March 2, 1886.

Dr. St. George Mivart, F.R.S., Vice-President, in the Chair.

The Secretary read the following report on the additions made to the Society's Menagerie during the month of February 1886 :—

The total number of registered additions to the Society's Menagerie during the month of February was 79, of which 3 were by birth, 40 by presentation, 14 by purchase, 1 by exchange, and 21 were received on deposit. The total number of departures during the same period, by death and removals, was 99.

Amongst the additions during the month attention may be called to :—

1. Five examples of a large Batrachian of the Argentine Republic, there called "Escuerzo" (*Ceratophrys ornata*), presented by Dr. Frederick C. Strutt, and received February 13th.

2. A Mantled Buzzard (*Leucopternis palliata*) from Brazil, purchased February 15th, being the first example of this fine bird of prey received by the Society.

Mr. John G. Millais, F.Z.S., exhibited an adult male specimen of the Ivory Gull (*Larus eburneus*), which he had shot himself at Thurso, Caithness, on December 30, 1885, during a severe snowstorm from the north. The base of the bill to the end of the nostril in living specimen was light blue, and the point of the same orange-yellow; feet black, and eye surrounded by a ring of orange; the rest of the plumage being entirely white.

Mr. Millais also exhibited an immature specimen of the same species killed at East Haven, Forfar, in January 1879.

Mr. T. D. Cockerell exhibited a living specimen of a variety of *Parmacella valenciennesi*, Webb and Van Beneden, collected by J. H. Ponsonby, Esq., at Tangier, and made the following remarks :—The specimen differs from the typical *P. valenciennesi* in that it is marked with black, the original figure of the species being quite uniform. It may possibly prove to be distinct, but until further details are ascertained it is best classed merely as a variety of *P. valenciennesi*.

A precisely similar form is found at Gibraltar, of which there are details in the 'Journal of Conchology' for January 1886.

The following papers were read :—

1. On a new Pediculate Fish from the Sea off Madeira. By Robert Collett, C.M.Z.S.

[Received February 12, 1886.]

(Plate XV.)

Fam. Ceratiidæ.

Linophryne, n. gen.

Head enormous; the body slender, compressed, mouth oblique. Spinous dorsal reduced to a single cephalic tentacle, the basal part of which is erect, not procumbent. Teeth in the jaws, on the vomer, and the upper pharyngeals. Gill-openings exceedingly narrow, situated a little below the root of the pectorals. Soft dorsal and anal very short; ventrals none. Abdominal cavity forming a sac, suspended from the trunk. Skin smooth; a long tentacle on the throat.

Linophryne lucifer, sp. nov. (Plate XV.)

The head tetrahedral, with a supraorbital spine; its length is to the total length as 1 to 2·7. Eyes small, situated high up on the side of the head. Teeth of the jaws uniserial, very long; 7 to 9 on each side in each jaw; one or two in front longer than the others; all are movable inwards and covered with skin. Gill-openings narrower than the diameter of the eye. Length of the intermaxillary bone is contained three times in the total length. Cephalic tentacle thick, with a large bulb; the guttural tentacle long, with the end cleft and provided with small papillæ. Colour uniformly black, the top of the cephalic tentacle and the papillæ of the guttural tentacle white (phosphorescent?). Total length of the single specimen 49 millim.

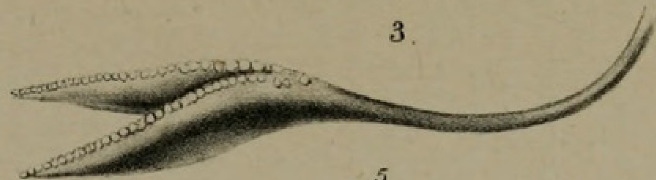
1 D. 1; 2 D. 3; A. 2; P. 14–15; C. 9.

Habitat. One specimen, total length 49 millim., from the sea off Madeira (36° N. lat., 20° W. long.), May 1877; preserved in the Zoological Museum at Christiania.

Measurements.

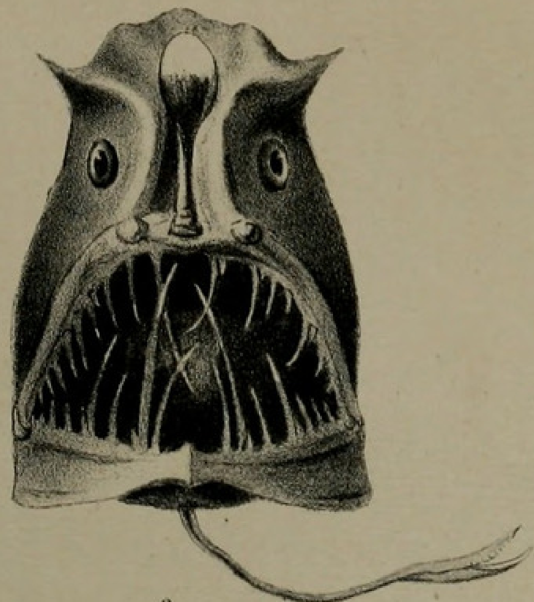
	millim.
Total length to the end of the caudal fin	49
Length to the root of the caudal fin	35
Length of the head to the hind margin of the operculum	18
,, ,, to the end of its spine	22
Length from the snout to the hinder margin of the eye	9
Length to the edge of the distended abdominal sac	39
Length of intermaxillary	16
Length of lower jaw	17
Breadth of the lower jaw	4·5
The greatest depth of the head	19
The depth of the head from the base of the orbital spine	10

3.



