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1. The first part of the paper discusses the importance of the research.

2. The second part of the paper discusses the methodology used.

3. The third part of the paper discusses the results of the study.

4. The fourth part of the paper discusses the conclusions of the study.

5. The fifth part of the paper discusses the implications of the study.

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

A LIST OF THE FISHES OF PENNSYLVANIA.

BY HENRY W. FOWLER.¹

The present paper is a summary of the data accumulated during the past twenty years, presented in condensed form, so that the distribution of each species may be traced so far as present details permit. For this reason they are arranged according to the various hydrographic basins with only the counties mentioned, additional records, where noteworthy, being supplied in parentheses. The work is therefore intended as a slight contribution to the distribution of our local fishes.

Like many departments of natural history the founding of the binomial system by Carl von Linné in 1758 first establishes several fishes from Philadelphia. Alexander Wilson contributes the first notice of shad and alewife in the article on ichthyology in Ree's Encyclopaedia, to which he secured an assistant editorship in 1806. His article was published about 1812. Charles Alexandre Le Sueur is the first to carefully study the fishes of this State, much of his material doubtless having been secured near Philadelphia. He is credited with sixteen of our species, while eight other names he proposes are synonyms. Constantine Samuel Rafinesque described many of our species in his *Ichthyologia Ohiensis*. The localities given are seldom definite and usually would apply to the entire Ohio basin. He has described twenty-three of our species, besides fourteen synonyms.

Several of our species are also described by Achille Valenciennes, in collaboration with Baron Cuvier, in the great *Histoire Naturelle des Poissons*. Samuel Stehman Haldeman studied the fauna of the lower Susquehanna, though his contributions to ichthyology are rather incidental. He was signally unfortunate

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in that the four species he described were all anticipated. Charles Girard was a frequent contributor to North American ichthyology, and though he described two species from our limits both are synonyms. Spencer Fullerton Baird published a few notes on Pennsylvania fishes and the only one he described added another synonym to our well known fall-fish.

The serious study of Pennsylvania fishes, however, begins with Edward Drinker Cope in his elaborate memoir the "Synopsis of the Cyprinidae of Pennsylvania."¹ Later he attempted "The Fishes of Pennsylvania,"² intended as a partly popular descriptive catalogue, apparently modeled from Jordan's Manual of Vertebrates. This work, likely valuable at the time of its publication, is chiefly useful for the notes on habits, etc. Cope described fourteen valid species and five synonyms. In this connection mention should be made of Jacob Stauffer, of Lancaster, who discovered two interesting fishes in his region, which were described by Cope. Stauffer's only contribution appears as his list of the fishes of Lancaster County.³ This work is often faulty in the obscurity of determinations of many species. For instance, our common white catfish is described no less than three times. Tarleton Hoffman Bean gives a descriptive account⁴ somewhat like Cope's. It is similarly marred by the inclusion of a number of species native to regions adjacent to Pennsylvania, but never actually taken in the State limits.

Among living writers Evermann and Bollman⁵ publish an important account of Monongahela River fishes in 1885.⁶ In 1902 Ross gives an account of twenty-five Center County fishes,⁷ largely of an economic nature. His *Minytrema melanops*, *Leuciscus margarita* and *Hybopsis dissimilis* are important additions, and listed without comment or details of satisfactory comparison they may be dropped.

Below follows a list of my own papers:

¹Tr. Amer. Philos. Soc., XIII, 1869, pp. 35-399, Pl. 10-13.

²Rep. State. Comm. Fisher., 1879-80 (1881), pp. 59-145, figs. 1-44.

³In Mombert's Hist. Lancaster County, Pa. 1868.

⁴The Fishes of Pennsylvania. Rep. State Comm. Fisher., 1889-91 (1892), pp. 1-149, Pls. 1-35.

⁵Bollman died of fever contracted in Georgia swamps, 1889.

⁶Ann. N. Y. Acad. Sci., III, 1883-5 (1886), pp. 335-340.

⁷Studies of Fishes of Central Pennsylvania. Rep. State Comm. Fisher., 1902, pp. 111-

1905. Exoglossum in the Delaware. < *Science*, XXI, June 30, 1905, p. 994.
1906. Notes on Pennsylvania Fishes. < *Amer. Nat.*, XL, 1906, pp. 595-6.
- Pinephales in the Susquehanna. < *L. c.*, p. 743.
- Fishes in Winter. < *Forest and Stream*, LXIX, December 28, 1906, p. 1022.
1907. Records of Pennsylvania Fishes. < *Amer. Nat.*, XLI, January, 1907, pp. 5-21, fig. 1.
1908. Fishes of Bristol. < *Bucks County Gazette*, December 25, 1908. (Popular newspaper account, with list.)
1909. A Synopsis of the Cyprinidæ of Pennsylvania. < *Proc. Acad. Nat. Sci. Phila.*, 1908 (Feb. 2, 1909), pp. 517-553, Pl. 27.
1910. Note on some Pennsylvania Fishes. < *Science*, XXXI, March 4, 1910, pp. 345-6. (List of some Indiana County species.)
- Note on the distribution of some Pennsylvania Fishes. < *L. c.*, XXXII, December 23, 1910, pp. 926-7. (Few species from Altoona and Easton.)
1912. Records of Fishes for the Middle Atlantic States and Virginia. < *Proc. Acad. Nat. Sci. Phila.*, 1912, pp. 34-59, 2 figs. (Pennsylvania, pp. 41-50.)
- Some Features of Ornamentation in Fresh-water Fishes. < *Amer. Nat.*, XLVI, 1912, pp. 470-6, figs. 1-21. (On spawning cyprinoids and catostomoids.)
- Hermaphrodite Shad in the Delaware. < *Science*, XXXVI, July 5, 1912, pp. 18-19.
1914. Some Local Fish-eating Birds. < *Cassinia*, 1913 (March, 1914), pp. 6-16.
- Fishes in Polluted Waters. < *Copeia*, April 15, 1914, No. 5. (List of species in the Schuylkill tidal.)
- Fishes of the Poquessing Creek. < *Aquarium Notes and News*, I, No. 4, April, 1914, pp. 35-6.
- Description of a new Blenny from New Jersey, with notes on other fishes from the Middle Atlantic States. < *Proc. Acad. Nat. Sci. Phila.*, 1914 (June 24), pp. 342-358, 1 fig. (Pennsylvania, pp. 346-353.)
- *Hadropterus peltatus* in the Delaware. < *Science*, XL, December 25, 1914, pp. 939-940.
1915. An Annotated List of the Cold-blooded Vertebrates of Delaware County, Pennsylvania. < *Proc. Del. Co. Inst. Science*, VII, No. 2, June, 1915, pp. 1-13. (Fishes, pp. 1-8.)
- Fishes of the Neshaminy Creek Tidal Region. < *Aquar. Notes and News*, II, No. 6, June, 1915, pp. 49-51.
1916. The River Fishes of Upper Philadelphia. < *L. c.*, III, No. 4, April 1916, pp. 28-30.
- The Fishes of Pennypack Creek in Upper Philadelphia. < *L. c.*, III, No. 8, October 1916, pp. 60-64.
1917. Fishes found in Bucks County, Pennsylvania, during 1915 and 1916. < *L. c.*, IV, No. 2, February, 1917, pp. 11-15.

- Notes on the Spawning-habits of our Lampreys. < L. c., IV, No. 4, April, 1917, pp. 28-32.
- Notes on Fishes from New Jersey, Pennsylvania and Maryland. < Proc. Acad. Nat. Sci. Phila., 1917 (April 24), pp. 108-126. (Pennsylvania, pp. 115-122.)
- Fish Life of Mill Creek, a Delaware tributary. < Bristol Daily Courier, X, April 23, 1917. (Popular newspaper article.)
- Spawning Habits of Local Fishes, No. 1. < Aquar. Notes and News, IV, No. 5, May, 1917, pp. 37-40, 1 fig.
- Spawning Habits of Local Fishes. No. 2. < L. c., IV, No. 7, September, 1917, pp. 52-56.
1918. Fishes from the Middle Atlantic States and Virginia. < Occas. Papers Mus. Zool. Univ. Michigan, No. 56, May 6, 1918, pp. 1-19, Pls. 1-2. (Pennsylvania, pp. 8-14.)
- The Fishes of Perry County, Pennsylvania. < Copeia, November 21, 1918, No. 63, pp. 89-91.

