill, tarsi and membranes black.

Total length, 16 inches; bill, $1\frac{3}{4}$; wing, 12; tail, $5\frac{1}{2}$; tarsi, $\frac{3}{4}$; middle toe and nail, $2\frac{3}{8}$.

Procellaria leucoptera. *Proc. vertice, corpore superiore, alisque e plumbeo nigris; caudâ e plumbeo-cinereâ; facie, gutture, corpore inferiore, rectricum pogoniis internis ad basim, lineâque humerali albis; tarsis, et membranis interdigitalibus per dimidium basale e carneo-albis.*

Crown of the head, all the upper surface and wings dark slaty black; tail slate-grey; greater wing-coverts slightly fringed with white; face, throat, all the under surface, the base of the inner webs of the primaries and secondaries, and a line along the inner edge of the shoulder, pure white; bill black; tarsi and basal half of the interdigital membrane fleshy white; remainder of the toes and interdigital membrane black.

Total length, 13 inches; bill, 1; wing, $8\frac{1}{2}$; tail, 4; tarsi, $1\frac{1}{8}$; middle toe and nail, $1\frac{3}{8}$.

Aptenodytes undina. *Apt. corpore superiore, lateribus, alisque supernè nitidè cærulescentibus, per plumas singulas lineâ nigrâ longitudinali (latiore in plumis dorsalibus); corpore inferiore alisque subtùs et ad marginem, rectricumque pogoniis internis albis.*

The whole of the upper surface, flanks and upper surface of the wings glossy light blue, with a narrow stripe of black down the centre of each feather, the black mark being broadest and most con-

spicuous on the back; all the under surface of the body, under side, and the inner margin of the upper side of the wing and inner webs of the tail-feathers silky white; bill reddish brown beneath, black above; feet yellowish white.

Total length, $13\frac{1}{2}$ inches; bill, $1\frac{1}{4}$; tarsi, $\frac{3}{4}$.

Hab. Van Diemen's Land.

This is less than *Ap. minor*, to which it is nearly allied.

For the fine specimen here described I am indebted to Ronald C. Gunn, Esq., who procured it at Circular Head, Van Diemen's Land.

practised by drawing the hairs of his fore-arm over the glans. I castrated him some time before death, but not until the ravages of mollities had very far advanced.

"In conclusion, I beg again to apologize for these unconnected remarks, which I have put together hastily and without being enabled to refer to any notes."

The conclusion of the paper by Dr. Falconer and Captain Cautley on the Gigantic Fossil Tortoise of India was then read:—

"On a former meeting we went through the anatomical characters presented by the remains of the *Colossochelys Atlas*. Commencing with the plastron, we traced the modifications of form through the costal elements of the carapace and the dorsal vertebræ, all of which bear the closest resemblance to the ordinary type of the Chersite Chelonians, or true land tortoises. A like result followed the examination of the extremities, which, as exhibited in the remains of the humerus, femur and ungueal phalanges, were seen to be constructed exactly on the plan of *Testudo*, with columnar legs and truncated club-shaped feet, as in the proboscidean Pachydermata. The same direction of affinity was observed throughout the conformation of the head. The only portions of the skeleton from which more or less direct evidence was not derived, were the neck and tail vertebræ, of which there were no specimens in the collection. The general result of the examination showed that the *Colossochelys Atlas* was strictly a land tortoise in every part of its bony frame; and the impressions of the horny scutes proved the like in regard to the arrangement of its dermal integument.

"The principal distinctive characters were found in the sternum, which is enormously thickened at its anterior extremity, along the united portion of the episternal bones, and contracted into a narrow neck, so that the width of the combined episternals does not much exceed their thickness: this thickened portion bears on its under side a deep massive cuneiform keel, which terminates upon the commencement of the entosternal piece. There is more or less thickening of this part in all the species of *Testudo*, and the amount of it is very variable in different individuals of the same species; but there is nothing approaching the same degree of contraction in reference to the thickness, nor aught like a developed keel, in any of the existing land tortoises which we have either had an opportunity of examining, or seen described in systematic works on the tribe. The keel in the fossil is feebly shown in the young animal, but strongly marked in the adult. Conceiving that generic distinctions are only legitimate in the case of well-defined modifications affecting some of the leading characters in the organization of an animal, we do not consider ourselves warranted in attaching a higher systematic importance to the *Colossochelys* than as a subgenus of *Testudo*, which may technically be defined thus (the distinction resting mainly on the form of the sternum):—

Subgen. Colossochelys.