$\frac{5}{7}$

2.



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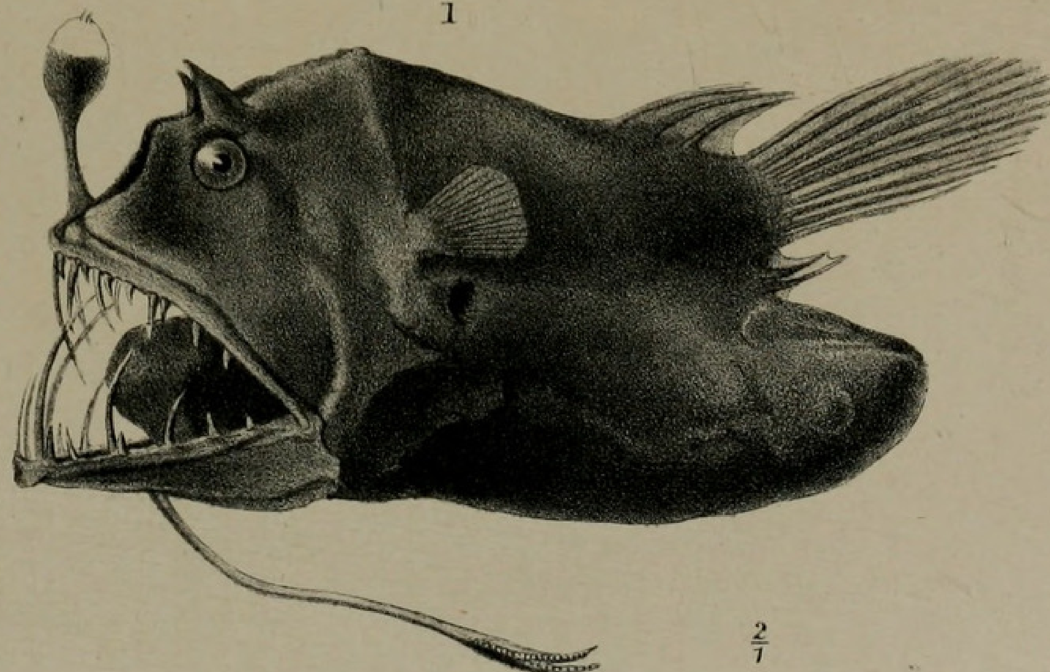


$\frac{2}{7}$

J. Smit del et lith.

Mintern Bros. imp

LINOPHRYNE LUCIFER.

	millim.
Breadth of the head across the jaws	16
,, ,, across the base of the orbital spine	10
Length of the body to the commencement of the second dorsal	26
Base line of the second dorsal	6
Depth of the root of the tail	4·5
Diameter of the eye	2·5
Length of the cephalic tentacle (first dorsal)	9
Length of the guttural tentacle	23
Length of the caudal fin	14·5
Length of the pectorals (with the pseudobrachium)	5
Length from the snout to the pectorals (to the root of pseudobrachia)	16

The structure of the body in its natural state can hardly be correctly described from this specimen, in which the whole of the belly exhibits an abnormal distension in consequence of the fish having swallowed a Scopeloid fish, the total length of which is one half longer than itself.

The head is very large, with an enormous mouth and long teeth. The body itself is short and slender, compressed, and with the heavy dependent abdominal cavity, of which the hindermost part extends far beyond the end of the vertebral column.

The greatest depth of the body is at the back of the head, and is precisely the same as the length of the head. The body itself is apparently much lower, and the root of the tail narrow and low.

A thick cephalic spine is to be found on the snout; and under the throat a long tentacle divided at the end, which undoubtedly is phosphorescent, as well as the end of the cephalic spine.

The gill-openings are so narrow that they can only be distinguished with difficulty; their openings are not much larger than the head of a pin.

The head.—Its appearance when viewed from the front is nearly tetrahedral, somewhat compressed, and broadest downwards. Its greatest width is across the angle of the mouth, and is about equal to the length of the intermaxillary bones. The upper profile of the head exhibits a somewhat projecting and slightly outwardly inclined spine above each eye. The breadth of the head across the base of these spines (which form the upper corners of the square when the head is seen from the front) is one third less than the breadth across the angles of the mouth (or the lower corners of the square).

The forehead in front of the orbital spines is concave, with a deep furrow leading to the end of the snout, bounded on each side by a ridge, on which also the orbital spines are projecting; the concavity is somewhat broader downwards than it is above.

There are altogether three spines on each side of the head. One orbital spine is directed upwards and slightly forwards. One spine at the back of the operculum is directed backwards; also a small spine at the back of the lower jaw sloping inwards and downwards;

the last is, however, in the uninjured specimen scarcely perceptible beyond the common skin which covers the head.

The length of the head from the end of the lower jaw to the base of the spine on the operculum is to the total length as 1 to 2·7, this measured to the end of the caudal fin, but only 1·9 in the length to the root of the caudal. Thus the head is about the same as the rest of the body without the caudal fin.

