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Professor Edward Drinker Cope's Travels Through North Carolina, August–December 1869: Insights from the Transcriptions and Annotations of Letters to His Father and His Contributions to North Carolina Ichthyology

Bryn H. Tracy
Retired, fieryblackshiner@gmail.com

Robert E. Jenkins
Roanoke College, Roanoke, VA, jenkins@roanoke.edu

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Professor Edward Drinker Cope's Travels Through North Carolina, August–December 1869: Insights from the Transcriptions and Annotations of Letters to His Father and His Contributions to North Carolina Ichthyology

Abstract

Since 1870, ichthyologists have pondered Edward Drinker Cope's two publications: "*On some Etheostomine Perch from Tennessee and North Carolina"* and *"A Partial Synopsis of the Fishes of the Fresh Waters of North Carolina*", along with correspondences to his father while traveling in North Carolina. We transcribed and annotated four of his letters searching for further knowledge regarding his field notebook(s) and original data (meristics, morphometrics, life coloration, etc.) from his travels across NC during Summer and Fall of 1869. However, unresolved questions remained - many related to unaccounted for periods of time. We did not achieve insights into who helped him with his collections. The loss of some of his larger specimens or their unavailability to be re-examined by Cope at a later date, lead us to question if Cope hastily wrote some of the descriptions in the field, or wrote them from memory afterwards in his lodging, or did he write them in a field notebook? We did not discover the existence or whereabouts of field notes or field book. We surmised he did record field notes and original data, because he could not have remembered meristic counts and which data went with which species after encountering a myriad of specimens in the field. We marveled how Cope was able to successfully achieve the rapidity in naming, writing, and publishing shortly after his trip. We concluded Cope must have been extremely impatient and perhaps consumed by his more important paleontological interests when writing two fish manuscripts in a short period of time.

Cope's two publications resulting from this trip laid a foundation for all ensuing studies of NC's freshwater fish fauna the past 151 years. Of the 242 described species of freshwater fish in NC 45 were described by him between 1865-1871. He described 25 species from his NC trip of which 15 species are presently considered valid; the other species having since been synonymized. Cope recounted collecting 91 described and undescribed species from NC during his trip, excluding four genera, *Acipenser, Carpiodes, Ictiobus, and Sander* (*Stizostedion*), whose specimens were lost, unavailable, or unseen. We accounted for all of the species and specimens he had collected during this trip. Lots, totaling 138, representing 63 species and 943 specimens were subsequently curated at Academy of Natural Sciences of Drexel University, the National Museum of Natural History, and the University of Michigan Museum of Zoology. No additional lots were found at other museums. Various type specimens are represented in 49 lots, with the remaining 89 lots representing non-type specimens.

Keywords

Edward Drinker Cope, North Carolina, Historical Ichthyology

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Cover Page Footnote

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INTRODUCTION[1]

In August 1869 Edward Drinker Cope, 1840–1897, departed Haddonfield, NJ shortly after returning from the annual meeting of the American Association for the Advancement of Science where he presented two papers on larval characters of salamanders and extinct whales (AAAS 1869). He arrived with his wife Annie and his daughter Julia at Warm Springs, North Carolina near the end of August and for the next three and one-half months proceeded to collect and report on almost 100 species of freshwater fishes that he encountered in the state. Cope was the first ichthyologist to widely collect, scientifically describe, and name North Carolina's freshwater fish fauna. Cope began sharing his results with the scientific community less than one month after his return to Haddonfield and subsequently had his two influential papers ready for publication by June 1870 (Cope 1870a, 1870b). More than 100 years ago, ichthyologist Hugh M. Smith proclaimed regarding Cope (1870b): "*This is the most important contribution to the literature of the fresh-water fishes of North Carolina. It is based chiefly on collections made by Cope in 1869 . . . and contains description of many new species*" (Smith 1907). That proclamation of its importance continues to ring true today.

For the past 150 years, ichthyologists have continued to ponder over Cope's publications: "*On some Etheostomine Perch from Tennessee and North Carolina"* and *"A Partial Synopsis of the Fishes of the Fresh Waters of North Carolina*" and his correspondences to his father while traveling in North Carolina. REJ's interest in Cope began in the mid-1960s while conducting doctoral research on the systematics of the catostomid fish tribe Moxostomatini (Jenkins 1970) and more recently when writing on the history of fish investigations in Virginia (Jenkins and Burkhead 1994). BHT's interest began less than two decades ago when he became interested in the type localities of fish species described from North Carolina (Tracy 2010) and in the indigenous fish species and historical fish surveys of the Pee Dee River drainage in North Carolina (Tracy et al. 2013). We summarize our collective knowledge of Cope's travels across North Carolina and the new species he identified during this time. Even though his trip also encompassed eastern Tennessee in the vicinity of Knoxville, we focused primarily on his travels and collections in North Carolina. To better understand who Cope was during these travels and expand on his work during these travels that contributed to seminal publications on North Carolina fishes, we asked ourselves why he might have gone on this trip in the first place. In late 1869, four years after the conclusion of the Civil War: "*The main features of recent vertebrate life in the eastern states were by that time well known. Only the fishes of the Appalachian streams offered much in the way of novelty and Cope was already well on the way to making the majority of them known*" (Myers 1936). Two years prior he had visited southwestern Virginia where he surveyed streams in the upper New, James, and Roanoke drainages and in the Middle Fork Holston River and North Fork Holston River systems and reported on 72 species or subspecies (Cope 1868a; Jenkins and Burkhead 1994). In 1869, he turned his sights to the fauna of North Carolina which had not been surveyed and for: "*The opportunity of seeing fishes in life, it is believed, is no small aid to their proper specific determination*" (Cope 1870b). Another possible reason for making this trip was his interest in

[1] The authors would like to stress, in no uncertain terms, that this publication focuses on a very narrow window of Edward D. Cope's life during 1869 when he was a young man. By no means should the reader interpret the authors or this publication as supporting Cope's societal and racial beliefs he held later in life. These aspects of his life have come to light most recently by Smith (2021) and Parker (2021). Cope may have fostered those beliefs when visiting North Carolina, but the authors are unaware of those beliefs in the material we have read or presented herein.

obtaining fossils from eastern Tennessee and from eastern North Carolina. While traveling in Virginia he visited resorts with therapeutic springs. Dogged by intermittent health problems his entire life, he might have made Warm [Hot] Springs and the Warm Springs Hotel his first destination in North Carolina because it was a resort well-known for its therapeutic and curative waters. Just as important as the other reasons for venturing to North Carolina, Cope might have been escaping the professional embarrassment and controversy regarding his misplacement of the cranium of *Elasmosaurus platyurus,* a plesiosaur, on the wrong end of its body (Cope 1869; Davidson 2002).

Why Are the Letters Important?