PETROMYZONIDÆ.

Petromyzon marinus Linnæus. Lamprey.

In the Delaware basin (Douglasville) Berks, (Neshaminy Falls and George School) Bucks, (Stock Grange, French Creek?) Chester, Northampton, Philadelphia, Pike and Wayne Counties.

Susquehanna basin (Athens and Sayre) Bradford, (Emporium) Cameron, (Harrisburg) Dauphin, (Marietta, McCall's Ferry, Peach Bottom, Pequea, Safe Harbor) Lancaster, (Newton Hamilton) Mifflin, (Marysville) Perry and (Peach Bottom, York Furnace) York Counties.

Ichthyomyzon concolor (Kirtland). Silvery Lamprey.

(Conemaugh River formerly and Two Lick Creek) Indiana and McKean Counties. Lake Erie?

Entosphenus æpypterus (Abbott). Brook Lamprey.

Delaware basin in (Red Clay Creek near Kennett Square and White Clay Creek near Leonard) Chester County.

Elk basin, (Elk View?) Chester County.

Susquehanna basin in Cameron County.

Ohio basin (Pittsburg) Allegheny, Indiana and (Seven Bridges) Potter Counties.

ACIPENSERIDÆ.

Acipenser sturio Linnæus. Sturgeon.

Delaware basin in Bucks, Delaware, Northampton and Philadelphia Counties, now rare Susquehanna basin (reported at Coxtown in 1844¹) Dauphin and (Fite's Eddy, Marietta, McCall's Ferry, Peach Bottom and Safe Harbor) Lancaster Counties.

Acipenser fulvescens Rafinesque. Lake Sturgeon.

Ohio basin (Pittsburgh formerly) Allegheny, (Foxburg and mouth of

¹Forest and Stream, XXXIV, March 20, 1890, p. 171.

Clarion River) Clarion, (Conemaugh and Kiskiminitas Rivers formerly) Indiana and (Tediante and Warren) Warren Counties.

Erie basin, (Massassauga Point) Erie County.

Acipenser brevirostrum Le Sueur. Short-nosed Sturgeon.

Delaware basin in Bucks and Philadelphia Counties. Le Sueur's type¹ is still in the Academy and agrees with several examples I examined in the field.

Scaphirhynchus platyrhynchus (Rafinesque). Shovel-nosed Sturgeon.

Though the late Dr. Bean mentions² that "in the large tributaries of the Ohio, in western Pennsylvania, the species is very common," the original account by Rafinesque³ contains our only definite record.

POLYODONTIDÆ.

Polyodon spathula (Walbaum). Paddle Fish.

Ohio basin in Allegheny, (Foxburg and Clarion River formerly) Clarion, (Conemaugh River formerly at Blairsville) Indiana, McKean and (Tediante and Warren) Warren Counties.

LEPISOSTEIDÆ.

Lepisosteus osseus (Linnæus). Long-nosed Gar-pike.

Delaware basin in Bucks, (Chester) Delaware, Monroe and Philadelphia Counties. *

Susquehanna basin (Marietta, Safe Harbor) Lancaster and (Peach Bottom) York Counties.

Ohio basin (Foxburg) Clarion, (Conneaut Lake) Crawford, (Conemaugh River formerly) Indiana and Warren Counties.

Erie basin in Erie County.

Lepisosteus platostomus (Rafinesque). Short-nosed Gar-pike.

Known from Rafinesque's original account⁴ which says "as far as Pittsburgh in the Allegheny River." Reported to me at Erie.

AMIATIDÆ.

Amiatus calvus (Linnæus). Bowfin.

A "dog fish" reported at Allegheny City⁵ is the only record I have for the Ohio basin, though I found it abundant at Erie. Stauffer mentions an example from the Susquehanna at Safe Harbor,⁶ likely an introduction?

HIODONTIDÆ.

Hiodon alveoides (Rafinesque). Gold-eye.

Known from Cope's Beaver and Youghiogheny River examples which I reported.⁷

¹Proc. Acad. Nat. Sci. Phila., 1910, p. 604, Pl. 38, fig. 1.

²Rep. Com. Fisher. Pa., 1889-91 (1892), p. 5.

³Ich. Ohien., 1820, p. 80. Seldom reaching as high as Pittsburgh in the Ohio River.

⁴Ich. Ohien., 1820, p. 72.

⁵Forest and Stream, VIII, May 24, 1877, p. 243.

⁶Amer. Nat., XIII, 1879, p. 525.

⁷Proc. Acad. Nat. Sci. Phila., 1911, p. 204.

***Hiodon tergisus* Le Sueur.** Moon-eye.

Originally described from the Ohio at Pittsburgh,¹ though no recent records given. I found it at Erie.

DOROSOMIDÆ.

***Dorosoma cepedianum* (Le Sueur).** Mud-shad.

Only recorded from the tidal of the Delaware basin, (Andalusia) Bucks, Chester, Delaware and (Bridesburg, Tacony) Philadelphia Counties. Le Sueur originally² obtained it in the "market of Philadelphia."

CLUPEIDÆ.

***Pomolobus chrysochloris* Rafinesque.** Inland Alewife.

Known from Rafinesque's original account,³ which gives it from the Ohio River and also says "it seldom goes as far as Pittsburgh." "Herring" reported formerly in (the Conemaugh River) Indiana County were likely this species.

***Pomolobus mediocris* (Mitchill).** Fall Herring.

I have no local material though include this species provisionally, or only on reports of its occurrence in the Delaware River tidal of Bucks County at Tullytown. In late October, 1906, a school of about fifty large examples were reported at this point. When swimming at the surface they produced quite a disturbance, somewhat like a school of menhaden. About eight were taken on hooks baited with our common river killifishes (*Fundulus*), which were fastened to the hook by the upper jaw. When opened the herring were found more or less gorged with killifish. They took the bait with a rush and greatly interested the local anglers who called them "jacks" or "skipjacks." They remained until November. A large herring taken at the same place in December, 1912, was doubtless the same species.

***Pomolobus pseudoharengus* (Wilson).** Alewife.

Delaware basin, (New Hope) Bucks, Delaware and Philadelphia Counties. Susquehanna basin, (Harrisburg) Dauphin, (reported at Clarke's Ferry dam in North Branch⁴) Lackawanna, (Bainbridge, Fite's Eddy, Marietta, McCall's Ferry, Pequea, Safe Harbor) Lancaster, (Marysville) Perry and (McCall's Ferry, Peach Bottom and York Furnace) York Counties.

***Pomolobus æstivalis* (Mitchill).** Summer Herring.

Only found in the Delaware basin in Bucks, Delaware and Philadelphia Counties.

¹As *Hiodon tergisus* Le Sueur, Journ. Acad. Nat. Sci. Phila., I, pt. 2, 1818, p. 366, and *H. clodatus* Le Sueur, l. c., p. 367. Rafinesque next names it *Hyodon vernalis* in Ich. Ohien., 1820, p. 43.

²As *Megalops cepediana* in l. c., p. 361.

³Rafinesque, l. c., p. 38.

⁴Forest and Stream, LXVII, November 3, 1906, p. 701.

Alosa sapidissima (Wilson). Shad.

Delaware basin (Andalusia, Biles Creek, Dunk's Ferry, New Hope, Scott's Creek, Uhlertown, Yardley) Bucks, (Long Ford, Ming and mouth of French Creeks, Perkiomen, Phoenixville all formerly) Chester, Delaware, (Delaware Water Gap) Monroe, (Easton formerly) Northampton, (Manayunk, Port Providence, Valley Forge all formerly) Montgomery, Philadelphia, (Bushkill, Conashaugh, Delaware, Egypt Mills, Matamoras, Milford, Shohola) Pike and (Damascus, Hancock, Millanville) Wayne Counties.

