

A REVIEW OF THE NORTH AMERICAN SPECIES OF THE GENERA  
LAGODON, ARCHOSARGUS, AND DIPLODUS.

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In the following paper we give the synonymy of the North American species of the genera *Lagodon*, *Archosargus*, and *Diplodus*, with notes on the skeletons and keys for the identification of the species.

The specimens examined have, for the most part, been collected by Dr. D. S. Jordan, and are in the Museum of the Indiana University; duplicate series of all these are in the United States National Museum.

The genera of the American Sparinæ may be distinguished as follows:

ANALYSIS OF THE GENERA OF NORTH AMERICAN SPARINÆ.

- a. Second interhæmal spine normal, not "pen-shaped."  
 b. Front teeth conic, usually more or less canine-like; occipital crest coalescent with the temporal crests.....SPARUS.\*  
 bb. Front teeth broad, incisor-like; no canines.  
 c. First spine-bearing interneural developed as an antrorse spine above.  
 d. Occipital and temporal crests nowhere coalescent, the interorbital area not swollen. Bones of the interorbital area thin, concave in transverse section; temporal crest low, separated from occipital crest by a flattish area, which extends forward on each side of the occipital crest and to the groove of the premaxillary spine .....LAGODON, 1.  
 dd. Occipital and temporal crests coalescent anteriorly, both disappearing in the gibbous interorbital area. Bones of the interorbital area transversely gibbous and more or less cavernous or honey-combed; temporal crest separated from occipital crest by an excavated area, which is bounded anteriorly by the lateral crest, which merges into the occipital crest in the interorbital area.....ARCHOSARGUS, 2.  
 cc. First spine-bearing interneural not developed as an antrorse spine above; skull essentially as in *Archosargus*; the interorbital area more cavernous .....DIPLODUS, 3.  
 aa. Second interhæmal spine enlarged, hollowed anteriorly, pen-shaped, receiving the posterior end of the air-bladder in its anterior groove.  
 e. Front teeth narrow, incisor-like; an antrorse spine on the first spine-bearing interneural; temporal crest obsolete; lateral crest nowhere coalescent with the occipital crest; interorbital area flattish, with two low ridges, a small foramen in each of these above anterior margin of pupil; interorbital area much contracted anteriorly; a strongly projecting preorbital process which makes an acute angle with the supra-orbital bone.....STENOTOMUS.†  
 ee. Front teeth conic or canine-like; no antrorse spine on first spine-bearing interneural; temporal crest very thin and high, joining the lateral crest (which in this case forms part of the margin of the orbit) above the middle of the orbit, both coalescing with the occipital crest in the cavernous anterior part of the interorbital area; interorbital area somewhat contracted anteriorly; the preorbital process stronger than in *Stenotomus*, but making a very obtuse angle with the supra-orbital bone. . .CALAMUS.

\* We have examined the skulls of *S. aurata*, *pagrus*, and *erythrinus*, the types of Cuvier's genera *Chrysophris*, *Pagrus*, and *Pagellus*; though there are some variations in structure, the differences are not of generic character, nor do the teeth offer any grounds for division.

† We have examined only the skulls of *Calamus calamus* and *Stenotomus chrysops* in this group.

## 1. LAGODON.

LAGODON Holbrook, Ichth. South Carolina, 59, 1860 (*rhomboides*).

*Type*.—*Sparus rhomboides* Linnæus.

There is a marked difference in the character of the interorbital bones of *Lagodon* as compared with *Archosargus* and *Diplodus*. As there are no species known which show intermediate characters between *L. rhomboides* and the species of *Archosargus*, the differences set forth in the key may be considered of generic value. The interorbital bones of *Archosargus* are much more like those of *Diplodus* than like those of *Lagodon*.

But one species of *Lagodon* is yet certainly known.

## ANALYSIS OF THE SPECIES OF LAGODON.

- a. Upper jaw with two rows of molars; dorsal spines, 12; second anal spine not larger than third. Body elongate, elliptical; depth, 2 to 2½ in length; head, 3½; head flattened, muzzle pointed, profile not very steep. Eye moderate, 1½ to 1¾ in snout, 1 in interorbital, 4 in head. Mouth moderate, maxillary not reaching to front of orbit, 3½ in head; incisors ¼, deeply notched; molars in two series in each jaw. Dorsal spines all rather high, the highest about 2 in head. Caudal deeply forked. Ventrals short and broad; pectorals moderate, upper rays reaching past origin of anal. Bluish above, paler below; sides with 8 to 12 golden longitudinal stripes and about 6 dark cross-bars. A black blotch above pectoral. Anal with a light margin. Dorsal and anal each with a median golden stripe. D. XII, 11; A. III, 11. Scales 10-65 to 70-17 ..... RHOMBOIDES, 1.