Regardless of his reasons, Cope spent the remainder of the summer and fall of 1869 traveling from one end of the state to the other, from the mountains to the coast. Throughout his life, Cope wrote meticulous letters to his father as he traveled. Osborn (1931, p437) believed that Cope wrote letters because they contained: "*an insight into the finest qualities of his character and his desire, unchanged from his boyhood days, to share all the delights of his experience and discoveries with his loved ones at home*." Fortuitous for us, those letters were archived upon Cope's death at the American Museum of Natural History. We believe that the letters he wrote during his travels to North Carolina are important because his field notebook(s) and original data (meristics, morphometric, life coloration, etc.) from this time period cannot be found. Thus, it was our hope that these letters would provide insights into Cope's work and life during his travels to North Carolina.

METHODS

As others have done before us since 1870, we critically reviewed and summarized both of Cope's influential publications (Cope 1870a; 1870b) and any specimens he may have vouchered from his 1869 trip to North Carolina. We knew that Cope's fish collection was willed, upon his death, to the Academy of Natural Sciences of Drexel University (ANSP). But we also wanted to determine if any other specimens that Cope collected from North Carolina might have been donated to other nationally- and internationally-recognized museums during the late 1800s. To accomplish this task, we accessed the FishNet2 Portal (www.fishnet2.net, 2015) and the FishBase Portal (http://fishbase.mnhn.fr/search.php, 2015) to query collections of the Muséum National d'Histoire Naturelle–Paris, National Museum of Natural History, Harvard Museum of Comparative Zoology, University of Michigan Museum of Zoology, California Academy of Sciences, Cornell University Museum of Vertebrates, Field Museum of Chicago, and the Yale Peabody Museum of Ichthyology. Through direct contact with museum staff, ichthyological collections were queried for us at the Academy of Natural Sciences of Drexel University, American Museum of Natural History, Museum für Naturkunde-Germany, and the Natural History Museum-England. All scientific and common names follow the California Academy of Sciences' Catalog of Fishes Online Database (www.calacademy.org/scientists/projects/catalog-of-fishes; Fricke et al. 2020) and Page et al. (2013). For currently undescribed species, vernacular names are used strictly for convenience and may or may not be the accepted common name once the species is scientifically described.

We obtained digital copies of four letters Cope wrote to his father: three written during late summer and fall 1869 and an additional letter written in February 1870 (Figure 1 and Letters Nos. 1–4). These letters, archived at American Museum of Natural History, Library Special Collections; https://www.amnh.org/research/research-library; Call Number MSS.C67, Cope Letters Nos 104–106, were sent to us by Gregory August Raml on October 30, 2008. Portions of his letters had been previously transcribed by Frazer (1900), Osborn (1931), and by unknown staff at the Academy of Natural Sciences of Drexel University (ANSP). The letters had never been annotated and by re-reading the letters, we were able to fill in some of the gaps regarding his travels across North Carolina.

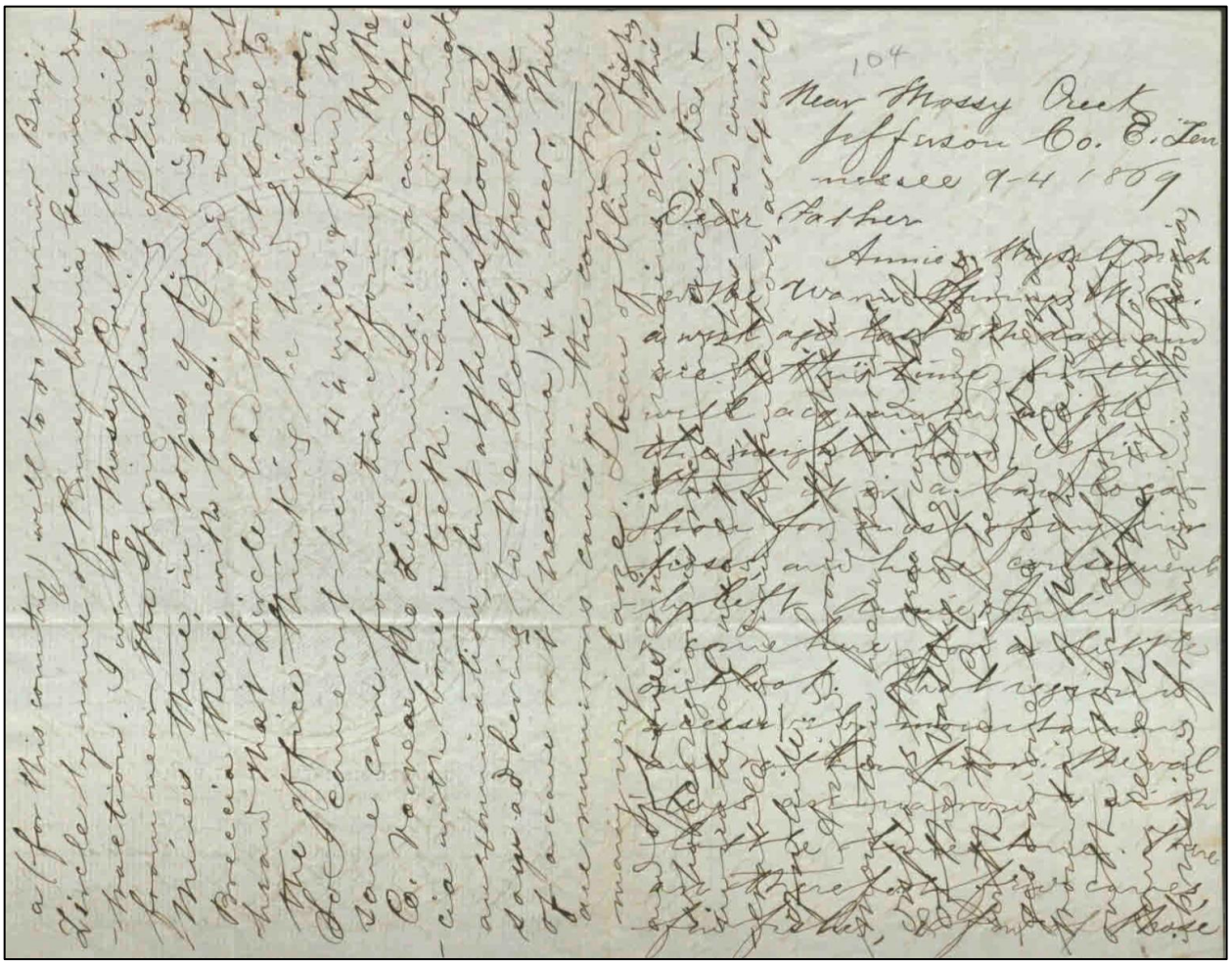

Figure 1. Letter from Edward D. Cope to his father, dated September 04, 1869. Letter courtesy of the American Museum of Natural History.