Susquehanna basin (Browntown, Sayre, Towanda) Bradford, (Beach Haven, Berwick, Bloomfield) Columbia, (Harrisburg) Dauphin, (Bainbridge, Columbia, Creswell, Fite's Eddy, Marietta, Peach Bottom, Pequea, Safe Harbor, Washington Borough) Lancaster, (Hemlock Creek, Nanticoke, Pittston, Shickhinny, Wilkes Barre all formerly) Luzerne, (Long Level, Northumberland) Northumberland, (Duncannon, Newport) Perry, (Keelersburg, Meshoppen, Tunckhannock) Wyoming and (East Prospect, Long Level, York Furnace) York Counties.

Brevoortia tyrannus (Latrobe). Menhaden.

Valenciennes early mentions it as abundant in the markets of New York and Philadelphia, and later Cope says it ascends the Delaware for a short distance in our limits. I have it from the New Jersey shore at Washington Park in August, 1908, and since then small examples have been found in Bucks (far as Dunk's Ferry) and Philadelphia Counties.

SALMONIDÆ.

Coregonus clupeaformis (Mitchill). Whitefish.

Abundant at Erie.

Leucichthys sisco (Jordan). Sisco.

Known from Erie examples reported by Jordan and Evermann.¹

Leucichthys artedi (Le Sueur). Lake Erie Herring.

Abundant at Erie.

Cristivomer namaycush (Walbaum). Lake Trout.

Erie County. Introduced in the Delaware and Susquehanna basins.

Salvelinus fontinalis (Mitchill). Brook Trout.

Delaware basin in Berks, Bucks, Carbon, Chester, Lackawanna, Lebanon, Lehigh, Montgomery, Monroe, Northampton, Philadelphia, Pike, Schuylkill and Wayne Counties.

Susquehanna basin in Berks, Blair, Bradford, Cameron, Center, Clearfield, Clinton, Columbia, Cumberland, Dauphin, Elk, Fulton, Huntingdon, Juniata, Lackawanna, Lancaster, Lebanon, Luzerne, Lycoming, Mifflin, Perry, Potter, Schuylkill, Somerset, Sullivan, Susquehanna, Wayne, Wyoming and York Counties.

¹Bull. Bur. Fisher., XXIX, 1909, p. 12, fig. 6 (type) and Pl. 2, as *L. sisco huronius*.

Potomac basin in Adams, Franklin, Fulton and Somerset Counties.

Genesee basin in Potter County.

Ohio basin in Erie, Fayette, Forrest, Indiana, McKean, Lawrence, Potter, Somerset, Warren and Westmoreland Counties.

Erie basin in Erie County.

ARGENTINIIDÆ.

Osmerus mordax (Mitchill). Smelt.

Delaware tidal in Bucks, Delaware and Philadelphia Counties. Besides the types of *O. sergenti* Norris¹ many examples in the markets examined, but the latter largely imported.

ICTALURIDÆ.

Ictalurus furcatus (Valenciennes). Chuckle-head Cat.

Reported from the Monongahela River by Evermann and Bollman.²

Ictalurus punctatus (Rafinesque). Spotted Cat.

Ohio basin in Allegheny, Beaver, Clarion, (Blairsville formerly) Indiana and Westmoreland Counties.

Erie basin in Erie County. Possibly the alleged *A. nigricans* (Le Sueur) is not distinct from the present species. The late Dr. Bean says "Erie receives its supply of catfish from fishermen who operate in the lake from Erie to Elk Creek, with set-lines during the summer months." A number of catfish in the markets and fisheries at Erie were examined and all of the fork-tailed forms were the spotted cat. All had the predorsal bony bridge complete and but few were without spots.

Ameiurus catus (Linnæus). White Cat.

Delaware basin in Bucks, (Brandywine Creek) Chester, Delaware and (League Island) Philadelphia Counties.

Susquehanna basin in Lancaster and (Peach Bottom) York Counties.

Ameiurus natalis (Le Sueur). Yellow Cat.

Only met with by me at Erie. Not found east of the Alleghanies in our limits, though in the Ohio basin early recorded as far as Pittsburgh.³

Ameiurus nebulosus (Le Sueur). Common Cat.

Delaware basin in Berks, Bucks, Carbon, Chester, Delaware, Lebanon, Monroe, Montgomery, Northampton, Pike and Wayne Counties.

Susquehanna basin in Bedford, Berks, Blair, Bradford, Cambria, Center, Chester, Clearfield, Clinton, Cumberland, Fulton, Juniata, Lackawanna, Lancaster, Lebanon, Luzerne, Lycoming, Mifflin, Montour, Northumberland, Perry, Snyder, Somerset, Sullivan, Susquehanna, Tioga, Wayne, Wyoming and York Counties.

¹Proc. Acad. Nat. Sci. Phila., 1868, p. 93. Schuylkill below Fairmount dam. Brandywine Creek.

²Ann. N. Y. Acad. Sci., III, 1883-5 (1886), p. 336.

³*Pimelodus cupreus* Rafinesque, Ich. Ohien., 1820, p. 65.

Northeast River basin in Chester County.

Potomac basin in Franklin, Fulton and Somerset Counties.

Genesee basin in Potter County.

Ohio basin in Armstrong, Beaver, Cambria, Crawford, Indiana, Jefferson, Lawrence, McKean, Somerset, Venango, Warren and Westmoreland Counties.

Erie basin in Erie County.

Ameiurus melas (Rafinesque). Black Cat.

Abundant and frequently marketed at Erie.

Ameiurus nigrilabris (Cope). Blind Cat.

Only known from the types,¹ procured in the Conestoga Creek, tributary to the Susquehanna. Originally placed in a separate genus on account of the rudimentary eyes, though otherwise very close to *A. nebulosus*.

Leptops olivaris (Rafinesque). Mud Cat.

Known from Cope's material I reported from the Youghiogheny River.²

Noturus flavus Rafinesque. Stone Cat.

Reported from Pigeon Creek by Evermann and Bollman³ and I have it from the Youghiogheny River and Indiana County.

Schilbeodes gyrinus (Mitchill). Tadpole Cat.

Many examples from the Delaware basin in Bucks, Lehigh and Philadelphia Counties, and the Genesee basin in Potter County.

Schilbeodes insignis (Richardson). Margined Cat.

Delaware basin in Bucks, (Jordan Creek near Helfrich's Spring) Lehigh, Montgomery, Monroe, Northampton, Philadelphia, Pike and Wayne Counties.

Elk basin in Chester County.

Susquehanna basin in Blair, Bradford, Cameron, Center, Cumberland, (Columbia, Fite's Eddy, Marietta) Lancaster, Sullivan and (Peach Bottom, Sowego Creek) York Counties.

Schilbeodes miurus (Jordan). Brindled Cat.

Recorded by McConnell⁴ from Indiana County. I have been unable to examine the material on which this record is based.

CYPRINIDÆ.

Campostoma anomalum (Rafinesque). Stone Roller.

Susquehanna basin in Columbia County.

Ohio basin in Allegheny, Beaver, Indiana, Lawrence and McKean Counties.

¹*Gronias nigrilabris* Cope, Proc. Acad. Nat. Sci. Phila., XVI, 1864, p. 231.

²Amer. Nat., XLI, 1907, p. 14.

³Ann. N. Y. Acad. Sci., III, 1883-5 (1886), p. 335.

⁴Rep. Com. Fisher. Pa., 1905, p. 179.

Chrosomus erythrogaster (Rafinesque). Red-bellied Dace.

Only known from Cope's material obtained in the Kiskiminitas River, which I reported recently.¹

Chrosomus erythrogaster eos (Cope). Eastern Red-bellied Dace.

Known only from Cope's types,² obtained in Meshoppen Creek, Susquehanna basin, in September, 1861, and of them but three now extant.

Hybognathus nuchalis Agassiz. Silvery Minnow.

Reported from the Ohio basin by Cope,³ though I have no material.

Hybognathus nuchalis regius (Girard). Eastern Silvery Minnow.

Only in the Delaware tidal in Bucks, Delaware and Philadelphia Counties.

Hybognathus nuchalis argyritis (Girard). Blunt-jawed Silvery Minnow.

Known from Cope's material from the Kiskiminitas I recently noticed.⁴

Pimephales promelas Rafinesque. Black-headed Minnow.