1. *Lagodon rhomboides*. Pin-fish; Bream; Sailor's Choice; Chopa Spina.

*Sparus rhomboides* Linnæus, Syst. Nat., ed. xii, 1, 470, 1766 (Charleston; on a specimen from Dr. Garden). Schöpfung, "Schrift. der Naturf. Freunde. Berlin, viii, 153," 1788 (New York). Gmelin, Syst. Nat., 1275. 1788 (copied). Walbaum, Artedi Piscium, 292, 1792 (copied). Shaw, "Genl. Zool., iv, 447, 1803."

*Sargus rhomboides* Cuvier & Valenciennes, Hist. Nat. Poiss., vi, 68, plate 143, 1830 (New York, New Orleans). De Kay, Fishes New York, 93, plate 71, fig. 228, 1842 (New York). Storer, Synopsis Fishes, 333, 1845 (copied). Günther, Cat. Fish. Brit. Mus., 1, 447, 1859 (Southern U. S.).

*Lagodon rhomboides* Holbrook, "Ichth. S. Car., 58, plate 3, fig. 1," 1860 (South Carolina). Gill, Cat. Fish. East Coast, 31, 1861. Poey, Syn. Pisc. Cub., 310, 1868 (Cuba). Gill, Cat. Fishes East Coast, 27, 1873. Poey, Enumeratio Pisc. Cub., 58, 1875 (Cuba). Uhler & Lugger, Fishes of Maryland, 104, 1876 (Maryland). Goode, Fishes Bermuda, Am. Journ. Sci. and Arts, 1877, 292 (Bermuda). Jordan & Gilbert, Proc. U. S. Nat. Mus., 1878, 378 (Beaufort). Goode & Bean, Proc. U. S. Nat. Mus., 1879, 133 (Pensacola). Jordan, Proc. U. S. Nat. Mus., 1880, 19 (Eastern Fla.). Jordan, Proc. U. S. Nat. Mus., 1880, 22 (Saint John's River). Bean, Proc. U. S. Nat. Mus., 1880, 95 (Saint John's River). Jordan & Gilbert, Proc. U. S. Nat. Mus., 1882, 278 (Pensacola). Jordan & Gilbert, Proc. U. S. Nat. Mus., 1882, 605 (Charleston). Bean, Cat. Fish Internat. Fish Ex., London, 57, 1883 (Galveston, Texas). Henshall, Florida, 239, 1884 (east and west coasts; Florida Keys). Gill, Standard Nat. Hist., III, 222, 1886.

*Diplodus rhomboides* Jordan & Gilbert, Syn. Fish North America, 558, 1883. Jordan, Proc. U. S. Nat. Mus., 1884, 129 (Key West). Jordan & Swain, Proc. U. S. Nat. Mus., 1884, 233 (Cedar Keys). Jordan, Cat. Fish North America, 91, No. 1064, 1885 (name only). Jordan, Proc. U. S. Nat. Mus., 1886, 28 (Beaufort, N. C.).

*Perca rhomboidalis* Goode & Bean, Proc. U. S. Nat. Mus., 1885, 20 (not of Linnæus).

Habitat.—Atlantic and Gulf coasts of the United States. Cape Cod to Cuba.

This species is very common all along the eastern coast of the United States south of New York and on the Gulf coast as far west as Pensacola.

Its synonymy needs no remark.

*Skeleton*.—Vertebrae 10 + 14. Occipital crest high and thin, extending to above the anterior part of the eye, the frontal crest being very low. No transverse ridge or crest anywhere. A thin crest (temporal) extends back from above the eye past the edge of the skull, the suprascapula being attached some distance in advance of its posterior edge. Skull otherwise smooth. Interorbital area low, depressed, narrowest near the anterior border; its bones thin. A small foramen in the anterior part of the maxillary, the outer coating of the anterior part being thin. Teeth much narrowed towards their base.

The posterior part of the skull on each side of the occipital crest is higher than in *A. probatocephalus* or *A. unimaculatus*, and less concave or excavated than in either of these species.

## 2. ARCHOSARGUS.

ARCHOSARGUS Gill, Canadian Naturalist, August, 1865 (*probatocephalus*).

