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to U.S.N.M.

Trans. Zool. Soc. London 1869,
6, 377-494. 99L
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XIV. *An account of the Fishes of the States of Central America, based on collections made by Capt. J. M. Dow, F. GODMAN, Esq., and O. SALVIN, Esq. By ALBERT GÜNTHER, M.A., M.D., Ph.D., F.R.S., F.Z.S.*

Read March 22nd, 1864, and December 13th, 1866.

[PLATES LXIII. to LXXXVII.]

§ 1. *Introductory Historical Remarks on the Collections forming the basis of this Memoir.*

BEFORE proceeding to the enumeration and description of the fishes known to exist in the States of Central America, I may be permitted briefly to notice the circumstances which enable me to submit to the Society the results contained in the present memoir.

Mr. Salvin started in the year 1859 on his second excursion to Guatemala, chiefly with the intention of working out the ornithological fauna of that country. But having had his attention directed by me to the fact that its cold-blooded vertebrates were almost entirely unknown, he made and brought home a small collection of reptiles and fresh-water fishes, which proved to be of sufficient interest to encourage him to pay still more attention to this subject on a third excursion, which he undertook in company with Mr. Godman in the year 1861. By far the greater part of the materials which form the basis of this memoir were obtained on this occasion. Not only did the two travellers extend their excursions to various parts of Guatemala, but Mr. Salvin also visited Panama, where he met and collected in company with Capt. Dow, of the Panama Railway Company's Steamer 'Guatemala.'

Capt. Dow, indeed, had commenced to collect fishes previously to this, having sent several collections to the Smithsonian Institution in Washington, and to the Zoological Society of London, whence they were transferred to the British Museum; and for the last three years he has continued his researches with such zeal and liberality that I cannot abstain from acknowledging here the great services he has rendered to the cause of science.

The collections made by these gentlemen contained not less than about 1500 examples, in a perfect state of preservation, many of considerable size. In addition to these, I have examined a few which had been purchased of a dealer for the British Museum having been collected at Puerto Cabello in the Bay of Honduras, and, finally, those collected by Dr. Seemann, originally deposited in the Collection of Haslar Hospital, and now in the British Museum. The latter have lost much of their scientific value, as, unfortunately, no record was kept of the localities where they were obtained; and only in a few cases have I been able to avail myself of specimens of this collection, viz. where the original label, with the name of the collector, has been accidentally preserved.

§ 2. *Topographical Features of the Localities explored.*

As regards the topographical features of the localities explored by Messrs. Dow, Godman, and Salvin, I have been favoured by the latter gentleman, by whom also the accompanying map has been prepared, with the following notes:—

Lakes.

AMATITLAN.—The Lake of Amatitlan is situated in lat. $14^{\circ} 29' N.$, long. $90^{\circ} 35' W.$, in the Republic of Guatemala. Its elevation above the sea-level is about 4500 feet. Being only a short distance on the southern side of the main ridge, it collects the waters of a few small streams, which it discharges at its southern extremity, into the river Michatoya, a mountain-torrent for half its course, then expanding, like all the rivers of Guatemala which flow into the Pacific, into a broad shallow stream with a shifting sandy bed. The lake is very deep, and its water clear. The volcanoes of Pacaya and Agua rise amongst the mountains of its southern border, the whole forming a landscape of great beauty. Fish are caught during the rainy season near the outlet into the river Michatoya, and are sent to the market of the City of Guatemala.

ATITLAN.—The Lake of Atitlan is elevated 5000 feet above the sea. Like the last-mentioned it lies in Guatemala on the southern side of the main ridge, in lat. $14^{\circ} 43' N.$, long. $91^{\circ} 14' W.$ It has no visible outlet. The water is clear and fresh, and the lake of great depth. The hills on three sides attain to a height of 2000 feet above the lake. On its southern border the two large volcanoes of Toliman and S. Pedro rise, their bases being washed on one side by the lake, giving one the idea that one of them (that called Toliman) has in rising acted as a dam and stopped the outflow of the waters of a mountain-valley. A few small streams enter the lake, the water of which rises during the rainy season, to fall again in the dry. On the mountain-slope below, several streams take their rise, supplied probably by the filtration of water from the lake; but it would appear, from the alteration of the water-level in accordance with the season of the year, that it is chiefly influenced by evaporation. A number of Indian villages surround the lake; at one of them, Panajachel, a small collection of fish was made. Fish never seem to grow to any size in this lake, the Mojara (*Heros*) being quite diminutive. The Indians fish with round nets amongst the reeds that grow at the mouths of small streams. The lake itself is about twenty-two miles long, and twelve miles wide.

DUEÑAS.—This lake is little more than a depression in one of the elevated (5000 ft.) plains forming the tablelands of Guatemala. Its depth is nowhere more than 6 feet, and its banks are everywhere clothed with reeds. A small stream connects the lake with the river Guacalate. Here, too, fish are caught by the Indians in round nets, which are held by both hands, pushed in amongst the reeds, and suddenly brought to the surface.

HUAMUCHAL.—This name applies properly to a series of small lakes situated in about lat. $14^{\circ} 32' N.$, long. $92^{\circ} 13' W.$, close to one another, about six miles from the mouth of the river Tilapa on the Pacific coast. The place is not shown on any map; but it is near

the large Lake of Tamachian, with which, in the rainy season, all these smaller lakes are connected. During this period of the year the river Tilapa overflows its banks and inundates the whole country round. In the dry season water remains in depressions of the land, forming the lagoons of Huamuchal; but in years of great drought even these dry up, the fish being destroyed; but a fresh supply finds its way from Lake Tamachian during the next inundation. The water is slightly brackish. The fish are taken in drag-nets, salted, and sold to Indians coming from the Altos of Guatemala.

MANAGUA.—According to Mr. J. Bailey this lake is about fifty or sixty miles long, by thirty-five miles wide. Its depth varies from 2 to 10 and 15 fathoms, but in its deepest part reaches to as much as 40 fathoms. Its elevation above the sea is 156 feet. On its south-western border the lake is separated from the Pacific by a series of comparatively low hills, the lowest section of which, through the Plain of Leon, is only 230 feet above the ocean-level. The high mountains of the Republic of Honduras approach the north-eastern border of the lake. On its south-eastern side an opening communicates with the Lake of Nicaragua. Commencing with the Fall of Tipitapa, of 22 feet height, the river widens into the Estero of Panaloya, and thence into the larger lake.

NICARAGUA.—The same authority gives a length of one hundred and five miles to this lake, and a width of about forty-five, its depth being about 15 fathoms. The surface of the lake is studded with numerous islands, some of them, as Omotepec, being volcanic cones. The elevation of the lake above the mean ocean-level is given as 128 feet. The same line of low hills which divides Lake Managua from the Pacific separates Lake Nicaragua from the same ocean; but at no point is the elevation so low as at that above indicated. The river San Juan, a deep stream with several rapids, flows out of the south-eastern end of the lake, and falls into the Atlantic Ocean, at the port of Greytown, or San Juan del Norte.

PETEX.—The Lake of Peten is situated in lat. $17^{\circ} 10' N.$, long. $90^{\circ} W.$, and is one of several lakes formed at the base of the Promontory of Yucatan. Its length is about thirty miles, its width eight miles, and elevation above the sea 500 feet. The water is quite fresh, clear, and of considerable depth. Neither the Lake of Peten nor the adjoining Lake of Yasha has any outlet; and in both the water is rapidly increasing in expanse—so much so that several streets of the town of Flores, which stands on an island in Lake Peten, have been absorbed within a few years, and the posts of huts, which formerly were on dry ground, may now be seen standing in deep water. This increase of water can only be accounted for by supposing that a common subterranean outlet has been stopped up, or that the land of this district is experiencing a gradual subsidence. All the fish obtained here were caught with a hook and line, or speared. All the natives, even quite small children, are very expert in using a light spear formed of bamboo cane with an iron barb at the end.

YZABAL.—This lake, which is also called the Golfo Dulce, is about thirty or forty miles long, and ten to fifteen miles wide, and has a tolerably uniform depth of about 35

to 40 feet. It is situated in lat. $15^{\circ} 30' N.$, long. $89^{\circ} 15' W.$, at the bottom of the Bay of Honduras. One large river, the Polochic, enters this lake; and it has a narrow but deep outlet to the sea, called the Rio Dulce, which is navigated by small schooners plying between Belize and the town of Yzabal. It was near this last-mentioned place that a few species of fish were obtained.

Rivers.

BAYANO.—This is a river which rises in the narrow part of Central America, and flows into the Pacific a little to the southward of the Bay of Panama.

CAHABON.—The town of Cahabon, where a few fishes were obtained, is situated on an affluent of the river which bears this name. The main stream rises in the same marsh as the Polochic, but takes another valley, in Vera Paz, and again joins the Polochic, when they both flow into the Lake of Yzabal, and thence into the Atlantic.

CHAGRES.—This is the principal river of the Isthmus of Panama. It flows into the Atlantic. The fish were obtained near the railway bridge at Barbacoas, about halfway across the isthmus.

CHISOY.—Of the numerous names this river bears, I have chosen this for the principal stream which forms the large river that flows out into the Laguna de los Terminos, in the Bay of Campeachy. This branch is also known as the Rio Negro; and after receiving the water of the Rio de la Pasion, or Rio de Santa Isabel, as it is also called, the two are usually called the Usumacinta. Fishes were collected from this river near the Indian village of Cubulco; and a number were also procured by poisoning with herbs a small stream near Saouchil, an Indian village below the town of Coban, in Vera Paz.

GUACALATE.—Is one of the numerous rivers which drain the southern watershed of the main ridge into the Pacific. It flows past Antigua, the old capital of Guatemala. Fishes were obtained about 3500 feet above the sea, where the river is still quite a torrent.

MOTAGUA.—This river, the second largest in Guatemala, rises in the main ridge, and flows, with high mountains on either side, nearly due eastward into the Atlantic. Fishes abound in this river; and nearly every year a considerable length is poisoned, and a large quantity obtained. On one of these occasions a collection was made a little below the bridge over which the highroad from Guatemala to Vera Paz passes. Another collection came from lower down the stream, below the village of Tocoy.

SAN GERONIMO.—Is a tributary of the Chisoy before mentioned. A small collection was made near the village of San Geronimo, in a plain at the foot of the mountains whence it takes its rise.

SANTA ISABEL.—A small stream flowing into this river, one of the principal branches of the Usumacinta, was poisoned, and a number of small fishes obtained.

SAN SALVADOR.—A few small fishes were caught by Capt. Dow in a warm stream near the capital town of this republic.

Marine localities.

BELIZE.—All fishes from Belize were from the market, and were caught amongst the coral reefs which line this coast.

CARDON¹ ISLAND.—Is situated at the mouth of the fine harbour of Realejo, in Nicaragua. Fishes were found at low tide in the pools amongst the rocks, and caught with a landing-net.

CHIAPAM.—The whole coast of Guatemala, bordering the Pacific Ocean, is studded with a number of lagoons formed at the mouths of the numerous rivers which flow down from the neighbouring mountains. All these rivers are charged with volcanic sand, which is thrown back by the heavy surf that rolls in on this coast. The body of water brought down during the dry season is often insufficient to reduce this sandbar; and it frequently happens that all outlet to the sea is stopped. The accumulation of water during the rainy season breaks this barrier; but it again forms when the water subsides. About the period of the cessation of the rains the natives cut an artificial channel, which, at first widening of itself, often remains open some months, each tide bringing a great quantity of fishes into the lagoon, which are there netted by drag-nets. The water is almost salt, but varies in this respect according to the size of the river which enters it. A few fishes were also obtained by a hook and line from a canoe in the open sea.

LIBERTAD.—This is an open roadstead, the port of the City of San Salvador. Whilst we were lying at anchor here a few fishes were caught with a hook and line.

PANAMA.—Most of the fishes taken in the Bay of Panama were found in the pools amongst the rocks at low tide. A reef running out from the town was an excellent locality; one spring tide Capt. Dow and I secured twenty-four species in the course of half an hour.

SAN JOSÉ.—Is the port of Guatemala on the Pacific side; a few fishes were caught here in the open sea in a canoe.

§ 3. *Definition of the Boundaries of the Fauna treated of in this Memoir.*

Although we may presume that our account contains a tolerably complete list of the species inhabiting the localities visited, particularly as on several occasions poison (the best means for securing a complete series of the fishes of a certain locality) was resorted to, yet there is still a wide field for future explorers in a country where several forms (such as *Heros*, *Pimelodus*, and the *Cyprinodontes*) are so much developed and specialized. Of the fishes of Yucatan we still know absolutely nothing. The list of the marine fishes of the Atlantic coast will, without doubt, be considerably swelled, as the gentlemen mentioned paid much less attention to the Atlantic marine fauna (which would have yielded comparatively few novelties) than to the freshwater fauna. And knowing how little advantage is derived from, and how much confusion is caused by, receiving into a

¹ This name is misspelt "Cardova" in several places in the 3rd volume of the 'Catalogue of Fishes.'—A. G.

fauna species which may be *expected* to belong to it, although they are not yet discovered within its limits, I have excluded all species not actually known from Guatemala, although they have been obtained north and south of it. A collection made by Mr. Godman at Belize was of great value in determining this part of the fauna.

Numerous species of fishes have been described from Mexico¹; and if we were better acquainted with their geographical distribution, it would have been useful to treat at least of the southern portion of them, in conjunction with the Guatemalan species. Unfortunately but a small proportion of the exact localities are known, so that at present no line can be drawn to indicate where the preponderance of nearctic types over tropical ones terminates. Thus, confining myself to the fishes occurring between the political boundary of Guatemala in the north and the Isthmus of Darien in the south, I would repeat that, previously to the receipt of the collections forming the basis to this Memoir, only a small number had been described, as will be seen from the following remarks:—

§ 4. *Historical account of Publications previous to this Memoir.*

It would be of but little advantage to enumerate the few isolated species incidentally described in general works or memoirs as occurring in Guatemala or Panama. However, I must mention that the first traveller who collected fishes in these states appears to have been Baron von FRIEDRICHSTHAL. I am not aware that any account of his travels has been published; but in a paper published by the late JACOB HECKEL in 'Annalen des Wiener Museums,' vol. ii. 1840, a single species is described, which is stated to be from Friedrichsthal's Central-American Collection, and which I have recognized as belonging to the Lake-Peten fauna (*Heros friedrichsthalii*). The greater part of the collection made by this gentleman evidently remained unpublished until 1864, when Dr. F. STEINDACHNER determined from it four other species (Denkschr. Akad. Wiss. Wien, xxiii.), viz.:—*Heros wrophthalmus* (Gthr.), *Heros triagramma*=*H. salvini* (Gthr.), *Heros melanopogon*, and *Petenia splendida* (Gthr.). As we have received four of these species from Lake Peten, it is very probable that Baron Friedrichsthal visited and collected in that locality.

In the second place I have to mention Dr. SEEMANN, who, as naturalist attached to the expedition of the 'Herald,' brought to England a collection of Central-American fishes. These, as I have mentioned above, were originally deposited in the collection of Haslar Hospital, but no record as regards the origin of the specimens was kept, so that most of them are lost for the purposes of this Memoir.

In the year 1861 I received the first collections from Mr. SALVIN and Capt. DOW. The species belonging to the families treated of in the 3rd volume of the 'Catalogue of Fishes' were described therein; and a separate account of those sent by the latter

¹ Prof. Troschel enumerates some 130 freshwater and marine species in Müller's 'Reisen in den Vereinigten Staaten,' &c.

gentleman from the Pacific Coast of Central America was published in the Society's 'Proceedings' for 1861 (Nov. 26); it contained fourteen species, ten of which were new.

In the following year the 4th volume of the 'Catalogue of Fishes' was published, containing the descriptions of those species of Pharyngognaths and Anacanthines which had arrived from our travellers, who were then engaged in collecting.

In the year 1863 Mr. GILL published a descriptive enumeration of a collection of "Fishes from the western coast of Central America, presented to the Smithsonian Institution by Capt. J. M. Dow." He distinguished in it the following twenty-five species, of which I consider eighteen to have been new to science (Proc. Ac. Nat. Sc. Philad. 1863, p. 162):—

1. *Diapterus dowii*, sp. n. = *Gerres dowii*.
2. *Pomacanthodes zonipectus*, Gill.
3. *Centropomus armatus*, sp. n.
4. *Epinephelus analogus*, sp. n. = *Serranus analogus*.
5. *Promicropterus decoratus*, sp. n. = *Rhypticus decoratus*.
6. *Bairdiella armata*, sp. n. = *Corvina armata*.
7. *Ophioscion typicus*, sp. n. = *Corvina ophioscion*.
8. *Amblyscion argenteus*, sp. n.
9. *Caranx panamensis*, Gill, = *Caranx speciosus* (Forsk.).
10. *Carangoides dorsalis*, sp. n.
11. *Carangus marginatus*, Gill, = *Caranx hippos*, L., var.
12. *Oligoplites inornatus*, sp. n. = *Chorinemus inornatus*.
13. *Exocoetus dowii*, sp. n.
14. — *albidactylus*, sp. n. ? = *E. bahiensis* (Ranz.).
15. *Upeneus grandisquamis*, sp. n.
16. *Trichidion opercularis*, sp. n. = *Polynemus opercularis*.
17. — *approximans* = *Polynemus approximans* (Lay & Benn.).
18. *Mugil guentherii*, Gill, = *M. brasiliensis* (Agass.).
19. *Batrachoides pacifici* = *Batrachus pacifici* (Gthr.).
20. *Dormitator microphthalmus*, Gill, = *Eleotris maculata* (Bl.).
21. *Leptarius dowii*, sp. n. = *Arius dowii*.
22. *Sciades troschelii*, sp. n. = *Arius troschelii*.
23. *Elurichthys panamensis*, sp. n.
24. *Atractosteus tropicus*, sp. n. = *Lepidosteus tropicus*.
25. *Urotrygon mundus*, sp. n.

At later periods Mr. Gill has described some other species incidentally, which will be referred to in the general list.

A small collection made by Prof. M. WAGNER on the Isthmus of Panama, between 7° and 9° lat. N., and 77° and 83° long. W., was examined by Messrs. KNER & STEIN-

DACHNER, who gave a preliminary account of it in 'Sitzgsber. bayer. Akad. Wiss.' 1863, pp. 220-230, and more detailed descriptions in 'Abhandl. bayer. Akad. Wiss.' 1864 (1865), pp. 1-61. Prof. M. Wagner added, besides, a detailed account of the hydrographical peculiarities of this part of Central America (pp. 65-92). The species treated of in these Memoirs are the following:—

1. *Pristipoma humile*, sp. n.
2. *Dajaus elongatus* (K. & St.)=*Agonostoma nasutum* (Gthr.).
3. *Dajaus monticola* (C. & V.).
4. *Acara cæruleopunctata*, sp. n.
5. *Heros altifrons*, sp. n.
6. *Heros sieboldii*, sp. n.
7. *Eleotris pictus*, sp. n.
8. *Engraulis macrolepidotus*, sp. n.
9. — *poeyi*, sp. n.
10. *Xiphophorus gillii*, K. & St.,=*Pæcilia*, sp. ?
11. *Macrodon brasiliensis*, K. & St.,=*M. microlepis* (Gthr.).
12. *Saccodon wagneri*, sp. n.
13. *Pseudochalceus lineatus*, sp. n.
14. *Chalcinopsis striatulus*, sp. n.
15. — *chagrensis*, sp. n.
16. *Chalceus atrocaudatus*, sp. n.
17. *Tetragonopterus aneus* (Gthr.).
18. — *gronovii* (C. & V. ?).
19. *Bagrus* (?) *arioides*, sp. n.=*Arius multiradiatus* (Gthr.).
20. *Pimelodus modestus* (Gthr.)
21. — *cinerascens* (K. & St.)=*P. wagneri* (Gthr.).
22. *Loricaria uracantha*, sp. n.
23. — *lima* (Kner).
24. *Hypostomus plecostomus* (K. & St.)=*Plecostomus*, sp.
25. *Ancistrus cirrhosus* (C. & V.).
26. *Acanthias vulgaris* (Risso ?).

Finally, having received in 1864 the last collections made by Messrs. Godman & Salvin, I gave preliminary notices of the new species in the 'Proceedings' of this Society, embodying the numerous contributions to our knowledge of the Siluroids and Characinoids in the fifth volume of the 'Catalogue of Fishes,' to which were added the Cyprinodontes and Scombresocides in the sixth (1865-66).

§ 5. General List of Central-American Fishes.

After these introductory remarks on the contributions to the ichthyology of Central

America preceding this Memoir, I at once proceed to give a list of all the species known to exist in these countries. There are comparatively few which I do not know from autopsy; their names are printed in italics. An asterisk (*) marks those which are described or remarked upon. The second column contains chiefly the names of the localities where they have been found within the limits of Central America. The localities of species occurring on both sides of the Isthmus are printed in italics; of these I shall treat again subsequently. Finally, the letter M signifies that a species is marine, B that it is known from brackish, and F that it is from fresh water.

ACANTHOPTERYGII.

Fam. PERCIDÆ.

CENTROPOMUS, *Cuv.*

1. * <i>appendiculatus</i> , <i>Poey</i> . . .	Chagres R. (Cuba, Mex., Surin.) . . .	F. & M.
2. * <i>medius</i> , <i>Gthr.</i> . . .	Chiapam . . .	B.
3. * <i>nigrescens</i> , <i>Gthr.</i> . . .	Chiapam . . .	B.
4. * <i>parallelus</i> , <i>Poey</i> . . .	Chagres R. (W. Indies, Bahia) . . .	F. & M.
5. * <i>armatus</i> , <i>Gill</i> . . .	Chiapam . . .	B.
6. * <i>ensiferus</i> , <i>Poey</i> . . .	Belize (Cuba, Jamaica, Guyanas) . . .	B.

CENTROPRISTIS, *Bris. de Barnev.*

7. * <i>macropoma</i> , <i>Gthr.</i> . . .	Panama . . .	M.

SERRANUS, *Cuv.*

8. * <i>creolus</i> , <i>C. & V.</i> . . .	<i>Atl. & Pac.</i> . . .	M.
9. <i>striatus</i> , <i>Bl.</i> . . .	<i>Atlant.</i> . . .	M.
10. <i>coronatus</i> , <i>C. & V.</i> . . .	<i>Atlant.</i> . . .	M.
11. <i>undulosus</i> , <i>C. & V.</i> . . .	<i>Atlant.</i> . . .	M.
12. * <i>sellicauda</i> , <i>Gill</i> . . .	Pacific Coast . . .	M.
13. * <i>analogus</i> , <i>Gill</i> . . .	Pacific Coast . . .	M.?

PLECTROPOMA, *Cuv.*

14. * <i>afrum</i> , <i>Bl.</i> . . .	<i>Atl. & Pac.</i> . . .	M.

RHYPTICUS, *Cuv.*

15. * <i>decoratus</i> , <i>Gill</i> . . .	Pacific Coast . . .	M.

MESOPRION, *Cuv.*

16. <i>chrysurus</i> , <i>Bl.</i> . . .	<i>Atlant.</i> . . .	M.
17. <i>griseus</i> , <i>C. & V.</i> . . .	<i>Atl. & Pac.</i> . . .	M.
18. <i>uninotatus</i> , <i>C. & V.</i> . . .	<i>Atl. & Pac.</i> . . .	M.
19. * <i>aratus</i> , <i>Gthr.</i> . . .	Chiapam, Panama . . .	M. & B.
20. <i>vivans</i> , <i>C. & V.</i> . . .	<i>Atlant.</i> . . .	M.

APOGON, *Lacép.*

21. * <i>dovii</i> , <i>Gthr.</i> . . .	Pacific Coast . . .	M.

Fam. PRISTIPOMATIDÆ.

PRISTIPOMA, *Cuv.*

22. *melanopterum, *C. & V.* *Atl. & Pac.* M.
 23. *virginicum, *L.* *Atl. & Pac.* M.
 24. *dovii, *Gthr.* Panama M.
 25. *chalceum, *Gthr.* Panama M.
 26. *humile, *Kner & Steind.* Rio Bayano F.
 27. *macracanthum, *Gthr.* Chiapam B.
 28. crocro, *C. & V.* Rio Motagua (Trop. Amer., Atlant.) . . . F., B., & M.
 29. *leuciscus, *Gthr.* San José, Chiapam, Panama B.

CONODON, *C. & V.*

30. *pacifici, *Gthr.* Chiapam B.

HEMULON, *Cuv.*

31. chromis, *Brouss.* Atlant. . . . M.
 32. canna, *C. & V.* Atlant. . . . M.
 33. xanthopterus, *C. & V.* Atlant. . . . M.
 34. *brevirostrum, *Gthr.* Panama, Puerto Cabello M.
 35. *margaritiferum, *Gthr.* Panama M.

LOBOTES, *Cuv.*

36. auctorum, *Gthr.* Atlant. (India) B.

Fam. SQUAMIPINNES.

CHÆTODON, *Cuv.*

37. striatus, *L.* Atlant. . . . M.
 38. capistratus, *L.* Atlant. . . . M.
 39. *humeralis, *Gthr.* Panama (Sandwich Isl.) M.

POMACANTHUS, *Lacép.*

40. paru, *Gthr.* Atlant. (Colon) M.
 41. *zonipectus, *Gill* Pac. . . . M.

EPHIPPIUS, *Cuv.*

42. faber, *Bl.* Atlant. (Belize) M.

Fam. MULLIDÆ.

UPENEUS, *C. & V.*

43. *tetraspilus, *Gthr.* Panama M.
 44. *grandisquamis, *Gill* Panama M.

Fam. SPARIDÆ.

SARGUS, *Cuv.*

45. unimaculatus, *Bl.* Atlant. (Belize) M.
 46. aries, *C. & V.* Atlant. (Belize) M.

CHRYSOPHRYS, *Cuv.*

47. *calamus, *C. & V.* Atl. & Pac. (Panama) M.

PIMELEPTERUS, *Cuv.*

48. bosci, *Lacép.* Atl. & Pac. (Chiapam & Panama) M.

Fam. CIRRHITIDÆ.

CIRRHITICHTHYS, *Blkr.*

49. **rivulatus*, *Val.* Galapagos Islands, Panama M.

Fam. SCORPÆNIDÆ.

SCORPÆNA, *Art.*

50. *plumieri*, *Bl.*, *Schn.* *Atl. & Pac.* (Panama) M.

Fam. POLYNEMIDÆ.

POLYNEMUS, *L.*

51. **melanopoma*, *Gthr.* San José M.
 52. **approximans*, *Lay & Benn.* *Pacif.*, Chiapam, Panama M.
 53. **opercularis*, *Gill.* *Pacif.* M.

Fam. SCLÆNIDÆ.

LARIMUS, *C. & V.*

54. **breviceps*, *C. & V.* *Atl. & Pac.* (Panama) M.

MICROPOGON, *Cuv. & Val.*

55. *undulatus*, *L.* *Atlant.* M. & F.
 56. **altipinnis*, *Gthr.* Chiapam, San José, Panama M. & B.

UMBRINA, *Cuv.*

57. **elongata*, *Gthr.* Chiapam B.
 58. **nasus*, *Gthr.* Panama M.
 59. **nalis*, *Gthr.* Panama M.

CORVINA, *Cuv.*

60. *ronchus*, *C. & V.* *Atlant.* M.
 61. **chrysoleuca*, *Gthr.* Panama M.
 62. **vermicularis*, *Gthr.* Panama M.
 63. **armata*, *Gill.* *Pacif.*
 64. **ophioscion*, *Gthr.* Panama M.

OTOLITHUS, *Cuv.*

65. **squampinnis*, *Gthr.* Panama M.
 66. **albus*, *Gthr.* Chiapam B.
 67. **reticulatus*, *Gthr.* San José, Chiapam M. & B.

Fam. ACRONURIDÆ.

ACANTHURUS, *Schn.*

68. *chirurgus*, *Bl.* *Atlant.* M.

Fam. CARANGIDÆ.

CARANX, *Gthr.*

69. *crumenophthalmus*, *Bl.* *Atl. & Pac.* M.
 70. *amblyrhynchus*, *C. & V.* *Atlant.* M.
 71. **leucurus*, *Gthr.* Panama M.
 72. **speciosus*, *Forsk.* From Panama to East Africa M.

73. carangus, <i>Bl.</i>	<i>Atlant. & Ind. Occ.</i> (Chiapam & Belize)	M.
74. *hippos, <i>L.</i>	<i>Tropics generally</i>	M.
75. *caballus, <i>Gthr.</i>	Panama	M.
76. *caninus, <i>Gthr.</i>	Panama	M.
77. *dorsalis, <i>Gill</i>	San Diego (Cal.), Panama	M.
<i>ARGYRIOSUS, Lac.</i>		
78. vomer, <i>L.</i>	<i>Atl. & Pac.</i> (Belize, Chiapam, Panama)	B. & M.
79. setipinnis, <i>Mitch.</i>	<i>Atl. & Pac.</i> (Panama)	M.
<i>CHORINEMUS, C. & V.</i>		
80. occidentalis, <i>L.</i>	<i>Atlant.</i>	M.
81. saliens, <i>Bl.</i>	<i>Atlant. & Pac.</i> (Chiapam, Isabel)	B. & F.
82. *altus, <i>Gthr.</i>	Panama	M.
83. *inornatus, <i>Gill</i>	Panama	M.
<i>TRACHYNOTUS, C. & V.</i>		
84. ovatus, <i>L.</i>	<i>Atl., Pac., & Ind. Oc.</i> (Panama)	M.
85. *fasciatus, <i>Gill</i>	Panama, San José	M.

Fam. SCOMBRIDÆ.

<i>PELAMYS, C. & V.</i>		
86. *sarda, <i>Bl.</i>	<i>Atl. & Pac.</i>	M.
<i>CYBIUM, Cuv.</i>		
87. maculatum, <i>Mitch.</i>	<i>Atlant.</i> (Belize)	M.
<i>ECHENEIS, Art.</i>		
88. remora, <i>L.</i>	<i>Atl., Pac., & Ind. Oc.</i>	M.
89. naucrates, <i>L.</i>	<i>Atl., Pac., & Ind. Oc.</i>	M.

Fam. BATRACHIDÆ.

<i>BATRACHUS, Gthr.</i>		
90. *pacifici, <i>Gthr.</i>	<i>Panama, West Coast of Africa</i>	M.
91. surinamensis, <i>Bl. Schn.</i>	<i>Atl. & Pacif.</i> (Panama)	M.
<i>*THALASSOPHRYNE, Gthr.</i>		
92. *maculosa, <i>Gthr.</i>	Puerto Cabello	M.
93. *reticulata, <i>Gthr.</i>	Panama	M.
<i>PORICHTHYS, Girard.</i>		
94. porosissimus, <i>C. & V.</i>	<i>Atl. & Pac.</i>	M.

Fam. PEDICULATI.

<i>ANTENNARIUS, Commers.</i>		
95. *leopardinus, <i>Gthr.</i>	Panama	M.
96. *tenuifilis, <i>Gthr.</i>	Panama	M.

Fam. GOBIIDÆ.

<i>GOBIUS, Art.</i>		
97. soporator, <i>C. & V.</i>	<i>Atl. & Pac.</i> (Panama)	M. & B.
98. paradoxus, <i>Gthr.</i>	Panama	M.

99. <i>mexicanus</i> , <i>Gthr.</i>	Mexico, Rio Motagua	F.
100. <i>seminudus</i> , <i>Gthr.</i>	Panama	M.
<i>EUCTENOGOBIOUS</i> , <i>Gill.</i>		
101. <i>sagittula</i> , <i>Gthr.</i>	Panama	M.
<i>SICYDIUM</i> , <i>C. & V.</i>		
102. <i>plumieri</i> , <i>Bl.</i>	<i>Atl. & Pac.</i> (Panama)	M.
<i>ELEOTRIS</i> , <i>Cuv.</i>		
103. <i>*maculata</i> , <i>Bl.</i>	<i>Atl. & Pac.</i> (Huamuchal)	B.
104. <i>somnolenta</i> , <i>Girard</i>	<i>Atl. & Pac.</i> (Cardon)	M.
105. <i>dormitatrix</i> , <i>Bl.</i>	Atl. (Rio Motagua, Yzabal)	F. & B.
106. <i>*longiceps</i> , <i>Gthr.</i>	Lake of Nicaragua	F.
107. <i>*picta</i> , <i>Kner</i>	Rio Bayano	F.
108. <i>*seminuda</i> , <i>Gthr.</i>	Panama	M.
<i>AMBLYOPUS</i> , <i>C. & V.</i>		
109. <i>*brevis</i> , <i>Gthr.</i>	Panama	M.

Fam. BLENNIIDÆ.

<i>BLENNIUS</i> , <i>Artedi.</i>		
110. <i>brevipinnis</i> , <i>Gthr.</i>	Pacif.	M.
<i>SALARIAS</i> , <i>Cuv.</i>		
111. <i>atlanticus</i> , <i>C. & V.</i>	<i>Atl. & Pac.</i>	M.
<i>CLINUS</i> , <i>Gthr.</i>		
112. <i>nuchipinnis</i> , <i>Q. & G.</i>	<i>Atl. & Pac.</i>	M.
113. <i>delalandii</i> , <i>C. & V.</i>	<i>Atl. & Pac.</i>	M.
114. <i>*macrocephalus</i> , <i>Gthr.</i>	Panama	M.
<i>CREMNOBATES</i> , <i>Gthr.</i>		
115. <i>*monophthalmus</i> , <i>Gthr.</i>	Panama	M.

Fam. SPHYRÆNIDÆ.

<i>SPHYRENA</i> , <i>Artedi.</i>		
116. <i>picuda</i> , <i>Bl.</i>	Atl.	M.
117. <i>forsteri</i> , <i>C. & V.</i>	Ind. Oc. & Pac. (Chiapam)	M. & B.

Fam. ATHERINIDÆ.

<i>ATHERINICHTHYS</i> , <i>Gthr.</i>		
118. <i>*pachylepis</i> , <i>Gthr.</i>	Panama	M.
119. <i>*guatemalensis</i> , <i>Gthr.</i>	Huamuchal	B.

Fam. MUGILIDÆ.

<i>MUGIL</i> , <i>Artedi.</i>		
120. <i>*brasiliensis</i> , <i>Agass.</i>	<i>Atl. & Pac.</i>	M. & F.
121. <i>*incilis</i> , <i>Hancock</i>	Atl. (Chagres)	M. & F.
122. <i>proboscideus</i> , <i>Gthr.</i>	<i>Atl. & Pac.</i> (Cardon)	M. & F.
<i>AGONOSTOMA</i> , <i>Benn.</i>		
123. <i>*microps</i> , <i>Gthr.</i>	Rio Guacalate	F.

124. *nasutum, *Gthr.* { *Rivers of both sides of C. America* (R. San Geronimo,
R. Motagua, Panama) F.
125. *monticola, *Bancroft* *W. Indies and rivers of both sides of C. America* F.
MYXUS, Gthr.
126. *harengus, Gthr.* Panama M.

Fam. FISTULARIIDÆ.

FISTULARIA, Lacép.

127. *tabaccaria, L.* *Atl. & Pac.* M.

Fam. GOBIESOCIDÆ.

SICYASES, Müll. & Trosch.

128. *fasciatus, Ptrs.* Puerto Cabello M.

GOBIESOX, Lacép.

129. **rhodospilus, Gthr.* Panama M.
130. *nigripinnis, Ptrs.* Puerto Cabello M.
131. *nudus, Bl.* *Atl. & Pac. (Cardon)* M.

PHARYNGOGNATHI ACANTHOPTERYGII.

Fam. POMACENTRIDÆ.

POMACENTRUS, C. & V.

132. **rectifrenum, Gill* *Pacif. & Atl.* M.
133. *leucostictus, Müll. & Trosch.* *Atl.* M.

GLYPHIDODON, Cuv.

134. *saxatilis, L.* *Atl.* M.
135. *concolor, Gill* *Atl. & Pac. (Cardon)* M.
136. *declivifrons, Gill* *Pac. (Cardon)* M.

HELIASTES, C. & V.

137. **marginatus, Casteln.* *Atl. & Pac.* M.

Fam. LABRIDÆ.

LACHNOLEMUS, C. & V.

138. *falcatus, L.* *Atl.* M.

COSSYPHIUS, Günth.

139. *rufus, L.* *Atl.* M.
140. *diplothenia, Gill* Panama, Lower Calif. M.
141. **pectoralis, Gill* Panama, Lower Calif., St. Helena (? Cuba) M.

PLATYGLOSSUS, Gthr.

142. *bivittatus, Bl.* *Atl.* M.
143. **dispilus, Gthr.* Panama M.