I met with it in the Ohio basin of McKean County.

Pimephales notatus (Rafinesque). Blunt-nosed Minnow.

Delaware basin in Bucks, Lehigh and Montgomery Counties.

Susquehanna basin in Berks, Blair, Lebanon, Dauphin, Snyder and York Counties.

Ohio basin in Allegheny, Clarion, Indiana, McKean and Westmoreland Counties.

Semotilus bullaris (Rafinesque). Fall Fish.

Delaware basin in Berks, Bucks, Chester, Delaware, Lehigh, Monroe, Montgomery, Northampton, Philadelphia, Pike and Wayne Counties.

Susquehanna basin in Berks, Bradford, Cambria, Chester, Clinton, Cumberland, Huntingdon, Lancaster, Lycoming, Mifflin, Montour, Potter, Somerset, Wayne and York Counties.

Potomac basin in Franklin and Somerset Counties.

Semotilus atromaculatus (Mitchill). Creek Chub.

Delaware basin in Berks, Bucks, Chester, Delaware, Lehigh, Monroe, Montgomery, Northampton, Philadelphia, Pike and Wayne Counties.

North East basin in Chester County.

Potomac basin in Franklin and Somerset Counties.

Susquehanna basin in Berks, Blair, Cameron, Chester, Clinton, Columbia, Cumberland, Dauphin, Huntingdon, Lackawanna, Lancaster, Lebanon,

¹Proc. Acad. Nat. Sci. Phila., 1908 (1909), p. 519.

²*C. eos* Cope, Proc. Acad. Nat. Sci. Phila., 1861, p. 523.

³Rep. Com. Fisher. Pa., 1879-80 (1881), p. 91.

⁴Proc. Acad. Nat. Sci. Phila., 1908 (1909), p. 521.

⁵L. c., p. 522. Port Allegany.

Lycoming, Mifflin, Montour, Perry, Potter, Snyder, Somerset, Sullivan, Wayne and York Counties.

Genesee basin in Potter County.

Ohio basin in Allegheny, Armstrong, Cambria, Clarion, Fayette, Indiana, Jefferson, McKean, Potter, Somerset, Warren and Westmoreland Counties.

Leuciscus margarita (Cope). Pearl Dace.

One of Cope's six examples, originally obtained in the Conestoga near Lancaster,¹ remains in the Academy. Ross records this species from Center County,² though I have been unable to examine his material.

Leuciscus carletoni Kendall. Carleton's Dace.

A single example I obtained in high color July 23, 1899, in McKean County at Cole Grove, is interesting as a new addition to the fauna.³ It was captured in a small mountain-stream, the surface of which was largely covered with petroleum, so that the fish was not discovered until taken out of the water in a net. Associated were a number of other small fishes as creek chubs, silver-fins and cut-lips. Though I wrongly identified the present example as the pearl dace, as indicated below, it agrees in every way with the present species.

Leuciscus vandoisulus Valenciennes. Rosy-sided Dace.

Delaware, Elk and North East basins in Chester County.

Susquehanna basin in Cameron, Chester and Lancaster Counties.

Leuciscus elongatus (Kirtland). Slender Dace.

Ohio basin in Crawford, Indiana and McKean Counties.

Abramis crysoleucas (Mitchill). Roach.

Delaware basin in Berks, Bucks, Chester, Delaware, Lebanon, Lehigh, Monroe, Montgomery, Northampton, Philadelphia and Pike Counties.

Susquehanna basin in Cameron, Lackawanna, Lancaster, Mifflin, Sullivan and York Counties.

Ohio basin in Clarion and Elk Counties.

Erie basin in Erie County.

Ceraticthys vigilax Baird and Girard. Cliola Minnow.

Recorded from the Monongahela by Evermann and Bollman.⁴

Notropis bifrenatus (Cope). Bridled Minnow.

Delaware basin in Berks, Bucks, Chester, Delaware, Lehigh, Montgomery, Northampton and Philadelphia Counties.

Susquehanna basin in York and Lancaster Counties.

¹*Clinostomus margarita* Cope, Tr. Amer. Philos. Soc., (2) XIII, 1866, p. 377, fig. (teeth), Pl. 13, fig. 1.

²Rep. Com. Fisher. Pa., 1902, p. 114.

³*L. margarita* (non Cope) Fowler, Science, XXXI, March 4, 1910, p. 346.

⁴Ann. N. Y. Acad. Sci., III, 1883-5 (1886), p. 336.

Notropis deliciosus (Girard). Straw-colored Minnow.

Recorded from the Monongahela by Evermann and Bollman,¹ and I have it from Indiana County.

Notropis procyne (Cope). Swallow Minnow.

Delaware basin in Berks, Bucks, Chester, Delaware, Montgomery and Philadelphia Counties.

Elk and North East basins in Chester County.

Susquehanna basin in Berks, Columbia, Dauphin, Lancaster, Lebanon, Snyder and York Counties.

Notropis boops Gilbert. Big-eyed Minnow.

I obtained it at Foxburg in Clarion County.²

Notropis keimi Fowler. Allegheny Minnow.

Only the types obtained in the Allegheny basin.³

Notropis hudsonius (Clinton). Spawn-eater.

Ohio basin in the Monongahela River and McKean County. Erie basin in Erie County.

Notropis hudsonius amarus (Girard). Eastern Spawn-eater.

Delaware basin in Bucks, Chester, Delaware, Lehigh, Montgomery, Philadelphia and Pike Counties.

Susquehanna basin in Center, Columbia, Dauphin, Lancaster, Lebanon, Snyder and York Counties.

Notropis whiplii (Girard). Silver-fin.

Ohio basin in the Kiskiminitas and Youghiogheny Rivers, and McKean County. Erie basin in Erie County.

Notropis whiplii analostanus (Girard). Eastern Silver-fin.

Delaware basin, Berks, Bucks, Carbon, Chester, Delaware, Lehigh, Montgomery, Philadelphia and Pike Counties.

Elk basin in Chester County.

Susquehanna basin in Berks, Blair, Columbia, Dauphin, Huntingdon, Lancaster, Lebanon, Mifflin, Perry, Snyder, Susquehanna, Wyoming and York Counties.

Notropis cornutus (Mitchill). Red-fin.

Delaware Basin in Berks, Carbon, Chester, Delaware, Lehigh, Monroe, Montgomery, Northampton, Philadelphia and Pike Counties.

Elk basin in Chester County.

Susquehanna basin in Bedford, Berks, Cameron, Chester, Columbia, Cumberland, Center, Dauphin, Lancaster, Lebanon, Luzerne, Lycoming, Perry, Sullivan, Snyder, Susquehanna, Wyoming and York Counties.

¹L. c.

²Science, XXXI, March 4, 1910, p. 338.

³Proc. Acad. Nat. Sci. Phila., 1908 (1909), p. 533, Pl. 27.

Genesee basin in Potter County.

Ohio basin in Clarion, Indiana, Lawrence, McKean and Warren Counties.

Erie basin in Erie County.

Notropis chalybæus (Cope). Iron-colored Minnow.

Originally described from the Schuylkill near Conshohocken¹ and I obtained it in the Delaware basin in Bucks, Montgomery and Northampton Counties.

Notropis jejunus (Jordan). Hungry Minnow.

Reported from the Monongahela by Evermann and Bollman.²

Notropis atherinoides Rafinesque. Emerald Minnow.

The Monongahela by Evermann and Bollman, and I have it from the Beaver River, Indiana and Erie Counties.

Notropis photogenis (Cope). Arrow Minnow.

Two of the types from the Youghiogheny River³ and an example from Indiana County examined.

Notropis photogenis amœnus (Abbott). Attractive Minnow.

Delaware basin in Bucks, Monroe, Montgomery and Philadelphia Counties.

Susquehanna basin in Center, Columbia, Dauphin, Lancaster, Lebanon, Perry, Snyder and York Counties.

Notropis dilectus rubrifrons (Cope). Red-faced Minnow.

The types⁴ and Indiana County examples.

Ericymba buccata Cope. Scalloped Minnow.