The highest part of the skull is indicated by a protuberance at the back of the head, probably formed by the point in which the *os mastoideum* (*occipit. posterius*) adjoins to the shoulder-girdle.

The mouth is enormously large, with the cleft oblique; the lower jaw is slightly longer than the intermaxillary, and has backwards a considerable width (or about $\frac{1}{4}$ of its length).

The length of the jaws is to the total length (to the end of caudal fin) as 1 to 2·8–3·0. At the back of the lower jaw there is a spine slanting inwards and downwards, the length of which scarcely equals the orbital spines.

The eyes are well developed, although small on the whole; the lens is particularly small (about 1 millim.). The diameter of the eye is about 2·5 millim.; it is placed somewhat far forward, or a little more than two orbital diameters from the margin of the upper jaw.

The gill-covers are but incompletely ossified, but their construction cannot be properly examined in this single specimen. The operculum is present as a long styliform bone, which towards its lowest end sends out a backward-directed spine the length of which is 3 millim. (which, however, is completely enveloped in the common skin of the head).

The *præoperculum* appears to be unossified.

The *gill-openings* are extremely small, and are situated at a distance of about half an eye's diameter below the pectoral fins; they form a crescent-formed slit, the height of which is only 2·2 millim.

The *gills* are $2\frac{1}{2}$ pairs, as the second and third branchial arches have a double series, the fourth a uniserial gill. *Pseudobranchiæ* are wanting.

The branchial arches are smooth on their inner surface, without a trace of protuberance or teeth.

The branchiostegals appear to be but five in number; and I cannot, in this little and frail specimen, discover a sixth, which may possibly exist.

The *teeth* are placed in a single row in each half jaw, with a distinct space between each tooth, and consist of long and slender teeth, some of which are very long, while the rest are somewhat shorter. They are finely streaked throughout their length, pointed like awls, and movable inwards, so that the long front teeth lie backwards, the side teeth inwards.

All of them are covered with a jet-black skin, the extension of which cannot with certainty be determined in this specimen; a few of the shorter teeth are still completely covered with it; but the points of long teeth have probably always been bare.

The number of teeth in each half of the jaw is 7–9, to which should be added one or more accessory teeth, which are quite short, and are situated immediately at the base of the longest teeth ; probably these accessory teeth are meant to supplant the others when these are shed or lost, which may often happen when devouring the huge prey.

In the intermaxillary, the longest teeth in front have a length of 6 millim., and are quite straight (on the left side it is not fully developed) ; the other teeth are shorter, not more than 3 millim. long. The total number of teeth in each intermaxillary is 8 or 9, to which must be added 2–3 accessory teeth situated at the base of the longest.

In the lower jaw the two foremost teeth (and the 4th) are particularly long, the others somewhat shorter. In each half jaw there are seven teeth, to which must be added the two accessory teeth situated at the base of the longest. The innermost tooth in the jaw is quite small.

Of the two long front teeth, the first is somewhat shorter than the second, considerably curved ; its length is 4·5 millim. The second is the longest of all the teeth ; it is 8 millim. in length, and is also a little curved. It is placed a little inside of the row of other teeth, and has a short tooth at its base. The fourth has a length of 5 millim., and it also has an accessory tooth ; the others are shorter.

The upper pharyngeal bones have each a group of about six teeth forming two long irregular rows. The lower pharyngeals do not appear to have teeth.

The vomer has a single tooth, which, like the pharyngeal teeth, is about the length of the shorter teeth in the jaws, and is slightly curved.

Cephalic spine.—The first dorsal appears as a single tentacle on the forehead (the cephalic spine). Its basal element is not subcutaneous and procumbent, but erect and continuous with its distal part. When laid back its bulb reaches to the hind margin of the eyes, or just between the two orbital spines, in which position it fills up the concavity on the forehead. It is situated at the front margin of the snout. Its length is 10 millim., of which half comprises the peduncle, which is rather thick, especially towards its base, the other half the head, which forms an oblong bulb, the breadth of which is 3 millim., or about the same as the diameter of the eye.

The bulb ends in a pair of exceedingly short and slender threads, which, in a good light, can be seen to have small papilla-shaped bodies on one side, of the same kind as the papillæ on the guttural tentacle, but much smaller (probably answering to the "scales" which, according to Lütken, cover the threads of the tentacles of the Himantolophoids). The colour of this cephalic spine is jet-black as far as the middle of the bulb ; its other half is white (perhaps silvery in the living specimen), as in most or all the other species of the Ceratiidæ.

The fins.—The second dorsal is situated far behind, close into the caudal fin, although separated from it by a distinct space. It has three single rays, which at their base are enveloped with a thick skin, a continuation of that of the body. It is directed backwards, and the point of the fin extends a little beyond the root of the caudal fin (about an eye's length).

The anal fin is much like the second dorsal, and is placed right beneath it; it has two rays, which also are single.

The caudal fin consists of nine rays, four in the upper, five in the lower half. Of these the outermost are somewhat shorter than the middle ones; thus the fin is somewhat pointed. The four middle rays are bifid from below the centre; the others are simple.