PSEUDOJULIS, Blkr.

144. **notospilus, Gthr.* Panama M.

JULIS, Gthr.

145. *lucasana*, Gill Panama, Lower Calif. M.

SCARUS, Blkr.

146. *abildgaardii*, Bl. Atl. M.

PSEUDOSCARUS, Blkr.

147. *sanctæ crucis*, Bl. Atl. M.
 148. *guacamaia*, C. & V. Atl. M.

Fam. GERRIDÆ.

GERRES, Cuv.

149. *plumieri*, C. & V. Atl. F., B., & M.
 150. **axillaris*, Gthr. Chiapam B.
 151. **brevimanus*, Gthr. Chiapam B.
 152. *rhombus*, C. & V. Atl. & Pac. (Chiapam) B. & M.
 153. *squamipinnis*, Gthr. (Jamaica) Atl. & Pac. (Chiap. & Panama) B. & M.
 154. *aprior*, C. & V. Atl. & Pac. (Panama) M.
 155. **dovii*, Gill Pac.

Fam. CHROMIDES.

ACARA, Gthr.

156. **cæruleopunctata*, Kner & Steind. Chagres River F.

HEROS, Gthr.

157. **parma*, Gthr. Mexico, R. Chagres & R. Motagua F.
 158. **margaritifera*, Gthr. Lake Peten F.
 159. **melanopogon*, Steindachner . . . ? Lake Peten F.
 160. **melanurus*, Gthr. Lake Peten F.
 161. **macracanthus*, Gthr. Chiapam & Huamuchal F. & B.
 162. **spilurus*, Gthr. Rio Motagua, Yzabal F.
 163. **nigrofasciatus*, Gthr. Lakes of Amatitlan & Atitlan F.
 164. **multispinosus*, Gthr. Lake of Managua F.
 165. **longimanus*, Gthr. Lake of Nicaragua F.
 166. **urophthalmus*, Gthr. Lake Peten F.
 167. **aureus*, Gthr. Yzabal, Rio Motagua F.
 168. **affinis*, Gthr. Lake Peten F.
 169. **labiatus*, Gthr. Lakes of Managua & Nicaragua F.
 170. **erythreus*, Gthr. Lake of Managua F.
 171. **lobochilus*, Gthr. Lake of Managua F.
 172. **citrinellus*, Gthr. Lake of Nicaragua F.
 173. **altifrons*, Kner & Steind. Western Veragua F.
 174. **friedrichsthalii*, Heck. Lake Peten F.
 175. **salvini*, Gthr. Santa Isabel, Lake Peten F.
 176. **trimaculatus*, Gthr. Chiapam, Huamuchal F. & B.
 177. **dovii*, Gthr. Lake of Nicaragua F.
 178. **motaguensis*, Gthr. Rio Motagua F.

179. *managuensis, <i>Gthr.</i>	Lake of Managua	F.
180. *microphthalmus, <i>Gthr.</i>	Rio Motagua	F.
181. *oblongus, <i>Gthr.</i>	Rio Motagua	F.
182. *nicaraguensis, <i>Gthr.</i>	Lake of Nicaragua	F.
183. *godmanni, <i>Gthr.</i>	River of Cahabon	F.
184. *sieboldii, Kner & Steindachner .	New Granada	F.
185. *guttulatus, <i>Gthr.</i>	Lake of Amatitlan	F.
186. *irregularis, <i>Gthr.</i>	Rio Usumacinta, S. Geronimo	F.
187. *intermedius, <i>Gthr.</i>	Lake Peten	F.
188. *angulifer, <i>Gthr.</i>	Yzabal	F.
*PETENIA, <i>Gthr.</i>		
189. *splendida, <i>Gthr.</i>	Lake Peten	F.
*NEETROPLUS, <i>Gthr.</i>		
190. *nematopus, <i>Gthr.</i>	Lake of Managua	F.

ANACANTHINI.

Fam. LYCODIDÆ.

*MICRODESMUS, *Gthr.*

191. *dipus, <i>Gthr.</i>	Panama	M.
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Fam. OPHIDIIDÆ.

BROTULA, *Cuv.*

192. *? multibarbata, <i>Schleg.</i>	Pac. coast	M.
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DINEMATICHTHYS, *Blkr.*

193. marginatus, <i>Ayres</i>	Panama	M.
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OPHIDIUM, *Cuv.*

194. brevibarbe, <i>Cuv.</i>	Atl. & Pac.	M.
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Fam. PLEURONECTIDÆ.

CITHARICHTHYS, *Blkr.*

195. *spilopterus, <i>Gthr.</i>	Atl. & Pac. (Chiapam)	M. & B.
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196. *guatemalensis, <i>Blkr.</i>	Guatemala	
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HEMIRHOMBUS, *Blkr.*

197. *ovalis, <i>Gthr.</i>	Pac.	M.
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PSEUDORHOMBUS, *Blkr.*

198. *brasiliensis, <i>Ranzani</i>	Atl.	M.
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SOLEA, *Gthr.*

199. scutum, <i>Gthr.</i>	Panama	M.
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APHORISTIA, *Kaup.*

200. *ornata, <i>Lacép.</i>	Atl. & Pac.	M.
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PHYSOSTOMI.

Fam. SILURIDÆ.

AMIRUS, Rafin.

201. *meridionalis, Gthr. Rio Usumacinta F.

PIMELODUS, Gthr.

202. modestus, Gthr. Rio Chagres, Esmeraldas F.
 203. guatemalensis, Gthr. Huamuchal F.
 204. godmanni, Gthr. Lower Vera Paz, Rio Motagua, Mexico F.
 205. *wagneri, Gthr. Pacific & Atlantic rivers of Panama F.
 206. *managuensis, Gthr. Lake of Managua F.
 207. micropterus, Gthr. Rio San Geronimo F.
 208. nicaraguensis, Gthr. Lake of Nicaragua F.
 209. petenensis, Gthr. Lake Peten F.
 210. motaguensis, Gthr. Rio Motagua F.
 211. salvini, Gthr. Rio San Geronimo F.
 212. polycaulus, Gthr. Rio San Geronimo F.

ARIUS, Gthr.

213. guatemalensis, Gthr. Chiapam, Panama B.
 214. *assimilis, Gthr. Lake of Yzabal F.
 215. platypogon, Gthr. San José F.
 216. seemanni, Gthr. — ?
 217. cærulescens, Gthr. Huamuchal F.
 218. troscheli, Gill Pac.
 219. *dovii, Gill Pac.
 220. melanopus, Gthr. Rio Motagua F.
 221. multiradiatus, Gthr. Rio Bayano F.

ÆLURICHTHYS, Baird & Gir.

222. *nuchalis, Gthr. Panama
 223. *panamensis, Gill Panama

PLECOSTOMUS, Gthr.

224. *? sp., Kner & Steindachner Rio Chagres F.

CHÆTOSTOMUS, Heck.

225. *aspidolepis, Gthr. Veragua F.
 226. *? cirrhosus, Val. Rio Chagres F.

LORICARIA, Lacép.

227. *uracantha, Kner & Steindachner Atlantic & Pacific rivers of Panama F.
 228. lima, Kner Atlantic & Pacific rivers of Panama F.

Fam. CHARACINIDÆ.

MACRODON, Müll. & Trosch.

229. *microlepis, Gthr. W. Ecuador, Rio Chagres F.

TETRAGONOPTERUS, Cuv.

230. fasciatus, Cuv. { From Brazil to Mexico (Huamuchal, Rio Guacalate,
 Rio Motagua, Rio Chisoy) F.

231. <i>microphthalmus</i> , <i>Gthr.</i>	Lake of Amatitlan, Pacif. Coast of Guatemala, Peru.	F.
232. <i>panamensis</i> , <i>Gthr.</i>	<i>Panama, Yzabal</i>	F.
233. <i>brevimanus</i> , <i>Gthr.</i>	Rio S. Geronimo, Yzabal.	F.
234. <i>petenensis</i> , <i>Gthr.</i>	<i>Lake Peten, W. Ecuador</i>	F.
235. <i>humilis</i> , <i>Gthr.</i>	Lake of Amatitlan	F.
236. <i>*æneus</i> , <i>Gthr.</i>	Mexico, <i>Pacific & Atlantic rivers of Panama</i>	F.
<i>CHALCINOPSIS</i> , <i>Kner.</i>		
237. <i>*dentex</i> , <i>Gthr.</i>	<i>Rio Motagua and Usumacinta, Yzabal; Ecuador</i> . .	F.
238. <i>striatulus</i> , <i>Kner</i>	<i>Pacific & Atlantic rivers of Panama</i>	F.
239. <i>chagrensis</i> , <i>Kner</i>	Rio Chagres	F.
<i>ANACYRTUS</i> , <i>Gthr.</i>		
240. <i>*guatemalensis</i> , <i>Gthr.</i>	<i>Rio Chagres, Huamuchal</i>	F.

Fam. SCOPELIDÆ.

SAURUS, *C. & V.*

241. <i>ætens</i> , <i>L.</i>	<i>Atl. & Pac.</i>	M.
242. <i>myops</i> , <i>Bl.</i>	<i>Atl. & Pac.</i>	M.

Fam. SCOMBRESOCIDÆ.

HEMIRHAMPHUS, *Cuv.*

243. <i>unifasciatus</i> , <i>Ranzani</i>	<i>Atlantic, Pacific, & Indian Oceans</i>	M.
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EXOCETUS, *Artedi.*

244. <i>*callopterus</i> , <i>Gthr.</i>	<i>Pac.</i>	M.
245. <i>albidactylus</i> , Gill (? = <i>bahiensis</i> , <i>Ranz.</i>)	} <i>Pac.</i>	M.
246. <i>dovii</i> , Gill		

Fam. CYPRINODONTIDÆ.

**CHARACODON*, *Gthr.*

247. <i>*lateralis</i> , <i>Gthr.</i>	— ?
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HAPLOCHILUS, *M'Clell.*

248. <i>*dovii</i> , <i>Gthr.</i>	Punta Arenas (Costa Rica)	F.
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FUNDULUS, *C. & V.*

249. <i>*labialis</i> , <i>Gthr.</i>	Rio S. Geronimo, Yzabal	F.
250. <i>*punctatus</i> , <i>Gthr.</i>	Chiapam	B.
251. <i>*guatemalensis</i> , <i>Gthr.</i>	{ Lakes of Dueñas & Amatitlan, Rio Guacalate, W. Ecuador	F.
252. <i>*pachycephalus</i> , <i>Gthr.</i>		

BELONESOX, *Kner.*

253. <i>belizanus</i> , <i>Kner</i>	Lake Peten, Honduras, Mexico	F.
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GAMBUSIA, *Poey.*

254. <i>*nicaraguensis</i> , <i>Gthr.</i>	Lake of Nicaragua	F.
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ANABLEPS, *Artedi.*

255. <i>dovii</i> , <i>Gill</i>	Chiapam	B.
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PÆCILIA, *Gthr.*

256. *mexicana*, *Steindachner* { *Chiapam, Dueñas, Rio Chisoy, Huamuchal, Lake of*
Amatitlan F. & B.
 257. *thermalis*, *Steindachner* San Salvador, Mexico F.
 258. *chisoyensis*, *Gthr.* Rio Chisoy F.
 259. **clongata*, *Gthr.* Panama
 260. **petenensis*, *Gthr.* Lake Peten F.
 261. *dovii*, *Gthr.* Lakes of Nicaragua & Amatitlan, Mexico . . . F.
 262. **gillii*, Kner Rio Chagres F.
 263. *spilurus*, *Gthr.* ——— ?

MOLLIENESIA, *Lesueur.*

264. **petenensis*, *Gthr.* Lake Peten F.

XIPHOPHORUS, *Gthr.*

265. **hellerii*, *Heck.* Rio Chisoy, Mexico F.

GIRARDINUS, *Poey.*

266. **pleurospilus*, *Gthr.* Lake of Dueñas F.

Fam. CYPRINIDÆ.

SCLEROGNATHUS, *Gthr.*

267. *meridionalis*, *Gthr.* Rio Usumacinta F.

Fam. CLUPEIDÆ.

CHANOS, *Lacép.*

268. *salmonensis*, *Forst.* Indian & Pacific Oceans (Chiapam) . . . M. & B.

ALBULA, *Gronov.*

269. *conorhynchus*, *Bl.* *Tropical & Subtropical seas* (Panama) . . . M.

MEGALOPS, *Lacép.*

270. *thrissoides*, *Schn.* Atlantic M.

PRISTIGASTER, *Cuv.*

271. **macrops*, *Gthr.* Panama M.

272. **dovii*, *Gthr.* Panama M.

CLUPEA, *Artedi.*

273. **libertatis*, *Gthr.* Libertad M.

CHATOËSSUS, *C. & V.*

274. **petenensis*, *Gthr.* Lake Peten F.

ENGRAULIS, *C. & V.*

275. *brownii*, *C. & V.* *Atlantic & Pacific* (Libertad) . . . M. & B.

276. **poeyi*, Kner & Steindachner Rio Bayano F.

277. **macrolepidota*, Kner & Steind. Rio Bayano F.

CETENGRAULIS, *Gthr.*

278. **mysticetus*, *Gthr.* Pacific coast of Panama M.

Fam. GYMNOTIDÆ.

CARAPUS, *Müll. & Trosch.*

279. **fasciatus*, *Pall.* Rio Motagua F.

300. *leucorhynchus, *Gthr.* Panama M.

PRISTIS, *Lath.*301. *antiquorum*, *Lath.* *Atl. & Pac. Oceans* (Chiapam) M.UROLOPHUS, *Müll. & Henle.*302. **mundus*, *Gill* *Pac.* M.AETOBATIS, *Müll. & Henle.*303. **latirostris*, *A. Dum.* *Gaboon, Panama* M.

§ 6. *Partial Identity of the Fish-faunas of the Atlantic and Pacific Coasts of
Central America.*

It will be seen that, as far as our present knowledge reaches, of these 303 species,

173 are truly marine forms, 57 being found on both sides of the Isthmus.

25 have been found in brackish water, of which 3 are found on both sides of the Isthmus.

101 are freshwater fishes, 17 being found in rivers of the Atlantic and Pacific sides.

There will be but very few species which are entirely limited to brackish water, and which may not be with equal propriety added either to the marine or freshwater fauna. Thus, five of the 25 species hitherto known from lagoons with brackish water belong to freshwater genera; and, admitting two groups only, we have

193 marine fish, 59 of which are found on both sides of Central America= $30\frac{1}{2}$ per cent.

106 freshwater fish, 19 being found in rivers of the Atlantic and Pacific sides=18 per cent.

From the circumstance that our collectors paid more attention to the freshwater than to the marine fauna (at least of the Atlantic coast), we may assume that the proportion between the two groups will be increased by future researches in favour of the marine fauna, but that the proportion between species peculiar to one side and those common to both will be lessened, inasmuch as every collector will discover other Atlantic forms on the Pacific side, and *vice versa*.

The very curious fact of the partial identity of the species of both coasts of Central America was first distinctly stated by myself in the Society's 'Proceedings' for 1861 (p. 370), when, out of fourteen species collected by Capt. Dow on the Pacific side, five were found to be Atlantic forms. To these various others were added by me in the 'Catalogue of Fishes;' and Mr. Gill confirmed this observation in *Proc. Ac. Nat. Sc. Philad.* 1862, pp. 140, 249. Professor Wagner, in his memoir quoted above (p. 384)¹, has made the same observation; but the species enumerated by him, fourteen in number, are, with one exception, freshwater forms, the geographical distribution of which must have been brought about at periods and in ways different from those of the diffusion of marine species.

Knowing now that at least 30 per cent. of the *marine* fish are found on both sides of

¹ See also 'Record, Zool. Literat.' ii. p. 177.

Central America¹, we cannot account for this fact by resorting to such occasional means of dispersal as the accidental transmission of spawn from one shore to the other by birds or water-spouts, or even the close proximity of the sources of rivers flowing in opposite directions. If we do not adopt the view that species were created at the spot where we find them now, similar creations being produced under similar physical conditions, we have but one way of explaining the partial similarity of these marine fish-faunas, namely, by assuming that the Isthmus did not form a continuous barrier between the two oceans at a former period, but that one or more open channels existed. I am not aware that geology has, up to this time, furnished us with proof positive that this is really the fact; but considering the volcanic nature of Central America, and the absence of all fossiliferous strata, it does not appear too bold an hypothesis to assume that North and South America were formerly connected by a chain of islands similar to that of the Antilles, and that subsequently an elevation (as in other parts of the globe) took place, resulting in the final continuity of dry land: the long-continued activity of the numerous volcanoes may have been another, though secondary cause in filling up the channels on the Pacific side. If such a bodily elevation of Central America has taken place, it is easy to show where some of the broadest channels existed, namely, where we find the greatest depressions running from one ocean to the other. The northernmost of these depressions exists between Tehuantepec and the river Coatzaco; the second is indicated between Puerto Cabello and the Gulf of Fonseca; the third by the Lake of Nicaragua (the remnant and deepest part of a very broad channel); a fourth between Chagres and Panama. (See map, Pl. LXIII., where these supposed former depressions are coloured green.) As far as I have been able to ascertain, the greatest elevation of the first of these lines of depression would be 1500, of the fourth 287 feet only². If we presume that only one of the channels was open at a period when the present marine fauna was already in existence, it will fully explain the existence of identical species on both sides of the isthmus, especially if the difference of the tides was as great as it is now³, causing strong currents from one ocean to the other.

Such an instance of a disconnexion of a marine fauna by elevation of land as I am inclined to assume in the case of Central America does not stand quite alone. We owe to the researches of Prof. S. Lovén and Dr. Malmgren⁴ the knowledge of the fact that marine animals (Crustacea, Annelids, and Fishes) inhabiting the glacial ocean are found in the great freshwater lakes of Sweden and in the Bothnian Gulf, and that this is to be explained only by the former continuity of the Baltic with the Glacial Ocean. During the second half of the glacial period the greater part of Finland and of the

¹ Mr. Darwin ('Origin of Species,' 3rd edit. p. 378) was not acquainted with this fact, which by no means militates against his argument, but merely modifies it.

² M. Wagner, *l. c.* p. 87.

³ At Chagres the mean elevation is 1.16 foot, while at Panama the highest flow is 22 feet. (Seemann, *Voy. of H.M.S. 'Herald,' i. p. 236.*)

⁴ Lovén, *Skand. Naturforsk.-Sällskap. först. offentl. möte d. 9 Juli 1863: Stockholm, 1864.* Malmgren, *Kritisk Öfversigt af Finlands Fiskfauna,' see 'Zool. Record,' i. pp. 136-138.*

middle of Sweden was submerged, and the Baltic was a great gulf of the Glacial Ocean, and not connected with the German Ocean. By the gradual elevation of the Scandinavian continent, the Baltic became disconnected from the Glacial Ocean, and the great lakes separated from the Baltic.

The Isthmus of Suez appears to have been a much more permanent barrier between the faunas of the Mediterranean and the Red Sea. R. A. Philippi has drawn up a list of species of shells common to both faunas; but it was founded on a collection made by Ehrenberg, in which the shells from both seas had been mixed¹; and P. Fischer² has lately shown that the two faunas are quite distinct. As regards the fishes, I have mentioned (on former occasions) a few occurring in both seas (*Sargus noct*, *Sargus rondeletii*); but the number is so small that one might be tempted to account for it by the temporary existence of an artificial communication between the two seas.

Looking at the results of the separation of the Baltic from the Glacial Ocean on the one hand, and of that of the Pacific from the Atlantic on the other, we find them very different. As soon as the continuity of the Baltic with the Glacial Ocean was interrupted, the amount of fresh water carried into the former by rivers exceeded the quantity lost by evaporation of its surface, and the salt water gradually changed into brackish, and in the northern parts into fresh water. By far the greater part of the animals became extinct; but a few survived³, *however, in spite of the greatly altered physical conditions, without altering their specific characters, still agreeing with the typical forms in every point, except in size, remaining smaller, leaner, almost starved.* The same thing might happen if by a rising of the chain of the West-Indian islands the Gulf of Mexico or the Caribbean Sea were at a future time converted into inland seas with narrow outlets into the open ocean.

The separation of the Atlantic and Pacific Oceans was, of course, not accompanied by a change of the water; and any difference that existed in the physical conditions of both seas, as, for instance, the formation of corals on the Atlantic side, and their total absence on the Pacific, existed already before the communication between the oceans was closed; so that the life of species was not in any way affected by the discontinuance of this communication. Let us for argument's sake assume that the part of the isthmus between the Lake of Nicaragua and Panama was once an island, *à peu près* of the form of Cuba, inhabited, like Cuba, on its northern and southern coasts by a certain species of fish. The only effect of a gradual rise of the land on the life of this species would be to force it to retreat further and further from the original coast, and to accommodate itself to the new one—an effect to which, if felt at all, the individuals on the northern and southern coasts would be equally exposed. Thus there is in this case no apparent external cause for an alteration of the species; *and, indeed, the specimens examined by me from opposite coasts of the isthmus are absolutely identical, and there is not the slightest indication that one of them has been modified or degenerated into a climatic or local variety.* I trust that

¹ Martens, in 'Zoolog. Record,' ii. p. 237.

² Journ. Conchyl. xiii, 1865, pp. 241-248.

³ Seven or eight species of the northern part of the Baltic are believed to be of Arctic origin.

geology will furnish us with the proof of the former partial submergence of a part of Central America, as it has done with respect to the northern part of Scandinavia. We should then be able to speak with more confidence of the permanence, or rather endurance, of the characters of a specific type, and arrive at a somewhat more definite idea of the age of species which must have existed before those geological changes were completed¹.

Sir CHARLES LYELL has directed my attention to collateral evidence from other classes of the animal kingdom, by which the partial identity of the faunas of the two coasts is shown, although not in an equally conclusive manner. The majority of malacologists appear to have presumed *à priori* their distinctness, and consequently described Pacific shells generally as distinct from Atlantic species. However, Dr. MÖRCH, in a paper in which he describes or enumerates about 360 Panama species, makes the following remarks (Pfeiff. Malakozool. Blätt. 1859, p. 107):—

“The tropical [molluscan] faunæ may be classed in two principal divisions, the Indian and the Atlantic. To the latter belong, 1, the Guinean (Senegalian); 2, the Antillian; and 3, the Panaman, which, although belonging to the Pacific, appears to be most analogous to the Guinean. A great number of species, especially of Bivalves, have been regarded as identical with those from the eastern (Brazilian) shore. I believe I can prove that they are different. Certain irregular mollusks cannot be separated diagnostically; but I can recognize them by their general habit. It is at all events a fact that no species stamped with definite characters (wohl ausgeprägt) is identical on both sides of the isthmus. The Panama species may be divided into:—1, those analogous to West-Indian; 2, those analogous to species from Guinea and Senegal; 3, those very remotely analogous to East-Indian species.”

¹ I may on this occasion recur to a remark made by me in Proc. Zool. Soc. 1858, p. 381, with regard to the sea-snakes observed in the Bay of Panama by M. Sallé, Capt. Dow, and Mr. Salvin. There is now not the least doubt that the snakes seen were *Pelamys bicolor*, and that they are, moreover, very common there. I find that Dr. Seemann (Voy. ‘Herald,’ i. p. 265) already mentions them. But I am much inclined to think that this most common Indian species has migrated eastwards, and that its arrival on the West-American coast is of very recent date. Dampier and the other bucaniers who have left us records of their adventures, and who passed weeks and months in the Bay of Panama, could not have failed to observe them, and to mention them in their notes, just as they did on other occasions. It is also probable that these snakes would have spread into the Atlantic Ocean, had they been so numerous on the Pacific side at the time when a communication existed between the two oceans.

Whilst this paper was passing through the press, I found two notices of the existence of water-snakes on the western coasts of South America, in seas considerably more southwards than the Bay of Panama. The notes are in Capt. Sharp's Voyage in “The History of the Bucaniers of America.” London, 1699, 8vo, vol. ii. p. 50: “As we sailed” [near Cape St. Francisco, which is nearly under the equator] “we saw multitudes of *Grampusses* every day; as also *Water-snakes* of divers colours.” And p. 72, when sailing in lat. 19° S., the author mentions “A huge shoal of fish, two or three *Water-snakes*, and several *Seals*.” I find in another part of the same work a note which I believe to be the first description of *Tapirus bairdi*. The part has a separate title-page, “A Journal of a Voyage made into the South Sea by the Bucaniers or Freebooters of America from the year 1684 to 1689. Written by the Sieur Raveneau de Lussan.” Lond. 1698, 8vo. The Indian name of the Tapir is given as *Manipourye*, page 16.

These remarks appear to me to convey very strong testimony in accordance with my own observation on the ichthyological fauna, inasmuch as the author refers the Panama Mollusks generally to the Atlantic fauna. He, indeed, denies the perfect identity of the species, admitting merely an "analogy" between them; but then it is a question whether malacologists do not go too far in making specific distinctions, when they are not even able to express those distinctions "diagnostically," recognizing the forms merely "by their general habit." Shells are, after all, that portion of a mollusk the formation and development of which is most influenced by the peculiarities (physical and chemical) of the surrounding medium and locality; and only too many specific forms have been distinguished on account of slight differences in the sculpture and shape of the shells, the importance of which disappears on comparing a large series of examples. However, as I am not prepared to form an opinion with regard to the shells of Central America from my own examination, I am bound to receive the testimony of so celebrated a malacologist as Dr. Mörch; and should his observations prove to be fully correct, they will give an additional interest to this fauna, as proving that the shells of Mollusks suffer change under circumstances in which the specific characters of fishes remain unaltered.

With regard to fossil shells, Mr. J. C. MOORE, who has examined several collections from tertiary beds in San Domingo, has made the observation that "many bear a strong resemblance to shells now living in the Indian Seas and the Pacific, and that one or two appear to be identical" (Quart. Journ. Geol. Soc. 1853, p. 131), and "that a channel or sound may have existed in the equatorial parts during some portion of the tertiary period, by which some few of the tropical shells may have migrated from the one ocean to the other" (ibid. 1850, p. 43).

Of the other marine animals, the *Corals* have been made the object of elaborate researches, the various authors arriving at somewhat different conclusions. First, Mr. DUNCAN, in a paper "On the Fossil Corals of the West-Indian Islands" (Quart. Journ. Geol. Soc. xix. 1863, p. 455), has shown that "in all the calcareous formations which are coralliferous, and are considerably elevated above the level of the Caribbean Sea [being probably of miocene age], there is a very limited series of Corals with generic relation to those now existing and characteristic of the West-Indian Coral Fauna, but a predominance of forms resembling those of the present Coral-seas of the Pacific, South Sea, and the Indian Ocean." This identity of the Corals proves an identical condition of the physical circumstances, and evidently a wide continuity of the West-Indian and Western seas.

On the other hand, Prof. VERRILL, when speaking of the living Polyp-fauna of the Atlantic and Pacific *sides of Central America* (Proc. Bost. Soc. Nat. Hist. x. 1866, p. 323 *et seq.*), states that their differences of character are very remarkable; that at Panama none of the reef-building corals of Aspinwall, Florida, or the West Indies occur, nor even any of the genera of the families to which they belong, with the

exception of a small *Porites* and *Stephanocora*; that these and other differences do not favour the theory entertained by some geologists, viz. that there has been a communication between the two oceans at this point, and that the Gulf-stream flowed across the isthmus into the Pacific, within comparatively recent geological times.

It is not within the scope of this paper further to discuss the point on which Messrs. Duncan and Verrill are at variance, as we cannot assume that the present fish-fauna existed at so early a period. From the observations made on the fishes and shells we are obliged to conclude that down to a very recent period a connexion between the two seas has been kept open by channels and straits wide enough to allow of the passage of these animals. Why corals, or at least a part of them, should not have been dispersed by their floating germs in a similar manner, is a circumstance which we cannot explain.

The occurrence of identical species of *freshwater fishes* in rivers running to the two opposite oceans is a matter of much less difficulty, and, besides, has been very generally observed in various parts of the globe. The same agencies which in other countries have effected a wider dispersion of one species than of another must have been at work here also. Prof. M. Wagner has, in his Memoir quoted above, so fully treated of this part of our subject, with particular reference to the hydrographical peculiarities of the isthmus, that we need not dwell further on it.

§ 7. *Definition of the Characteristics of the Fish-fauna of Central America.*

In defining the zoological characters of Central America, expressed in its fish-fauna, I confine myself to the freshwater fishes proper. Here the *nearctic* types become extinct, and are represented by five generic types, four of which, although with numerous species in the north, have but a single one here—*Lepidosteus*, *Amiurus*, *Sclerognathus*, and *Haplochilus*. *Fundulus*, extending a little further southwards (with one species in Western Ecuador), is represented by four species in Guatemala. Not one of these species is identical with a North-American.

Much greater is the affinity with *neotropical* types; and their representatives are much more numerous: there is one species of *Acara*, one of *Macrodon*, seven of *Tetragonopterus*, one of *Anacyrtus*, twelve of *Pimelodus*, one of *Plecostomus*, two of *Chaetostomus*, two of *Loricaria*, one of *Anableps*, one of *Carapus*, the latter being identical with a species from Guiana. Types in common with the West-Indian Islands are—*Agonostoma* with three species (one of which is said to be identical with a Jamaican species), *Girardinus* and *Gambusia* with one, the two latter genera being also represented in the Southern States of North America. The Siluroid genus *Arius*, which extends over the tropics generally, is represented by nine species.

Finally, the following genera are peculiar to Central America, or at least have attained there to the greatest development:—*Heros* and the allied *Neetroplus* and *Petenia* with thirty-four species, *Ælurichthys* with two, *Chalcinopsis* with three, *Characodon* with one,

Xiphophorus with one, *Mollienesia* with one, *Pecilia* with eight, and *Belonesox* with one species.

The affinity of this freshwater fauna with that of Mexico, will be found to be greater than with that of any other country (I might mention about ten species common to Guatemala and Mexico); but until we are better acquainted with the habitats of species described as Mexican, a more detailed comparison of the two countries would be of but little advantage. The freshwater fish-fauna of Central America may be shortly thus characterized:—*A part of the Chromides (Heros, &c.) and the Cyprinodontes generally have attained to their greatest development; neotropical types extending northwards prevail over nearctic extending southwards, the latter being represented by a few extreme branches.*

§ 8. *An Attempt to Subdivide this Fauna into Provinces.*

We may subdivide this part of the freshwater fauna into the following provinces:—

A. *The fresh waters north of the Lakes of Managua and Nigaraqua, emptying into the Pacific.*—To this province belong the fishes collected at Chiapam [Ch.], Huamuchal [H.], San José [J.], in the Rio Guacalate (Dueñas) [G.], San Salvador [S.], and Libertad [L.]; also the fishes from the Lakes of Amatitlan [Am.] and Atitlan [At.] may be referred to the same province.

[The species printed in italics in the following lists are found also in one or more other provinces, and in Atlantic rivers.]

<i>Heros macracanthus</i>	Ch.	H.	—	—	—	—	—
— <i>trimaculatus</i>	Ch.	H.	—	—	—	—	—
— <i>nigrofasciatus</i>	—	—	—	—	—	Am.	At.
— <i>guttulatus</i>	—	—	—	—	—	Am.	—
<i>Agonostoma microps</i>	—	—	—	G.	—	—	—
<i>Arius guatemalensis</i>	Ch.	—	—	—	—	—	—
— <i>platypogon</i>	—	—	—	J.	—	—	—
— <i>cærulescens</i>	—	H.	—	—	—	—	—
<i>Pimelodus guatemalensis</i>	—	H.	—	—	—	—	—
<i>Anacyrtus guatemalensis</i>	—	H.	—	—	—	—	—
<i>Tetragonopt. microphthalmus</i>	—	—	—	—	—	Am.	—
— <i>humilis</i>	—	—	—	—	—	Am.	—
<i>Fundulus guatemalensis</i>	—	—	—	G.	—	Am.	—
— <i>pachycephalus</i>	—	—	—	—	—	—	At.
— <i>punctatus</i>	Ch.	—	—	—	—	—	—
<i>Anableps dovii</i>	Ch.	—	—	—	—	—	—
<i>Pecilia mexicana</i>	Ch.	H.	—	G.	—	Am.	—
— <i>thermalis</i>	—	—	—	—	S.	—	—
— <i>dovii</i>	—	—	—	—	—	Am.	—
<i>Girardinus pleurospilus</i>	—	—	—	G.	—	—	—
<i>Clupea libertatis</i>	—	—	—	—	L.	—	—
<i>Lepidosteus tropicus</i>	—	H.	—	—	—	—	—

B. *The fresh waters north of the Lakes of Managua and Nicaragua, emptying into the Atlantic.*—To this province belong the fishes collected in the Rio Usumacinta [U.] (and in its tributaries Rio de Santa Isabel, Rio Chisoy, and Rio San Geronimo); in the Rio Motagua [M.], and in the Rio Cahabon (Yzabal) [Y.].

<i>Eleotris dormitatrix</i>	—	M.	Y.
<i>Agonostoma nasutum</i>	U.	M.	—
<i>Heros parma</i>	—	M.	—
— <i>spilurus</i>	—	M.	Y.
— <i>aureus</i>	—	M.	Y.
— <i>motaguensis</i>	—	M.	—
— <i>microphthalmus</i>	—	M.	—
— <i>oblongus</i>	—	M.	—
— <i>angulifer</i>	—	—	Y.
— <i>salvini</i>	U.	—	—
— <i>irregularis</i>	U.	—	—
— <i>godmanni</i>	—	—	Y.
<i>Arius assimilis</i>	—	—	Y.
— <i>melanopus</i>	—	M.	—
<i>Amiurus meridionalis</i>	U.	—	—
<i>Pimelodus godmanni</i>	U.	M.	—
— <i>motaguensis</i>	—	M.	—
— <i>salvini</i>	U.	—	—
— <i>polycaulus</i>	U.	—	—
<i>Tetragonopterus panamensis</i>	—	—	Y.
— <i>brevimanus</i>	U.	—	Y.
<i>Chalcinopsis dentex</i>	U.	M.	Y.
<i>Fundulus labialis</i>	U.	—	Y.
<i>Belonesox belizanus</i>	Honduras, Belize.		
<i>Pœcilia chisoyensis</i>	U.	—	—
<i>Xiphophorus helleri</i>	U.	—	—
<i>Sclerognathus meridionalis</i>	U.	—	—
<i>Carapus fasciatus</i>	—	M.	—

C. *Lake Peten.*—The fish-fauna of this limited district is so peculiarly developed, that we cannot hesitate to describe it as a separate province.

<i>Heros margaritifer</i> .	<i>Petenia splendida</i> .
— <i>melanurus</i> .	<i>Pimelodus petenensis</i> .
— <i>urophthalmus</i> .	<i>Tetragonopterus petenensis</i> .
— <i>affinis</i> .	<i>Belonesox</i> (in common with province
— <i>friedrichsthalii</i> .	B).
— <i>salvini</i> (in common with pro-	<i>Pœcilia petenensis</i> .
vince B).	<i>Mollienesia petenensis</i> .
— <i>intermedius</i> .	<i>Chaetoëssus petenensis</i> .

D. *Lake of Managua*.—Although the number of species known from this lake is small, the forms are quite peculiar; we find here those species of *Heros* which are distinguished by the extraordinary development of the lips, or by incisor-like teeth, which render the separation into a distinct genus necessary. The development of these Chromides is the more remarkable, as this lake occupies a space which is supposed to have been a portion of a marine channel.

<i>Heros erythræus</i> .		<i>Heros lobocheilus</i> .
— <i>managuensis</i> .		— <i>multispinis</i> .
— <i>labiatus</i> .		<i>Neetroplus nematopus</i> .

E. *Lake of Nicaragua*.—Also the fishes of this lake are, with two exceptions, peculiar; like Lake Managua, it appears to have been part of a marine channel.

<i>Eleotris longiceps</i> .		<i>Heros labiatus</i> (Lake of Managua).
<i>Heros longimanus</i> .		<i>Pimelodus nicaraguensis</i> .
— <i>citrinellus</i> .		<i>Gambusia nicaraguensis</i> .
— <i>dovii</i> .		<i>Pœcilia dovii</i> (in common with Lake
— <i>nicaraguensis</i> .		Amatitlan).

F. *The fresh waters south of the Lakes of Managua and Nicaragua to the Isthmus of Darien*.—We are obliged, at present, to unite into one province the fish-fauna of Costa Rica, Veragua, Panama, and Darien, as our knowledge of the fishes of Costa Rica and also of Veragua is too incomplete to admit of a comparison with those of the more southern part of the isthmus. This is the more to be regretted, as a former separation of these two parts and of their faunas is, as we have explained above, a matter of great probability. The fishes of the Chagres River show a decidedly South-American character. The identity of the freshwater fish-faunas of the Pacific and Atlantic sides is here easily explained by the narrowness of the isthmus.

