

chirping when disturbed; they nest on the ground, under or near a tuft of high grass.

·9. *PHLÆOCRYPTES MELANOPS* (Vieill.).

♂. La Plata, Buenos Aires, Arg. Rep., Nov. 14, 1882.

♀. La Plata, Buenos Aires, Arg. Rep., Nov. 6, 1882.

Iris sepia.

These birds are found abundantly about the lagoons, where they may be seen darting about amongst the tall reeds that form a thick mass round the edge of the water; they are rather difficult to distinguish, as they are of a sombre colour and keep well amongst the reeds, only occasionally taking a short flight from one clump to another. I found their nests abundant; rather round in shape, with the aperture near the tip, which is very strong and neatly rounded off. The nest is made of grass supported on three or four reeds joined together for that purpose; it is built about a foot above the water, and is a very neat and strong structure; the interior is nicely lined. I once found two nests together, one on the top of the other; the underneath one was occupied, but that above seemed not to have been quite finished.

Three eggs, in a clutch, of a uniform dull pale-green colour.

Measurement: axis 22 millim., diam. 15 millim.

7. On a Collection of Birds from Yucatan. By A. BOUCARD,
C.M.Z.S. With Notes by OSBERT SALVIN, M.A., F.R.S.

[Received June 18, 1883.]

From October 1878 to August 1881 Mr. G. F. Gaumer (the well-known American collector of *Amblychila cylindriciformis* and other rare insects) traversed various parts of the State of Yucatan, in Mexico, with the object of making collections of natural history. At my request he consented to devote himself particularly to birds and to study their habits. The notes and observations which he has sent me on the general aspect of the country and the habits of the birds collected are so interesting, that I have determined to have them published; and for that purpose I have carefully named all the birds he sent me and have prepared the following list. Among the birds collected by Mr. Gaumer are some great rarities, such as *Meleagris ocellata*, *Chrysotis xantholara*, *Melanoptila glabrioris*, *Pyranga roseigularis*, *Icterus auratus*, *Cyanocitta yucatanica*, and *Amazilia yucatanensis*, which have been found up to the present time only in Yucatan and in the adjoining countries; but a great number of the species found by Mr. Gaumer are the same as those which I collected myself at San Andres Tuxtla and Playa Vicente, countries situated south of Mexico on the Atlantic side, such as *Crypturus sallæi*, *Penelope purpurascens*, *Craw glo-*

bicera, *Ortyx nigrogularis*, *Melopelia leucoptera*, *Granatellus sallæi*, and others. A few of the others are the usual North-American species found all over America. One species seems to be very abundant near Merida, namely *Eumomota supercilialis*, originally discovered in Nicaragua. I have also received this species from Tehuantepec, from my friend Sumichrast; so that up to this time we may consider the extreme limits, north and south, known for this species to be between Tehuantepec and Yucatan on the north and Panama on the south. I never met with this species in South Mexico. I have been surprised not to find among the birds of Yucatan more of the species of the Antilles, the only exception being *Perisoglossa tigrina*, *Petrochelidon fulva*, and *Zenaida amabilis*. This shows clearly that the bird-fauna of Yucatan has hardly any affinity with that of the Antilles, and that if the promontory of Yucatan has ever been united with the Antilles, it must have been a very long time ago. Even if the island of Cuba has ever been united to the continent, the distance between the coast of Yucatan and the said island being comparatively small, it is rather strange that more species of Yucatan are not found in Cuba, or *vice versâ*. When Mr. Gaumer went to Yucatan, I confess that I was under the impression that he would find there many of the peculiar species of the Antilles; but the years which he devoted in that country to collecting all the species of birds shows clearly that this idea must be given up altogether. Mr. George N. Lawrence, of New York, who purchased the remainder of Gaumer's duplicates, has lately described three supposed new species from this source; these are:—*Leptoptila fulviventris* (so closely allied to *L. albifrons*¹ that I do not admit it as a good species); *Formicarius pallidus*² (closely allied to *F. moniliger*), which I consider a good species, because the characters given by Mr. Lawrence are constant; and *Chætura gaumeri*³, which is closely allied to *C. vauxi*. On this last-named species I cannot give my opinion, not having received any specimens. Although the collection made by Mr. Gaumer is not large, considering the time spent in collecting, it is of great scientific interest in consequence of the great rarities which he met with, some of which were known only by unique specimens, and still more for the notes which he took on the country and on the habits of birds. These notes can be well depended upon, Mr. Gaumer being a very laborious naturalist and a careful observer. All his observations agree exactly with those I made on many of the same species of birds during my different travels in Mexico.

Mr. Gaumer writes as follows about the climate and seasons of Yucatan:—

"I reached Yucatan on the 14th of October 1878, in the first heavy norther of the season. The weather had been good for some ten days before, the summer rains having ceased about ten days (at least upon the coast). During October, November, and December norther followed norther every ten to fourteen days, with

¹ Lawr. Ann. N. Y. Acad. Sc. ii. p. 287.

² Tom. cit. p. 288.

³ Tom. cit. p. 245.

light drizzling rain, which generally lasted from two to four days, and with increasing cold, until the thermometer is said to have fallen at one time to 61° Fahr. In January 1879 there were four moderately heavy rainfalls, with strong northers and cold nights. One very heavy rainfall occurred on February 23rd, with a considerable sprinkling of hail. The hailstones were quickly gathered up and placed in bottles in Izamal by many persons, who thought they could be saved. There were five northers, each of which brought light rain. From February 26th to May 23rd no rain fell, and often the sky was entirely clear for weeks at a time, and in fact rarely was a cloud to be seen. The heat in the day gradually increased, until it was almost intolerable in April and May. On account of the dry air and clear sky the radiation was so great that the nights often became disagreeably cool, though generally most delightfully pleasant and balmy. The birds disappeared as the dry season advanced, except a few of the common resident species, which lived about the ranchos and at the aguadas, where water was to be found. On the 23rd of May the first of the summer rains occurred, which was soon followed by daily showers at midday. All nature changed as if by magic; new leaves grew, and the forests were again populated with sweet songsters, which gave life and joy to every thing. In June the rains began at 11 A.M. and ceased at 2 P.M., rarely beginning earlier or continuing later. In July they began at 10 A.M. and lasted until 3 or 4 P.M., but never earlier. In August they began at 10 A.M. and lasted until nightfall, and sometimes later. During these three months there were from five to eight days in each month upon which no rain fell. The heat was almost insupportable even for the natives. Yellow fever raged in most of the interior towns. In September the rains began at 8 or 9 A.M., and often lasted until midnight, and not unfrequently all night. The weather became milder. Insects became exceedingly scarce, and the birds were not fit to skin. Reptiles were about the only things to be found. Mollusks are exceedingly rare in Yucatan: not one species can be said to be common. During the first twenty-seven days of October 1879 rain in torrents fell almost incessantly. The sun was seen on four days, and the stars appeared in patches on five nights. Not five consecutive hours passed during the twenty-seven days without rain. Yellow fever gave place to intermittent and bilious fevers. Insects were rarely seen, and the birds again almost entirely disappeared. The rains seem now to have ceased as they began; whether the rainy season is over remains to be seen. On account of the heavy rains or other cause, the birds which are here now are worthless for skins, as the feathers are not yet grown. *Meleagris ocellata* will probably have its full plumage by December, and will continue in good plumage until June."

The chief localities in which birds were collected by Mr. Gaumer are as follows:—

"(1) *Progreso* is the port of Merida, situated on the north coast, six leagues to the east of the old port of Sisal. The country is low and marshy for nearly two leagues inland; and in times of the northers the greater part of this distance is inundated by the rise of the

sea, leaving the town of Progreso on a narrow strip of land between the bays and the sea. This neck of land is covered with low shrubs, which furnish but poor protection for the birds in the season of the northers. October and part of November 1878 were spent at Progreso, and the remainder of November at the port of Silam (Tzeelam), twenty leagues to the east of Progreso, which is similarly located in every respect. (2) *Chablé* is a hacienda on the Campeche road, eight leagues south-west of Merida. The land is almost entirely limestone-rock, with a few very low scrubby trees, which rarely rise to the height of twenty-five feet; beneath these is one impenetrable thicket of undergrowth. The month of December was mostly spent in this rancho. (3) *Merida*, the capital of Yucatan, is a large village situated in a forest of shady trees, which by care have become quite large, and in every respect unlike the natural trees about the city. Part of December and half of January 1879 were spent in this city. (4) *Izamal* is situated in the interior, fourteen leagues to the east of Merida. The country is low, level, and stony; thickly wooded with low scrubby trees and a dense growth of underbush and thorns. (5) *Izalam* is a rancho six leagues to the south of Izamal, located in a forest of trees which rise to the height of forty feet. The country is level and rocky, and covered with the usual undergrowth. The remainder of January, February, and half of March were spent in Izamal and Izalam. (6) *Tizimin* is situated fifty leagues to the east of Merida, and sixteen leagues from the north coast. The country, like all Northern Yucatan, is low, level, and undiversified, without streams of water of any kind. This is on the border of what are called the eastern forests. To the north, east, and south of Tizimin lie vast forests, for the most part uninhabited since the emigration of the Indians nearly half a century ago. These forests are filled with ruins both ancient and modern. Of the former nothing remains worth sending out of the country. A few ranchos have been repeopled, and from these I have collected most of the birds sent. Of these the first was (7) *Yok Sonat Ku*, a large forest to the north-east of Tizimin six leagues. Here are large trees and the forests comparatively open. The months of April and May and part of June were spent in this forest and others near by. (8) *Rio Lagartos* is a seaport town at the mouth of the river of the same name. Rio Lagartos is not a river in the sense generally given to the word *river* in Europe and America, but rather an arm of the sea into which open innumerable springs, or, as I believe, large subterranean rivers. The water is very salt, and in the dry season even more salt than the sea. It is very broad and shallow, bordered by a dense growth of low brush, behind which lie marshes of salt or brackish water. Here many thousands of Flamingos were seen in their finest plumage, while vast swarms of other sea-birds are ever in sight. The remainder of June and part of July were spent here, though, on account of the innumerable hosts of mosquitoes and gnats, which come with the first rains, my work was very much impeded. (9) *Calotmul* is situated five leagues to the south of Tizimin in similar lands, though on the road to Merida. (10) *Pocobach* is a new settlemen

four leagues south of Calotmul, on the border of the largest forest-trees yet seen in Yucatan. The forests are open and quite penetrable. (11) *Chem Jonat* is a new rancho, three leagues further in this forest; there the collections of August, September, and October were made. The incessant rains and immense floods of water of September and October rendered collecting an utter impossibility; besides the persistent and almost universal intermittent and pernicious fevers made it extremely hazardous to expose one's self to the inclemencies of the weather. The Aguadas are deep excavations in the earth, which are filled with water never very deep. These are said to be natural; but I am of opinion that many of them are artificial, or at least reconstructed by the ancient Maya races. They are of various sizes, but average from fifty to one hundred yards square (or nearly square). The general shape is circular, though I think there is sufficient evidence for believing that they were originally quadrilateral in shape. However that may be, the important point is, that these aguadas, which are abundant in Yucatan, are filled with fresh water all the year. The approach is generally easy for all animals, the sides being inclined. In the dry season immense numbers of land-birds and animals go to these aguadas to drink. Birds and animals of prey find there an abundance of food; and the hunter generally fills his game-bag with choice game in a short time, while the naturalist is generally rewarded by the finding of something good. The *Jonat* (*tscu-not*) or *Senote* is a deep circular opening in the earth, with perpendicular walls of limestone, generally about sixty feet high (in the region of Tizimin, and shallower towards the coast). These are of all sizes and shapes, and are filled with clear, fresh, and cool water. The senote is of *unknown depth*, and believed by the natives to be openings to great underground rivers. There is generally no approach except down the stony walls. The senote is often in an immense underground cave with but a narrow mouth. At the water's edge there is no place to rest, nor visible object in the deep clear waters. When open, large numbers of small birds go to the senote to drink, and especially Finches. The Vultures often build their nests in the rocky walls, also Owls and other similar birds. When closed, or partly closed, or cave-like, the cave over the senote is populated with Swallows, Owls, Bats, and Motmots. Reptiles &c. are also said to abound, sometimes in immense numbers. In the water of every senote that I have ever seen there is at least one species of fish belonging to the Siluroids. These fishes are very abundant, hundreds sometimes being visible at one time. In nearly all of the open and shallow senotes nearer the coast there is said to exist another species belonging to the scaly tribe. I have seen examples of this latter species but twice, and when I was utterly unprepared to capture and preserve them. This general distribution of the Siluroid fishes, and some experiments which I have made, prove conclusively, to my mind, that the theory of underground rivers in Yucatan is an undoubted fact. The surface-water is all swallowed up by these senotes and by the ever thirsty land. There are no rivers

nor streams of any kind, nor other source of supply of water than those mentioned, except in the rainy season, when cavities in the rocks are often filled with rain-water. Artificial wells are also dug through solid limestone."

I now add Mr. Gaumer's notes on the species which he has collected¹.

1. *TURDUS GRAYI*, Bp.; Lawr. Ann. Lyc. N. Y. ix. p. 199; Salv. & Godm. Biol. Centr.-Am., Aves, i. p. 18.

Native name "Buisseñor." This bird is rather common in all parts of Yucatan, and is much prized as a pet for its sweet song. It is found alike in towns and forests. It utters no cry when approached, and is said to sing only in June. Though I have spent the summer in Yucatan, I have never had the pleasure of hearing this bird sing.

2. *GALEOSCOPTES CAROLINENSIS* (L.); Lawr. l. c. p. 204; Salv. & Godm. Biol. Centr.-Am., Aves, i. p. 26.

This bird is very rare; only a few specimens have been seen, all of which were in the cities of Merida, Izamal, and Tizimin. It is very shy, and frequents low clumps of bushes along the stone fences.

3. *MELANOPTILA GLABRIROSTRIS*, Sclat.; Salv. & Godm. Biol. Centr.-Am., Aves, i. p. 27, t. 3. f. 2.

Exceedingly rare.

4. *MIMUS GILVUS* (Vieill.); Salv. & Godm. Biol. Centr.-Am., Aves, i. p. 36.

Mimus gracilis, Lawr. l. c. p. 199.

Native name "Chico," or "Zenzontl." The name of "Zenzontl" is generally given in Mexico to all the species of Mocking-birds.

[This is the only species of *Mimus* of which I have seen specimens from Yucatan.—O. S.]

5. *POLIOPTILA CÆRULEA* (L.); Lawr. l. c. p. 199; Salv. & Godm. Biol. Centr.-Am., Aves, i. p. 50.

6. *POLIOPTILA BILINEATA* (Bp.).

♂, Progreso, October 1878.

7. *CAMPYLORHYNCHUS GUTTATUS* (Gould); Lawr. l. c. p. 199; Salv. & Godm. l. c. p. 68.

Progreso, Oct. 1878. Iris black.

Rare; only two specimens sent.

8. *THRYOTHORUS MACULIPECTUS* (Lafr.); Salv. & Godm. Biol. Centr.-Am., Aves, i. p. 92.

¹ [These have been arranged for convenience according to the order of the 'Nomenclator.' I have also added the references to Mr. Lawrence's paper on the Birds of Yucatan (Ann. Lyc. N. Y. ix.), and the names of several species obtained by Dr. Cabot, whose collection I examined in 1874.—O. S.]

9. *THRYOTHORUS ALBINUCHA* (Cabot).*Troglodytes albinucha*, Cabot, Pr. Bost. Soc. N. H. ii. p. 258.*Thryothorus albinucha*, Lawr. *l. c.* p. 199; Salv. & Godm. *l. c.* p. 94.*Thryothorus petenicus*, Salv. P. Z. S. 1863, p. 187.

Chablé, Dec. 1878. Iris black.

This little bird is very common in all the forests of Yucatan, seldom entering the villages or ranchos. Is a lively songster, spending most of its time near the ground. Its song is varied and thrilling, dispelling sadness as if by magic. Its food is small insects and worms.

10. *TROGLODYTES INTERMEDIUS*, Cab.; Lawr. *l. c.* p. 199; Salv. & Godm. *l. c.* p. 100.

11. *SIURUS AUROCAPILLUS* (L.); Lawr. *l. c.* p. 200; Salv. & Godm. *l. c.* p. 144.

This bird is common in all the shady forests of Yucatan, but it abounds most on the coast at Silam and Rio Lagartos.

12. *SIURUS NOVEBORACENSIS* (Gm.); Lawr. *l. c.* p. 200; Salv. & Godm. *l. c.* p. 145.

This bird was only observed in the salt-marshes of Silam. It is probably common in winter on the coast generally.

13. *SIURUS LUDOVICIANUS* (Aud.).

14. *MNIOTILTA VARIA* (Linn.).

Izalam.

Common at all times and in all parts. Ever busy climbing about the bark of the trees, upon which it finds most of its food.

15. *PARULA AMERICANA* (L.); Lawr. *l. c.* p. 200; Salv. & Godm. *l. c.* p. 119.

Taken at Silam and Progreso in October and November.

16. *PROTONOTARIA CITREA* (Bodd.); Lawr. *l. c.* p. 200; Salv. & Godm. *l. c.* p. 111.

Rare; only three specimens sent.

17. *HELMINTHOPHAGA PINUS* (L.).

[New to the fauna of Yucatan.—O. S.]

18. *PERISOGLOSSA TIGRINA* (Gm.).

[New to the fauna of Central America.—O. S.]

19. *DENDRÆCA CORONATA* (L.); Salv. & Godm. *l. c.* p. 127.

Common in Izamal in January, seen again in March, and not seen since nor elsewhere.

20. *DENDRÆCA ÆSTIVA* (Gm.); Lawr. *l. c.* p. 200; Salv. & Godm. *l. c.* p. 124.

21. *DENDRÆCA VIEILLOTI* (Cass.); Lawr. *l. c.* p. 200; Salv. & Godm. *l. c.* p. 125.

Taken at Silam in November 1878, where it was quite rare and very wild. Seen again in greater abundance in June and July at Rio Lagartos. I conclude that it is a coast-bird, as I have never seen it inland beyond two leagues.

[Dr. Cabot also found this species in Yucatan.—*O. S.*]

22. *DENDRÆCA PALMARUM* (Gm.).

This bird was only seen at the port of Progreso, where it lives in the low dense clump of under-brush. It is exceedingly shy and difficult to shoot.

[No specimens of this species have been submitted to me. It is known to pass the winter in the Antilles, but has not previously been noticed in Central America.—*O. S.*]

23. *DENDRÆCA SUPERCILIOSA* (Bodd.); Salv. & Godm. *l. c.* p. 134.

Dendræca dominica, Lawr. *l. c.* p. 200.

Chablé, November 1878.

24. *GEOTHLYPIS TRICHAS* (L.); Lawr. *l. c.* p. 200; Salv. & Godm. *l. c.* p. 150.

This bird was only observed at Chablé in November 1878, and subsequently at Progreso.

25. *MYODIOCTES MITRATUS* (Gm.); Lawr. *l. c.* p. 200; Salv. & Godm. *l. c.* p. 167.

Izalam, February 1879.

26. *SETOPHAGA RUTICILLA* (L.); Salv. & Godm. *l. c.* p. 178.

27. *GRANATELLUS SALLÆI* (ScL.); Salv. & Godm. *l. c.* p. 161.

Several specimens, male and female. This is a rare species, only met with in the forest.

28. *ICTERIA VIRIDIS* (Gm.); Salv. & Godm. *l. c.* p. 157.

Icteria virens, Lawr. *l. c.* p. 200.

Only one specimen seen in Yucatan.

29. *VIREOSYLVA OLIVACEA* (L.).

This bird was taken at Silam in November.

[No specimen sent to me.—*O. S.*]

30. *VIREOSYLVA FLAVOVIRIDIS*, Cass.; Salv. & Godm. *l. c.* p. 189.

First seen on May 17th, when it seemed to come in a great

swarm after the first light rain of the season. On the 16th, I was all day in the woods and did not see one of these birds; on the 17th there were hundreds of them in all parts. They have been very abundant since.

31. *VIREO OCHRACEUS*, Salv.; Salv. & Godm. *l. c.* p. 201, t. 12. f. 1.

Taken at Silam and Progreso. I have not retained specimens of these last birds, and do not know whether I have seen them in other parts of the State or not.

32. *CYCLORHIS FLAVIVENTRIS*, Lafr.; Lawr. *l. c.* p. 200; Salv. & Godm. *l. c.* p. 211.

Not common.

[Obtained by Dr. Cabot.—*O. S.*]

33. *AMPELIS CEDRORUM*, Vieill.

Izalam, February 1879.

Only one specimen of this bird was seen in Yucatan during the year.

34. *PETROCHELIDON FULVA* (Vieill.); Salv. & Godm. *l. c.* p. 228.

Common in the cave-like wells called Senotes, and resident in Yucatan.

[This seems to be certainly the same as the bird of Cuba and Jamaica.—*O. S.*]

35. *HIRUNDO ERYTHROGASTER*, Bodd.; Salv. & Godm. *l. c.* p. 232.

A flock of 50 or more seen flying over an aguada on April 28th, but the species was not met with again during the year, and is probably only migratory.

36. *STELGIDOPTERYX SERRIPENNIS* (Aud.); Salv. & Godm. *l. c.* p. 237.

Stelgidopteryx fulvipennis, Lawr. *l. c.* p. 200.

Common in February, March, and April; rare at other seasons. Found in the towns and ranchos.

37. *EUPHONIA AFFINIS*, Less.; Lawr. *l. c.* p. 200.

Native name "Chichimbula." This little bird is very abundant in Merida and the surrounding country. It is sold on the Playa by the hundred at the nominal price of four for a medio real (=three pence). It is highly prized by the Meridanas for its sweet and varied song as well as its handsome plumage. It is easily domesticated. Its food is fruit, and it is passionately fond of ripe plantains. Few birds eat too much; but I have seen this little bird so full of plantains that it could not fly. In confinement they are said to kill themselves by eating plantains. This bird is also found in other parts of Yucatan.

38. *EUPHONIA HIRUNDINACEA*, Bp.

Native name "Chi-chim-bi-chi-la." This species is not common in Yucatan. It was first seen in Chablé, and also in Izalam and Tizimin. In habits it is much like the preceding, though the two birds are never found together. It is not quite so good a singer as the other.

39. *PYRANGA RUBRA* (Linn.).

Common near the city of Merida.

40. *PYRANGA ÆSTIVA* (Gm.).

Valladolid in October, not common. Feeding on Hemiptera.

41. *PYRANGA ROSEIGULARIS*, Cabot, Bost. Journ. N. H. v. p. 416; *Scl. Ibis*, 1873, p. 125, pl. 3.

Only two specimens were obtained of this rare species. The female very much resembles the male; but the throat is yellow instead of red. The size is exactly the same.

42. *PHENICOTHAUPIS RUBICOIDES* (Lafr.).

This bird is quite common in the forests, where it follows the swarms of ants, in search of its food. It is generally seen in flocks of from six to a dozen, and is not wild.

[Also in Dr. Cabot's collection.—O. S.]

43. *EUCOMETES SPODOCEPHALA*, Bp.44. *SALTATOR ATRICEPS*, Lesson.

Pyrrhula raptor, Cabot, Bost. Journ. N. H. v. p. 90, t. 12.

This bird is found abundantly in the city of Merida, and is quite common in all parts. It is generally seen in flocks of from 4 to 12. The song of the male is exceedingly sharp, shrill, and piercing; it generally sings at break of day. While living in Izamal a pair of these birds came every morning into a bush at my window, where they sang for half an hour every day, and at their first notes I found myself awakened. This bird mounts to the highest branch of a tree, where it utters a few shrill notes, and again descends to the thick foliage below. Its food is the flowers of the convolvulus when this plant is in bloom; and at other times I have found other flowers and green leaves, or sometimes fruits, in its stomach.

45. *SALTATOR GRANDIS*, Lafr.; Lawr. l. c. p. 200.

This is believed by the natives to be a distinct species, though I am of opinion that it is the female of the preceding. Its habits are the same, though the song is much milder; and of this form I have seen flocks of 70 to 100, while the preceding rarely exceeds 8 or 10.

[In Dr. Cabot's collection.—O. S.]

46. *HEDYMELES LUDOVICIANUS* (Linn.); Lawr. *l. c.* p. 200.

47. *CARDINALIS VIRGINIANUS* (L.); Lawr. *l. c.* p. 201.

Common in all parts, quite shy, and always seen in pairs. It is alike prized for its sweet song and for its bright plumage. Its food is mostly seeds. It frequents open lands or the outskirts of the towns.

48. *GUIRACA CÆRULEA* (L.); Lawr. *l. c.* p. 200.

This bird is common from December to May. In Yucatan it is rather stupid, nor has it the beautiful plumage which it generally has in the north in summer.

49. *GUIRACA PARELLINA*, Bp.

Merida, January 1878. Irides black.

50. *SPERMOPHILA MORELETI*, Bp.