The ventral fins are wanting.

The pectorals are small and rounded; the pseudobrachia very short. On the right side there are 14, on the left side 15 rays, most of which are simple, and only the middle ones seem to be bifid at the ends. The length of the pectoral (including the pseudobrachium) is only 5 millim., or the length of the bulb of the cephalic spine.

The guttural tentacle is nearly $3\frac{1}{2}$ times as long as the tentacle on the snout (23 millim.), or has about the same length as the distance from the front of the eye to the root of the tail. It is placed on the throat, at a distance from the symphysis about equal to half the length of the jaw.

It is thinner than the cephalic spine, and divides itself at the end into two short pointed blades, the length of each being 6 millim. Whilst the tentacle otherwise is black, the inner edges of these blades are white, like the upper half of the snout tentacle, and are furnished with a row of round papillæ, about 30 on each, resembling a chain of pearls. These small bodies undoubtedly have a use, either as organs of sense or as the source of the phosphorescent light [1].

The abdominal cavity is greatly distended, somewhat flattened underneath, which is in consequence of the position the swallowed fish has taken up. This fish, which undoubtedly is a *Scopeloid*, has a length of about 70 millim., and is therefore not far from being half a length longer than the specimen itself. It lies with the head and the caudal fin bent backwards and the belly turned down.

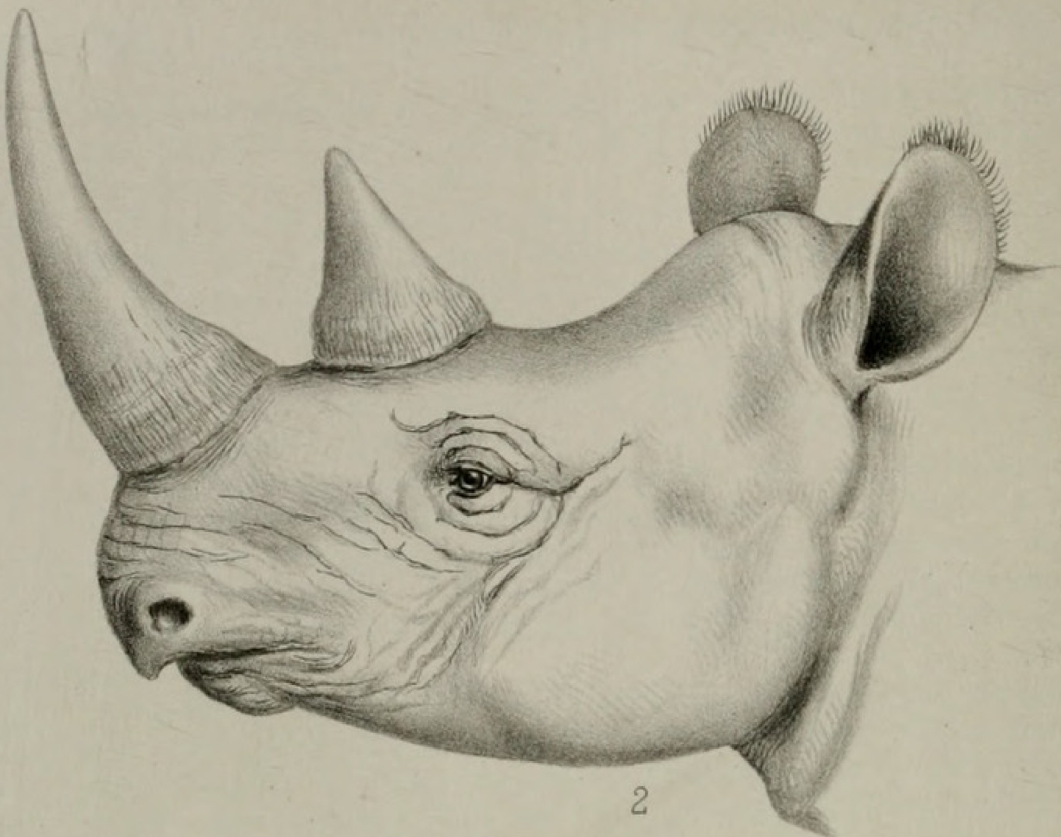
Anus. Its position cannot be given with certainty.

The skin is smooth throughout, and covers all the spines on the head as well as the teeth. Lateral line or mucous glands cannot be detected.

The colour everywhere is jet-black, with the exception of the upper half of the bulb of the tentacle on the snout, and the inner margins of the ends of the guttural tentacle, which (in the preserved specimen) are white, but which in the living fish have probably been silvery and phosphorescent.

The fin-rays are also black, the membrane blackish. The mouth is also black, as well as the covering of the teeth.

[1] A similar phosphorescent guttural tentacle is mentioned in *Eustomias obscurus*, captured from enormous depths during the voyage of the 'Talisman' ('La Nature,' 1884, p. 184; Day, 'Fishes of Great Britain and Ireland,' p. xxvii).



