ART. X.—*Review of Holbrook's Ichthyology of South Carolina.*[1]

THIS volume is for the most part a second edition, the first having been published in the year 1855, but suspended with the issue of the tenth number. The plates, stones, and original drawings for the work having been subsequently destroyed by the fire which consumed the Artists' Buildings in Philadelphia, the government of South Carolina interposed and assumed the cost of its reproduction. "The delay in the publication of the work has, however, enabled" Dr. Holbrook "to give more accurate and highly finished plates and to correct some errors of the letter press. As but few numbers of the work were distributed previous to the destruction of the original plates, ... and the present edition is so much improved," the author "decided to recall the former numbers and to replace them by those of the new edition, without expense to the present holders." It is to be regretted that the new edition was not more freely opened to the patronage of the public, and to obviate the inconvenience to naturalists caused by the restriction of its circulation, the present notice is given.

In the second edition, the generic and specific descriptions are in most cases entirely the same as those of the first, the principal deviations occurring in the family called Ichthelidae. The plates are also arranged in the same manner, the only exception relating to XXIII and XXIV which had the numbers reversed in the first, and the interposition of an additional plate between XXVI and XXVII which last in the present is consequently called XXVIII. The figures themselves are mostly new and are as a rule superior to those of the original edition; the worst are the ones illustrating the scales of the Sparoid fishes and another intended to represent the preoperculum of "*Homoprion lanceolatus.*" Dr. Holbrook, adopting the fashion introduced in this country of figuring three scales of each species, has caused to be thus represented those of the Sparoids, but none give an idea of the type of structure peculiar to the representatives of that family and so characteristic of it. When the scales are so especially figured, we might at least reasonably expect a close approximation to correctness, and when it is not found, and it thus becomes apparent that the author himself has not paid special regard to them, we may well ask why the time and space given to these figures could not have been more advantageously bestowed in illustrating some more important characters. By what strange optical delusion a preoperculum, like that represented in the enlarged view of that bone in *Homoprion lanceola-*

[1] Ichthyology of South Carolina, Vol. I. By JOHN EDWARDS HOLBROOK, M.D., &c., Charleston, S. C. Published by Russell & Jones, 1860.

tus, could have been imagined by the artist, it is difficult to conjecture. With these remarks, however, special criticism may end, for although some of the other figures might be much improved, most are tolerably accurate.

With regard to the nomenclature of the species, little need be said. The names which will probably be for the most part adopted are given below; those specially interested in the subject are referred to the discussions in the Proceedings of the Academy of Natural Sciences of Philadelphia, &c. Dr. Holbrook has been frequently unfortunate in the application to his fishes of former names, especially in the cases of the synonymy of his *Caranx hippos* and *Homoprion xanthurus*. The *Scomber hippos* L., identified with the first, belongs to a different genus, as does also the *S. chrysos* of Mitchill. Under *Homoprion xanthurus*, the *specific character* is based on an extract from Cuvier & Valenciennes' description and radial formula of *Leiostomus xanthurus*, while the body of the description and the figure apply to *Bairdiella argyroleuca*—the *Corvina argyroleuca* C. & V.—a species of a different subfamily. If Dr. Holbrook had been correct in his application of Lacépède's name *Leiostomus xanthurus*, he would have been subject to the charge of a perversion of that author's generic name, but by a happy error, he has correctly retained it in its true sense.

On the other hand, some former names, concerning whose application there is no reasonable room for doubt, have not been at all accepted; such are the Linnæan *Labrus auritus* and *Gasterosteus Carolinus*. The former was evidently proposed for the species called by Holbrook, *Ichthelis rubricauda*—the *Pomotis rubricauda* of Storer, well characterized in the terse Linnæan phrase "opercula apice membranaceo, *elongato*, obtuso, *nigro*,"[2] and even rendered more certain as to its application by the *doubtful* reference to Catesby's figure of *Pomotis aureus*. It is however due to Dr. Holbrook to state that it appeared to him "certain that the specific name *auritus* was not applied to the "*Pomotis vulgaris*," and that Linnæus's description might "possibly apply to" either *P. rubricauda* or *P. incisor*. Probably none familiar with the subject will hesitate to retain the *Linnæan* name instead of *rubricauda*. The *Gasterosteus Carolinus* was as evidently intended for Holbrook's *Bothrolaemus pompanus*, notwithstanding this author's opinion to the contrary.[3] The latter species, it may be here remarked, has served at different stages of development, as the type of three genera, and Holbrook's *Bothrolaemus* is founded simply on very old individuals of *Trachynotus* in which the teeth had fallen out.