This little bird was first seen in February, and afterwards in great numbers in May and June. It lives in flocks, and is only seen in open land, often in company with the other species of small Fringilidæ.

51. *VOLATINIA JACARINA* (L.); Lawr. *l. c.* p. 201.

Very common in the corn-fields near Merida and elsewhere.

52. *PHONIPARA PUSILLA* (Sw.); Lawr. *l. c.* p. 201.

53. *CYANOSPIZA CIRIS* (L.); Lawr. *l. c.* p. 201.

Common in all open lands and villages, often seen in the principal streets of Merida, but most common on the coast. It lives among the weeds and low bushes, where it finds its food, which consists chiefly of seeds. Rather rare in midsummer.

54. *CYANOSPIZA CYANEA* (Linn.).

Progreso.

55. *MELOSPIZA LINCOLNI* (Aud.).

Large flocks of this little Sparrow were seen in Izamal in January and February. A very few have since been seen in other places. In Izamal it was very tame and quite active, living principally in the hedges and brush-heaps.

[No specimen sent to me.—O. S.]

56. *EMBERNAGRA CHLORONOTA*, Salvin.

Embernagra rufivirgata γ . *verticalis*, Ridgw. Pr. U. S. Nat. Mus. i. p. 248.

Embernagra rufivirgata, Lawr. Ann. Lyc. N. Y. ix. p. 201.

Abundant in all parts, always on the ground, where it is ever

busy scratching for its food. Generally seen in pairs, rarely mounts high nor flies far, is a good singer, and when hunting for its food it constantly utters its sweet chirp, which fills the woods with joy.

[Mr. Gaumer's skins are a little paler beneath than typical *E. chloronota*, but the difference is but slight.—*O. S.*]

57. *CHRYSONOTIS MEXICANA* (Sw.).

Common in the corn-fields.

58. *CASSIDIX HOLOSERICEUS* (Licht.); *Sclater, Ibis, 1883, p. 163.*

This bird is quite common in the margins of corn-fields and in open places in the forests. Its peculiar wedge-shaped bill is well adapted to its mode of extracting worms. This bird selects a thicket of dead weeds, then mounts the stem of a plant suspected of having a worm inside; with its wedge-bill it splits the weed, and with a twist crushes and tears away the half, thus exposing the enclosed worm. This it does also with the hard limbs of bushes and trees. The muscles of the head are wonderfully developed, and on this account the bird possesses great wrenching force. It lives in Yucatan all the year.

59. *ICTERUS AURATUS*, Bp.; *Lawr. Ann. Lyc. N. Y. ix. p. 271*; *Sclater, Ibis, 1883, p. 369.*

A very rare species; only two specimens obtained.

60. *ICTERUS CUCULLATUS*, Sw.

Very common in the western towns, but more rare in the eastern. It is found alike in forest, field, and village and is everywhere a favourite bird with the natives. It builds a very long pendent nest.

61. *ICTERUS GIRAUDI*, Cassin.

Common.

62. *ICTERUS MESOMELAS*, Wagler.

Oriolus musicus, Cabot, *Pr. Bost. Soc. N. H. i. p. 156*; *Bost. Journ. N. H. iv. p. 465.*

Calotmul, June 1880.

Like the last is common in all parts. Its habits are nearly the same.

63. *MOLOTHRUS ÆNEUS* (Wagl.).

This bird is very abundant in all parts of Yucatan. It lives in flocks, and generally frequents barn-yards and cow-pens. I have frequently seen it perched upon the back of a horse or cow, in order to pick maggots out of old sores. These sores are very prevalent among draught-horses in Yucatan, and wherever there is a sore the flies soon populate it with their larvæ: the sore then spreads, and hundreds

of maggots may be extracted from a single sore. In the intolerable laziness and neglect of these people to attend to wounded animals, it seems as if God had sent this bird as a merciful surgeon to clean the foul ulcers of poor helpless brutes. Females were abundant at Chablé in November.

64. *AGELEUS PHENICEUS* (Wagl.).

Abundant on the coast, where it lives in the salt-marshes. Its habits are well known.

65. *STURNELLA LUDOVICIANA* (L.).

Common on the savanas of Rio Lagartos, but not seen elsewhere.

66. *LAMPROPSAR DIVES*, Cab.

Native name "Pich" (pronounced "peach"). This is the commonest of all Yucatan birds, being very abundant in all the towns, as well as in the forests. I have seen this bird walking about in the busiest streets of Merida, apparently without fear, and it often enters houses in search of food.

67. *QUISCALUS MACRURUS*, Sw.

Native name "Sacoa." This bird is most common here from January to May. I did not see one in July and August, nor in September, and up to the present time, Oct. 15th, the bird has not made its appearance. It does not go in flocks; rarely more than five or six are seen at a time: it apparently sings with very great effort. The female is considered by the natives another species and is called "Socao," instead of "Sacoa."

68. *CYANOCITTA YUCATANICA* (Dubois).

Cyanocitta crassirostris, Lawr. l. c. p. 201.

Native name "Chel." This bird is abundant in all parts of the country, and is often very destructive to the corn-fields and to certain kinds of fruit. It is rather shy, though sometimes seen in the villages. In the country it travels in flocks of from twenty to one hundred. On being approached these birds set up a loud cry, each chattering and squawking as if disputing the right of the invader; and while one or two of the largest, who are perched upon some high object, greet him in a most offended manner, the remainder stealthily fly away; when all are gone, these suddenly give a few laugh-like notes, and quickly follow. When young this bird is pure white, and gradually changes to its adult plumage.

[In Dr. Cabot's collection.—O. S.]

69. *CYANOCITTA MELANOCYANEA* (Hartl.).

Only one specimen of this fine species, killed in the forests near Merida.

[No specimen sent to me. I have never seen this species in the low lands of Guatemala.—O. S.]

70. *CYANOCORAX LUXUOSUS* (Less.); Lawr. *l. c.* p. 201.

Peruvian Jay.

Native name "Tzee-tzep." This Jay is abundant in the city of Merida, and quite common in all the towns and villages. It is seldom seen in the forests, though frequently along roadsides. The natives call this bird "jisip" (tzee-seep), which with the Maya pronunciation is exactly the word articulated by the bird. Though very common, it is very little known by the people of Yucatan. This is probably due to the bird resorting to the thick foliage of those trees with a green shade nearest its own.

[In Dr. Cabot's collection.—*O. S.*]

71. *PSILORHINUS MEXICANUS*, Rüpp.

Corvus vociferus, Cabot, Pr. Bost. Soc. N. H. i. p. 155; Bost. Journ. N. H. iv. p. 464.

This bird is common only in the great forests, is very shy, lives in flocks of twenty or more, rarely descends to the earth; when approached, it utters a loud cry, "pap," repeated many times in rapid succession, and then darts away a few hundred yards, when it repeats its cry a few times and then becomes quiet. Its flesh is eaten by the natives.

[In Dr. Cabot's collection.—*O. S.*]

72. *ONCOSTOMA CINEREIGULARE*.

♂. Tizimin, May 1879. Iris grey.

73. *ELAINIA FAGANA* (Licht.).

♀. Tizimin, May 1879. Iris dark brown.

This bird is very rare; only a few specimens were seen on the 22nd of May, after which I did not meet with it again.

74. *ELAINIA PLACENS*, Sclat.; Lawr. *l. c.* p. 201.

Not common.

[Not sent to me.—*O. S.*]

75. *MYIOZETES TEXENSIS* (Giraud); Lawr. *l. c.* p. 201.

The boldest of all the Tyrants, never relaxing in its efforts until it has routed all other birds from its accustomed place at the top of a dead limb. It is exceedingly noisy, uttering a loud shrill cry, which alone is sufficient to put to flight many other birds. It seldom descends to the earth, but often pursues other birds to a great height. While shooting birds on the wing, I have frequently seen this bird dart from its perch, and flap with its wings the falling bird; and on two occasions, when the falling bird was only wounded, the two birds clenched together so firmly that both reached the ground together. Its food is principally insects; but it is also fond of several kinds of fruits.

76. *RHYNCHOCYCLUS CINEREICEPS*, Sclat.; Lawr. *l. c.* p. 201.

♀. Tizimin, June 1879. Iris white.

Quite common in the east until May; not seen after that time.

77. *PITANGUS DERBIANUS*, Kaup; Lawr. *l. c.* p. 201.

A bold bird, living in the vicinity of the aguadas (artificial ponds), and quite rare. It is very difficult of approach, flying from one side of the aguada to the other. It feeds upon the insects which hover over the water.

78. *MYIODYNASTES LUTEIVENTRIS*, Sclat.

Common in May and June, after which time it disappeared.

79. *MEGARHYNCHUS PITANGUA* (L.); Lawr. *l. c.* p. 201.

"Stachi."

Abundant in all parts of the State. This is a very noisy bird. Its favourite haunt is the point of a dead limb near the top of a tree with open lands around, over which he may fly to capture his favourite insects. This is a bold bird, fighting bravely for his favourite limb when another bird happens to perch upon it. I have found several of these birds with crops well filled with fruit and seeds.

80. *MUSCIVORA MEXICANA*, Sclat.; Lawr. *l. c.* p. 201.

Only one specimen seen. Said to be common in Panabá, though several visits to the aguadas brought me no birds. The crest opens transversely and is very beautiful; and as the bird was very tame I had the pleasure of watching it a long time. Its food is insects.

[Not submitted to me.—O. S.]

81. *PYROCEPHALUS MEXICANUS*, Sclat.; Lawr. *l. c.* p. 201.

This bird is very abundant on the coast, and at Merida common; not found elsewhere in the interior. Its favourite haunts are low dead bushes, where it may be seen at all times of the day perched upon a dead limb, from which it darts into the air after its prey, which consists of small insects.

82. *EMPIDONAX MINIMA*.

Merida, Dec. 1878.

83. *EMPIDONAX TRAILLI* (Aud.).

Izalam, Feb. 1879.

84. *MYIARCHUS LAWRENCII* (Giraud); Lawr. *l. c.* p. 204.85. *TYRANNUS PIPIRI*, Vieill.

Tizimin, April 1879.

Common in April and May, after which it disappeared.

86. *TYRANNUS MELANCHOLICUS*, Vieill.; Lawr. *l. c.* p. 204.

Native name "Stachi." This is the most common of all the Tyrannidæ. It abounds alike in all the towns and forests, is bold and fearless, pursuing its prey even within the houses, fighting the largest Hawks, and especially the Buzzards.

87. *TITYRA PERSONATA*, Jard. et Selby; Lawr. *l. c.* p. 204.

Common in April. A few were seen as late as June 1st, after

which the species disappeared. A very active and noisy bird, ever on the alert for a passing insect, upon seeing which the bird darts into the air with a scream, and rejoices greatly when successful in the capture.

88. *TITYRA FRASERI*, Kaup.

This bird has similar habits to those of the former species, but is not so common.

89. *HADROSTOMUS AGLAIÆ* (Lafr.); Lawr. *l. c.* p. 204.

Very rare; only five specimens (males) were seen during the year. This bird lives in the darkest forests, and utters no cry of any kind. It is solitary in its habits, and neither ascends to the tops of the trees nor descends to the ground. It lives upon insects, which it captures upon the wing. My first specimen was found in Merida in a thicket; but it was afterwards taken in Izamal and again at Tizimin.

[Also in Dr. Cabot's collection.—*O. S.*]

90. *PACHYRHAMPHUS MAJOR* (Cab.).

This bird is very rare. Only one was seen in Izalam in February; four more were seen in Tizimin in May, and on the road to Rio Lagartos in June. It is not shy; lives only in large forests and very high in the trees. It utters a kind of prolonged mournful *twit*, by which its whereabouts may be determined.

91. *ATTILA CITREOPYGIUS*, Sclat.

April 1879. Iris red.

This bird is rather rare. It was first seen in Izalam in February, and again in Tizimin in April. It is quite tame, and is found only in the largest forests. It is a very quiet bird, and moves but little and very slowly. It is generally seen upon a dead limb near the ground.

92. *SYNALLAXIS ERYTHROTHORAX*, Sclater.

The Maya name of this bird is "Tzapatan." It is common in Eastern Yucatan from May to October, and is very tame and active. It lays its eggs in a monstrous nest of large sticks, well laid, with the entrance below and about 18 inches from the eggs. I am of opinion that this bird does not build its own nest, but occupies the deserted nest of some other bird or animal. The natives have a curious belief with regard to the formation of the nest of this bird, which is worth relating. When the "Tzapatan" begins to sing, all the birds of the forest bring a stick to form the nest. The Chom (*Cathartes*) being too large to enter the nest, the Stachi (*Tyrannus*) brings two sticks instead of one. In this way the nest is constructed by all the birds of the forest. But this sounds much like many other ingenious inventions of the Spanish conquerors, and is probably a tale invented for the natives to follow in the construction of their houses.

93. *SITTASOMUS OLIVACEUS*.

February 1879. Iris black.

Rare, being met with only in Izalam and in Tizimin. This bird is only seen moving about the trunks of trees and mostly upon the smaller limbs, for the climbing of which its tail is remarkably adapted. Each of its tail-feathers is tipped with a sharp spine, which together form a semicylindrical end, and fit exactly to the limbs upon which it generally moves.

94. *DENDROCINCLA ANABATINA*, Sclat.

Common in the forests only, but not seen near the ranchos.

95. *DENDROCINCLA HOMOCHROA*, Sclat.

Izalam.

Not common, though occasionally found in all the eastern forests, quite shy and rarely quiet. This bird is generally seen upon the trunks of small trees and bushes, where it finds its favourite food.

96. *DENDRORNIS EBURNEIROSTRIS*, Lesson ; Lawr. *l. c.* p. 201.

Common in all the large forests, but never seen near the ranchos. Ever busy, climbing about the dead trees, from which it tears the loose bark in search of its favourite worms. It is very tame and easily approached. Rarely mounts to the top or descends to the roots of the tree. Its flight is always downward ; and on alighting some distance above the ground, it begins to move up until it has searched well the trunk of the tree, then it passes to another.

[Also in Dr. Cabot's collection.—*O. S.*]

97. *THAMNOPHILUS DOLIATUS* (L.).

Thamnophilus affinis, Lawr. *l. c.* p. 201.

Very rare ; the first was met with at Tzalam near Izamal in Jan. 1879. Afterwards it was seen twice in Tizimin. Lives in low bushes, and is very tame.

98. *FORMICARIUS PALLIDUS*, Lawrence, Ann. N. Y. Ac. Sc. ii. p. 288 (1882).

Not common. I agree with Mr. George N. Lawrence that this species is quite distinct from *F. moniliger*. The description given by Mr. Lawrence agrees exactly with the specimens sent to me.

99. *SPHENOPROCTUS PAMPA* (Lesson).

Rare in Yucatan. Four specimens of this bird were seen near Izalam, and three afterwards in Tizimin. It lives only in the most distant and secluded forests, and is extremely shy. Its song is not harmonious nor sweet, though it sings and chatters a great deal and very loudly. It was only on account of the great noise made by this bird that I was ever able to see it alive. Like all the Humming-birds, it flies very swiftly, and is never seen a second time.

100. *LAMPORNIS PREVOSTI* (Less.).

Very rare; only four specimens seen, all of which were killed. It lives only in the loneliest forests, far from the dwellings of man, but is not very shy. Izalam, February.

101. *TROCHILUS COLUBRIS*, Linn.

Abundant on the coast.

102. *DORYCHA ELISÆ* (Lesson).

Found only at the port of Progreso, where it is very abundant all the year. I have never seen one of these birds elsewhere. It is a very swift flier, shy and rather noisy. It stops but an instant, and again darts away, so that it can rarely be shot upon the perch.

103. *AMAZILIA CINNAMOMEA* (Lesson); Lawr. Ann. Lyc. N. Y. ix. p. 204.

This bird is the rarest of all the Humming-birds yet found in Yucatan. Only one specimen has been seen during the year. This specimen was shot while hovering about some flowers in a very high tree. Its habits are not known to me.

104. *AMAZILIA YUCATANENSIS*, Cabot.

Seems to be a very rare species, only four specimens having been sent by Mr. Gaumer.

105. *AMAZILIA DEVILLII* (Bourc.).

[Not seen by me.—O. S.]

106. *CHLOROSTILBON CANIVETI* (Lesson).

This beautiful little Humming-bird was very abundant in Izalam in January and February.

107. *CHÆTURA GAUMERI*, Lawr. Ann. N. Y. Ac. Sc. ii. p. 245.

Chætura vauzi, Lawr. Ann. Lyc. N. Y. ix. p. 204.

[Not submitted to me.—O. S.]

108. *CHORDEILES TEXENSIS*, Lawrence, l. c. p. 204.

Only once met with.

109. *ANTROSTOMUS MACROMYSTAX* (Wagl.).

Very common in Merida. Frequents the roads and by-paths; appears in the evening after sunset, and often continues its wanderings all night.

I am not certain that the specimen examined is correctly determined.

110. *NYCTIDROMUS ALBICOLLIS* (Gm.); Lawr. l. c. p. 204.

This is the most common of all the Caprimulgidae in Yucatan. It is found in all parts of the country, appearing early and flying all night.

[Not seen by me.—O. S.]

111. *CAMPEPHILUS GUATEMALENSIS* (Hartl.).

This bird abounds in all parts of Yucatan. It frequents the large forests, but is also often seen in the corn-fields pounding away upon the dead trees which abound there. Its cry is sharp and rolling, and may be heard at a very great distance, as well as the sound of its blows upon the dead trees. In the forests it is seldom shy, while in the open lands it is rarely to be approached. I have seen 14 of these birds on one tree, crying and pounding away, until at a short distance off it seemed like a hundred woodmen felling trees and conversing at the same time.

112. *PICUS SCALARIS*, Wagl. ; Lawr. *l. c.* p. 205.

Picus parvus, Cabot, Pr. Bost. Soc. N. H. i. p. 164 ; Bost. Journ. N. H. v. p. 92.

This bird I have seen in all parts of Yucatan, though it is not at all common. I have met with it both in the towns and in the ranchos. It is not wild. The *iris* is reddish brown.

113. *CHLORONERPES OLEAGINEUS* (Licht.).

Very rare ; only three specimens were seen during the year.

114. *CHLORONERPES YUCATANENSIS* (Cabot).

Picus yucatanensis, Cabot, Pr. Bost. Soc. N. H. i. p. 164 ; Bost. Journ. N. H. v. p. 92.

Tizimin, May 1879.

This Woodpecker was first seen at Izalam in February, but only one specimen was met with. Afterwards two birds were seen near Valladolid in September. As all these birds were very noisy, I conclude that the species must be very rare in this State.

115. *CENTURUS DUBIUS*, Cabot.

Picus dubius, Cabot, Pr. Bost. Soc. N. H. i. p. 164 ; Bost. Journ. N. H. v. p. 91.

Centurus albifrons, Lawr. *l. c.* p. 205.

This bird abounds in all parts of Yucatan, and is everywhere dreaded by those who raise cocoa-nuts, for it is said to puncture the shell of the young cocoa-nut in order to drink the milk, and the nut is then spoiled. This bird is most frequently found in the cities and near the habitations of man, but is not uncommon in the larger forests.

The *iris* is red.

116. *CENTURUS RUBRIVENTRIS*, Sw. ; Lawr. *l. c.* p. 206.

Several specimens of both sexes of this rare species were obtained. I am of the same opinion as Mr. Lawrence as to the validity of this species.

117. *CELEUS CASTANEUS* (Wagl.).

Very rare ; only two specimens were seen during the year. This bird has a very strong and peculiar odour, derived from its food,

which consists exclusively of a small Hymenopterous insect called the *Uss*. It is solitary, and lives in the deepest part of the forest. The specimens obtained were very tame and were watched for some hours before being shot; they jump nimbly about the trees, and are constantly catching the small insects which seem to be attracted to them by their odour.

118. *MOMOTUS LESSONI*, Lesson; Lawr. l. c. p. 204.

This bird is found in all parts of Yucatan, though it is not abundant anywhere. It lives in the forests, and is seldom seen in the towns or ranchos. It never enters wells nor caves, but breeds in the deserted dens of the Armadilloes and other burrowing animals. These subterranean burrows it cleans out with its own claws and bill, and constructs its nest at the bottom. The trimming of the two middle feathers of the tail is a work performed by the bird, and is not natural. Its song is "moot-moot," uttered twice in rapid succession, and repeated at intervals of one minute.

119. *EUMOMOTA SUPERCILIARIS* (Sw.); Lawr. l. c. p. 204.

Momotus yucatanensis, Cabot, Pr. Bost. Soc. N. H. i. p. 156; Bost. Journ. N. H. iv. p. 466.

This bird is abundant in every part of the State. It lives in wells and in the peculiar caves called "*senotes*." I have seen as many as 100 of these birds issue from a single *senote*, but more frequently one or two dozen is the limit. This bird abounds in the towns, and all places where there are wells or caves; and although a well is used every day it never deserts its home. Its cry is "*Toh*," uttered with a broad emphasis as "*Tāh*;" hence its name in Maya. This word as uttered by the bird means in Maya "straight," and by the ancient Indians refers to the two long straight feathers of the tail. Its food is frogs and other small animals and insects, which it finds in its subterranean home.

120. *CERYLE AMAZONA* (Lath.).

[Not sent to me.—O. S.]

121. *CERYLE CABANISI* (Tsch.).

122. *CERYLE SUPERCILIOSA* (Linn.); Lawr. l. c. p. 204.

Rio Lagartos, June 1879.

This little Kingfisher was taken at the sulphur-springs of Rio Lagartos, the only place where it is known to live in Yucatan. As this is a favourite bathing-place for the people of all the interior towns, this little bird has a great celebrity throughout the State. It is very tame, so much so that I have seen it plunge into the water after a fish only a few yards from me while I was bathing. The owner of the springs does not allow these birds to be killed, and it was with difficulty that I obtained permission to shoot one or two.

123. TROGON PUELLA, Gould.

Tizimin, May 1879.

Very rare; only three specimens were seen, and the bird is unknown to the natives. The first time I saw this bird there were two, which I believed to be a pair, though they differed a great deal. This was on May 31st, and on June 2nd I saw another. They were in the forest, and were very tame. They uttered no sound of any kind.

124. TROGON CALIGATUS, Gould.

Very common from May to September; lives only in the forest, is very tame, and spends much of its time singing; is rarely seen very high in the tree, nor does it descend to the ground. Like all the Trogons, it does not change its position upon the limb of a tree when once it alights; and when it flies from a branch it always keeps its back towards the hunter.

[Not submitted to me.—O. S.]

125. TROGON MELANOCEPHALUS, Gould.

Not common. I have never seen this bird in more than two localities—first in Yak-Jonat¹ in April, and again in Chemzonot in August. Those of April were only six in number, and those of August 20 or more. Several specimens, male and female, were obtained.

126. CROTOPHAGA SULCIROSTRIS (Sw.); Lawr. l. c. p. 205.

Abundant in all parts of the State. Lives in flocks, and flies very clumsily. In cool damp mornings these birds may be killed by dozens, with clubs, and are often captured alive by the hand. There are several species of ants which are accustomed to set out on migratory or foraging expeditions in immense flocks or swarms; these ants are as mauna to the "*Crotophaga*." I have seen as many as two hundred birds at a time devouring these insects.

127. GEOCOCCYX AFFINIS, Hartlaub.

Geococcyx mexicanus, Lawr. l. c. p. 205.

Rather rare in all parts, except at Rio Lagartos. May generally be seen perched upon the stone fences in the morning, or upon some elevated object; rarely in the trees. When startled it jumps quickly to the ground, and runs away, hiding itself in the thick undergrowth. "Xcum-kumil" is its name in Western Yucatan; in the east the Indians call it "Bachen-choo-lool."

[In Dr. Cabot's collection.—O. S.]

128. PIAYA CAYANA (Linn.).

Piaya mehleri, Lawr. l. c. p. 205.

"Kip choh."

This bird, which is common in all parts, is a great enemy of the

¹ Yak-Jonat is a great forest six leagues north-east of Tizimin, where many birds were obtained. But one rancho exists in a region extending over many leagues.

bee-raiser, as its food consists exclusively of these insects. Stationing itself in the vicinity of the hives, or frequenting the trees to which the bees resort to seek for honey, it is ever busy collecting them. It is rather inactive and clumsy, scarcely appearing at ease in any position. Its song is neither beautiful, nor varied, nor often repeated.

129. *DROMOCOCCYX PHASIANELLUS* (Spix).

Only one specimen of this bird was seen by me in Yucatan; and as it has no name, neither in Maya nor in Spanish, I conclude it is seldom found in this State.

130. *RHAMPHASTOS CARINATUS* (Swains.).

Said to be very common in all parts of the State, though I have not found this to be the case. Only six specimens have been observed by me during the year. It is also said to go in immense flocks, but I have only seen solitary individuals. It lives upon fruits, and is found in the forests, rarely in the settlements, and never in the towns.

[In Dr. Cabot's collection.—*O. S.*]

131. *PTEROGLOSSUS TORQUATUS* (Gm.).