*Type*.—*Sparus probatocephalus* Walbaum.

For reasons already stated, *Archosargus* is here admitted as a valid genus as distinct from *Lagodon* on the one hand and *Diplodus* on the other. The structure of the skulls of *A. probatocephalus* and *A. unimaculatus* are very much alike; the skulls of the other species of the genus we have been unable to examine. The presence of a procumbent dorsal spine serves to separate both this and the preceding genus from *Diplodus*. This character is, curiously, confined to American species of *Sparina*, none of the European types showing it.

We recognize three species and one variety as inhabiting our waters. Besides these species Dr. Günther records *Sargus capensis* from our waters (Günther, Shore Fishes, 9, 1880, Bermudas). The record is somewhat doubtful and we omit the species from our list.

### ANALYSIS OF NORTH AMERICAN SPECIES OF ARCHOSARGUS.

- a. Upper jaw with three rows of molars; second anal spine much larger than third.
- b. Incisors,  $\frac{4}{4}$  or  $\frac{4}{3}$ ; dorsal spines, 12 or 13.
- c. Occipital crest broad, its honeycombed structure plainly exposed at its upper margin; dorsal spines 12. Seven broad, black cross-bars, separated by narrower light bars. No distinct shoulder spot. Body much compressed; dorsal outline strongly arched; ventral outline almost straight. Profile straight and steep anteriorly. Depth, 2 to  $2\frac{1}{2}$  in length; head  $3\frac{1}{2}$ . Head compressed, deep; mouth large, almost horizontal; maxillary  $2\frac{2}{3}$  in head; eye placed high, 4 in head,  $1\frac{1}{3}$  in interorbital,  $1\frac{1}{4}$  in suborbital. Incisors,  $\frac{4}{4}$ ; entire or slightly emarginate, serrate in the young; molars

in three series above, in two below; those of the inner series larger, those behind the incisors very small. Highest dorsal spine  $1\frac{1}{2}$  in head. Caudal not deeply forked. Second anal spine about twice in head, much larger than third. Ventrals not near reaching vent; pectorals reaching past beginning of anal. Color: Head dark; body silvery gray with 5 to 7 dark bars, which are less distinct in the adult; base of pectorals black. D.

XII, 10 or 12; A. III, 10 or 11 ..... *PROBATOCEPHALUS*, 2.

d. Incisors broad, their breadth about half their length. Scales, 7-48-15.  
var. *Probatocephalus* 2 (a).

dd. Incisors narrower, their breadth  $2\frac{1}{2}$  in their length. Scales, 7-44-14.  
var. *aries* 2 (b).

cc. Occipital crest rather thin, the honeycombed structure not exposed; dorsal spines 13; black cross-bars narrow, disappearing with age, their width about  $\frac{1}{3}$  that of the interspace; a distinct shoulder spot. Body somewhat elongate and compressed; depth 2 to  $2\frac{1}{2}$  in length; head  $3\frac{3}{4}$ . Profile rounded, steep. Mouth large, horizontal; maxillary not reaching front of orbit, 3 to  $3\frac{1}{2}$  in head. Eye large, placed high, its diameter equal to the preorbital,  $3\frac{3}{8}$  to 4 in head,  $1\frac{1}{2}$  in interorbital width. Incisors,  $\frac{2}{3}$ , entire or with a shallow notch; molars in three series in upper jaw, in two in lower. Fifth dorsal spine highest, 2 to  $2\frac{1}{2}$  in head. Second anal spine strong, recurved in head. Ventrals not near reaching vent; pectorals broad, the upper rays reaching past insertion of anal. Bluish above; about 7 narrow, dark cross-bands; a black humeral spot. D. XIII, 10; A. III, 10 or 11. Scales, 7 to 9-45 to 50-14 to 16 ..... *UNIMACULATUS*, 3.

bb. [Incisors  $\frac{3}{4}$ ; dorsal spines 12. Depth  $2\frac{9}{10}$  in total length; head, more than 4; eye  $3\frac{3}{4}$  in head, 1 in snout; maxillary extending to a point between the pupil and the "interior" border of the eye; profile with slight depression above the eye; second anal spine much longer than the third. Color grayish, belly white; 8 golden longitudinal bands; a black shoulder spot. D. XII, 10; A. III, 9.] (*Poey*)..... *TRIDENS*, 4

## 2. *Archosargus probatocephalus*. *Sheepshead*; *Sargo Raiado*.

*Sparus* Sheepshead "Schriften der Gesellsch. Natf. Freunde, VIII, 152." 1788 (New York).