In our transcriptions and annotations, no corrections were made to Cope's original capitalization, abbreviation, punctuation, or paragraph indentations. Our annotations are enclosed in brackets [ ] and lines are inserted to separate paragraphs. As others before us had discovered, Cope's penmanship was challenging to read and decipher. The first letter he wrote went from left to right, then later on in the letter, perhaps to save paper, Cope then rotated the sheets of paper clockwise 90 degrees and continued writing across the page from left to right (Figure 1). In several

instances, to denote a new paragraph, rather than indenting to the next line, Cope would just resume writing several spaces past the last sentence. We did not find any correspondence between Cope and his father between October 14 and December 11, 1869 (Letters No. 2 and 3, respectively) and his last known letter from North Carolina to his father, dated December 11, 1869 (Letter No. 3), does not mention any details regarding the additional collection of fishes during this two-month period.

Letters Nos. 1-4. Transcribed and annotated letters from Edward D. Cope to his Father.

Letter No. 1
Near Mossy Creek [now known as Jefferson City], Jefferson Co. [County] E. [East] Tennessee, 9-4-1869 [September 4, 1869; written mistakenly in Osborn (1931, p152) as September 9, 1869, and with the last two paragraphs transcribed in a different order.]

Dear Father

Annie & myself reached the Warm Springs [The Town of Warm Springs was changed to the Town of Hot Springs apparently because a "hotter" spring was found. Jordan (1889, p150) mentioned the name change; also, Warm Springs Creek is now known as Spring Creek], N. Ca. [North Carolina] a week ago last 5th. day [Thursday, August 29, 1869] and are by this time pretty well acquainted with the neighborhood. I find that it is a bad location for most of my purposes, and have consequently left Annie and Julia there & come here for a little outlook. That region is excessively mountainous and rather poor; the valleys are narrow & with little limestone. There are therefore few caves, few fishes, & few of those products generally which make a country interesting and generally result from a rich soil. Since coming here yesterday [September 3, 1869] I have found more of interest than during my whole stay at the Warm [Hot]) Springs.

There is much of Botanical interest in the mountains at the Warm [Hot] Springs. There is plenty of Magnolia auriculata [*Magnolia fraseri*, Fraser Magnolia] & Halesia tetrafolia [*Halesia tetraptera* a synonym of *H. carolina*, Carolina Silverbell], Ulmus alata [*Ulmus alata*, Winged Elm], & the Mustang Grape [*Vitis mustangensis*, but this species does not grow in North Carolina; most likely another species of *Vitis*] which I never saw before. Elephantopsis [*Elephantopus carolinianus*, Elephant's Foot] is a queer composite reminding one of a Ruellia [*Ruellia*, Wild Petunia]. The woods abound with the beautiful deep green Andromeda racemosa [*Leucothoe racemosa*, Dog Hobble], which forms beautiful thickets with Rhododendron & Kalmia [*Kalmia latifolia*, Mountain Laurel], with A. arborea [*Rhododendron arborescens*, Sweet Azalea], & *Clethra* [*Clethra*, Pepper Bush] 12 feet high, in the richer parts. The grounds near the spring abound in false strawberry, Waldsteinia fragarioides [*Waldsteinia fragarioides*, Barren Strawberry]. A small Ranunculasceous shrub Xanthorhiza apifolia [*Xanthorrhiza apiifolia*, Yellow Root] & the fern Pheilanthes vestita [*Cheilanthes lanosa*, Hairy Lip Fern], abound. The Springs have a temperature of 104F & sometimes higher, & are used as a bath. They are said to be useful in cutaneous diseases & we have a chance to try is virtue on Julia, who has a bad scabby face-apparently from impure blood. Little scratches received on the cars [railroad cars], festered & since, little pimples appear & discharge & do not heal, but leave scabs. It is very disagreeable & we hope that mountain air will benefit it.

I am writing at the house of a (for this country) well to do farmer Benj. Zircle [Lircle?] by name of Pennsylvania German extraction. I went to Mossy Creek [approximately 65 air kilometers northwest of Hot Springs] by rail from near the Springs hearing of zinc mines there, in hopes of finding some Breccia there, with bones. I did not but heard that Zircle had brought some to the office thinking he had zinc ore. So I came out here 4½ [?] miles, & find the same cave formation I found in Wythe Co.[County] Va.[Virginia] near the zinc mines; i.e., a cave breccia with bones & teeth. Tomorrow I make an examination, but at the first look, I saw adhering to the blocks, the teeth of a cave rat (Neotoma) [*Neotoma*, wood rat] & a deer. There are numerous caves in the country, many very large. I hear of blind fish and of bones & Indian [First Nations] remains etc. This whole region is rich in curiosities & in natural wealth, and has had considerable Indian [First Nations] population, as it will of white.

A view from the Rich Mountain [approximately 4.3 air kilometers northeast of Hot Springs] near the Springs, displays the great width of the Valley of E. [East] Tennessee, with the Cumberland ranges on one side and the great mountains of North Carolina on the other as far as eye can reach. The eye extends its visions from Virginia to Georgia, to Kentucky & far into N. Ca. [North Carolina]. The scenery is more picturesque than in Virginia as the ranges are not so regular. I hope to write more fully again. We are very well and hope to have letters from Fairfield soon. Please give love to Mother [undecipherable] Thy affectionate son,

Edw. D. Cope

Letter No. 2

Pleasant Garden McDowell Co. [County] N. [North] Ca. [Carolina]
10/14/69 [October 14, 1869]

Dear Father

Since my last [letter] I have been so continually on the go that I have done very little corresponding. I am now put (?) in quod [*per quod*?, a Latin phrase meaning whereby] by a rainy day in an out of the way place, and proceed to pay some of my debts.

We are at a very pleasant boarding house near the junction of the Catawba River & Buck Creek [McDowell County, the Carson House (Figure 5) was built *circa* 1793 and besides being a hub of local politics and society, the house served as a popular roadside inn and tavern for nearly a century (https://mcdowellhistory.com/the-carson-house/). The house is approximately 45 kilometers east-northeast of Asheville.]. The Eastern spurs of the Blue Ridge run out into near view, while to the N.E. the high Linville Range with the Table Mountain, bounds a not very distant horizon. The valley of the Catawba is not very wide here, but is productive of good timber and of corn; the river itself is here about as large as the Brandywine [Brandywine Creek in southeastern Pennsylvania].

Since my last [letter], I left the friendly roof of J. Zircle in Jefferson Co. [County] Tenn. [Tennessee] & made a trip to the bank of the Holston [transcribed as Ralston in Osborn (1931, p152)] [River] in Grainger [transcribed as Granger in Osborn (1931, p152] Co. [County] to examine a large cave [Indian Cave, 10.7 air kilometers northwest of Jefferson City (Mossy Creek)]

in the limestone. I followed it two miles and was cut off by a considerable creek, which prevented progress. The gallery was as large at this point as near the mouth and it was nowhere so small as to require one to stoop. A little clearing would allow the passage of a two horse team to the end. Just within the mouth the stream is dammed & a race issues which turns a grist mill beyond. I found some nice cave insects & centipedes here.