Common in most parts of the State. Lives in flocks in the forests, rarely seen near the ranchos, and never in the towns. Lives upon fruit, of which it is very fond and eats a great deal. It generally takes its food three times a day—at 7 A.M., and at 2 and 5 P.M.; at these hours it is easily shot, as it is not very wild when eating.

132. *CONURUS AZTEC*, Souancé; Lawr. *l. c.* p. 207.

This bird abounds in all parts of Yucatan; but the largest flocks were met with in Western Yucatan, where 400 or 800 were seen in a single flock. In November and December they were feeding upon the seeds of a plant which grows very abundantly in that part of this State. The sharp piercing cry of these birds is almost deafening when in large flocks.

133. *CHRYSOTIS ALBIFRONS* (Sparrm.); Lawr. *l. c.* p. 207.

This bird abounds in every part of Yucatan, rarely entering the villages, though common near the ranchos, and frequently seen in immense flocks in the wild-orange groves, where it spends much of its time eating the fruit of this tree. This bird is found domesticated in almost every house, and learns to speak quite readily.

[In Dr. Cabot's collection.—*O. S.*]

134. *CHRYSOTIS XANTHOLORA*, G. R. Gray; Salv. Ibis, 1874, p. 327.

This bird seems to be very rare. Only three specimens were sent by Gaumer, who made no special remarks on them, probably believing that they were the same as *C. albifrons*.

[In Dr. Cabot's collection.—*O. S.*]

135. *STRIX FLAMMEA*, Linn.

This Owl is rather rare in Yucatan, being seen only in Izamal and Tizimin, though it is known to exist in other parts, and I think it is generally distributed. It is found perched upon a large branch of some tree with thick dark foliage. Its note is well represented by its Indian name, "Too-coo-loo-chhoo-oo."

136. *SYRNIUM VIRGATUM*, Cassin.

[Not seen by me.—O. S.]

137. *GLAUCIDIUM PHALÆNOIDES* (Daud.).

Glaucidium infuscatum, Lawr. l. c. p. 207.

♂, iris yellow; Merida, Dec. 1878. This bird is abundant in all parts of the State, lives more in the cities and towns and about old ruins than in the country. It is so tame that the boys often capture it alive with their hands, or with a noose fastened to the end of a stick. In the day it makes a kind of constant clicking noise, which may be heard some distance.

[Not seen by me.—O. S.]

138. *CIRCUS HUDSONIUS* (Linn.).

Not common, only four specimens having been seen during the year. My specimen was shot in February, at Izamal.

139. *ASTURINA PLAGIATA* (Schl.).

Shot at the aguada of Yok-satz, where it was evidently accustomed to go in search of Pigeons and other birds, which assemble there to drink and bathe. Its flight is more rapid than the latter.

[In Dr. Cabot's collection.—O. S.]

140. *ASTURINA RUFICAUDA*, ScL. et Salv.

Asturina magnirostris, Lawr. l. c. p. 207.

This Hawk is not common, only six specimens having been observed during the year. It is very shy, and lives in the open fields generally, but takes to the woods when approached.

[In Dr. Cabot's collection.—O. S.]

141. *URUBITINGA ANTHRACINA* (Nitzsch).

♀, iris brown; Chablé, Yucatan, Dec. 1, 1878. Three specimens of this bird were seen during the year in this State:—the first on Dec. 1, 1878; the second was seen in Jan. 1879, in the city of Merida, where it seemed to be at perfect ease, and without fear of man; the third was seen in an aguada near Espita in March, and was quite tame. This bird utters a faint cry "pip," hence its Indian name.

[In Dr. Cabot's collection.—O. S.]

142. *SPIZAËTUS MELANOLEUCUS* (Vieill.).

"Koss."

Tizimin, ♂, June 6, 1879. Iris golden yellow.

This large Hawk was shot by my friend Dr. Filipe Alcala near his house. I have heard this bird spoken of in all parts of Yucatan, but it has never been my fortune to see one alive.

143. *MICRASTUR MELANOLEUCUS*.

Falco percontator, Cabot, Bost. Journ. N. H. iv. p. 462.

[In Dr. Cabot's collection.—*O. S.*]

144. *ACCIPITER BICOLOR* (Vieill.).

Shot at the aguada of Yok-satz in March and May.

145. *ACCIPITER FUSCUS* (Gm.).

Dec. 1878, Chablé. Only a few specimens of this Hawk have been seen. It is very shy, and frequents thick shady woods, where it flies with rapidity. In its stomach were found only mice.

146. *TINNUNCULUS SPARVERIUS* (Linn.); Lawr. l. c. p. 207.

This little Hawk lives in the old church-towers and ruined buildings. It preys upon the small birds and young chickens which it finds in the cities. Generally one or two pairs may be found in every village. I have never seen it elsewhere.

147. [*HYPOTRIORCHIS FEMORALIS*.

In Dr. Cabot's collection from Yucatan.—*O. S.*]

148. *HYPOTRIORCHIS RUFIGULARIS* (Daud.).

Hypotriorchis aurantius, Lawr. l. c. p. 207.

149. *LEPTODON CAYENNENSIS* (Gm.).

♀, Izalam. Iris dark grey.

150. *ICTINIA PLUMBEA* (Vieill.).

Only two specimens of this fine Hawk were seen in Yucatan, and these were flying over the aguada near Tizimin. One was shot very high in the air, but the other, which was not within gunshot, escaped. Its flight is slow and with set wings whirling in easy and graceful turns.

151. *HERPETOTHERES CACHINNANS*, Vieill.

[In Dr. Cabot's collection.—*O. S.*]

152. *POLYBORUS CHERIWAY* (Jacq.)

Polyborus auduboni, Lawr. l. c. p. 207.

This Hawk is rather rare in Yucatan, only four pairs having been seen in the year. It is always seen in pairs.

[In Dr. Cabot's collection.—*O. S.*]

153. *CATHARISTES ATRATUS* (Bartr.).

[Not seen by me.—*O. S.*]

154. *FREGATA AQUILA* (Linn.).[In Dr. Cabot's collection.—*O. S.*]155. [*ARDEA RUFa* (Bodd.).*Demigretta rufa*, Lawr. *l. c.* p. 210.Also in Dr. Cabot's collection.—*O. S.*]156. [*ARDEA LUDOVICIANA*, Wils. ; Lawr. *l. c.* p. 210.]157. [*ARDEA CANDIDISSIMA* (Gm.).*Garzetta candidissima*, Lawr. *l. c.* p. 210.Also in Dr. Cabot's collection.—*O. S.*]158. *BUTORIDES VIRESCENS* (Linn.).

A very common species.

159. *CANCROMA COCHLEARIA*.

Taken at Rio Lagartos, where it is common and very tame.

160. *PLATALEA AJAJA* (Linn.).

The Ajaja is common at Rio Lagartos, where it may be seen in flocks of from four to twenty. Like the Flamingo, it is very tame and easily shot. Its Spanish name is *Chocolatera*.

[Not seen by me.—*O. S.*]161. *PHENICOPTERUS RUBER*, Linn.

These Flamingoes were taken at Rio Lagartos in June. They were in very beautiful plumage and very abundant. I think I have seen as many as three thousand at one time, at the mouth of the river, where the coast and river are lined every morning for many leagues.

[Not seen by me.—*O. S.*]162. *COLUMBA FLAVIROSTRIS*, Wagler.

“Ku-kut-keep.”

The Blue Pigeon is abundant in Eastern Yucatan, more rare in the west, where it has probably been much persecuted for its fine flesh, which forms a favourite dish among the natives. It is everywhere exceedingly wild and timorous.

163. *ZENAIIDA AMABILIS*, Bp.*Zenaidura yucatanensis*, Lawr. Ann. Lyc. N. Y. ix. p. 208.

[This seems to me to be identical with the West-Indian-Island species, as I cannot distinguish Mr. Gaumer's specimens from those from Cuba and Jamaica.—*O. S.*]

This Dove is quite common at Rio Lagartos, and occasionally seen at Progreso. From this I conclude that it is a common coast bird. I have never met with it more than one league inland. It is easily domesticated, and is found in many houses.

164. *MELOPELIA LEUCOPTERA* (Linn.) ; Lawr. l. c. p. 207.

This bird abounds in all parts of Yucatan. In the dry season thousands of them congregate in the vicinity of an aguada to drink. From ten o'clock until four they line the shore and are very tame ; at other seasons they are more solitary, and often very shy.

165. *CHAMÆPELIA RUFIPENNIS*, Bp. ; Lawr. l. c. p. 207.

This little Dove abounds in all parts, is quite tame, and often becomes half domesticated.

166. *LEPTOPTILA ALBIFRONS*, Bp.

Leptoptila fulviventris, Lawr. Ann. N. Y. Ac. Sc. ii. p. 287.

This bird is found in all parts of the State, and is generally quite shy. Though often seen searching for its food in the roads, it is more properly an inhabitant of the more lonely forests, where its cooing may be heard all day long in its own peculiar half sad, half cheerful tone. Its nest is built upon an inclined or falling branch of a tree, and is composed of a few small sticks to prevent the two small white eggs from falling to the ground. This bird is much prized for its flesh among the better sportsmen of Yucatan.

These Yucatan birds have the rufous tint of the underparts slightly darker than is usual in Guatemalan examples ; but the difference is too slight to be considered of specific value.

167. *CRAŶ GLOBICERA*, Linn.

A very shy bird, living far in the interior of uninhabited forests. Its walk is cautious and almost noiseless ; it is generally found in pairs, though the males often travel alone. It spends most of its time upon the ground, where it finds its food by scratching among the leaves. In the morning and evening it mounts upon the trees which bear its favourite fruit, to feast upon the best fruits of the forest. It ascends not by a single flight, but by short flights from limb to limb, until it reaches the fruit. While there it makes no noise ; but at every moment it listens for the approach of an enemy, which once discovered, it utters a short impatient cluck and flies away to a very great distance. The song resembles the deep distant bass roaring of the Tiger, or the gentle blowing in the bung-hole of a barrel. The flesh of this bird is highly valued as food ; but the bones are always carefully kept away from the dogs and cats, as they are said to be very poisonous. It is sometimes domesticated, though it rarely lives beyond a few months.

168. *PENELOPE PURPURASCENS*, Wagl.

The "*Cojolito*" (in Maya, "*Kosh*") is abundant only in certain localities. I know of but one forest in Yucatan (Yak-Jonat) where this bird is found ; but in this forest I think I have seen 800 or more. It is very shy, lives mostly upon the trees, where it feeds upon

fruit and flowers, as also, in times of scarcity, of fruit upon leaves and buds. On discovering a tree laden with its favourite fruit, it utters a loud yell, which is a signal for all the 'cojolitos' in the forest. In a moment, from every part of the forest come the yells of dozens of other individuals; and soon the tree is covered with these birds, and in a few minutes it is stripped of its fruit, and the cojolitos fly away to return no more. It has been my fortune twice to be beneath the tree when these birds were feeding. The first time I counted 84 birds in one hour and a quarter. The second time 51 birds were in the tree, when I shot and brought down eight. The flesh is eaten, though it is much darker and more solid than that of the Kambool.

[In Dr. Cabot's collection.—O. S.]

169. *ORTALIS VETULA*, Wagl.

Ortalida maccalli, Lawr. l. c. p. 209.

"Cha-cha-la-ca."

This bird spends most of its time in the trees, where it lives upon the fruit, flowers, and tender leaves. Its neutral green plumage renders it very difficult to spy out the bird. When disturbed it jumps to the ground to ascertain the nature of its danger, gives one or two long leaps, and again mounts upon a limb, from which it quickly flies from one branch to another until it escapes in the distance. In the male the trachea is wonderfully prolonged beneath the skin of the breast and abdomen almost to the anus, whence it returns and enters the chest at the proper place. With this great trumpet-like instrument the bird makes a peculiar noise, which may be heard at a league's distance. The song is harsh and sonorous, and never produced alone; but after each part the female, with a finer shriller voice, repeats it in such rapid succession, that it seems like one bird doing the whole. The usual time of singing is in the morning and evening, but it frequently sings at other hours.

[In Dr. Cabot's collection.—O. S.]

170. *ODONTOPHORUS LINEOLATUS*, Licht.

This bird is common in all the eastern forests, where it is much esteemed for its fine flesh and as a household pet. As a pet it is not a success, living but a few months in confinement. Like the Quails, this bird lives upon the ground, where it is always seen in pairs. At nightfall it sings a very pretty song, beginning with a low whistle, which is three times repeated, each time with greater force; then follow the syllables *che-va-lieu-a* repeated from three to six times in rapid succession. The tone is musical, half sad, half persuasive, beginning somewhat cheerful, and ending more coaxingly. From its colour and its habit of remaining immovable while one is passing, this bird is somewhat difficult to see. I have frequently seen this bird squatting close to the ground while I passed within a few feet of it. It seldom flies, and never flies far when compelled to take wing.

171. *ORTYX NIGROGULARIS*, Cabot.

Ortyx nigrogularis, Cabot, in Stevens's Trav. in Yucatan, i. App. p. 474; Pr. Bost. Soc. N. H. i. p. 151.

Chablé. Always seen in flocks or in pairs, sometimes in the darkest forests, but more usually in corn-fields. The flesh of this bird is delicious.

[In Dr. Cabot's collection.—*O. S.*]

172. *MELEAGRIS OCELLATA*, Cuv.; Cabot, Pr. Bost. Soc. N. H. i. p. 73; Bost. Journ. N. H. iv. p. 246.

In Maya, "Kutz."

The Spanish name of this bird is *Pavo del Monte*. It is occasionally seen within five leagues of Merida, but cannot be said to be common west of Espita. East of Espita it is often seen in the corn-fields in small flocks of from six to ten. I have recently discovered a locality, ten leagues to the north and east of Valladolid, where it may be said to be common. This is the region depopulated since the emigration of the Indians nearly half a century ago; no one lives there now, and the *Meleagris* is the proud ruler of the forest. It is one of the wildest and shiest of birds, extremely cautious in its movements, and ever on the alert for a hidden enemy; it flies with the greatest rapidity at the sight of man, regardless of distance. When met with in open land it takes flight, rising with a heavy flutter peculiar to the family, and after mounting a few yards sails away with set wings to such a distance that the hunter never cares to follow. During the breeding-season, which is in May and June, the male makes a peculiar drumming noise, very deep and sonorous; after this he utters his peculiar song, which resembles the rapid pecking of a distant Woodpecker or the song of the great Bull Toad. On discovering a dreaded object, he utters a peculiar cluck and glides away with a proud movement, which seems to defy the world; and if the object moves, he darts away with headlong speed. The natives believe that this bird sees the image of its enemies in its plumage even before they are visible to the eye of the bird. However this may be, it is a bird of extraordinary caution and vision. Its flesh is held in the highest esteem by the natives, who hunt it unceasingly on this account. In Merida a specimen sells from \$1 to \$2 dressed; and from \$8 to \$1 when alive. It is not easily domesticated, and rarely lives more than a few months.

Mr. J. Gaumer has sent me a very fine series of this species, both sexes, in all sorts of plumage. At my request he also sent me some fresh eggs, which I gave to a hen for hatching, but the result was *nil*. I strongly recommended him to procure birds alive and bring them to Europe, but he has not been able to do so.

[In Dr. Cabot's collection.—*O. S.*]

173. *GRUS FRATERCULUS*, Cass.

Only one seen in Yucatan. This specimen was shot at an aguada near Tizimin in March.

[Not seen by me.—*O. S.*]

174. [ARAMIDES AXILLARIS, Lawr.

In Dr. Cabot's collection from Las Bocas de Silan.—O. S.]

175. [ARAMIDES ALBIVENTRIS, Lawr.

In Dr. Cabot's collection from Las Bocas de Silan.—O. S.]

176. PARRA GYMNOTOMA, Wagl.

Very common everywhere near the lakes.

177. [HIMANTOPUS NIGRICOLLIS.

In Dr. Cabot's collection.—O. S.]

178. CALIDRIS ARENARIA (Linn.); Lawr. *l. c.* p. 210.

Common at Progreso.

179. STERNA MAXIMA, Bodd.

Very abundant on the coast.

180. RHYNCOPUS NIGRA, Linn.

Very common on the coast, where many thousands of these birds may be seen at any time at the mouths of the rivers.

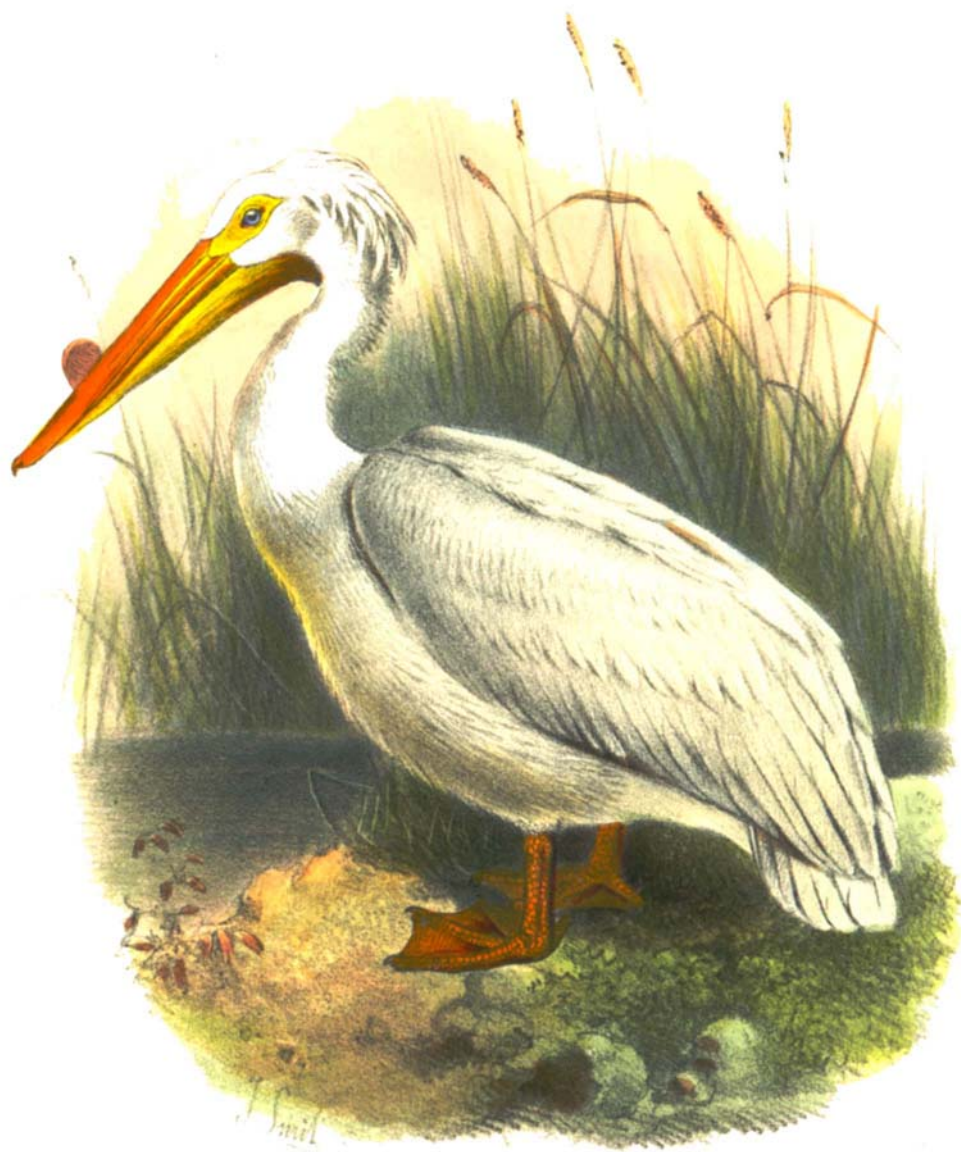
181. CRYPTURUS SALLÆI, Bp.

"Perdiz" (Spanish name).

The Perdiz is common in most parts of Yucatan, and very abundant in the east. Its flesh is highly prized for food, being very fine and savoury. In the dry season this bird may often be seen in great numbers drinking water at the aguadas, and along the roadsides in the heat of the day, where it is easily shot. It is the sport of the boys of the ranchos to go out at 4 p.m. with stones to kill Perdizes; and those who aim well rarely return unrewarded. It is never seen upon the trees, but is a good runner, rarely taking wing, except when hard pressed. Its song is a single, loud, short, flute-like whistle, uttered at intervals of one or two minutes in the morning and evening. This bird is found domesticated in many houses; it is said to rid the premises of the dreaded Alacranes (scorpions).

[In Dr. Cabot's collection.—O. S.]

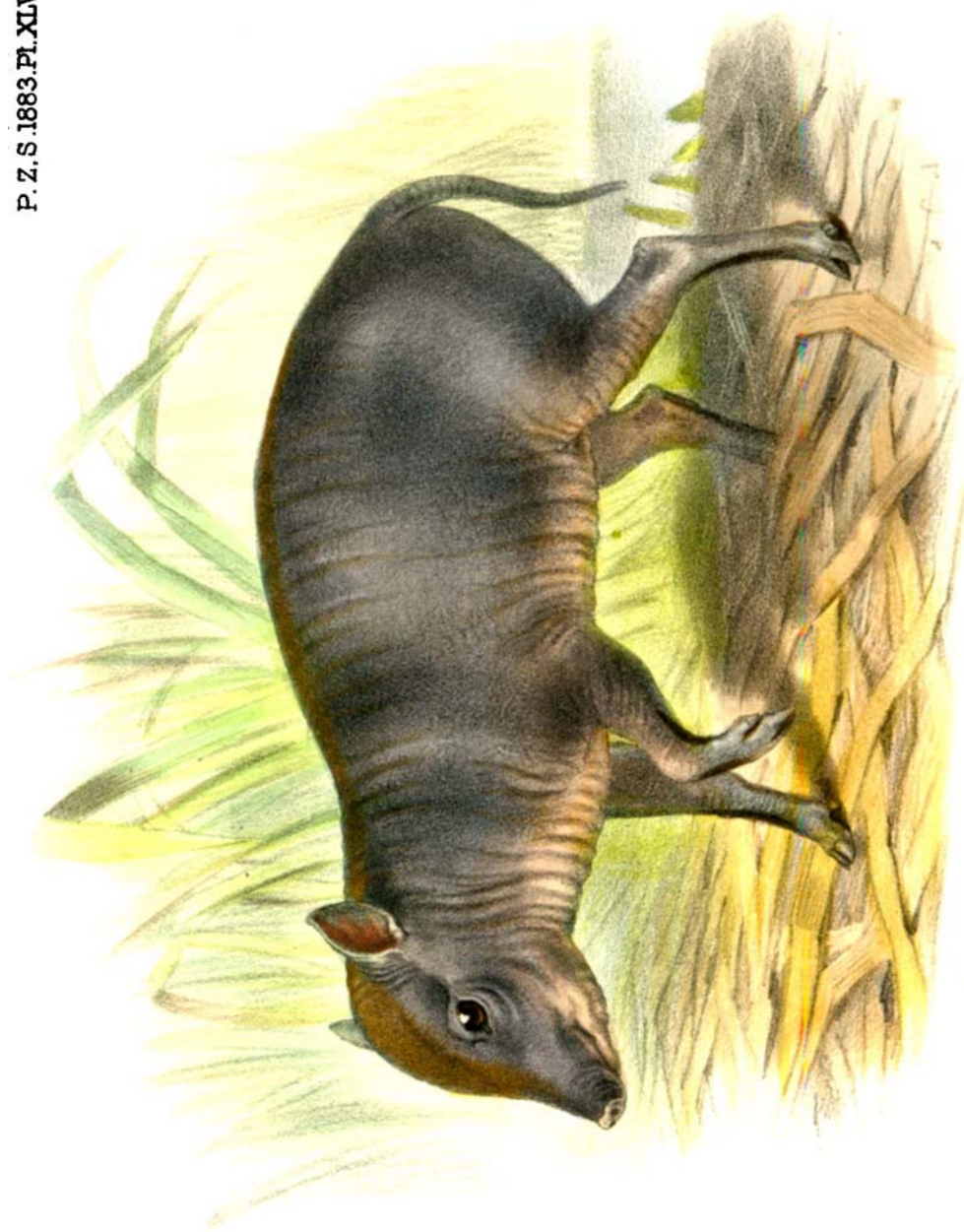
P.Z.S. 1883. PLXLVI.



J.Smit lith.

Hanhart imp

PELECANUS TRACHYRHYNCHUS.



J. Smit lith.

BABIRUSSA ALFURUS.
(YOUNG)

Heinart imp.

November 20, 1883.

Prof. Flower, LL.D., F.R.S., President, in the Chair.

The Secretary read the following reports on the additions made to the Society's Menagerie during the months of June, July, August, September, and October, 1883:—

The total number of registered additions to the Society's Menagerie during the month of June was 177, of which 39 were by birth, 52 by presentation, 48 by purchase, 8 by exchange, and 30 were received on deposit. The total number of departures during the same period by death and removals was 122.