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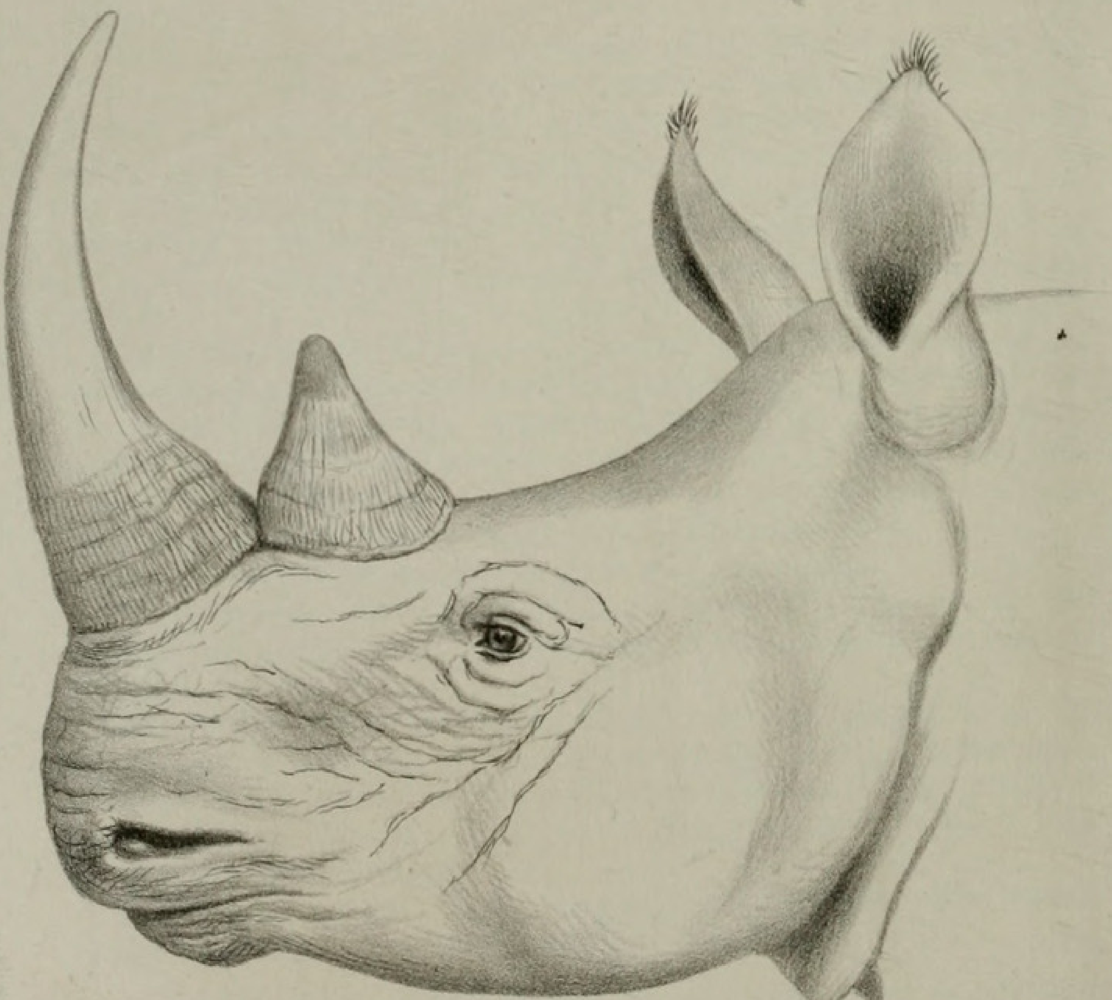

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J. Smit lith.

Hanhart imp.

HEADS OF RHINOCEROS SIMUS (Fig.1) AND R. BICORNIS. (Fig.2)

Affinities.—*Linophryne lucifer* belongs to the family *Ceratiidæ*, and resembles *Melanocetus johnsonii*, Günth. (Proc. Zool. Soc. 1864, p. 301) in several particulars, viz. that only one single spine in the first dorsal is developed (the nasal tentacle), in the enormous mouth, the almost square head, as well as in its small size, its black and smooth skin, and pendent abdominal cavity, besides in its having $2\frac{1}{2}$ pairs of gills and unarmed branchial arches; but it differs from this species by the formation of its teeth, the oblique mouth, its rudimentary gill-openings, its short and thick nasal tentacle, in the number of its fin-rays, the spiny armature of its head, and its comparatively well-developed eye.

It differs from all the *Ceratiidæ* in its having a long guttural tentacle, also in the low number of rays in its second dorsal and anal fins.

Locality.—A single specimen, with a total length of 49 millim., was caught by Capt. P. Andresen in May 1877 floating in the sea (about 36° north latitude, 20° west longitude) 3° N.W. of Madeira, and was presented to the Museum of the Christiania University. During several years it remained unnoticed in the private house of the late Director of the Museum, Prof. Esmark, but after his death it was returned to the Museum (December 1885).

Mr. Andresen, who is now residing in Christiania, reports to me that on the day mentioned he was on a voyage to the West Indies. He was capturing turtle in his boat; there was a heavy swell, but the water was smooth. After a time he caught sight of this little black fish, which lay on the surface quite alive, but almost motionless, which was not surprising when it was discovered that it had just swallowed a fish longer than itself. It did not lie on its side, but was apparently unable to swim away. By getting the bailer under it, he lifted it out with ease, and in order to keep it fresh he gave up his search for turtle and rowed back to the ship, where it was placed in spirit for preservation.