I attended Friends [Religious Society of Friends, also known as Quakers] mtg.[meeting] near here, in a small log hs. [house] with slabs for seats. There were a good many present, some in shirt sleeves, others in every variety of costumes. A woman friend, Stevens by name, preached a most excellent sermon & appeared in supplication.

From this point I went to Knoxville & crossed the Cumberland Mtn. [Mountain], & Waldens Ridge from Coal Creek [a town, renamed Lake City in 1936 and in 2014 renamed Rocky Top (https://en.wikipedia.org/wiki/Rocky_Top,_Tennessee)] in Anderson Co. [County], which is at the end of a new R.R. [railroad] from Knoxville, 40 miles distant from the latter. At Coal Creek, I examined the coal mines & formed some idea of the immense resources of Tennessee in this respect. The strata of the Cumberland Mtn. [Mountain] are horizontal; & of the coal measures [a lithostratigraphical term], and are productive of coal over a great extent of country. Northern people chiefly Ohioans are working the mines.

I crossed the highest ridge of the Mtn. on a mule, with a bag of chaff for a saddle, a journey of 15 miles to the headwaters of the [Big] So. [South] Fork of the Cumberland R. [River] [near New River in Scott County, TN]. I put (?) up in a valley, in one of the most beautiful places I have seen, fit for seat of Eutopia [Utopia]. The locality is retired enough, as there are two ranges of the Cumberland to the westward. Gordonia [Loblolly Bay, but this tree is a Coastal Plain species and not found in the Cumberland Mountains area; Cope may have been referring to *Stewartia ovata*, Mountain Camellia], Andromeda [*Leucothoe*, Dog Hobble, Fetterbush], Kalmia [*Kalmia latifolia*, Mountain Laurel], Rhododendron, pawpaws [*Asimina triloba*], Magnolias, Halesias [*Halesia*, Silverbell] etc. etc. grew to their finest proportions. The trees were immense for the forest, how much of it, never heard the axe. Panthers [*Puma concolor*, Cougar], the shyest of the wild beasts, were not uncommon, while the copperhead [*Agkistrodon contortrix*, Copperhead] & mountain moccasin [*Agkistrodon piscivorous*, Water Moccasin] snakes were more common even than rattlesnakes [*Crotalus*]. The people know little of the world and were hospitable and very curious to see strangers. The mischiefs of the war [the Civil War] had entered even here, for as elsewhere, as soon as civil society was disorganized, the bad showed their hand & became robbers of their neighbors, on political pretexts, but when they had opportunity robbed either side alike. This was the case all over the South. I attended a Baptist mtg. first day [Sunday], and saw a very singular style of worship. It was in the evening and for a time was in the dark. Nearly every woman had a baby. The preaching was of the style that might be called ranting almost, & the prayer likewise. There were no forms, but the hymns. On leaving I left a considerable number of Friends tracts [a religious pamphlet, often just a few small pages].

I returned direct to the Warm [Hot] Springs [approximately 165 kilometers southeast from New River, TN] where I found all well. We remained there a week and then hired conveyance to take us to Lane boarding ho.[house] 6 miles N. [North] of Hendersonville, Henderson Co. [County] N. [North] Ca [Carolina]. We took two days to it stopping all night at Alexander's 10 miles N.W.

[Northwest] of Asheville [Alexander is small community in Buncombe County on the west side of the French Broad River, across from what was the Buncombe Turnpike which followed the river from the North Carolina-Tennessee state line through to Hendersonville; the community is just downstream from Reems Creek]. Here I procured a fine lot of river fishes & expressed [shipped or conveyed] them N.[North]. One of these was an 8 lb. "Jack" which I believe a new sp. [species] & possibly genus, near Leucioperca (pike-perch) ["Jack" was likely Muskellunge, *Esox masquinongy*, or Walleye, *Sander vitreus;* see Cope (1870b) and Jordan (1889) who also quoted a local farmer calling a Muskellunge a "Jack"]. It reaches 20 [mistakenly transcribed in Osborn (1931, p510 as 40] lbs. wt. [weight] & is the most savage fish as well as most active & vigorous of the fresh water fishes I know. The black & green perches [Largemouth Bass, *Micropterus salmoides* and Smallmouth Bass, *Micropterus dolomieu*, respectively], the next most active species, can scarcely be taken in a net, but I took two from the stomach of my Leucioperca one of 2 lb. & they are taken out, of 3-5 lbs. I discovered 30 sp.[species] fishes in the French Broad riv.[river] & its tributaries, of which the "Jack" is the largest.

Henderson and Buncombe Cos.[Counties] are part of that high table land wh.[which] supports the highest of the Alleghanies, and from which the traveler makes a long descent into S.[South] Carolina, E.[East] N.[North] Carolina, & E.[East] Tennessee. Henderson Co.[County] consists of a valley between two ranges, and is crossed by [undecipherable and faded writing] some cross ridges of great height. Not far east of the Warm [Hot] Springs the Potsdam sandstone region gives place to the mica slates & granites of Quebec age, the same that underlie Germantown [Pennsylvania] & Philada [Philadelphia]. The vegetation alters somewhat & the animals present some differences. I found in Henderson a long erect tubular Sarracenia [*Sarracenia*, Pitcher Plant, found in mountain bogs] which was always full of many kinds of insects, also rare Salamanders etc. The proprietress was wife of an active rebel officer & had six sons, all in the army [the Confederate Army]. Of one I afterward heard dreadful accounts of his cruelty & barbarity. The place is on the main road [Buncombe Turnpike] from Northern So. [South] Carolina to E. [East] Tennessee, & numerous migrating parties passed it, many of them of the most dilapidated appearance. Others were coming for loads of apples, potatoes (i[I]rish) etc. which this region produces in a high degree of perfection & in great abundances this year.

From a low mountain close by we saw a grand view of the western mountain ranges to Georgia & south Tennessee. The Pisgah range towers to a conic summit at one point to the right is the high Newfound [Newfound Mountain, west of the City of Asheville, Buncombe County] range; behind these the Cold range; still higher & in the rear the Balsam Mts. [Mountains] tower over all. The Saluda range is on the borders of S. [South] Ca. [Carolina] and is lower, while a confusion of mtns.[mountains] are in the highlands of Georgia.