The following are of special interest:—

1. A fine young female Ourang-outang (*Simia satyrus*), presented by J. M. Vermont, Esq., of Batu Kawan Estate, Penang, June 7th. Mr. Vermont informs me that this animal, which is in fine condition, and appears to be just changing its teeth, was captured in Acheen, Sumatra.

2. A fine King Penguin (*Aptenodytes pennanti*), brought home from the Falkland Islands, and presented by R. C. Packe, Esq., June 14th.

3. A Cape Ant-Bear (*Orycteropus capensis*), purchased June 25th. This animal is apparently in excellent condition, and seems likely to do well.

The registered additions to the Society's Menagerie during the month of July were 139 in number; of these 72 were acquired by presentation, 22 by purchase, 2 by exchange, 27 by birth, and 16 were received on deposit. The total number of departures during the same period by death and removals was 93.

The most noticeable additions during the month were:—

1. A Rough-billed Pelecan (*Pelecanus trachyrhynchus*), from Mexico, purchased July 3rd, being the first example of this species which we have received.

The bird, of which I exhibit a coloured sketch by Mr. Smit (Plate XLVI.), was in full breeding-plumage on its arrival, and bore on its culmen the characteristic knob which distinguishes the species; this knob has been since shed.

2. A male and two female Babirussas (*Babirussa alfurus*), from Celebes, presented by Dr. F. H. Bauer, C.M.Z.S., and received July 23rd.

One of the female Babirussas produced a young one shortly before the termination of the voyage home, which has reached England safely in company with its mother.

I exhibit a coloured drawing of this little animal, by Mr. Smit (Plate XLVII.). It will be observed that the young Babirussa is nearly uniform in colour, and does not exhibit any of the stripe-marks which usually distinguish the immature forms of the Suidæ.

The total number of registered additions to the Society's Menagerie during the month of August was 138; of these 54 were acquired by presentation, 44 by purchase, 11 by birth, 7 by exchange, and 22 were received on deposit. The total number of departures during the same period by death and removals was 88.

The following are of special interest :—

Two young Mule Deer (*Cariacus macrotis*), born in the Gardens, August 12th, from the specimens presented to the Society by Dr. J. D. Caton, C.M.Z.S.

This is believed to be the first instance of the breeding of this fine American Deer in Europe.

The total number of registered additions to the Society's Menagerie during the month of September was 109; of these 65 were acquired by presentation, 26 by purchase, and 18 were received on deposit. The total number of departures during the same period by death and removals was 92.

The total number of registered additions to the Society's Menagerie during the month of October was 146, of which 11 were by birth, 60 by presentation, 38 by purchase, 3 by exchange, and 34 on deposit. The total number of departures during the same period by death and removals was 88.

The following are of special interest :—

1. Four Ural Phrynocephales (*Phrynocephalus helioscopus*), from the eastern shores of the Caspian Sea, presented by Dr. A. Strauch, F.M.Z.S., October 6th. These interesting Lizards are new to the Society's Collection.

2. A young female Chimpanzee, purchased October 24th, which seems perhaps referable to the form named by M. Du Chaillu *Troglodytes calvus* (Proc. Boston Soc. of Nat. Hist. vol. vii. p. 296). The head is very sparingly covered with hairs, the ears are longer and more prominent than in the ordinary Chimpanzee, and the hands and feet are black.

The Secretary also called attention to the opening of the Society's New Reptile House which had taken place on Saturday, 4th August last, and explained the mode in which the specimens had been arranged in the new building.

The large cases on the north side had been assigned to the Boas and Pythons, those on the west to the Venomous Snakes, and those on the east to the Colubrine Snakes. The Lizards and smaller objects were mostly arranged in the small glass cases along the south front.

It was proposed to add, next spring, a special collection of British Reptiles and Batrachians, which could be conveniently placed in the porch of the building.

The Secretary read a list of the Reptiles and Batrachians living in the Society's collection on October 1st, showing a total of 211 specimens of the former and 51 of the latter class.

The Secretary took this opportunity of calling attention to the increase in size and weight of the young male African Elephant (*Elephas africanus*) which had taken place during the past year. When purchased in July 1882 this animal was 4 feet in height, and weighed 7 cwt. 0 qrs. 4 lb. On the 8th October last the height was found to have increased to 4 feet 11 inches, and the weight to 13 cwt. 2 qrs.

A letter was read from Mr. G. B. Sowerby, Junr., relating to his paper on five new species of Shells read before the Society on the 16th January, 1883.

Mr. Sowerby proposed to change the name of *Thracia jacksonensis* given in this paper (see P. Z. S. 1883, p. 30) to *Thracia brazieri*, the former name having been previously given to another species described in the 'Journal of the Linnean Society' by Mr. Edgar A. Smith.

The Secretary read the following extract from a letter addressed to him by Mr. W. H. Ravenscroft, dated Colombo, 6th July, 1883:—

"I have lately noticed a fact new to me, though possibly well known to students of natural history, in regard to the Spotted Deer as it is called here (*Cervus axis*). We have five or six in an enclosure near the house; and a short time since one of the does gave birth to a fawn. On the second day after the birth I noticed, at about 4.30 in the afternoon, that the doe was quietly feeding by herself, and that the fawn was nowhere within sight. I went into the enclosure to search, and took five or six servants with me; we carefully hunted the ground within the enclosure, about a quarter of an acre, which is bare of any bushes except at one end, where there are a few clumps of cinnamon bushes and one biggish tree; we also hunted the ground outside the enclosure, as I thought that possibly the fawn might have got out through the fence, as it might readily have done. The search, however, was entirely fruitless. Next morning the fawn was with its mother. I set a man to watch; and one afternoon he told me that he had watched the doe and fawn into the bushes, and that the doe alone came out. It would seem that the doe put the fawn to bed every afternoon, for about eight or ten days, at about 4.30 P.M., and hid it so successfully that though I knew within a few feet the place in which it was, I never succeeded in finding it."

The Secretary exhibited, on the part of Major C. H. T. Marshall, F.Z.S., a specimen of a new Impeyan Pheasant from Chumba, N.W. India, which Major Marshall was shortly intending to describe under the name of *Lophophorus chumbanus*: also a partial albino of *Lophophorus impeyanus*, and two other skins of males of the same species in interesting stages of plumage.

Mr. H. E. Dresser, F.Z.S., exhibited and made remarks on some Ringed Pheasants from Corea, which appeared to be intermediate between the Chinese Pheasant (*Phasianus torquatus*) and the Formosan form of the same bird.

Mr. Seebohm exhibited an example of a new species of Owl from Yezo, the north island of Japan, which he proposed to call *Bubo blakistoni*. It was most nearly allied to *B. coromandus* from North India, which it resembled in general style of coloration; but was much larger, and had the toes entirely bare of feathers, thus forming a link between the genera *Bubo* and *Ketupa*.

Prof. F. Jeffrey Bell, Sec. R.M.S., exhibited some specimens of a small undescribed species of ten-armed *Antedon* from the neighbourhood of Port Stephens, which had been placed in his hands by Mr. E. P. Ramsay. These were remarkable for the large number of egg-cases on them, which, at first sight, closely simulated the parasitic *Myzostomata*.

The following papers were read :—

1. On the Characters and Divisions of the Family *Delphinidæ*.

By WILLIAM HENRY FLOWER, LL.D., F.R.S., Pres.
Zool. Soc., &c.

[Received November 10, 1883.]

In few groups among the higher animals has our knowledge made greater advances during the last twenty years than in the Cetacea. The materials for their study contained in our museums have considerably increased, and the literature devoted to them has expanded to a great extent. Many valuable and solid contributions have been made to the knowledge of the anatomy of various species and groups, contributions which will always remain as fixed points gained, from which no retreat will ever be required. There has also been a great amount of imperfect and hasty compilation, and attempts at systematizing, based upon erroneous conceptions of affinities and imperfect anatomical knowledge, which have thrown a haze over the subject, often most difficult to penetrate.

Only two attempts have been made during this time by original workers of recognized authority, who have had ample materials at their disposal, to assemble together the main facts bearing upon a general revision of the classification and nomenclature of the genera and species of the group. It is to these two that all who commence the study of the Cetacea have to look for guidance.

1. The magnificent work of Van Beneden and Gervais¹. This professedly only treats of the osteology of the Cetacea, but other parts of the subject are necessarily included, if only incidentally. Splendid and valuable as are the illustrations, and full as are the descriptions of the skeletal characters, the zoological portion of the work is by no means so thorough and exhaustive as might be wished. Perhaps intentionally, owing to the difficulties of the subject, and the still insufficient state of knowledge, there is a vagueness about the classification and nomenclature used which is often disappointing to those who hope to find an authoritative statement upon these subjects from authors of such eminence. Owing to the lamented death of Professor Gervais (who had undertaken the portion of the work containing the Odontocetes) having occurred before his task was completed, the group to which the present notes chiefly relate, the true Dolphins, which occupies the last part of the work, is the least satisfactory in its mode of treatment.

2. The other work, which has exercised a still wider influence upon the state of knowledge of the zoology of the Cetacea, is the Catalogue, with its Supplement, of the specimens in the British Museum by the late Dr. J. E. Gray, based upon his famous memoir on the Cetacea, comprised in the Zoology of the Voyage of the 'Erebus' and 'Terror' (1846), and on a series of memoirs which have appeared at different times in the Proceedings of this Society. Of Dr. Gray's extraordinary energy in collecting specimens and in bringing together from all available sources the references which make his works so useful, and also of his acute perception of minute distinctions apt to be overlooked by an ordinary observer, I cannot speak without praise; but unfortunately his tendency to multiply divisions and impose names almost at random, his want of accuracy in description, and his defective anatomical knowledge, are exhibited in his writings on this group in their fullest development. Individual peculiarities, or such as are the effects of immaturity (as in *Benedenia*, *Meganeuron*, &c.), or of accidental mutilation (*Sphærocephalus*), or of mistaken impressions gathered from imperfect photographic representations (*Macleayius*), are made the foundations of generic distinctions, which are maintained in successive catalogues and lists, notwithstanding the exposure of the errors upon which they were based. Specimens between which no one else finds any specific distinction are placed in different genera, as *Megaptera longimana* and *Poesecopia lalandii*, *Sibbaldius borealis* and *Rudolphius laticeps*, *Kogia macleayi* and *Euphysetes grayi*, *Hyperoodon butzkopf* and *Lagenocetus latifrons*, *Leucopleurus arcticus* and *Electra acuta*, and many others. Even the same individual specimen occurs twice over in the same list in two different genera, as in the case of *Grampus affinis* and *Globiocephalus affinis*, both founded upon one skull in the Museum of the College of Surgeons.

¹ 'Ostéographie des Cétacés vivants et fossiles, comprenant la description et l'iconographie du Squelette et du Système dentaire de ces animaux ainsi que des documents relatifs à leur histoire naturelle,' par MM. Van Beneden et Paul Gervais. 1 vol. quarto; and Atlas of 64 plates, folio. Paris 1869-1880.

Yet in default of any other convenient systematic work, Dr. Gray's Catalogue is constantly referred to, and his names and views of affinity are becoming so deeply rooted in zoological literature, that it appears time that an attempt should be made to supply something upon a more scientific basis, at all events to afford those who have not the means of examining the original types, upon which the Catalogue was mainly founded, some idea of what these types really are, and of the extent to which his divisions seem justified by the facts upon which he based them.

In the present communication I have confined myself to the family *Delphinidæ* as defined in the article MAMMALIA in the 'Encyclopædia Britannica,' vol. xv. p. 398 (1883), or the Toothed Whales, which remain after separating the *Physeteridæ* (containing the Cachalots and the Ziphioids), and the three aberrant genera *Platanista*, *Inia*, and *Pontoporia*. This family is a perfectly natural one, containing a very large number of species, the main outlines of whose anatomical structure are essentially alike, but which present numerous modifications in small details. Among them there are certain forms, easily separated by well defined characters, and of which the structure is sufficiently known to permit of their being definitely characterized as forming divisions which may be considered as of generic value. These are *Monodon*, *Delphinapterus*, *Phocæna*, *Neomeria*, *Orcella*, *Orca*, *Pseudorca*, *Globiceps*, *Grampus*, and perhaps *Feresa*, of which the skull only is at present known. After the separation of these, there is still a large residuum of species, too heterogeneous to constitute a single genus, but never yet satisfactorily divided into natural groups, unless the fifteen generic and subgeneric divisions of Dr. Gray's final revision contained in the 'Supplement to the Catalogue of Seals and Whales in the British Museum' (1871) can be considered as such.

It is to this residuum of the Dolphins, which in the article in the 'Encyclopædia' above referred to is left in the old genus *Delphinus* in preference to adopting divisions the value of which at that time I had not had the opportunity of testing, that I have mainly addressed myself in the present communication. For this purpose I have made as full an examination as the time at my disposal afforded of all the specimens in the British Museum, including the types of all Dr. Gray's genera and species, as also of those in the Museums of Paris, Leiden, the Collège of Surgeons of London, Cambridge University, and in several minor collections.

The collections now being made in America I have had unfortunately no opportunity of examining personally, except in so far as they are represented in the United-States department of the International Fisheries Exhibition of the present year; but I am greatly indebted to the kindness of the Commissioners for the facilities they have afforded me in studying these, and in comparing them with European specimens.

I am very far from thinking that the result of this examination has led to any thing like a complete knowledge of even the main outlines of the classification of this difficult group. Even for a

study of the characters of the known species the materials at present available are very insufficient, and doubtless there are many species still to be discovered. I trust, however, that something will have been done to clear the way for future work ; at all events I have avoided adding to the existing confusion by introducing a single new name. It seems to be the rule with some zoologists to assume that any newly found individual, especially if in a new locality, belongs to a new species, to name it, and to leave for others to prove its identity with already described forms. The opposite view, that a species should not be considered distinct unless some definable and tangible character can be shown in which it differs from others, appears to me to be preferable, and therefore, following Prof. Van Beneden, the highest living authority on the Cetacea, I have abandoned the old assumption, upon which so many new species were founded, which limited the geographical area of each species to a small and circumscribed portion of the ocean, and placed imaginary barriers to its distribution where none really existed.

Species founded upon osteological characters alone are, of course, not of the same value as those based upon a full knowledge of the external characters, habits, &c. Probably many sections which among other groups of animals we should call distinct species are united by this method ; but still, when the only certain information we possess of their structure is derived from their bones, as in the case of so many Cetaceans, no other course can be followed. It is, however, not so much to specific distinctions that this research has been directed, as to discover the mutual relations of the different modifications of the Dolphin type to one another, and their association into groups which may be considered (following the custom adopted in the arrangement of other groups) of generic value.

It will be necessary to precede the examination of the special groups by some preliminary observations applicable to all, upon variations of form depending upon age, sex, and individual peculiarity, the study of which has been hitherto too much neglected, and of which our knowledge is unfortunately still imperfect.

In all Dolphins the form of the skull alters considerably with age, the rostrum or beak becomes larger in older animals, being both longer and wider in proportion to the brain-case. The teeth become actually larger, in consequence of a more considerable portion of the broad base of the crown rising out of the alveolus as the slender apex wears away, and they become more distant from each other through the growth of the maxillary bones.

Thus the proportions of length and width of beak, and number of teeth in a given space (so much used by Gray to distinguish species) cannot be relied upon, except in comparing *perfectly adult* animals ; and when the skull alone is present, it is extremely difficult, if not impossible, to tell the relative age of the individual, as, contrary to what takes place in many other mammals, the sutures of the cranium close very early in Dolphins. Even of the basilar suture, which in Seals for instance is only united in old age, no traces are left in Dolphins about three-quarters grown, and in which the

epiphyses are all free on the vertebræ and the bones of the limbs, and of which the carpus is but very imperfectly ossified. Want of appreciation of this circumstance has led to many errors in the discrimination of the species of this group.

Sex also appears to exercise an important influence upon the form of the skull, although very little attention has hitherto been paid to this important question, owing chiefly to the difficulty of obtaining a sufficient number of adult specimens of which the sexes are known. Fischer¹ has, however, recently published some extremely interesting observations upon the sexual differences of the skulls of two of the species most frequently met with on the French coast, differences which will probably be also found in other members of the group. In *Delphinus delphis* he found that in the male the rostrum is more elongated, more regularly tapering forwards, and less dilated in its middle portion. The external borders of the intermaxillaries are subparallel to the corresponding borders of the maxillaries. The crests of the cranial bones are more elevated, the temporal fossa more ovoid, and the whole cranium rather higher. In the females the rostrum has a more triangular form, the triangle of the intermaxillaries is more dilated at its base, the apex of the rostrum is less slender, the temporal fossa is broad and rounded.

In *Delphinus tursio* corresponding differences were observed. In the males the rostrum is longer and relatively narrower; the intermaxillaries are more prominent and convex, especially in their posterior half; in this region the external border of the maxillaries is almost parallel to the corresponding portion of the intermaxillaries; the crests of the cranium are more elevated, and less sloping laterally. The heads of the females are remarkable for the breadth of the rostrum at its base and its middle part; the rostrum consequently has a more triangular form; the intermaxillaries are more flattened; the external border of the posterior portion of the maxillaries is not parallel to the external border of the intermaxillaries, but it has a rounded projection outwards. The cranium of the female is relatively a little broader than that of the male; its height is the same in the two sexes. The mandible is a little more elongated in the male.

Such differences as these are, it will be observed, quite as great as many upon which Dr. Gray has founded distinct species.

No dependence can be placed upon the exact number of the teeth in discriminating species. In the first place there is often a great difficulty in counting the teeth of the skulls met with in museums, as, especially in those species in which they are numerous, they become extremely small at the ends of the series, particularly in front, and are often lost or concealed in the gum. And when circumstances permit of their exact enumeration, variations in number are often met with, even in different sides of the same jaw. The range within which the numbers may vary in a single species has been recorded by Fischer, in the memoir cited above, in *Delphinus delphis*, and will be referred to again when speaking of that species.

¹ "Cétacés du Sud-Ouest de la France" (Actes de la Société Linnéenne de Bordeaux, t. xxxv. 1881).



Fig. 1. Posterior part of the osseous palate of *Globiceps melas*, showing a very general arrangement of the pterygoid bones in the *Delphinidæ*. *mx.* maxillary bone; *pal.* palatine bone; *pt.* pterygoid bone; *r.* its reflected inferior lamina, enclosing the great post-palatine air-sinus, the opening into which is *o.* This and all the following figures are drawn one third of the natural size.



Fig. 2. Posterior part of osseous palate of *Phocæna communis*. The pterygoid bones are comparatively little developed and far apart. A portion of the vomer, of irregular form, is seen in the middle line, behind the palatine bones. Though generally present, this bone varies considerably in form and extent in different individuals.

In the same memoir are also valuable observations upon the differences observed in the number of the vertebræ and ribs, as well as in the external coloration of different individuals, which deserve careful consideration, and as opportunities occur further development and corroboration.

Besides the usual distinctive characters derived from the length and form of the rostrum and the number and size of the teeth, the condition of the pterygoid bones, though hitherto much neglected, seems to me one of great importance in separating the different



Fig. 3. Palate of *Delphinapterus leucas*. The pterygoid bones are widely separated in the middle line, and of comparatively simple form, the air-sinus between their laminae being very little developed.

groups of Dolphins. The remarkable involution of this bone, by which it encloses a large air-sinus opening behind between the outer and inner laminae (see fig. 1), is peculiar to the family *Delphinidæ*, and is possessed by all its members. Sometimes, in what may be considered the most typical forms (as in *Delphinus* as now restricted (fig. 9), *Tursio* (fig. 5), *Steno* (fig. 6), &c.), the bones are large, and come into apposition in the middle line by straight surfaces of considerable extent. In others, as *Phocæna* (fig. 2), *Monodon*, *Delphinapterus* (fig. 3), they are small and widely separated, having the posterior apex of the palatine bones wedged in between them in front and a

wide open space behind. Between these forms are several intermediate conditions.

After the separation of the genera named on p. 468, it is possible to discriminate among the remainder at least seven distinct types, apparently worthy of generic designation, the characters of which will now be considered.

CEPHALORHYNCHUS.

Cephalorhynchus, Gray, Cat. Cetacea Brit. Mus. p. 106 (1850).

This name may be applied to a group of small-sized Dolphins, which appear to be characterized externally by an obtusely triangular (not falcate) or rounded dorsal fin, small, ovate, or oblong pectoral fins, and rather short rounded snout without groove separating a distinct beak. Both externally and in some of their osteological characters they resemble the members of the genus *Phocæna*.

In the skull the rostrum scarcely exceeds half the entire length, is broad at the base, and gradually tapering, with convex lateral

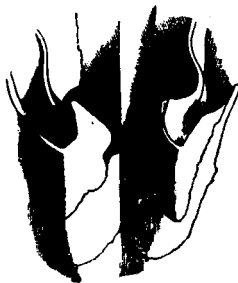


Fig. 4. Palate of *Cephalorhynchus heavisidii*¹.

borders. The palate is smooth, that is, without the deep, lateral, longitudinal grooves characteristic of the genus *Delphinus* as now restricted. The pterygoid bones are short and separated from one another by a considerable interval. The outer edges of the premaxillæ form a prominent elevated ridge on each side of the anterior end of the narial aperture. The upper surface of the rostrum itself is very smooth, and evenly rounded from side to side, the surface of the premaxillæ in this region being flat and not distinctly elevated above the maxillæ. The teeth are small (less than 3 millims. in diameter²), 25 to 30 in number in each side of each jaw. Vertebræ: C. 7, D. 13, L. 15, C. 30 or 31; total 65 or 66.

The type and best known species of this group is that described by Gray (from a stuffed specimen formerly in the Museum of the College of Surgeons, now in the British Museum), in the 'Spicilegia Zoologica' (p. 2, 1828) under the name of *Delphinus heavisidii*. It

¹ This figure is from the "Ostéographie des Cétacés" of Van Beneden and Gervais, pl. xxvi. fig. 1 A. All the others are from specimens in the Museum of the Royal College of Surgeons.

² This measurement is in the antero-posterior direction, at the base of the crowns of the largest teeth in the middle of the series.

is from the Cape of Good Hope, and is about 4 feet long, with rather a peculiar distribution of colours, the greater part of the surface being black, but with very distinct "white markings beneath, consisting of a transverse band in front of, and a triangular spot behind each of, the pectoral fins; and of a longitudinal line on the belly, which separates just beneath the dorsal fin into three equal forks, the central one of which is continued in its direct course, while the lateral ones extend obliquely up the sides."

These colours are no longer to be distinguished upon the specimen. The dorsal fin is low and triangular, its base measuring $6\frac{1}{2}$ inches, its height 3, its anterior edge 5, and its posterior edge 4 inches; the latter is nearly straight. The caudal fin is of a crescentic form, not deeply excavated in the middle behind. The pectoral fins are small, and rather ovate than falcate in form.

Two skeletons referred to this species, both from the Cape, are contained in the Leiden Museum, and there is one at Oxford; there are also a skeleton and four skulls at Paris; but it is at present not represented by osteological specimens in the British Museum.

The vertebral formulæ of these skeletons are as follows:—Leiden, No 1—C. 7, D. 11 (two pairs of ribs probably lost), L. 18, C. 29=65. Leiden, No. 2—C. 7, D. 13, L. 15, C. 30=65. Oxford—C. 7, D. 13, L. & C. 46=66. Paris (according to Gervais), C. 7, D. 12, L. 17, C. 26=62 (probably not complete). The skeletons appear all to be those of rather young animals, and are all between 4 feet and 4 feet 2 inches long. The skulls vary in length from 270 to 293 millim. The numbers of the teeth of the different individuals are $\begin{smallmatrix} 28 & 27 & 29 \\ 25 & 26 & 29 \end{smallmatrix}$ and $\begin{smallmatrix} 30 \\ 30 \end{smallmatrix}$. Of the four skulls in the Paris Museum now assigned to this species, and which certainly appear alike, one has no locality; one is from the Cape and is marked "*D. capensis*, F. Cuvier, Dussumier, 1827;" one is "Des mers de la Nouvelle Zélande, 1841, Hombron;" and the fourth from "Otago (Mr. Hutton), Voyage de M. Filhol."

As the skull remains concealed in the skin of the type of this species, now in the British Museum, I do not know the reasons for which these skeletons and skulls were originally referred to it, but, judging by what can be seen of the teeth of that (probably young) individual, there seems no need to doubt the identification.

In the 58th part of the 'Histoire Naturelle des Mammifères,' bearing the date of September, 1829, Fréd. Cuvier describes and figures the external characters of a Dolphin brought from the Cape of Good Hope by M. Dussumier. In general form and size, and in the characters of the dorsal fin, it bears a considerable resemblance to Gray's *D. heavisidii*; but its colour is said to be entirely black, except a white spot (not shown in the figure) on each side. The name of "Marsouin du Cap," *Delphinus capensis*, is assigned to it¹. I presume it is to this specimen that the skull in the Paris Museum marked "*D. capensis*, F. Cuvier, Dussumier, 1827," but now assigned to *D. heavisidii*, belongs. The same animal appears in

¹ This is not the *D. capensis* of Gray's 'Spicilegia Zoologica,' p. 2 (1828).