Testa solida, immobilis, sterno anticè in collum valdè incrassatum,

subtùs carinâ crassâ cuneiformi instructum, angustato. Testudo terrestris, staturâ et mole ingenti (inde nomen κολοσσὸς et χέλυς) sui tribus prodigium! Olim in Indiæ orientalis provinciis septentrionalibus degebat.

"*Colossochelys Atlas.*—The first fossil remains of this colossal tortoise were discovered by us in 1835 in the tertiary strata of the Sewalik Hills, or Sub-Himalayahs skirting the southern foot of the great Himalayah chain. They were found associated with the remains of four extinct species of Mastodon and Elephant, species of Rhinoceros, Hippopotamus, Horse, Anoplotherium, Camel, Giraffe, Sivatherium, and a vast number of other Mammalia, including four or five species of Quadrumana. The Sewalik fauna included also a great number of reptilian forms, such as crocodiles and land and freshwater tortoises. Some of the crocodiles belong to extinct species, but others appear to be absolutely identical with species now living in the rivers of India: we allude in particular to the *Crocodilus longirostris*, from the existing forms of which we have been unable to detect any difference in heads dug out of the Sewalik Hills. The same result applies to the existing *Emys tectum*, now a common species found in all parts of India. A very perfect fossil specimen, presenting the greater part of the evidence of the dermal scutes, is undistinguishable from the living forms, not varying more from these than they do among each other. Prof. Thomas Bell, the highest living authority on the family, after a rigid examination, confirms the result at which we had arrived, that there are no characters shown by the fossil to justify its separation from the living *Emys tectum*. There are other cases which appear to yield similar results, but the evidence has not yet been sufficiently examined to justify a confident affirmation of the identity at present.

"The remains of the *Colossochelys* were collected during a period of eight or nine years along a range of eighty miles of hilly country: they belong in consequence to a great number of different animals, varying in size and age. From the circumstances under which they are met with, in crushed fragments, contained in elevated strata which have undergone great disturbance, there is little room for hope that a perfect shell, or anything approaching a complete skeleton, will ever be found in the Sewalik Hills. It is to be mentioned, however, that remains of many of the animals associated with the *Colossochelys* in the Sewalik Hills have been discovered along the banks of the Irrawaddi in Ava, and in Perim Island in the Gulf of Cambay, showing that the same extinct fauna was formerly spread over the whole continent of India.

"This is not the place to enter upon the geological question of the age of the Sewalik strata; suffice it to say, that the general bearing of the evidence is that they belong to the newer tertiary period. But another question arises: 'Are there any indications as to when this gigantic tortoise became extinct? or are there grounds for entertaining the opinion that it may have descended to the human period?' Any *à-priori* improbability, that an animal so hugely disproportionate to existing species should have lived down to be a

contemporary with man, is destroyed by the fact that other species of Chelonians which were coeval with the *Colossochelys* in the same fauna, have reached to the present time; and what is true in this respect of one species in a tribe, may be equally true of every other placed under the same circumstances. We have as yet no direct evidence to the point, from remains dug out of recent alluvial deposits; nor is there any historical testimony confirming it; but there are traditions connected with the cosmogonic speculations of almost all Eastern nations having reference to a tortoise of such gigantic size, as to be associated in their fabulous accounts with the elephant. Was this tortoise a mere creature of the imagination, or was the idea of it drawn from a reality, like the *Colossochelys*?

"Without attempting to follow the tortoise tradition through all its ramifications, we may allude to the interesting fact of its existence even among the natives of America. The Iroquois Indians believed that there were originally, before the creation of the globe, six male beings in the air, but subject to mortality. There was no female among them to perpetuate their race; but learning that there was a being of this sort in heaven, one of them undertook the dangerous task of carrying her away. A bird (like the Garūda of Vishnoo or the Eagle of Jupiter) became the vehicle. He seduced the female by flattery and presents: she was turned out of heaven by the supreme deity, but was fortunately received upon the back of a tortoise, when the otter (an important agent in all the traditions of the American Indians) and the fishes disturbed the mud at the bottom of the ocean, and drawing it up round the tortoise formed a small island, which increasing gradually became the earth. We may trace this tradition to an Eastern source, from the circumstance that the female is said to have had two sons, one of whom slew the other; after which she had several children, from whom sprung the human race.