The types⁵ and Indiana County material examined. Both this and the preceding recorded from the Monongahela by Evermann and Bollman.

Rhinichthys cataractæ (Valenciennes). Long-nosed Dace.

Delaware basin in Bucks, Carbon, Chester, (Hosensack) Lehigh and Northampton Counties.

Susquehanna basin in Blair, Cameron, Center, Columbia, Cumberland, Dauphin, Lancaster, Lebanon, Luzerne, Perry and Snyder Counties.

Elk basin in Chester County.

Ohio basin in Fayette and Indiana Counties.

Rhinichthys atronasmus (Mitchill). Black-nosed Dace.

Delaware basin in Bucks, Carbon, Chester, Delaware, Lehigh, Monroe, Montgomery, Northampton, Philadelphia and Pike Counties.

Elk and North East basins in Chester County.

¹*Hybopsis chalybæus* Cope, Trans. Amer. Philos. Soc., (2), XIII, 1869, p. 383.

²Ann. N. Y. Acad. Sci., III, 1883-5 (1886), p. 338.

³*Squalius photogenis* Cope, Proc. Acad. Nat. Sci. Phila., 1864, p. 280.

⁴*Alburnus rubrifrons* Cope, l. c., 1865, p. 85.

⁵L. c., p. 88.

Susquehanna basin in Berks, Blair, Cameron, Columbia, Chester, Center, Cumberland, Dauphin, Huntingdon, Lackawanna, Lancaster, Lebanon, Luzerne, Mifflin, Perry, Potter, Snyder, Sullivan and York Counties.

Potomac basin in Fulton County.

Genesee basin in Potter County.

Ohio basin in Beaver, Fayette, Indiana, McKean, Potter, Somerset, Warren and Westmoreland Counties.

Rhinichthys bowersi Goldsborough and Clark,¹ from the Ohio basin of West Virginia appears only a local variety. A number of specimens from many of the above listed districts show even greater ranges of variation, with many details in extremes of other characters in combination. The fact of the lesser row of teeth, for instance, being absent or consisting only of a single tooth is a very variable condition.

Hybopsis dissimilis (Kirtland). Spotted Chub.

Cope's material from the Monongahela and Youghiogheny Rivers examined.

Hybopsis storerianus (Kirtland). Storer's Chub.

Evermann and Bollman report it from the Monongahela.²

Hybopsis kentuckiensis (Rafinesque). Horned Chub.

Elk basin in Chester County.

Susquehanna basin in Berks, Cameron, Center, Dauphin, Lancaster, Lebanon, Perry, Snyder, Susquehanna and York Counties.

Ohio basin in Beaver, Fayette, Indiana, Lawrence, McKean, Warren and Westmoreland Counties.

No definite record has been given for the Delaware, where it likely does not occur. Possibly *H. dissimilis* Ross is the present species.

Exoglossum maxillingua (Le Sueur). Cut-lips.

Delaware basin in Berks, Bucks, Chester, Delaware and Montgomery Counties.

Elk basin in Chester County.

Susquehanna basin in Berks, Blair, Cameron, Center, Columbia, Cumberland, Dauphin, Juniata, Lancaster, Lebanon, Luzerne, Snyder, Sullivan and York Counties.

Ohio basin in McKean County.

CATOSTOMIDÆ.

Cycleptus elongatus (Le Sueur). Black-horse.

Mentioned by Rafinesque in the Ohio as far as Pittsburgh,³ and Cope reports it from the Allegheny. An example obtained by Cope from the Kiskiminitas River is doubtless partly the basis of his record and the only one from our limits I examined.

¹Bull. Bur. Fisher., XXVII, 1907 (March 14, 1908), p. 36, fig.

²Ann. N. Y. Acad. Sci., III, 1883-5 (1886), p. 339.

³Ichth. Ohien., 1820, p. 60.

Ambiodon bubalus Rafinesque. Small-mouth Buffalo.

Reported by Rafinesque, who says it comes as far as Pittsburgh.¹ No other records have been given, though doubtless it may have been found in the Allegheny, at least until recently.

Carpiodes carpio Rafinesque. Carp Sucker.

Known from two of Cope's examples I reported² from the Beaver River.

Carpiodes thompsoni Agassiz. Lake Carp Sucker.

Found at Erie by the writer 1912-1914.

Carpiodes cyprinus (Le Sueur). Eastern Carp Sucker.

Found at several localities in the Susquehanna basin in Lancaster and York Counties. Not certainly known from the Delaware in our limits.

Carpiodes difformis Cope. Snub-nose Carp Sucker.

A small example obtained by Cope in the Youghiogheny River reported by the writer.³

Carpiodes cutisanserinus Cope. Rough-nose Carp Sucker.

Only known from the type taken in the Kiskiminitas River.⁴

Carpiodes velifer (Rafinesque). Quill-back.

Besides Rafinesque's original record from the Ohio River to Pittsburgh,⁵ Evermann and Bollman obtained it in the Monongahela and I have two examples obtained in the Youghiogheny by Cope.

Catostomus catostomus (Forster). Long-nose Sucker.

Jordan records it from the Youghiogheny River,⁶ though this material I have not seen.

Catostomus commersonnii (Lacépède). Common Sucker.

Delaware basin in Berks, Bucks, Carbon, Chester, Delaware, Lehigh, Monroe, Montgomery, Northampton, Philadelphia, Pike and Wayne Counties.

North East basin in Chester County.

Susquehanna basin in Bedford, Berks, Blair, Bradford, Cameron, Center, Chester, Clinton, Columbia, Cumberland, Dauphin, Fulton, Juniata, Lackawanna, Lancaster, Lebanon, Luzerne, Lycoming, Mifflin, Perry, Snyder; Susquehanna, Wyoming and York Counties.

Potomac basin in Franklin and Fulton Counties.

Genesee basin in Potter County.

Ohio basin in Armstrong, Beaver, Cambria, Clarion, Fayette, Forest,

¹L. c., p. 55.

²Proc. Acad. Nat. Sci. Phila., 1913, p. 46.

³Proc. Acad. Nat. Sci. Phila., 1913, p. 46.

⁴Proc. Amer. Philos. Soc., XI, 1870, p. 481.

⁵Ich. Ohien., 1820, p. 56.

⁶Bull. U. S. Nat. Mus., No. 12, 1878, p. 175.

Indiana, McKean, Somerset, Venango, Warren and Westmoreland Counties.

Erie basin in Erie County.

Catostomus nigricans Le Sueur. Black Sucker.

Delaware basin in Lehigh County, likely introduced?

Elk basin in Chester County.

Susquehanna basin in Berks, Blair, Cameron, Chester, Dauphin, Lancaster, Lebanon, Mifflin, Perry, Snyder and York Counties.

Ohio basin in Beaver, Clarion, Indiana, Lawrence, Warren and Westmoreland Counties.

Erimyzon sucetta oblongus (Mitchill). Chub Sucker.

Delaware basin in Berks, Bucks, Chester, Delaware, Lehigh, Montgomery, Northampton and Philadelphia Counties.

Susquehanna basin in Blair, Cameron, Center, Columbia, Cumberland, Dauphin, Lancaster, Mifflin, Sullivan and York Counties.

Erie basin in Erie County.

Moxostoma anisurum (Rafinesque). White-nose Red-horse.

The original account by Rafinesque¹ mentions it from the Ohio and large streams far as Pittsburgh. Cope later describes it from the Youghiogheny River,² and these types, together with Beaver River material, I have examined. McConnell has reported it from Jamestown in Mercer County.³

Moxostoma aureolum Le Sueur. Red-horse.

Ohio basin in Beaver, Indiana and Westmoreland Counties.

Erie basin in Erie County.

Moxostoma macrolepidotum (Le Sueur). Eastern Red-horse.

Delaware basin in Philadelphia County, where rare.

Susquehanna basin in Cumberland, Lancaster and York Counties.

Moxostoma breviceps (Cope). Long-tailed Red-horse.

The type from the Youghiogheny and Erie examples examined.

Moxostoma duquesnii (Le Sueur). Fine-scaled Red-horse.

Le Sueur originally had it from the Ohio at Pittsburgh.⁴ Cope obtained an example in the Youghiogheny and one in the Beaver River in 1880. These and a small example from Indiana County constitute my material.