F. Cuvier's 'Histoire Naturelle des Cétacés' (1836), at p. 158, under the name of *D. cephalorhynchus*. It does not appear that an animal having exactly the coloration ascribed to this individual has been met with again; and as, allowing for imperfections of the drawings, it agrees very closely in form with *D. heavisidii*, it may be considered as only a variety (perhaps melanism) of that species.

A full and accurate description of a Dolphin, of which the skin was brought from the Cape of Good Hope by M. Verreaux, is quoted by Fréd. Cuvier (*op. cit.* p. 161), from a manuscript by M. Quoy, under the name of *D. hastatus*. Cuvier recognizes its identity with Gray's *D. heavisidii*, but does not adopt the name, although it clearly has the right of priority as to publication. In the same chapter in which he quotes Gray's 'Spicilegia' (published eight years before), he says:—"Voici la description manuscrite que nous trouvons de la main de M. Quoy, et que nous ne sachions pas avoir été publiée."

With the same disregard for priority, Rapp ('Die Cetaceen,' p. 37, 1837) has the species *Delphinus hastatus*, Fr. Cuvier, giving *D. heavisidii*, Gray, and *D. capensis*, Dussumier, as synonyms. His figure is from a specimen in the Museum of Stuttgart, and is an improvement upon that of Gray, except perhaps as to the form of the head and mouth. The colouring, well shown in the figure of the under surface (plate iii. fig. B), agrees exactly with the descriptions of Gray and Quoy.

A better figure of unquestionably the same animal, from a drawing by Castelnau, has been given by Van Beneden (Bull. de l'Acad. Roy. de Belgique, 2me sér. t. xxxvi. No. 7, juillet 1873) under the erroneous name of *Orca capensis*, Gray, although its specific identity with *Delphinus heavisidii* and *D. hastatus* is admitted.

In a valuable paper on the "Whales and Dolphins of New Zealand," published in the Transactions of the New-Zealand Institute for 1872, vol. v. (1873), Dr. Hector describes the external and some of the osteological characters of a Dolphin, apparently one of the commonest in the seas around New Zealand, under the name of *Electra clancula*, upon the supposition that it was identical with the *Lagenorhynchus clanculus* (afterwards *Electra clancula*) of Gray, described from a skull alone. The vagueness of Dr. Gray's description may be a sufficient excuse for this determination; but it was altogether an erroneous one, as it is evident that the New-Zealand animal is not an *Electra* or *Lagenorhynchus* at all, but belongs to a totally different group of the family. The figure of the under surface of the skull (Trans. N.-Z. Inst. vol. ix. pl. xi.) shows the separated and diverging pterygoid bones, and all the characters of the present section. Unfortunately the numbers of the vertebræ are not given.

In size the animal differs little from *C. heavisidii*, fifty-one inches being given as its length. Hutton (Trans. N.-Z. Inst. ix. p. 350) gives four to five feet. The slight sketch of the external form given by Hector (which Hutton characterizes as "not good") shows considerable similarity to the previous figures of *D. heavisidii*, but

is peculiar in the deep indentation between the lobes of the caudal fin, and especially in the dorsal fin being rounded in outline, unlike that of any other known Cetacean, but rather resembling the adipose fin of a Salmon on a large scale. Hutton simply describes the dorsal fin as "truncated." Both Hector and Hutton describe the distribution of the white markings on the black surface as in *D. heavisidii*, but with this striking difference, that in the New-Zealand animal the "nose and forehead is pure white," bounded by a crescent of black behind the blowholes. The teeth also appear to be more numerous, being usually 31 and sometimes 32 on each side of each jaw. A statement made by Dr. Hector that "the cervical vertebræ are ankylosed into a solid mass, 1·3 inch in length," is also very important, but requires elucidation and confirmation.

An important contribution to our knowledge of the animals of this group has been lately made by the publication by Van Beneden (Bull. de l'Acad. Roy. de Belgique, 3me sér. t. i. no. 6, juin 1881) of a description and figure of the external characters, with osteological details, of a "Nouveau Dauphin de la Nouvelle-Zélande," which, misled by Hector's identification of the common *Cephalorhynchus* of the seas around that land with Gray's *Electra clancula*, he has named *Electra hectori*. But the description of the skull, the form of the pterygoid bones (a drawing of which Prof. Van Beneden has most obligingly sent me), and especially the number of the vertebræ, show that it is widely removed from the *Lagenorhynchi*, and must enter into the group of *Cephalorhynchi*. In fact Van Beneden says that "la tête est parfaitement conformé à celle qui est représentée sous le nom de *Cephalorhynchus heavisidii* ('Ostéographie,' Atlas, pl. xxxvi. fig. 1)." He further states:—"Si nous comparons le dessin du crâne et du corps avec les figures publiées par M. James Hector sous le nom de *Electra clancula*, nous trouvons une similitude presque complète avec cette espèce: le crâne offre exactement la même conformation et les dents se correspondent par le nombre comme par la forme." The dorsal fin has almost exactly the same rounded form, though with less elevation, and the caudal fin the same deep indentation between the widely divaricated lateral lobes. The coloration appears only to differ in the upper and anterior part of the head and beak being black instead of white, as in Hector's specimens. In this we have a return to the original figures of *D. heavisidii* and *D. hastatus*. From Rapp's figure of the latter, however, Van Beneden's differs in the under surface of the chin and throat being white instead of black. The teeth are $\frac{30}{27}$, the largest being 2 millim. in diameter. The vertebræ are C. 7, D. 14, L. 15, C. 27; total 63. The atlas and axis are united, the remainder of the cervical vertebræ free. The manus is narrow, the first and fifth digits being quite rudimentary. The following are the numbers of the elements of each digit, including metacarpals:—I. 1., II. 6, III. 4, IV. 3, V. 1; the individual described was, however, very young, being only 3 feet 6 inches in length, and therefore all the phalanges may not have been ossified.

Such is at present all the material available for the history of these interesting Dolphins. The various individuals described, some from the Cape of Good Hope, some from New Zealand, all present strong points of agreement as to size, form, cranial characters, number of vertebræ and of teeth, and general distribution of surface colouring. They obviously form a natural group; but before we can determine whether to consider them as forming one or more species, we require to know how far the differences hitherto pointed out depend upon errors of observation and imperfect description and delineation, and how far upon individual or sexual variation. It must be noted that hitherto all the Cape specimens recorded have obtusely triangular dorsal fins, while those from New Zealand have had the same organ of a rounded outline. If the two forms should prove to be distinct, the name *C. heavisidii*, Gray, will be retained for the former, while *C. hectori* (Van Beneden) will be adopted for the latter, which may or may not include Hector's so-called *Electra clancula*. If the distinctive characters of the latter should prove to be valid, it will require a new name.

A form evidently closely allied, as far as cranial characters tell, is that represented by a skull in the British Museum, from the coast of Chili, to which Dr. Gray gave the name of *Delphinus eutropia* (P. Z. S. 1849, p. 1), and subsequently erected into the type of his genus *Eutropia*, under the designation of *Eutropia dickiei*. Although a second, smaller, and younger skull of the same form has since (in 1881) been received by the Museum from the same locality, nothing is as yet known of its external characteristics, or of the remainder of the skeleton. Specific distinction from *C. heavisidii* may readily be found in greater size (its extreme length being 360 mm.), longer and narrower rostrum, and larger and rather more numerous (30 to 32) teeth. It must be borne in mind, however, in making this comparison, that all the skulls of *C. heavisidii* hitherto examined seem to belong to immature specimens, and that the original "*Eutropia dickiei*" of the British Museum is apparently that of a perfectly adult animal. The form of the pterygoid bones (broken in the type specimen, but preserved in the younger one), however, though of the same general type, is appreciably different from that of those of *C. heavisidii*. They are longer from before backwards, and their inner edges, though never in contact, are more nearly parallel, and thus approach more nearly to the normal type of the Dolphins. The palate of the larger species also is laterally contracted in front of the pterygoid bones in a manner not seen in the smaller one.

Pending the discovery of further evidence as to the characters of this species, I see no reason to separate it generically from *Cephalorhynchus*, and it should therefore bear the name of *C. eutropia*.

TURSIOPS.

Tursio, Gray, Zool. 'Erebus' and 'Terror,' p. 37 (1846).

Tursiops, Gervais, Hist. Nat. des Mammifères, ii. p. 323 (1855)¹.

The type of this group is *Delphinus tursio* of Bonnaterre and Cuvier, so named because it was supposed to be the *D. tursio* of Fabricius, a very doubtful identification, especially since, as I am informed on the high authority of the late Professor Reinhardt, no specimens of this species have ever been sent from Greenland, its range in the northerly direction not extending so far. It is frequently met with in the seas around the British Isles, and its external and osteological characters are now very well known. I have given a



Fig. 5. Palate of *Tursiops tursio*.

figure of its external appearance in the Trans. Zool. Soc. vol. xi. pl. i., and have observed the same coloration in several other specimens, including the one which was exhibited at the Westminster Aquarium last September. Fischer's description, taken from specimens captured on the west coast of France, is different. He says:—"Tout le corps est d'un noir intense, à l'exception d'une bande ventrale étroite, d'un gris clair chez le mâle, d'un blanc pur chez la femelle." Schlegel has figured one from the coast of Holland which appears to be quite black; but whether this was the original colour

¹ "Afin d'éviter toute méprise, nous appellerons *Tursiops* et non *Tursio* le genre auquel le Nésarnak ou *Tursio* sert de type, quoique M. Gray l'appelle *Tursio*, mais sans faire attention que le genre *Tursio*, proposé antérieurement par Wagler, a pour unique espèce un animal tout à fait différent, le Delphinaptère de Péron."—Gervais, *loc. cit.*

or that acquired by the specimen after being stuffed and dried he does not say (*Abhandlungen aus dem Gebiete &c.*, i. 1841).

This section includes the largest members of the group, of stouter build than most of the others. The snout or beak is short, but distinctly marked off from the prenasal adipose elevation by a V-shaped groove. The pectoral fin is of the typical lanceolate form, and the dorsal fin high and falcate. The skull has no lateral grooves on the palate. The rostrum tapers moderately from base to apex. The pterygoid bones are of the normal form, and united in the middle line (see fig. 5). The symphysis of the lower jaw is short. The teeth number from 21 to 25 on each side of each jaw. They are large (the largest measuring 6 to 7 mm. in antero-posterior diameter at the base of the crown). Their summits (at least in British specimens) are commonly worn off in old individuals.

An examination of a number of skeletons from European seas, in various museums, proves that the usual vertebral formula is C. 7, D. 13, L. 17, C. 27; total 64¹. Not unfrequently in skeletons, apparently complete, there are but 63 vertebræ present, and in one in the Leiden Museum but 62. In another specimen in the same collection there is a fourteenth rib present on the right side only. In one at Bordeaux there are 13 ribs on the right side and 14 on the left. The chevron bones are 21 in number. The number of phalanges (including metacarpals) of the digits of the manus are respectively I. 1, II. 7, III. 6, IV. 3, V. 1. The length of full-grown specimens is 3 metres, or about 10 feet, that of the skull being 530 millim.

According to Gervais, skulls in the Paris Museum, received from such various localities as the Cape of Good Hope, the Indian Ocean, China, Japan, and New Zealand, cannot be satisfactorily distinguished from those of the common European form, indicating an almost cosmopolitan distribution. There is, however, one skull in the collection from the Cape of Good Hope, referred to *T. aduncus*, Hemprich & Ehrenberg (from the Red Sea), which differs from the ordinary form in little but its larger size, being 600 mm. (23½ inches) long. Its teeth are $\frac{24}{24}$, the antero-posterior diameter of their crowns measuring as much as 8 millim. A figure of this skull is given upon plate xxxiv. of the 'Ostéographie des Cétacés.' Its claim to be considered of a different species rests apparently only upon its large size, but may be provisionally admitted.

The species referred to this section in Dr. Gray's latest list are:—
1. *Tursio truncatus* = *Delphinus tursio*. *Hab.* North Sea and Mediterranean. 2. *T. erebennus*. *Hab.* Philadelphia (!). 3. *T. metis*. *Hab.* West Africa? 4. *T. cymodice*. *Hab.* River Uragua? 5. *T. abusalam*. *Hab.* Cape of Good Hope. 6. *T. eurynome*. *Hab.* South Sea, India?, Bay of Bengal. And 7. *T. catalania*. *Hab.* North-west coast of Australia. The remark is added that "these skulls are all very much alike." The last named species is founded on two specimens in the British Museum.² In the Museum

¹ Fischer gives C. 7, D. 13 or 14, L. 14, C. 30 or 31; total 64 or 65.

² These were obtained off the north coast of Australia by Mr. John Mac-

of the College of Surgeons there is another, of unknown origin, exactly resembling them; and the similarity of the three, and their difference from all the others, especially in their considerably smaller size (the entire length of the skull being only 440 mm.) and rather more numerous teeth ($\frac{25-26}{22-22}$ in the College specimen), leave me no hesitation about retaining this as a distinct species. In the Paris Museum there is a skull from the China seas, of about the same size and very like these, but that the borders of the premaxillaries are not so much contracted in the proximal part of the beak. The teeth are $\frac{23}{23}$, but as the apex of the upper jaw has been damaged, possibly a few more may have been originally present.

All the other British-Museum skulls certainly resemble each other closely, though with slight differences. *T. cymodice* may be at once expunged from the list. It is founded upon a single skull of a very young animal; the basilar suture is not closed, and all its distinguishing characters are those of immaturity. It is impossible to say even of which variety it is the young.

The others may be divided into two types—those with a broader and more flattened rostrum, and those in which the rostrum is narrower. This is a difference, it will be observed, which may depend upon age, or perhaps on sex, as, according to Fischer's observations quoted above, the rostrum of the female is broader than that of the male. To the first type belong most of the undoubted European specimens assigned to *T. truncatus*; to the latter most of the exotic ones, or those of unknown locality, assigned to *T. metis* and *T. eurynome*. This last is founded on one skull only, which differs from *T. metis* in the teeth being slightly smaller and more numerous (i.e. $\frac{25}{23}$). *T. aduncus*, the large species figured by Gervais, is of the narrow form, as is also one assigned to *Tursiops tursio* (*Tursio truncatus* of Gray), "de la Manche," figured in the same plate. There is one Hunterian skull in the College Museum, of unknown locality (No. 2486), of this type. It may be remarked that the two broad skulls of which the sex is known—viz., the one sent to Hunter by Jenner from Berkeley, and the one taken at the mouth of the Thames in 1828, are both females; and a decidedly narrow one lately received into the collection is that of a male which lived some months in the Brighton and Westminster Aquariums,—thus quite confirming Fischer's observations.

We have a tolerably full description of the external characters of a *Tursiops* common in the New-Zealand seas, which has been assigned, without, as far as I can learn, any definite reason, to Gray's *T. metis*¹; and it is interesting to find that, as far as this

gillivray, who has given a description of the external characters of the animals, accompanied by measurements. See Proc. Zool. Soc. 1862, p. 143.

¹ "Description of the 'Cow-fish' or 'Bottle-nosed Dolphin' (*Tursiops metis*) of the Sounds on the west coast of Otago," by Captain T. W. Hutton. Trans. N.-Z. Inst. vol. viii. (1875), p. 180. For the skeleton, see Hector, "Notes on New-Zealand Cetacea," Trans. N.-Z. Inst. vol. ix. (1876), p. 477.

description enables us to judge, there is absolutely nothing to distinguish it, either in the external proportions, the distribution of the colours, or the osteological characters, from the common *T. tursio* of the European seas. It is true that in the only skeleton described it is stated that but 12 pairs of ribs are present; but as the last pair is so often wanting or lost in preparation, this is of little consequence, especially as the total number of vertebræ is given as 64.

An animal of this genus is also found in the North Pacific off the Californian coast, the "Cow-fish" of Scammon, *Tursio gillii* of Dall¹; but there is nothing in the description of the external characters, "based upon two momentary observations," the habits, or the one portion of the animal actually obtained, to distinguish it from *T. tursio* of the European seas. Perhaps the skull in the Paris Museum, sent from Monterey, California, in 1879, belongs to this form if distinct. It is 510 mm. in length, and with comparatively few and large teeth, $\frac{20}{20}$ in number, and 7 mm. in antero-posterior diameter at the base. It is very like the skull of Gray's *T. metis*, figured in the 'Zoology of the Erebus and Terror.'

In the International Fisheries Exhibition of the present year, among the beautiful and instructive models of Cetaceans and other aquatic animals shown by the United States Commissioners, are coloured casts in *papier maché* of an animal of this group, and of the heads of two individuals marked male and female, the former being apparently the same individual as the entire animal. These are labelled *Tursio subridens*, True. MS. On comparing them with the figure of *D. tursio* in the Trans. Zool. Soc. vol. xi. pl. 1, from the coast of Wales, the only noticeable difference is in the colour of the lower jaw and chin. In the figure this part is entirely white. In the male American specimen it is black, this colour extending farther back in the middle line below, than on the sides of the jaw, and terminating in a point at about the level of the eye. This might have been thought to constitute a specific difference; but in the cast said to be that of a female of the same species there is only a dark gray patch confined to the anterior part of the under surface of the chin; so that with the totally white-throated English specimen, we have three different and quite distinct conditions of the coloration of this region—one, that of the American female, being exactly intermediate between the other two. Until a larger series of specimens are examined, it would not be safe to establish specific distinctions on such characters, especially when we bear in mind the different descriptions of the colours of animals attributed to this species given by Fischer. A skull attributed to this form, presumably of one of the same individuals, is in the collection: it is that of a not fully adult animal; and on comparing it with a specimen in the same state of development taken off the coast of Kent, near Margate,

¹ Scammon, 'Marine Mammals of the North-western Coast of North America,' pp. 101 and 288 (1874).

in 1872, not the slightest difference can be detected, either in size or form or in the characters of the teeth.

It follows from what has just been said, that of the section (or genus) called *Tursiops* there are two distinct forms as indicated by the skulls:—

1. *T. tursio*, including those that have been named *metis*, *eurynome*, *cymodice*, *aduncus*, and *gillii*, some of which may be specifically distinct, but, if so, are very closely allied, and still require definite elucidation of their characters, the principal differences observed in the skulls depending on the comparative breadth of the rostrum, a character much influenced by sex. *T. aduncus* (*T. abusalam*, Gray) differs from the rest only in its superior size.

2. *T. catalania*, of smaller size than any of the others, and with smaller and more numerous teeth. There is truth in the remark with which Dr. Gray concludes his original description of this species. After comparing it with others of the group, he says:—"It is not easy to point out the distinction of these species in words; but there cannot be a doubt about them when they are compared together"¹.

The Dolphins of other groups which present the nearest resemblance to *Tursiops*, both in external and cranial characters, are those of the section of the genus *Clymenia* to which *C. obscura* belongs.

STENO.

Steno, Gray, Zool. Erebus & Terror, p. 43 (1846).

Glyphidelphis, Gervais, Zool. et Pal. Françaises, p. 301 (1859).

This group contains also some comparatively large forms of Dolphins, but which differ greatly from the last in the form of the skull. There are no lateral grooves on the palate, and the pterygoid bones are of the normal form, meeting in the middle line (see fig. 6). The rostrum is long, narrow, compressed, and very distinct from the cranium. The symphysis of the mandible is longer than in any of the other *Delphinidæ*, exceeding one fourth of the length of the ramus. Teeth 21 to 25 on each side of each jaw, of comparatively large size (5-6 millim. in diameter at base of crown), and in most, if not all the species, with their surfaces roughened by fine irregular longitudinal grooves (which are in a great measure effaced in old individuals) not seen in other Dolphins, and whence the name *Glyphidelphis* proposed by Gervais for the section.

The type of this group is known by skulls only, which are very common in museums, but, as far as I am aware, no skeleton of the species has ever been preserved, and its external characters are most imperfectly, if at all, known.

The first published intimation of the existence of the specimens upon which the species was ultimately founded is contained in Cuvier's "Rapport sur diverses Cétacés" &c., in the 'Annales du

¹ P. Z. S. 1862, p. 145.

Muséum d'Histoire Naturelle,' t. xix. (1812), p. 10, where, though no name is given, it is stated that "il semble aussi que c'est l'espèce légèrement indiqué par Shaw (Gen. Zool. vol. ii. pt. 2, p. 514, 1801) sous le nom de *Delphinus rostratus*"¹. In the 'Ossements fossiles,' 2nd edit. t. v. p. 278, 1823², these indications were more fully developed, and a species, a "phantom" species as it afterwards turned out, was described under the name of *Delphinus frontatus*, based upon a stuffed specimen and certain skulls which Cuvier supposed to belong to one and the same species. At p. 400 of the same work an "addition importante" appears, stating that Van Breda



Fig. 6. Palate of *Steno rostratus*.

had identified the skulls as belonging to a species quite distinct from the stuffed specimen, for which alone in future Cuvier reserved the name of *frontatus*. This specimen afterwards proved to have been previously described by Blainville as *D. geoffrensis* (now *Inia geoffrensis*), and the name *frontatus* therefore disappeared from the list³. In the meantime the skulls in the Paris Museum, and another of the same species observed by M. de Blainville in Sowerby's collection in London, had been fully described, even to the "*rugueuse*

¹ In all probability the species now known as *Platanista gangetica* (Lebeck), as subsequently conjectured by Cuvier.

² It may be convenient for those to whom the now scarce first edition of this work is inaccessible, to know that it does not contain any account of the Cetacea.

³ Every one who has followed in Cuvier's steps in endeavouring to identify Dolphins by the old descriptions will echo the sentiment which his researches into the synonymy of this species called forth:—"toutes ces indications incomplètes ne servent qu'à mettre les naturalistes à la torture."

ou plutôt guillochée" surface of the teeth, under the name of *D. rostratus*, Cuvier, by Desmarest in the 'Nouveau Dictionnaire d'Histoire Naturelle,' t. ix. p. 160 (1817), and the 'Mammalogie,' p. 515 (1822); and they appear under the same name in the second edition of Cuvier's 'Règne Animal,' vol. i. p. 289 (1829). In the fourth (posthumous, 8vo) edition of the 'Ossements Fossiles' (1836) the skulls figure under the name of *rostratus*, the editor, Fréd. Cuvier, saying, "*Nous substituons au mot frontatus du texte du quarto, celui de rostratus qui est le nom véritable de cette espèce, comme mon frère l'a reconnu.*" In F. Cuvier's 'Histoire Naturelle des Cétacés,' of the same date, these skulls are associated with Van Breda's figure of the external form, with the remark that "*le nom de rostratus est sans doute celui que ce dauphin conservera dans les catalogues méthodiques*" (p. 158). Notwithstanding the very definite character of these statements, and also Desmarest's determination in 1817, the name *frontatus* as applied to this species has lingered on, as will be seen by the synonymy below, probably in consequence of identifications made with the earlier editions of the 'Ossements Fossiles,' without regard to the later rectification. The objection that might possibly be raised that this species is not the *D. rostratus* of Shaw, as Cuvier at first thought it might be, is unimportant, as no confusion can arise with that animal, which (if recognizable at all) belongs to a totally different genus, and is now universally known by the specific name of *gangeticus* applied to it by Lebeck, and which is simultaneous with, if not prior to, Shaw's name.

The synonymy will therefore stand as follows:—

? *Delphinus rostratus* (Shaw), Cuvier, Ann. du Muséum, xix. p. 10 (1812).

Delphinus rostratus (Cuvier), Desmarest, Nouv. Dict. d'Hist. Nat. ix. p. 160 (1817), and Mammalogie, p. 515 (1822).

Delphinus frontatus (in part), Cuvier, Ossements Fossiles, 2^e édit. v. p. 278 (1823), which name was abandoned in the same work at p. 400.

Delphinus rostratus, Cuvier, Règne Animal, 2^e édit. i. p. 289 (1829).

Delphinus planiceps, Van Breda, Verhand. Nederl. Institut. p. 235, figs. 7 & 8 (1829).

Delphinus rostratus, Fréd. Cuvier, Ossements Fossiles, 4^e édit. (1836), and Hist. Nat. des Cétacés, p. 156 (1836).

Steno rostratus and *Steno frontatus*, Gray, Zool. of Erebus and Terror, p. 43 (1846).

Delphinus frontatus, Owen, Cat. Osteol. Spec. Mus. Roy. Coll. Surg. Eng. ii. p. 453 (1853).

Glyphidelpbis rostratus, Gervais, Zool. et Paléont. Franç. p. 301 (1859), and Ostéographie des Cétacés, p. 594, tab. xxxvii. figs. 8-11 (1880).

Steno frontatus, Gray, Synopsis of Whales and Dolphins, p. 5 (1868).