*Sparus probatocephalus* Walbaum, *Artedi Pisc.* 295, 1792 (based on Schöpfung).

*Archosargus probatocephalus*, Gill, *Cat. Fish. east coast North America*, 27, 1873. Uhler and Lugger, *Fishes of Maryland* 103, 1874 (Maryland); Jordan and Gilbert *Proc. U. S. Nat. Mus.*, 1873, 379 (Beaufort); Goode and Bean, *Proc. U. S. Nat. Mus.*, 1879, 133 (Pensacola); Jordan, *Proc. U. S. Nat. Mus.*, 1880, 22 (Saint John's River); Bean, *Proc. U. S. Nat. Mus.*, 1880, 95 (Saint John's River); Goode and Bean, *Proc. U. S. Nat. Mus.*, 1885, 208.

*Diplodus probatocephalus* Jordan and Gilbert, *Proc. U. S. Nat. Mus.*, 1882, 278 (Pensacola); Jordan and Gilbert, *Proc. U. S. Nat. Mus.*, 1882, 605 (Charleston); Jordan and Gilbert, *Syn. Fish. North America*, 558, 1883; Bean, *Internat. Fish Exhib. London* 57, 1883 (Matauzas River Inlet, Florida); Jordan, *Proc. U. S. Nat. Mus.*, 1884, 128 (Key West); Jordan and Swain, *Proc. U. S. Nat. Mus.*, 1884, 232 (Cedar Keys); Jordan and Meek, *Proc. U. S. Nat. Mus.*, 1884, 237 (Jacksonville, Fla.); Henshall, Florida, 239, 1884 (east and west coast, Florida Keys); Jordan, *Catalogue Fishes North America* 91, No. 1066, 1885; Gill, *Standard Nat. Hist.*, III, 220, fig. 125, 1885; Goode, *Hist. Aquat. Animals*, 381, plates 130 and 131, 1886; Jordan, *Proc. U. S. Nat. Mus.*, 1886, 27 (Beaufort, N. C.).

*Sparus oricephalus* Bloch & Schneider, *Syst. Ichth.*, 280, 1801 (based on Schöpfung).



- Sargus ovicephalus* Gill, Proc. Acad. Nat. Sci. Phila., 20, 1860 (name only).  
Gill, Cat. Fish East Coast, 31, 1861 (name only).
- Sargus oris* Mitchill, Trans. Lit. & Phil. Soc. N. Y., I, 392, plate 2, fig. 5, 1814 (New York). Cuvier & Valenciennes, Hist. Nat. Poiss., VI, 53, 1830 (N. Orleans); Dekay, Fishes, New York, 89, plate 8, fig. 23, 1842 (New York); Storer, Synopsis Fishes North America, 332, 1846 (copied); Günther, Cat. Fish. Brit. Mus. I, 447, 1859 (North America); Holbrook "Ichth. S. Carolina, 54, plate 8, fig. 2," 1860 (South Carolina); Storer, Fishes Mass., 126, plate 10, fig. 1, 1867 (New Bedford).

*Habitat.*—Atlantic and Gulf coasts of the United States. Cape Cod to Florida Keys and Texas.

The numerous specimens examined by us are chiefly from Florida.

The synonymy and characters of this well-known food-fish need no special discussion.

*Skeleton.*—Vertebrae, 10 + 14. Occipital crest very stout, broadened at its upper edge, which is very finely honeycombed, and appears as if cut with a sharp knife; frontal crest extending to above middle of orbit; from the anterior edge of this crest a ridge extends outward and backwards to the upper corner of the preopercle. All bones in front of this ridge are swollen and finely honeycombed, the interorbital region being slightly convex; all the bones behind the crest are smooth. A very high and thin crest extends forward from the insertion of scapula to the transverse crest, a somewhat prominent preorbital process; interorbital area of same width everywhere. No foramen in maxillary, the bones thick and hard; teeth long, scarcely narrower at their base than at their cutting edge.

## 2 (b) *Archosargus probatocephalus aries*.

- Sargus aries* Cuv. & Val. Hist. Nat. Poiss., vi, 58, 1830 (Rio Janeiro Maracaibo); Günther, Cat. Fish. Brit. Mus. i, 449, 1859 (copied). Günther, Fishes Central America, 386. 1864. (Belize.)