"In this fable we have no comparative data as to the size of the tortoise, but in the Pythagorean cosmogony the infant world is represented as having been placed on the back of *an elephant, which was sustained on a huge tortoise.* It is in the Hindoo accounts, however, that we find the fable most circumstantially told, and especially in what relates to the second Avatar of Vishnoo, when the ocean was churned by means of the mountain Mundar placed on the back of the king of the tortoises, and the serpent Asokee used for the churning-rope. Vishnoo was made to assume the form of the tortoise and sustain the created world on his back to make it stable. So completely has this fable been impressed on the faith of the country, that the Hindoos to this day even believe that the world rests on the back of a tortoise. Sir William Jones gives the following as a translation from the great lyric poet Jyadeva: 'The earth stands firm on thy immensely broad back, which grows larger from the callus occasioned by bearing that vast burden. O Cesava! assuming the body of a tortoise, be victorious! Oh! Hurry, Lord of the Universe!'

"The next occasion in Indian mythology where the tortoise figures prominently is in the narratives of the feats of the bird-demigod 'Garūda,' the carrier of Vishnoo. After stating the circumstances of

his birth, and the disputes between his mother Vinūta and 'Kudroo,' the mother of the serpent, it is mentioned that he was sent on an expedition to bring 'Chundra' the moon, from whom the serpents were to derive the water of immortality. While pursuing his journey, amidst strange adventures, Garūda met his father Kŭshgŭfa, who directed him to 'appease his hunger at a certain lake, where *an elephant and tortoise were fighting*. The body of the tortoise was eighty miles long—the elephant's 160. Garūda with one claw seized the elephant—with the other the tortoise, and perched with them on a tree 800 miles high.' He is then, after sundry adventures, stated to have fled to a mountain on an uninhabited country, and finished his repast on the tortoise and elephant.

"In these three instances, taken from Pythagoras and the Hindoo mythology, we have reference to a gigantic form of tortoise, comparable in size with the elephant. Hence the question arises, are we to consider the idea as a mere fiction of the imagination, like the Minotaur and the chimæra, the griffin, the dragon, and the cartazonon, &c., or as founded on some justifying reality? The Greek and Persian monsters are composed of fanciful and wild combinations of different portions of known animals into impossible forms, and, as Cuvier fitly remarks, they are merely the progeny of uncurbed imagination; but in the Indian cosmogonic forms we may trace an image of congruity through the cloud of exaggeration with which they are invested. We have the elephant, then as at present, the largest of land animals, a fit supporter of the infant world; in the serpent Asokee, used at the churning of the ocean, we may trace a representative of the gigantic Indian python; and in the bird-god Garūda, with all his attributes, we may detect the gigantic crane of India (*Ciconia gigantea*) as supplying the origin. In like manner, the *Colossochelys* would supply a consistent representative of the tortoise that sustained the elephant and the world together. But if we are to suppose that the mythological notion of the tortoise was derived, as a symbol of strength, from some one of those small species which are now known to exist in India, this congruity of ideas, this harmony of representation would be at once violated; it would be as legitimate to talk of a rat or a mouse contending with an elephant, as of any known Indian tortoise to do the same in the case of the fable of Garūda. The fancy would scout the image as incongruous, and the weight even of mythology would not be strong enough to enforce it on the faith of the most superstitious epoch of the human race.

"But the indications of mythological tradition are in every case vague and uncertain, and in the present instance we would not lay undue weight on the tendencies of such as concern the tortoise. We have entered so much at length on them on this occasion, from the important bearing which the point has on a very remarkable matter of early belief entertained by a large portion of the human race. The result at which we have arrived is, that there are fair grounds for entertaining the belief as probable that the *Colossochelys Atlas* may have lived down to an early period of the human epoch and become extinct since:—1st, from the fact that other Chelonian species and

crocodiles, contemporaries of the *Colossochelys* in the Sewalik fauna, have survived; 2nd, from the indications of mythology in regard to a gigantic species of tortoise in India.

"Some of the bones were analysed with great care by Mr. Middleton, and yielded a large proportion of fluorine, the constituents being,—

Phosphate of lime	64·95
Carbonate of lime	22·36
Fluoride of calcium	11·68
Oxide of iron	1·00
A trace of chloride of soda.	———
	99·99

"Other Sewalik fossil bones were at the same time subjected to analysis, such as the *Mastodon elephantoides*, *Camelus sivalensis*, Horse, Ruminants, &c., and the whole of them yielded similar results, with a proportion of fluoride of calcium varying from 9 to 11 per cent. This is much above the usual quantity found in fossil bones; the utmost that has been met with having been in bones of the Anoplotherium from the Paris basin, 14 per cent."