It is very remarkable that though the skulls of this large and

very well-marked species are common in every museum¹, there is, so far as I am aware, no skeleton or any part of a skeleton which certainly belongs to it preserved anywhere, and very few of the skulls have localities assigned to them. In the Leiden Museum two are said to be from the "Indian Ocean" and one from the "Atlantic;" Indian Ocean, Red Sea, and the Pacific are the localities given by Dr. Gray; while Van Breda's specimen, supposed to belong to this species, and from which alone its external characters are known, came from the coast of Holland. It does not appear to have been met with hitherto in the seas around New Zealand or Australia, or in the North Pacific.

Among the skulls of this form of Dolphin are two well-marked varieties, distinguished by the amount of lateral compression of the rostrum. To the broader form the name of *rostratus* is more properly applied; while those (otherwise quite similar) with a very compressed rostrum have been specifically distinguished by Gray under the name of *Steno compressus* (Erebus and Terror, p. 43, tab. 27, 1846). Specimens of this form from the Indian archipelago were, however, previously described by Schlegel (Abhandl. p. 27, Taf. iii. figs. 2 & 3, 1841) as *Delphinus reinwardtii*, which name will therefore have the priority if it should prove to be a good species.

In the series of ten skulls in the British Museum the two extreme forms look very distinct, but others are quite intermediate; and when the whole series is placed together in order such a regular gradation can be traced, that it becomes impossible to say where the broad form ends and the narrow one begins. Dr. Gray evidently met with this difficulty, as the names attached to the skulls show; some which are marked by him *S. compressus* being indistinguishable from others labelled *S. frontatus*. In the series at Leiden exactly the same occurs, the two forms passing insensibly into each other; and there is one among them that has a shorter and stouter rostrum than any which I have seen elsewhere. The broad form appears to be the most common in collections. Bearing in mind the observations quoted from Fischer upon the sexual characters of the skulls of *D. delphis* and *D. tursio*, the question naturally arises whether the different forms observed in the skulls of this group may not have the same relation to one another. Unfortunately there are no materials available at present for its solution. The teeth are sculptured in both, but are generally rather more numerous in the narrow than in the broad skulls, being usually 23 or 24 in the former and 20 to 23 in the latter on each side of each jaw. The extreme length of these skulls varies between 520 and 550 mm.

A very important contribution to the history of this group of Dolphins has been made by the publication of a good description and figures of both external and anatomical characters of a specimen captured in the South Atlantic in September 1874, in 32° 29' South lat. and 2° 1' West longitude, by the officers of the German ship

¹ There are 10 in the British Museum, the same number at Leiden, 6 at Paris, and 5 in the Museum of the College of Surgeons.

'Gazelle.' It was named by the late Dr. Peters *Delphinus (Steno) perspicillatus* (Monatsb. Berl. Acad. Wissensch. 1876, p. 360). In the external form there is nothing to distinguish it from one of the ordinary Dolphins, such as *D. delphis*, except that the dorsal fin is rather more obtuse and less falcate. The skull, as figured and described by Peters, closely resembles in form and size the broadest specimens of *S. rostratus*; and it is interesting to note, in connection with Fischer's observations on the commoner species, that the specimen was a female. The teeth are $\frac{24-23}{23-22}$, with a diameter at the base of their crowns of 6 mm., and three occupy a space of 28 mm. Dr. Peters does not say whether their surface is sculptured. The vertebral formula is C. 7, D. 12, L. 15, C. 32, making a total of 66. The manus resembles that of *Lagenorhynchus*, the metacarpals and phalanges being very broad, flattened, and with parallel borders. The number of ossified elements of each digit (excluding the metacarpals) appears to be I. 2, II. 8, III. 6, IV. 2, V. 1. I regret that I have not yet had an opportunity of comparing the skull directly with typical specimens of *S. rostratus* and especially with the very broad one previously mentioned in the Leiden Museum, and also of ascertaining the condition of the surface of the teeth; but I strongly suspect that this individual, so fortunately preserved for scientific examination, will afford us the much-required evidence of the general characters of the animal which furnishes the skulls so common in museums, as if it is not specifically identical with, it is certainly very closely allied to *Steno rostratus*.

SOTALIA.

Sotalia, Gray, Cat. Seals and Whales Brit. Mus. 2nd edit. pp. 393 & 401 (1866).

On account of the general resemblance in the form of the skull, I provisionally associated with the section or genus called *Steno* by Gray the Chinese White Dolphin (*Delphinus sinensis*). The existence of this species was first indicated by Osbeck, who saw it in the Canton River in 1751. Nothing more was heard of it until 1867, when it was rediscovered by the late Mr. R. Swinhoe, who sent a perfect skeleton, prepared from an animal taken in the harbour at Amoy, to the Museum of the College of Surgeons, which has been fully described and figured in the 'Transactions' of the Society, vol. vii. pt. 2, Jan. 1870. The animal must have been about 8 feet in length. The skull, though resembling that of *Steno rostratus* in many points, including the length of the symphysis, is readily distinguished by the different form of the pterygoid bones (see fig. 7), which are narrow and have the inner borders of their inferior surfaces very little developed, leaving a wide space between them. The teeth also are more numerous ($\frac{33-32}{32-31}$) and of smaller size. They are considerably worn and truncated, so that it is difficult to ascertain the natural condition of the enamelled surface, but there is no distinct evidence of its having been striated. The vertebral formula is C. 7,

D. 12, L. 10, C. 22, making a total of 51 vertebrae, very different therefore from the skeleton of *D. (Steno) perspicillatus* described by Dr. Peters. As remarked in the original description, "the principal differences between this skeleton and that of all other known Dolphins lie in the vertebral column. The total number of vertebrae is less, the individual vertebrae are proportionally longer, and their transverse processes are shorter and broader than in any other species. Next



Fig. 7. Palate of *Sotalia sinensis*.

to it in these characters stands *D. guianensis*¹ (genus *Sotalia*, Gray), which has the following vertebral formula—C. 7, D. 12, L. 14, C. 22=55." Among other differential characters it was also pointed out that "the manus is broader at the base than in most Dolphins (e. g. *D. delphis* and *D. tursio*) and much resembles in form that of *D. guianensis* as figured by Prof. Van Beneden. This breadth is caused by the considerable development and position of the two outer digits. The number of ossified elements of each digit (excluding the metacarpals) are—I. 0, II. 6, III. 5, IV. 2, V. 1. Though the manus thus differs in some characters from that of the Common Dolphin, the metacarpal and phalangeal bones are of the usual character, *i. e.* contracted in the middle of their outer borders, or hour-glass shaped, thus differing greatly from the form observed in the true *Steno* (if *D. perspicillatus* is to be taken as typical of

¹ Mém. de l'Acad. Roy. de Belgique, Coll. in 8vo, t. xvi. 1863, p. 33.

that group), where the lateral margins are nearly parallel, and the borders of the first three digits are in contact for nearly the whole of their length.

In the conclusion of the description of this skeleton I said :—" If the osteological characters possessed by this specimen be found to exist in other Dolphins with narrow compressed beaks and long mandibular symphyses, *Steno* will be established as a natural group of generic value." The result has been quite otherwise ; for the skeleton described by Dr. Peters and that of the Chinese White Dolphin clearly belong to two different types. For the first the term *Steno* should be reserved. With what other known forms can *D. sinensis* be associated ? Since the publication of the description of its skeleton more information has been obtained regarding the animals of the group, properly distinguished by Gray as a special form, to which he gave the name of *Sotalia*, and the indications of the similarity of *D. sinensis* to *D. guianensis*, the type of the group, already pointed out, can be more completely developed¹. Edward Van Beneden has given a very full description of the external and osteological characters of a specimen taken in the Bay of Rio, where it appears to be of very common occurrence. Unfortunately the individual upon which his description is based was an exceedingly young one ; and the imperfect development of the bones not only accounts for some of the peculiarities he noticed, but also renders a comparison with other specimens less satisfactory than it otherwise would be. Gervais has given figures and some details of the osteological characters of another species from the Amazon, *D. pallidus* ; and the British Museum possesses two skulls, also of very young individuals, obtained by Mr. Bates near Santarem, on the Upper Amazon, described by Dr. Gray under the name of *Steno tucuxi*. That these are all very closely allied forms there can be no question ; but the materials are not yet sufficient to work out their specific characters or geographical distribution. At present they have been found on the coast of Guiana, in the Bay of Rio, and in the upper waters of the Amazon. From the published descriptions it is very difficult to find any characters by which the *Delphinus pallidus* of Gervais, *Steno tucuxi* of Gray, and *Sotalia brasiliensis* of E. Van Beneden can be distinguished specifically.

To this group I have now no hesitation in adding *Delphinus sinensis*. It is curious that it agrees with the American form of which we have the fullest description (*S. brasiliensis*) in its pale coloration, and in its habit of frequenting estuaries and bays, and not the open sea.

A cranium in the Museum of the College of Surgeons, found upon the sea-beach at Aripo, in the north of Ceylon, by Mr. E. W. H. Holdsworth, closely resembles that of *D. sinensis*, but is of smaller size.

Another animal apparently of the same group is *Delphinus*

¹ See "Mémoire sur un Dauphin nouveau de la Baie de Rio de Janeiro, *Sotalia brasiliensis*," by Ed. Van Beneden : Mém. de l'Acad. Roy. de Belgique, t. xli, 1874 ; and Gervais, in 'Ostéographie des Cétacés,' p. 594.

(*Steno?*) *gadamu* of Owen¹, described from a mutilated skull and a native drawing of a specimen taken at Vizagapatam (Madras) in 1853. The skull is now in the British Museum; it is that of a young animal. The pterygoids are widely divergent. The rostrum is wider and more depressed than in *D. sinensis*; the premaxillæ especially are of a peculiar form, being narrow at their upper third and enlarging at the middle of the rostrum, where they are both more elevated and wider than in other species. The teeth are $\frac{23-28}{27-28}$ according to Owen. A more complete skull of the same species, from Australia, has been recently added to the Cambridge University Museum.

D. lentiginosus, Owen, from the same locality, described in the same memoir, is a closely allied species, if distinct.

Delphinus plumbeus, Dussumier, in Cuvier's 'Règne Animal,' 2^e edit. t. 1, p. 283 (1829), according to the skull in the Paris Museum, figured by Gervais (Ostéographie, pl. xxxvii.), represents the longest and narrowest form of this type, with the most numerous teeth, viz. $\frac{38}{34}$, only 4 mm. in diameter. The pterygoids are very characteristic. It is a large species, the skull measuring 550 mm. in length. This has been conjecturally identified with *D. malayanus*, Lesson (Voy. de la Coquille, Zool. p. 184, pl. ix. fig. 5 (1826), from external form only).

LAGENORHYNCHUS.

Lagenorhynchus, Gray, Zool. Erebus & Terror, p. 34 (1846).

The following characters appear to be common to all the animals of this section of which the complete osteology is known:—

Cranium without grooves on palate. Rostrum scarcely exceeding the length of the cranium, broad at the base, and gradually tapering towards the apex, depressed. The pterygoid bones rather short and broad, united in the middleline (see fig. 8, p. 490). Symphysis of mandible short. Teeth small, not exceeding 4 mm. in diameter, not numerous, 23–33. Vertebrae very numerous, 80 to 90. Spinous and transverse processes of the lumbar vertebrae very long and slender. Manus with broad, flattened metacarpals and phalanges, with parallel borders.

The skulls of the species assigned to this group vary considerably in form. *L. albirostris* especially deviates from the others in the outline, as seen from above, being more regularly pear-shaped, an appearance caused mainly by the anteorbital prominences of the maxilla, frontal and jugal, which stand out on each side behind the notch, being softened off and the rostrum tapering gradually to a sharp apex; while in *L. electra* (also a large species) the prominences are more strongly developed, and the rostrum is more obtuse at the apex. The smaller *L. acutus* and *L. clanculus* are somewhat intermediate, the former, however, inclining strongly to the *electra* type, the latter to that of *albirostris*.

Gray appears to have recognized this difference, although, as usual, not defining it clearly, for in the 'Synopsis' (1868) he places

¹ Trans. Zool. Soc. vol. vi. p. 17.

albirostris in a genus by itself, for which he reserves the name *Lagenorhynchus*, and forms two other genera, *Electra* and *Leucopleurus*, for the others; but it is highly probable that the type and only species of the last, *Leucopleurus arcticus*, Gray, is identical with *Electra acuta*, Gray, of the same list. The only distinguishing characters given for these two genera are—*Electra*, "tooth-line stopping considerably short of the notch;" *Leucopleurus*, "tooth-line reaching nearly to the notch."

Of the skulls of this group in the British Museum, *Lagenorhynchus* (or *Electra*) *asia*, Gray, except for its somewhat inferior size, appears to be the same as *L. electra* (*Electra obtusa* of the Synopsis). *L. fusiformis*, Owen (Trans. Zool. Soc. vol. vi. p. 22), from the



Fig. 8. Palate of *Lagenorhynchus acutus*.

Madras seas, appears to be the same or a closely allied species. *Electra thicolea*, founded on a single skull stated to have been brought from the west coast of North America, has a longer and narrower rostrum than any of the others, and forms a transition to the section *Clymenia*, if it is not identical with species which Gray places in that group. *L. clanculus* (Gray, P. Z. S. 1849, p. 2) appears to be a distinct form. The type specimen is from Dr. Dickie's collection from the Pacific Ocean, and is figured among the supplementary plates of the Cetacea of the 'Erebus' and 'Terror' voyage. There is a similar skull in the Museum of the College of Surgeons from the Pacific coast of North America. It has been suggested that *D. cruciger*, Quoy and Gaimard (Voy. de l'Uranie, 1824), and *D. bivittatus*, Lesson and Garnot (Voy. de la Coquille, 1826), may be the same as Gray's *L. clanculus*; but as they are only known by descriptions and drawings made of animals swimming at sea, the identifications are very doubtful. There is also the possibility that *Delphinus fitzroyi* of Waterhouse (Zool. Voy. 'Beagle,' p. 25, 1840), from the coast of Patagonia, may be

identical, or at all events an allied species, its external characters being evidently those of a *Lagenorhynchus*; but without any knowledge of the form of the cranium, this is a point which cannot be determined. The New-Zealand species described by Hector under the name of *Electra clancula*, is, as stated above, a *Cephalorhynchus*, as is also the *Electra hectori* of Van Beneden, and they have therefore nothing to do with the present group.

Two species of this genus are so frequent in the North Atlantic, especially off the British and Scandinavian coasts, that the number of skeletons in museums is sufficient to determine their osteological characters quite satisfactorily, although there are considerable discrepancies in the accounts of the external appearance and coloration of the specimens which have fallen under the notice of naturalists.

L. albirostris (Gray, Ann. & Mag. N. H. 1846) has fortunately had only one specific name bestowed upon it. Variations in the form and colour, depending partly on age, are shown in the descriptions and figures of two British specimens, both young, by D. J. Cunningham and J. W. Clark, in P. Z. S. 1876. In the first, captured off Great Grimsby, the vertebral formula is C. 7, D. 15, L. & C. 68, total 90. In Clark's specimen, from Lowestoft, there are C. 7, D. 14, L. 24, C. 46=91, the last being composed only of cartilage. The two first cervical vertebræ appear always to be united, the rest being free. In a skeleton in the Museum of the College of Surgeons from Norway the vertebræ are C. 7, D. 14, L. & C. 67, making a total of 88; possibly one or two small terminal caudal vertebræ may be missing.

Of the second British species the synonymy is involved in some difficulty. Schlegel, in his 'Abhandlungen aus dem Gebiete der Zoologie und vergleichenden Anatomie,' Heft 1, Leiden, 1841, p. 23, described from the skeleton alone, received from the Farøe Islands, a species of Dolphin which he considered new to science, under the name of *Delphinus eschrichtii*. He says that of the external form nothing is known; but the description of the skeleton, with a figure of the skull, and the fact that the skeleton is still to be seen in the Leiden Museum, are sufficient to identify the species intended. At the conclusion of his description he adds:—"Vielleicht gehört der von Gray, Spic. Zool. i. p. 2, mit ein Paar Worten, unter dem Namen *D. acutus*, beschriebene Delphinschädel hierher, welche Annahme besonders durch die gegebenen Masse Wahrscheinlichkeit erhält. Mit Gewissheit aber lässt sich ohne eine genaue Beschreibung und Abbildung dieses Schädels nichts bestimmen."

In 1843, Rasch described and figured (in a small folio pamphlet published at Christiania) the external and principal osteological characters of a Dolphin, of which a herd of twenty-three were taken in the Bay of Christiania in June of the previous year, under the name of *Delphinus leucopleurus*. There is no doubt but that these were identical with the Leiden skeleton named two years before by Schlegel *D. eschrichtii*: therefore *leucopleurus*, otherwise a very appropriate name, is not admissible. The question remains between Gray's *acutus* and Schlegel's *eschrichtii*. The description and figure in the 'Spicilegia' of the skull contained in Brookes's

Museum, upon which Dr. Gray founded the species, are extremely meagre. I have therefore taken considerable pains to endeavour to ascertain whether the specimen itself can still be appealed to. In the 'Zoology of the Erebus and Terror,' p. 36 (1846), Dr. Gray, under the head of *Lagenorhynchus acutus* (*D. eschrichtii*, Schlegel, being given as a synonym), says:—"This species was first described by me from a skull in Brookes's Museum, which is now at Leyden, and Mr. Schlegel has described it from a skeleton sent from the Faröe Islands." The statement that the original skull is "now at Leyden" is repeated in the 'Catalogue of Seals and Whales' in the British Museum, 1866. Judging from the extract quoted above, Schlegel apparently was not aware of the specimen being in the Leiden Museum in 1841, which is rather remarkable, as he was at that time, although not actually in charge of the collection, a member of the staff; but this is no proof that it was not there.

With the obliging assistance of Dr. Jentink, in August last I carefully examined all the Dolphins' skulls in the collection, with a view to ascertain whether Gray's type skull is there or not. A difficulty at once arose from the fact that none of the skulls have any number or mark upon them by which their history could be traced with certainty. They are all placed upon wooden stands, to which they are fixed in such a way that they can be readily taken off for examination and replaced; the names and indications of origin are written on cards fixed on the stands, and there is unfortunately no guarantee that the latter may not have been changed, as in some cases it is quite evident has been done.

Looking through the skulls, I found one which had been recently labelled "*D. tursio*," which evidently belonged to the species in question. There was no history on the card or any indication of its origin on the skull itself. The idea at once occurred that this might be the sought-for specimen. Comparing it with the figure and the description in the 'Spicilegia,' the agreement was quite as close as could be expected. The teeth, as near as they could be counted, were of the right number, the length of the beak (8 inches) and its breadth at base ($4\frac{1}{2}$) were exact; the only difference was in the length of the cranial portion of the skull, which Dr. Gray gives as 7 inches, and which I made as 8; but this is a difficult measurement to take exactly, especially if taken rapidly, as we know was Dr. Gray's habit. The absence of all indication upon the skull itself of its history in no way militates against its coming from Brookes's Museum; on the contrary, rather corroborates it, as the other skull in the collection, that of *D. longirostris*, also described by Gray in the 'Spicilegia,' and which Schlegel himself mentions in his 'Abhandlungen' (p. 19) as having been received from the collection of Dr. Brookes, is equally without indication of its *provenance*, and is otherwise in much the same general condition. We have thus evidence from published writings of two Dolphins' skulls passing from the Brookesian to the Leiden Museum—the type of *D. acutus*, as stated by Gray, and the type of *D. longirostris*, as stated by Schlegel. Of the identification of the latter there is no doubt; its characters are quite unlike

those of any other in the collection, and it is still upon the stand which bears the inscription "Brookes's Museum." This collection was sold in 1828; and the next question was to endeavour to find a record of the specimens from it which were purchased for the Leiden Museum. After a considerable search it was ascertained by Dr. Jentink, and communicated to me by letter after I had left Leiden, that two Dolphins' skulls are mentioned in the original list as derived from this source, which are described as "*Delphinus globiceps* and *Phocæna longirostris*," from which Dr. Jentink concluded that the type of *D. acutus* was never in the collection; a conclusion, however, with which I was not satisfied. The previous indications of two Dolphins' skulls passing from Brookes's collection to Leiden were confirmed, and there was considerable probability in such a list of an error of nomenclature, especially at a time when the knowledge of the distinguishing characters of the crania of Cetacea was so slight and confined to so few individuals.

The next step was therefore to ascertain what had become of the skull called *D. globiceps*, the other one being satisfactorily accounted for; so I wrote to Dr. Jentink on this point, and received the following answer, dated Leiden, 14th Aug. 1883:—"Of *Delphinus globiceps* we only possess a single skull labelled 'Côte de Holland,' four skeletons from 'Zéelande' and 'Japon,' one stuffed from 'Zéelande,' and two foetuses from 'Iles Faer;' and I believe that *globiceps* can hardly be confounded with any other species. Moreover we have no other skull which shows signs that it formerly belonged to Brookes's collection, only *Delphinus longirostris* as you know. The skull of *D. globiceps* bought from Brookes thus must have been lost. It is not in our collection. But where can the type of Gray's *acutus* be hidden?"

Putting all the circumstances together, my inference is that the type of Gray's *acutus* is the skull incorrectly described in the sale list as *D. globiceps* (the inaccuracy of that list in such matters is shown by the name *Phocæna longirostris* for a specimen previously and properly described by Gray as *Delphinus longirostris*), which, never having been given its proper name, was lost sight of even by Schlegel. If it first bore the name of *D. globiceps*, as it more recently did that of *D. tursio*, both of which it is perfectly unlike, it is scarcely surprising that its identity has disappeared. It is very unfortunate that this should be so, as a doubt may always be raised upon the subject; but the evidence to my mind is almost irresistible that the type of Gray's *D. acutus* still exists in the skull of unrecorded origin in the Leiden Museum, and also that this skull is specifically identical with the animals afterwards described as *D. eschrichtii* by Schlegel and *D. leucopleurus* by Rasch.

In this species the teeth are usually 34 to 35 on each side of each jaw. The total number of vertebræ varies in different individuals between 79 and 82, either 80 or 81 being the most common. The number of ribs appears to be always 15 pairs. There is often a difficulty in determining between the lumbar and the caudal region, owing to the irregular development of the anterior chevron

bones. The cervical vertebræ have a greater tendency to ankylosis than in other Dolphins, the first three being often united by their bodies, and several of the others by their neural arches. This disposition has not been observed in *L. albirostris*. The manus also has a more characteristically flattened and broad form than in *L. albirostris*.

Of the other species of Dolphins which have been assigned to this group, the following are the most noteworthy :—

Lagenorhynchus perspicillatus, Cope (Proc. Acad. Nat. Sciences, Philadelphia, 1876, p. 136), said to be abundant on the coast of Maine (North Atlantic). This is apparently closely allied to, if not identical with, *L. acutus*, as might naturally be supposed from its habitat. Slight differences in the external colouring are pointed out, and the teeth are said to be only $\frac{30}{30}$. A figure of the animal is given. A more rigid examination both of the osteological and the external characters of a series of specimens is required before its specific distinction from *L. acutus* can be admitted.

Lagenorhynchus obliquidens, Gill, from its remote habitat (the North Pacific) might be expected to present greater differences; but if it does these have not yet been pointed out. It appears to be closely allied to *L. acutus*, judging by Scammon's figure and description (Marine Mammals of N. America, p. 98). The description of the skeleton by Dall, in the same work, is full of anatomical details, but is without any discrimination as to characters common to many other species, or such as may be peculiar to the individual described, and does not even state the number of the vertebræ or the ribs.

Gervais's account of this genus is very confused. In enumerating the species (p. 593) he speaks of *L. eschrichtii* from the North Atlantic, giving as synonyms in the footnote *L. eschrichtii*, Schlegel, *D. leucopleurus*, Rasch, and *D. acutus*, Gray. In describing the skeleton he speaks of *L. eschrichtii* and *L. leucopleurus* as if they were distinct species, pointing out, among other characters, that in *L. eschrichtii* the six anterior ribs have heads, while in *L. leucopleurus* only five are so provided. He speaks of Gray's *L. asia*, but makes no mention of Gray's *L. electra*, which, being placed first in the original description in the 'Zoology of the Erebus and Terror,' should be taken as the type and name-giver, if the two are considered as one, as even Gray appears to consider as probable. He identifies Owen's *D. fusiformis* with Gray's *L. clanculus*. In the plate devoted to the genus (tab. xxxvi.), *L. albirostris* (fig. 5) appears to be the same as Gray's; but the cranium and hinder part of the maxilla are wider, perhaps because it is from a younger individual. *L. leucopleurus* (fig. 4) is probably also taken from a young individual. *L. asia* (fig. 6) is larger even than Gray's *electra*, though the principal difference between the types of these supposed species is that the former is somewhat smaller than the latter. *L. cruciger* (fig. 3) is apparently Gray's *clanculus*; if so the former name should have the preference, provided any satisfactory identification

with Quoy and Gaimard's *D. cruciger* can be made. Lastly, *L. breviceps* (fig. 2) is evidently the same as Gray's *Delphinus obscurus* or *Clymenia obscura* (Zool. 'Erebus' and 'Terror,' pl. xvi.).