This species is unknown to us except through the published descriptions above referred to, and through the manuscript notes of Dr. Jordan on the type of Cuv. & Val. It would appear to be very closely allied to *D. probatocephalus*, distinguishable only by the slightly narrower teeth and possibly larger scales. It is doubtless to be regarded as a geographical variety or southern representative of the common sheephead.

## 3. *Archosargus unimaculatus*. *Salema*.

*Salema*, Maregrave, Hist. Pisc. Brasil, 153, 1648 (Brazil).

*Bream* Brown, "Jamaica, 446, No. I," 1756.

*Perca unimaculata* Bloch, Plate 308, 1792 (Brazil). (On a figure by Prince Maurice.)

*Grammistes unimaculatus* Bloch & Schneider, Syst. Ichth., 184, 1801 (after Bloch).

*Sargus unimaculatus* Cuvier & Valenciennes, Hist. Nat. Poiss., vi, 62, 1830 (Rio Janeiro, Martinique); Storer, Synopsis Fish North America, 334, 1845 (copied); Günther, Cat. Fish Brit. Mus., I, 446, 1859 (Bahia; Rio Janeiro; Guatemala, Puerto Cabello; Jamaica); Günther, Fishes of Central America, 386, 1866 (Belize).

*Diplodus unimaculatus* Jordan & Gilbert, Proc. U. S. Nat. Mus., 1884, 128 (Key West); Bean, Proc. U. S. Nat. Mus., 1884, 158; Jordan, Cat. Fishes North America, 91, No. 1065, 1885; Jordan, Proc. U. S. Nat. Mus., 1886, 43 (Havana).

*Sparus salin* Lacépède, Hist. Nat. Poiss., iv, 136, 1803 (based on *unimaculatus* of Bloch).

*Sargus humeri-maculatus* Quoy & Gaimard Voyage Freycinet, Zool. 297, 1825 (Rio Janeiro).

*Sargus flavolineatus* Cuvier & Valenciennes, Hist. Nat. Poiss., vi., 60, 1830 (Cuba); Storer, Syn. Fish U. S., 333, 1845 (copied); Günther, Cat. Fish Brit. Mus., i, 446, 1859 (copied); Poey, Syn. Pisc. Cub., 310, 1868 (copied); Poey, Enumeratio, 57, 1875 (copied).

*Diplodus flavolineatus* Jordan, Proc. U. S. Nat. Mus., 1886, 42 (Havana).

*Sargus caribæus* Poey, Mem. Pisc. Cub., II, 197, 1860 (Cuba); Poey, Syn. Pisc. Cub., 309, 1868 (Cuba); Poey, Enumeratio, 56, 1875 (Cuba); Poey, Fauna Puerto Riqueña, 328, 1881 (Porto Rico).

*Diplodus caribæus* Jordan & Gilbert, Syn. Fish North America, 930, 1883 (copied).

*Habitat*.—West Indian Fauna, north to Key West; south to Rio Janeiro.

The numerous specimens examined by us are from Key West and from Havana.

The specimens before us differ decidedly in the proportions, the color, and the size of the teeth; but while the differences of the extremes are very marked, the intergradation is so perfect that no tangible difference can be made out. We have only the deeper form (*flavolineatus*) from Key West, while we have both extremes from Havana.

As far as we are able to judge from the figures and descriptions the *unimaculatus* of Bloch, Bloch & Schneider, Cuv. & Val. and of Jordan & Gilbert, the *caribæus* of Poey and the *humeri-maculatus* Quoy & Gaimard represent the more slender form, while the *flavolineatus* Cuv. & Val. represents the deeper form.

The differences of the extreme forms seem to be these:

<i>The deeper form (flavolineatus).</i>	<i>The more slender form (unimaculatus).</i>
Greatest depth, 2 in length.	Greatest depth, 2½ in length.
Ventral outline very much rounded.	Ventral outline almost straight.
Distance from insertion of first dorsal spine, obliquely to snout, 1½ in depth.	Distance from insertion of first dorsal spine, obliquely to snout, 1 in depth.
Teeth about one-third narrower than in the more slender form.	
Body more compressed.	

*Skeleton*.—Skull essentially as in *A. probatocephalus*; the occipital crest thinner, its honey-combed structure not exposed; a deep notch in the supra-ocular bone in front. Teeth short, abruptly narrowed at the base to a third of the width of the cutting edge. Maxillary with a small foramen in front; the outer coat of the bones thin.

A species very close to *Archosargus unimaculatus* has been lately described from the Galapagos Islands as *Sargus pourtalesii* (Steindachner, Fische Afrika's, 39, 1881).