<i>Eleotris picta</i>	—	—	R. Bayano.
<i>Agonostoma nasutum</i>	—	Panama.	—
— <i>monticola</i>	—	Panama.	—
<i>Heros parma</i>	Chagres.	—	—
— <i>altifrons</i>	—	Western Veragua.	—
<i>Acara cæruleomaculata</i>	Chagres.	—	—
<i>Arius multiradiatus</i>	—	—	R. Bayano.
<i>Ælurichthys dorsalis</i>	—	Panama.	—
— <i>panamensis</i>	—	Panama.	—
<i>Pimelodus wagneri</i>	—	Panama.	—
— <i>modestus</i>	Chagres.	—	—
<i>Plecostomus</i> , sp.	Chagres.	—	—
<i>Chaetostomus aspidolepis</i>	—	Veragua.	—
<i>Chaetostomus ? cirrhosus</i>	Chagres.	—	—
<i>Loricaria lima</i>	Chagres.	—	—

<i>Loricaria uracantha</i>	Chagres.	—	—
<i>Macrodon microlepis</i>	Chagres.	—	—
<i>Tetragonopterus panamensis</i>	—	Panama.	—
— <i>aneus</i>	—	Panama.	—
<i>Chalcinopsis striatulus</i>	—	Panama.	—
— <i>chagrensis</i>	Chagres.	—	—
<i>Anacyrtus guatemalensis</i>	Chagres.	—	—
<i>Haplochilus dovii</i>	—	Costa Rica.	—
<i>Poecilia elongata</i>	—	Panama.	—
— <i>gillii</i>	Chagres.	—	—

§ 9. *Descriptive Part.*

In the following descriptive part of this Memoir I have admitted full descriptions of those species only which are not described elsewhere; secondly, descriptive diagnoses of those of which figures are given; and, finally, notes on some known species, if they appeared to contribute to their better knowledge. For the descriptions of all the other species (the insertion of which would be a repetition of matter already published), I must refer the student to my general work on Fishes.

1. *CENTROPOMUS APPENDICULATUS.*

Poey, Mem. Cub. ii. p. 119.

D. $8\frac{1}{10}$. A. $\frac{3}{6}$. L. lat. 70–72.

Nine longitudinal series of scales between the origin of the second dorsal fin and the lateral line. The height of the body is contained four times in the total length (without caudal), the length of the head twice and two-thirds. Præorbital indistinctly serrated; suboperculum produced into a short flap, which extends to or nearly to the vertical from the origin of the dorsal fin. The intermaxillary extends to below the middle of the orbit. Dorsal spines of moderate strength; the third is the longest, and about half as long as the head. The second anal spine is generally longer than the third; but sometimes they are equal in length, and even shorter than the third dorsal spine. The length of the ventral fin is more than one-half of its distance from the anal. Air-bladder with a pair of appendages anteriorly. Silvery; dorsal fins blackish; lateral line black.

We have received this species (which was originally described from Cuban examples) from Surinam and Mexico. Mr. Salvin and Capt. Dow obtained a specimen from the Chagres River, 10 inches long.

2. *CENTROPOMUS MEDIUS.*

Günth. Proc. Zool. Soc. 1864, p. 144.

D. $8\frac{1}{10}$. A. $\frac{3}{7}$. L. lat. 57.

Eight longitudinal series of scales between the origin of the second dorsal fin and the lateral line. The height of the body is contained thrice and three-fourths in the total

length (without caudal), the length of the head twice and four-fifths. Præorbital finely serrated; suboperculum produced into a flap, which does not extend to the vertical from the origin of the dorsal fin. The intermaxillary extends somewhat beyond the anterior margin of the orbit. Dorsal spines strong; the third is longer than the fourth, and half as long as the head. The second anal spine long, but a little shorter than the third, and equal in length to the distance between the extremity of the upper jaw and the præopercular margin. The length of the ventral fin is much more than one-half of its distance from the anal fin. Lateral line black.

Two specimens, 13 inches long, from Chiapam.

3. CENTROPOMUS NIGRESCENS.

Günth. Proc. Zool. Soc. 1864, p. 144.

D. $8\frac{1}{10}$. A. $\frac{3}{6}$. L. lat. 70.

Ten longitudinal series of scales between the origin of the second dorsal fin and the lateral line. The height of the body is contained four times and a half in the total length (without caudal), the length of the head twice and four-fifths. Præorbital not serrated; suboperculum produced into a short flap, which does not extend to the vertical from the origin of the dorsal fin. The intermaxillary extends a little beyond the middle of the orbit. Dorsal spines rather feeble; the third and fourth are equal in length, two-fifths of the length of the head. The second and third anal spines also are equal in length, and not longer than the dorsal spines mentioned. The length of the ventral fin is scarcely more than one-half of the distance of its base from the anal. Air-bladder without appendages anteriorly. Silvery; upper parts and fins blackish; lateral line black.

One specimen, 14 inches long, from Chiapam.

This species is allied to *C. appendiculatus* (Poey), but differs externally in its considerably more feeble and shorter fin-spines.

4. CENTROPOMUS PARALLELUS.

Poey, Mem. Cuba, ii. p. 120.

D. $8\frac{1}{10}$. A. $\frac{3}{6}$. L. lat. 85-90.

Twelve longitudinal series of scales between the origin of the second dorsal fin and the lateral line. The height of the body is contained thrice and three-fourths in the total length (without caudal), the length of the head twice and a half. Præorbital distinctly serrated; suboperculum produced into a flap, which extends to the vertical from the origin of the dorsal fin. The intermaxillary extends a little beyond the middle of the orbit. Dorsal spines rather feeble; the third is the longest, half as long as the head. The second anal spine is exceedingly strong, longer than the third and the third dorsal spine. The length of the ventral fin is considerably more than one-half of

the distance of its base from the anal. Air-bladder without appendages anteriorly. Silvery; upper parts and fins greenish; lateral line not black.

This species occurs in Cuba; we have received it from San Domingo, Jamaica, and Bahia. Messrs. Dow and Salvin collected a specimen in the Chagres River.

5. CENTROPOMUS ARMATUS.

Gill, Proc. Ac. Nat. Sc. Philad. 1863, p. 163.

D. $8\frac{1}{10}$. A. $\frac{3}{6}$. L. lat. 51. L. transv. 7/14.

Six longitudinal series of scales between the origin of the second dorsal fin and the lateral line. The height of the body is contained from thrice and two-fifths to thrice and three-fourths in the total length (without caudal); the length of the head twice and a half. Præorbital serrated in its hinder half; suboperculum produced into a long flap, which extends beyond the vertical from the origin of the dorsal fin. The intermaxillary extends scarcely to below the middle of the orbit. Dorsal spines of moderate strength; the third is the longest, and half as long as the head. The second anal spine is exceedingly strong, much stronger than the third, and longer than the third dorsal spine. The length of the ventral fin is scarcely more than one-half of the distance of its base from the anal. Silvery; dorsal fins, a blotch on the opercle, and the membrane between the anal spines blackish. Lateral line not black.

Several specimens, 12 inches long, were collected by Mr. Salvin at Chiapam.

6. CENTROPOMUS ENSIFERUS.

Poey, Mem. Cub. ii. p. 122, pl. 12. fig. 1.

D. $8\frac{1}{10}$. A. $\frac{3}{6}$. L. lat. 53.

Seven longitudinal series of scales between the origin of the second dorsal fin and the lateral line. The height of the body is one-fourth of the total length (without caudal), the length of the head two-fifths. Præorbital coarsely serrated; suboperculum produced into a flap, which extends to the vertical from the origin of the dorsal fin. The intermaxillary extends scarcely to below the middle of the orbit. Dorsal spines of moderate strength; the third and fourth are the longest, and two-fifths as long as the head. The second anal spine is exceedingly strong, much stronger than the third, and much longer than the dorsal spines. The length of the ventral fin is somewhat more than one-half of the distance of its base from the anal. Silvery; dorsal fin, a blotch on the opercle, and the membrane between the anal spines blackish. Lateral line not black.

This species occurs in Cuba; we have received it from Jamaica and from the Guyanas. Mr. Godman collected a specimen, 12 inches long, at Belize.

7. *CENTROPRISTIS MACROPOMA*. (Pl. LXV. fig. 1.)

Günth. Proc. Zool. Soc. 1864, p. 145.

D. $\frac{10}{12}$. A. $\frac{3}{7}$. L. lat. 52. L. transv. 6/16.

Closely allied to *C. radialis*, Q. & G.; but whilst that species has a notch above the spiniferous angle, the present has its præopercular margin not interrupted, the long spines of the angle gradually passing into the finer serrature. There are six series of scales between the eye and the angle of the præoperculum. The maxillary extends nearly to the vertical from the posterior margin of the orbit. Dorsal fin with a notch, the ninth spine being considerably shorter than the tenth. A series of rather small brownish spots above and below the lateral line.

Three specimens, $4\frac{1}{2}$ inches long, were collected by Messrs. Dow and Salvin on the Pacific coast of Panama.

8. *SERRANUS CREOLUS*, C. & V.

I have examined specimens from the Atlantic coasts only; but Mr. Gill has found it in a collection of fishes from Lower California, the specimens being undistinguishable from those of the West Indies and South America (Proc. Ac. Nat. Sc. Philad. 1862, p. 249).

12. *SERRANUS SELLICAUDA*.

Epinephelus sellicauda, Gill, Proc. Acad. Nat. Sc. Philad. 1862, p. 250.

D. $\frac{11}{17}$. A. $\frac{3}{8}$. L. lat. 100.

Caudal fin with the posterior margin convex. The height of the body is rather more than three-fourths of the length of the head, and one-fourth of the total (caudal included). The diameter of the eye is one-fourth of the length of the head. Præoperculum finely serrated behind, with some coarser teeth at the angle, lower limb entire; sub- and interoperculum entire. Ventrals three-fourths of the length of pectorals, and reaching two-thirds of the distance between their insertion and the commencement of the anal. Brownish, with olive-coloured spots of larger and smaller size on the body and opercles. All the fins with a narrow white margin. A square black blotch across the back of the tail.

Description.—Body not very elevated; its greatest height is below the third spine of the dorsal fin, rather more than three-fourths of the length of the head, and one-fourth of the total. The distance between the end of the dorsal and the commencement of the caudal is nearly one-sixth of the length of the base of the dorsal, is contained once and two-thirds in the base of the anal, is one-fourth of the distance between the dorsal fin and the snout, and equals the least depth of the tail. The distance between the eyes is one-half of the diameter of the eye, and covered with very minute scales, which are found also on the præorbital around the nostrils. The length of the snout is two-thirds of the diameter of the eye. The maxillary bone reaches the vertical from the posterior margin of the eye. The mandibular is one-half of the length of the

head. The lips are not very thick. Posterior limb of præoperculum very convex, minutely serrated, with three coarser teeth at the angle; lower limb toothless. Sub- and interoperculum entire. Operculum terminating in three not very strong teeth, the upper of which is somewhat more remote than the others, the middle one being the more prominent. Suprascapular concealed by the scales.

The membrane of the dorsal fin is scaly for about half the height between the spines and rays; the spinous portion scarcely lower but longer than the soft, with its upper margin convex, and a small membranaceous appendage behind the tip of each spine. The first spine is the shortest, rather more than half the length of the second, which is one-fifth shorter than the third; from the third to the seventh the spines are equal, becoming slightly shorter at the eighth; the last two spines are of equal length. The rays increase slightly from the first to the sixth, after which the upper margin is straight, becoming again rounded posteriorly. The first ray is one-fifth longer than the preceding spine. Caudal with posterior margin convex. The commencement of the anal is on a line with that of the soft dorsal, and it ends before the termination of the dorsal; the first spine is short, not half the length of the second, which is long and strong, longer than any of the dorsal spines; the third is slenderer, and equal to the third dorsal spine: the margin of the soft part of the fin is nearly straight, sharply rounded off posteriorly. The pectoral consists of eighteen rays, is rounded, and longer than the ventral, and covered with very minute scales to one-third of the length. The ventrals reach the vent; the second ray is the longest, the spine being equal to the second of the dorsal. Canine teeth of moderate size, those of the lower jaw rather small. Coloration as described above.

A single specimen, 4 inches long, was sent by Capt. Dow from the Pacific coast of Panama. The specimen in the collection of the Smithsonian Institution is from the coast of Lower California; a statement of its size, which would have been of some importance, is omitted.

13. SERRANUS ANALOGUS.

Epinephelus analogus, Gill, Proc. Acad. Nat. Sc. Philad. 1863, p. 163.

D. $\frac{10}{17}$. A. $\frac{3}{8}$. L. lat. ca. 100.

Adult.—The height is contained thrice in the total length (without caudal), the length of the head twice and two-thirds. The præoperculum is finely serrated behind, and towards the angle armed with three or four strong teeth. The diameter of the eye equals a sixth of the head's length, and equals the interorbital space as well as the snout behind the intermaxillaries. The third, fourth, and fifth spines are equal, and contained twice and two-thirds in the length of the head; the tenth thrice and a half. The caudal fin enters five times and a half in the length, the height of the dorsal twice and three-fourths in the head. The anal is deeper; its third spine is longest, and enters four times and three-fourths in the head's length; the pectoral is at least half as long as the head; the ventral shorter, but coterminous with it.

The colour is purplish grey, with numerous dark spots about as large as the pupil; those of the pectoral and caudal fins are smaller and more crowded, of the dorsal, anal, and ventral more like those of the body.

The specimens are from 11 to 15 inches long, and were found by Capt. Dow at Panama.

We have received also a *smaller* example, 5 inches long, from the same gentleman. It differs from those described above in being provided with five cross bands, paler in colour than the spots, which are one-third the size of the eye. The dorsal fin is scarcely notched, the tenth spine being but little shorter than the third or fourth, the length of which is contained twice and two-thirds in that of the head. The example being young, its eye is comparatively larger.

14. PLECTROPOMA AFRUM. (Pl. LXVII. fig. 3.)

Epinephelus afer, Bloch, Taf. 327 (fide Peters, Monatsber. Ak. Wiss. Berlin, 1865, p. 105).

Alphestes afer, Bl. Schn. p. 236.

Plectropoma chloropterum, Cuv. & Val. ii. p. 398. Poey, Mem. Cub. i. p. 73, lam. 9. fig. 3.

— *monacanthus*, Müll. & Trosch. in Schomb. Hist. Barb. p. 605. Günth. Fish. i. p. 164.

— *multiguttatum*, Günth. Proc. Zool. Soc. 1866, p. 600.

$$D. \frac{11}{18-20}. \quad A. \frac{3}{9}. \quad L. \text{lat. } 75.$$

Caudal rounded. The height of the body is equal to the length of the head, and contained twice and three-fourths in the total (without caudal). The diameter of the eye is one-fifth of the length of the head, and a little less than that of the snout. Præoperculum with a strong spinous tooth below the angle, pointing forwards. Olive-brown, head and body with numerous spots.

Description.—Body somewhat elevated; its greatest height is below the fourth spine of the dorsal, and equal to the length of the head, which is contained thrice and one-third in the total (the caudal included). The distance between the dorsal and the caudal is contained seven times and one-third in the length of the base of the dorsal fin, twice in that of the base of the anal, four times in the distance between the dorsal fin and the snout, and is considerably less than the least depth of the tail. The distance between the eyes is about two-thirds of the diameter of the eye, and covered with scales which extend forward beyond the nostrils on the præorbital, and in a narrow band on the upper maxillary. The length of the snout equals the diameter of the eye, which is one-fifth of the length of the head. The maxillary reaches a little beyond the level of the posterior margin of the eye. The mandibular is covered with minute scales, and is equal to one-half the length of the head. The lips are thick and fleshy. The posterior limb of the præoperculum slants obliquely backwards, and is minutely serrated, the denticulations becoming coarser at the angle; and beneath on the lower limb at some distance from the other teeth there is a single strong tooth pointing downwards, and nearly concealed by the skin; sub- and interoperculum not serrated.

The operculum terminates in three, flat, triangular teeth, the upper of which is the more distant and somewhat more obtuse than the others, the middle one being the longest, but not very prominent, and the lower one the shortest and weakest. The suprascapula is concealed by the scales.

Base of dorsal fin covered with very small scales, a tapering band of scales runs up between each pair of the spines and rays to about half the height of the fin. Spinous portion rather lower but longer than the soft, its upper margin convex; the membrane between each spine is deeply notched, and there is a small membranaceous appendage behind the top of each spine. The first spine is the shortest, half the size of the second; the second is five-sixths of the length of the third; the third, fourth, and fifth are the longest, and of nearly equal length; the spines then become gradually shorter to the last one, which is scarcely longer than the preceding. The soft portion exhibits an entirely rounded upper margin, the rays becoming longer from the first to the sixth or seventh, and shorter from the fourteenth to the last; the first ray is one-fourth longer than the preceding spine. Caudal with the posterior margin convex. Anal commencing a little behind the commencement of the soft dorsal, and terminating in advance of the end of the same; the first spine is not very strong, and short; the second long, thick, and strong; the third more slender and shorter, being but little longer than the second dorsal spine; the margin of the fin is rounded throughout, the third ray being the longest, and the subsequent ones becoming progressively shorter. The pectoral is composed of eighteen rays, rounded, one-fourth longer than the ventral, and covered with minute scales for about one-third of its length. The ventral reaches to the vertical from the origin of the eighth spine of the dorsal, but not to the vent; the spine is a little less than two-thirds the length of the first ray; the first and second rays are the longest, the others diminishing gradually in length; the length of the spine is somewhat less than that of the second dorsal spine. Canine teeth small in both jaws.

This species varies somewhat in coloration, as most of its congeners; the spots are numerous and small, either of a uniform dark-brown colour, or of a light colour and mixed with large brown spots. Pectoral fins with narrow blackish cross bands.

One example, 10 inches long, and three smaller ones have been collected by Capt. Dow on the Pacific coast of Panama. The latter have the spots somewhat larger and less conspicuous than the adult. This species occurs also in the West Indies and at the Falkland Islands.

15. RHYPTICUS DECORATUS.

Rhypticus nigripinnis, Gill, Proc. Ac. Nat. Sc. Philad. 1861, p. 53.

Promicropterus decoratus, Gill, l. c. 1863, p. 164.

D. $\frac{2}{26}$. A. 16.

The two dorsal spines are continuous with the soft portion. Body generally with more or less numerous round whitish spots, many of which have a brown centre.

Messrs. Dow and Salvin have collected several examples, from 3 to 8 inches long, on the Pacific coast of Panama.

The species described by Holbrook as *R. maculatus*, and said to have the dorsal spines separated from the soft portion, may eventually prove to be identical with the Pacific fish.

19. MESOPRION ARATUS.

Günth. Proc. Zool. Soc. 1864, p. 145.

D. $\frac{11}{13-14}$. A. $\frac{3}{8}$. L. lat. 45. L. transv. $4\frac{1}{2}/12$.

The height of the body equals the length of the head, and is contained thrice and two-fifths, or thrice and one-fifth in the total (without caudal). The maxillary does not extend backwards to the vertical from the centre of the eye. Præoperculum finely serrated, with scarcely a trace of a posterior notch. Dorsal spines of moderate strength; the third and fourth are the longest, two-fifths of the length of the head; the eleventh is scarcely longer than the tenth, which is rather more than half as long as the fourth. Caudal fin emarginate, two-thirds scaly; anal spines short, rather feeble, the third longer than the second, and equal in length to the last dorsal spine. Upper and lateral parts brownish-olive, each scale with a pearl-coloured spot, the spots forming together very distinct longitudinal stripes; no black lateral spot; hind part of the root of the pectoral brown. Lower parts salmon-coloured.

We have six examples: two, 15 inches long, were collected by Mr. Salvin at Chiapam; and four others were sent by Capt. Dow from the Pacific coast of Panama.

21. APOGON DOVII.

Günth. Proc. Zool. Soc. 1861, p. 371.

D. $6\frac{1}{5}$. A. $\frac{2}{8}$. L. lat. 25. L. transv. $3/9$.

A roundish black spot on each side of the root of the caudal; the spinous dorsal colourless, transparent; uniform olive (in spirits). Head densely punctulated with brown. Only the hind margin of the posterior præopercular ridge is serrated. Dorsal fins nearly equal in height.

The height of the body is one-third of the total length (without caudal); the length of the head two-fifths; eye large, its diameter being more than one-third of the length of the head. Palatine and vomerine teeth present. The upper jaw overlaps slightly the lower; maxillary extending backwards to below the posterior third of the orbit. Operculum with an upper flexible point, and with a lower stiff spine. The third dorsal spine is a little longer than the second, one-half the length of the head. Caudal fin slightly emarginate, with the angles rounded.

Total length 26 lines.

This species is so closely allied to *A. inermis* from the Mediterranean, that perhaps

it would be better not to separate it; the only difference which I can find is the form of the soft dorsal fin, which is considerably higher than the spinous in the Mediterranean species.

22. PRISTIPOMA MELANOPTERUM.

Pristipoma melanopteron, Cuv. & Val. v. 1830, p. 273.

— *bilineatum*, Cuv. & Val. v. 1830, p. 271, pl. 122.

Hæmulon melanopteron, Ranzani, Comm. Bonon. v. 1842, p. 343, tab. 30.

Pristipoma melanopteron, Günth. Fish. i. 1859, p. 287.

Var. *Geytremus interruptus*, Gill, Proc. Acad. Nat. Sc. Philad. 1862, p. 256.

Pristipoma melanopteron, Günth. Proc. Zool. Soc. 1864, pp. 23 & 27.

This species occurs on both sides of Central America, Capt. Dow having collected specimens at Panama and Colon. Mr. Gill has found it also in a collection of fishes from Lower California. He describes his Pacific specimen as a distinct species; but the distinctive characters are, according to my views, not of specific value. He mentions it in the following terms:—

“The species is so closely allied to *bilineatus*, that it might be even considered as a variety, but it appears to differ by the steel-blue colour of the back, and the discontinuance of the lateral band a short distance before the spot on the tail¹; at its end the band is bounded below by the lateral line. In other respects, the two species are so similar, that a detailed description would be only a repetition of that of *bilineatus*.”

23. PRISTIPOMA VIRGINICUM.

We have examined specimens of this species from the West Indies, from the Atlantic coasts of Central America, and from Bahia. Mr. Gill has described an example from Panama under the denomination of *Anisotremus taniatus*, Proc. Ac. Nat. Sc. 1861, p. 107. Although six or seven is the normal number of longitudinal bands, it is sometimes increased by a more or less complete division of one or several bands. It appears to be more natural to consider the golden colour the ground-colour than the blue, as after death it fades into the same colour as that of the space between the black vertical bands. In *all* specimens, I have found the bluish bands edged with purplish. Mr. Gill, in describing his *A. taniatus*, has taken the blue colour as ornamental, whilst in his description of *A. virginicus* the character assigned to the colours is reversed, and the blue colour regarded as ground-colour. There is no specific difference between these fishes.

24. PRISTIPOMA DOVIL.

Günth. Proc. Zool. Soc. 1864, p. 23, pl. 3, fig. 1.

D. $\frac{12}{16}$. A. $\frac{3}{9}$. L. lat. 48. L. transv. 8/15.

The height of the body is one-half of the total length (without caudal); the length of the head one-third. Snout obtuse, not much longer than the eye; cleft of the

¹ This is also the case in some Atlantic specimens.

mouth small, the maxillary extending to the vertical from the anterior margin of the orbit. Lips thick; a pair of pores on the symphysis of the lower jaw, a central groove behind it. Snout naked, the remainder of the head being scaly. The width of the interorbital space is much less than that of the orbit. Dorsal and anal spines exceedingly strong; the third of the dorsal fin is the longest, and nearly two-thirds as long as the head. The second anal spine is much longer than the third, and a little shorter (but stronger) than the third of the dorsal fin. Each ray of the soft fins is accompanied by a series of minute scales, but only on the caudal fin are these scales dense enough to cover the rays. Caudal fin slightly emarginate. Silvery, with four black cross bands; the first runs from the occiput, through the eye, to behind the angle of the mouth, the second from before the dorsal fin to below the base of the pectoral, the third from the base of the sixth, seventh, and eighth dorsal spines to the vent; the fourth descends from the origin of the soft dorsal to that of the soft anal. Fins blackish. The cross bands appear to become fainter in old age.

Two specimens, $8\frac{1}{2}$ and 9 inches long, in the collection from Panama.

25. PRISTIPOMA CHALCEUM.

Günth. Proc. Zool. Soc. 1864, p. 146.

D. $\frac{12}{15}$. A. $\frac{3}{12}$. L. lat. 56. L. transv. 11/19.

The height of the body is contained twice and two-thirds in the total length (without caudal), the length of the head thrice and a third. The diameter of the eye is nearly equal to the width of the interorbital space, and two-thirds of the extent of the snout. The maxillary does not extend backwards to the vertical from the anterior margin of the orbit. Præoperculum minutely serrated behind, with the angle rounded, but not produced. There is no notch between the spinous and soft portions of the dorsal fin, the hinder spines being only a little shorter than the anterior rays; dorsal spines of moderate strength, the fourth being the longest, not quite half as long as the head; anal spines short, the second being only a little longer than the third, two-sevenths of the length of the head. Caudal fin subtruncated, scarcely emarginate. Dorsal and anal perfectly scaleless. The pectoral fin extends to the vertical from the vent. Bronze-coloured, shining silvery, perfectly immaculate; vertical fins blackish, with an indistinct light band along the base.

One specimen, 8 inches long, was discovered by Messrs. Dow and Salvin on the Pacific coast of Panama.

26. PRISTIPOMA HUMILE.

Kner & Steindachner, Sitzgsber. Ak. Wiss. Münch. 1863, p. 222; and Abhandl. bay. Ak. Wiss. x. p. 3, tab. 1. fig. 1.

D. $\frac{12}{12}$. A. $\frac{3}{7}$. L. lat. 56. L. transv. $\frac{8}{19-20}$. Cæc. pyl. 3.

The height of the body is contained thrice and two-thirds in the total length (without

caudal), the length of the head thrice. The diameter of the eye equals the width of the interorbital space, is one-fifth of the length of the head, and two-thirds of the extent of the snout. Snout produced; cleft of the mouth wide; the maxillary extending beyond the front margin of the eye. Præoperculum with the hind margin vertical and finely serrated. The spinous and soft portions of the dorsal fin are separated by a notch; dorsal spines moderately strong, the fourth being the longest, its length being contained twice and three-fourths in that of the head. Second anal spine exceedingly strong, more than half as long as the head. Caudal fin slightly emarginate; pectorals terminating at some distance before the vent. Scales ctenoid. Coloration uniform.

This species is known from a single example (size not stated) from the Rio Bayano (Panama).

27. *PRISTIPOMA MACRACANTHUM*. (Pl. LXIV. fig. 1.)

Günth. Proc. Zool. Soc. 1864, p. 146.

D. 11 $\frac{1}{13}$. A. $\frac{3}{8}$. L. lat. 47. L. transv. $\frac{6}{13}$.

The height of the body equals the length of the head, and is one-third of the total (without caudal). The diameter of the eye equals the width of the interorbital space, and is two-thirds, or somewhat less than two-thirds, of the extent of the snout. Hind margin of the anterior nostril with a broad flap. Snout somewhat produced; the maxillary does not extend to below the anterior margin of the eye. Præoperculum with the hind margin rather concave, and with stronger teeth at the angle, which is rounded. The spinous and soft portions of the dorsal fin are separated by a deep notch, the spine of the soft portion being much longer than the preceding, which is somewhat longer than the second. Dorsal and anal spines exceedingly strong; the fourth dorsal spine is the longest, its length being contained twice and a third in that of the head. The second anal spine much longer and stronger than the third, and even than the fourth dorsal spine. Caudal fin truncated. Each soft ray of the vertical fins is accompanied by a series of minute scales. The pectoral fin extends to the vent. Scales smooth. Silvery, with several very indistinct dark cross bands on the back, which appear to be arranged as in *P. leuciscus*.

Two specimens, 11 and 14 inches long, were collected by Mr. Salvin at Chiapam.

29. *PRISTIPOMA LEUCISCUS*. (Pl. LXVI. fig. 3.)

Günth. Proc. Zool. Soc. 1864, p. 147.

D. 11 $\frac{1}{15}$. A. $\frac{3}{7-8}$. L. lat. 51. L. transv. $\frac{5.6}{10}$.

The height of the body is contained thrice or thrice and a third in the total length (without caudal), the length of the head thrice and a fourth. The diameter of the eye is equal to, or more than, the width of the interorbital space, but is less than the extent of the snout. The maxillary does not quite extend backwards to the vertical from the anterior margin of the orbit. Præoperculum finely serrated behind, with the angle

rounded, and with the hind margin slightly concave. The spinous and soft portions of the dorsal fin are separated by a deep notch, the spine of the soft portion being nearly twice as long as the preceding. Dorsal spines long, of moderate strength: the third is the longest, and one-half, or more than one-half, as long as the head. Anal spines rather strong: the third is a little longer than the second, equal to the seventh dorsal spine, and more than one-third of the length of the head. Caudal fin emarginate. Each soft ray of the vertical fins is accompanied by a series of minute scales. The pectoral fin extends to the vertical from the origin of the anal in the younger example, but is shorter in adult ones. Scales smooth, bright silvery; young specimens with several very indistinct dark cross bands on the back, the first from the nape of the neck to the gill-opening, the second below the seventh dorsal spine, the third below the last dorsal spine; old specimens with the marginal membrane of the operculum black.

One specimen, $7\frac{1}{2}$ inches long, was found by Mr. Salvin at San José. Three others, from 11 to 12 inches long, are from Chiapam; and Capt. Dow found it also at Panama, where it does not appear to be rare.

30. *CONODON PACIFICI*. (Pl. LXIV. fig. 3.)

Günth. Proc. Zool. Soc. 1861, p. 147.

D. 11 $\frac{1}{13}$. A. $\frac{3}{10}$. L. lat. 47. L. transv. $7/13$.

Diagnosis.—The spinous teeth at the angle of the præoperculum are not much stronger than the others. The height of the body is contained twice and two-fifths in the total length (without caudal).

One specimen, $12\frac{1}{2}$ inches long, was collected by Mr. Salvin at Chiapam.

Description.—The body is compressed, and considerably elevated; its greatest height, which is below the fifth dorsal spine, is contained twice and three-fourths in the total length. Upper profile rounded from the first dorsal spine to the nape, concave over the eyes, whence it descends abruptly over the snout. The upper surface of the head is very broad, the space between the eyes being nearly twice the width of the orbit. The snout is thick and obtuse; the lips thick and fleshy. Teeth in a villiform band in both jaws, with an outer series of conical teeth. Chin with a median groove and a pair of pores. Posterior limb of præoperculum straight, regularly and distinctly serrated, the teeth becoming gradually a little larger at the angle, and continued on the lower limb; the entire surface of the præoperculum is covered with scales, which are smaller than those of the operculum, and reach to the margin of the bone. The operculum has a notch behind, between two obtuse and feeble points. Suprascapular margin indistinctly toothed or roughened. The origin of the dorsal is in the vertical from the root of the pectoral, and its termination is vertically opposite to that of the anal; the base of the spinous portion is nearly twice as long as that of the soft. The spines are strong, broader alternately on one side than on the other; the first is small, not quite one-half the length of the second, which is rather more than half that of the

third; the third spine is three-fourths the length of the fourth; the fifth is the longest, its length being contained twice and two-thirds in the height of the body; the sixth and fourth spines are equal in height, and the subsequent spines decrease gradually in length; the twelfth, which must be considered part of the soft dorsal, is slightly longer than the preceding spine, and equal to the tenth. The soft portion has a rounded margin; the third or highest ray is not quite equal to the fifth spine, and is twice as long as the last. The spinous portion as well as the soft can be received into a scaly sheath. The caudal fin is very slightly emarginate, scaly to within a short distance from its tip, and one of its longest rays is nearly one-fifth of the total length. The distance between the caudal and anal fins is less than the base of the latter; the first anal spine is opposite to the third ray of the dorsal, it is strong, broader on the right side, and excavated posteriorly, and is one-half the length of the second, which is very long and strong, equal in length to the fifth dorsal spine, and broader on the left side; the third anal spine is equal to the third of the dorsal, and little more than half the height of the first ray; the first and second rays are the longest, and the margin of the soft portion is vertical. The pectoral is moderately long, its length being contained four times and a half in the total. Root of ventral immediately behind that of pectoral; the spine is of moderate size and strength, a little more than half the length of the first ray, which is produced about one-eighth of an inch at its tip; the other rays decrease gradually in height. The scales are of moderate size, very finely crenated, with the margin convex. The lateral line is parallel with the curve of the back. Scales silvery, with purple reflexions; membrane between the scales brown; fins blackish.

34. *HÆMULON BREVIROSTRUM*.

D. $\frac{12}{15-16}$. A. $\frac{3}{8-9}$. L. lat. 50. L. transv. 5/14.

This species is closely allied to *H. chromis* and *H. canna*, differing from both by its much shorter and more convex snout.

The height of the body is contained twice and two-thirds in the total length (without caudal), the length of the head thrice and one-fourth. The snout is short, not much longer than the diameter of the eye, which is more than one-fourth of the length of the head. Cleft of the mouth rather wide, the maxillary extending beyond the vertical from the front margin of the eye. Hind margin of the præoperculum slightly emarginate, its angle with more conspicuous denticulations. Dorsal fin notched, with strong spines; the fourth is the longest, half as long as the head. Caudal fin forked.

The second anal spine is strong, and somewhat longer than the third, but not quite as long as the fourth of the dorsal fin. Scales above the pectoral fin not conspicuously larger than the others. More or less conspicuous oblique brown streaks run along the series of scales, and are broken up into series of spots in larger examples. A vertical black spot covered by the angle of the præoperculum.

We possess four examples of this species: three were collected by Capt. Dow at Panama; and the fourth is from Puerto Cabello. The largest is 8 inches long.

35. *HLEMULON MARGARITIFERUM*. (Pl. LXV. fig. 2.)

Günth. Proc. Zool. Soc. 1864, p. 147.

D. $\frac{12}{17}$. A. $\frac{3}{11}$. L. lat. 55. L. transv. 6/15.

The height of the body is one-third of the total length (without caudal), the length of the head two-sevenths. The diameter of the eye is two-sevenths of the latter, and equal to the extent of the snout and to the width of the interorbital space, which is very convex. The maxillary extends beyond the vertical from the anterior margin of the eye. Præoperculum emarginate behind. Dorsal fin scarcely notched, with the soft portion very low; its spines are moderately strong, the fourth is the longest, not quite half as long as the head. Anal spines strong; the second is longer and stronger than the third, and equal to the eighth of the dorsal. The soft vertical fins enveloped in scales; caudal forked, with the upper lobe longest. The pectoral fin does not extend to the vent. Greenish olive above, each scale with a pearl-coloured centre; sides silvery; a blackish spot above the axil.

One specimen, 12 inches long, was obtained by Messrs. Dow and Salvin on the Pacific coast of Panama.

39. *CHELODON HUMERALIS*. (Pl. LXV. fig. 3.)

Günth. Fish. ii. p. 19.

I have given a full description of this species (*l. c.*). The Pacific coast of Central America appears to be its true home. Messrs. Salvin and Dow collected three specimens at Panama; and our other specimens, which we received from the Haslar Collection, are probably from Guatemala, from which country Sir J. Richardson, as we know, obtained a collection of fishes. I have no doubt that the statement of this species extending to the Sandwich Islands is correct. The Panama examples differ from the typical specimens only in having an additional black cross band near the hind margin of the caudal fin.

41. *POMACANTHUS ZONIPECTUS*.

Pomacanthodes zonipectus, Gill, Proc. Ac. Nat. Sc. Philad. 1862, p. 244.

D. $\frac{11}{23-24}$. A. $\frac{3}{20}$.

“The form much resembles that of *Pomacanthus*. The greatest height equals three-

fifths of the length. The head forms about a quarter, and the caudal fin about a sixth of the total length. . . . The dorsal is considerably produced at the sixth ray, which passes behind the rounded posterior margin. . . . Brownish, margined with light on each scale. A very dark brown band girdles the breast behind the pectoral and ventral fins." . . .

Obtained by Capt. Dow at San Salvador.

43. *UPENEUS TETRASPILUS*. (Pl. LXVI. fig. 1.)

Günth. Proc. Zool. Soc. 1864, p. 148.