We returned to Asheville [after staying in Hendersonville] where Annie and Julia staid [stayed] a week, while I was gone to the Black Mtns [Mountains]. [The Black Mountains are approximately 32 km northeast of Asheville.] This range contains that series of peaks known as the highest of the Alleghenies. I took thick clothing, gum blanket [During the Civil War, this referred to the gum rubber blanket and its derivative the poncho], etc. & rode on a mule along the French Broad Riv [River], to the Swannanoa R. [River] then up this beautiful stream [the mainstem Swannanoa River] 12 mi. to the N.[North] Fork [North Fork Swannanoa River], which rises in the Black range, & flows between two high chains – the Craggy on the W. [West] & the Blue Ridge

on the E [East]. Both of these rise to points, higher than Mt. [Mount] Washington & are covered with fine timber. The valley of the N. Fork [North Fork Swannanoa River] is cleared in a narrow irregular strip. Near the upper part of its course, a small stream leaps 70 ft. over a precipice of the Bulls Head Mtn [Mountain]of the Craggy.

In the morning I started up the Black [Blackstock] Knob with a guide & passed between it & Potatoe Top Mtn [Mountain]. [now known as Potato Knob] to the ridge between them, five miles, then up the ridge to the summit of Mnt [Mount]. Mitchell, and then round the bases of Mt. [Mount] Gibbs & the Sugarloaf to the top of the highest peak Mt. [Mount] Clingman [Clingmans Peak]. [For a history of the exploration and naming of these peaks, please consult Schwarzkopf, S. K. 1985. A history of Mt. Mitchell and the Black Mountain. Exploration, development, and preservation. North Carolina Division of Archives and History. North Carolina Department of Cultural Resources. Raleigh, NC.] The views from the two peaks are magnificent and no doubt, the most picturesque ~~mountains scene~~ [strike through by Cope] in the East N. [North] Am.[America]. One sees 1-200 miles of the Cumberland with the great valley at their feet, and the lowlands along the Catawba River, in So. [South] Carolina. There are 25 peaks in sight higher than Mt. [Mount] Washington; the near ones of the Black, Craggy, & Blue Ridge Ranges present the most picturesque variety, but the great Smokey on the border of Tennessee keeps its back up for a long distance (70 miles) to within 60 ft. [feet] of the Clingmans Peak. (The latter is 6710 ft. [feet] ab. [above] tide water [sea level]). It is a great background to the many ranges east of it, and rises like a wall from the Tennessee Valley. Mitchell's [Elisha Mitchell, died 1857] grave is on one of the knobs which compose the summit of Mt. Clingman; at the foot of the other is a cave beneath overhanging rocks; also [several words that are undecipherable and which have been stricken through] a log shanty in which I spent the night with the guide. The mule went into the back room which had neither roof nor floor & while the guide cut wood, I carpentered trying to stop the gaps between the logs. I nailed up my saddle blanket for protection, & laid down my gum blanket for a bed: for bedclothes I put on my overcoat & covered with a shawl. We had a great fire of wood Abies balsamea [*Abies fraseri*, Fraser Fir] ([?] which covers the mountains) & so prepared for the night. Clouds & fog soon covered us, & then the rain began & soaked everything, till after morning light. When I stepped out we were on an island, with an ocean of white clouds, around & at our feet. We ate our breakfast of cold corn bread & chicken & commenced our march through the wet bush for Mitchells Peak. My gum blanket kept me dry & by the time we ascended the peaks, the clouds broke & I had a wonderful view of the opening of the vallies [valleys], & the looming up of the peaks, which appeared first as black islands in an ocean of snow [hence the name the Black Mountains from the dark evergreen color of the Frasier Fir and Red Spruce]. When we started on the descent all were clear except the lower ones near the course of the French Broad River, which lay under an immovable mass of white clouds, whose upper surface looked like that of a vast glacier.

On the mountains I found several interesting insects, salamanders [*Desmognathus fuscus*, Northern Dusky Salamander, *Desmognathus carolinensis*, Carolina Mountain Dusky Salamander, and *Eurycea wilderae*, Blue Ridge Two-Lined Salamander] and at its base, fishes [The fishes were presumably obtained from the North Fork Swannanoa River, but none were retained. There are 55 lots of amphibians, primarily salamanders, and one lot of reptiles at Academy of Natural Sciences of Drexel University (ANSP) (Ned Gilmore, ANSP, Bryan Stuart, North Carolina State Museum of Natural Sciences, and David Beamer, Nash Community College, pers. comm.) which Cope

collected from North Carolina during his trip; all but one lot were from locales west of the Appalachian Mountains.].

Soon after my return [back to Asheville] we came here [Pleasant Garden], a days stage-ride from Asheville. We passed the Swananoa [Swannanoa] Gap, to which there is not much ascent from the West, but a very great one from the East. From it we had a narrow but very distant view towards the East. Near the top they are sinking a shaft which is to strike a tunnel [Swannanoa Tunnel or Jarrett Tunnel, which is closer to the top] for the West N. [North] Ca. [Carolina] R. R. [railroad] now in course of construction. It has reached 70 ft. [feet] of which 45 ft. [feet] is through soapstone. Soon after starting on the descent, a babbling brook disclosed the headwaters of the Catawba [Cope is actually referring to Mill or Swannanoa creeks which flow parallel to the railroad line. The headwaters of the Catawba River lie to the southeast from Swannanoa Gap], a stream the fish & other fauna of which I have had a great curiosity to examine. This place (where I write) has furnished me a pretty good opportunity. I have found already 25 sp. [species] of which 6-7 are new; it bears quite or near a resemblance to the Delaware [River] in this respect as to the French Broad [River]. The large species I have not yet secured. So far I have obtained on this trip about 70 sp. [species], of which about 20 are new to the books.

The descent from Swananoa [Swannanoa] Gap is not only long & steep but on a very bad road. A stage too is the most uncomfortable vehicle to accomplish it in. The plunging & swinging & jarring gave Annie a headache, but a night's rest relieved her. All the way to this point, the soil has been good and the timber large. Comparatively little of the country is cleared [logged].

I have obtained very few minerals so far; the localities of many of the most important were out of my way, or interfere with either money or time. I go however in a day or two [October 15 or 16] to a hill made of Itacolumite (flexible sandstone) [found in McDowell County] & will procure some for the Germantown Academy [Fort Washington, Pennsylvania]. I have already found some remarkably large mica etc. & manganese & have saved some of that for you.

My plan is to go slowly east to Raleigh or near there & leave Annie & Julia, I then receive a free pass from the State Geologist on the R. R. [railroad] & will probably visit briefly the fossiliferous beds in the East of the State.

I am improving in health [Cope provided no previous explanation of being ill] & Annie & Julia are very well. Please remember me with love to Mother. [undecipherable word] Annie & Julia believe [undecipherable word] thy affectionate son

Edw. D. Cope

[several undecipherable words]

Letter No. 3

I saved the seeds of some of the Pines & other trees for thy arboretum-if they will grow. [Written as a postscript, but there was insufficient space at the end of the letter, so Cope wrote it at the top of the letter.]