As Dr. Holbrook has not uniformly adopted a systematic ar-

[2] Labrus auritus *Linn.* Syst. Nat., ed. xii, vol. i, p. 475.
[3] See Proc. Acad. Nat. Sciences, Philad., 1862, p. 439.

rangement, but has scattered some species in places where they do not belong, the species given under a family name cannot be considered as members of that family, even in the author's opinion, and many of those have been referred to their proper ones in foot notes to the text. *Labrax*, *Grystes*, *Serranus*, *Diplectrum*, *Rhypticus* and *Centropristes* are not Ichthelidæ, but Percidæ; *Pagrus* and *Serranus nigritus* not Sciænidæ, but severally Sparoid and Percoid; and finally *Trachinotus* and *Hæmulon* are not Scopelinidæ, but respectively members of the Scombroid and Sciænoid families as understood by Dr. Holbrook.

With regard to the systematic arrangement thus corrected, it may be remarked that it is not an exposition of the views now prevalent concerning the limits of the families. All the Scombridæ of Holbrook are Carangoids, except *Cybium*, *Elacate*, *Echeneis* and perhaps *Temnodon*, members of as many different families. *Ephippus* scarcely belongs to the same family as *Chætodon* and its allies; *Hæmulon* and *Pristipoma* are rather Sparoids than Sciænoids, and at least do not belong to the latter family. *Lobotes* is the type of a peculiar one, and finally *Saurus* is the representative of another.

The most important modification in the arrangement is undoubtedly the foundation of the family Ichthelidae for the reception of the North American fresh water Percoids of Cuvier with six branchiostegal rays. Adopting the family of Percidae with the boundaries established for it by Sir John Richardson, he has considered that the Theraponidae of that author taken from it should be itself subdivided, and the family of Ichthelidae is therefore proposed for some of its constituents. The only positive character of the family mentioned by Holbrook which would remove it from the typical Percoids is the presence of only six branchiostegal rays.[4] As such, if strictly adhered to, would necessitate the expulsion from the latter of *Dulés* (auriga) *Percilia*, &c., and their transference to the Ichthelidae, the character is not the true one, and is of very secondary importance in itself. The group of genera embraced under Ichthelidae is however so natural, and its representatives so well distinguished from the true Percoids by their physiognomy, that it is probable that the family itself is a natural one; it has indeed more resemblance to the Cichloids, and its species hold the same place in North America that those fishes do in the Southern Continent and in Africa. Like them, the Ichthelidæ construct a rude nest, guard their young and are the most characteristic Acanthopterygian types of their respective regions. Their arrangement of colors and the variation in the number of anal spines are analogous, and their forms simulate each other. That form is

[4] Dr. Holbrook gives to Grystes in the new edition, "branchiostegal rays seven" instead of "branchial rays six" as formerly, but in a note adds that "sometimes there are but six rays."

distinguished by the equal development of, and the correspondence of, the regions of the body above and below the axis, while in the Percoids and others, these regions are obliquely opposed. It is therefore probable that future investigation will place the family on a firm basis. The family itself is composed of two very distinct types which must be regarded as subfamilies; the LEPOMINÆ distinguished by the very much greater development of the dorsal than the anal fin, their termination at the same vertical behind, and the equality of their respective soft portions; the EUCENTRARCHINÆ, in which the dorsal and anal fins are nearly or quite equal and obliquely opposed, so that the end of the anal is considerably behind the vertical from that of the dorsal; the soft portion of the anal is longest. These two subfamilies embrace a number of genera; Dr. Holbrook has admitted "*Pomotis, Ichthelis, Pomoxis, Ambloplites, Calliurus* [Ag.][5], &c., Raf., *Centrarchus* and *Bryttus*." The *Pomotis chætodon* Bd., *P. obesus*, Grd., *Centrarchus pomotis*, Bd., *Ambloplites interruptus* Gd., and *Pomoxis hexucanthus* Ag., are types of as many additional genera; that typified by *Pomotis chætodon* may be called MESOGONISTIUS on account of the peculiar angulation at the dorsal spine; *P. obesus* (n. g. ENNEACANTHUS) is distinguished by the nine spines of the dorsal fin; *Centrarchus pomotis* (ACANTHARCHUS), by the elliptical form, cycloid scales and convex caudal; the *Ambloplites interruptus* has been already separated under the name of ARCHOPLITES; finally, *Pomoxis hexacanthus*, (HYPERISTIUS) is removed from *Pomoxis* on account of the more oblique mouth, less produced snout, and the presence of seven or eight dorsal spines. Of these genera, *Centrarchus* Ag., *Hyperistius* Gill, and *Pomoxis* Raf., belong to the subfamily Eucentrarchinæ, while all the others are Lepominæ.[6]