D. $8\frac{1}{9}$. A. 7. L. lat. 33. L. transv. $2\frac{1}{6}$.

The height of the body equals the length of the head, and is contained thrice and two-fifths in the total (without caudal); the width of the interorbital space is two-thirds of the length of the snout. Teeth in both jaws in two series, the outer series of the upper jaw being formed by very obtuse and partly confluent teeth. The maxillary is dilated and rounded behind, and bent upwards into a sort of hook; the barbels extend to the vertical from the root of the pectoral. The third and fourth dorsal spines are subequal in length, longer than the second, and nearly three-fourths of the length of the head. Greenish olive above, each scale above and below the lateral line with a large pearl-coloured spot; sides yellow; a rose-coloured band on each side of the belly. A large blackish blotch on the lateral line, behind the hind part of the spinous dorsal fin. A second smaller blackish spot behind the orbit; the latter is sometimes very indistinct.

Two specimens, $8\frac{1}{2}$ inches long, were collected by Messrs. Dow and Salvin on the Pacific coast of Panama.

This species would belong to the division which has been called *Mulloides*.

44. *UPENEUS GRANDISQUAMIS*.

Gill, Proc. Acad. Nat. Sc. Philad. 1863, p. 168.

This species, which belongs to Bleeker's division *Upeneus*, is described thus:—

D. $8\frac{1}{8}$. A. 7. L. lat. 30. L. transv. $2\frac{1}{5}$.

The greatest height is contained four times in the length to the end of the median caudal rays, and four times and a half in the total. The head equals the height, and is itself longer than high, the profile in front of the eyes rapidly declines downwards, and is nearly rectilinear. The diameter of the eye enters thrice and a half in the head's length, and the height of the preorbital twice and three-fourths. The supramaxillar ends at the vertical from the front of the eye. The teeth in front of the upper jaw are biserial; below uniserial. The first dorsal fin is highest at the third spine, and there equals the head in front of the præopercular margin; the first is exceedingly short, and the second and fourth nearly equal, little shorter than the third; all the spines are very slender towards the ends. The distance of the second from the first dorsal enters once

and three-fourths in the base of the former, and in that interval are three scales; its length is less than that of the first. The ventral equals the distance of the hinder margin of the orbit from the snout. The tubes of the lateral line have slender branches diverging from them, generally directed obliquely upwards. The larger scales have six radiating striæ. The colour is light greenish brown above, with an indistinct silvery spot at the centre of each scale. Below the lateral line, especially between it and the anal fin, the colour is rose. The dorsal fins covered with spots of the colour of the back. The others are immaculate.

Two specimens, the longest of which is $7\frac{1}{2}$ inches long, were collected by Capt. Dow on the Pacific coast of Central America.

47. CHRYSOPHRYS CALAMUS.

A fine example, 16 inches long, has lately been sent by Capt. Dow from Panama.

49. CIRRHITICHTHYS RIVULATUS. (Plate LXXXVI. fig. 4.)

Cirrhitès rivulatus, Valenc. Voy. Vénus, Poiss. p. 309, pl. 3. fig. 1 (bad).

D. $\frac{10}{11}$. A. $\frac{3}{6}$. L. lat. 47. L. transv. 6/14.

The height of the body is contained thrice in the total length (without caudal), the length of the head twice and two-thirds. The snout is of moderate extent, compressed and rather elevated; the maxillary extends beyond the front margin of the eye. Inter-orbital space deeply concave, and half as wide as the orbit; a low longitudinal median crest on the crown of the head. Præoperculum finely serrated behind. The fourth, fifth, and sixth dorsal spines are the longest, two-sevenths of the length of the head, all are of moderate strength. Seven simple pectoral rays, none of which extend so far backwards as the ventral fin. The second anal spine is longer, but scarcely stronger, than the third. Brownish, with transverse dark brown bands and spots, all of which are edged with light blue. There are two of these bands on the head crossing the præoperculum; five on the body and tail, composed of large, more or less confluent, round spots; especially the third and fourth terminate above each in a pair of large spots, the first pair occupying the end of the spinous and commencement of the soft dorsal, the second the basal portion of the end of the soft dorsal. Caudal and anal fins with similar ocellated spots; a brown band across the inner side of the root of the pectoral.

A single example of this beautiful species, 5 inches long, was obtained by Capt. Dow at Panama. The typical specimen was obtained at the Galapagos Islands.

51. POLYNEMUS MELANOPOMA.

Günth. Proc. Zool. Soc. 1864, p. 148.

D. $7\frac{1}{12}$. A. $\frac{2}{13}$. L. lat. 73.

Nine free pectoral appendages, the longest of which extends to the vent. Præoper-

culum finely serrated, with a small spine above the angle. The vomerine teeth form a rounded patch; the band of the palatine teeth is as broad anteriorly as the front part of the intermaxillary band. Operculum black.

A single specimen, 15 inches long, was obtained by Mr. Salvin at San José.

Description.—This fish is elongated in form, its greatest height being contained five times and a half in the total length, with the caudal, and four times and one-sixth without it. The tail is compressed, its height above the end of the anal fin being half the length of the head. The head is much longer than high, and is contained four times and two-thirds in the total length with the caudal, and thrice and one-third without it; its width between the eyes is two-ninths of its length. Snout produced beyond the mouth, obtusely conical, and shorter than the diameter of the eye, which is contained five times and a half in the length of the head. The cleft of the mouth is situated on the inferior side of the head, it is extremely wide, the maxillary being more than half the length of the head. The posterior margin of the præoperculum is finely serrated; the angle is produced, forming a rounded membranaceous lobe. The posterior margin of the opercular apparatus is membranaceous, rounded, and formed by the operculum and suboperculum. The origin of the first dorsal is in the vertical from the ninth scale of the lateral line, or from a point about midway between the pectoral and ventral fins. The first spine is minute, the second is the strongest, all the others being flexible; the third is the longest, contained once and two-thirds in the length of the head; the fourth is longer than the second, and the following rapidly decrease in length. A series of scales ascends behind the second, third, and fourth spines, but disappears at the fifth; the distance between the two dorsals equals the length of the base of the second, which is entirely covered with scales and has the upper edge strongly emarginate; the second ray is the longest, nearly as high as the spinous dorsal, and twice the height of the last ray. The distance between this fin and the caudal is one-fourth of the total length (without caudal). The caudal fin is completely covered with scales, deeply forked, with the lobes pointed, the upper one being slightly the longer, and one-fourth of the total length. The distance between the anal and caudal fins is less than that between the caudal and dorsal, as the termination of the anal falls behind that of the dorsal, and in the vertical from the 52nd scale of the lateral line. It is entirely covered with scales; and its origin corresponds to that of the seventh ray of the dorsal; its lower edge is emarginate; the first spine is very small, the second being only one-third the length of the first ray; the first and second rays are the longest, and about thrice the length of the thirteenth or final ray, which, however, is rather longer than the one which precedes it. The pectoral is nearly one-sixth of the total length; its root is covered with minute transparent scales. The free pectoral appendages are long, the third and fourth being the longest, considerably longer than the pectoral fin, and reaching to the vent; the fourth is one-eighth of an inch longer than the head. The root of the ventral fin falls behind that of the pectoral, and in a vertical from the twelfth scale of the lateral

line; it is short, one-eighth of the total length, and does not quite reach the vent; its spine is about one-half the length of the adjacent ray. The *scales* are of moderate size, longer than high, and have the posterior margin minutely crenulated. Lateral line straight, very slightly bifurcated between the lobes of the caudal. The teeth are minute and villiform, those of the vomer form a rounded or nearly square patch; the band on the palatines cuneiform and elongated, broadest anteriorly. The body is uniform silvery, greenish grey, darker on the back; the fins are minutely dotted with black, the dorsals becoming blackish at their margins. Operculum black.

52. POLYNEMUS APPROXIMANS.

Polynemus approximans, Lay & Benn. in Beechey's Voy. Zool. Fish. p. 57.

Trichidion approximans, Gill, Proc. Ac. Nat. Sc. Philad. 1863, p. 169.

D. $7\frac{1}{13}$. A. $3\frac{3}{15}$. L. lat. 60.

Six pectoral appendages, the longest of which reaches to the commencement of the anal fin. The length of the caudal lobes is rather more than one-fourth of the total length. Pectoral fins blackish.

Description.—This fish is moderately elongate in form; its greatest height, which is between the root of the second dorsal and anal fins, is contained four times and one-third in the total length with the caudal, and thrice and one-fourth in the same without caudal. The tail is compressed, its height above the end of the anal being contained seven times and one-third in the total length. The head is much longer than high; its length is about four times and a half in the total with, and thrice and a half without caudal; its width between the eyes is nearly one fourth of its length. The snout is produced, obtusely conical, and shorter than the diameter of the eye, which is one-fifth of the length of the head. The cleft of the mouth is situated at the inferior side of the head, as usual; it is wide; the maxillary reaching considerably behind the orbit, but the length of the bone is only two-fifths of that of the head. The posterior margin of the præoperculum is armed with a distinct serrature, and one or two more distinct teeth above the projecting membranaceous lobe of the angle. The posterior extremity of the opercular apparatus is angular, membranaceous, and formed by the operculum and suboperculum. The origin of the first dorsal is opposite to the eighth scale of the lateral line, and in the vertical between the roots of the pectoral and ventral fins. The first spine is minute, the second shorter than the third, which is the longest, and contained about once and one-third in the length of the head; the fourth is longer than the second; and the subsequent spines rapidly decrease in length, rendering the upper margin almost vertical. There is a series of scales behind each spine almost to the top. The distance between the two dorsals is more than the length of the base of the second, which is entirely covered with scales and has the upper margin emarginate; the first and second rays are the longest, not so high as the spinous dorsal, more than twice as long as the hindmost rays. The distance between this fin and the caudal is

one-fifth of the total length. The caudal fin is completely covered with scales, deeply forked, with the lobes pointed, the upper one being rather the longer. The distance between the caudal and anal fins is less than that between the dorsal and caudal, as the extremity of the anal falls behind that of the dorsal, or in the vertical from the forty-third scale of the lateral line. Its origin corresponds to that of the dorsal; and it has the lower edge straight or very slightly emarginate; it is entirely covered with scales. The first two spines are very small, and the third not half the length of the first ray; the first and second rays are the longest, but not twice as long as the fifteenth or terminal ray. The length of the pectoral is not one-fourth of the total; it has minute scales towards the base. The free pectoral appendages are six in number; the upper one is the longest, reaching to the anal fin, and is not quite one-third of the total length. The root of the ventral falls a little behind the middle of the pectoral, and in the vertical from the eleventh scale of the lateral line; it is short, one-eighth of the total length, reaching to the vent; its spine is more than half the length of the adjacent ray. The scales are of moderate size, scarcely higher than long, and minutely ciliated on the posterior margin. The lateral line is straight, bifurcating between the lobes of the caudal. Teeth on the vomer in a narrow transverse patch.

Two specimens, 12 inches long, are in the Collection, one found by Mr. Salvin at Chiapam, the other by Capt. Dow at Panama.

Mr. Gill first recognized this species, which is not identical with *P. xanthonemus*, as suggested in the 'Catal. of Fishes.'

53. POLYNEMUS OPERCULARIS.

Trichidion opercularis, Gill, Proc. Acad. Nat. Sc. Philad. 1863, p. 169.

This fish is described thus:—

$$D. 8 \frac{8}{12}. \quad A. \frac{2}{13}. \quad L. \text{ lat. } 69-70. \quad L. \text{ transv. } 8/14.$$

The greatest height equals a fourth of the length to the fork of the caudal fin, and more than a fifth of the extreme, while the head enters four times and a half in the latter. The outline from the dorsal to the snout is nearly rectilinear and little declined. The distance of the anal from the outer axil of the ventral equals that of the posterior nostril from the margin of operculum. The first dorsal, when bent backwards, rests on the fourth scale, in front of the second. The second commences nearly above the twentieth scale of the lateral line. The pectoral is as long as the head behind the pupil. There are eight pectoral filaments, the longest of which extends rather beyond the front of the second dorsal. The colour is greenish brown above and yellowish green below. The operculum is blackish. The first dorsal and the pectorals, except below, are also blackish, as is likewise the margin of the caudal. The anal is tinged with orange.

A single specimen, 11 inches long, was collected by Capt. Dow at Panama.

54. *LARIMUS BREVICEPS*.

Larimus breviceps, Cuv. & Val. v. p. 146, pl. 111. Günth. Fish. ii. p. 268.

Amblyscion argenteus, Gill, Proc. Ac. Nat. Sc. Philad. 1864, p. 165.

Having recently received a fine example of this fish from Panama through Capt. Dow, I have convinced myself that the Pacific examples are not specifically, much less generically, distinct from West-Indian ones.

56. *MICROPOGON ALTIPINNIS*.

Günth. Proc. Zool. Soc. 1864, p. 149.

D. $10\frac{1}{22}$. A. $2/7$. L. lat. 48-50. L. transv. $7/15$.

The height of the body is contained thrice and two-thirds in the total length (without caudal), the length of the head thrice and a half. The maxillary extends scarcely beyond the vertical from the anterior margin of the eye. A series of five minute barbels along each side of the mental groove. Two short, strong, divergent spines at the angle of the præoperculum. The third and fourth dorsal spines are long, their length being three-fifths of that of the head; anal spine of moderate strength, not quite one-fourth of the length of the head. Nearly uniform silvery.

Two specimens were procured by Mr. Salvin—one, 17 inches long, at Chiapam, and another, 14 inches long, at San José; a third specimen, $4\frac{1}{2}$ inches long, was found by Capt. Dow at Panama: this agrees in every other respect with the older examples, but of the minute barbels only a trace of the anterior (longest) pair is visible; so that it appears that this generic (!) character is developed with age.

57. *UMBRINA ELONGATA*. (Pl. LXIV. fig. 2.)

Günth. Proc. Zool. Soc. 1864, p. 148.

D. $10\frac{1}{24}$. A. $1/7$. L. lat. 70. L. transv. $7/22$.

The height of the body is contained four times and a third in the total length (without caudal), and five times if the caudal is included; the length of the head is two-sevenths of the total, or one-fourth if the caudal is included. The depth of the head is contained once and three-fourths in its length. Snout long; the diameter of the eye is two-fifths of the length of the snout, and one-fourth of the postorbital part of the head. Symphysial barbel very short, as long as the posterior nostril. Præoperculum without distinct serrature. The length of the second dorsal spine is one-half of that of the head. Posterior margin of the caudal *f*-shaped, the upper lobe being pointed, the lower rounded; anal spine very feeble. The maxillary extends to the vertical from the anterior margin of the orbit. Upper parts blackish, shining silvery, the lower white.

One specimen, 17 inches long, was found by Mr. Salvin at Chiapam.

58. *UMBRINA NASUS*.D 10 $\frac{1}{22}$. A. $\frac{1}{8}$. L. lat. 54. L. transv. 6/14.

The height of the body is contained four times in the total length (without caudal), the length of the head thrice and one-fourth. Snout much produced beyond the

mouth, which is quite at the lower side of the snout. The diameter of the eye is two-thirds of the length of the snout, and two-fifths of that of the postorbital portion of the head. Symphysial barbel very short, scarcely as long as the posterior nostril. Præoperculum distinctly serrated. The second and third dorsal spines are as long as the head, without snout. Posterior margin of the caudal fin *f*-shaped, the upper lobe being pointed, the lower rounded; anal spine very feeble. The maxillary extends to below the centre of the orbit. Silvery, fins blackish.

One specimen, 10 inches long, was found by Capt. Dow at Panama.

59. *UMBRINA ANALIS*.D. 10 $\frac{1}{26}$. A. $\frac{2}{6}$. L. lat. 46-48. L. transv. 6/15.

The height of the body is one-third of the total length (without caudal), the length of the head two-sevenths. Snout compressed, rather deep, of moderate extent, longer than the eye, which is two-ninths of the length of the head, and equal to the width of the interorbital space. Snout overlapping the mouth, but not much protruding beyond it. Barbel very short, scarcely as long as the posterior nostril. Præoperculum distinctly serrated. The second and third dorsal spines are not quite as long as the head without snout. Caudal fin subtruncate. Anal spine very strong, more than half as long as the head. The maxillary extends beyond the front margin of the eye. An oblique dark streak runs along each series of scales. The spinous dorsal fin blackish.

One specimen, 11 inches long, was found by Capt. Dow at Panama.

I thought it possible for some time that this fish might be identical with *Umbrina undulata* of Girard; however, as this writer states that the anal spines of *U. undulata* are feeble, and gives 1/9 for the number of anal rays, we are not justified in identifying these two species.

61. CORVINA CHRYSOLEUCA. (Pl. LXVII. fig. 1.)

Allied to *C. ronchus*.

D. $10 \left| \frac{1}{22-23} \right.$ A. $\frac{2}{9}$. L. lat. 55-56. L. transv. $\frac{5-8}{13}$.

The height of the body is contained thrice in the total length (without caudal), the length of the head thrice and one-third. Head thick; snout obtuse, with the upper jaw slightly overlapping the lower, as long as the diameter of the eye, which is contained four times and two-thirds in the length of the head. The maxillary is nearly entirely hidden by the præorbital, and extends beyond the vertical from the centre of the orbit. Teeth of the outer series of the upper jaw rather stronger than the others. Interorbital space slightly convex, only one-third wider than the orbit, its width being two-sevenths of the length of the head. Præoperculum with spinous teeth round its margin, three on and below the angle being much stronger than the others. Suprascapular denticulated. The second dorsal spine is the strongest, and the third the longest, being as long as the postorbital portion of the head. The second anal spine is very strong, as long as the longest of the spinous dorsal, and not much shorter than the first anal ray. Caudal fin irregularly rounded. Silvery, irregularly mottled with large brownish patches shining golden. A young specimen (5 inches long) is more uniform silvery.

Two specimens, 9 inches long, were collected by Capt. Dow at Panama.

I have observed in this species a most extraordinary variation in the size of the scales above the lateral line, such as I do not recollect having seen in other Acanthopterygian fishes. The two larger specimens are of nearly the same size; yet the dorsal scales of one are only half the size of those of the other. The lateral line is composed of nearly the same number of scales in both, and also the scales below the lateral are of nearly the same size.

62. CORVINA VERMICULARIS. (Pl. LXVII. fig. 2.)

D. $10 \left| \frac{1}{23} \right.$ A. $\frac{2}{8}$. L. transv. $\frac{6}{15}$.

The height of the body is a little more than one-third of the total length (without caudal); the length of the head two-sevenths. Head moderately compressed, snout obtuse, with the upper jaw overlapping the lower, a little longer than the diameter of the eye, which is one-fifth of the length of the head. The maxillary is entirely hidden by the præorbital, and extends somewhat beyond the vertical from the centre of the orbit. Teeth of the outer series of the upper jaw rather stronger than the others. Interorbital space convex, only one-fourth wider than the orbit, its width being one-

fourth of the length of the head. Præoperculum with spinous teeth round its margin; they are rather widely set and of equally small size. Suprascapular scarcely denticulated. The second dorsal spine is scarcely stronger than, and but half as long as, the third, the length of which exceeds somewhat that of the postorbital portion of the head. The second anal spine is very strong, rather shorter than the succeeding ray, and equal in length to the postorbital portion of the head. Caudal fin rounded, with the upper lobe slightly produced. Scales irregularly arranged. Purplish shining silvery; a purplish brown streak, obliquely ascending backwards, follows the middle of each series of scales. Fins brown.

A single specimen, 8 inches long, was found by Capt. Dow at Panama.

63. CORVINA ARMATA.

Bairdiella armata, Gill, Proc. Acad. Nat. Sc. Philad. 1863, p. 164.

This species, which is evidently allied to *C. ronchus*, is described thus:—

D. $10\frac{1}{23}$. A. $\frac{2}{8}$. L. lat. 51. L. transv. $7\frac{1}{10}$.

The height equals a fourth of the total length, of which the head forms a fourth. The caudal fin equals the head behind the front margin of the eye. The diameter of the eye enters four times and a half in the head's length, somewhat exceeds the interorbital area, which is scarcely convex, and equals the snout. The fourth dorsal spine is longest, and nearly equals half the head's length; all are stout and robust. The second dorsal commences nearly above the twentieth scale of the lateral line, or tip of pectoral. The second anal spine is very strong, longer than the first ray, and nearly equals the interval between the front of orbit and opercular flap; the soft fin behind is incurved. The pectoral equals the interval between the middle of the pupil and the opercular flap, and the ventral that between the front of the pupil and the same. The colour is hoary above, silvery below; the fins yellowish; the vertical, especially the first dorsal, clouded with darker.

Found by Capt. Dow at Panama.

64. CORVINA OPHIOSCION.

Ophioscion typicus, Gill, Proc. Acad. Nat. Sc. Philad. 1863, p. 164.

D. $10\frac{1}{22-23}$. A. $\frac{2}{7}$. L. lat. 49. L. transv. $4\frac{1}{10\frac{1}{2}}$.

The height of the body is nearly equal to the length of the head, and two-sevenths of the total (without caudal). Head rather low, snout obtuse, but prominent, with the upper jaw projecting beyond the lower, the cleft of the mouth being quite at the lower side of the snout. The diameter of the eye equals the extent of the snout, and is two-ninths of the length of the head. The maxillary is entirely hidden by the præorbital, and extends to below the middle of the orbit. Teeth of the outer series of the upper jaw rather stronger than the others. Interorbital space scarcely convex, only one-third

wider than the orbit, its width being two-sevenths of the length of the head. Præoperculum with straight, widely-set, spinous teeth round its margin, those on or near the angle being slightly the strongest. The second dorsal spine is the strongest, the third the longest, its length being more than that of the postorbital portion of the head. The second anal spine is exceedingly strong, about as long as the third dorsal spine, or as the first anal ray. Caudal fin irregularly rounded. Uniform silvery; top of the spinous dorsal blackish.

This species appears to be scarce at Panama, Capt. Dow having collected only two examples, of 8 and 6 inches in length.

65. OTOLITHUS SQUAMIPINNIS.

D. $8\frac{1}{21-22}$. A. $\frac{2}{10}$. L. lat. 85.

Scales rather irregularly arranged; there are nine longitudinal series between the origin of the first dorsal fin and the lateral line, and five or six between the end of the second dorsal fin and the lateral line. The height of the body is contained four times and one-sixth in the total length (without caudal), the length of the head thrice and one-fourth. Lower jaw very prominent, the extent of the snout being contained thrice and one-third in the length of the head. The width of the interorbital space is more than the diameter of the eye, and equals the extent of the upper jaw from the orbit. The maxillary extends to the vertical from the hind margin of the orbit. Præopercular angle slightly produced, dilated into a membranaceous margin which is faintly striated. The spinous dorsal is longer than high; the spines are feeble, the length of the third being two-fifths of that of the head. Caudal fin rounded, the middle rays being the longest. The membrane of the soft dorsal and anal fins is covered with small, transparent scales, which form a thickish cover on the base of these fins. The length of the pectoral is three-fifths of that of the head. Body uniformly coloured, scales on the sides minutely punctulated with brown; hinder side of the axil of the pectoral brown. Inner membrane of the gill-cover black. Ventral yellowish.

Two specimens, 10 & 11 inches long, were collected by Capt. Dow at Panama.

66. OTOLITHUS ALBUS.

Günth. Proc. Zool. Soc. 1861, p. 149.

D. $10\frac{1}{21}$. A. $\frac{2}{9}$.

Scales rather irregularly arranged; there are seven series between the origin of the dorsal fin and the lateral line. The height of the body is one-fourth of the total length (without caudal), the length of the head two-sevenths. The extent of the snout is one-fourth of the length of the head; the maxillary extends somewhat beyond the vertical from the posterior margin of the eye. Præopercular angle not produced behind. The spinous dorsal is much longer than high; its spines are feeble, the length of the fourth

being two-fifths of that of the head. Caudal fin rounded, with the middle rays produced. The second anal spine is truly spinous, not flexible, two-fifths of the length of the first soft ray. Membrane of the dorsal and anal fins not scaly. The pectoral fin extends as far backwards as the ventral, being more than half as long as the head. Immaculate, silvery, back greenish. (Pseudobranchiæ present.)

One specimen, $14\frac{1}{2}$ inches long, was obtained by Mr. Salvin at Chiapam.

67. OTOLITHUS RETICULATUS.

Günth. Proc. Zool. Soc. 1864, p. 149.

$$D. 10 \left| \frac{1}{26-27} \right. \quad A. 11 \left(\frac{2}{9} \right).$$

Closely allied to *O. carolinensis*. Scales rather irregularly arranged; there are nine series between the origin of the dorsal fin and the lateral line. The height of the body is contained four times and a third in the total length (without caudal); the length of the head thrice and a third. The extent of the snout is two-sevenths of the length of the head; the maxillary does not extend backwards to the vertical from the posterior margin of the eye; præopercular angle somewhat produced behind, membranaceous, striated; the posterior margin of the præoperculum obliquely descending backwards. The spinous dorsal is much longer than high; its spines are feeble, the fourth being the longest, two-fifths of the length of the head. Caudal fin subtruncated, the middle rays somewhat produced. The first anal ray is quite rudimentary; the second as long as the eye, flexible, scarcely spinous. The pectoral fin extends as far backwards as the ventral, being more than half as long as the head. Back and sides with an irregular network of brown undulated streaks; fins immaculate.

Two specimens were collected by Mr. Salvin—one, 15 inches long, at San José, the other, 13 inches long, at Chiapam.

71. CARANX LEUCURUS.

Günth. Proc. Zool. Soc. 1864, p. 24.

Very closely allied to *C. bicolor*.

$$D. 8 \left| \frac{1}{23} \right. \quad A. 2 \left| \frac{1}{24-26} \right.$$

The first dorsal fin is composed of short, stoutish spines, the fourth of which is the longest, but scarcely longer than the eye. The soft dorsal and anal are rather elevated; the caudal is emarginate, and has the lobes rounded. Teeth very small, forming a single series in both jaws; palate smooth. The height of the body is one-half of the total length (without caudal), the length of the head one-third. Snout rather obtuse, the jaws being equal in front when the mouth is closed; the maxillary extends to below the anterior margin of the orbit. The lateral line makes anteriorly a subsemicircular curve, the width of which is contained from once and two-thirds to once and four-fifths in the length of the straight portion; it becomes straight behind the vertical

from the origin of the second dorsal, and is armed with about fifty small and low shields, only a few of which terminate in a depressed spine. The pectoral fin extends to the anal spines. Brownish grey, body with six dark brown vertical bands; the first crosses the body behind the base of the pectoral, and the fourth descends from the middle of the soft dorsal fin. Operculum with a large black spot. Dorsal, anal, and ventral black; pectoral and caudal whitish.

Only two examples, three inches long, were found by Capt. Dow at Panama.

72. *CARANX SPECIOSUS* (Forsk.).

Having examined specimens from Panama, collected by Mr. Salvin, and compared them with others from Borneo, Madras, Zanzibar, &c., I have convinced myself that *C. panamensis*, Gill, Proc. Acad. Nat. Sc. Philad. 1863, p. 166, is identical with *C. speciosus*.

74. *CARANX HIPPOS*. L.

We have received two examples from the Pacific coast of Panama from Capt. Dow. The younger one, which is 5 inches long, agrees in every point, especially in the height of the body, with Atlantic examples of this species, whilst the older, 10 inches, is identical with that remarkable form described by Mr. Gill as *Carangus marginatus* (Proc. Acad. Nat. Sc. Philad. 1863, p. 166). This is considerably lower in form than the type, the height of the body being only two-sevenths of the total length; but having had an opportunity of comparing the example first mentioned, I do not think it entitled to specific rank, but regard it merely as a variety. The formula of fin rays in our example is $D. 7 \left| \frac{1}{20} \right.$ $A. 2 \left| \frac{1}{16} \right.$

75. *CARANX CABALLUS*.

Trachurus boops, Girard, U. S. Pac. R. R. Exped. Fish. p. 108; Günth. Fish. ii. p. 422 (not *C. boops*, C. & V.).

$D. 7 \left| \frac{1}{23-24} \right.$ $A. 2 \left| \frac{1}{20-21} \right.$ L. lat. 37.

The teeth of the upper jaw form a villiform band, those of the outer series being a little the larger; those of the lower are in a single series; teeth on the vomer, the palatines, and the tongue. The height of the body is two-sevenths of the total length (without caudal), the length of the head rather more than one-fourth. Eye with a broad adipose membrane in front and behind. Breast scaly. The lateral line is curved, the width of the arch being one-half of the length of the straight portion; the latter commences in the vertical from the third dorsal ray; the plates commence from the beginning of the straight portion of the lateral line, and are well developed. Lower jaw projecting beyond the upper; maxillary extending to below the anterior rim of the pupil. Pectoral reaching beyond the anterior anal rays. A black opercular spot.

Two specimens were collected by Capt. Dow at Panama; the species extends northwards to the coast of California.

76. *CARANX CANINUS*.D. $8\frac{1}{20}$. A. $2\frac{1}{17}$. L. lat. 24.

The teeth in the upper jaw form a villiform band, those of the outer series being much the stronger, and widely set. Lower jaw with a single series of rather strong, closely set teeth, and with the two anterior ones somewhat enlarged, canine-like; teeth on the vomer, the palatines, and the tongue. The height of the body is a little more than the length of the head, and one-third of the total (without caudal). Snout obtuse, as long as the diameter of the eye; eye with an adipose eyelid in front and behind. Præorbital much narrower than the orbit. The maxillary extends beyond the vertical from the centre of the eye. Breast naked; lateral line slightly bent, the width of the arch being contained once and one-third in the length of the straight portion; the latter commences in the vertical from the fifth dorsal ray; the plates do not reach forward to the end of the arched portion, and are well developed. Lower jaw scarcely projecting beyond the upper. Dorsal spines rather stout and short; the fourth is the longest, and one-third of the length of the head. The pectoral extends to the fifth anal ray. A black opercular spot. Membrane of the soft dorsal and anal blackish.

One specimen, $7\frac{1}{2}$ inches long, was discovered by Capt. Dow at Panama.

77. *CARANX DORSALIS*.

Carangoides dorsalis, Gill, Proc. Acad. Nat. Sc. Philad. 1863, p. 166.

D. $4-5\frac{1}{18}$. A. $2\frac{1}{16}$. L. lat. 25*.

The teeth in both jaws form villiform bands; teeth on the vomer, the palatine bones, and on the tongue. The height of the body is contained once and four-fifths in the total length (without caudal), the length of the head thrice and one-fourth. The first dorsal fin is but little developed, the spines being short, feeble, and flexible. Anterior rays of the dorsal and anal fins prolonged into a very long filament, sometimes longer than the whole body. Jaws equal in length, the maxillary extends to the vertical from the front margin of the orbit. Lateral line bent, the width of its arch being as long as the straight portion; the latter commences below the middle of the second dorsal fin. The plates are moderately developed, and commence at some distance from the bend of the lateral line. Gill-membrane above the pectoral blackish; posterior half of the ventrals black.

Panama. We have received two examples from Capt. Dow, one 19 inches long.

* Mr. Gill counted 44; this is either a mistake, or he has counted small scales not deserving the name of plates.

82. CHORINEMUS ALTUS.

D. $5\frac{1}{10}$. A. $2\frac{1}{10}$.

The height of the body is contained thrice in the total length (without caudal), the length of the head four times and one-fourth. Eye rather large, its diameter being equal to the length of the snout, and one-fourth of that of the head. Lower jaw projecting beyond the upper. Maxillary very narrow posteriorly, scarcely extending to the vertical from the hind margin of the eye; the length of the intermaxillary is contained once and three-fourths in the length of the head. The infraorbital, situated above the maxillary, is as broad as the bone next above it; none of these bones reach to the anterior præopercular ridge. Pectoral fin longer than the ventral, nearly as long as the head (without snout). Coloration uniform.

One example, 11 inches long, has been recently sent by Capt. Dow from Panama.

83. CHORINEMUS INORNATUS.

Oligoplites inornatus, Gill, Proc. Acad. Nat. Sc. Philad. 1863, p. 166.

D. $5\frac{1}{20}$. A. $2\frac{1}{20}$.

"The height of the body enters four times and two-thirds in the total length; the length of the head five times and two-thirds. The upper maxillary reaches nearly to the vertical from the hinder margin of the orbit; the intermaxillary enters twice and one-third in the head's length. The snout is a little longer than the diameter of the eye; the latter equals a quarter of the head's length. The infraorbital bones do not extend to the præoperculum; the one above the maxillary bones is wider than the one above itself, and as wide as that behind the eye. The opercular apparatus is vertical in front of the pectoral, and for an equal space above. The præoperculum is nearly vertical, and its angle obliquely rounded. The width of the operculum and suboperculum in front of the lower axilla of the pectoral equals the diameter of the eye and the interval between suboperculum and axil. The pectoral equals the interval between its axis and the hinder border of the pupil; the ventral is rather shorter, but its end almost or quite reaches to the anus. The colour is uniform, tinged with blue above."

One adult specimen was collected by Capt. Dow on the Pacific coast of Central America.

85. TRACHYNOTUS FASCIATUS. (Plate LXIX. fig. 4.)

Trachynotus fasciatus, Gill, Proc. Ac. Nat. Sc. Philad. 1863, p. 86.

— *glaucoides*, Günth. Proc. Zool. Soc. 1864, p. 150.

$$D. 6 \frac{1}{20}. \quad A. 2 \frac{1}{18}.$$

Closely allied to *T. glaucus*, but with the body more elevated. The height of the body is one-half of the total length (without caudal); the length of the head two-sevenths. The maxillary extends to below the middle of the eye. Anterior dorsal and anterior anal rays, and the caudal lobes, much prolonged, the length of the latter being two-sevenths of the total. The *ventral fin does not extend to the vent*. Five narrow blackish vertical bars across the lateral line.

One specimen, 7 inches long, was obtained by Mr. Salvin at San José; two others, 11 inches long, were obtained by Capt. Dow at Panama.

Description.—This species has the body (without caudal) of a rhomboidal form, its greatest height being between the last spine of the dorsal and the vent, and one-half of the total length (without caudal); the upper profile between the dorsal and the snout is oblique, feebly convex over the eye. The length of the head is contained thrice and one-half in the total (without caudal). The diameter of the eye is rather more than the length of the snout, and contained thrice and two-thirds in that of the head. The cleft of the mouth is narrow; the maxillary reaches nearly to the level of the centre of the diameter of the eye; its length is a little more than one-third of that of the head. The width of the space between the eyes is more than one-third of the length of the head, or equal to the distance from the tip of the snout to the centre of the eye. Præoperculum with the hinder margin straight, and at a right angle with the lower border, which is also straight and parallel with the axis of the body. Operculum small, narrow, about two-thirds as long as high; the hinder border of the opercular apparatus is formed almost entirely of the sub- and interoperculum; it is rounded and membranaceous: the line of the separation between the operculum and suboperculum is at right angles with that between the sub- and interoperculum. There is a recumbent spine before the commencement of the first dorsal, and in a line with the posterior part of the axil of the pectoral; the dorsal spines, seven in number, are short; the first is minute, but erect, and not attached by any apparent membrane to the second; the others show a slight progression in dimensions, and are united by a low membrane. The base of the soft dorsal is not twice as long as that of the spinous; the first two rays, which are the longest, project considerably beyond any of the others, and are equal to half the length of the body (without the caudal); the following rays diminish very rapidly in length, and from the eighth ray to the last the fin is scarcely higher than the spinous dorsal, and its upper edge almost straight. The distance between the dorsal fin and the caudal is equal to that between the anal and caudal. The anal fin is preceded by three short spines about equal to the fourth, fifth, and sixth of the dorsal. The base of the

soft portion of the anal is about as long as that of the soft dorsal: it consists of eighteen rays, and perfectly resembles the soft dorsal in shape, having the first two rays much longer than the others, equal to the corresponding rays in the dorsal, and the following rays rapidly decreasing in length to the sixth, from which the margin of the fin is almost straight. The pectoral fin is pointed, of moderate size, its length being three-fourths that of the head. The ventrals are short, more than half the length of the pectoral, and not reaching to the vent. The tail behind the dorsal and anal is compressed and narrow. The caudal is deeply forked; the lobes are equal, and contained thrice and a half in the total length; it is covered with small scales.

The body is covered with very minute scales; those at the base of the vertical fins and near the lateral line are a little larger. The head and opercular bones are entirely naked. The lateral line shows a somewhat irregular sinuosity slightly above the median axis of the body for the first half of its length, after which it is perfectly straight, terminating between the two lobes of the caudal. Teeth small, villiform; a small central patch on the vomer, and a narrow one on each of the palatines.