Placopharynx carinatus Cope. Big-toothed Sucker.

Günther records it from the Youghiogheny⁵ and I have Cope's Beaver River material.

¹Ich. Ohien., 1820, p. 54.

²*Ptychostomus velatus* Cope, Proc. Amer. Philos. Soc., XI, 1870, p. 470.

³Rep. Com. Fisher. Pa., 1905 p. 178.

⁴*Catostomus duquesnii* Le Sueur, Journ. Acad. Nat. Sci. Phila., I, 1817, p. 105.

⁵As *C. duquesnii* (non Le Sueur) Günther, Cat. Fish. Brit. Mus., VII, 1868, p. 18.

ANGUILLIDÆ.

Anguilla rostrata (Le Sueur). Eel.

Delaware basin in Berks, Bucks, Carbon, Chester, Delaware, Lehigh, Monroe, Montgomery, Northampton, Philadelphia, Pike and Wayne Counties.

Susquehanna basin in Bedford, Berks, Blair, Bradford, Cameron, Clearfield, Clinton, Huntingdon, Lackawanna, Lancaster, Luzerne, Lycoming, Mifflin, Montour, Potter, Perry, Sullivan, Susquehanna, Wyoming and York Counties.

Potomac basin in Somerset County.

Ohio basin in Allegheny, Cambria, Clarion, Indiana, Potter, Somerset and Warren Counties.

Genesee basin in Potter County.

Erie basin in Erie County.

ESOCIDÆ.

Esox americanus (Gmelin). Banded Pickerel.

Delaware basin in Berks, Bucks, Carbon, Chester, Delaware, Lehigh, Monroe, Montgomery, Northampton, Philadelphia and Pike Counties.

Susquehanna basin in Berks, Blair, Chester, Columbia, Cumberland, Elk, Fulton, Huntingdon, Lancaster, Luzerne, Lycoming, Montour, Northumberland, Perry and York Counties.

Esox vermiculatus Valenciennes. Western Pickerel.

Ohio basin in Armstrong, Clarion, Crawford, Elk, Indiana, McKean, Mercer and Venango Counties.

Esox tridecemlineatus Mitchill. Chain Pickerel.

Delaware basin in Bucks, Carbon, Lehigh, Monroe, Philadelphia, Pike and Wayne Counties.

Susquehanna basin in Bradford, Center, Clearfield, Clinton, Cumberland, Lackawanna, Lebanon, Luzerne, Sullivan, Susquehanna, and Wyoming Counties. Introduced in Lake Erie.

Esox lucius Linnaeus. Pike.

Ohio basin in Clarion, Indiana, Mercer, McKean, Warren and Westmoreland Counties.

Erie basin in Erie County.

Esox masquinongy Mitchill. Muskallunge.

Ohio basin in Beaver, Clarion, Crawford and Warren Counties.

Erie basin in Erie County. Introduced in the Delaware basin of Wayne County.

UMBRIDÆ.

Umbra limi (Kirtland). Western Mud Minnow.

Known from my examples obtained at Meadville in Crawford County.¹

¹Proc. Acad. Nat. Sci. Phila., 1912, p. 47.

Umbra pygmæa (De Kay). Eastern Mud Minnow.

Delaware basin in Bucks, Delaware and Philadelphia Counties. Shufeldt recently describes *U. pygmæa bilineata* as a new form, from the tributaries of Chesapeake Bay, which I have discussed elsewhere.¹

POECILIIDÆ.

Fundulus heteroclitus macrolepidotus (Walbaum). Mummichog.
Delaware basin in Bucks, Delaware and Philadelphia Counties.

Fundulus diaphanus (Le Sueur). Barred Killifish.

Delaware basin in Bucks, Berks, Chester, Delaware, Lehigh, Montgomery, Northampton and Philadelphia Counties.

Susquehanna basin in Berks, Center, Columbia, Dauphin, Lancaster, Lebanon, Snyder and York Counties.

Fundulus diaphanus menona (Jordan and Copeland). Menona Killifish.

My examples from the Allegheny River near Warren and at Erie.

BELONIDÆ.

Strongylura marina (Walbaum) Green Gar.

Delaware basin in Bucks, Delaware and Philadelphia Counties.
Susquehanna basin in Lancaster and York Counties.

Strongylura acus (Lacépède). Houndfish.

A single example in the Academy obtained by E. D. Cope in the lower Susquehanna, within our limits, is an addition to the State's fauna. No exact locality is given. The specimen is 667 mm. long and still in good preservation. Comparison with Massachusetts and Italian material reveal all its characters in harmony. As the species enters our limits by way of Chesapeake Bay it may occur casually in any of the other large rivers tributary. I have, however, not certainly secured it in the Delaware.

ATHERINIDÆ.

Labidesthes sicculus (Cope). Brook Silversides.

My material from the Youghiogeny River and Erie.

PERCOPSIDÆ.

Percopsis omiscomaycus (Walbaum). Trout Perch.

I have this interesting fish from the Jordan Creek in Lehigh County, the only locality in the Delaware basin.² In the Ohio basin it is recorded from the Monongahela by Evermann and Bollman,³ and French Creek above Frenchtown, by McConnell.⁴

¹Copeia, No. 50, Oct. 26, 1917, pp. 94-96.

²Proc. Acad. Nat. Sci. Phila., 1917, p. 119.

³Ann. N. Y. Acad. Sci., III, 1883-5 (1886), p. 339.

⁴Rep. Com. Fisher. Pa., 1905, p. 178.

GASTEROSTEIDÆ.

Eucalia inconstans (Kirtland). Brook Stickleback.

I obtained it in the Allegheny at Foxburg.

Gasterosteus aculeatus Linnæus. Two-spined Stickleback.

I have no local material, though it has been recorded from the Delaware at Philadelphia by Dr. C. C. Abbott.¹ It must be rare or extremely local in our limits, as I never met with it away from the coastal region, or far from salt water. To the contrary the late Dr. Bean says "in Pennsylvania Mr. Seal has found this fish abundant in pools and ditches along the Delaware," a statement² which in every way agrees with my knowledge of *Apeltes quadracus*.

Apeltes quadracus (Mitchill). Three-spined Stickleback.

Delaware basin in Bucks, Delaware, Lehigh, Northampton and Philadelphia Counties. Jordan and Evermann state "male almost black; ventrals with the membrane red in spring," though of the countless spawning examples I have examined never a black male has been seen, and most all the males at every season of the year had red ventrals.

APHREDODERIDÆ.

Aphredoderus sayanus (Gilliams). Pirate Perch.

Delaware basin in Bucks, Delaware and Philadelphia Counties.

MICROPTERIDÆ.

Pomoxis annularis Rafinesque. Crappie.

Reported from the Monongahela and my material from the Kiskiminitas River. Likely introduced in the Delaware and Susquehanna basins, where frequently met with.

Pomoxis sparoides (Lacépède). Calico Bass.

Delaware basin in Bucks, Delaware, Monroe, Montgomery, Northampton, Philadelphia and Pike Counties.

Susquehanna basin in Lancaster and York Counties.

Ohio basin in Clarion County

Erie basin in Erie County.

Ambloplites rupestris (Rafinesque). Red-eyed Bass.

Ohio basin in Beaver, Clarion, Fayette, Indiana, Lawrence, McKean, Warren and Westmoreland Counties.

Genesee basin in Potter County.

Erie basin in Crawford and Erie Counties. Introduced in the Delaware and Susquehanna basins.

¹*Gasterosteus biaculeatus* Abbott, Geol. N. J., 1868, p. 814.

²Rep. Com. Fisher. Pa., 1889-91 (1892), p. 98.

³Bull. U. S. Nat. Mus., No. 47, T, 1896, p. 752.

Enneacanthus obesus (Girard). Sphagnum Sunfish.

Only taken in the Delaware basin at Philadelphia, though abundant outside our limits in the Coastal Plain.

Enneacanthus gloriosus (Holbrook). Blue-spotted Sunfish.

Delaware basin in Bucks, Delaware and Philadelphia Counties.

Susquehanna basin in Lancaster and Lebanon Counties.