While we have been thus obliged to dissent from Dr. Holbrook in many of his conclusions, we would at the same time indicate our appreciation of his great zeal in the cause of science, and his laborious and pains-taking endeavors to perfect his work. When, indeed, we recall that after having had engraved many years ago at least eight plates representing twice that number of species for a work on Southern Fishes of the Atlantic slope; after having published at least one part of a "Southern Ichthyology"[7] with fresh plates in 1847, he suppressed both and issued in 1855 under another title the work now reviewed, and that he

[5] CHAENOBRYTHUS Gill (type *Calliurus melanops* Grd.).—*Calliurus* Raf.=*Grystes* Cuv.=Micropterus *Lac.*

[6] A synopsis of the family of Ichthelidæ, or Centrarchoids, will be hereafter published in the *Proceedings of the Academy of Philadelphia.* There the synonymy of the genera, so much complicated by the mischievous Rafinesque, will be also discussed and a rectification of the nomenclature attempted.

[7] "Southern Ichthyology: or a Description of the Fishes inhabiting the waters of South Carolina, Georgia and Florida." New York and London, Wiley & Putnam, 1847. I have seen only one number of this (II), including pages 1 to 32 and plates

finally withdrew as much as possible that last publication from circulation and issued a new edition of it with so slight modifications in 1860,—we cannot withhold the praise of the most conscientious desire on his part for perfection, and the wish that the first volume of the final work shall be followed by others. It is however, doubtful whether the enterprising little state at whose expense the last edition of that first volume was published will feel able soon to continue its encouragement of the abstract sciences, and we may therefore probably hope in vain for the completion of the work. The following list of the species described under Holbrookian names, with references to the pages of the second edition, first edition, plates and figures of second edition, and names known to us, will therefore be useful. For the family relations of several of the species, the reader is referred to the remarks on a previous page. The list is rendered almost necessary by the impossibility of the recall of the first edition which has already been referred to in so many works and by the great difficulty if not impossibility of obtaining copies of the second edition.

Family Percidæ.					
Perca flavescens,	2	2	I,	1.	
Family Ichthelidæ.					
Pomotis vulgaris,	8	6	I,	2,	(Pomotis) aureus.
Ichthelis incisor,[1]	12	13	II,	1,	Lepomis incisor.
" rubricauda,[2]	15	10	II,	2,	Lepomis auritus.
Centrarchus irideus,	18	15	III,	1,	Eucentrarchus (irideus).
Labrax Americanus,	20	21	"	2,	Morone Americana.
" lineatus,	24	17	IV,	1,	Roccus lineatus.
Grystes salmoides,	28	25		2,	Micropterus salmoides.
Serranus erythrogaster,	32	29	V,	2,	(Epinephelus) erythrogas-
Diplectrum fasciculare,	35	32		1.	[ter.
Pomoxis hexacanthus,	39	36	VI,	1,	Hyperistius caroliniensis.
Rhypticus maculatus,	42	39		2,	Promicropterus maculatus.
Centropristis atrarius,	45	42	VII,	2,	Centropristis atrarius.
" trifurca,	49	47		1,	Triloburus trifurcus.
Family Sparidæ.					
Sargus ovis,	53	51	VIII,	2,	Sargus probatocephalus.
Lagodon rhomboides,	59	56		1.	
Family Scombridæ.					
Temnodon saltator,	64	62	IX,	2,	Pomatomus saltatrix.
Cybium maculatum,	68	66		1,	Apodontis maculatus.