EXPLANATION OF PLATE XV.

Fig. 1. Full view of *Linophryne lucifer*, $\frac{4}{1}$.
2. Front view of head, showing open mouth.
3. Guttural tentacle, $\frac{4}{1}$.

2. Note on the External Characters of *Rhinoceros simus*. By P. L. Sclater, M.A., F.R.S., Secretary to the Society.

[Received February 24, 1886.]

(Plate XVI.)

The heads of the two African Rhinoceroses exhibited by Mr. E. Gerrard, Jun., at the last meeting of the Society, and again placed on the table this night by Mr. Gerrard's kind permission, have enabled me to make a comparison between *Rhinoceros bicornis* and *Rhinoceros simus*, which I have never before had an opportunity of doing. Indeed, as is well known, such specimens of the latter species, with the exception of a single immature example in the British Museum, are almost unknown in Europe.

On looking at the two heads now before us side by side, the points by which this part of the two animals may be distinguished present themselves very appreciably. In the first place, as is already well known, the "White" or "Square-nosed" Rhinoceros, as it is much better called, is distinguished by its short upper lip, which is quite apparent in the example now before us. In *R. bicornis* the central portion of the upper lip is far extended, and forms a quasi-prehensile organ. This is sufficiently manifest in the specimen now on the table, but is still better seen in the living example of the same animal in the Society's Gardens.

A second point in which the heads of the two African Rhinoceroses differ materially is in the size and shape of the ears. In *R. bicornis* (Plate XVI. fig. 2) the ear-conch is much rounded at its extremity and edged by a fringe of short black hairs which spring from the margin. In *R. simus* (Plate XVI. fig. 1) the ear-conch is apparently much more elongated and sharply pointed at its upper extremity[1], where the hairs which clothe its margin constitute a slight tuft. While the upper portion of the ear-conch is much more expanded in *R. simus* than in *R. bicornis*, in the lower portion the two margins are united together for a much greater extent, and form a closed cylinder, which in the present specimen rises about 3 inches above the base. The total length of the ears in the present specimens is, in *R. simus*, 12·5 inches and in *R. bicornis* about 9·5 inches.

A third point in which the two species appear to differ is in the shape of the nostrils, which, judging from the present specimens, are, in *R. simus*, elongated in a direction parallel with the mouth, while in *R. bicornis* they are more nearly of a circular shape. Again the eye in *R. simus* appears to be placed further back in the head than in *R. bicornis*.

A regards the well-known differences in the skulls of these two Rhinoceroses, which are obvious enough on a glance at the specimens on the table, I will say nothing on the present occasion, but simply refer to De Blainville's figures (Ostéographie, Rhinoceros, pl. iii. and iv.), and to Prof. Flower's remarks on this subject in the 'Proceedings' of this Society for 1876 (p. 452).

[1] This peculiar feature is well shown in the figures of *R. simus* given by Smith (Ill. S. Afr. Zool. Mamm. t. xix.), and Harris (Portraits, &c. pl. 19).

3. Note on the Air-sacs of the Cassowary. By Frank E. Beddard, M.A., F.R.S.E., Prosector to the Society.

[Received March 1, 1886.]

The following note refers to a male *Casuarius uniappendiculatus* which died in the Society's Gardens on February 15th of the present year.

Since no description of the respiratory organs of this bird has, so far as I know, been published, I have thought it worth while to bring a note upon the subject before the Society, to supplement Prof. Huxley's paper upon the respiratory organs of *Apteryx* [1] and Prof. W. N. Parker's 'Note' upon the same structures in *Rhea* [2].

As regards its air-sacs the Cassowary appears to resemble *Apteryx* much more closely than *Rhea,* though differing slightly from the former. In *Apteryx* the main difference in the air-sacs from those of Carinate Birds is in the small extent of the abdominal air-sac. "In *Apteryx* the whole of this sac is enclosed between the oblique septum and the pulmonary aponeurosis, the dissepiment between its loculus and that of the posterior intermediate sac being situated almost midway between the second dissepiment and the posterior extremity of the pneumatic chamber. In the Duck, on the contrary, the dorsal end of this dissepiment is attached close to the posterior extremity of the lung, and thence slopes very obliquely backwards. The capacity of the posterior intermediate air-sac thus becomes greatly increased. But, as the capacity of the posterior air-sac is also vastly greater than in *Apteryx,* its posterior wall has been, apparently, driven out, like a hernial sac, between the peritoneum and the parietes, and projects into the abdominal cavity." (*Loc. cit.* p. 566.)

In *Rhea* "the anterior and posterior intermediate and the posterior air-sacs are almost precisely similar to those of the Duck. The dorsal end of the dissepiment between the posterior intermediate and the posterior sac slopes backward; and the posterior wall of the latter has been, as Prof. Huxley describes it, 'apparently driven out like a hernial sac, between the peritoneum and the parietes' projecting almost to the posterior end of the abdomen." (Parker, *loc. cit.*)

In *Casuarius uniappendiculatus* the anterior and posterior intermediate air-sacs are of about the same size and are separated from each other and from the posterior sac by erect, almost vertical dissepiments, which are entirely parallel with each other; the dissepiment which separates the posterior air-sac from the one in front does not slope backwards any more than does the dissepiment in front of it. The posterior air-sac is entirely shut off from the abdominal cavity by the oblique septum; there was no trace whatever of any prolongation of its walls among the coils of the intestines; the whole of the sac, as in *Apteryx,* is enclosed between the oblique septum and the

[1] P. Z. S. 1882, p. 560.