Raleigh N. [North] Ca. [Carolina] 12/11 1869 [December 11, 1869]

Dear Father

This late winter day we are sitting with open windows, and walking out without shawl or cloak. The weather has been most delightful, and the bright moonlight nights are like anything but winter

We expect to start home in a day or two [December 12 or 13]. We will have been in Raleigh about a week [December 5 or 6, 1869; however Cope (1870a) states that *Poecilichthys vitreus* (*Etheostoma vitreum*) was collected: "*late in November*"], having come direct from New [mistakenly transcribed in Osborn (1931, p154 as Kew] Garden [New Gardens Friends Meeting place, established 1754 in Greensboro, NC; approximately 120 kilometers northwest of Raleigh] [This entire sentence was mistakenly transcribed in Osborn (1931, p154 as having been written as part of the October 14, 1869 letter]. Prior to that, I spent four weeks [much of November 1869] east of this city, engaged in investigating the marl region [found in Eastern North Carolina chiefly in Pitt, Columbus, Wayne, Lenoir, Craven, Duplin, and Onslow counties (https://www.ncpedia.org/marl-beds)] and collecting its fossils. This region is mostly Miocene, and the formation is more largely developed here than in any part of the United States, excepting perhaps Nebraska. It is covered with a great deals of pine forest. The most striking species is the turpentine pine, *P*. [*Pinus*] *palustris* [*Pinus palustris*, Longleaf Pine], a truly remarkable tree and a great ornament. The leaves are very long & stiff and grow erect, and only on the ends of the branchlets, like candelabra. It is one of the largest of forest trees, and of a very deep green. The loblolly pine, *P*. [*Pinus*] *taeda* [*Pinus taeda*, Loblolly Pine] is very abundant and almost as fine a tree. It has a more familiar appearance. The swamp & willow oaks have scarcely lost their foliage yet, and the several species of Ilex [hollies] being evergreen, almost deprive winter of its usual desolation. Nearer the coast the greenness is still more striking. Added to the above trees are the swamp growths; the several species of Myrica [*Myrica* sp., Bayberry and Wax Myrtle], several almost evergreen vines, the Cyrilla [*Cyrilla racemiflora*, American Cyrilla or Titi], and the large leafed Persea carolinensis [a synonym of *Persea borbonia*, Swamp Red Bay], and several thick leaved Andromedas [*Pieris* sp., Fetterbush]. Magnolia glauca [a synonym of *Magnolia virginiana*, Sweet Bay] was barely shedding its leaves when I left, and a few live oaks were to be seen near Wilmington. Magnolia grandiflora [*Magnolia grandiflora*, Southern Magnolia] is common in all the yards, but rare in the woods. There were many bushes that I did not know. Two species of Gentiana [*Gentiana* sp., Gentian] were abundant in the sandy woods, which were nearly or quite as beautiful as the fringed species; viz. *G. angustifolia* [*Gentiana angustifolia*, Stemless Gentian] and *G. saponaria* [*Gentiana saponaria*, Soapwort Gentian].

I had pretty good success in my fossil collecting, and with more knowledge of the country could have done much better. I will however be able to make some valuable additions to paleontology, and will have all the vertebrate fossils obtained by the State Survey to determine. The majority of mammalia are cetaceous, I have at least 15 species of these. The marl is a very valuable fertilizer in this state, and it is more extensively dug here than anywhere else out of New Jersey. The number of species and individuals of Mollusks to be found lying on the heaps thrown out, is something truly wonderful. During my trip, Prof. Kerr [Washington Caruthers Kerr] State Geologist went to a fossil he knew of, & had it broken out and sent to Raleigh. On my return he invited me to help clean it from the matrix, and determine and name the species if necessary. This I did on condition that the Survey paid my expenses to which he consented. We have nearly cleaned the huge thing. It is half the cranium of a toothless whale; the left side having been destroyed. The

cranium when perfect measured 16-17 ft. [feet] long, and the whole animal 75-90 ft [feet]. Its characters are between the right and finner [family Balaenopteridae] whales, but I cannot yet make out which genus. The species appears to be new. The bone is very fragile and much crushed [The new species, from Quankey Creek in Halifax County, was given the name *Mesoteras kerrianus* by Cope. Cope, E.D. 1870. Discovery of a huge whale in North Carolina. American Naturalist 4(1):128.].

In traveling through the country I hired horses or more frequently was kindly furnished with animals for my use. I followed the custom of the country in stopping to meals and lodging where my business happened to find me, sometimes paying, but mostly not. I found various modes of introduction; often through knowledge of friends or relatives of my hosts in other parts of the country. In general, the people of the East [eastern North Carolina] are sharper and less friendly to northern people than those of the West [western North Carolina]. The hotel charges were exorbitant, so that I took care to be far from public houses at night. In the west [western North Carolina] they were very reasonable. The rebel [Confederate] element was and is stronger here, and I heard comparatively little unionism [loyalty to the federal union of the United States of America, especially at the time of the Civil War]. At one place only did I experience any discomfort on account of my origins, politics etc. Many of the planters in this section keep savage dogs reminding one of the old days of slavery. These dogs often have bloodhound, oftener bull blood. At one place I had to be escorted both to and from the house by the proprietor so long as I stayed, as his dogs were so ferocious that no one could go alone near the house. Colored people are always much afraid of them, and the dogs seem sometimes to know this. Such planters as keep them are generally a bad profane set.

I met a number of friends [Religious Society of Friends, also known as Quakers] at Nahunta [in northwestern Wayne County] meeting in Wayne Co [County]. Jesse Hartley an Ohio friend [Friend] preached on the day I attended. There would be quite a large meeting if the families of friends [Friends] all attended, but the younger members often do not seem to know much about the Society [Religious Society of Friends], in that locality. The friend [Friend] I stayed with had sixteen children; quite a number had married out of the Society [Religious Society of Friends]. It was a great pleasure to get among friends [Friends] & into a friendly country, after the rebel neighborhoods in Edgecombe & Halifax Cos (Counties].; for where friends [Friends] are, Unionism & common sense appear to prevail on all hands.

I have visited the legislature here; there are “five-six quakers [Quakers], 12-15 n******, the rest white men”, as an old rebel expressed it. The clerk of one of the monthly mtgs. [meetings], ran for the legislature and was defeated.