CLYMENIA.

Olymene, Gray, P. Z. S. 1864, p. 237.

Clymenia, Gray, Synopsis of Whales and Dolphins, p. 6 (1868).

Prodelphinus, Gervais, Ostéographie des Cétacés, p. 604 (1880).

This is not a very homogeneous group, and may perhaps require further division when the characters of some of the animals at present referred to it are better known. The cranium has no lateral grooves on the palate, by which it is distinguished from *Delphinus* proper, to which otherwise some of the species present a close resemblance. The pterygoid bones are well developed and touch for the whole length of their inner sides, as in *Delphinus* and *Tursio*. The rostrum is long and narrow, or of moderate width, always more than half the entire length of the skull. The symphysis of the lower jaw is less than one fifth of the length of the ramus, but varies according to the width of the rostrum. When the rostrum is wide the symphysis is short; when narrow the two rami of the mandible come in contact for a larger space. The teeth are small, the largest less than 3 millim. in diameter at the base, and numerous, exceeding 30 on each side of each jaw. The vertebræ in all the known skeletons (which are very few) from 73 to 76 in number.

This group contains a considerable number of forms, almost all known by the skulls alone, which vary chiefly in the comparative width of the rostrum, passing off almost insensibly into *Lagenorhynchus* on the one side, and *Steno* on the other. In fact, two species which I place in this group, on account of their close resemblance to others undoubtedly members of it, Gray includes respectively in the two genera just named.

The skulls at present referred to this genus can be separated into at least four distinct types, distinguished chiefly by the comparative breadth of the rostrum.

A. The broadest form is represented by skulls which in the British Museum are called *Clymenia obscura*, being referred to the stuffed specimen described as *Delphinus (Grampus) obscurus* in Gray's 'Spicilegia,' p. 2 (1828), which Schlegel identifies with *D. superciliosus* of Garnot and Lesson ('Voyage de la Coquille,' 1826), of which, however, so little is really known that the identification cannot be verified.

The type specimen, from the Cape of Good Hope, described and figured in the 'Spicilegia,' is now in the British Museum, and presents much resemblance in its external characters to one of the *Tursiops* group, having a high falcate dorsal fin and long falcate pectorals. There seems no reason why the skulls which Gray subsequently referred to this species may not belong to it, as the teeth and palate, as far as they can be seen, appear to correspond; but unless the whole cranium could be removed from the skin so as to allow of a

complete comparison, absolute certainty on this point cannot be attained. But as the species seems to be a common one both at the Cape of Good Hope and New Zealand, the question will probably soon be settled by the examination of recent specimens.

A skull is also figured in Gervais's 'Ostéographie' under the name of *Lagenorhynchus breviceps* (pl. xxxvi. fig. 2). There is a skeleton at Leiden from the Cape, described by Schlegel in his 'Abhandlungen' (p. 22). The figure of the upper surface of the skull (tab. 1. fig. 3) is not quite correct, the rostrum not being sufficiently rounded at the sides. The vertebræ are C. 7, D. 13 (15?), L. 20 (18?), C. 33, total 73. The teeth about $\frac{30}{36}$. In the British Museum are four skulls, two from the Cape and two without locality. In the College of Surgeons Museum two, both from New Zealand; and there is one skull in the Cambridge University Museum. Hector figures a skull from New Zealand (Trans. N.-Z. Inst. vol. v. pl. i.). The teeth in all these specimens are from 30 to 33 in number. Those in the Cambridge specimen are slightly larger than in the others, being almost 3 millim. in diameter. In all the "triangle in front of the blowers," formed by the premaxillæ, is flat and elevated on each side above the maxillæ, which slope down laterally to the supra-orbital ridge. The most opposite form to this among the Dolphins is *Steno*, where the "triangle" is concave, the middle part being sunk between the lateral ridges, and though the latter are raised above the supraorbital plates of the maxillæ, these, instead of falling away laterally, rise up, forming an elevated supraorbital ridge. Most of the other Dolphins are intermediate in this respect. In the rostrum the premaxillæ are thick and well raised above the maxillæ, as in *Tursiops tursio*, to which the cranium bears considerable resemblance, though of much smaller size.

Clymenia similis, Gray, from the Cape of Good Hope, is probably of the same species; the only difference being a constriction of the posterior part of the palate in the region of the palatine bones, as figured by Gray (P. Z. S. 1868, p. 147); but this is a character which varies in different specimens of *C. obscura*.

A single skull in the British Museum (from the Pacific Ocean) described and catalogued as *Lagenorhynchus thicola*¹, and subsequently as *Electra thicola*, and figured under the former name in the supplementary plates to the 'Zoology of the Erebus and Terror' (pl. 36), is very like that of *Clymenia obscura*; but without knowledge of the rest of the skeleton, it is impossible to say whether it really belongs to this group or to the one to which Dr. Gray assigned it. It is of the same size as *C. obscura*, but the rostrum is more depressed, the premaxillæ less prominent, and the nares and the premaxillæ in front of the nares are narrower. The lower jaw is somewhat stouter, the ramus deeper from above downwards, and the symphysis more vertical. The most valid distinction, however, seems to be in the teeth, which are more numerous and rather more slender and close together. Unfortunately they are very incomplete in this much mutilated

¹ P. Z. S. 1849, p. 2.

and unique specimen, but they appear to have exceeded 40 in number on each side of each jaw; whereas in *C. obscura* they do not appear to be ever more numerous than 33.

Perhaps *Delphinus leucorhamphus* of Péron, or *Leucorhamphus peronii*, Lilljeborg, belongs to this group. It is a Dolphin from the South Seas, remarkable for the absence of a dorsal fin. It is not represented in the British-Museum collection; but a skull in the Museum of the College of Surgeons, which I believe to belong to this species (as it agrees with one so called in the Paris Museum), is not unlike that of *Clymenia obscura*, having a rostrum broad at the base, and gradually tapering and much depressed. It is of larger size, and the teeth are very small and numerous. Without a knowledge of its skeleton, it is difficult to assign its exact position, or decide whether the absence of dorsal fin entitles it to generic distinction.

B. Another distinct form of *Clymenia* is represented by three skulls in the British Museum. Of these two are marked "*Delphinus euphrosyne*, 'Erebus' and 'Terror,'" = "*Clymenia euphrosynoides*, Supp. Cat. Seals and Whales, p. 71;" the other, "*Clymenia dorides*, Supp. Cat. Seals and Whales, p. 71." "*Styx*" is also written upon the label of the latter.

Upon these specimens, one in the Norwich Museum, and another in the United-Service Museum, the following four species in Gray's 'Synopsis' and 'Supplement' are founded:—

Clymenia (Micropia) euphrosyne.

Clymenia (Micropia) styx.

Clymenia (Clymenia) euphrosynoides.

Clymenia (Clymenia) dorides.

In all these the teeth vary from 40 to 46 on each side of each jaw. The anterior nares are very small, with a large flat space in front. I am not able to detect any difference of specific importance between them, and am inclined also to include with them *Delphinus marginatus*, Duvernoy (in Pucheran, *Revue et Mag. de Zoologie*, 1854, p. 547), described from two individuals taken at Dieppe, and of which the external and osteological characters are well known, one of the skeletons being mounted in the Paris Museum. It is described by Fischer¹, and parts of it figured in Gervais's 'Ostéographie.' The skeleton is very like that of *D. delphis*. The vertebral formula is C. 7, D. 15, L. 22, C. 32, total 76. It belongs to a quite adult animal. The skull is 460 millim. in length, and has ⁴⁷/₄₄ teeth, the antero-posterior diameter of the largest of which is 3 millim. The animal was 2.090 metres in length.

After describing the skeleton, Fischer remarks, "*Le Delphinus euphrosyne*, Gray, de la mer du Nord, est peut-être identique avec le *C. marginata*."

The single skull from the Mediterranean upon which Gervais founded *D. tethyos*, now in the Paris Museum, is so similar that I should be disposed to include it also, at all events until some distinc-

¹ "Cétacés du Sud-Ouest de la France" (Actes de la Soc. Linn. de Bordeaux; xxxv. p. 150, 1881).

tion can be shown, in the same species. It is rather smaller than the skull of *D. marginata* from Dieppe, measuring 436 millim. in length.

C. The next form of skull, with still narrower rostrum, is one which is very abundant in all collections. It was first distinguished from *D. delphis* by Cuvier (Annales du Muséum, xix. 1812, p. 9) under the name of *D. dubius*, with the following characters:—"Smaller than *D. delphis*, with narrower rostrum, flat (not grooved) below. Vomer showing itself for a small longitudinal space in the middle, between the intermaxillaries and the maxillaries. Teeth slender and pointed as in *D. delphis*, 35 on each side of each jaw, 140 in all." In the series of skulls referable generally to this form in the British Museum there are two distinct types, one called *Clymenia doris* and the other *Steno attenuatus*. With the former must be placed the solitary imperfect cranium of *Delphinus clymene* (Cat. Cetacea B. M. 1850, p. 115) = *Clymenia normalis* (Synopsis), which differs from the true *C. doris* in having the teeth rather more numerous (38) and more slender (only 2 millim. in diameter), and in the rostrum being rather more depressed and the premaxilla less elevated above the maxilla. There is a specimen like this in the Museum of the Cambridge University; and one, quite intermediate between it and the typical *C. doris*, in the Museum of the College of Surgeons. With *Steno attenuatus* must be included *Steno capensis*, Gray, not distinguishable from it. This must be a common form, judging by the number of crania met with in collections, but unfortunately entire skeletons are extremely rare. It certainly presents a distinct approach to the typical *Steno* in the length and compression of the rostrum, the length of the symphysis ($\frac{1}{4}$ to $\frac{1}{5}$ of that of the ramus), and also the elevation of the anterior part of the infraorbital ridge, causing a distinct depression between it and the raised outer edge of the premaxillæ. Dr. Gray says, in his 'Synopsis' (p. 5), "This section is nearly intermediate between *Steno* and *Clymenia*." Though a single well-marked specimen of *Clymenia doris* and of *Steno attenuatus* may be so unlike as to justify their being placed as at least distinct species, it is very remarkable that when a large series are compared together, as those of the British Museum and College of Surgeons collections combined, the two extremes pass so insensibly into each other that it is impossible to say where one begins and the other ends; and it is difficult to avoid the suspicion that the differences depend on age or sex, or on individual variation, especially since we know how great the differences depending on these causes are in other better-known species. A comparison of the skeletons of two of the extreme forms would go far to clear up the difficulty. The size and form of the teeth is much alike in all: they may be described as rather stout (being fully 3 millim. in diameter) compared with *C. euphrosyne*, *obscura*, or *longirostris*; but their numbers vary greatly, even in skulls otherwise quite similar. As a general rule the broader skulls, or those referable to *Clymenia doris*, have the smaller number, i. e. from 33 to 38, while the narrower forms (*Steno attenuatus*) have generally as many as 38 or 40 on each side of each jaw. Very few of the specimens of either form have localities assigned to them.

In the Paris Museum are 12 skulls of this form of *Clymenia*, presenting the same diversities of character. They are mostly referred to *D. dubius*, Cuvier, though it is impossible now to say which were the identical specimens upon which he founded the species.

One is a very important specimen, the nearly complete skeleton and also the stuffed skin being preserved with it. It belongs to the *Steno attenuatus* type, and is named *Delphinus brevimanus*, Hombron & Jacquinot, 'Voy. de l'Astrolabe,' Zoologie, 1840, pl. 21. It comes from Malacca. The extreme length of the skull is 405 millim. It is not distinguishable from others marked *D. dubius*. The vertebræ are: C. 7, D. 13, L. & C. 56 = 76, but possibly one or two are wanting from the end of the tail. The general form of the vertebræ is like that of *D. delphis*. The form and arrangement of the bones of the manus, as figured by Gervais, are exactly like those of *C. marginata* (*euphrosyne*). Another skull of the same form is stated to be from Madagascar. Of the broad form (*Clymenia doris*, Gray), one is called *D. dubius*, from St. Helena. One called *D. frænatus*, F. Cuvier, from Cape Verd, sent by Dussumier, is exactly like the figure of *D. doris* in 'Zool. Erebus and Terror,' plate 20; and another is marked *D. frontalis*, Dussumier, also from Cape Verd. The under surfaces of these two are figured in Gervais's 'Ostéographie,' pl. xxxviii. figs. 4 and 5. The length of different skulls of this group (or species?) in the Paris Museum varies between 383 and 420 millim., and the number of the teeth from 36 to 45 on each side of each jaw.

D. A fourth distinct form of *Clymenia* is characterized by a very narrow cranium, a long, slender rostrum, and numerous fine teeth, about 50 or more in number on each side above and below.

The type of this group is Gray's *D. longirostris* ('Spicilegia,' p. 1, 1828), formerly in the museum of Joshua Brookes, and now at Leiden. It was redescribed and figured by Schlegel in his 'Abhandlungen'; but notwithstanding his clear statement (which I have myself verified by an examination of the specimen) that "die beiden tiefen Rinnen, welche beim gemeinen Delphin auf der Unterseite des Oberkiefes hinlaufen, und sich bis an dessen vorderes Drittel erstrecken, fehlen hier gänzlich," it was retained by Gray in all his successive lists at the head of the restricted genus *Delphinus*, characterized by "*Palate with a deep groove on each side.*" This error has caused much confusion, separating it from its nearest congeners, and inducing Gervais to refer to the same species one of the true Dolphins, which is really not allied to it.

The skull appears to be that of a young animal. Its entire length is 425 millim., of which the rostrum occupies 280; the greatest breadth of the cranium is 153 millim.; the width of the rostrum at the base 72 millim. The teeth are very small and slender, about 56 on each side in each jaw.

The skulls in the British Museum which may be referred to this section are named, according to Gray's 'Synopsis,' p. 6:—

Clymenia (*Micropia*) *stenorhyncha*.

Clymenia (*Euphrosyne*) *microps*.

Clymenia (*Euphrosyne*) *alope*.

In all the premaxillæ are very thick and prominent, and bordered by a strong groove laterally. They vary considerably in comparative width and length of rostrum, *stenorhyncha* being the narrowest, and *alope* the broadest. One of the specimens marked with the latter name has the rostrum considerably wider than the other, approaching very near in proportions to *Chymenia euphrosyne* (Section B). The College of Surgeons Museum has two specimens belonging to this group, one of which is intermediate between Gray's *stenorhyncha* and *microps*.

D. roseiventris (Hombron & Jacquinot, Voy. au Pôle Sud, Zool. t. 1. p. 39), of which there is a skull in the Paris Museum, figured by Gervais ('Ostéographie,' pl. xxxviii. figs. 6 & 6a), is also of the same form, and, except in its smaller size, closely resembles the original *longirostris* of Gray. It is certainly the same as *microps*.

No skeleton of any animal of this group exists in any museum I have visited.

DELPHINUS, Linn.

Eudelphinus, Gervais, 'Ostéographie des Cétacés,' p. 600 (1880).

If the name of *Delphinus* is to be retained as a generic appellation, it is to this section that it properly belongs, as its type is the common Dolphin of the Mediterranean, the "Delphis" of the Greeks; and therefore *Eudelphinus* is a superfluous term.

The skulls are distinguished from those of all other Dolphins by the deep longitudinal grooves which run along both sides of the palatal surfaces of the maxillary bones, separating the alveolar border from a strongly pronounced median ridge. The inner borders of the pterygoid bones meet for their whole length (see fig. 9). The rostrum is long and narrow, greatly exceeding the length of the cranial portion (generally about double), and its width at the base is usually about one third of its length. The teeth are small (not exceeding 3 millim. in diameter) and numerous, from $\frac{40}{40}$ to $\frac{60}{60}$ in each jaw.

Delphinus delphis, of the North Atlantic and Mediterranean, may be taken as the type of this group. In the 'Transactions' of this Society, vol. xi. plate 1, I gave a coloured figure of the external characters of a young female (5 feet $1\frac{1}{2}$ inch long) taken off the coast of Cornwall in March 1879. This year (Sept. 17, 1883) I received from Mr. Matthias Dunn another specimen, still younger (only 4 feet 4 inches in length), from the same locality. It differed from the former in having a shorter beak, relatively to its general size, showing, as might be expected, that this is a character influenced by age. Though the general distribution of the colours on the surface of the body was the same, there was this one marked difference. The upper white line, which courses along the side above the pectoral fin towards the head, instead of dipping below the eye and running towards the angle of the mouth as in the former one (and also in Reinhardt's ex-

cellent figure¹), passed straight to the posterior canthus of the eye, and then divided, one tract passing above and the other below that organ, the former merging into the light band just above the supra-rostral groove, the latter reaching the angle of the mouth. Between this white band and the pectoral fin the surface was gray, though somewhat varied, but still much darker than in the specimen figured.

These differences are, however, slight compared with those that have been shown by Lafont and Fischer² to occur in different individuals, attributed by the last-named author to *Delphinus delphis*,



Fig. 9.—Palate of *Delphinus delphis*.

taken in the Bay of Arcachon, where this species is very abundant. Upon these differences Lafont established five species: *D. fusus*, *D. souverbianus*, *D. variegatus*, *D. balteatus*, and *D. moschatus*, which Fischer reduces to two marked varieties, one having yellow sides, the other with grey sides. The description and figures of the external and osteological characters of so many individuals of the common Dolphin from the same locality, given in this memoir, is a contribution to the progress of Cetology the importance of which can scarcely be overrated; as if these are really all to be regarded as one species, as appears the most reasonable view, especially since the variation of external characters does not appear to go hand in hand with

¹ Naturh. Forenings Vidensk. Meddelelser, 1866, tav. v.

² "Cétacés du Sud-Ouest de la France," Actes de la Soc. Linnéenne de Bordeaux, xxxv., 1881.

those in the skeleton and dentition, numbers of nominal species, founded on slight differences of external or cranial characters, which now encumber our lists, must fall to the ground. But valuable as these observations are they admit of much further extension; indeed, as Fischer truly says, "nous ne sommes qu'au début de l'étude des variations chez les Dauphins."

The observations on the osteological and dental characters may be thus summarized:—The average length of the full-grown animal is rather more than 2 metres (6 feet 7 inches), the longest measuring 2.150 metres. The males and females, when adult, do not differ in size. The differences of the skulls of the two sexes has already been indicated (p. 470). The longest skull of which the dimensions are given (a female) has an extreme length of 460 millim.

The number of the teeth varies considerably in each jaw and each side. Sometimes there are more in the upper than in the lower jaw, and sometimes the reverse is the case. The average number for each side of each jaw of ten individuals was 47, the highest number observed being 53 and the lowest 39.

The number of vertebræ ranges between 73 and 75, 74 being the most usual. The two first cervical vertebræ are united, the remainder free. The ribs are either 14 or 15 pairs, these numbers occurring apparently with about equal frequency. In one case 16 were observed. In two cases the numbers differed on the two sides of the same individual, there being 14 ribs on one side and 15 on the other.

In the manus there was some variability in the number of elements composing each digit; but this may have arisen partly from the difficulty of preserving and counting them. The numbers given are:—I. 2 to 3, II. 8 to 9, III. 5 to 7, IV. 2 to 4, V. 1 to 2.

After the examination of these Arcachon specimens and of others from the British Channel and the Mediterranean, Fischer arrived at this important conclusion:—"Je pense que le Dauphin vulgaire, qui semble habiter presque toutes les mers du globe, présente d'innombrables races ou variétés. Chaque bande de ces Cétacés constitue en quelque sorte une famille, et les individus ayant une même provenance ont des caractères communs qui se perpétuent par la voie d'hérédité. Les caractères distinctifs de ces bandes ou familles sont fournis par la coloration du corps, beaucoup plus variable chez les Dauphins qu'on ne l'admet généralement, par le plus ou moins de largeur du rostre, et par le nombre des dents."

Let us now examine into the evidence of the almost cosmopolitan nature of this form. All considerable osteological collections abound in skulls undistinguishable from the ordinary *Delphinus delphis*; but as very few have any localities assigned to them or any indication of their external or remaining osteological characters, they are of little value for the purpose, except as showing that it is a very abundant and probably wide-spread form. We have, however, a tolerably complete knowledge of a *Delphinus* very frequent in the seas around Australia and New Zealand, *D. novæ-zealandiæ* of Quoy and Gaimard ('Voyage de l'Astrolabe,' p. 49, t. 28), and *D. forsteri*,

Gray (Zool. Erebus and Terror, p. 42), first described under the name of *D. delphis* by Forster, a copy of whose original drawing was published by Gray (*op. cit.* tab. 24). *D. fulvo-fasciatus*, Hombron and Jacquinot (Voy. au Pôle Sud, Zool. p. 37, pl. xxi. fig. 1), also appears to have been founded on the same form.

Through the kindness of Mr. W. L. Crowther, of Hobart Town, Tasmania, the Museum of the College of Surgeons has lately received a fine series of skeletons of the common species of Dolphin of the seas around that island, probably that just mentioned, and they are in every character identical with those of *D. delphis* of our coasts; at least, after careful examination and allowing for individual variation, I can find nothing to separate them.

In the United States department of the International Fisheries Exhibition of this year, casts of a Dolphin from the Atlantic coast of America were exhibited, which though not presenting the bright yellowish tint or the variety of coloration of the English specimen figured in the Transactions of the Society, quite come within the range of variation shown by Fischer. I have had also, through the kindness of the Commissioners, an opportunity of carefully comparing the skull sent to the Exhibition, with one of corresponding age and size from our seas, and can detect no difference. This is of course what might be expected; but it is more surprising to find the same form represented in so widely removed a region of the world as the North Pacific; at least this must be our assumption until any specific distinction has been pointed out between *D. bairdii*, Dall, and *D. delphis*. Our knowledge of the former is at present very defective, as in the description of its osteological characters appended to Scammon's work, although a perfect skeleton is said to exist in the Smithsonian Institution, and a 4to page of small type is devoted to a detailed description of the cervical vertebræ, even the number of the other vertebræ is not stated, and no comparison of the skull or other parts is instituted between it and those of *D. delphis*, to which it is so obviously closely allied, but only with other Pacific forms with which it has no special affinity.

It is, however, not at all improbable that there are several modifications of this type of Dolphin, that may be considered of specific value.

In the British Museum Collection is one skull marked *D. major* (Gray, Cat. Seals and Whales B. M. 1866, p. 396), of unknown habitat, considerably larger than any of the others, which otherwise it closely resembles. Its length is 523 mm. (the largest in the collection referred to *D. delphis* being 470 mm.); it has $\frac{46-48}{47-47}$ teeth.

Another form represented by three specimens in the same collection, *D. janira* (Gray, Zool. Erebus & Terror, p. 41, pl. 23), is probably distinct, being of smaller size than *D. delphis*, and with a wider head and shorter rostrum. The number of teeth is about 44. From this *D. pomeeagra*, Owen (Trans. Zool. Soc. vol. vi. p. 23), from Madras, appears to me to present no marked distinguishing characters.

A still more distinct form is represented by a skull in the Paris collection, called *D. longirostris*, and figured under that name by

Gervais in the 'Ostéographie des Cétacés,' pl. xxxix. figs. 10 and 11. The specimen is from the Malabar coast, and marked "Dussumier, 1827," but does not appear to have been described until the publication of the 'Ostéographie.' It is certainly not the *D. longirostris* of Gray's 'Spicilegium,' p. 1 (1828), described from a skull now in the Leiden Museum, as that has fewer teeth and no grooves on the palate, and is therefore not a true *Delphinus*, although, as said above, Gray in his Catalogue and Synopsis places it at the head of the section of Dolphins characterized by the "Palate with a deep groove on each side," and joins the Paris specimen with it in his account of the species.

It may be convenient to append a Synopsis of the principal characters of the divisions of the whole family, which appear to me of generic value, with some remarks upon the best-known species. This will serve to show what are the natural groups into which the different members of which it is composed appear, according to our present knowledge, to resolve themselves, although in endeavouring to set it out, the usual difficulty has occurred in arranging in a linear series a number of forms the affinities of which are so closely intertwined. Although the most nearly allied have been brought together when possible, this cannot always be done in such a list. The arrangement must therefore be considered to a certain extent arbitrary, and subject to modification according to the judgment of different zoologists. Even in the primary grouping together of the Dolphins with rounded heads and those with projecting beaks I have probably followed too much the traditional and artificial order, instead of finding one more consonant with natural affinities.

We must wait until our Museums are more abundantly supplied with specimens before it will be possible to attempt with any success a complete and critical examination of the minor modifications which we commonly call specific.

Synopsis of the Genera of DELPHINIDÆ.

A. With rounded head, without distinct rostrum or beak. In the skull the rostrum is about equal in length to the cranial portion.

a. The first and second cervical vertebræ not united.

MONODON, Linnæus, Syst. Nat. ed. 12, i. p. 105 (1766).