[2] P. Z. S. 1883, p. 141.

pulmonary aponeurosis. The shape of the posterior air-sac is, however, rather different from that of the corresponding air-sac in *Apteryx*. In the latter bird, according to Prof. Huxley's figure (*loc. cit.* figs. 1 and 2, v.), the posterior air-sac is rather smaller than the preceding posterior intermediate air-sac, and does not extend further back than the lung. In *Casuarius* the posterior air-sac forms anteriorly a rounded capacious cavity, which pretty nearly corresponds in size to that of the posterior intermediate sac; the cavity is, however, prolonged for some way backwards as a narrow interspace between the oblique septum and the parietes, but this posterior region is altogether outside the abdominal cavity and does not in the least resemble the condition of the posterior air-sac which is characteristic of the Carinatæ.

The pulmonary aponeurosis is thick, and costo-pulmonary muscles arising from the ribs are spread out over its surface; the oblique septum itself is stout and thick.

Each lobe of the liver is contained in a separate compartment as in so many other birds (see P. Z. S. 1885, p. 836); the gizzard is enveloped in a special coat of peritoneum, while the intestines are covered below by a stout horizontal septum which laterally becomes indistinguishably fused with the oblique septum; in this respect therefore the Cassowary agrees with the Emu and with many Carinatæ. Between the horizontal septum and the ventral peritoneum was a large mass of fat.

The special resemblance between *Casuarius* and *Apteryx* in the structure of the respiratory organs is not altogether in accord with the results obtained from the study of the structure of other organs.

Prof. Garrod [1] divides the Struthiones into three families, *Apteryx* being the type of one; *Casuarius* and *Dromæus*, *Struthio* and *Rhea* form the two other families. A study of the osteology has led Prof. Mivart [2] to a similar conclusion. The results contained in the present Note confirm the opinion expressed by these two authors that *Casuarius* and *Rhea* should be separated. I have not had the opportunity of examing the air-sacs of the Ostrich, but, judging from a sketch left by the late W. A. Forbes, they appear to be like those of *Rhea*. In *Dromæus* the air-sacs are not similar to those of *Casuarius*, but agree with *Rhea* in the extension of the posterior air-sac into the abdominal cavity. At the end of his paper "On the Axial Skeleton of the Struthionidæ" Prof. Mivart represents the affinities of the Struthious birds in a phylogenetic scheme. Removing *Dromæus* from *Casuarius* and placing it nearer to *Rhea* and *Struthio*, that scheme will exactly represent the position of the different genera of *Struthiones* as indicated by the structure of their respiratory organs.

[1] Coll. Papers, p. 219. [2] Trans. Zool. Soc. vol. x. p. 21.

4. On the Syrinx and other Points in the Anatomy of the Caprimulgidæ. By Frank E. Beddard, M.A., F.R.S.E., Prosector to the Society.

[Received March 1, 1886.]

It has been known for a long time, and the fact is recorded in most text-books of comparative anatomy[1], that *Steatornis* among the Caprimulgidæ and *Crotophaga* among the Cuculidæ are distinguished from the other genera of their respective families, as well as from all other birds, by the possession of a bronchial syrinx. The voice-organ of these two birds, instead of being situated at the junction of the trachea with the bronchi, as in the vast majority, or being formed by a modification of the lower portion of the trachea, as in the tracheophone Passeres, is produced by a modification of certain of the bronchial rings some way from the bifurcation of the bronchi. The structure of the syrinx of the Guacharo was first made known by Johannes Müller[2], and subsequently described and figured by Garrod[3]. I am unacquainted with any exact description of the syrinx of *Crotophaga*, which, as I have myself indicated[4], presents the following resemblances to, and differences from, the syrinx of *Steatornis*. In both types the bifurcation of the trachea to form the bronchi takes place precisely as it does in the Mammalia; that is to say, the anterior bronchial rings are complete rings, and in no way different from the rings of the trachea. The membrana tympaniformis does not commence until about the tenth (*Crotophaga*) or thirteenth (*Steatornis*) bronchial rings; at this point the rings not only cease to be complete rings but alter in their character, being narrower and softer than the anterior bronchial rings, and separated from each other by wider intervals of fibrous tissue; the single intrinsic muscle is inserted on to the first of these modified bronchial rings; the last two or three rings before that on which the muscle is inserted are semirings, the membranous intervals between their inner extremities, which constitute the upper part of the membrana tympaniformis, becoming gradually less and less, until it disappears entirely and the rings are complete rings. These, however, although they support the anterior part of the membrana tympaniformis, agree in their structure with the tracheal and anterior bronchial rings; like them they are placed close together and ossified; there is no transition between the anterior and posterior bronchial semirings; their character abruptly changes at the semiring on to which the intrinsic muscle is attached. In *Crotophaga* the menbrana tympaniformis extends back unto the entrance of the bronchus into the lung; in *Steatornis* the membrana tympaniformis

[1] Huxley, 'The Anatomy of Vertebrated Animals,' London, 1871, p. 315; Gegenbaur's 'Comparative Anatomy,' French Trans. by C. Vogt, p. 776.