Bluish green above, silvery beneath. Five vertical brown stripes down the sides of the body across the lateral line, the first two being nearer together than the others, which are at almost equal distances: the first behind the axil of the pectoral, the second below the third dorsal spine, the third below the sixth, the fourth below the seventh dorsal ray, and the fifth below the seventeenth. However, the second and third of these bands are placed sometimes more backwards, which is evidently the case in the example described by Mr. Gill, and named by him *T. fasciatus*. Having recently obtained two examples from Capt. Dow, one of which shows the arrangement of the bands as in *T. glaucoides*, on one side, and that of *T. fasciatus* on the other, I cannot entertain any doubt as to the specific identity of these fishes.

86. PELAMYS SARDA, Bl.

We may mention this species here, although it is not contained in any of the collections forming the material for this Memoir, because Dr. Ayres alludes to it in the following manner:—"A species of *Pelamys* brought to the markets of San Francisco is without question the *P. sarda*. The closest examination fails to distinguish it from the Atlantic form. Previous to this time we had no positive knowledge of any fish in the low latitudes which inhabits Californian waters and those of the Atlantic."—Proc. Calif. Acad. 1855, p. 74.

90. BATRACHUS PACIFICI (Gthr.).

In other specimens recently collected by Capt. Dow at Panama, I find the membrane at the bottom of the pouch of the axil of the pectoral fin (described in Fish. iii. p. 173) folded and wrinkled, with a great quantity of coagulated mucus between the folds. The same species appears to occur also on the coast of West Africa, a specimen having been lately obtained by Dr. Steindachner, who describes it as *B. liberiensis* (Sitzgsber. Ak. Wiss. Wien, 1867, lv. p. 525, Taf. 1. figs. 2 & 3).

THALASSOPHRYNE¹.

Thalassophryne, Günth. Fish. iii. p. 174.

Head broad, depressed; body subcylindrical anteriorly, and compressed posteriorly; skin naked. Canine teeth none. Operculum with a single spine. The spinous dorsal formed by two spines of moderate length. The opercular and dorsal spines with a canal conducting a poisonous fluid from a sac situated at their base. Gill-opening not very narrow, not extending to the isthmus.

Atlantic coasts of Tropical America.

92. THALASSOPHRYNE MACULOSA. (Plate LXVIII. fig. 1.)

Günth. Fish. iii. p. 175.

D. 2 | 19. A. 18. V. 1 | 2.

Brown, marbled with darker; some round black spots on the pectoral and the side of the body.

The general habitus is that of a *Batrachus*. The head is somewhat longer than broad, its length being contained thrice and one-third in the total; it is moderately depressed. The snout is short, obtuse, with the cleft of the mouth ascending obliquely upwards, and with the chin prominent. The maxillary extends to the vertical from the posterior margin of the orbit. The teeth are obtusely conical, standing in single series, except anteriorly in the lower jaw, where they form two series, and in the upper, where they are cardiform, in a narrow band. The eyes are directed upwards and very small, their width being one-half of that of the bony bridge between the orbits. Gill-covers with a single spine; it is long, slender, cylindrical, like one of the dorsal spines, and has the operculum for its base. Gill-opening not very narrow; it extends from the upper base of the pectoral obliquely downwards and forwards to the level of the inferior base of the pectoral. The two dorsal spines are slender, pungent, about one-third of the length of the head. Dorsal and anal fins terminate immediately before the root of the caudal, the length of which is one-seventh of the total. Pectoral obliquely rounded, extending to the origin of the anal; ventral rather short, not quite one-half the length of the head, extending to the base of the pectoral. Skin perfectly smooth, with some very short tentacles at the lower jaw. Two short horizontal muciferous channels on the cheek and the lateral line are very distinct; they are not, as usually, composed of a series of distant pores, but the pores are confluent, forming one continuous groove of a white colour. Other muciferous channels, as for instance along the base of the anal, are composed of separate indistinct pores. Colour brown, marbled with darker; pectoral fins and sides of the body with some round black spots; chin and ventrals brownish; belly white.

A single specimen from Puerto Cabello is known.

¹ Greek denomination for Sea-toad.

	lines.
Total length	54
Length of the head	16
Width of the head	14
Depth of the head.....	10
Diameter of the eye	1
Length of the caudal fin	8
—— of the ventral fin	7

93. *THALASSOPHYRNE RETICULATA*. (Plate LXVIII. fig. 2.)

Günth. Proc. Zool. Soc. 1864, pp. 150, 155.

D. 2 $\frac{1}{2}$ /24. A. 24. V. 1 $\frac{1}{2}$. P. 16.

The length of the head is two-sevenths of the total length (without caudal). The teeth on the palate are in a single series, very short, obtuse, incisor-like. Pectoral very large, extending backwards to the sixth anal ray. Head, body, and fins brown, with a network of yellowish lines; vertical and pectoral fins with a white margin.

In other respects this species agrees with *T. maculosa*; so that we may refer to the description of that species given above.

Three specimens were found by Messrs. Dow and Salvin on the Pacific coast of Panama; the largest is 13 inches long.

In this species I first observed and closely examined the poison-organ with which the fishes of this genus are provided. Its structure is as follows:—

1. *The opercular part*.—The operculum is very narrow, vertically styliform, and very mobile; it is armed behind with a spine, 8 lines long in a specimen of 10 $\frac{1}{2}$ inches, and of the same form as the venom-fang of a snake; it is, however, somewhat less curved, being only slightly bent upwards; it has a longish slit at the outer side of its extremity, which leads into a canal perfectly closed, and running along the whole length of its

Fig. 1. Hind half of the head, with the venom-sac of the opercular apparatus *in situ*. * Place where the small opening in the sac has been observed. a. Lateral line and its branches. b. Gill-opening. c. Ventral fin. d. Base of pectoral fin. e. Base of dorsal fin.

Fig. 2. Operculum, with the perforated spine.

interior; a bristle introduced into the canal reappears through another opening at the

base of the spine, entering into a sac situated on the opercle and along the basal half of the spine; the sac is of an oblong-ovate shape, and about double the size of an oat-grain. Though the specimen had been preserved in spirits for about nine months, it still contained a whitish substance of the consistency of thick cream, which on the slightest pressure freely flowed from the opening in the extremity of the spine. On the other hand, the sac could be easily filled with air or fluid from the foramen of the spine.

No gland could be discovered in the immediate neighbourhood of the sac; but on a more careful inspection I found a minute tube floating free in the sac, whilst on the left-hand side there is only a small opening instead of the tube. The attempts to introduce a bristle into this opening for any distance failed, as it appears to lead into the interior of the basal portion of the operculum, to which the sac firmly adheres at this spot.

2. The *dorsal part* is composed of the two dorsal spines, each of which is 10 lines long. The whole arrangement is the same as in the opercular spines; their slit is at the front side of the point; each has a separate sac, which occupies the front of the basal portion; the contents were the same as in the opercular sacs, but in somewhat greater quantity. A strong branch of the lateral line ascends to the immediate neighbourhood of their base.

Thus we have four poison-spines, each with a sac at its base; the walls of the sacs are thin, composed of a fibrous membrane, the interior of which is coated over with mucosa. There are no secretory glands imbedded between these membranes, and these sacs are probably merely the reservoirs in which the fluid secreted accumulates. The absence of a secretory organ in the immediate neighbourhood of the reservoirs (an organ the size of which would be in accordance with the quantity of the fluid secreted), the diversity of the osseous spines which have been modified into poison-organs, and the actual communication indicated by the foramen in the sac, lead me to the opinion that the organ of secretion is either that system of muciferous channels which is found in nearly the whole class of fishes, and the secretion of which has poisonous qualities in a few of them, or at least an independent portion of it.

This description was made from the first example; through the kindness of Capt. Dow I received two other specimens; and in the hope of proving the connexion of the poison-bags with the lateral-line system, I asked Dr. Pettigrew, of the Royal College of Surgeons, a gentleman whose great skill has enriched that collection with a series of the most admirable anatomical preparations, to lend me his assistance in injecting the canals. The injection of the bags through the opening of the spine was easily accomplished; but we failed to drive the fluid beyond the bag, or to fill with it any other part of the system of muciferous channels. This, however, does not disprove the connexion of the poison-bags with that system, inasmuch as it became apparent that, if there be minute openings, they are so contracted by the action of the spirit in which the speci-

mens were preserved, as to be impassable to the fluid of injection. A great part of the lateral-line system consists of *open* canals; however, on some parts of the body, these canals are entirely covered by the skin: thus, for instance, the open lateral line ceases apparently in the suprascapular region, being continued again in the parietal region. We could not discover any trace of an opening by which the open canal leads to below the skin; yet we could distinctly trace the existence of the continuation of the canal by a depressed line, so that it is quite evident that such openings do exist, although they may be passable only in fresh specimens. Thus, likewise, the existence of openings in the bags, as I believe to have found in the first specimen dissected, may be proved by examination of fresh examples.

The sacs are without an external muscular layer, and situated immediately below the loose thick skin which envelopes their spines to their extremity; the ejection of the poison into a living animal, therefore, can only be effected by the pressure to which the sac is subjected the moment the spine enters another body.

Nobody will suppose that a complicated apparatus like the one described can be intended for conveying an innocuous substance; and therefore I have not hesitated to designate it as poisonous; and, Capt. Dow informs me in a letter lately received, "the natives of Panama seemed quite familiar with the existence of the spines and of the emission from them of a poison which, when introduced into a wound, caused fever, an effect somewhat similar to that produced by the sting of a Scorpion; but in no case was a wound caused by one of them known to result seriously. The slightest pressure of the finger at the base of the spine caused the poison to jet a foot or more from the opening of the spine." The greatest importance must be attached to this fact, inasmuch as it assists us in our inquiries into the nature of the functions of the muciferous system, the idea of its being a secretory organ having lately been superseded by the notion that it serves merely as a stratum for the distribution of peripheric nerves. Also the objection that the Sting-Rays and many Siluroid fishes are not poisonous, because they have no poison-organ, cannot be maintained, although the organs conveying their poison are neither so well adapted for this purpose nor in such a perfect connexion with the secretory mucous system as in *Thalassophryne*.

The poison-organ serves merely as a weapon of defence. All the Batrachoids with obtuse teeth on the palate and in the lower jaw feed on Mollusca and Crustaceans.

95. ANTENNARIUS LEOPARDINUS. (Plate LXIX. fig. 3.)

Günth. Proc. Zool. Soc. 1861, p. 151.

D. 3|13. A. 7. P. 11.

Skin very rough, covered with minute spines; anterior dorsal spine (tentacle) not longer than the second, terminating in a small, flat disk; the third is separate from the soft dorsal. Brownish grey, marbled with rose-colour, and with brown dots on the

sides; a black ocellus edged with rosy in the middle of the side, another larger one on the base of the ninth and tenth dorsal rays, and one or two small ones on the side of the tail. Belly covered with round brown spots; caudal with ovate black spots, arranged in three transverse series; all the other fins with similar spots.

One specimen, $2\frac{1}{2}$ inches long, was found by Capt. Dow on the Pacific coast of Panama.

96. ANTENNARIUS TENUIFILIS.

D. 3/12. A. 7. P. 10.

Allied to *A. bigibbus*. Skin rough, the spines being exceedingly fine; anterior dorsal spine (tentacle) much longer than the second, and tapering into a fine point; second quite free, conical; third entirely covered by the skin, forming a slight protuberance. Rose-coloured, with black markings which are most crowded and confluent on the middle parts of the length of the fish, less so on the head and thorax, leaving the nape and back of the trunk nearly immaculate; the markings form irregular concentric streaks on the thorax, and larger patches on the body; a deep-black band across the caudal and anal fins.

One specimen, $2\frac{1}{2}$ inches long, was found by Dr. Seemann, walking on the reefs outside the city of Panama.

103. ELEOTRIS MACULATA (Bl.).

This species attains to a large size; Mr. Salvin collected specimens 11 inches long at Huamuchal. Such large examples have, of course, the eye comparatively smaller than younger ones; and having also a deeper body, the number of series of scales between the origin of the second dorsal and the anal is increased by the addition of smaller scales. On such a large example Mr. Gill has founded his *Dormitator microphthalmus*, Proc. Ac. Nat. Sc. Philad. 1863, p. 170.

106. ELEOTRIS LONGICEPS.

Günth. Proc. Zool. Soc. 1864, p. 151.

D. $6\frac{1}{10}$. A. $\frac{1}{10}$. L. lat. 66.

Vomerine teeth in a broad subcrescentic band, which is more than half as broad as that of the intermaxillaries. Thirty-six series of scales between the occiput and the anterior dorsal fin; twenty between the origin of the posterior and the anal. The height of the body is nearly one-half of the length of the head, which is more than one-third of the total (without caudal). The maxillary extends to below the middle of the eye; teeth cardiform. Caudal fin obtusely rounded, one-sixth of the total length. Brownish black, marbled with brown and black; fins with roundish blackish spots.

This species differs from the others (which have been referred to the division of *Philypnus*) in having a comparatively longer head. One specimen, 8 inches long, was given to Mr. Salvin by Capt. Dow, who found it in the Lake of Nicaragua.

107. *ELEOTRIS PICTA*.

Kner, Sitzgsber. bayer. Ak. Wiss. 1863, p. 223, and Abhandl. bayer. Ak. Wiss. 1865, p. 18, tab. 3. fig. 1.

D. $6\frac{1}{8-9}$. A. $\frac{1}{9}$. L. lat. 60.

This fish is closely allied to *E. gyrynus*, but is said to be distinguished by having the height of the body only one-sixth or one-seventh of the total length¹; lower parts of the body with numerous whitish spots and streaks.

From the Pacific side of the Isthmus.

108. *ELEOTRIS SEMINUDA*.

Günth. Proc. Zool. Soc. 1864, p. 24.

D. 7|11. A. 9.

The head and the trunk are naked; the tail is covered with small scales; head depressed, broader than high, flat above, its length being two-sevenths of the total. Snout rather obtuse, longer than the eye, with the lower jaw somewhat prominent; the cleft of the mouth extends to below the anterior margin of the orbit. Teeth in the upper jaw in a narrow band; the lower has four somewhat larger and recurved teeth in front; they appear to form a single series; palate toothless. None of the fin-rays are prolonged; the pectoral does not quite extend to the origin of the second dorsal; ventral much shorter than pectoral, its inner ray is the longest, the others gradually decreasing in length outwards; caudal fin rounded. Brown, with numerous well-defined white cross stripes on the head as well as on the body; vertical fins black.

Although there is only a single example, 20 lines long, in the collection, the characters of this species are so well marked that I have not hesitated to describe it.

109. *AMBLYOPUS BREVIS*.

Günth. Proc. Zool. Soc. 1864, p. 151.

D. $6\frac{1}{2}$ |15. A. 15.

The height of the body is one-eighth of the total length (without caudal); the length of the head two-ninths. Eyes minute. Jaws with a series of longish, widely set teeth. Caudal fin black.

One specimen, 3 inches long, was found on the Pacific coast of Panama by Messrs. Dow and Salvin.

The specimen being young, I abstain from giving a detailed description. In its dentition it agrees with *A. sagitta* from California, and therefore it would belong to the subgenus *Tyntlastes* (Proc. Zool. Soc. 1862, p. 194). The scales must have been very thin and deciduous, and do not appear to be very small, at least not on the hinder part of the body. The ventral is much longer than the pectoral, and the caudal longer than the head.

¹ According to the figure it is higher.

114. *CLINUS MACROCEPHALUS*. (Plate LXIX. fig. 2.)

Günth. Fish. iii. p. 266.

D. $\frac{21-22}{12}$. A. $\frac{2}{24}$. C. 13. P. 13. V. $1\frac{1}{3}$.

The height of the body is contained seven times and a half in the total length, the length of the head five times. The head is depressed, rather short, nearly as broad as long; crown of the head broad and flat; interorbital space concave, narrower than the orbit. Snout very short, obtuse, rounded; the maxillary does not extend to behind the posterior margin of the orbit; lips thick. The teeth in the jaws form a band with an outer series of stronger ones; vomerine teeth in a narrow band; palatine teeth none. No orbital tentacles, those at the nostril and on the neck very small. Gill-openings wide, the gill-membranes being united at the throat. Head naked; scales on the body not very small, cycloid. The dorsal fin commences at the occiput, and terminates near the base of the caudal; the spines are flexible, and much lower than the soft rays; the three anterior ones are rather more remote from one another than the following: none of the rays of this or of the other fins are branched. Caudal rounded. The anal is higher posteriorly than anteriorly, about as high as the spinous dorsal. Pectoral rounded, with the middle rays longest, shorter than the head. Ventrals jugular, half as long as the pectoral, with the spine and the outer ray enveloped in a common thick membrane. Dark greyish olive; head and fins blackish; head, base of the pectoral, anterior part of the body, and dorsal dotted with white.

Several examples, of the size of the figure, were collected by Capt. Dow at Panama.

CREMNOBATES.

Cremnobates, Günth. Proc. Zool. Soc. 1861, p. 374.

Body moderately elongate, with the scales small or of moderate size. Snout rather short, with the cleft of the mouth of moderate width. A band of small teeth in the jaws; teeth on the vomer. Two separate dorsals, composed of spines only; the anterior short, formed of three spines. Ventrals jugular, composed of three rays. Head with tentacles; gill-opening wide.

115. *CREMNOBATES MONOPHTHALMUS*. (Plate LXIX. fig. 1.)

Auchenopterus monophthalmus, Günth. Fish. iii. p. 275.

Cremnobates monophthalmus, Günth. Proc. Zool. Soc. 1861, p. 374.

D. 3 | 27. A. $\frac{2}{10}$. V. 3. L. lat. 38.

A fimbriated superciliary tentacle; a small one at the nostril and on each side of the nape, both multifid. A black ocellus, edged with white, on the posterior quarter of the dorsal fin.

Specimens, 2 inches long, were collected by Capt. Dow at Panama.

118. *ATHERINICHTHYS PACHYLEPIS*.

Günth. Proc. Zool. Soc. 1864, p. 25.

$$D. 4 \frac{1}{6}. \quad A. \frac{1}{20-21}. \quad L. \text{ lat. } 41. \quad L. \text{ transv. } 7.$$

The height of the body is nearly equal to the length of the head, and contained five times and a half or five times and a third in the total length (without caudal). The snout is short, not longer than the diameter of the eye; and the cleft of the mouth does not extend backwards to below the anterior margin of the eye. The anterior dorsal is composed of short, feeble spines; and its origin is opposite to the fourth or fifth anal ray. The pectoral fin is much longer than the head. The silvery streak occupies the adjoining halves of the third and fourth series of scales.

Two specimens, 6 inches long, were collected by Capt. Dow at Panama.

119. *ATHERINICHTHYS GUATEMALENSIS*.

Günth. Proc. Zool. Soc. 1864, p. 151.

$$D. 4 \frac{1}{9}. \quad A. \frac{1}{22}. \quad L. \text{ lat. } 36. \quad L. \text{ transv. } 7.$$

Anterior dorsal fin very small, inserted behind the vertical from the commencement of the anal fin. The height of the body is contained five times in the total length (without caudal), the length of the head four times and a fourth. The silvery band occupies the third upper series of scales. The lower caudal lobe rather longer than the upper.

Several examples, from 2 to $2\frac{1}{2}$ inches long, were collected by Mr. Salvin in the Lakes of Huamuchal.

120. *MUGIL BRASILIENSIS* (Agass.).

Messrs. Dow, Godman, and Salvin have collected numerous examples of all sizes at Belize, Chiapam, and Panama. I have no doubt that *M. güntheri*, Gill, Proc. Ac. Nat. Sc. Philad. 1863, p. 169, is founded on a specimen of this species; it is described as having all the fins scaleless; but, as all our specimens of *M. brasiliensis* and *M. incilis* have the dorsal and anal more or less covered with minute scales, I suppose that these scales have either been lost in the example of the Smithsonian Institution, or overlooked.

The first dorsal spine, in this species, is either longer than or as long as the second. L. lat. 36-38.

121. *MUGIL INCILIS*.

Mugil incilis, Hancock in Lond. Quart. Journ. Sc. 1830, p. 127.

$$D. 4 \frac{1}{8}. \quad A. \frac{3}{9}. \quad L. \text{ lat. } 42-44. \quad L. \text{ transv. } 15.$$

Closely allied to *M. brasiliensis*, but with smaller scales, and with the second dorsal spine rather longer than the first.

The height of the body equals the length of the head, which is two-ninths of the total (without caudal). The snout is moderately broad, scarcely convex, with the lower profile ascending in the same degree as the upper descends; the interorbital space is slightly convex, its width being contained twice and two-thirds in the length of the head. Upper lip rather thin. The angle made by the two mandibular bones is a

right one; the præorbital tapers posteriorly, has the anterior margin finely serrated, and covers the maxillary, so that only a very narrow portion of it is visible on the side of the snout. Eyes hidden anteriorly and posteriorly by a broad adipose membrane. Nostrils rather distant from each other, the posterior situated nearer to the orbit than to the extremity of the snout. The space of the chin, between the mandibles and the interopercula, is elongate cuneiform. The second dorsal and the anal are enveloped in small scales. There are twenty-three scales between the snout and the anterior dorsal. The second dorsal spine is longer than the first, and more than half as long as the head. The tenth, eleventh, and twenty-fifth scales of the lateral line correspond to the extremity of the pectoral fin and to the origins of the two dorsal fins. The root of the pectoral is above the middle of the body; and the ventral is inserted somewhat nearer to the pectoral than to the spinous dorsal; pectoral shorter than the head; caudal deeply emarginate. Silvery, axil of the pectoral blackish.

We have received examples of this species from Dutch and British Guiana; Mr. Salvin collected two fine examples in the Chagres River.

I formerly considered it possible that the fish described by Hancock might be identical with *M. brasiliensis*; but having now received examples, I have convinced myself that it is a distinct species.

123. AGONOSTOMA MICRIPS. (Plate LXX. fig. 1.)

Günth. Fish. iii. p. 462.

D. $4\frac{1}{8}$. A. $\frac{3}{9}$. L. lat. 43. L. transv. 12.

Broad bands of villiform teeth in the jaws, on the vomer, and the palatine and pterygoid bones. The height of the body is contained five times in the total length, the length of the head four times and a half; the latter is more than the distance between the origins of the two dorsal fins; snout much longer than the eye. Upper lip thick, protruding anteriorly. The maxillary extends to, or beyond, the vertical from the anterior margin of the eye. The interorbital space is convex. The anterior dorsal commences midway between the snout and the base of the caudal fin.

Mr. Salvin has collected specimens of this species (of which we have given a detailed description, *l. c.*) in the Rio Guacalate.

124. AGONOSTOMA NASUTUM. (Plate LXX. fig. 2.)

Agonostoma nasutum, Günth. Fish. iii. p. 463.

Dajaus elongatus, Kner & Steindachner, Sitzgsber. bayer. Ak. Wiss. 1863, p. 222; and Abhandl. bayer. Ak. Wiss. 1865, p. 6, Taf. 1. fig. 2.

— *nasutus*, Kner & Steindachner, *l. c.* p. 8.

D. $4\frac{1}{8}$. A. $\frac{3}{9}$. L. lat. 42. L. transv. 12.

Rather narrow bands of villiform teeth in the jaws, on the vomer, and palatine bones. The height of the body equals the length of the head, and is one-fifth of the total.

¹ See Zool. Record, ii. p. 192.

Upper lip thick. The maxillary extends to the vertical from the anterior margin of the eye. The interorbital space is convex. The anterior dorsal commences nearer to the end of the snout than to the base of the caudal fin.

This species, of which we have given a full description (*l. c.*), occurs in rivers of both sides of the Isthmus and of Guatemala. The specimens named *Dajaus elongatus* are probably emaciated, caught after spawning-time.

125. AGONOSTOMA MONTICOLA (Bancroft).

This species, which is indigenous in Jamaica and Barbadoes, has been found by M. Sallé in Mexico; and Messrs. Kner & Steindachner enumerate it in a collection from Panama, where it is found in rivers of both sides of the Isthmus. Abhandl. bayer. Ak. Wiss. 1865, p. 8.

129. GOBIESOX RHODOSPILUS.

Günth. Proc. Zool. Soc. 1864, p. 25.

D. 6. A. 5. C. 8-9. P. 17.

A vertical fold of the skin along the lower half of the base of the pectoral; the coracoid is scarcely below the level of the upper margin of the pectoral. The distance of the origin of the dorsal fin from the caudal is contained twice and two-thirds in its distance from the snout; the anal commences below the third dorsal ray. A very narrow band of short conical teeth in the upper jaw—one of the lateral teeth being somewhat larger than the others, recurved, canine-like. The lower jaw with a single series of teeth, the anterior being narrow incisors, whilst the outermost on each side is distinctly a canine tooth, corresponding to that in the upper jaw. Rose-coloured, with dark-rose transverse spots, each spot having an edge of deep-red dots.

Two specimens, 18 lines long, were collected by Capt. Dow at Panama.

132. POMACENTRUS RECTIFRÆNUM.

A species from California and the western coast of Central America was described by Mr. Gill under this name in the year 1862, and easily recognized by myself when I gave an account of this genus in the fourth volume of my 'Fishes,' having received, beside numerous examples from Panama and the Island of Cardon, a typical specimen from the collection of the Smithsonian Institution. At the same time a specimen was received from the same establishment, numbered as the other, but marked in the accompanying list as *Pomacentrus bairdii*, another name proposed by Mr. Gill in the same year (Proc. Ac. Nat. Sc. Philad. 1862, p. 149). It agreed perfectly with the description given there; but as a comparison with our other examples of *P. rectifrænum* did not reveal distinctive specific characters, I did not hesitate to regard it not only as a typical specimen of Mr. Gill's *P. bairdii*, but also as specifically identical with *rectifrænum*; about this I had no doubt.

However, during the publication of my account of the *Pomacentridæ*, Mr. Gill kindly sent me a MS. communication on the same subject, in which he pointed out the

characters of these two and of three other allied species (see 'Fishes,' iv. p. 27); I had no faith whatever in these distinctions; but, to allow others interested in the subject to judge for themselves, I admitted into my account those MS. notes in the form in which they were sent to me.

I was rather surprised to find in an article written by Mr. Gill a short time afterwards (Proc. Ac. Nat. Sc. Philad. 1863, p. 218) the assertion that the specimen sent as "*P. bairdii*" is not this species, but the young of *P. rectifrenum*, "the name, under which the *P. bairdii* was sent, having doubtless by some accident been shifted to the young of *P. rectifrenum*, and the specimen of the former lost." If this be so, it is certainly curious that the "*P. bairdii*" sent agrees so well with the "*P. bairdii*" described; and the shifting must have happened to the sender, inasmuch as the number corresponding to "*P. rectifrenum* in the accompanying list" is still tied, by a thread drawn through the tail, to one of the specimens; and two specimens of *Pomacentrus* only having been then sent, it is fair to assume that the other example was meant for *P. bairdii*.

But in the same paper the author goes a step further: *P. bairdii* is not only mentioned as distinct, but it becomes one of the types of a new genus, *Pomataprion*, distinguished from *Pomacentrus* by its *entire*¹ præoperculum. In our series of examples, varying in size from 10 lines to $4\frac{1}{2}$ inches, I find that the youngest have the præoperculum entire, without exception, that in specimens $2\frac{1}{2}$ inches long the præoperculum is as frequently entire as but very slightly denticulated, and that the serrature even in the oldest examples is fine and thin. Therefore I continue to regard those specific and generic distinctions of Mr. Gill as utterly valueless, and the names of *P. rectifrenum*, *P. flavilatus*, *P. analigutta*, and *P. bairdii* as referring to specimens of one and the same species.

The synonymy stands now thus:—

Gill, 1862.	{	<i>Pomacentrus rectifrenum</i> , Gill, l. c. p. 148.
		— <i>flavilatus</i> , Gill, ibid.
		— <i>bairdii</i> , Gill, l. c. p. 149.
		— <i>analigutta</i> , Gill, in Günth. Fish. iv. p. 27.
Günther, 1862.	{	<i>Pomacentrus rectifrenum</i> , Günth. Fish. iv. p. 26.
		<i>Heliastes insolatus</i> , young (10 inches long), Günth. ibid. p. 61.
Gill, 1863.	{	<i>Pomacentrus rectifrenum</i> , Gill, l. c. p. 214.
		— <i>flavilatus</i> , Gill, ibid.
		<i>Pomataprion bairdii</i> , Gill, l. c. p. 217.

137. HELIASTES MARGINATUS (Castelnau).

Chromis atrilobata (Gill) is, as already stated in Fish. iv. p. 64, identical with this species. Mr. Gill thinks that it ought to be kept distinct on account of a "sulphur spot behind the dorsal fin," Proc. Ac. Nat. Sc. Philad. 1863, p. 220. In two specimens

¹ "The præopercular serrature is *almost obsolete*," Gill, 1862, p. 149.

from Bahia, which I have examined, the larger is without any trace of such a spot; whilst the smaller one shows one, of about the size of the scale, on each side of the base of the last dorsal ray.

141. *COSSYPHUS PECTORALIS* (Gill).

This species occurs also in the Atlantic, as I have lately received fine examples from St. Helena. *Cossyphus pulchellus* (Poey) is perhaps identical with it.

143. *PLATYGLOSSUS DISPILUS*. (Plate LXXIV. fig. 1.)

Günth. Proc. Zool. Soc. 1864, p. 25.

D. $\frac{9}{11}$. A. $\frac{2}{12}$. L. lat. 28. L. transv. $2\frac{9}{10}$.

The height of the body equals the length of the head, and is contained four times and one-fourth in the total. Caudal fin rounded, with the lobes very slightly produced. Greenish olive, with a roundish black spot edged with silvery on the lateral line, below the fifth and sixth dorsal spines; the side of the head with five or six pearl-coloured streaks, a part of which are continued on the body, forming a series of round spots. An oblong variegated blotch behind the pectoral fin: it is composed of three pearl-coloured stripes, enclosing two yellow bands, each of which has an undulated purple edge. No spot in the axil of the pectoral. A short oblique yellowish streak behind the base of each soft dorsal ray; these streaks form a continuous band on the spinous portion. Anal fin with two or three whitish lines; caudal with several irregular reddish longitudinal bands, which are convergent behind.

Young specimens are much more plain-coloured; the black spot on the lateral line, however, is very distinct, and there is another at the root of the caudal.

Capt. Dow's Panama collection contains a single young specimen; but Mr. Salvin has brought others, one, apparently adult, being $5\frac{1}{2}$ inches long.

144. *PSEUDOJULIS NOTOSPILUS*. (Plate LXVI. fig. 2.)

Günth. Proc. Zool. Soc. 1864, p. 26.

D. $\frac{9}{11}$. A. $\frac{3}{12}$. L. lat. 25. L. transv. $2\frac{1}{8}$.

The height of the body is rather less than the length of the head, and contained four times and a quarter in the total. Dorsal spines pungent; caudal fin slightly rounded. Brownish or yellowish olive; young specimens with a silvery band along each side of the trunk, above the pectoral fin. Back with four or five indistinct broad brown cross bars; a series of blotches on the dorsal fin corresponds to these cross bands, one of them, on the first three dorsal rays, being the largest and most distinct; it is of a deep black colour, and of an ovate form. The corners of the caudal fin are white; ventral whitish, with a broad blackish outer margin.

One adult specimen, 4 inches long, and several young ones were collected by Capt. Dow at Panama.

150. GERRES AXILLARIS.

Günth. Proc. Zool. Soc. 1864, p. 102.

D. $9\frac{1}{2}$ 10. A. $\frac{3}{8}$. L. lat. 34. L. transv. $5\frac{1}{10}$.

Allied to *G. plumieri*, but with considerably shorter fin-spines. The height of the body is contained twice and a fourth in the total length (without caudal). Præorbital finely serrated. Snout as long as the eye; the groove for the intermaxillary processes is very broad, scaleless, extending backwards to the vertical from the centre of the eye. Dorsal fin notched, the last spine being not much longer than the eye; dorsal spines strong, the second as long as the head without snout; the second anal spine stronger, but scarcely longer than the second of the dorsal fin. The pectoral extends to the vertical from the third anal spine. Caudal deeply forked, with the lobes equal in length to each other and to the pectoral. A blackish streak along each series of scales; the hinder side of the axil, and sometimes the anterior, blackish.

Three specimens, from 8 to 9 inches long, were collected by Mr. Salvin at Chiapam.

151. GERRES BREVIMANUS.

Günth. Proc. Zool. Soc. 1864, p. 152.

D. $9\frac{1}{2}$ 10. A. $\frac{3}{8}$. L. lat. 39. L. transv. $6\frac{1}{11}$.

Præorbital minutely serrated. The height of the body is contained twice and two-fifths in the total length (without caudal), the length of the head twice and a half. Snout as long as the eye; the groove for the intermaxillary processes is broad, scaleless, not extending backwards to the vertical from the centre of the eye. Dorsal fin notched, the last spine being longer than the eye; dorsal spines strong, the length of the second equals the distance between the end of the operculum and the anterior nostril; the second anal spine stronger, but much shorter, than the second of the dorsal fin. The scaly sheath of the anal fin leaves the outer half of the last ray uncovered. The pectoral extends scarcely to the vertical from the vent. Caudal scaly, deeply forked, with the lobes equal in length, each being one-fourth of the total. Three or four blackish streaks along the series of scales below the lateral line; the spinous dorsal fin black.

One specimen, 10 inches long, was found by Mr. Salvin at Chiapam.

155. GERRES DOVIL.

Diapterus dowii, Gill, Proc. Ac. Nat. Sc. Philad. 1863, p. 162.

This species is characterized thus:—

D. $\frac{9}{10}$. A. $\frac{3}{7}$. L. lat. 47. L. transv. $5\frac{1}{10}$.

The greatest height is contained thrice and a half in the extreme length; the head four times and a quarter; the diameter of the eye twice and three-fourths in the head; the snout equals four-fifths of the eye. The profile is rectilinear, and the interorbital

space nearly flat, but convex above the eyes, and nearly as wide as the eye. The maxillary groove is linear, and extends backwards to a vertical midway between the front of the orbit and pupil, while the scales on each side extend to the vertical from the front of the orbits. The exposed surface of the supermaxillary bones is at first triangular, and thence oblong, the whole twice and a half as long as wide. The height of the constricted portion of the caudal peduncle equals two-thirds of its length and the diameter of the eye. The lateral line is scarcely bent behind. The second and third dorsal spines are slender, and nearly equal half the height of the body beneath; the last is little more than half as long as the first branched ray. The third anal spine is as long as the snout, and longer and more slender than the second. The colour is silvery; the spinous dorsal blackish at margin; the axilla of pectoral blackish.

Discovered by Capt. Dow on the Pacific coast of Central America.

156. *ACARA CÆRULEOPUNCTATA*.

Kner & Steindachner, Sitzgsber. bayer. Akad. 1863, p. 222; and Abhandl. bayer. Akad. Wiss. x. p. 16, tab. 2. fig. 3.

D. $\frac{15}{10}$. A. $\frac{3}{8}$. L. lat. 27. L. transv. $2\frac{1}{2}/9$.

Three series of scales on the cheek. Præorbital scarcely wider than the orbit. The greatest breadth of the head is two-thirds of its length. Cleft of the mouth oblique. Body with four or five indistinct cross bands. A large black blotch on the middle of the sides, and traces of a second on the root of the caudal. Each scale on the side of the head and chest with a bluish spot.

Two specimens, 5 inches long, were collected by Mr. Salvin in the Rio Chagres.

Description.—The height of the body is contained twice and a half in the total length (without caudal), the length of the head rather more than thrice. Nape curved, the profile of the snout straight. Width of the interorbital space two-fifths of the length of the head, and more than that of the snout. Snout broad, moderately elevated, the width of the præorbital being scarcely more than the diameter of the eye. Cleft of the mouth slightly oblique, not reaching the vertical from the orbit. The fold of the lower lip is interrupted in the middle. Lower limb of præoperculum more than half the length of the posterior limb. There are only eight series of scales between the throat and the root of the ventral. Dorsal spines of moderate strength, gradually increasing in length posteriorly; the length of the ninth is more than one-third of that of the head. The middle of the soft dorsal and anal produced, and extending beyond the middle of the caudal, which is rounded. Pectoral as long as the head, reaching only to the origin of the anal. Ventral filament rather long. Colours as described above.

157. *HEROS PARMA* (Gthr.).

This species varies considerably in coloration and in form of the body. The cross bands may be entirely absent, and replaced by a large diffuse black blotch on the end

of the tail; the height of the body is contained from once and three-fifths to twice and one-fifth in the total length. Guatemalan specimens have generally the black caudal blotch, but they vary much in the depth of the body. The numbers of the fin-rays ($D. \frac{17}{12-13}$. $A. \frac{6}{9-10}$) appear to be very constant.