Mesogonistius chaetodon (Baird). Banded Sunfish.

Delaware basin in Bucks and Philadelphia Counties.

Lepomis cyanellus Rafinesque. Green Sunfish.

No definite record ever given. I include it as the late Eugene Smith informed me he secured several examples from the Monongahela River at McKeesport, over twenty years ago

Lepomis auritus (Linnæus). Red-bellied Sunfish.

Delaware basin in Berks, Bucks, Chester, Delaware, Lehigh, Montgomery, Northampton, Philadelphia, Pike and Wayne Counties.

Elk basin in Chester County.

Susquehanna basin in Berks, Center, Dauphin, Lancaster, Lebanon, Snyder, Sullivan and York Counties.

Lepomis megalotis (Rafinesque). Long-eared Sunfish.

I have it from the Kiskiminitas River, where it was obtained by Cope.

Lepomis macrochirus Rafinesque. Chain-side Sunfish.

Type of *L. nephelus* Cope, from the Kiskiminitas River, examined.

Lepomis incisor Valenciennes. Blue Sunfish.

Besides Cope's type of *L. ardesiacus* from the Kiskiminitas I have it from the Delaware basin in Bucks, Lehigh, Pike and Philadelphia Counties.

Ohio basin in Warren County.

Erie basin in Erie County.

Pomotis gibbosus (Linnæus). Common Sunfish.

Delaware basin in Berks, Bucks, Carbon, Chester, Delaware, Lehigh, Monroe, Montgomery, Northampton, Philadelphia, Pike and Wayne Counties.

Susquehanna basin in Berks, Blair, Bradford, Cambria, Clinton, Center, Columbia, Dauphin, Franklin, Fulton, Huntingdon, Lackawanna, Lancaster, Lebanon, Luzerne, Mifflin, Montour, Northumberland, Perry, Sullivan, Susquehanna, Wyoming and York Counties.

Potomac basin in Fulton County.

Ohio basin in McKean and Indiana Counties.

Erie basin in Erie County.

Micropterus dolomieu Lacépède. Small-mouth Bass.

Ohio basin in Allegheny, Armstrong, Beaver, Butler, Cambria, Clarion,

Clearfield, Crawford, Erie, Fayette, Forest, Indiana, Lawrence, McKean, Mercer, Somerset, Venango and Warren Counties.

Erie basin in Crawford and Erie Counties. Introduced in Delaware, Susquehanna and Potomac basins.

Micropterus salmoides (Lacépède). Large-mouth Bass.

Ohio basin in Crawford, Indiana, McKean and Warren Counties.

Erie basin in Erie County. Introduced in Delaware and Potomac basins.

PERCIDÆ.

Stizostedion vitreum (Mitchill). Pike Perch.

Genesee basin in Potter County.

Ohio basin in Allegheny, Beaver, Butler, Cambria, Clarion, Crawford, Forest, Indiana, Lawrence, McKean, Warren and Westmoreland Counties.

Erie basin in Erie County. Introduced in the Delaware and Susquehanna basins.

Stizostedion canadense (Griffiths). Sauger.

Ohio basin in Indiana and Warren Counties, and Beaver and Youghiogheny Rivers.

Erie basin at Erie.

Perca flavescens (Mitchill). Yellow Perch.

Delaware basin in Bucks, Carbon, Delaware, Lehigh, Monroe, Montgomery, Pike, Philadelphia and Wayne Counties.

Susquehanna basin in Bradford, Lackawanna, Lancaster, Luzerne, Mifflin, Wyoming and York Counties.

Erie basin in Erie County. Introduced in Ohio basin of Crawford County.

Percina caprodes (Rafinesque). Log Perch.

Susquehanna basin in Lancaster County.

Ohio basin in Crawford County. Reported from the Allegheny and Monongahela and I have Cope's Kiskininitas and Youghiogheny River material.

Erie basin in Erie County.

Haldeman described it as *Perca nebulosa* from the Susquehanna.¹ At the same time he also described *Perca minima* from the same stream, though not the young as he suggests, but simply a tessellated darter. He also gave the manuscript name *Percina bimaculata* to Storer for still another example from the Susquehanna several years later,² this insuring the generic name for the log perches. The types of the first two nominal forms I have examined. Cope overlooks³ the occurrence of the log perch in the Susquehanna, as he only mentions it from Lake Erie and the Allegheny River.

¹Journ. Acad. Nat. Sci. Phila., 1842, p. 330.

²Proc. Boston Soc. Nat. Hist., 1844, p. 157.

³Rep. Com. Fisher. Pa., 1879-80 (1881), p. 124.

Hadropterus phoxocephalus (Nelson). Slender-headed Darter.

Reported from the Monongahela by Evermann and Bollman.¹

Hadropterus macrocephalus (Cope). Long-headed Darter.

Cope's types of *Etheostoma macrocephalum* from the Youghiogheny examined. The late Dr. Bean reports it from French Creek² and Foxburg.³

Hadropterus peltatus (Cope). Shielded Darter.

Delaware basin in Montgomery County.

Susquehanna basin in Berks, Dauphin, Lancaster and Snyder Counties.

Hadropterus aspro (Jordan). Black-sided Darter.

A number of examples from Indiana County, some I wrongly identified with *H. macrocephalus*.⁴

Etheostoma blennioides Rafinesque. Green-sided Darter.

Reported from the Kiskiminitas and Monongahela Rivers, and my material from the Beaver River.

Boleosoma nigrum (Rafinesque). Johnny Darter.

Ohio basin in Clarion, Indiana and McKean Counties.

Boleosoma nigrum olmstedii (Storer). Tessellated Darter.

Delaware basin in Berks, Carbon, Chester, Delaware, Lehigh, Monroe, Montgomery, Northampton, Philadelphia and Pike Counties.

Susquehanna basin in Berks, Blair, Cameron, Chester, Cumberland, Huntingdon, Columbia, Dauphin, Lancaster, Luzerne, Mifflin, Perry, Snyder, Sullivan and York Counties.

Elk basin in Chester County.

Ammoerypta pellucida (Putnam). Sand Darter.

Reported from the Youghiogheny and the Monongahela. I have it from Erie.

Pœcilichthys variatus (Kirtland). Variegated Darter.

Described as *Hadropterus tessellatus* by Jordan from the Allegheny at Foxburg.⁵ Evermann and Bollman report it from the Monongahela,⁶ and McConnell mentions it from French Creek above Franklin.⁷ The specimen mentioned by Jordan and Evermann from Easton is likely with wrong locality.⁸

¹Ann. N. Y. Acad. Sci., III, 1883-5 (1886), p. 339.

²Rep. Com. Fisher. Pa., 1889-91 (1892), p. 122.

³Bull. U. S. Nat. Mus., No. 27, 1884, p. 466.

⁴Science, XXXI, March 4, 1910, p. 346; Proc. Acad. Nat. Sci. Phila., 1912, p. 49.

⁵Bull. U. S. Nat. Mus., No. 10, 1877, p. 7.

⁶Ann. N. Y. Acad. Sci., III, 1883-5 (1886), p. 339.

⁷Rep. Com. Fisher. Pa., 1905, p. 178.

⁸Bull. U. S. Nat. Mus., No. 47, 1, 1896, p. 1069.

Pœcilichthys zonalis Cope. Zoned Darter.

Recorded from the Monongahela by Evermann and Bollman.¹

Pœcilichthys maculatus (Kirtland). Trout Darter.

McConnell records it from the Shemango River at Jamestown.²

Pœcilichthys œeruleus (Storer). Blue Darter.

Recorded from the Monongahela by Evermann and Bollman, and I have it from the Kiskiminitas.

Pœcilichthys flabellaris (Rafinesque). Fantail Darter.

Ohio basin in Allegheny, Indiana, McKean and Westmoreland Counties. Susquehanna basin in Perry County.

Boleichthys fusiformis (Girard). Lowland Darter.

Only met with in the Delaware tidal region near Bristol, Bucks County.

SERRANIDÆ.

Roccus chrysops (Rafinesque). White Bass.

Genesee basin in Potter County and Erie basin at Erie. Ohio basin in Clarion, Indiana, Mercer and Warren Counties. Introduced in the Delaware basin.