4. *Archosargus tridens*.

*Sargus tridens* Poey, Enumeratio Pisc. Cub., 57, 1875 (Cuba).

*Habitat*.—Cuba.

This species is known to us only from the description of Professor Poey. Its distinctive characters need verification, it being perhaps an abnormal specimen of *Archosargus unimaculatus*.

## 3. DIPLODUS.

DIPLODUS Rafinesque, Indice d'Ittiologia Siciliana, 54, 1810 (*annularis*).

SARGUS Cuvier, Règne animal, 1817 (*sargus*), (name preoccupied).

*Type*.—*Sparus annularis* Gmelin.

The name *Diplodus* should of course supersede *Sargus* both from the fact that it is prior in date and because the latter name has been earlier used for a genus of insects. The genus *Diplodus*, as here understood, differs from *Archosargus* chiefly in the absence of a procumbent dorsal spine.

Most of the species of *Diplodus* are European, as those of *Lagodon*, *Archosargus*, and *Stenotomus*—the genera which have the procumbent dorsal spine—are American. The skull in *Diplodus* resembles that of *Archosargus*, but the cavernous or honey-combed structure of the interorbital area is still more prominent.

Skeleton of *Diplodus annularis*, type of *Diplodus*.—Vertebrae 10 + 14. No procumbent spine before the dorsal fin. Upper surface of the skull very rugose, with many ridges; occipital crest extending to frontal bone; frontal crest a mere ridge in the interorbital area; the bony stay extending on the occipital crest up from the posterior edge of the skull more prominent than in others; a crest extending from the upper angle of the preopercle, forward to anterior edge of occipital crest; this crest is broad and porous posteriorly; the inner edge is well defined, the outer edge with many projecting points. A smooth, thin, but higher crest extends between this and the occipital crest from the insertion of the scapula forward to the transverse crest. The interorbital not rounded, with many irregular crests. Maxillary without foramen. Teeth somewhat abruptly narrowed.

## ANALYSIS OF SPECIES OF DIPLODUS.

- a. Scales, 7-56-14; depth in adult,  $2\frac{1}{3}$  in length; black bar extending entirely across caudal peduncle; body regularly elliptical, moderately compressed; head  $3\frac{2}{3}$  in length; profile regularly rounded, not as steep as in *argenteus*; eye  $1\frac{1}{4}$  in preorbital;  $1\frac{1}{2}$  in snout;  $4\frac{1}{2}$  in head; mouth large, almost horizontal; maxillary  $3\frac{2}{3}$  in head; incisors  $\frac{4}{5}$ , inserted obliquely; molars in 3 series above and 2 below; longest dorsal spine  $2\frac{2}{3}$  in head; caudal deeply forked; second anal spine little larger than third,  $3\frac{1}{2}$  in head; ventrals reaching half way to the anal fin; pectorals not reaching to first anal spine; steel-blue above, paler below, a broad black border on the operculum; a black spot on upper part of base of pectoral; D. XII, 14 or 15; A. III, 13.

HOLBROOKI, 5.

- aa. Scales, 8-62 to 65-16; black bar not extending entirely across the caudal peduncle.
- b. Eye  $3\frac{1}{2}$  in head, 1 in snout; second anal spine  $2\frac{3}{8}$  in head; body much compressed; dorsal outline greatly elevated; depth,  $1\frac{1}{2}$  in length; head,  $3\frac{1}{2}$  in length; profile almost straight, very steep; eye large,  $1\frac{1}{4}$  in preorbital; mouth moderate, almost horizontal; maxillary  $3\frac{1}{8}$  in head; incisors  $\frac{4}{8}$ , placed as in *holbrooki*; molars as in *holbrooki*. Longest dorsal spine  $2\frac{1}{2}$  in head; caudal long, forked; second anal spine much stouter and  $\frac{1}{2}$  longer than third; ventrals reaching half way to second anal ray; pectorals reaching to first anal spine; steel-blue above, silvery below; a blackish border on the operculum; a black spot on the upper part of the base of pectorals; five or six very narrow, oblique blackish crossbars; D. XII, 14; A. III, 13; scales 8-62-16.....ARGENTEUS, 6.
- bb. [Eye  $4\frac{1}{8}$  in head,  $1\frac{1}{2}$  in snout; second anal spine  $3\frac{1}{4}$  in head; depth about 2 in length; incisors rather broad, implanted obliquely; three series of molars above, two below; eye  $1\frac{1}{8}$  in interorbital; crown of head convex, a protuberance above the anterior angle of the orbit; preorbital not entirely covering maxillary; pectoral fins extending to origin of anal; ventrals nearly to vent; silvery or shining golden, with many narrow longitudinal dusky stripes (8 or 9 above lateral line, 15 or 16 below), and with four or five narrow blackish cross-bands, the first between the origin of the dorsal and the axil; D. XI or XII, 12 to 15; A. III, 13 or 14; scales, 8-65-16.] (*Günther*).....SARGUS, 7.