We are all in very good health. Annie sends love. Thy aff. [affectionate] son

Edw. D. Cope

Letter No. 4

Haddonfield N. J. 2/6/1870 [February 6, 1870]

Dear Father

Perhaps two weeks ago I called on W. Wagner and found him in no very amiable mood. He would not even let me see the boxes and specimens, and told me I had induced him to pay heavy freights on a quantity of worthless material for the purpose of deceiving him! Etc. I know he is only haggling on a large scale-so I keep shy of him. I have plenty to do in the meantime, I suppose in a few months he will mollify. Nevertheless the N. Ca [North Carolina] specimens for the institute at Germantown remain locked up. I will get them ultimately no doubt. I have been for some months preparing a series of skeletons of fishes which I propose to study out before long for the purpose of making a hand book of osteology as a basis for one of zoology. As yet the field lies but partially examined. The fossil reptile book creeps along at a "philosophical" pace. It gives me however opportunity of making additions now and then. Among these are some of the Mosasauridae group. I will have 25 sp. [species] in the book, Leidy gave in his book only three. One of thy numbers of the Naturalist Library which I had at Haverford, I found still there on a visit which I recently paid. I have it now and will bring it when I next visit Fairfield. Thy little physiology which I borrowed I have not read entirely through yet.

Our friends in Haddonfield are all well. Annie and the little girl have been in excellent health for a long time past. I am trying to rent my house for some time. The payment of the rent on one house and tax on another, is stretching things pretty tight. A soon as I can get rid of this, and something I owe A. Davis, I may have something to spend on scientific work. The Philosophical Soc. Publication Comm. makes many exceptions about changes. Authors must do this and that, so that in a large essay changes amount to considerable.

In a few days I propose to make a trip to some of the Marl pits. Our landlord Chas. Shinn died a short time since. He failed in business, and became greatly depressed in consequence. He finally became insane, and refused to eat. He died in a comatose condition. He was chiefly interested in business, and not a religious man. Nothing however, immoral could be charged to him, and he was industrious. His end will be a lesson to some, and excites sadness in all. I am glad to hear of thy and Mother's health being so improved. Hoping it may so continue, I remain thy affectionate son,

Edw. D. Cope

RESULTS

Insights from Cope's Letters

At the time of his travels, Cope, 29 years of age (Figure 2), was accompanied by his wife, Annie, 28 years of age, and by his daughter, Julia, 3 years of age. His itinerary took him from his home in Haddonfield, NJ, to eastern Tennessee to eastern North Carolina and back to Haddonfield within a span of approximately 3.5 months (Figures 3 and 4). Cope and his family arrived by rail in Hot Springs, NC on August 29th where he stayed until September 2nd. He left his family at Hot Springs and arrived in Mossy Creek, TN on September 3rd. From September 3rd until early-mid October, he traveled, often by himself, to eastern Tennessee (Jefferson, Grainger, Anderson, and Scott counties) and then returned to Hot Springs where he stayed a week. With his family once again accompanying him, they traveled to Alexander, spending one night there before continuing on to Hendersonville where they spent an unspecified amount of time. They returned to Asheville where his family spent a week while Cope spent the week exploring the Black Mountains and Mount Mitchell before returning back to Asheville. Sometime between early- and mid-October, Cope and family arrived in Pleasant Gardens, again staying for an undetermined period of time. Upon their departure, Cope planned: "*to go slowly east to Raleigh or near there & leave Annie & Julia, I then receive a free pass from the State Geologist on the R. R. & will probably visit briefly the fossiliferous beds in the East of the State*" (Letter No. 2).

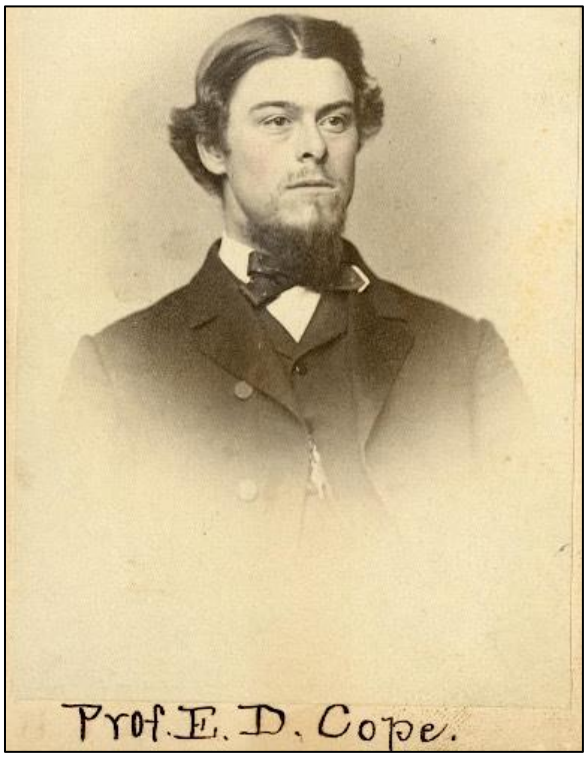

Figure 2. Edward Drinker Cope, *circa* 1867. Photograph courtesy of the Smithsonian Institution Archives, Record Unit 95, Image No. SA-420 (https://www.si.edu/object/siris_arc_391590).