158. *HEROS MARGARITIFER*. (Plate LXXI. fig. 2.)

Günth. Fish. iv. p. 287.

$D. \frac{17}{11}$. $A. \frac{7}{9}$. L. lat. 31. L. transv. $5/13$.

The fold of the lower lip is slightly interrupted in the middle; five or six series of scales on the cheek. The height of the body is rather less than one-half of the total length (without caudal). Brownish olive, with seven black cross bands, each band with pearl-coloured spots.

One specimen, $6\frac{1}{2}$ inches long, was found by Mr. Salvin at Lake Peten.

159. *HEROS MELANOPOGON*.

Steindachner, Denkschr. Ak. Wiss. Wien, xxiii. p. 72, Taf. 1. fig. 3.

$D. \frac{16-17}{12}$. $A. \frac{6}{9}$. L. lat. 30. L. transv. $6\frac{1}{2}/13$.

The fold of the lower lip is interrupted in the middle; five or six series of scales on the cheek. The height of the body is four-ninths of the total length (without caudal). Body with five irregular blackish cross bands interrupted in the middle, so as to represent two series of irregular blotches; a large blackish blotch on the root of the caudal fin. Small pearl-coloured spots surround the lower blotches, and are scattered over the caudal blotch.

Known from a specimen $4\frac{1}{2}$ inches long.

This fish may represent merely the younger state of *H. margaritifer*; it is stated to be from Central America. It formed part of a collection made by Friedrichsthal, who, to judge from other specimens collected by him, appears to have visited Lake Peten, which is inhabited by *H. margaritifer*.

160. *HEROS MELANURUS*. (Plate LXXII. fig. 3.)

Günth. Fish. iv. p. 288.

$D. \frac{17}{11}$. $A. \frac{6}{8}$. L. lat. 33. L. transv. $5/13$.

The fold of the lower lip is subinterrupted in the middle¹; five series of scales on the cheek. The height of the body is contained twice and a third or twice and a half in the total length (without caudal). A deep-black band along the middle of the tail; the lower parts black in adult specimens.

Several examples, from 3 to 10 inches long, were collected by Mr. Salvin at Lake Peten.

¹ The fold is distinctly interrupted in specimens from 6 to 10 inches long, whilst it appears to be slightly continuous in young individuals of 3 to 4 inches long.

161. *HEROS MACRACANTHUS*.

Günth. Proc. Zool. Soc. 1864, p. 153.

$$D. \frac{14-15}{12-13}. \quad A. \frac{5}{9-10}. \quad L. \text{ lat. } 31. \quad L. \text{ transv. } \frac{5\frac{1}{2}}{15}.$$

The lower lip is interrupted in the middle. The height of the body is two-thirds of the total length (without caudal) in adult specimens, but only one-half in immature; the length of the head is one-third of the total. Upper profile of the head very steep, not concave. Scales on the cheek in five series. The first dorsal spine is a little before the vertical from the upper end of the gill-opening. Dorsal and anal spines strong, the tenth of the dorsal fin being two-fifths of the length of the head. Pectoral as long as the head. Dark greenish, many scales with a pearl-coloured spot in the upper or lower angle. Vertical and ventral fins black.

About a dozen specimens, from 3 to 9 inches long, were collected by Mr. Salvin at Chiapam and Huamuchal.

Description.—The height of the body is two-thirds of the total length (without caudal), and nearly one-half of the entire length of the fish. The length of the head is one-third, or slightly more than one-third of the total (without caudal). Head rather higher than long, the nape convex, but the upper profile showing a slight concavity above the snout. The snout is of rather considerable extent, the height of the præorbital being one-half more than the width of the orbit. The cleft of the mouth is slightly oblique; the præorbital almost covering the posterior end of the maxillary, which does not attain the line of the front margin of the eye. Jaws rather protractile, armed with a broad band of villiform teeth, those of the outer series being enlarged. Interorbital space convex, nearly twice the width of the orbit. Eye somewhat nearer to the end of the operculum than to that of the snout. Base of soft dorsal and anal with a few small scales. Dorsal spines strong; the twelfth is a little less than one-half of the length of the head in adult specimens; the fifteenth is the longest, and more than half the length of the head. Soft dorsal and anal much elevated; the middle rays produced; caudal rounded. Pectoral rounded, about as long as the head. First ventral ray slightly prolonged. The free portion of the tail is nearly twice as deep as long. Greenish or brownish olive; fins black; a more or less distinct black spot on the root of the caudal fin, above the lateral line. Immature specimens with six very indistinct dark cross bands, the third of which has a blackish blotch below the lateral line; an indistinct blackish spot at the root of the caudal fin.

162. *HEROS SPILURUS*. (Plate LXXIII. fig. 1.)

Günth. Fish. iv. p. 289.

$$D. \frac{18}{16}. \quad A. \frac{8-9}{7-8}. \quad L. \text{ lat. } 29. \quad L. \text{ transv. } \frac{4\frac{1}{2}}{11}.$$

The fold of the lower lip is interrupted in the middle; four series of scales on the cheek. The height of the body is one-half of the total length (without caudal), the

length of the head nearly one-third. Head a little higher than long; snout of moderate extent, its length being two-fifths of that of the head. The diameter of the eye is two-sevenths of the length of the head, two-thirds of that of the snout, and less than the width of the interorbital space, which is convex; the eye is situated below the upper profile, a little nearer to the extremity of the operculum than to that of the snout. Præorbital as wide as the orbit. Dorsal spines of moderate length and strength, the length of the twelfth being contained twice and a third in that of the head. The distance between dorsal and caudal is less than the depth of the tail. Greenish olive, with nine dark vertical bands; a large, roundish black spot on the middle of the root of the caudal; no spot on the temple; caudal and the posterior part of the dorsal and anal with whitish spots.

Three examples were collected by Messrs. Salvin and Godman at Yzabal and in the Rio Motagua. Length $3\frac{1}{2}$ inches.

163. *HEROS NIGROFASCIATUS*. (Plate LXXIV. fig. 3.)

D. $\frac{18}{8}$. A. $\frac{10}{7}$. L. lat. 29. L. transv. 4/11.

The lower lip is interrupted in the middle. Scales on the cheek in four or five series. Dark blackish brown, with nine deep-black cross bands.

Numerous examples, from 2 to $3\frac{1}{2}$ inches long, were collected by Mr. Salvin in the Lakes of Amatitlan and Atitlan.

Description.—The height of the body is contained twice and one-sixth in the total length (without caudal), the length of the head thrice; the free portion of the tail is considerably deeper than long. Head as high as long, with the upper profile convex to the snout, where it is straight. Snout of moderate extent, the width of the præorbital being equal to that of the orbit. The eye is somewhat nearer to the end of the snout than to that of the operculum; its diameter is considerably less than the width of the interorbital space, and one-fourth of the length of the head. Jaws equal in length. The soft dorsal and anal fins have scarcely any scales on their base, and are more or less produced in the middle, the longest rays reaching to the middle of the caudal. The dorsal fin commences in the vertical from the humerus; its spines are of moderate strength, rather short, the length of the twelfth being somewhat less than one-third of that of the head. Anal spines as long as, but rather stronger than those of the dorsal fin. Caudal rounded, two-ninths of the total length. Pectoral as long as the head, without snout, extending to the second or third anal spine. Ventral but slightly produced.

This species is very dark-coloured. The ground-colour is a dark blackish purplish brown. An arched black band runs from the nape of the neck round the opercular margin to the interoperculum. A second is nearly concentric with the first, running from the nape to behind the pectoral and ventral. The third is short, like a spot,

between the anterior dorsal spines and the lateral line. The following are subvertical, slightly inclined backwards, and broader than the interspaces between them. The penultimate connects the ends of the dorsal and anal fins; the last across the root of the caudal. Fins black.

This species appears to remain within small dimensions.

164. *HEROS MULTISPINOSUS*. (Plate LXXIV. fig. 2.)

D. $\frac{18}{9}$. A. $\frac{11}{7}$. L. lat. 29. L. transv. $4\frac{1}{12}$.

The lower lip is interrupted in the middle. Three series of scales on the cheek. A blackish band, interrupted on the tail, runs from the eye to the caudal; a round black spot in the middle of the length of the band.

A single specimen, $3\frac{1}{2}$ inches long, was obtained by Capt. Dow in the Lake of Managua.

Description.—The height of the body is contained twice and one-seventh in the total length (without caudal), the length of the head thrice. The free portion of the tail is twice as deep as long. Head as deep as long, with the upper profile nearly straight. Snout rather short; the width of the præorbital being considerably less than that of the orbit. The eye is situated immediately below the upper profile, nearer to the end of the snout than to that of the operculum; its diameter is a little less than one-third of the length of the head, and much less than the width of the interorbital space, which is flat. Mouth with the jaws equal in length, small, the maxillary not nearly reaching the vertical from the orbit. Suboperculum with two series of scales. The soft dorsal and anal fins are scaly at the base, they are scarcely prolonged, and not extending to the middle of the caudal. The dorsal fin commences above the humerus; its spines are of moderate strength, and rather long, the length of the eighth to the last spine being not much less than one-half of that of the head. Anal spines stronger, and even a little longer than those of the dorsal. Caudal fin rounded, two-ninths of the total length. Pectoral shorter than the head, extending to the fifth anal spine. The outer ventral ray produced into a short filament. Brownish olive, each scale somewhat darker at the base. A blackish band, as broad as a scale, runs from the eye to a round black spot situated before and below the termination of the upper part of the lateral line; thence it is continued to the root of the caudal as a series of four or five irregular spots. Fins blackish, apparently immaculate.

165. *HEROS LONGIMANUS*. (Plate LXXII. fig. 2.)

D. $\frac{16}{10}$. A. $\frac{6}{8}$. L. lat. 28. L. transv. $4\frac{1}{12}$.

The fold of the lower lip is interrupted in the middle. Three or four series of scales on the cheek. Pectoral very long, extending nearly to the end of the anal. Greenish

olive, with an indistinct blackish band running from the orbit to a large black spot on the middle of the side. Dorsal fin with numerous round whitish spots.

One specimen, $5\frac{1}{2}$ inches long, was found by Capt. Dow in the Lake of Nicaragua.

Description.—The height of the body is contained twice and one-sixth in the total length (without caudal), the length of the head twice and three-fifths. Upper profile of head straight. Head rather longer than high; cleft of the mouth slightly oblique, with the lower jaw rather prominent. Jaws moderately protractile; the maxillary does not extend to the vertical from the front margin of the eye. Præorbital as wide as the diameter of the eye, which is somewhat less than the width of the interorbital space, and more than one-fourth of the length of the head. The eye is situated immediately beneath the upper profile of the head, and a little nearer to the end of the operculum than to that of the snout. Scales on the cheek in three or four series; scales on the opercles large. The dorsal commences vertically above the scapula; the spinous portion has its upper margin convex; the spines are slender and long, the fifth and sixth being the longest, one-half of the length of the head. The soft dorsal and anal have the middle rays somewhat longer than the others, and reaching to about the middle of the caudal; the soft anal is slightly scaly at the base, the soft dorsal scarcely or not at all scaly. Anal spines shorter but somewhat stronger than those of the dorsal. Caudal slightly emarginate. Pectoral very long, slightly longer than the head, and extending nearly to the end of the anal. Ventral with the outer ray produced into a filament. The distance between the vent and the root of the ventrals is equal to one-third of the length of the head. Teeth in the jaws small, cardiform, forming a band, those of the outer series being somewhat larger than the others.

This species is similar to the Mexican *H. helleri*, but has a considerably longer pectoral fin, and also less anal rays.

166. *HEROS UROPTHALMUS*. (Plate LXXII. fig. 1.)

Günth. Fish. iv. p. 291.

D. $\frac{17}{11}$. A. $\frac{6}{9}$. L. lat. 28. L. transv. 5 12.

The fold of the lower lip is continuous in the middle. Scales on the cheek in six series. The height of the body is contained twice and a half or twice and a quarter in the total length (without caudal), the length of the head nearly three times. Head as high as long; snout rather elevated, with the cleft of the mouth oblique and with the lower jaw prominent. Præorbital as wide as the orbit; interorbital space flat, wider than the orbit. The eye is nearer to the extremity of the snout than to that of the operculum. Dorsal spines of moderate length and strength, the length of the twelfth being two-fifths of that of the head. The free portion of the tail is higher than long. Anal spines strong and long. The distance between the vent and the root of the ventral is three-fifths of the length of the head. Brownish- or greenish-olive, with seven blackish cross bands, as broad as the interspaces between: the first descending obliquely back-

wards across the nape; the second, third, and fourth below the dorsal spines; the seventh across the free portion of the tail. A large, black, white-edged ocellus on the root of the caudal. Fins blackish; pectoral yellowish towards the base.

Mr. Salvin obtained three examples, 7 inches long, at Lake Peten.

167. *HEROS AUREUS*. (Plate LXXIII. fig. 2.)

Günth. Fish. iv. p. 292.

D. $\frac{16}{9-10}$. A. $\frac{7}{8}$. L. lat. 33. L. transv. 6·13.

The fold of the lower lip is continuous in the middle. Scales on the cheek in five series. Base of the dorsal scaleless. The height of the body is contained twice and a third in the total length (without caudal), the length of the head three times. Head as high as long; snout somewhat elevated, with the cleft of the mouth oblique and with the jaws equal anteriorly; præorbital as wide as the orbit. The eye is a little nearer to the extremity of the operculum than to that of the snout. Dorsal spines rather slender, the length of the twelfth being a little less than one-half of that of the head. The distance between the dorsal and caudal is somewhat less than the greatest depth of the free portion of the tail. Caudal slightly emarginate. The distance between the vent and the root of the ventral is one-third of the length of the head. Yellowish-olive, with six dark cross bands, extending downwards to a yellow longitudinal band running from above the pectoral to the lower half of the base of the caudal. The third cross band terminates in a large black lateral spot; sides of the head with several bluish dots, and with a blackish spot on the operculum and suboperculum, darkest on the latter bone. Fins light-coloured, immaculate.

Two specimens, 4 and 5 inches long, were collected by Messrs. Salvin and Godman at Yzabal and in the Rio Motagua.

168. *HEROS AFFINIS*. (Plate LXXIX. fig. 1.)

Günth. Fish. iv. p. 292.

D. $\frac{16}{8-9}$. A. $\frac{8-9}{8-7}$. L. lat. 29. L. transv. 5·12.

The fold of the lower lip is continuous in the middle. Scales on the cheek in four series. The height of the body is contained twice and two-fifths in the total length (without caudal), the length of the head twice and three-fourths. Head as high as long; snout compressed, elevated, with the cleft of the mouth oblique and with the lower jaw prominent. Præorbital wider than the orbit (in the larger individuals); the eye is considerably nearer to the extremity of the operculum than to that of the snout. Dorsal and anal fins entirely scaleless; dorsal spines rather strong and long, the length of the twelfth being two-fifths of that of the head. Anal spines very strong. The free portion of the tail is a little higher than long. Caudal slightly emarginate, two-ninths of the total length. The distance between the vent and the root of the ventral is one-

third of the length of the head. Olive, with five or six dark cross bands, the middle one of which has a deep-black spot where it passes the lateral line; a more or less distinct black spot on the suboperculum; sides of the head and vertical fins with bluish dark-edged ocelli.

This species is very closely allied to *H. aureus*, but may be distinguished from it by larger scales, by a more backward position of the eyes, by stronger spines, &c.

Four examples, from $3\frac{1}{2}$ to $5\frac{1}{2}$ inches long, were obtained by Mr. Salvin at Lake Peten.

169. HEROS LABIATUS.

Günth. Proc. Zool. Soc. 1864, p. 27, pl. 4. fig. 1.

D. $\frac{17}{11}$. A. $\frac{7-8}{8}$. L. lat. 32. L. transv. 6/13.

The anterior portions of the upper and lower lips are much enlarged, each forming a moveable subtriangular flap (probably in old males only). The height of the body is somewhat more than the length of the head, and two-fifths of the total (without caudal); the eye occupies the middle of the length of the head. Scales on the cheek in four series. Base of the dorsal fin almost scaleless. *The length of the eighth dorsal spine is less than one-third of that of the head. The depth of the free portion of the tail is scarcely more than its length.* Uniform red, or red irregularly marbled with black, or nearly entirely black.

Two specimens, $6\frac{1}{2}$ and 7 inches long, were collected by Capt. Dow in the Lake of Managua; three others were lately sent by the same gentleman from the Lake of Nicaragua. We do not yet know the female sex and the young state of this species.

Description.—Head rather longer than high; snout somewhat elevated; cleft of the mouth slightly oblique, with the lower jaw a little prominent. Teeth in narrow bands, those of the outer series enlarged, with brown tips. The maxillary does not nearly attain the vertical from the front of the eye. Preorbital as wide as the orbit, the diameter of which is less than the extent of the snout, and one-fourth of the length of the head. Interorbital space somewhat convex, wider than the orbit. The eye is situated not quite immediately beneath the upper profile of the head, and midway between the end of the snout and that of the operculum. Opercles scaly, the scales being larger than those on the cheek; suboperculum with two series of scales. Soft portions of dorsal and anal fins with minute scales between the rays at their base. Dorsal spines of moderate length and strength, the length of the eighth dorsal spine being less than one-third of the length of the head. Points of the produced middle rays of the soft dorsal and anal reaching to the middle of the caudal fin. Caudal rounded, its length being contained rather more than five times in the total. Anal spines of nearly the same length and strength as those of the dorsal fin. Pectoral rounded, reaching to the fourth or fifth spine of the anal; ventral filament produced.

The distance between the vent and the root of the ventral is less than one-half of the length of the head.

170. *HEROS ERYTHRÆUS*. (Plate LXXV. fig. 2.)

D. $\frac{17}{12}$. A. $\frac{7}{8}$. L. lat. 31. L. transv. $6\frac{1}{2}/14$.

Lips thick, with broad free margin in their entire circumference. The height of the body is contained twice and a third in the total length (without caudal), the length of the head twice and two-thirds; the eyes occupy the middle of the length of the head. Scales on the cheek in four or five series. Base of the soft dorsal fin with very small scales. *The length of the eighth dorsal spine is less than one-third of that of the head. The depth of the free portion of the tail is conspicuously more than its length.* Of a deep orange-colour; many of the scales of the tail with a blackish spot on the base.

One specimen, 7 inches long, was collected by Capt. Dow in the Lake of Managua.

I was for some time inclined to regard this fish as a variety of sex or age of *H. labiatus*. This, however, is not the case, all the specimens being males, and the specimen of *H. erythræus* larger than one of the two of *H. labiatus*. Besides, it appears to be sufficiently distinguished by its much shorter and deeper tail.

Description.—Head as high as long; snout rather elevated, with the cleft of the mouth slightly oblique, and the lower jaw scarcely prominent. Teeth in narrow bands, those of the outer series enlarged, with brown tips. The maxillary does not reach the vertical from the front margin of the eye; præorbital wider than the orbit. The diameter of the eye is contained nearly five times in the length of the head. Interorbital space slightly convex, much wider than the orbit. Eye situated near the upper profile of the head, and equidistant from the end of the snout and that of the operculum. Opercles scaly, the scales being larger than those on the cheek; suboperculum with two series of scales. The soft dorsal and anal fins with a few minute scales running up between the bases of the rays; dorsal spines of moderate strength. Soft dorsal and anal slightly produced, not reaching to the middle of the caudal. Caudal rounded, one-fifth of the total length. Anal spines stronger but not longer than those of the dorsal fin. Pectoral rounded, extending to the fourth anal spine, somewhat shorter than the head. The outer ventral ray produced; the distance between the ventral and the vent is one-half of the length of the head.

171. *HEROS LOBOCHILUS*. (Plate LXXV. fig. 1.)

D. $\frac{17}{11-12}$. A. $\frac{7}{8-9}$. L. lat. 32. L. transv. $6/14$.

Old males with the anterior portions of the upper and lower lips much enlarged, each forming a moveable subtriangular flap; in young males the lips are simple, the fold of the lower being continuous. The height of the body is contained twice and a third in the total length (without caudal), the length of the head twice and three-

fourths. The eye occupies the middle or nearly the middle of the length of the head. Scales on the cheek in four or five series. Base of the dorsal fin scaly. *The length of the eighth dorsal spine is more than one-third of that of the head. The depth of the free portion of the tail is scarcely more than its length.* Greenish or yellowish, with about six indistinct dark cross bands; that below the fourteenth dorsal spine with a large black blotch below the lateral line; sometimes a black spot on the upper half of the base of the caudal.

Two male specimens were collected by Capt. Dow in the Lake of Managua; the larger, 8 inches long, has the labial lobes and black caudal spot; the smaller is 7 inches long, and, without doubt, of the same species. The female sex is unknown.

Description.—Head as high as long; snout rather elevated, with the cleft of the mouth oblique, and the lower jaw rather prominent. Upper profile very concave. Teeth in narrow bands, those of the outer series enlarged, with brown tips. The maxillary does not reach nearly to the vertical from the front of the orbit; præorbital as wide as the orbit, being contained very slightly more than four times in the length of the head. Interorbital space flat, much wider than the orbit. The eye is situated immediately below the upper profile, slightly nearer to the extremity of the snout than to that of the operculum. Opercles scaly, the scales being larger than those on the cheeks; suboperculum with one series of scales. The soft portions of the anal and dorsal fins with a series of small scales between the rays at their base. Dorsal spines of moderate strength, the length of the eighth to twelfth being more than one-third of that of the head. Points of the soft anal and dorsal reaching to the middle of the caudal. The free portion of the tail is scarcely higher than long. Caudal rounded, its length being one-fifth of the total. Anal spines strong and long. Pectoral rounded, reaching to the fourth anal spine; outer ventral ray produced. The distance between the vent and the root of the ventral is three-sevenths of the length of the head. Coloration as described above.

172. *HEROS CITRINELLUS*. (Plate LXXI. fig. 1.)

Günth. Proc. Zool. Soc. 1864, p. 153.

D. $\frac{16-17}{12}$. A. $\frac{7}{8-9}$. L. lat. 30. L. transv. 6/13.

The fold of the lower lip is continuous in the middle. The height of the body is contained twice and a fifth in the total length (without caudal), the length of the head twice and seven-eighths; the free portion of the tail is conspicuously deeper than long; nape of the neck very convex; interorbital space broad, its width being two-fifths of the length of the head. Snout not obtuse; scales on the cheek in four series. The first dorsal spine is inserted above the upper end of the gill-opening. Dorsal and anal spines slender, the eighth or tenth of the dorsal fin being two-fifths of the length of the head. Pectoral nearly as long as the head. Lemon-coloured, either nearly uni-

form or with the back black, which colour sometimes forms irregular blotches on the vertical fins.

Three specimens, two males and one female, from 7 to 8 inches long, were collected by Capt. Dow in the Lake of Nicaragua.

Description.—Head as high as long; snout rather elevated, the cleft of the mouth almost horizontal, the lower jaw scarcely prominent. Teeth in narrow bands, those of the outer series enlarged, with brown tips. The maxillary does not reach the vertical from the front margin of the eye. Præorbital wider than the orbit. The eye is situated close to the upper profile, and a little nearer to the end of the snout than to the opercular margin; its diameter is one-fourth of the length of the head. Interorbital space flattish, twice the width of the orbit. Opercles scaly, the scales being larger than those on the cheeks; suboperculum with two series of scales. Soft anal and dorsal fins slightly scaly at the base. The points of the soft dorsal and anal considerably produced, and extending beyond the middle of the caudal fin, sometimes to its extremity. Caudal rounded, its length being contained four times and a half in the total. Pectoral long and rounded, extending to the fifth anal spine. Outer ventral ray produced. The distance between the vent and the root of the ventral is nearly one-third of the length of the head.

173. HEROS ALTIFRONS.

Kner & Steindachner, Sitzgsber. bayer. Akad. 1863, p. 223; and Abhandl. bayer. Akad. x. p. 11, Taf. 2. fig. 1.

$$D. \frac{16}{11}. \quad A. \frac{5}{8-9}.$$

The lower lip is dilated into a lobe on each side, which is broadest behind. Scales on the cheek in four or five series. The height of the body is contained twice and two-fifths in the total length (without caudal), the length of the head twice and four-fifths. Snout rather high, the width of the præorbital being more than that of the orbit. Jaws equal in length. Eye considerably nearer to the end of the operculum than to that of the snout. Dorsal spines of moderate length and strength. Body with four or five dark vertical bands¹, each band with a darker blotch. Scattered pearl-coloured dots all over the body; a dark spot on the middle of the root of the caudal fin.

Southern (Pacific) rivers of the district Chiriqui (Western Veragua).

174. HEROS FRIEDRICHSTHALII.

Heckel, Flussfische Brasil. p. 381. Günth. Fish. iv. p. 294.

$$D. \frac{18}{9-10}. \quad A. \frac{8-9}{9-7}. \quad L. \text{ lat. } 31. \quad L. \text{ transv. } 4/12.$$

The fold of the lower lip continuous in the middle. Scales on the cheek in seven series. Antero-inferior margin of præorbital concave, the greatest width of this bone

¹ The authors describe them as "*teniæ*," instead of "*fasciæ*."

being only two-thirds of that of the orbit. The length of the twelfth dorsal spine is two-sevenths of that of the head. Yellowish-olive, with six or seven blackish cross bands; a black band from the eye to the upper part of the root of the caudal, interrupted by the interspaces between the cross bands; the origin and end of this band are edged with yellow; suboperculum with a black ocellus; an oblique black streak from the eye towards the ocellus.

Lake Peten. Several examples, 5 inches long, were collected by Mr. Salvin.

175. *HEROS SALVINI*. (Plate LXXIII. fig. 3.)

Heros salvini, Günth. Fish. iv. p. 294.

— *triagramma*, Steindachner, Denkschr. Akad. Wiss. Wien, xxiii. p. 70, tab. 3. fig. 2.

D. $\frac{17}{10}$. A. $\frac{8-9}{7}$. L. lat. 29. L. transv. 5/10.

Fold of the lower lip continuous in the middle; scales of the cheek in five series. Præorbital a little narrower than the orbit, with the antero-inferior margin concave. Base of the soft dorsal scaly. The height of the body is contained twice and a fourth in the total length (without caudal), and the length of the head twice and three-fourths. Head somewhat longer than high; snout of moderate extent, longer than the eye, pointed, with the cleft of the mouth very oblique, and with the lower jaw projecting; the maxillary does not quite extend to the vertical from the anterior margin of the orbit. The eye is situated immediately below the upper profile, in the middle of the length of the head. Suboperculum of moderate width, with one series of scales. The length of the twelfth dorsal spine is two-fifths of that of the head in specimens from Lake Peten, and one-third in those from Santa Isabel. The distance between dorsal and caudal is considerably less than the depth of the free portion of the tail. The distance between the vent and the root of the ventrals is two-fifths of the length of the head. Dark greenish olive, with a black band, edged with yellow, running from the snout, through the eye, to the root of the caudal; it is most distinct on the head, but interrupted on the tail by lighter interspaces; it passes a black lateral spot, and, in young specimens, terminates in another black spot. An irregular black band along the back, below the base of the dorsal fin. Sometimes three bands across the upper surface of the head. A blue horizontal line below the orbit; a more or less distinct black ocellus on the suboperculum is sometimes entirely absent. Fins blackish, immaculate, or with faint dots only in small number. The sides below the black band are sanguineous in mature specimens.

The largest specimen is $4\frac{1}{2}$ inches long.

This species occurs in Lake Peten as well as in the Rio Santa Isabel; specimens from the former locality are distinguished by somewhat longer dorsal spines. *H. triagramma* appears to have been founded on a Lake-Peten example.

176. *HEROS TRIMACULATUS*. (Plate LXXVI.)D. $\frac{17}{11}$. A. $\frac{6-8}{9}$. L. lat. 31. L. transv. $5/14$.

Allied to *H. salvini*. Fold of the lower lip continuous in the middle; scales of the cheek in five series. Lower jaw prominent. Præorbital as wide as the orbit, with the antero-inferior margin concave. The length of the twelfth dorsal spine is rather less than one-third of that of the head. Dark greenish olive, with three black spots; the first above the origin of the lateral line, the second in the middle of the side, and the third above the end of the lateral line. Fins black.

Three adult examples, from 8 to 11 inches long, and one of $2\frac{1}{2}$ inches, were collected by Mr. Salvin at Chiapam and Huamuchal.

Description.—The height of the body is contained twice in the total length (without caudal), the length of the head twice and two-thirds. Head nearly as high as long; snout rather pointed, much longer than the eye, with the cleft of the mouth very oblique, and the lower jaw prominent; the maxillary extends nearly to the vertical from the front margin of the orbit. Præorbital as wide as the orbit, with the antero-inferior margin concave. The width of the orbit is one-fifth of the length of the head, but only two-thirds of that of the interorbital space. The eye is situated immediately below the concavity of the upper profile of the head, and is very slightly nearer to the tip of the snout than to the opercular margin. Opercles scaly; suboperculum with two series of scales. The vertical fins are scaly at the base. Dorsal spines of moderate strength and length, the twelfth being rather less than one-third of the length of the head. The points of the soft dorsal and anal extend beyond the middle of the caudal. Caudal much rounded. The distance between the caudal and the dorsal is considerably less than the depth of the free portion of the tail. Pectoral much shorter than the head, extending only to the second anal spine; ventrals with the outer ray produced. The distance between the vent and the root of the ventrals is nearly half the length of the head. The coloration of the young example is exactly the same as that of the adult.

177. *HEROS DOVIL*. (Plate LXXIII. fig. 4.)

Günth. Proc. Zool. Soc. 1864, p. 154.

D. $\frac{18}{11-12}$. A. $\frac{6}{9-10}$. L. lat. 35. L. transv. $5\frac{1}{13}$.

The fold of the lower lip is continuous in the middle. The height of the body is contained thrice in the total length (without caudal); the length of the head twice and three-fifths. Snout pointed, with the lower jaw very prominent. Præorbital with the antero-inferior margin but slightly concave, its greatest width being three-fourths of that of the orbit. Both jaws with a pair of fangs, those of the upper pair being close together in the middle of the jaw, whilst the lower are separate. Scales on the cheek small, rather irregularly arranged, in about eight series. The first dorsal spine is inserted behind the vertical from the upper end of the gill-opening. Dorsal and anal

spines slender, the length of the twelfth of the dorsal fin being one-fourth of that of the head. Pectoral three-fifths as long as the head. Brown, irregularly marbled with darker; fins black; an indistinct black band along the operculum and the side of the trunk; an oblique blackish band descends from the eye towards the root of the pectoral; a black spot behind the angle of the mouth.

This species is allied to *H. friedrichsthalii*, *H. salvini*, &c. Two specimens, 6 inches long, were collected by Capt. Dow in the Lake of Nicaragua.

Description.—Head much longer than high. Snout rather elongate, much longer than the eye, pointed, with the cleft of the mouth oblique, and the lower jaw very prominent. The maxillary reaches the vertical from the anterior margin of the orbit. The width of the orbit is contained four times and a half in the length of the head, and equal to that of the interorbital space. The eye is situated immediately below the upper profile, but is considerably nearer to the end of the snout than to that of the operculum. Opercles scaly, the scales on the operculum larger than those on the cheek; suboperculum with two series of scales. The soft portions of the dorsal and anal fins are scaly at the base, and do not reach much beyond the origin of the caudal. Caudal rounded. The pectoral is about two-thirds as long as the head, and scarcely reaches the vertical from the origin of the anal. Ventral pointed, slightly produced, reaching only to the vent. The distance between the vent and the root of the ventral is two-fifths of the length of the head.

178. *HEROS MOTAGUENSIS*. (Plate LXXVII. fig. 2.)

D. $\frac{18}{10}$. A. $\frac{7}{8-9}$. L. lat. 32. L. transv. 5 13.

The fold of the lower lip is continuous in the middle. Snout pointed, with the lower jaw prominent. Præorbital with the antero-inferior margin but slightly concave, its greatest width being equal to that of the orbit. Dentition as in *H. dovii*. Scales on the cheek small, in eight series. The first dorsal spine is inserted behind the vertical from the upper end of the gill-opening. Dorsal and anal spines short, the length of the twelfth of the dorsal fin being two-ninths of that of the head. Brownish, a black interrupted band runs from the eye to a spot on the root of the caudal, this spot being situated above the lateral line. An oblique short black streak runs from the lower posterior angle of the orbit towards a spot situated on the suture between operculum and suboperculum, close to the interoperculum, the band being not continuous with the spot. Back with traces of irregular cross bands, more distinct in young than in old individuals. Vertical fins with numerous brown dots.

Five examples, from 4 to 10 inches long, were obtained by Mr. Godman from the Rio Motagua. This species is closely allied to *H. friedrichsthalii*.

Description of an example 10 inches long.—The height of the body is nearly equal to the length of the head, and is contained thrice in the total length (without caudal); the length of the head is contained twice and five-sixths in the same. Head longer than

high; snout of moderate extent, much longer than the eye, pointed, with the cleft of the mouth very oblique, and the lower jaw very prominent. The maxillary reaches nearly to the vertical from the anterior margin of the orbit. The width of the orbit is not quite one-fifth of the length of the head, and less than the width of the interorbital space. The eye is situated near the upper profile of the head, nearer to the end of the snout than to that of the operculum. Opercles scaly; suboperculum with two series of scales. Vertical fins scaly at the base, their points do not reach the middle of the caudal. Caudal rounded. The distance between the dorsal and caudal is somewhat less than the depth of the free portion of the tail. Pectoral short, less than two-thirds of the length of the head, and scarcely reaching to the vent; ventral short, pointed, with the outer ray produced. The distance between the vent and the root of the ventral is more than half the length of the head.

179. *HEROS MANAGUENSIS*. (Plate LXXVII. fig. 3.)

D. $\frac{18}{10}$. A. $\frac{7}{8}$. L. lat. 32. L. transv. $4\frac{1}{2}$ 13.

The fold of the lower lip is continuous in the middle. Snout somewhat pointed, with lower jaw prominent. *Præorbital* with the antero-inferior margin concave, narrow, *its greatest width being scarcely more than one-half of that of the orbit*. Dentition as in *H. dovii*. Scales on the cheek small, rather irregularly arranged, in eight or nine series. The first dorsal spine is inserted behind the vertical from the upper end of the gill-opening. Dorsal and anal spines of moderate length and strength, *the length of the twelfth of the dorsal fin being contained thrice and two-thirds in that of the head*. Greenish brown, shining golden, and irregularly marbled with dark brown. A series of quadrangular black spots (probably a band in young examples) runs from the eye to a black spot on the root of the caudal, this spot being situated above the lateral line; a brown band descends obliquely from the lower posterior angle of the orbit to the lower posterior angle of the operculum. Vertical fins with black spots, each spot being half as large as a scale.

This species is allied to *H. friedrichsthalii*, *salvini*, &c.; a single specimen, $7\frac{1}{2}$ inches long, was found by Capt. Dow in the Lake of Managua.

Description.—The height of the body is nearly equal to the length of the head, and two-fifths of the total length (without caudal). Head longer than high; snout of moderate length, somewhat pointed, with the lower jaw prominent, and the cleft of the mouth oblique. The maxillary reaches beyond the anterior margin of the eye. The width of the orbit is one-fifth of the length of the head, and three-fourths of the width of the interorbital space. The eye is situated immediately below the upper profile; its distance from the end of the snout is a little more than half of that from the hinder margin of the operculum. Opercles scaly, the scales on the operculum larger than those on the cheek; suboperculum with two series of scales. Vertical fins

slightly scaly at the base. The soft dorsal and anal do not reach to the middle of the caudal. Caudal rounded. The distance between the dorsal and caudal is much less than the depth of the free portion of the tail. Pectoral short, more than half the length of the head, and extending only to the origin of the anal; ventral with the outer ray slightly produced, reaching beyond the vent. The distance between the vent and the root of the ventral is not quite half the length of the head.

180. HEROS MICROPHthalmus.

Günth. Fish. iv. p. 295.

D. $\frac{18}{13}$. A. $\frac{5-6}{10-9}$. L. lat. 34. L. transv. $5/14$.

The fold of the lower lip is continuous in the middle; six series of scales on the cheek. The height of the body is contained twice and a third in the total length (without caudal), the length of the head thrice and a third. Head as high as long; snout of moderate extent; præorbital wider than the eye. Cleft of the mouth rather narrow, horizontal, with the jaws equal anteriorly. Interorbital space very convex, twice as broad as the orbit; the eye is a little nearer to the extremity of the snout than to that of the opercle. Vertical fins scaly at the base; the spinous dorsal is low, the length of the twelfth spine being one-third or rather less than one-third of that of the head. The free portion of the tail is rather higher than long. Pectoral much shorter than the head, equal in length to the ventral, which does not extend on to the vent. Brownish, with indistinct dark cross bands, and with a dark band along the sides and tail, terminating at a black spot in the middle of the root of the caudal. Each scale on the lateral and lower parts with a purple spot at the base. The soft portions of the vertical fins with series of blackish dots; axil of the pectoral orange-coloured.