### 5. *Diplodus holbrooki*.

- Sargus holbrooki*, Bean, "Forest & Stream, June 13, 1878" (Charleston); Bean, Proc. U. S. Nat. Mus., 1878, 198 (Charleston); Jordan & Gilbert, Proc. U. S. Nat. Mus., 1878, 379 (Beaufort); Bean, Proc. U. S. Nat. Mus., 1880, 95 (Charleston; New York market).
- Diplodus holbrooki*, Jordan & Gilbert, Proc. U. S. Nat. Mus., 1882, 605 (Charleston); Jordan & Gilbert, Syn. Fish. North America, 559, 1883; Jordan & Swain, Proc. U. S. Nat. Mus., 1884, 232 (Cedar Keys); Jordan, Catalogue Fishes North America, 91, No. 1067, 1885; Goode, Hist. Aquat. Anim., 386, fig. 132, 1886; Jordan, Proc. U. S. Nat. Mus., 1886, 27 (Beaufort, N. C.).
- Diplodus caudimacula*, Jordan & Gilbert, Syn. Fish. North America, 559, 1883 (Yongg; not *caudimacula* of Poey).

*Habitat*.—South Atlantic and Gulf coasts of the United States, Cape Hatteras to Cedar Keys.

The specimens examined are from Cedar Key and Pensacola, Fla., and from Beaufort, N. C.

This species has not yet been found in the West Indies, though it probably occurs there. It may be considered as the northern representative of *argenteus*. It is, however, unquestionably a different species from the latter.

*Skeleton*.—No procumbent spine before the dorsal fin. Occipital crest high, moderately thick, produced somewhat back of posterior edge of skull; frontal crest moderately high at the anterior edge of the occipital crest, extending to the anterior edge of the skull, and running up to a point. An almost horizontal crest extends from the upper corner of the preopercle forward to the frontal crest. The region immediately in front of this *very* coarsely honey-combed. The space between the anterior part of the orbits with three longitudinal crests, one in the middle, the



extension of the frontal crest, and one on each side a little less than half way between it and the outer edge of the supraorbital; foramen above the middle of the eye on either side of this lateral crest extending backward into the honey-combed structure. A very high thin crest extends forward from the insertion of scapula to the point of union between the frontal and horizontal crest; in the others this crest is joined to the lateral (or horizontal) crest. Maxillary with a very large foramen in front, the outer coating of the bone being very fragile, the bone much smaller than in *Archosargus* and somewhat different in shape. Teeth very long and evenly narrowed towards their base.

#### 6. *Diplodus argenteus*.

*Sargus argenteus* Cuvier & Valenciennes, Hist. Nat. Poiss., VI, 60, 1830 (Brazil).  
Günther, Cat. Fish. Brit. Mus. I, 444, 1859 (Rio Janeiro); Goode, Bull. U. S. Nat. Mus., V, 75 (Bermudas); Günther, Shore Fishes 5-7, 1880 (Island of Ascension; Bermudas).

*Sargus caudimacula* Poey, Memorias de Cuba, II, 198, 1860 (Cuba); Syn. Pisc. Cub. 310, 1868, Cuba); Ennumeratio Pisc. Cub. 57, 1875 (Cuba).

*Habitat*.—West Indian Fauna; Florida and the Bermudas to Rio Janeiro.

The specimen examined is from New Smyrna, Florida, where it was obtained by Mr. P. Shannon. This is the only one yet recorded from the United States.

The account of *Sargus argenteus* Cuv. & Val. agrees well with our specimen from New Smyrna, which is certainly the *Sargus caudimacula* of Poey. We have therefore substituted the name *S. argenteus* for the current name *caudimacula*. The types of *S. argenteus* in the Museum at Paris are also identified by Dr. Jordan as belonging to the same species as the types of *Sargus caudimacula* which are in the National Museum.