Roccus lineatus (Bloch). Striped Bass.

Delaware basin in Bucks, Chester, Delaware, Montgomery, Philadelphia and Pike Counties.

Susquehanna basin in Dauphin, Lancaster, Luzerne and York Counties.

Morone americana (Gmelin). White Perch.

Delaware basin in Bucks, Carbon, Delaware, Montgomery, Northampton and Philadelphia Counties.

Susquehanna basin in Lancaster and York Counties.

SCIÆNIDÆ.

Aplodinotus grunniens Rafinesque. Fresh-water Drum.

Ohio basin in the Allegheny and Monongahela, and Indiana County.

Erie basin in Erie County.

COTTIDÆ.

Cottus ictalops (Rafinesque). Western Sculpin.

Genesee basin in Potter County.

Ohio basin in Allegheny, Clarion, Crawford, Indiana, McKean, Somerset and Westmoreland Counties.

Cottus gracilis Heckel. Sculpin.

Delaware basin in Berks, Bucks, Carbon, Chester, Lehigh, Montgomery and Northampton Counties.

¹Ann. Acad. Nat. Sci., III, 1883-5 (1886), p. 339.

²Rep. Com. Fisher. Pa., 1905, p. 178.

Elk basin in Chester County.

Susquehanna basin in Berks, Center, Columbia, Cumberland, Dauphin, Lancaster, Luzerne, Huntingdon, Perry and Snyder Counties.

SOLEIDÆ.

Achirus fasciatus Lacépède. American Sole.

Delaware basin in Bucks and Philadelphia Counties.

GADIDÆ.

Lota maculosa (Le Sueur). Burbot.

Found at Erie. Introduced in the Susquehanna and Delaware.

Besides the species already indicated as introduced are several others and several which may be considered accidental. Such are:

Carcharias taurus Rafinesque. Sand Shark.

Once recorded in the region of the Delaware opposite Philadelphia.

Eulamia milberti Muller and Henle. Brown Shark.

Once found in the Delaware opposite lower Philadelphia.

Raja ocellata Mitchill. Big Spotted Skate.

Once in the Delaware opposite upper Philadelphia.

Oncorhynchus tshawytscha (Walbaum). Quinnet Salmon.

Introduced in the Delaware and Susquehanna.

Salmo salar Linnæus. Salmon.

Introduced in the Delaware.

Salmo salar sebago (Girard). Landlocked Salmon.

Introduced in Luzerne, Monroe, Pike and Wayne Counties.

Salmo fario Linnæus. Brown Trout.

Introduced in Blair, Huntingdon, Luzerne, Monroe, Philadelphia, Pike and Wayne Counties.

Salmo clarkii Richardson. Columbia River Trout.

Introduced in Center and Susquehanna Counties.

Salmo irideus Gibbons. Rainbow Trout.

Introduced in Center, Clearfield, Cumberland, Fayette, Franklin, Montgomery, Pike, Wayne and Wyoming Counties.

Thymallus tricolor Cope. Michigan Grayling.

Introduced.

Cyprinus carpio Linnæus. Carp.

Introduced. Delaware basin in Berks, Bucks, Carbon, Chester, Lehigh, Montgomery, Northampton and Philadelphia Counties.

Susquehanna basin in Adams, Blair, Bradford, Center, Clearfield, Columbia, Huntingdon, Cumberland, Lackawanna, Lancaster, Lebanon, Lycoming, Luzerne, Mifflin, Perry, Snyder, Susquehanna, Union and York Counties.

Ohio basin in Allegheny, Armstrong, Butler, Crawford, Greene, Indiana, Jefferson, Lawrence, Mercer, Somerset, Venango, Washington, Warren and Westmoreland Counties.

Erie basin in Erie County.

Carassius auratus (Linnæus). Goldfish.

Introduced. Delaware basin in Bucks, Lehigh and Philadelphia Counties.

Scardinius erythrophthalmus (Linnæus).

Introduced about Philadelphia.

Pomatomus saltatrix (Linnæus). Blue Fish.

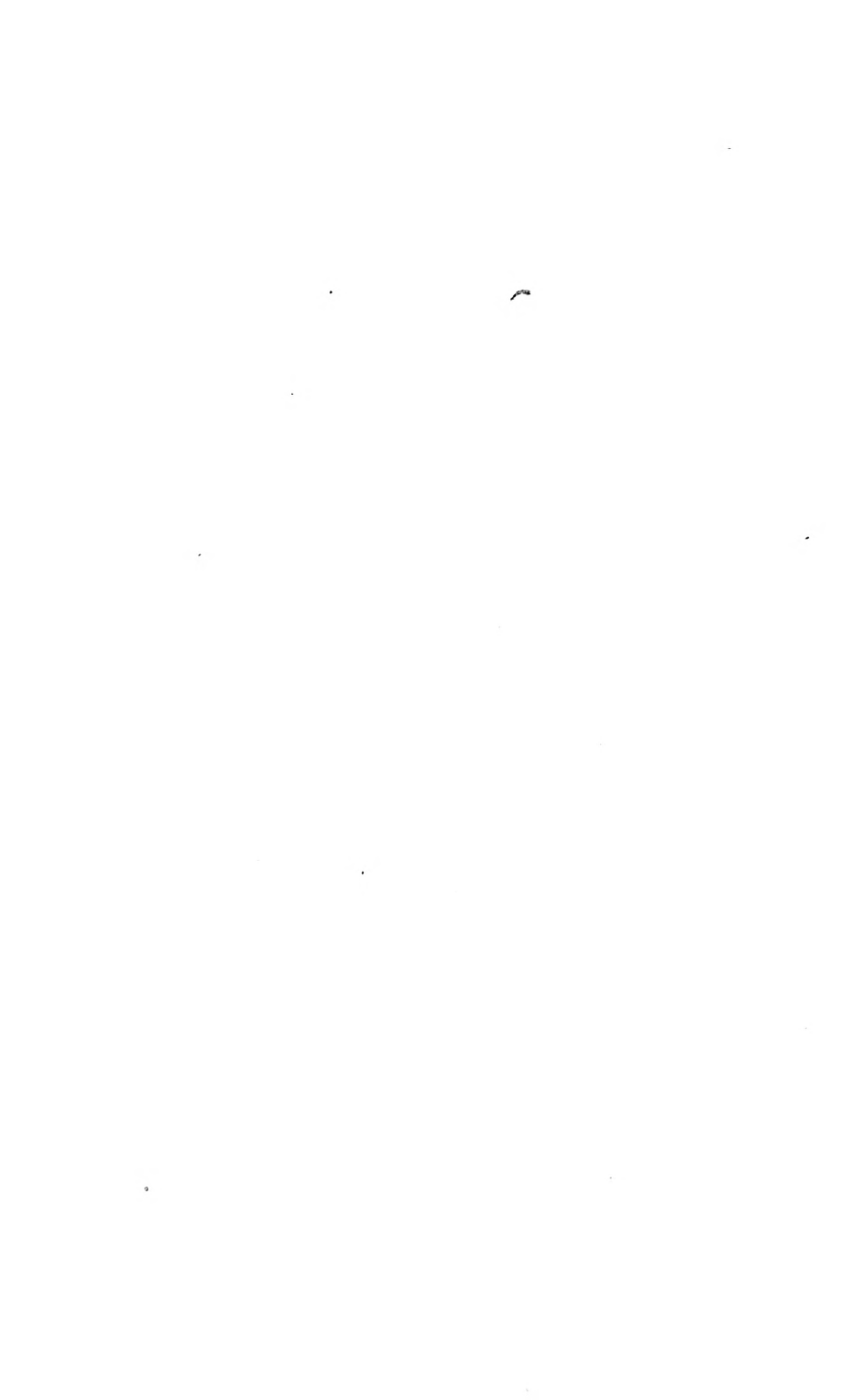
Accidental in the Delaware at Philadelphia.

Chænobryttus gulosus (Cuvier). Warmouth.

Introduced in the Delaware and Susquehanna.

Morone interrupta Gill. Yellow Bass.

Introduced in the Delaware.





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