Numerous examples, from 4 to 8 inches long, were collected by Mr. Godman in the Rio Motagua.

181. HEROS OBLONGUS.

D. $\frac{18}{12-13}$. A. $\frac{6}{8-9}$. L. lat. 33. L. transv. $5\frac{1}{2}/15$.

Closely allied to *H. microphthalmus*, but with the body considerably more elongate.

The fold of the lower lip is continuous in the middle; five series of scales on the cheek. The height of the body is one-third of the total length (without caudal), the length of the head two-sevenths. Mouth small, horizontal, with the jaws equal in length. The length of the twelfth dorsal spine is less than one-third of that of the head. Coloration as in *H. microphthalmus*.

Two examples, 7 and 8 inches long, were obtained by Mr. Godman from the Rio Motagua.

Description.—Head a little longer than high; snout of moderate extent; præorbital wider than the eye, the diameter of which is one-fifth of the length of the head. Cleft of the mouth rather narrow, horizontal, with the jaws equal anteriorly, and the maxil-

lary not extending backwards to the vertical from the front margin of the eye. Teeth in a band, those of the outer series much larger and stronger than the others, and with brown tips. Interorbital space convex, not quite twice as broad as the orbit. Eye about equidistant from the end of the snout and that of the opercle. Vertical fins scaly at the base. The spinous dorsal is rather low, the length of the twelfth spine being less than one-third of that of the head. Soft dorsal and anal somewhat produced, the former reaching to the middle of the caudal. The free portion of the tail is rather longer than high. Caudal subtruncated, its length being a little less than one-fifth of the total. Pectoral shorter than the head, about equal in length to the ventral, the outer ray of which reaches to the vent. Brownish, with about five very indistinct broad darker cross bands, descending from the back to a not less indistinct longitudinal band which runs from above the pectoral to a black spot in the middle of the root of the ventral. Vertical fins with transverse series of round whitish spots, separated by a network of dark lines. Pectoral yellowish.

182. *HEROS NICARAGUENSIS*. (Plate LXXVII. fig. 1.)

Günth. Proc. Zool. Soc. 1864, p. 153.

D. $\frac{18-19}{11}$. A. $\frac{7}{8-9}$. L. lat. 35. L. transv. 5/13.

The fold of lower lip is interrupted in the middle. The height of the body is contained twice and two-fifths in the total length (without caudal); the length of the head thrice and one-fifth. Head much higher than long, in consequence of an adipose swelling above the eye, which renders the shape of the head *Coryphæna*-like. Scales on the cheek in six series, rather irregularly arranged. The first dorsal spine is inserted above the upper end of the gill-opening. Dorsal and anal spines long, the sixteenth of the dorsal fin being one-half the length of the head. Pectoral not quite as long as the head. Brownish olive above, yellowish below; back with five or six blackish cross bands, not extending downwards to beyond the middle of the side; many scales with a brown vertical marginal streak. The soft vertical fins with brown spots, each half as large as a scale.

Two specimens, $6\frac{1}{2}$ and 7 inches long, were collected by Capt. Dow in the Lake of Nicaragua.

Description.—Snout elevated; præorbital wider than the orbit, the diameter of which is more than one-fourth of the length of the head. Cleft of the mouth rather narrow, horizontal, the jaws equal in front, and the maxillary not extending back to the vertical from the front of the orbit. Teeth in a band, those of the outer series being somewhat enlarged, and with brown tips. Interorbital space very convex, not quite twice as broad as the orbit. The eye is about equally distant from the end of the snout and that of the opercle, and far below the upper profile of the head. Vertical fins scaly at the base. Spinous dorsal not very low, the sixteenth spine being half as long as the head;

the soft portions of the dorsal and anal slightly produced, the former extending nearly to the middle of the caudal. Free portion of the tail as high as long. Caudal slightly emarginate, its length being considerably more than one-fifth of the total. The ventral has the outer ray much produced, and reaches to the sixth anal spine.

183. *HEROS GODMANNI*. (Plate LXXIV. fig. 5.)

Günth. Fish. iv. p. 296.

D. $\frac{16}{13}$ $\frac{17}{12}$. A. $\frac{5}{9}$. L. lat. 33. L. transv. $5\frac{1}{3}$.

The fold of the lower lip is interrupted in the middle; six or seven series of scales on the cheek. The height of the body is contained twice and three-fourths in the total length (without caudal), the length of the head thrice or thrice and a third. The profile of the nape is much curved. Head rather longer than high; snout rather elevated, the præorbital being wider than the orbit. Cleft of the mouth rather narrow, horizontal, with the jaws equal anteriorly, and with the maxillary not extending backwards to the vertical from the front margin of the eye. The nape is elevated, and the orbit considerably below the upper profile of the head. Dorsal and anal fins very slightly scaly at the base; the spinous dorsal is low, the length of the twelfth spine being one-fourth of that of the head. The free portion of the tail is a little longer than high. Head greyish olive; cheeks and body reddish olive; an irregular blackish band proceeds from above the pectoral to a black spot in the middle of the root of the caudal. A black spot above the origin of the lateral band. Opercles, back, and vertical fins with black dots.

Two specimens, 7 inches long, were collected by Mr. Salvin in the River of Cahabon.

184. *HEROS SIEBOLDII*.

Kner & Steindachner, Abhandl. bayer. Ak. Wiss. x. (1864) p. 13, Taf. 2. fig. 2.

This fish is probably not sufficiently distinct from *H. godmanni*; it is from New Granada, and the dark markings are arranged in irregular cross bands.

185. *HEROS GUTTULATUS*. (Plate LXXVIII. fig. 3.)

Günth. Proc. Zool. Soc. 1864, p. 152.

D. $\frac{17}{13}$. A. $\frac{6}{9}$. L. lat. 33. L. transv. $4\frac{1}{2}$.

Very closely allied to *H. godmanni*.

The fold of the lower lip is interrupted in the middle. The height of the body is contained twice and three-fifths in the total length (without caudal), the length of the head thrice and a fifth. Head as high as long. The upper profile of the head descending in a gentle curve. Scales on the cheek in four or five series. The first dorsal spine

is inserted behind the vertical from the upper end of the gill-opening. Dorsal spines rather feeble, the length of the twelfth being two-sevenths of that of the head. Pectoral two-thirds as long as the head. Upper parts blackish, each scale with a black base; lower parts reddish, with a broad blackish band from behind the pectoral to the base of the caudal; many scales within or below the band with a black spot in the upper or lower angle; each scale on the side of the head with a black spot; chin and throat violet. The spinous dorsal black, with yellowish margin; the soft parts of the vertical fins with blackish spots.

This species inhabits the Lake of Amatitlan, where Mr. Salvin obtained numerous examples up to 7 inches in length.

Description.—The profile of the head and nape forms a curve. Head as high as long; snout rather elevated; præorbital wider than the eye, the diameter of which is a little more than one-fifth of the length of the head, and about three-fifths of the width of the interorbital space. Cleft of the mouth narrow, horizontal, the upper jaw slightly overlapping the lower, and the maxillary not extending backwards as far as the anterior margin of the orbit. The six front teeth of the outer series are the longest, deep brown. The orbit is considerably below the upper profile of the head, and somewhat nearer to the end of the opercle than to that of the snout. Opercles scaly, the scales on the cheek in four or five series, and smaller than those on the opercle. Vertical fins not scaly at the base; the soft dorsal and anal do not reach far beyond the root of the caudal. Free portion of tail a little higher than long. Caudal subtruncated, two-ninths of the total length. Pectoral three-fourths as long as the head; ventral with the outer ray slightly produced, rather longer than the pectoral, and reaching nearly to the vent.

186. *HEROS IRREGULARIS*. (Plate LXXVIII. fig. 2.)

Theraps irregularis, Günth. Fish. iv. p. 284.

D. $\frac{16}{13}$. A. $\frac{(4)5}{9-10}$. L. lat. 35. L. transv. $4/14$.

The fold of the lower lip is interrupted in the middle. The height of the body is nearly equal to the length of the head, which is two-sevenths of the total (the caudal fin not included). Head longer than high, with the snout compressed and prominent; the length of the snout is two-fifths of that of the head, and twice or more than twice the width of the orbit. The cleft of the mouth is small, extending backwards somewhat behind the vertical from the nostril; upper jaw slightly overlapping the lower; teeth in a narrow band, those of the outer series largest. Præorbital wider than the orbit, its width being equal to that of the interorbital space, which is rather convex. The eye is situated immediately below the upper profile, its centre being a little behind the middle of the length of the head. Scales on the cheek small, in six oblique series. Scales on the opercles as large as those on the neck; those near the base of the dorsal and on the abdomen very small. Scales finely serrated. The dorsal fin commences

above the root of the ventral, and is not scaly. The spines are of moderate length and strength, the length of the fifteenth being two-sevenths, or in old examples one-third of that of the head. The soft portion does not extend to the caudal, if laid backwards. The free portion of the tail much longer than high. Caudal rounded. Pectoral shorter than the head. The ventral does not extend on to the vent. Reddish olive, marbled with blackish; the latter colour forming seven rather irregular transverse bands, some of which extend on the dorsal fin. Belly silvery, marbled with blackish; opercles and some scales on the body with blue dots. The inner half of the soft vertical fins blackish violet, the outer yellow; spinous dorsal with yellow margin. Lower side of head blackish violet.

I have now before me numerous examples of this species from the Rivers Chisoy, San Geronimo, and Santa Isabel; and finding that the anal spines are normally five in number, the number four of the typical specimen being merely accidental, I do not hesitate to reunite the genus *Theraps* with *Heros*. The largest example in the collection is 8 inches long.

187. *HEROS INTERMEDIUS*. (Plate LXXVIII. fig. 1.)

Günth. Fish. iv. p. 298.

D. $\frac{17-18}{11}$. A. $\frac{5-6}{10-8}$. L. lat. 32. L. transv. 5/13.

The fold of the lower lip is interrupted in the middle; five or six series of scales on the cheek. The height of the body is contained twice and three-fifths in the total length (without caudal), the length of the head thrice and a fourth. The eye is not very remote from the profile of the nape, which is curved. Head as high as long; præorbital rather wider than the orbit. Cleft of the mouth rather narrow, horizontal, with the jaws equal anteriorly. Base of the soft dorsal and anal with scarcely any scales; dorsal spines of moderate length and strength, the length of the twelfth being one-third or nearly one-third of that of the head¹. The soft dorsal and anal extend slightly beyond the root of the caudal. The free portion of the tail is not quite so long as high. Caudal subtruncated, its length being one-fifth of the total. Pectoral shorter than the head, but rather longer than the ventral, which extends nearly to the vent. Brownish, lower parts red in adult specimens; a broad angular brown band on the trunk, its horizontal branch extending from the gill-opening to the vertical from the first anal spine, whilst its vertical branch ascends to the hinder dorsal spines. Each scale within this band with a black vertical streak. A rather narrow brown band runs from the angular band to a blackish spot at the root of the caudal. Vertical fins with whitish ocelli, enclosed by reddish streaks.

This species is closely allied to *H. nebulifer* and *H. angulifer*, from which it may be distinguished by its colours, and by the size of its scales. It inhabits Lake Peten, where specimens 5 and 6 inches long were collected by Mr. Salvin.

¹ These spines are represented a little too short in the figure.

188. *HEROS ANGULIFER*. (Plate LXXXV. fig. 1.)

Günth. Fish. iv. p. 298.

D. $\frac{17-18}{10}$. A. $\frac{5}{8}$. L. lat. 33. L. transv. 4/12.

The fold of the lower lip is interrupted in the middle; four series of scales on the cheek. The height of the body is two-fifths of the total length (without caudal), the length of the head three-tenths. The eye is not very remote from the profil of the nape, which is slightly curved. Head as high as long; præorbital scarcely wider than the orbit. Cleft of the mouth rather narrow, horizontal, with the jaws equal anteriorly, and with the maxillary not extending backwards to the vertical from the front margin of the eye. Dorsal and anal fins not scaly; dorsal spines of moderate length and strength, the length of the twelfth being one-third of that of the head; the soft dorsal and anal extend to the root of the caudal. The free portion of the tail is as long as high. Caudal subtruncated, its length being not quite one-fifth of the total. Pectoral shorter than the head, but longer than the ventral, which does not extend to the vent. Brownish olive, with a broad angular black band on the trunk, its horizontal branch extending from the eye to the vertical from the first anal spine, whilst its vertical branch ascends to the hinder dorsal spines. Some scales within the band and on the opercles with a black dot. A round blackish blotch on the root of the caudal fin.

Two examples, 4 inches long, were collected by Messrs. Godman and Salvin at Yzabal.

PETENIA.

Günth. Fish. iv. p. 301.

Body compressed, oblong, covered with ctenoid scales of moderate size. Dorsal spines numerous, anal spines more than four; the soft dorsal scaleless. Teeth in a band, small, conical. Anterior prominences of the first branchial arch short, compressed, distant. Cleft of the mouth wide; jaws very protractile. Scales on the cheeks small. The origin of the ventral falls vertically below that of the dorsal.

189. *PETENIA SPLENDIDA*. (Plate LXXIX. fig. 2.)

Günth. l. c.

B. 5. D. $\frac{15}{12}$. A. $\frac{5}{10}$. L. lat. 41. L. transv. 6/17.

Scales on the cheek in about seven series. Greenish shining golden; head, body, and vertical fins with black dots. A series of six or seven large round black spots along the middle of the side, the last spot being edged with white, and situated on the upper half of the root of the caudal.

Three examples were collected by Mr. Salvin in Lake Peten, the largest being 16 inches long.

NEETROPLUS.

This genus differs from *Heros* in having a front series of flat incisor-like teeth. It is

also closely allied to *Etroplus*, which genus, however, has but a rudimentary lateral line, whilst in *Neetroplus* it is as much developed as in *Heros*.

190. NEETROPLUS NEMATOPUS. (Plate LXXIV. fig. 4.)

D. $\frac{19}{10}$. A. $\frac{8}{7}$. L. lat. 34. L. transv. $5\frac{1}{2}/12$.

The fold of the lower jaw interrupted in the middle; five series of scales on the cheek. Incisors $\frac{10}{8}$. The outer ventral ray produced into a filament as long as the fin.

One specimen, $4\frac{1}{2}$ inches long, was discovered by Capt. Dow in Lake Managua.

Description.—The height of the body is contained twice and three-fifths in the total length (without caudal), the length of the head thrice and two-fifths. Head as high as long, with an adipose prominence over the eye, which renders the profile of the forehead somewhat abrupt; snout rather compressed and prominent, the length of the snout is two-fifths of that of the head, and more than the width of the orbit, which is nearly one-third of the length of the head. Cleft of the mouth small, extending backwards somewhat behind the vertical from the nostril; jaws equal in front; teeth in a band, those of the outer series being genuine incisors, which appear to be replaced by smaller ones, standing behind in a band. Præorbital wider than the eye, equal in width to the interorbital space, which is convex. The eye is situated at some distance from the upper profile, nearer to the end of the opercle than to that of the snout. Scales on the cheek small, in about five oblique series. Posterior limb of præoperculum about twice as long as the inferior, and descending obliquely forwards. Scales on the opercles as large as those on the neck; those near the base of the dorsal and on the abdomen very small. The dorsal fin commences above the vertical from the hinder margin of the operculum. Dorsal and anal scaly at the base. Spines rather strong, the sixteenth dorsal spine being nearly one-half of the length of the head. The soft portions of both fins are produced, and reach beyond the middle of the caudal. Caudal truncated. Pectoral shorter than the head. Outer ray of ventral produced into a filament as long as the fin. Brownish-olive, with irregular darker clouds.

MICRODESMUS.

Günth. Proc. Zool. Soc. 1864, p. 26.

Body much elongate, eel-like, covered with rudimentary scales. Head rather short, with snout obtuse, cleft of the mouth narrow, and lower jaw prominent. Eyes minute. Teeth in both jaws minute; palate toothless. The gill-opening is reduced to a small slit in front of the pectoral fin. Vertical fins united by a membrane; but the caudal can be easily distinguished from the two other fins. Dorsal fin very long, composed of flexible, undivided rays, like the anal. Pectorals short; ventrals thoracic, each reduced to a single ray. Vent in the middle of the total length.

I am not able at present to add anything to the knowledge of this fish which would elucidate its natural affinities and indicate its systematic position.

191. *MICRODESMUS DIPUS*.Günth. *I. c.*, pl. 3. fig. 2.

D 55. A. 34. C. 16. P. 12. V. 1.

The depth of the body is about one-eighteenth of the total length; the length of the head one-eleventh. The head is rather compressed, the snout short, the mouth very narrow, and the lower jaw very prominent. The minute eye is lateral, and in the anterior third of the length of the head. The dorsal fin commences at a distance from the occiput which is somewhat less than the length of the head; it is nearly even, and the rays are very distinct, the interradial membrane being thin and transparent. The anal fin commences immediately behind the vent. The caudal rays are much more slender and more closely set than those of the dorsal and anal; the caudal fin is rounded, two-thirds of the length of the head. Pectorals as long as the ventrals, and half as long as the head; the latter fins are close together, and inserted a little behind the root of the pectoral. Upper parts uniform brownish olive.

The single specimen is $4\frac{1}{2}$ inches long, it was found by Capt. Dow at Panama.

192. *BROTULA MULTIBARBATA* (Schleg.).

Mr. Salvin has found on the Pacific coast of Guatemala a small fish, which I am unable to distinguish from the Indian or Japanese species. However, having only small examples for examination, I am not prepared to maintain the specific identity of these fishes.

195. *CITHARICHTHYS SPILOPTERUS*. (Plate LXXX. fig. 2¹.)

Günth. Fish. iv. p. 421.

D. 76-78. A. 60-63. L. lat. 47-50.

The height of the body is two-fifths of the total length (without caudal), the length of the head two-sevenths. Scales of the lateral line subquadrangular; lateral line nearly straight, gently descending anteriorly. Snout with the jaws equal in front, rather longer than the eye, the diameter of which is one-sixth of the length of the head. The maxillary, the length of which is contained twice and two-thirds in that of the head, extends beyond the middle of the orbit. Anterior teeth of the upper jaw widely set, much larger than the posterior, which are close together and very small; the lower jaw with seven or eight distant teeth of moderate size on each side. Eyes separated by a very narrow scaleless ridge, their front margins being nearly on the same level. Fin-rays scaly. The dorsal commences a little before the upper eye, and terminates close by the caudal; its longest rays are behind the middle, and one-half of the length of the head. Anal spine none. Caudal rounded; its length is one-sixth of the total. The pectoral is rather longer than half the length of the head; ventral much shorter, extending beyond the origin of the anal. Gill-rakers lanceolate, pointed.

¹ The artist has unfortunately omitted to reverse the view of this figure.

one-third as long as the eye. Greenish olive (in spirits); a series of distant blackish spots along the basal portions of the anal and dorsal fins.

This species occurs on the shores of the tropical parts of the Atlantic, and has been found by Mr. Salvin also on the Pacific coast, at Chiapam.

196. *CITHARICHTHYS GUATEMALENSIS*.

Bleeker, Nederl. Tydschr. Dierk. 1864, p. 73.

D. 77. A. 57. L. lat. ca. 45.

"*Citharichthys* corpore ovali, altitudine $2\frac{3}{4}$ circiter in ejus longitudine; capite $4\frac{3}{4}$ circiter in longitudine corporis, æque alto circiter ac longo; oculis sinistris, minus diametro $\frac{1}{5}$ distantibus, superiore quam inferiore vix majore 5 circiter in longitudine capitis, paulo ante inferiorem prominente; linea frontonuchali declivi rectiuscula; naribus non tubulatis, utroque latere approximatis; rictu curvato; maxillis subæqualibus, superiore usque ante oculi inferioris marginem superiorem adscendente, sub oculi inferioris partem posteriorem desinente, $2\frac{3}{5}$ circiter in longitudine capitis; dentibus maxillis conicis acutis parvis, caninis nullis, utroque latere maxilla superiore numerosis postrorsum magnitudine decrescentibus, maxilla inferiore parvioribus, intermaxillaribus majoribus subæqualibus; præoperculo obtusangolo angulo rotundato; squamis præoperculo in series verticales 8 circiter, operculo in series verticales 6 vel 7 dispositis, linea laterali corpore antice parum declivi; capite regione oculo-temporali conspicua obliqua; prima dorsali ante medium oculum superiorem incipiente et vix ante pinnam caudalem desinente radiis longissimis corpore plus triplo humilioribus; pinnis pectoralibus et ventralibus (ex parte abruptis); anali dorsali vix humiliore; caudali postice angulata $5\frac{3}{4}$ ad $5\frac{5}{4}$ in longitudine corporis; colore corpore latere oculari viridescente (!), latere anophthalmo albido, pinnis flavescente (!)."

The specimen, which is 145 mm. long, and in the Leyden Museum, is stated to be from Guatemala.

197. *HEMIRHOMBUS OVALIS*. (Plate LXXX. fig. 1¹.)

Günth. Proc. Zool. Soc. 1861, p. 154.

D. 86. A. 69. L. lat. 58.

The dorsal commences before the eye. Teeth of the upper jaw in a double series, with one or two pairs of small canine teeth in front; those of the lower jaw closely set, conical, in a single series. Scales largest in the middle of the body, adherent, ciliated; lateral line ascending gently over the pectoral fin, straight for the rest of its length. The height of the body is contained twice and two-thirds in the total length; the length of the head four times and two-thirds. Snout rather shorter than the eye, the diameter of which is two-ninths of the length of the head. Jaws equal anteriorly; the length of

¹ The artist has unfortunately omitted to reverse the view of this figure.

the maxillary is a little more than one-third of the length of the head; maxillary scaly. Interorbital space very narrow, concave, one-third of the vertical width of the orbit; the concavity is produced by two ridges convergent posteriorly. Head nearly entirely covered with ciliated scales. Rays of the vertical fins scaly, the distance between the dorsal and caudal fins is one-half of the depth of the free portion of the tail. The longest dorsal rays are somewhat behind the middle of the fin, and four-ninths of the length of the head. Pectoral rays not prolonged. Body nearly uniform reddish olive; some of the dorsal, anal, and caudal rays with elongate dark-brown spots.

One specimen, 7 inches long, was collected by Messrs. Dow and Salvin on the Pacific coast of Panama.

198. *PSEUDORHOMBUS BRASILIENSIS*.

Hippoglossus brasiliensis, Ranzani, Comm. Bonon. v. p. 10, tab. 3.

Rhombus aramaca, Casteln., not Cuv.

Pseudorhombus vorax, Günth. Fish. iv. p. 429.

This species is known to occur on the coast of Brazil; however, there is a specimen in the British Museum, which formed part of a collection containing numerous fishes from Guatemala; and I mention it, therefore, in this list to draw attention to this species.

200. *APHORISTIA ORNATA*, var. *ELONGATA*.

Two examples, 5 inches long, collected by Mr. Salvin on the Pacific coast of Panama, differ, from specimens from the West Indies, only in having the body more elongate, its depth being contained four times and two-thirds in the total length (with the caudal). The number of fin-rays is the same, viz. D. 97, A. 82; L. lat. 98.

201. *AMIURUS MERIDIONALIS*. (Plate LXXXI. fig. 1.)

Günth. Fish. v. p. 102.

D. 1/6. A. 28-29. P. 1/9.

Head one-half or one-third longer than broad; the maxillary barbels extend to the end of the head. The length of the dorsal spine is somewhat less than that of the head without snout, and nearly equal to that of the pectoral spine. Adipose fin short. The height of the body is one-fifth of the total length (without caudal), the length of the head one-fourth or two-ninths. Snout obtusely rounded, with the upper jaw longer than the lower. The diameter of the eye is one-half or two-fifths of the extent of the snout, and one-third or two-sevenths of the length of the postorbital portion of the head. The band of maxillary teeth is five or six times as broad as long. The outer mandibular barbels extend to the posterior margin of the gill-membrane. The distance of the dorsal spine from the snout is a little more than one-half of its distance from the caudal fin; it is finely serrated behind. The length of the base of the adipose fin equals that of the dorsal. Caudal fin deeply forked; the upper lobe is somewhat the longer,

its length being equal to, or a little less than, that of the head. The anal fin terminates behind the adipose fin, and its last rays do not extend to the base of the caudal. Axil of the pectoral with a very distinct porus mucosus. The pectoral spine is serrated interiorly, sometimes a little longer, sometimes a little shorter, but always rather stronger than that of the dorsal fin. Pectoral fin longer than ventral, two-thirds or three-fifths of the length of the head. The ventral extends to the origin of the anal. Upper parts brownish, with steel-blue reflexions; lower parts silvery, with a reddish tinge.

Three examples were collected by Mr. Salvin in the Rio Usumacinta; the largest is 15 inches long.

205. *PIMELODUS WAGNERI*.

Pimelodus cinerascens, Kner & Steindachner, Abhandl. bayer. Akad. x. p. 49 (not Gthr.).

D. 1/6. A. 11-12.

Head covered with soft skin above. Adipose fin one-third of the total length (without caudal). The maxillary barbels extend beyond the root of the ventrals; the outer ones of the mandible do not quite reach the base of the pectorals. The length of the head is contained from five times and two-fifths to five times and seven-eighths in the total (with the caudal), the height of the body seven times and one-third, or seven times and one-half. Upper jaw projecting beyond the lower. The eye is equidistant from the end of the snout and from that of the gill-cover; its diameter is one-seventh or one-eighth of the length of the head, and contained twice and two-thirds or twice and three-fourths in the width of the interorbital space. Dorsal fin with the spine very feeble, as high as long. Pectoral fin two-thirds as long as head. Porus axillaris small. Coloration uniform, a darker streak along the lateral line; dorsal fin with the usual whitish cross band, and sometimes with a large round black spot between the last two rays.

Pacific and Atlantic rivers of Panama.

The *complete* diagnosis of *P. cinerascens* (Gthr.), accompanied by a most accurate figure, proves at once that the species discovered by Hr. Wagner is distinct from it. It appears to be nearest to *P. godmanni*.

206. *PIMELODUS MANAGUENSIS*.

D. 1/6. A. 14-15. P. 1/9.

Head covered with soft skin above; occipital process styliform, not extending to the basal bone of the dorsal spine. Adipose fin very long, rather more than one-third of the total length (without caudal); its distance from the dorsal is equal to the length of the base of the latter. The maxillary barbels are rather short, extending nearly to the base of the dorsal fin, the outer ones of the mandibles reach beyond the root of the pectoral. The height of the body is contained six times in the total length (without

caudal); the length of the head five times. The lower jaw is slightly shorter than the upper. Interorbital space flat, its width being less than twice the width of the eye. Dorsal fin with the spine very feeble, somewhat higher than long. Pectoral fin rather short, as long as the head, without snout; its spine about double the length of the humeral spine. Porus axillaris distinct. Ventral rather longer than the pectoral. Anal fin with the base longer than that of the dorsal; its rays do not extend nearly to the end of the adipose fin if laid backwards. Caudal cleft to the base; its upper lobe less rounded and narrower than the lower one, which is one-seventh of the total length. Coloration uniform, dorsal fin with a whitish cross band.

One specimen, 9 inches long, was obtained by Capt. Dow in the Lake of Managua.

214. *ARIUS ASSIMILIS*.

Günth. Fish. v. p. 146.

D. 1/7. A. 19. P. 1/10.

The height of the body is contained four times and two-thirds in the total length (without caudal), the length of the head thrice and three-fifths; head much broader than high, its greatest width being three-fourths of its length. Eyes rather small, situated nearer to the end of the snout than to that of the operculum; the length of the snout is three-fifths of the width of the interorbital space. *The median longitudinal fonticulus on the upper side of the head does not extend to the base of the occipital process.* Teeth on the vomer but slightly separated in the middle, forming a pair of oblong transverse patches, which are confluent with those on the palatine bones; the latter are short, club-shaped. The band of intermaxillary teeth is five times as broad as long. All the teeth villiform. The maxillary barbels extend nearly to the end of the head; the length of the outer ones of the mandible is one-half or two-thirds of that of the head. Crown of the head granular, the granulations being arranged in radiating streaks. Occipital process broader than long, triangular, with its hinder end concave. The basal bone of the dorsal spine of moderate size, crescent-shaped. Dorsal spine of moderate strength, more than half as long as the head, granulated in front and slightly serrated behind; the first soft ray is longer than the spine and as high as the body. Adipose fin shorter than the dorsal. Caudal deeply forked, with the upper lobe longest, its length being contained five times and a half in the total. Pectoral spine serrated along its inner edge and on the extremity of the outer edge. Ventral fin shorter than pectoral. Sides of the body silvery; vertical fins greyish; basal half of the inner side of the paired fins black.

One example, 13 inches long, was obtained by Messrs. Godman and Salvin in the Lake of Yzabal.

Hexanematichthys hymenorrhinos, Bleek. Versl. & Mededeel. Akad. Wetensch. Amsterd. 1862, xiv. p. 377, appears to be closely allied to the above species; and we should not

hesitate to refer our specimens to it, if the barbels of Bleeker's species were not much longer, those of the maxillaries extending on to the base of the ventral fin, and the outer ones of the mandible to the base of the pectoral. The specimen in the Leyden Museum is $8\frac{1}{2}$ inches long.

219. *ARIUS DOWII*.

Mr. Gill (Proc. Acad. Nat. Sc. Philad. 1863, p. 170) describes a species discovered by Capt. Dow on the Pacific coast of Central America, under the name of *Leptarius dowii*. *Leptarius* is a distinct genus, according to Mr. Gill, characterized by having the band of teeth quadripartite, the head granulated and without lateral fontanelles, a slender body, and a very slender caudal peduncle, the anal fin rather low and oblong, the thin adipose fin extending behind the anal, and the fins little developed.—The species is not described; but detailed comparative measurements of the single example (which is $5\frac{3}{4}$ inches long) are given.

222. *ÆLURICHTHYS NUCHALIS*. (Plate LXXXI. fig. 2.)

Günth. Fish. v. p. 179.

D. 1/7. A. 26. P. 1/12.

The height of the body is rather less than the length of the head, which is two-ninths of the total (without caudal); the greatest width of the head is three-fourths of its length; snout longer than the eye, the diameter of which is rather less than one-fourth of the length of the head. The vomerine band of teeth is separated in the middle by a short interspace, each half being as broad, and long as the palatine band, with which it is subcontinuous. The maxillary barbels extend to the root of the ventral, those of the mandible nearly to the pectoral. The dorsal buckler is as broad behind as in front, with rounded lateral margins, each half being bent downwards on the side. Dorsal fin narrow and elevated, the first ray being considerably longer than the spine, which is as long as the head without snout; pectoral spine equal to the dorsal spine. The origin of the anal fin is much nearer to the base of the caudal than to that of the pectoral. The first pectoral ray is produced into a long filament reaching beyond the origin of the anal. Ventrals extending beyond the vent, their length being three-fifths of that of the head. Iridescent blue above, silvery below.

One example, 11 inches long, was obtained by Messrs. Salvin and Dow on the Pacific coast of Panama.

223. *ÆLURICHTHYS PANAMENSIS*.

Gill, Proc. Ac. Nat. Sc. Philad. 1863, p. 172.

This species is described thus:—

D. 1/7. A. 27. P. 1/13.

The greatest height is contained five times in the length to the base of the caudal fin,

and six times and a half in the total. The height of the caudal peduncle equals half the interorbital area, and is half its length behind the anal fin. The smooth head enters four times in the length to the middle of the central caudal ray, and nearly five times in the total. The width of the head enters once and one-third in its length, and the width of the interorbital area once and two-thirds. The eye is elliptical, its diameter equals a fourth of the head's length, and the distance from the anterior nostril is equal to it. The maxillary barbels extend backwards nearly to the anus, and the mental to the bases of the pectoral fins. The dorsal buckler is rather longer than wide, with its anterior margin concealed, and its lateral and posterior very conspicuous, rounded towards the posterior angles, and emarginated behind; the sides slope and form a rectangle, and the surface is filled with deep oblong pits. The anal fin is situated midway between, or scarcely in advance of, the central point between the bases of the pectoral and caudal fins; it is oblong, and equals or nearly equals the width of the head. The pectoral filaments extend about to the middle of the anal fin; the ventrals are inserted midway between the lower jaw and base of caudal, and extend backwards to the anus, entering twice and a half in the head's length. The colour above is plumbeous; the pectorals thickly dotted with black on their inner faces, and the anal less so.

One specimen, 8 inches long, has been collected by Capt. Dow on the Pacific coast of Panama.

224. *PLECOSTOMUS BICIRRHOSUS* (Gronov.).

Messrs. Kner & Steindachner (Abhandl. bayer. Ak. x. p. 60) mention a species of this genus from Pacific and Atlantic rivers of Panama, which they regard as a variety of *Plecostomus bicirrhosus*, but which differs in several respects.

225. *CHÆTOSTOMUS ASPIDOLEPIS*.

D. 17. A. 5. P. 16. L. lat. 25.

Head large, depressed, a little longer than broad, its length being contained thrice and one-third in the total (without caudal); snout very broad, rounded in front. Interorbital space nearly flat, with a very slight rising along the middle. Orbit small, its diameter being one-third of the width of the interorbital space. Margin of the snout granulated. Interoperculum with very few, and for the greater part short, setiform spines, the longest of which is about half as long as the orbit. Thorax and belly granulated, with naked patches. Dorsal fin higher than long, the length of its anterior rays being nearly equal to that of the head; the length of its base equals its distance from the hinder axil of the adipose fin. There are seven scutes between the two dorsal fins. The pectoral spine is strong, rather longer than the head, covered behind with setiform spinules. The ventral fins extend somewhat behind the anal. Twelve scutes between anal and caudal. Scutes of the body with a prominent keel, each keel

with from four to seven short setiform spines. Posthumeral ridge rather distinct. Each scute is variegated with dirty yellow and dark brown.

I have received of this species only a single skinned example, $12\frac{1}{2}$ inches long; it is from Veragua.

226. *CILETOSTOMUS CIRRHOSUS* (Val.).

Messrs. Kner & Steindachner (*l. c.* p. 61) mention this species from the Rio Chagres; but their species is probably distinct from it.

227. *LORICARIA URACANTHA*.

Kner & Steindachner, Abhandl. bay. Akad. x. p. 56, Taf. 6. fig. 3.

Snout broad, of moderate length; eye of moderate size, with a notch in its posterior margin, its horizontal diameter is one-half of the width of the interorbital space, which is slightly concave, owing to the raised supraorbitals. Eight or ten rather large bifid teeth in each jaw. Labial folds broad, with numerous papillæ, and a small lateral barbel. The lower side of the head naked; scutes of the neck but very indistinctly bicarinate. L. lat. 27. There are seven lateral scutes between the pectoral and ventral fins. Thorax and belly with numerous small irregular scutes. The origin of the dorsal is opposite to that of the ventrals. The length of the outer pectoral ray is contained six times and a half in the total (without caudal). *The upper caudal ray very thick and strong.* Rays of all the fins spotted.

Pacific and Atlantic rivers of Panama.

229. *MACRODON MICROLEPIS* (Gthr.).

The fish described by Messrs. Kner and Steindachner (*l. c.* p. 28) under the name of *M. taveira* belongs to this species.

256. *TETRAGONOPTERUS ÆNEUS* (Gthr.).

This species has been recognized in a collection from Panama by Messrs. Kner and Steindachner (*l. c.* p. 46).

237. *CHALCINOPSIS DENTEX*. (Plate LXXXII. fig. 1, $\frac{2}{3}$ nat. size.)

Brycon dentex, Günth. Proc. Zool. Soc. 1860, p. 240.

Chalcinopsis dentex, Günth. Fish. v. p. 337.

D. 11. A. 35-36. L. lat. 48-55. L. transv. $\frac{9-10}{7-8}$. Vert. 23/22.

The height of the body is contained thrice and one-fourth or thrice and one-third in the total length (without caudal), the length of the head four times and one-third or four times and two-thirds. The maxillary does not quite extend to below the centre of the eye. Snout as long as the eye in young examples, but much longer in adult ones. Interorbital space convex, its width being much more than the diameter of the eye in

old specimens. The origin of the dorsal fin is nearer to the root of the caudal than to the extremity of the snout; its hinder rays are vertically above the anterior anal rays. The free portion of the tail is considerably longer than high. Caudal deeply forked. The pectoral extends to, or nearly to, or a little beyond, the ventral. Silvery, sometimes with a reddish hue; a part of the scales have sometimes a black margin, or are spotted with black; humeral part of the gill-opening black; sometimes a black spot at the root of the caudal. Anal fin generally with a black margin.