#### 7. *Diplodus sargus*. *Sargo*.

*Sparus* No. 13, Artedi Genera, 37; No. 2. Sueci Descr. 58, 1738.

*Sparus sargus* Linnæus, Syst. Nat. ed. X, 278, 1758 (Mediterranean) and of early European authors.

*Sargus variegatus* Lacépède, Hist. Nat. Poiss. IV, 207, 1803, (Mediterranean); Goode, Bull. U. S. Nat. Mus. V, 52, 1876 (Bermuda); Goode, Cat. Fish. Bermuda, Am. Journ. Science & Art, 292, 1877 (Bermuda).

*Sargus raucus* Geoffrey St. Hilaire, Descr. de l'Egypt, Poiss. 1813, plate XVIII, fig. 1.

*Sargus rondeleti* Cuv. & Val., Hist. Nat. Poiss. VI, 14, plate cxli, 1830 (Mediterranean); and of European writers generally.

*Habitat*.—Coast of Southern Europe, Bermudas.

This species is known to us only from descriptions. It is included in the American Fauna on the record of Mr. Goode of its occurrence in the Bermudas.

List of the nominal species of *Lagodon*, *Archosargus*, and *Diplodus*, in chronological order, with identifications.

[Tenable specific names in italics.]

Nominal species.	Year.	Identification.
<i>Sparus sargus</i> Linnæus.....	1758	<i>Diplodus sargus</i> .
<i>Sparus rhomboides</i> Linnæus.....	1766	<i>Lagodon rhomboides</i> .
<i>Sparus probatocephalus</i> Walbaum.....	1792	<i>Archosargus probatocephalus</i> .
<i>Perca unimaculata</i> Bloch.....	1798	<i>Archosargus unimaculatus</i> .
<i>Sparus ovicephalus</i> Bloch & Schneider.....	1801	<i>Archosargus probatocephalus</i> .
<i>Sargus salin</i> Lacépède.....	1803	<i>Archosargus unimaculatus</i> .
<i>Sargus variegatus</i> Lacépède.....	1803	<i>Diplodus sargus</i> .
<i>Sargus raucus</i> Geoff. St. Hilaire.....	1813	Do.
<i>Sargus ovis</i> Mitchell.....	1814	<i>Archosargus probatocephalus</i> .
<i>Sargus humerimaculatus</i> Quoy & Gaimard.....	1825	<i>Archosargus unimaculatus</i> .
<i>Sargus rondeleti</i> Cuv. & Val.....	1830	<i>Diplodus sargus</i> .
<i>Sargus aries</i> Cuv. & Val.....	1830	<i>Archosargus probatocephalus aries</i> .
<i>Sargus argenteus</i> Cuv. & Val.....	1830	<i>Diplodus argenteus</i> .
<i>Sargus flavolineatus</i> Cuv. & Val.....	1830	<i>Archosargus unimaculatus</i> .
<i>Sargus caribæus</i> Poey.....	1860	Do.
<i>Sargus caudimacula</i> Poey.....	1860	<i>Diplodus argenteus</i> .
<i>Sargus tridens</i> Poey.....	1875	<i>Archosargus tridens</i> .
<i>Sargus holbrooki</i> Bean.....	1878	<i>Diplodus holbrooki</i> .

#### RECAPITULATION.

We recognize seven species of *Lagodon*, *Archosargus*, and *Diplodus* as inhabiting North American waters. In the following list of the species recognized the general distribution is indicated by: (E) Coasts of Europe and North Africa. (M) Coasts of North Atlantic States. (S) Coasts of South Atlantic States. (W) West Indian coasts (A) Atlantic coasts of tropical South America. (B) Bermudas.

#### Genus I. LAGODON, Holbrook.

1. *Lagodon rhomboides* Linnæus. (S. W.)

#### Genus II. ARCHOSARGUS, Gill.

2. *Archosargus probatocephalus* Walbaum. (U. S.)
- 2(a). *Archosargus probatocephalus aries* Cuv. & Val. (A.) (Not examined by us.)
3. *Archosargus unimaculatus* Bloch. (W. A.)
4. *Archosargus tridens* Poey. (W.) (Doubtful species; not examined by us.)

#### Genus III. DIPLODUS, Rafinesque.

5. *Diplodus holbrooki* Bean. (S.)
6. *Diplodus argenteus* Cuvier & Valenciennes. (S. W. B. A.)
7. *Diplodus sargus* Linnæus. (E. B.) (Not examined by us.)

INDIANA UNIVERSITY, December 15, 1886.