[2] Bericht d. Akad. Wiss. Berlin, 1841, p. 172; Müll. Arch. 1842, p. 1; Stimmorg. d. Passerinen, Berlin, 1847, p. 9.

[3] Coll. Papers, p. 188.

[4] P.Z.S. 1885, p. 173.

is of less extent, and there is an interval between it and the lung occupied by *complete* bronchial rings.

In the paper referred to I have described the syringes of other genera of the Cuculidæ: in some genera (e. g. *Cuculus*) the syrinx is tracheo-bronchial; in others (e. g. *Centropus*) the syrinx presents a very close approximation in its structure to the bronchial syrinx of *Crotophaga*. In these Cuckoos the intrinsic muscles of the syrinx are, as in *Crotophaga*, attached a long way down the bronchus, but the bronchial rings anterior to the attachment of these muscles are not complete rings as in *Crotophaga*, but are very nearly so, inasmuch as their free extremities are separated by a very short extent of membrane, which widens out below the attachment of the syringeal muscles to form the membrana tympaniformis; there is, moreover, a similar change in the nature of the bronchial semirings at the point where the syringeal muscles are inserted.

In the Caprimulgidæ there is a variation in the structure of the syrinx which is closely parallel to that of the Cuculidæ.

Three types of syrinx can be recognized in this group, in the genera which I have myself been able to examine, which are:

Caprimulgus.	*Batrachostomus.*
Chordeiles.	*Podargus.*
Nyctidromus.	*Steatornis.*
Ægotheles.	

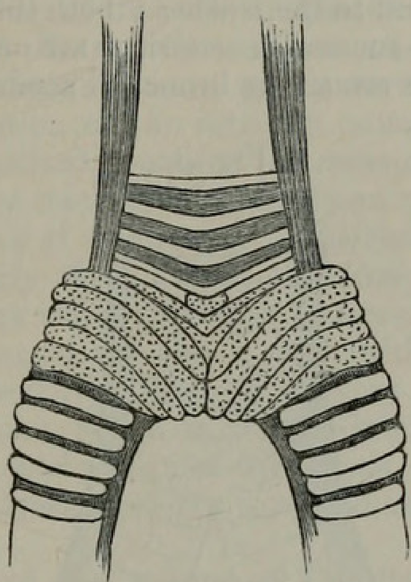
In the first four genera the syrinx is tracheo-bronchial; in *Batrachostomus* and *Podargus* the syrinx approximates in structure to the purely bronchial syrinx of *Steatornis*.

I need not redescribe the syringes of *Caprimulgus* and *Chordeiles*, which are already known from the investigations of Cuvier, Nitzsch, and Audubon. The remaining genus which possesses a tracheo-branchial syrinx, viz. *Nyctidromus*, has not, I believe, been described.

In *Nyctidromus* (fig. 1) the syrinx is not widely dissimilar from that of *Caprimulgus*. The tracheal rings are separated mesially, both on the anterior and posterior aspect, by considerable membranous intervals; the last four are, however, closely applied, as shown in the accompanying drawing (fig. 1), which represents the syrinx viewed from in front; the terminal rings of the trachea are much more slender than the bronchial semirings, and the last appears to be defective laterally, or is covered by the succeeding first bronchial semiring. The last two rings of the trachea, as well as the first five bronchial semirings, are ossified; the ossification has also extended on to the sixth bronchial semiring and the antepenultimate tracheal ring. The intrinsic muscles are attached on to the first bronchial semiring. Posteriorly is a rhomboidal ossified plate, to which the pessulus is attached; it represents the middle portion of the last four or five tracheal rings, but is separated from them completely.

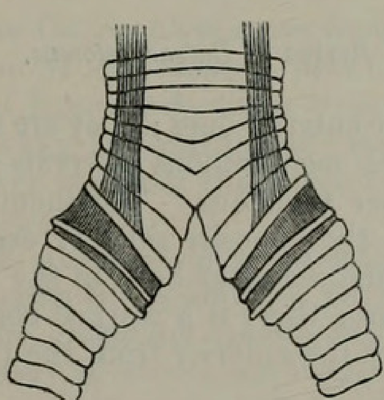
The syrinx of *Ægotheles* is displayed in the accompanying drawing (fig. 2). The syringeal muscles are inserted on to the third bronchial semiring, which differs from the two preceding in being more slender; the two first bronchial semirings are stout and closely applied. The terminal ring of the trachea is pointed downwards anteriorly, as shown in the figure; posteriorly it is incomplete; the penultimate, antepenultimate, and the next tracheal rings are

Fig. 1.



Syrinx of *Nyctidromus albicollis.*

Fig. 2.



Syrinx of *Ægotheles novæ-hollandiæ.*

separate anteriorly, but posteriorly are fused for a short space in the middle line, and are continuous with the pessulus, which arises anteriorly from the last tracheal ring.

Batrachostomus.—I am indebted to the kindness of Mr. R. Bowdler