Specimens, up to 16 inches in length, were collected by Messrs. Salvin and Godman in the Rio Mótagua and Usumacinta, and at Yzabal. The species occurs also in Ecuador.

240. *ANACYRTUS GUATEMALENSIS*. (Plate LXXXII. fig. 4.)

Anacyrtus (*Ræboides*) *guatemalensis*, Günth. Fish. v. p. 347.

D. 11. A. 51. V. 8. L. lat. 80. L. transv. 19/22.

Upper and lower jaw anteriorly on each side with a short, conical, tooth-like process directed forwards; teeth in the intermaxillary, maxillary, and mandible in a single, rather irregular series; no canine teeth in the upper jaw, those in the lower small and short. Back elevated, the upper profile of the head and nape forming an S-shaped curve. The height of the body is contained twice and three-fourths in the total length (without caudal), the length of the head four times. The lower jaw is rather shorter than the upper; the maxillary extends to the vertical from the centre of the eye. The width of the interorbital space is a little less than the diameter of the eye, which is two-sevenths of the length of the head. The humeral process in front of the pectoral terminates in a point anteriorly and posteriorly. The origin of the dorsal fin is a little nearer to the extremity of the snout than to the root of the caudal, above the fifth or sixth anal ray; caudal deeply forked; the ventral is inserted below the middle of the pectoral, which extends nearly to the origin of the anal. Light reddish olive with a silvery lateral band.

Specimens, up to 6 inches in length, were collected by Mr. Salvin at Huamuchal, and in the Chagres River.

244. *EXOCETUS CALLOPTERUS*. (Plate LXXXIII.)

Günth. Fish. vi. p. 292.

D. 11-12. A. 8. L. lat. 46.

Body stout, its height being one-fifth of the total length (without caudal), the length of the head being somewhat less than one-fourth. The depth of the head equals the distance between the extremity of the snout and the hind margin of the præoperculum. Snout obtuse and depressed, three-fifths of the length of the diameter of the eye, which is one-third of the length of the head, and less than the width of the interorbital space, which is slightly concave. The pectoral fin extends to the end of the dorsal. Ventral

fins midway between præoperculum and root of the caudal, extending nearly to the end of the base of the anal. The dorsal commences far in advance of the anal, its anterior rays being half as long as the head. *The distance between the first dorsal ray and the first rudimentary caudal ray equals the length of the head.* There are thirty-four scales between the occiput and origin of the dorsal, and nine longitudinal series of scales between the origin of the dorsal and the lateral line. Pectoral with numerous small roundish blackish-brown spots and with the lower and upper rays whitish. Ventral white, the middle rays greyish.

Two examples, 10 inches long, were obtained by Capt. Dow on the Pacific coast of Panama.

CHARACODON.

Günth. Fish. vi. p. 308.

Cleft of the mouth small, developed laterally and horizontally; mandible short, with the bones of each side firmly united. Snout short. Teeth rather small, bicuspid, in a single series; but there is a narrow band of villiform teeth behind the series of incisors. Scales of moderate size. Origin of the anal fin opposite, or nearly opposite, to that of the dorsal. Sexes not differentiated. Intestinal tract but slightly convoluted.

247. CHARACODON LATERALIS. (Plate LXXXII. fig. 2, fem.)

D. 10-11. A. 13 in fem., 15-16 in male. L. lat. 35. L. transv. 12.

In general habits very similar to a Cyprinodon. Body rather elevated, with the neck somewhat arched, its greatest depth being rather more than the length of the head, and one-third of the total (without caudal). Head thick and broad, with the snout obtuse, as long as, or rather longer than, the diameter of the eye, which is one-fourth or two-ninths of the length of the head. The mandible ascends obliquely, and is longer than the eye. There are about twenty smallish teeth in each jaw, their apex is indistinctly notched. Interorbital space flat, its width being two-fifths of the length of the head. The origin of the dorsal fin is a little nearer to the end of the caudal than to the occiput, and a little behind that of the anal. Both fins are small and rounded. In the male the six anterior rays of the anal are of nearly equal length, but considerably shorter than the following, forming a very distinct portion of the fin; all these rays are very closely set. Caudal fin small, truncate or slightly convex. The distance between dorsal and caudal is somewhat more than the least depth of the tail, and equal to the distance between eye and gill-opening. Brownish olive (in spirits), with a darker band running from the eye to the root of the caudal: this band is sometimes broken up into a more or less regular series of brownish-black spots.

There are several examples, from $1\frac{2}{3}$ to $2\frac{1}{2}$ inches long, in the British Museum; they are from Dr. Seemann's collection, who obtained them in Southern Central America.

248. HAPLOCHILUS DOVII. (Plate LXXXII. fig. 5.)

Günth. Fish. vi. p. 315.

D. 8. A. 14. V. 6. L. lat. 31. L. transv. 8.

The height of the body is contained five times in the total length (without caudal), the length of the head thrice and two-thirds; head elongate, low, and depressed, with the snout much produced and the upper jaw somewhat longer than the lower; the eye occupies exactly the middle of the length of the head, its diameter being two-ninths of it, and more than one-half of the width of the interorbital space, which is flat. The origin of the dorsal fin is a little nearer to the extremity of the caudal than to the gill-opening, and corresponds to the twenty-third scale of the lateral line. Anal fin entirely before the dorsal; pectoral extending to ventral, which reaches the vent; caudal rounded; all the fins well developed. Light brownish olive; posterior half of the dorsal and anal fins with black cross bands; basal half of the caudal with round light spots.

Two specimens, 6 inches long, probably males, were collected by Capt. Dow at Punta Arenas, Costa Rica.

249. FUNDULUS LABIALIS. (Plate LXXXIV. figs. 1 & 2.)

Günth. Fish. vi. p. 319.

B. 6. D. 13-14. A. 16-17. V. 6. L. lat. 37-39. L. transv. 15.

The height of the body, taken on the level of the base of the pectoral, is two-ninths of the total length (without caudal). Head rather depressed, its length being contained four times or four times and a third in the total. Interorbital space broad, slightly convex, its width being less than one-half of the length of the head. Snout broad, obtuse, depressed, with the jaws perfectly equal in front; mandible very short, not longer than the eye. Upper lip well developed, broad, extending to the angle of the mouth. The diameter of the eye is less than the length of the snout, or than one-fourth of that of the head, and, in females, one-half of the width of the interorbital space, whilst in males the forehead is somewhat narrower. The origin of the dorsal fin is midway between the extremity of the caudal and the orbit, and corresponds to the first ray of the anal. Dorsal fin as high as long in both sexes; anal fin rounded in the male, scarcely higher than long; much elevated in the female, the length of its base being two-thirds only of its depth. Genital opening of the female immediately in front of, but disconnected from, the anal fin. Basal third of the caudal fin (which is subtruncate) scaly. Body uniform brownish olive, paler below; sometimes irregular cloudy markings on the tail. Fins immaculate; the anal fin of the male is black at the base, and bright yellow on its marginal half; also the upper margin of the dorsal fin of the same sex is yellowish.

Numerous examples, up to $4\frac{1}{2}$ inches long, were collected by Messrs. Salvin and Godman in the Rio San Geronimo and at Yzabal. Figure 1 represents the male, and fig. 2 the female.

250. *FUNDULUS PUNCTATUS*. (Plate LXXXIV. fig. 5.)

Günth. Fish. vi. p. 320.

D. 12. A. 13. V. 6. L. lat. 34. L. transv. 12.

The height of the body, taken on the level of the base of the pectoral, is two-ninths of the total length (without caudal). Head depressed, its length being one-fourth of the total. Interorbital space very broad, slightly convex, its width being one-half of the length of the head. Snout broad, obtuse, much depressed, with the lower jaw scarcely projecting beyond the upper; mandible longer than the eye. Upper lip of moderate breadth, not extending to the angle of the mouth. The diameter of the eye is less than the length of the snout, two-ninths of that of the head, and less than one-half of the width of the interorbital space. The origin of the dorsal fin is somewhat nearer to the extremity of the caudal than to the orbit, and corresponds to the nineteenth scale of the lateral line. The first anal ray is opposite to the third of the dorsal. Dorsal and anal fins subquadrangular, with the outer margins convex: both are a little longer than high. Caudal fin subtruncate, scaly on its basal half. Pectoral fins shorter than the head without snout, not extending to the base of the ventrals. Brownish olive, paler below, each scale, especially those on the tail, with a vertical dark purplish violet spot on the centre. Dorsal with three or four series of blackish dots, anal with a whitish margin.

A single male, $3\frac{1}{2}$ inches long, was obtained by Mr. Salvin at Chiapam.

251. *FUNDULUS GUATEMALENSIS*. (Plate LXXXIV. figs. 3 & 4.)

Günth. Fish. vi. p. 321.

D. 12 (13). A. 14-15 (16). L. lat. 32-35. L. transv. 12.

The height of the body, taken on the level of the base of the pectoral, equals the length of the head, and is one-fourth or rather more than one-fourth of the total length (without caudal). Head thick and broad; interorbital space broad, slightly convex, its width being a little less than one-half of the length of the head. Snout broad, obtuse, with the lower jaw slightly projecting beyond the upper; mandible longer than the eye. The diameter of the eye is equal to, or, in the larger specimens, less than the length of the snout, one-fourth of that of the head, and one-half of the width of the interorbital space. The origin of the dorsal fin is midway between the extremity of the caudal and the posterior margin of the orbit, and corresponds to the nineteenth scale of the lateral line. The first anal ray corresponds to the second of the dorsal. Dorsal and anal fins subquadrangular, rather low, longer than high in the male, and as long as high in the female. Two-thirds of caudal covered with small scales. Brown above and on the sides, pale below; females with a very indistinct dark band along the side. Fins immaculate; anal with a light margin.

The sexual opening of the female is not attached to the anterior anal rays

Numerous examples, up to $3\frac{1}{2}$ inches long, were collected by Mr. Salvin in the Lakes of Dueñas and Amatitlan, and in the Río Guacalate. This species occurs also in Western Ecuador. Figure 3 represents the male, and fig. 4 the female.

252 FUNDULUS PACHYCEPHALUS. (Plate LXXXIV. fig. 6.)

Günth. Fish. vi. p. 321.

This species is closely allied to *F. guatemalensis*, but has a thicker head and smaller eye.

D. 13 14. A. 15. V. 6. L. lat. 35. L. transv. 12.

The height of the body, taken on the level of the base of the pectoral, is contained thrice and one-fifth or thrice and four-fifths in the total length (without caudal). Head very thick and broad, its length being contained thrice and one-third in the total. Interorbital space very broad, slightly convex, its width being one-half of the length of the head. Snout broad, obtuse, with the lower jaw slightly projecting beyond the upper; mandible longer than the eye. The diameter of the eye is less than the length of the snout, one-fourth of that of the head, and one-half of the width of the interorbital space. The origin of the dorsal fin is midway between the extremity of the caudal and the anterior or posterior margin of the orbit, and corresponds to the sixteenth scale of the lateral line. The first anal ray corresponds to the third of the dorsal. Dorsal and anal fins subquadrangular, of moderate height, the latter fin being scarcely higher than long. Caudal fin subtruncate. Brownish above and on the sides, each scale darker on the tip; an indistinct dark band along the middle of the tail. Fins immaculate, anal with the lower margin whitish.

Three males, $2\frac{1}{2}$ inches long, were obtained by Mr. Salvin in the Lake of Atitlan.

254. GAMBUSIA NICARAGUENSIS. (Plate LXXXII. fig. 3, fem.)

Günth. Fish. vi. p. 336.

D. 8. A. 10. L. lat. 29. L. transv. 8.

The height of the body is contained thrice and a third in the total length (without caudal), the length of the head thrice and two-thirds. Snout broad, subspatulate, with the lower jaw projecting beyond the upper. The diameter of the eye is a little more than the length of snout, one-third of that of the head, and three-fifths of the width of the interorbital space. In the female the origin of the dorsal fin is somewhat nearer to the extremity of the caudal than to the end of the snout, and opposite to the last ray of the anal fin. Pectoral fins not quite reaching as far backwards as the ventrals, which terminate immediately in front of the anal fin. Free portion of the tail rather short, the length of the base of the anal fin being one-half of its distance from the caudal fin. Brownish olive above, sometimes with series of black dots along the rows

of scales. Dorsal and caudal fins crossed by series of black dots; middle of anal blackish.

Several females, $1\frac{1}{2}$ or 2 inches long, were obtained by Capt. Dow in the Lake of Nicaragua.

259. *PÆCILIA ELONGATA*. (Plate LXXXV. fig. 2, fem.)

Günth. Fish. vi. p. 342.

D. 9. A. 8. L. lat. 30-32. L. transv. 9.

The height of the body is contained four times in the total length (without caudal), the length of the head four times and a third. The free portion of the tail is elevated, its least depth being contained once and two-thirds in its own length, and nearly equal to the length of the head without snout. The diameter of the eye equals the length of the snout, is two-sevenths of that of the head, and more than one-half of the width of the interorbital space. Snout much depressed. Lower jaw with a single series of very small teeth only; and also in the upper the posterior band of villiform teeth is very indistinct. Origin of the dorsal fin nearer to the root of the caudal than to the occiput, a little behind that of the anal, above the fourteenth scale of the lateral line. Dorsal fin higher than long, its longest ray being as long as the head without snout. Anal small. There are eight longitudinal series of scales on each side of the tail. Caudal rounded, its base only covered with scales. Uniform greenish; the membrane of the pouches of scales with a blackish margin. Fins immaculate.

This species is known from a female only, 5 inches long; it was obtained by Capt. Dow at Panama.

260. *PÆCILIA PETENENSIS*. (Plate LXXXV. fig. 3, male; fig. 4, fem.)

Günth. Fish. vi. p. 342.

D. 11. A. 8. L. lat. 29-30. L. transv. 8-9. Vert. 16/14.

The height of the body (measured below the anterior dorsal rays) is contained four times and one-fifth in the total length (without caudal) in females, and thrice and one-fourth in males, the males having the body much higher and shorter. The length of the head is one-fifth of the same length in the female, and one-fourth in the male. The diameter of the eye is a little less than the length of the snout, two-sevenths or one-fourth of that of the head, and somewhat more than one-half of the interorbital space. The origin of the dorsal fin is further distant from the root of the caudal than from the occiput, and corresponds to the eleventh or twelfth scale of the lateral line. Origin of the anal opposite to the fourth ray of the dorsal (in the female). Dorsal fin of moderate size; anal rather small, but pointed; caudal scaly in its basal third. The free portion of the tail is compressed, rather high, its least depth being one-half of its length, and equal to the length of the head without snout. There are seven longitudinal

series of scales on each side of the tail. Lateral line rather indistinct. Greenish, each scale with a black vertical spot. Dorsal and basal half of the anal irregularly and finely marbled with brown.

The male has the dorsal fin somewhat elevated, the longest ray being rather longer than the head. Anal fin modified into an intromittent organ, and advanced to between the ventrals, in front of the dorsal. Tail strongly compressed, and much higher than in the female, its least depth being equal to the length of the head.

Five examples, up to 6 inches in length, were collected by Mr. Salvin in Lake Peten.

262. *PECHILIA GILLII*.

Messrs. Kner & Steindachner (Abhandl. bayer. Akad. Wiss. x. p. 25, Taf. 4. fig. 1) have described a species of this genus from the Rio Chagres under the name of *Xiphophorus gillii*. It would appear to be most closely allied to *P. dovii*; but there are some apparently slight differences, which have induced me to keep the two species distinct until I shall have had an opportunity of comparing specimens from the Rio Chagres with the typical examples of *P. dovii*.

264. *MOLLIENESIA PETENENSIS*. (Plate LXXXVI. figs. 1-3.)

Günth. Fish. vi. p. 348.

B. 6. D. 15. A. 8-9. L. lat. 30. L. transv. 10. Vert. 17/13.

The height of the body is one-third of the total length (without caudal), the length of the head one-fourth or two-ninths. The diameter of the eye is equal to the length of the snout, two-sevenths of that of the head, and rather less than one-half of the width of the interorbital space. The length of the dorsal fin of the male is one-half of the distance between eye and root of the caudal, in the female two-fifths; caudal rounded, with scales at the base only. The free portion of the tail is as high as long, and covered by nine longitudinal series of scales on each side. Lateral line very indistinct. Greenish, or brownish green, silvery below; a dark spot to each scale of the upper and middle caudal series and the lower part of the trunk. Dorsal fin of the adult male with small irregular brown lines or spots, and with a row of large rounded spots along the middle of its height. Interradial membrane of the caudal with numerous black dots; the lower part of the hind margin black. Females and immature males have the dorsal fin simply ornamented with small irregularly curved brown spots.

Three examples, up to 5 inches in length, were collected by Mr. Salvin in Lake Peten.

Figure 1 represents the adult male, fig. 2 the immature male, and fig. 3 the adult female, all of the natural size.

265. *XIPHOPHORUS HELLERII* (Heck.). (Plate LXXXVII. figs. 2-6.)

This species varies considerably in coloration. Two varieties occur in the river Chisoy—one with two yellowish green bands along the side, separated, and bordered

above and below by a blue band; the second, without bands, has the body covered all over with irregular black spots.

The figures are of the natural size. The specimens are from an affluent of the Chisoy River,—fig. 4 representing an adult male of a variety, fig. 2 an adult female, fig. 5 a male approaching to maturity, fig. 3 an adult female of a variety; finally, fig. 6 represents a Mexican example, half-grown male.

266. *GIRARDINUS PLEUROSPILUS*. (Plate LXXXVII. fig. 1.)

Günth. Fish. vi. p. 353.

D. 8. A. 9. V. 6. L. lat. 28. L. transv. 8.

The height of the body is somewhat more than the length of the head, which is one-fourth of the total (without caudal); the diameter of the eye is more than the length of the snout, one-third of that of the head, and two-thirds of the width of the inter-orbital space, which is slightly concave. In the female the origin of the dorsal fin is in the middle of the total length, and conspicuously behind that of the anal fin. Caudal fin large, longer than the head, subtruncate behind; the free portion of the tail is somewhat elongate, the length of the base of the anal being one-third of its distance from the caudal. Pectoral fin not quite as long as the head, and not extending as far backwards as the ventral fins, which reach the vent.

In the male the origin of the dorsal is somewhat nearer the extremity of the caudal than that of the snout; the anal process is quite straight, nearly twice as long as the head, and terminating in a simple tapering point. Caudal very short. Reddish olive; a series of six or seven round blackish spots, each about the size of the eye, runs along the middle of the side, a black line along the base of the anal fin and the lower and upper margins of the tail. Caudal fin with two indistinct dark cross bands.

Mr. Salvin has discovered this species in the Lake of Dueñas. Females attain to a length of 2 inches, males to half that size only.

267. *SCLEROGNATHUS MERIDIONALIS*.

Günth. Fish. vii. p. 23.

D. 29–30. A. 10. L. lat. 38. L. transv. $7\frac{1}{2}/7\frac{1}{2}$.

Mouth small, inferior, slightly corrugated. The height of the body is contained thrice and one-half or thrice and one-fourth in the total length (without caudal), the length of the head four times or four times and one-half. Head not much longer than high. Eye rather small, one-fifth of the length of the head, and two-thirds of that of the snout. Suborbitals narrow. The anterior dorsal rays are not much produced, being shorter than the head. Caudal fin forked. The origin of the ventral fin is vertically below the fourth dorsal ray. Pectoral fin not extending to ventral. There are five longitudinal series of scales between the lateral line and the root of the ventral.

Coloration uniform. Pharyngeal teeth very numerous and small, increasing somewhat in size downwards.

Four examples, from 9 to 10 inches long, were obtained by Mr. Salvin in the Rio Usumacinta.

271. *PRISTIGASTER MACROPS*.

Günth. Proc. Zool. Soc. 1866, p. 603; and Fish. vii. p. 461.

D. 13. A. 61. L. lat. 53.

Abdominal profile but slightly convex, the greatest depth of the body being one-third of the total length (without caudal); the length of the head is contained four times and two-thirds in the same length; eye very large, its diameter being more than one-third of the length of the head, and nearly equal to that of the postorbital portion of the head. There are thirteen scales in the transverse series ascending from the origin of the anal fin to that of the dorsal, four of the series being above the lateral line. Origin of the dorsal fin midway between the root of the caudal and the scapula; origin of the anal nearer to the end of the snout than to the root of the caudal. A round black spot on the scapula.

A specimen, 8 inches long, was found by Messrs. Dow and Salvin on the Pacific coast of Panama.

272. *PRISTIGASTER DOVII*.

Pristigaster argenteus, Günth. Proc. Zool. Soc. 1866, p. 603 (not Cuv.).

— *dovii*, Günth. Fish. vii. p. 461.

D. 11. A. 56. L. lat. 51.

Abdominal profile but slightly convex, the greatest depth of the body being two-sevenths of the total length (without caudal); the length of the head is nearly one-fifth of the same. Eye large, its diameter being two-sevenths of the length of the head, and two-thirds of that of the postorbital portion of the head. There are eleven or twelve scales in the transverse series ascending from the origin of the anal fin to that of the dorsal, four of the series being above the lateral line. Origin of the dorsal fin much nearer to the root of the caudal than to the scapula; origin of the anal midway between the end of the snout and the root of the caudal. Scapula with an indistinct blackish spot.

A specimen, $8\frac{1}{2}$ inches long, was found by Capt. Dow at Panama.

273. *CLUPEA LIBERTATIS*.

Meletta libertatis, Günth. Proc. Zool. Soc. 1866, p. 603.

Clupea libertatis, Günth. Fish. vii. p. 433.

D. 17. A. 19. L. lat. 48.

Closely allied to *C. thrissa*. The length of the head is contained thrice and two-

thirds in the total (without caudal), the height of the body thrice and a half. The origin of the dorsal fin is much nearer to the end of the snout than to the root of the caudal. The dorsal filament does not extend on to the caudal. Uniform silvery, without humeral spot.

A single example, $2\frac{1}{2}$ inches long, was obtained by Messrs. Salvin and Dow at Libertad.

274. CHATOËSSUS PETENENSIS.

Meletta petenensis, Günth. Proc. Zool. Soc. 1866, p. 603.

Chatoëssus petenensis, Günth. Fish. vii. p. 408.

D. 14-15. A. 20-23. L. lat. 40.

The length of the head is two-sevenths of the total (without caudal); the height of the body is contained thrice or twice and three-fourths in the same. The origin of the dorsal fin is nearer to the end of the snout than to the root of the caudal, and in advance of the ventrals. The dorsal filament does not extend on to the caudal. A small black round spot on the shoulder.

Four examples, from 3 to 4 inches long, were obtained by Mr. Salvin in Lake Peten.

276. ENGRAULIS POEYL.

Kner & Steindachner, Abhandl. bayer. Akad. x. p. 23, Taf. 3. fig. 3.

D. 16. A. 24. L. lat. 42.

The length of the head is nearly equal to the height of the body, which is two-ninths of the total (without caudal); snout very short and rather obtuse; eye rather larger than one-fourth of the length of the head. The origin of the dorsal fin is nearer to the root of the caudal than to the end of the snout; origin of the anal fin opposite to the middle of the dorsal. Pectoral fin reaching a little beyond the root of the ventral. Upper and lower jaws with small teeth.

Rio Bayano.

277. ENGRAULIS MACROLEPIDOTA.

Kner & Steindachner, *l. c.* p. 21, taf. 3. fig. 2.

B. 12-13. D. 12. A. 29. L. lat. 35. L. transv. 9.

The length of the head is two-sevenths of the total (without caudal), the height of the body one-third. Snout pointed, very short. The diameter of the eye is one-fourth of the length of the head. The origin of the dorsal fin is a little nearer to the root of the caudal than to the end of the snout; origin of the anal fin immediately behind the end of the dorsal. Maxillary edentulous, extending to the angle of the præoperculum.

Rio Bayano.

278. CETENGRAULIS MYSTICETUS.

Engraulis mysticetus, Günth. Proc. Zool. Soc. 1866, p. 604.

Cetengraulis mysticetus, Günth. Fish. vii. p. 383.

D. 17. A. 20. L. lat. 42. L. transv. 14.

Head exceedingly large, its length being contained twice and four-fifths in the total (without caudal); the height of the body is contained thrice and two-thirds in the same; the depth of the head is two-thirds of its length; snout compressed, pointed, considerably shorter than the eye, the diameter of which is contained five times and a half in the length of the head. The origin of the dorsal fin is nearer to the root of the caudal than to the end of the snout; origin of the anal somewhat in advance of the end of the dorsal. Pectoral fin reaching a little beyond the root of the ventral. Scales adherent. Silvery, back greenish.

Three examples, the largest 6 inches long, were obtained by Messrs. Dow and Salvin on the Pacific coast of Panama.

279. CARAPUS FASCIATUS (Pall.).

Two examples from the Rio Motagua are of a uniform brown coloration, but do not differ structurally from South-American specimens.

284. TETRODON POLITUS (Gir.).

D. 8. A. 7.

Nasal cavity with a short, imperforated papilla. Body smooth, except in the interpectoral region, which is provided with minute spines. Head as broad as high, its greatest depth being equal to the distance between the gill-opening and the front margin of the orbit. Eye rather nearer to the gill-opening than to the end of the snout. Upper parts blackish brown, with numerous black dots; belly and lower part of the sides white. Dorsal and caudal fins brown; axil of the pectoral blackish.

One specimen, 13 inches long, was obtained by Mr. Salvin at San José.

285. TETRODON GEOMETRICUS.

D. 8. A. 7.

Nasal cavity with a short, imperforated papilla. Body covered with minute spines, except on the snout and tail. Belly pendent, very extensible. Head nearly as high as broad, its depth being equal to its length without snout. The eye occupies the middle of the length of the head. Upper parts blackish, with bluish transverse lines, curved on the sides; sides with some scattered black spots, lower parts white. Caudal fin white in its basal, and black in its outer half; the other fins whitish.

One example, 3 inches long, was obtained by Messrs. Dow and Salvin at Panama.

289. *BALISTES FRENATUS* (Lacép.).

A specimen, 8 inches long, obtained by Capt. Dow at Gonzalez Island, differs in being of a more uniform coloration, the yellow band on the head being but slightly indicated.

292. *LEPIDOSTEUS TROPICUS*.

Atractosteus tropicus, Gill, Proc. Ac. Nat. Sc. Philad. 1863, p. 172.

D. 10-11. A. 11. L. lat. 54. L. transv. 8/12.

The length of the head is nearly one-fourth of the total; the width of the inter-orbital space is two-fifths of the length of the snout, which equals the distance of the front margin of the orbit from the fifth scale of the lateral line. The root of the ventral fin is nearer to the base of the caudal than to the end of the snout.

Two examples, 18 inches long, were obtained by Mr. Salvin at Huamuchal.

293. *MUSTELUS DORSALIS*.

Gill, Proc. Ac. Nat. Sc. Philad. 1864, p. 149.

"Teeth unicuspid. The posterior angle of the first dorsal fin projects to the vertical of the origin of the ventrals, although the anterior fourth of the base of the fin is above the pectoral. The caudal fin equals the distance between the snout and third branchial aperture; and its terminal lobe nearly equals a third of the length, and is obliquely truncated behind."

Panama.

295. *CARCHARIAS MACULIPINNIS*.

Isogomphodon maculipinnis, Pöcy, Repertor. Fis. Nat. Cub. 1865, p. 191.

This species belongs to the subgenus *Prionodon*. Teeth with the terminal portion much constricted—the serrature being very fine, and only in a few distinct to the point; there are twelve on each side of the upper jaw; teeth of the lower jaw without any denticulations. The length of the snout, from the front margin of the mouth, is not much less than the width of the cleft of the mouth; the latter very deep, forming nearly a semicircular arch. The dorsal fin commences opposite to the inner posterior angle of the pectoral; pectoral pointed, not twice as broad as long. Coloration uniform grey, tips of most of the fins black.

One example, 4 feet long, was obtained by Mr. Salvin at Chiapam; the species was first described from a Cuban specimen.

297. *RHINOBATUS LEUCORHYNCHUS*.

The anterior nasal valve is not prolonged to the inner angle of the nostril. Disk longer than broad; the prenasal part of the snout is not so long as broad at the base, but longer than the distance between the front extremities of the nostrils. Skin very

finely granular; a series of very small, distant, smooth, oblong tubercles along the median line of the back. Nostrils longer than the space between their posterior extremities, but shorter than the mouth. Upper parts uniform ashy brown, the preocular part of the snout yellowish white.

One male, 21 inches long, was obtained by Capt. Dow on the Pacific coast of Panama.

299. *UROLOPHUS MUNDUS*.

Urotrygon mundus, Gill, Proc. Ac. Nat. Sc. Philad. 1863, p. 173.

Mr. Gill proposes the generic name of *Urotrygon* for *U. torpedinus* and the present species, the new genus being distinguished by the rounded and not angular outline, the longer tail and posterior insertion of the spine, and especially the acute teeth. The new species is thus characterized:—

The disk is orbicular, with a slight linguiform projection in front, and with the pectoral fins behind broadly rounded. The distance of the snout from the hinder margin of the pectorals equals the width of the disk. The tail (behind the anus) is rather longer than the body (in front). The spine is inserted behind the middle of the tail, and is about as long as the distance between the snout and the nostrils. The ventral fins extend outwards, the rectilinear anterior margin tending little backwards; and the external margins are on a line with and complete the outline of the disk. The posterior margin in the male is nearly rectilinear, while in the female it is slightly convex, especially towards the inner angles. The upper velum is very sinuous and fimbriated. The teeth are pointed and pyramidal. The spiracles are oval, interrupted at the intero-anterior angle by the eyes; and the margins are entire and well defined. The skin is beset with numerous small stelliform tubercles, larger on the dorsal region. The colour is a uniform dark brown above.

Two small specimens, male and female, were collected by Capt. Dow on the Pacific coast of Central America.

300. *AETOBATIS LATIROSTRIS* (A. Dum.).

This species was known from one very young example only, from the west coast of Africa; Messrs. Dow and Salvin have rediscovered it in the Bay of Panama. The specimen, which to the root of the tail is 12 inches long, and has a tail of 4½ inches, does not differ in anything from the Atlantic example. I may remark here that the soft rostral appendage is naturally bent upwards, like the nose-leaf of certain Chiroptera, and is not horizontally stretched forward as represented by M. A. Duméril.

EXPLANATION OF THE PLATES.

PLATE LXIII.

Map of the States of Central America, exhibiting localities mentioned in the paper.
The areas less than fifteen hundred feet above the sea-level are coloured *green*.

PLATE LXIV.

- Fig. 1. *Pristipoma macracanthum*, p. 416. Fig. 2. *Umbrina elongata*, p. 425.
Fig. 3. *Conodon pacifici*, p. 417.

PLATE LXV.

- Fig. 1. *Centropristis macropoma*, p. 409. Fig. 3. *Chaetodon humeralis*, p. 419
Fig. 2. *Hæmulon margaritifera*, p. 419.

PLATE LXVI.

- Fig. 1. *Upeneus tetraspilus*, p. 420. Fig. 3. *Pristipoma leuciscus*, p. 416.
Fig. 2. *Pseudojulis notospilus*, p. 447.

PLATE LXVII.

- Fig. 1. *Corvina chrysoleuca*, p. 427. Fig. 3. *Plectropoma afrum*, p. 411.
Fig. 2. — *vermicularis*, p. 427.

PLATE LXVIII.

- Fig. 1. *Thalassophryne maculosa*, p. 436. Fig. 2. *Thalassophryne reticulata*, p. 437.

PLATE LXIX.

- Fig. 1. *Cremnobates monophthalmus*, p. 442. Fig. 3. *Antennarius leopardinus*, p. 439.
Fig. 2. *Clinus macrocephalus*, p. 442. Fig. 4. *Trachynotus fasciatus*, p. 434.

PLATE LXX.

- Fig. 1. *Agonostoma microps*, p. 444. Fig. 2. *Agonostoma nasutum*, p. 444.

PLATE LXXI.

- Fig. 1. *Iheros citrinellus*, p. 458. Fig. 2. *Iheros margaritifera*, p. 450.

PLATE LXXII.

- Fig. 1. *Ieros urophthalmus*, p. 454. Fig. 3. *Ieros melanurus*, p. 450.
 Fig. 2. *Ieros longimanus*, p. 453.

PLATE LXXIII.

- Fig. 1. *Ieros spilurus*, p. 451. Fig. 3. *Ieros salvini*, p. 460.
 Fig. 2. *Ieros aureus*, p. 455. Fig. 4. *Ieros dovii*, p. 461.

PLATE LXXIV.

- Fig. 1. *Platyglossus dispilus*, p. 447. Fig. 4. *Neetroplus nematopus*, p. 470.
 Fig. 2. *Ieros multispinosus*, p. 453. Fig. 5. *Ieros godmanni*, p. 466.
 Fig. 3. *Ieros nigrofasciatus*, p. 452.

PLATE LXXV.

- Fig. 1. *Ieros lobochilus*, p. 457. Fig. 2. *Ieros erythreus*, p. 457.

PLATE LXXVI.

Ieros trimaculatus, p. 461.

PLATE LXXVII.

- Fig. 1. *Ieros nicaraquensis*, p. 465. Fig. 3. *Ieros managuensis*, p. 463.
 Fig. 2. *Ieros motaguensis*, p. 462.

PLATE LXXVIII.

- Fig. 1. *Ieros intermedius*, p. 468. Fig. 3. *Ieros guttulatus*, p. 466.
 Fig. 2. *Ieros irregularis*, p. 467.

PLATE LXXIX.

- Fig. 1. *Ieros affinis*, p. 455. Fig. 2. *Petenia splendida*, p. 469.

PLATE LXXX¹.

- Fig. 1. *Hemirhombus ovalis*, p. 472. Fig. 2. *Citharichthys spilopterus*, p. 471.

PLATE LXXXI.

- Fig. 1. *Amiurus meridionalis*, p. 473. Fig. 2. *Ælurichthys nuchalis*, p. 476.

¹ The figures on this plate ought to have been reversed.

- PLATE LXXXVII.

W. West amp

J. H. Ford.

1. CENTROPRISTIS MACROPOMA. 2. HÆMULON MARGARITIFERUM
3. CHÆTODON HUMERALIS.

(1 H. F. 184)

W. H. 1847

1. UPENEUS TETRASPILUS. 2. PSEUDOJULIS NOTOSPILUS. 3. PRISTIPOMA LEUCISCUS.

J. H. Ford

1872. Dec. 11. 1872. 1872.

W. West imp.

G. H. Ford

1 AGONOSTOMA MICRIPS. E. A. NASUTUM.

1. HEROS CITRINELLUS. 2. HEROS MARGARITIFER

G. H. Ford

W. Westring

1. HEROS UROPHTHALMUS. 2. H. LONGIMANUS 3. H. MELANURUS

1. 2. 3. 4.

W. West, sculp.

1. HEROS SPIURUS. 2. H. AUREUS. 3. H. SALVINI. 4. H. DOVII.

G.H. Ford.

W. Woodcock.

1. PLATYGLOSSUS DISPILUS.
2. HEROS MULTISPINOSUS. 3. H. NIGROFASCIATUS. 4. NEHTHOPIUS III

G. H. Bowd.

W. Wood sculp.

HEROS NILOTICUS.

G. H. Fox

1. *Thalassoma INTERMEDIUS*. 2. *Thalassoma*. 3. *Thalassoma* *H. GUTTULATUM*.

Spilopterus

July

W. West imp.

1. HEMIRHOMBUS OVALIS *Spilopterus* SPILOPTERUS.

W. Stent del.

1. CHALCINOPSIS DENTEX. 2. CHARACODON LATERALIS. 3. GAMBUSIA NICARAGUENSIS
4. ANACYRTUS GUATEMALENSIS. 5. HAPLOCHILUS DOVII.

PEZOMACHUS CALLIOPTERUS.

C. R. Ford.

W. Westrup

1. HEROS ANGULIFER. 2. PŒCILIA ELONGATA, *fem.* 3. P. PETENENSIS, *male.*
4. P. PETENENSIS, *fem.*

Cichla nigrofasciata (C. nigrofasciata) (C. nigrofasciata)

G. H. Ford

W. Westrup

1. GIRARDINUS FLEUROSPILUS. 2 & 3. XIPHOPHORUS HELLERI. female
4, 5 & 6. XIPHOPHORUS HELLERI. young & adult males

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