Pterygoid bones very small, not meeting in the middle line, approaching each other posteriorly as in *Delphinapterus* (see fig. 3, p. 472). Dentition reduced to a single pair of teeth, which lie horizontally in the maxillæ, and which in the female remain permanently concealed in the alveolus, while in the male the right tooth usually remains similarly concealed and abortive and the left is immensely developed, attaining a length equal to more than half that of the entire animal. Vertebræ: C. 7, D. 11, L. 6, C. 26; total 50¹. Cervical region comparatively long, and all the

¹ The numbers of the vertebræ and of the teeth given in this synopsis are averages, subject to slight individual modifications.

vertebræ distinct, or with irregular unions towards the middle of the series. Manus small, short and broad; second and third digits nearly equal, fourth slightly shorter. No dorsal fin.

One species, *M. monoceros*, Linn. Arctic seas.

DELPHINAPTERUS, Lacépède, Hist. Nat. des Cétacés, Tabl. des Ordres &c. p. xli (1804)¹.

Beluga, Gray, Spicilegia Zoologica, p. 2 (1828).

Agrees with the last in all the characters above mentioned except the dentition. Teeth $\frac{8}{8}$ to $\frac{10}{10}$ of moderate size, occupying the anterior three-fourths of the rostrum only and corresponding portion of the mandible, separated by intervals considerably wider than their own diameter, and implanted obliquely, the crowns inclining forwards, especially in the upper jaw.

D. leucas (Pallas), the Beluga or White Whale of the Arctic seas, is the only well-established species. It has been divided into several (*rhinodon*, *declivis*, and *angustatus*) by Cope, but these require confirmation. A skull of a young animal in the British Museum, not distinguishable from the northern form, but said to be from the coast of New Holland, was described in 1827 by Dr. Gray, under the name of *D. kingii*. No further light has since been thrown upon this habitat.

b. Atlas and axis firmly united.

PHOCÆNA, Cuvier, Règne Animal, i. p. 279 (1817).

a. Crowns of teeth laterally compressed.

Teeth $\frac{25}{25}$, small, occupying nearly the whole length of the rostrum, with compressed spade-shaped crowns, separated from the root by a constricted neck. Rostrum of skull rather shorter than the cranium proper, broad at the base and tapering towards the apex. Pre-maxillæ raised into tuberosities in front of the nares. The frontal bones forming a somewhat square elevated protuberance in the middle line of the skull behind the nares, rising altogether above the flattened nasals (see fig. 2, p. 471). Pterygoids very small and widely separated in the middle line. Symphysis of mandible very short. Vertebrae: C. 7, D. 13, L. 14, C. 30; total 64. First to sixth cervical vertebrae, and sometimes the seventh also, coalesced. Manus of moderate size, oval, slightly falcate; second and third digits nearly equal in length, fourth and fifth well developed but shorter. Dorsal fin near the middle of the back, triangular; its height considerably less than the length of the base; its anterior edge frequently furnished with one or more rows of conical horny tubercles.

Phocæna communis, F. Cuvier. *Hab.* European and American coasts of North Atlantic. A closely similar if not identical species

¹ The Beluga being the first mentioned and type of this genus, in fact the only species of those now recognized by cetologists known to Lacépède, should remain as its representative, although by Gray and others it has been removed to a new genus, and the name *Delphinapterus* transferred to species unknown to its founder.

(*P. vomerina*, Gill) from the North Pacific. Photographs of the skull of one of these animals from Puget Sound, sent to the International Fisheries Exhibition of 1883, when compared with a large series of skulls from the British seas, show absolute identity. There may, however, be characters other than cranial by which they may be distinguished. In the same collection was a photograph of a lower jaw of *Delphinus pectoralis*, Peale, from Hawaii, which has teeth of the same peculiar character as *P. communis*, but which appears to belong to an animal of much larger size, the ramus being $13\frac{1}{2}$ inches long, as against $8\frac{1}{2}$, the length of that of a full-grown common Porpoise. The figure given by Peale (in Wilkes's voyage) of the external form shows an animal with a head like that of the Porpoise, but with a rather high and falcate dorsal fin. The entire length is stated to be 8 feet 8 inches, which would be in correspondence with that of the jaw photographed.

Phocæna spinipennis, Burmeister (P. Z. S. 1865, p. 228, and Ann. Mus. Buenos Ayres, i. p. 380, 1869), from the mouth of the Plata, may be distinct. It forms the genus *Acanthodelphis* of Gray.

NEOMERIS, Gray, Zool. Erebus and Terror, p. 30 (1846).

Closely allied to *Phocæna*, so much so that if the genus had not been generally accepted, it would have been better not to have separated it. The principal difference is the absence of dorsal fin. Teeth $\frac{18}{18}$ to $\frac{20}{20}$, larger proportionally than in *Phocæna*, and more distinctly notched or lobed on the free edge of the crown. Vertebrae: C. 7, D. 13 L. 13, C. 30, total 63 (Leiden Museum).

One species, *N. phocænoides*, Cuvier (R. A. 2nd edit. i. p. 291, 1829), = *Delphinus melas*, Schlegel, Fauna Japonica, from the Indian Ocean and Japan.

β. Crowns of the teeth more or less conical and pointed.

CEPHALORHYNCHUS, Gray, Cat. Cetacea Brit. Mus. p. 106 (1850)¹.

Rostrum as long and sometimes slightly longer than the cranial part of the skull. Pterygoids widely separated from one another (see fig. 4, p. 473). Teeth small (less than 3 mm. in diameter), $\frac{25}{25}$ to $\frac{30}{30}$. Vertebrae: C. 7, D. 13, L. 15, C. 30; total 65. Dorsal fin low, obtusely triangular or rounded. Pectoral fins rather small, narrow, ovate.

To this genus appear to belong the species, real or nominal, described under the following names:—

Delphinus heavisidii, Gray, Spicilegia Zoologica, p. 2 (1828).

D. capensis, F. Cuvier, Hist. Nat. des Mammifères (1829).

D. cephalorhynchus, F. Cuvier, Hist. Nat. des Cétacés, p. 158 (1836).

D. hastatus (Quoy), F. Cuvier, ibid. p. 161.

Electraclancula, Hector, Trans. New Zealand Inst. v. p. 160 (1873).

Electra hectori, Van Beneden, Bull. Acad. Roy. de Belgique, 3rd ser. t. i. no. 6 (1881).

¹ This generic name is generally attributed to F. Cuvier (Hist. Nat. des Cétacés, 1836, p. 158), but it was only proposed by him as a specific designation.

Delphinus eutropia, Gray, P. Z. S. 1849, p. 1, = *Eutropia dickieii*, Gray, Synopsis, p. 7 (1868).

These are all from the Southern Hemisphere. The last is quite distinct from all the others.

ORCELLA.

Orcaella, Gray, Cat. Seals and Whales Brit. Mus. p. 285 (1866).

Orcella, J. Anderson, P. Z. S. 1871, p. 142.

Pterygoids widely separated from each other. Teeth $\frac{12}{12}$ to $\frac{14}{14}$, small, conical, pointed, rather closely set and occupying nearly the whole length of the rostrum. Vertebrae 62 to 63. Manus of moderate size, not elongated, but somewhat pointed. All the bones of the digits broader than long, except the proximal phalanges of the index and third fingers. Dorsal fin rather small, placed behind the middle of the body.

Two species, both of small size—*O. brevirostris*, from the Bay of Bengal, and *O. fluminalis*, from the Irawaddy river, from 300 to 900 miles from the sea. Our knowledge of these is almost entirely due to Dr. J. Anderson ('Anatomical and Physiological Researches, comprising an Account of the Zoological Results of two Expeditions to Western Yunnan in 1868 and 1875:' 1878).

ORCA, Gray, Zool. Erebus & Terror, p. 33 (1846).

Teeth about $\frac{12}{12}$, occupying nearly the whole length of the rostrum, very large and stout, with conical recurved crowns, and large roots, expanded laterally and flattened or rather hollowed on their anterior and posterior surfaces. Rostrum broad and flattened above, rounded in front; premaxillæ broad and rather concave in front of the nares, contracted at the middle of the rostrum, and expanded again towards the apex. Pterygoids of normal form, but not quite meeting in the middle line. Vertebrae: C. 7, D. 11–12, L. 10, C. 23; total 51 or 52. Bodies of the first and second and sometimes the third cervical vertebrae united, the rest free. Pectoral fin very large, ovate, nearly as broad as long. All the phalanges and metacarpals broader than long. Dorsal fin near the middle of the back, very high and pointed. Anterior part of the head broad and depressed.

All large, powerful, and rapacious animals (15 to 20 feet long); they occur in almost all seas from Greenland to Tasmania. Many species have been described (*O. gladiator*, *duhameli*, *schlegeli*, *latirostris*, *minor*, *eschrichti*, *stenorhyncha*, *capensis*, *muyellana*, *rectipinna*, *atra*, *destructor*, *pacifica*, &c.), but their specific differential characters, if any, have never been clearly defined.

PSEUDORCA, Reinhardt, Oversigt Kong. Danske Vidensk. Selskabs Forhandl. p. 151 (1862).

Teeth about $\frac{10}{10}$. Cranial and dental characters generally like those of *Orca*, except that the roots of the teeth are cylindrical. Vertebrae: C. 7, D. 10, L. 9, C. 24; total 50. First to sixth or seventh cervical vertebrae united. Bodies of the lumbar vertebrae

elongated, the length being to the width as 3 to 2. Pectoral fin of moderate size, narrow and pointed. Dorsal fin situated near the middle of the back, of moderate size, falcate. Head in front of the blowhole high, and compressed anteriorly. The snout truncated.

This peculiar form was first known by the discovery of a skull, in a subfossil state, in a fen in Lincolnshire, described by Owen under the name of *Phocæna crassidens* (Brit. Foss. Mamm. & Birds, p. 516, 1846). Animals of apparently the same species were afterwards met with in small herds on the Danish coast, and fully described by Reinhardt. In 1864 (see P. Z. S. 1864, p. 420) two skulls, sent from Tasmania, were described by me under the name of *Orca* (*Pseudorca*?) *meridionalis*¹. Since that time I have had an opportunity of comparing a larger series of skulls, as well as skeletons, from both localities, and believe that the differential characters upon which the latter species was established depend upon the type being of younger age than the only specimen of the northern form then accessible for comparison. In perfectly adult examples of both I have not been able to detect any constant differences. This fact has an important bearing upon the geographical distribution of the Cetacea, as, if confirmed, it indicates an immense range for a species apparently so rare. The length of the animal is about 14 feet.

GLOBICEPS².

Globicephala, Lesson, Nouv. Tableau du Règne Animal, p. 200 (1842).

Globiocephalus, Gray, Zool. Erebus & Terror, p. 32 (1846).

Teeth $\frac{8}{12}$, confined to the anterior half of the rostrum and corresponding part of the mandible, small, conical, curved, sharp-pointed when unworn, sometimes deciduous in old age. Skull broad and depressed. Pterygoid bones of normal form, meeting or very nearly meeting in the middle line (see fig. 1, p. 471). Upper surface of rostrum broad, flat, and concave in front of nares. Premaxillæ as wide, or wider, at the middle of the rostrum as at the base, and very nearly or completely concealing the maxillæ in the anterior half of this region. Vertebrae: C. 7, D. 11, L. 12-14, C. 28-29; total 58 or 59. Bodies of the anterior five or six cervical vertebrae united. Length of the bodies of the lumbar and anterior caudal vertebrae about equal to their width. Pectoral limb very long and narrow, the second digit the longest, and having as many as 12 or 13 phalanges, the third shorter (with 9 phalanges), the first, fourth, and fifth very short. Fore part of the head very round, in consequence of the great development of a cushion of fat

¹ It should be noted that the figure of the upper surface of the skull at p. 421 has accidentally not been reversed by the artist, and hence the distortion characteristic of the heads of the *Delphinidæ* is represented the wrong way.

² I have ventured to substitute this form of the word, originally proposed by Cuvier in a specific sense, but no longer used as such (*melas* having the priority), for Lesson's more cumbersome, hybrid term. It is certainly an adjective form, but this does not appear to be a bar to its being used generically.

in front of the blowhole. Dorsal fin low and triangular, the length of its base considerably exceeding its vertical height.

The type of this genus is *G. melas*, Traill, of the North Atlantic. Much confusion exists about the other species, or supposed species. I believe that *G. melas*, like *Pseudorca crassidens*, has an exceedingly wide range, as the common "Blackfish" of the Australian seas (erroneously called *G. macrorhynchus* in most catalogues, as that of Hector, Trans. N.-Z. Inst. vol. v. p. 164) appears not to be distinguishable from it either in external or osteological characters. I have examined a considerable series of skeletons both from the Tasmanian and New-Zealand seas, and, comparing them with specimens from the Faröe Islands, can see no real differences, allowing for the regular change which takes place, especially the increase of the width of the rostrum, with advancing age, and probably also sexual differences not yet understood. Gervais says that the southern skulls have not the rugosities on the upper surface characteristic of old specimens from the north; but in a skull sent to the College of Surgeons by Dr. Hector from New Zealand these are as well marked as in any that I have seen. There is, however, one form readily distinguished by the shape of the bones of the upper surface of the rostrum. The premaxillæ widen out at the middle, so that at this point, and thenceforward to the apex, the maxillaries are completely covered, whereas in *G. melas* a narrow strip of these bones is seen to form the lateral part of the rostrum for its whole length. The skull which presents this form, in the Museum of the Royal College of Surgeons, is the type of Gray's *G. macrorhynchus* (Zool. Erebus and Terror, p. 33, 1846). The teeth are $\frac{7}{8}$, and stouter than in *G. melas*. The specimen was presented by Mr. F. D. Bennett, and is said to be from the South Seas. Skulls of this form exist in many museums, and have been described under different names. One is figured in Van Beneden and Gervais's 'Ostéographie des Cétacés,' pl. 52, fig. 3, as *G. intermedius*, from Guadaloupe; another is Cope's *G. brachypterus* (Proc. Acad. Nat. Sciences Philadelphia, 1876, p. 129); and *G. scammoni* of the same author, from the coast of California, judging from the photographs sent to the International Fisheries Exhibition, is exactly like the type *G. macrorhynchus*. I do not mean to imply that there may not be other specific differences between these last, but with only figures of the skulls to judge by, these certainly cannot be distinguished.

The type of another of Gray's species, *G. affinis*, is also in the Museum of the College. The teeth are $\frac{12}{11}$. It is rather narrower than the others, and the premaxillæ in the rostrum are more convex laterally, approaching the form of *Grampus*, in which genus Gray at one time placed it, and from which it is at once distinguished by the presence of teeth in the upper jaw. It is probably only a variety of *G. melas*.

Delphinus intermedius, described by Harlan (Journ. Acad. Nat. Sc. Philadelphia, vi. p. 51, 1829) only from the external characters, is also, in all probability, *Globiceps melas*.

The genus *Sphærocephalus* of Gray (P. Z. S. 1864, p. 244; Cat. Seals and Whales, 2nd ed. p. 323, 1866), containing one species (*S. incrassatus*, Gray), is founded on a skull of *Globiceps melas*, which has been some time at the bottom of the sea, grinding among the sand and shingle until all the most prominent parts have worn away.

GRAMPUS, Gray, Zool. Erebus and Terror, p. 30 (1846).

Teeth, none in the upper jaw; in the mandible few (3 to 7 on each side) and confined to the region of the symphysis. Vertebrae: C 7, D 12, L 19, C 30; total 68. General external characters much as in *Globiceps*, but the fore part of the head less rounded, and the pectoral fins less elongated.

One species, *G. griseus* (Cuvier), is known, about 13 feet long, and remarkable for the variability of its colour. It occurs in the North Atlantic and Mediterranean. A skull from the Cape of Good Hope, which differs slightly, has been described by Gray as *G. richardsoni*. See also *G. souverbianus*, Fischer, Actes de la Soc. Linn. de Bordeaux, xxxv. p. 210 (1881).

FERESIA, Gray, Suppl. Cat. Seals and Whales in Brit. Mus. p. 78, may be placed here provisionally, although only known at present by the skulls of two individuals, which cannot be placed in any of the other recognized genera. Although its position, if a good genus, cannot be determined until the characters of the remaining parts of the animal are known, the cranium and teeth indicate that it is a connecting link between *Globiceps*, *Grampus*, and *Lagenorhynchus*. From the latter it differs chiefly in the smaller number (about $\frac{12}{12}$) and much larger size (6-7 millim. in diameter at base of crown) of the teeth. The two skulls are both in the British Museum; one is of unknown locality, the other from the "South Seas," obtained through Mr. Godeffroy. They have been both well figured, of half the natural size—the first under the name of *Orca intermedia* in the 'Zoology of the Voyage of the Erebus and Terror,' pl. viii., the second as *Feresia attenuata* in the 'Journal du Muséum Godeffroy,' Heft viii. (1875). Both appear to belong to the same species, although the latter is somewhat smaller and has a narrower rostrum. This is, however, a much younger specimen, and exactly corresponding differences are observed between the young and adults of *Globiceps* and *Orca* of apparently the same species. The smaller size of the teeth of the latter is due partly to younger age and partly to their bases being covered with the dried gum, whereas in the former they are entirely exposed. The greater number of the teeth ($\frac{11-12}{12-13}$, as against $\frac{11-11}{11-10}$) is also owing to the presence of several small ones at the end of the series, which appear to have been lost in the more mature specimen, in reference to which Dr. Gray is quite right in dissenting from an opinion which I once rashly expressed at the commencement of my cetological studies (P. Z. S.

1864, p. 425) that it might be a young individual of one of the larger species of the genus *Orca*.

The principal dimensions of the two skulls, in millimetres, are—

	Total length.	Length of beak.	Width of cranium.	Width of rostrum at base.	Width of rostrum at middle.
1. <i>F. intermedia</i> .	356	174	235	120	90
2. <i>F. attenuata</i> ...	350	172	222	107	80

LAGENORHYNCHUS, Gray, Zool. Erebus & Terror, p. 34 (1846).

Rostrum scarcely exceeding the length of the cranium, broad at the base and gradually tapering towards the apex, depressed. Pterygoid bones normal, meeting in the middle line. Teeth small, not exceeding 4 millim. in diameter, $\frac{23}{23}$ to $\frac{33}{33}$. Vertebrae very numerous, 80 to 90. Spinous and transverse processes of the lumbar vertebrae very long and slender; bodies short. Externally, head with a short but not very distinct beak.

L. albirostris, Gray.

L. acutus, Gray = *L. eschrichtii*, Schlegel, and *L. leucopleurus*, Rasch. Closely allied, if not identical, are *L. perspicillatus*, Cope, and *L. obliquidens*, Gill.

L. electra, Gray. Known from skull only. *L. asia*, Gray.

L. clanculus, Gray. Known from skull only. Not *Electra clancula* of Hector.

Here probably may be placed—*D. cruciger* and *D. albigena*, Quoy and Gaimard; *D. bivittatus*, Lesson and Garnot, and *D. fitzroyi*, Waterhouse.

B. Dolphins with distinctly elongated rostrum, or beak, generally marked off from the antenarial adipose elevation by a V-shaped groove. In the skull the rostrum considerably exceeds the cranial portion in length. Atlas and axis firmly united; all the other cervical vertebrae free.

a. Pterygoid bones of normal form, meeting in the middle line by the whole of their parallel inner edges. Pectoral fins lanceolate. Second and third digits well developed; the rest rudimentary.

a. Palate with deep lateral grooves.

DELPHINUS, Linnæus, Syst. Nat. ed. 12, i. p. 108 (1766), restricted.

The character of the palate separates the true Dolphins from all other members of the family. The rostrum is long and narrow, generally about double the length of the cranial portion of the skull.

The teeth are small, not exceeding 3 millim. in diameter, and numerous, $\frac{40}{40}$ to $\frac{60}{60}$. Vertebrae 73 to 75.

D. delphis, Linn., with the closely allied or identical *D. novæ zelandiæ*, Quoy and Gaimard, *D. forsteri*, Gray, *D. fulvofasciatus*, Hombron and Jacquinot, and *D. bairdii*, Dall.

D. major, Gray.

D. janira, Gray. *D. pomeeagra*, Owen.

D. longirostris, Gervais (not Gray).

β. Palate not grooved.

TURSIOPS, Gervais, Hist. Nat. des Mammifères, ii. p. 323 (1855).

Rostrum tapering moderately from base to apex. Symphysis of mandible short. Teeth $\frac{21}{21}$ to $\frac{25}{25}$, stout (6 to 7 millim. in antero-posterior diameter). Vertebrae: C. 7, D. 13, L. 17, C. 27; total 64.

T. tursio (Bonnaterre), with closely allied, if not identical, *T. metis*, Gray, *T. eurynome*, Gray, *T. cymodice*, Gray, *T. aduncus*, Hemprich and Ehrenberg, and *T. gillii*, Dall.

T. catalania, Gray.

CLYMENIA, Gray, Synopsis of Whales and Dolphins, p. 6 (1868).

Clymene, Gray, P. Z. S. 1864, p. 237.

Prodelphinus, Gervais, Ostéog. des Cétacés, p. 604 (1880).

Rostrum rather variable. Symphysis of mandible short (less than one fifth of the length of the ramus). Teeth $\frac{30}{30}$ to $\frac{50}{50}$, small, not exceeding 3 millim. in diameter. Vertebrae 73 to 78.

This is a rather heterogeneous group, which may require division when better known. Four leading forms are distinguishable, the characters of which need not be repeated here, especially as they are not very easily defined. The principal species, real or nominal, which have been assigned to each are:—

1. *C. obscura*, Gray. *C. superciliosa* (Garnot and Lesson). *C. similis*, Gray. *C. (Electra) thicola*, Gray.

2. *C. euprosyne*, Gray. *C. styx*, Gray. *C. euprosynoides*, Gray. *C. dorides*, Gray. *C. marginatus* (Duvernoy). *C. tethyos*, Gervais.

3. *C. dubia* (Cuvier). *C. doris*, Gray. *C. normalis*, Gray. *C. brevimana* (Hombron and Jacquinot). *C. frænata* (F. Cuvier). *C. frontalis* (Dussumier). *C. (Steno) attenuata* (Gray). *C. (Steno) capensis* (Gray).

4. *C. longirostris*, Gray. *C. stenorhyncha*, Gray. *C. roseiventris* (Hombron and Jacquinot). *C. microps*, Gray. *C. alope*, Gray.

Péron's Dolphin (*Delphinus leucorhamphus*, Péron, or *Leucorhamphus peronii* of Lilljeborg) resembles some forms of *Clymenia* in its cranial characters; but having no dorsal fin, it has been separated

generically by some zoologists. The skeleton has not been described. Perhaps *D. borealis*, Peale, from the North Pacific, also without dorsal fin, and of which only the external characters are known, may be allied to it.

STENO, Gray, Zool. Erebus & Terror, p. 43 (1846).

Rostrum long, narrow, and compressed, very distinct from the cranium. Symphysis of the mandible as long as or longer than one fourth the length of the ramus. Teeth $\frac{21}{21}$ to $\frac{25}{25}$, of comparatively large size (5-6 millim. in diameter); surface of their crowns finely furrowed. Vertebrae: C. 7, D. 12, L. 15, C. 32; total 66.

S. rostratus (Cuvier), with the closely allied, if not identical, *S. compressus*, Gray, *S. reinwardtii* (Schlegel), and *S. perspicillatus* (Peters).

- b. Pterygoid bones narrow, not uniting in the middle line; their inner borders not parallel, but diverging posteriorly.

SOTALIA, Gray, Cat. Seals & Whales Brit. Mus. 2nd ed. p. 393 (1866).

Cranial characters, except as regards the form of the pterygoid bones, much as in *Steno*. Teeth tolerably large (4-5 millim. in diameter), $\frac{30}{30}$ to $\frac{35}{35}$, with smooth enamelled surface. Vertebrae: C. 7, D. 12, L. 10-14, C. 22; total 51-55. Pectoral fin broad at the base, the breadth being caused by the considerable development and position of the two outer digits.

S. guianensis, Van Beneden, with the closely allied *S. brasiliensis*, Ed. Van Beneden.

S. pallida, Gervais. *S. tucuxi*, Gray.

S. sinensis (F. Cuvier).

S. plumbeus (Dussumier).

S. gadamu (Owen).

S. lentiginosus (Owen).

2. On a Specimen of Rudolphi's Rorqual (*Balaenoptera borealis*, Lesson), lately taken on the Essex Coast. By
WILLIAM HENRY FLOWER, LL.D., F.R.S., P.Z.S., &c.

[Received November 19, 1883.]

Early in the morning of the 1st of the present month some fishermen discovered a Whale alive in shallow water near the mouth of the River Crouch, in Essex. After considerable difficulty they succeeded in capturing and killing it. It was exhibited for some time at Southend, and was the subject of a Chancery suit regarding its ownership between the Lord of the Manor of Burnham, Sir Henry Mildmay, and the fishermen who caught it, which resulted in the former establishing his claim to it as a "royal fish."