I to IV, illustrating *Umbrina alburnus* (I, 1) *U. littoralis* (10, I, 2) *Micropogon undulatus*, (12, II, 2) *Corvina ocellata* (17, II, 1) *Leiostomus obliquus* (21, III, 1) *Lobotes Surinamensis* (25, III, 2) *Elacate canada* (30, IV, 1) *Ephippus gigas* (IV, 2). It is announced on the cover of the second part that "No. I, containing the Anatomical portion of the Work will be published with No. VI, and in the "Notice" to the first edition of the Work reviewed, it is affirmed that "two numbers were published under another title in 1845." The number noticed is, however, the only one with which we are acquainted.

[1] Pomotis incisor, 1st ed.

[2] Pomotis rubricauda, 1st ed.

Seriola Carolinensis,	72	70	x, 2,	Halatractus Carolincensis.
" zonata,	75	73	1,	Halatractus zonatus.
" chloris,[3]	79	77	xi, 1,	Chloroscombrus chloris.
Bothrolæmus pampanus,	83	81	2,	Trachynotus Carolinus.
Caranx defensor,	87	85	xii, (sup.)	Carangus chrysos.
" hippos,	90	88	(inf.)	Paratractus pisquetos.
" falcatus,	94	92	xiii,(2=sup.)[5]	Carangops falcatus
" Richardi,	96	94	(1=inf.)[6]	Carangus fallax.
Elacate canada,	97	95	xiv, 2,[7]	Elacate niger.
Echeneis vittata,[4]	102	101	1,[8]	Echeneis albicauda.
Family Squamipinnidæ,				
Ephippus gigas,	107	105	xv, 2,	Parephippus gigas.
" faber,	110	108	1, "	faber.
Family Sciænidæ.				
Pogonius cromis,	114	112	xvi, 2.	
" fasciatus,	119	118	1.	
Hæmulon chrysopteron,	121	120	xvii, 1.	
" arcuatum,	124	123	2.	
Otolithus regalis,	129	127	xviii, 1,	Cynoscion regalis.
" thallassinus,	133	132	2, "	thalassinus.
" nothus,	134	134	xix, 1, "	nothus.
" Carolinensis,	136	133	2, "	Carolinensis.
Umbrina alburnus,	137	136	xx, 1,[9]	Menticirrus alburnus.
" littoralis,	144	142	2,[10] "	littoralis.
Micropogon undulatus,	146	145	xxi, 1.	
Corvina ocellata,	150	149	2,	Sciænops ocellatus.
Larimus fasciatus,	154	153	xxii 1.	
Pristipoma fulvomaculatum,[11]	157	156	2,	Orthopristis fulvomaculatus.[12]
Leiostomus obliquus,	160	163	xxiii,[13]	(sup.=1)
Homoprion xanthurus,	164	170	(inf.=2[14])	Bairdiella argyroleuca.
" lanceolatus,	167	168	xxiv,[15] 1,	Stellifer lanceolatus.
Lobotes Surinamensis,	169	159	2.	
Pagrus argyrops,	174	175	xxv, 1.	
Serranus nigritus,	177	173	2,	(Epinephelus) nigritus.
Family Elopidæ.				
Elops saurus,	180	179	xxvi, 2.	
Family Scopelinidæ.				
Saurus fœtens,	187	184	1,	Synodus fœtens.
Trachinotus glaucus,	192		xxviii,[16] 1.	
Hæmulon quadrilineatum,	185		2.	
Family Esocidæ.				
Esox affinis,	198		xxviii,[17] 1.	
Esox Ravenelii,	201		2.	

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[3] Seriola cosmopolita, 1st ed.
[4] Echeneis lineata, 1st ed.
[5] Upper fig., 1st ed.
[6] Lower fig., 1st ed.
[7] Fig. 1, 1st. ed.
[8] Fig. 2, 1st ed.
[9] Fig 2, 1st ed.
[10] Fig. 1, 1st ed.
[11] Hæmulon fulvomaculatus, 1st ed.
[12] Pl. XXIV, 1st ed.
[13] Fig. inf.=2, 1st ed.
[14] Fig. sup.=1, 1st ed.
[15] Pl. XXIII, 1st ed.
[16] Not in 1st ed.
[17] Plate XXVII, 1st ed.