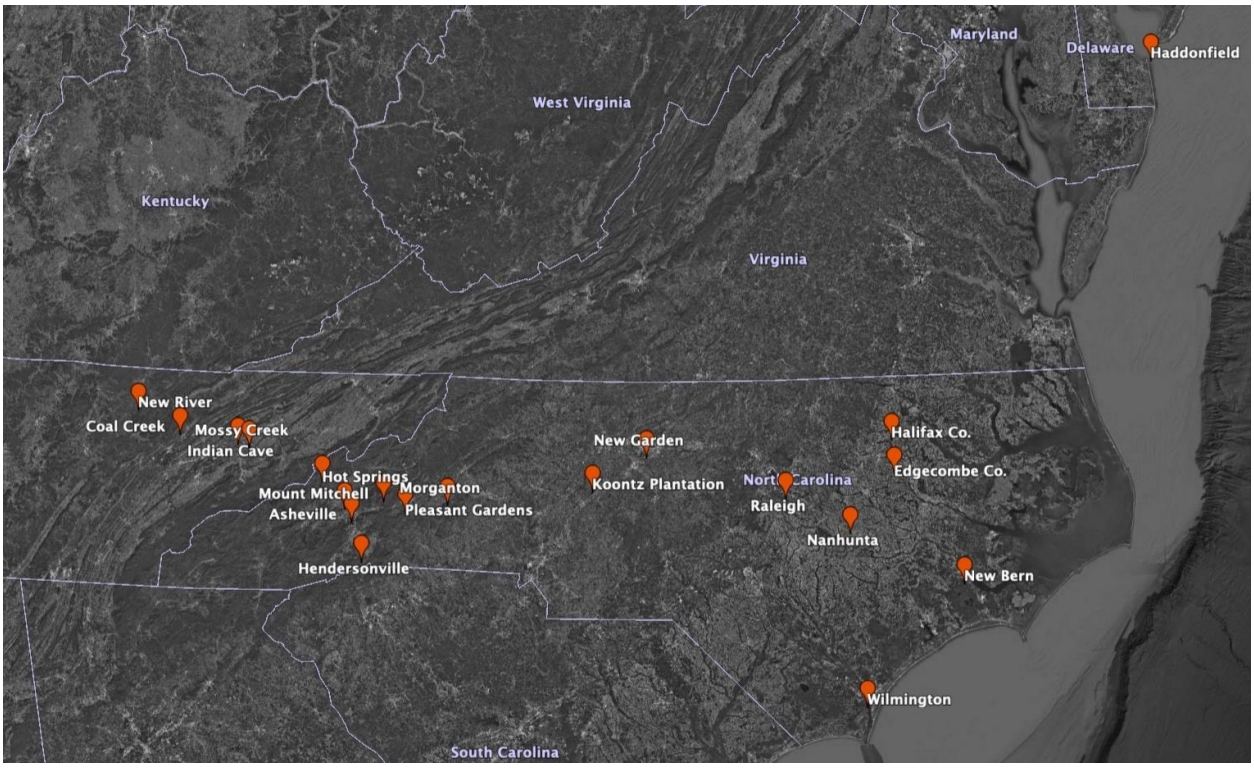

Figure 3. Google Earth image of the Cope's travels from his home in Haddonfield, New Jersey to destinations in Tennessee and North Carolina in 1869 (Google Earth Pro, accessed May 20, 2020).

From his letters, we obtained no additional information as to where Cope traveled or stayed in the Piedmont until they arrived in Raleigh after Cope had returned from eastern North Carolina and from New Gardens (Letter No. 3). Sometime between mid-October and November 5th, Cope had traveled to New Garden in present day Greensboro where he left his family once again while he continued on to Raleigh. Between early November and early December, Cope traveled to eastern North Carolina in search of fossils in Wayne, Edgecombe, and Halifax counties and also visited Wilmington in New Hanover County. By early December, Cope had returned from eastern North Carolina, traveled back to New Garden to reunite with his wife and daughter, and then traveled with them back to Raleigh by December 5th or 6th. Between December 5th or 6th and December 11th, Cope collected fishes in Wake County, although he may have been collecting in Wake County in late November when he collected *Poecilichthys vitreus* from Walnut Creek (Cope 1870a, p264). Their travels in North Carolina concluded around December 12th or 13th when they to return to Haddonfield, NJ.

Figure 4. Cope's 1869 travels from his home in Haddonfield, New Jersey to destinations in Tennessee and North Carolina along the Southern Railway (https://en.wikipedia.org/wiki/Southern_Railway_(U.S.)) and the Atlantic Coast Railway. [Note: this map was created in 1895. The Southern Railway did not exist between Hot Springs and Hendersonville nor east to Pleasant Gardens in 1869.]

After arriving in Hot Springs (Figure 5) and becoming " . . . *pretty well acquainted with the neighborhood. I find that it is a bad location for most of my purposes, and have consequently left Annie and Julia there & come here for a little outlook*" (Letter No. 1) "Here" was at Mossy Creek in Jefferson County, TN where Cope made it his base of operations while exploring eastern Tennessee. From there Cope explored the South Fork of the Cumberland River in Campbell County and near the Kentucky state line; the Clinch, Holston, and French Broad rivers; tributaries of the Cumberland, Clinch, and Holston rivers; Indian Cave and Coal Creek; and Beech Fork near New River, TN. Upon his return to Hot Springs, Cope collected from Warm Springs Creek [Spring Creek], the French Broad River, and tributaries of the French Broad River. On their way to Hendersonville, Cope spent one night at Alexander where he obtained large river fishes from local fishermen. While at Hendersonville, Cope collected from the upper French Broad River and its tributaries. Cope left Hendersonville, returning to Asheville, and then explored the Swannanoa and North Fork Swannanoa rivers on his way to and from Mount Mitchell. With his family, Cope traveled across the Swannanoa Gap to Pleasant Garden (Figure 5) where he then explored the Catawba River, the upper waters of the Catawba River, Buck Creek, unnamed clear & rapid creeks in McDowell and Burke counties, and a fish market at Morganton. From his letters, Cope did not provide details of his route east from Pleasant Gardens.

The letters make no mention of staying anywhere in the Yadkin basin. However, Cope (1870b, p471) mentions: "*I obtained a few specimens* [of *Ptychostomus pidiensis*] *from the traps in the Yadkin River, at the plantation of John Kuntz* [Koontz]." REJ was able to determine through regional historians, documentation at the Rowan County Library in Salisbury, and railroad maps that Cope stayed at the Koontz Plantation/House in Roane [Davidson] County (Figure 6). The Koontz Plantation is approximately 155 km east-northeast of Pleasant Gardens, the previous last known place where he stayed. Remnants of an historical Indian [First Nations] V-shaped rock weir are still visible in the Yadkin River at this site (REJ and BHT, pers. obs.; Figure 6). Cope's letters did not mention the use of this specific weir while staying at the Koontz Plantation, but he did expound upon the overfishing of suckers in Atlantic slope rivers by the use of spring nets at such weirs (Cope 1870b, p473-474). A tributary of the Yadkin River (Gobble Creek) and the rock weir are approximately 1 km west-southwest from the Y-shaped Koontz Plantation house which is located on SR 1186 (Koontz Road) (Figure 6). However, neither from his letters or from Cope (1870b) did we learn how much time he spent at the Koontz Plantation. We do know that after leaving the plantation he then headed eastward into North Carolina's Coastal Plain in search of fossils and fish. Exact localities are unknown, but his travels took him to Halifax, Edgecombe, Wayne, and New Hanover counties. Returning to Raleigh, but before departing back home to Haddonfield, Cope collected fishes from the localities along the Neuse River, Walnut Creek, and from still and sluggish water tributaries to the Neuse River (Figure 7).

Figure 5. The Hot Springs (A), the Warm Springs Hotel (B), and French Broad River at Hot Springs (C), Madison County North Carolina and the Carson House (D), Pleasant Garden, McDowell County, North Carolina.

Figure 6. The Koontz House (A), Gobble Creek (B), and a panoramic view of the rock weir across the Yadkin River at the mouth of Gobble Creek (C), Davidson County, North Carolina.

Figure 7. The Neuse River near the old Falls of the Neuse (A), Milburnie Dam across the Neuse River (B), Neuse River immediately below Milburnie Dam (C), and Walnut Creek at South State Street (D), Wake County, North Carolina.

From Cope's descriptive writings in his letters, we learned of his in-depth knowledge of botany, herpetology, ornithology, mineralogy, geography, geology, agriculture, and paleontology. Through his letters and publications (Cope 1870a, p266; Cope 1870c), he expressed his visual observations and beauty of the southern Appalachian Mountains and the Cumberland range. Traveling across North Carolina four years post-Civil War, Cope shared with his father his religious and often critical political and societal views he held of the citizens of North Carolina (Letter No. 3). The health of his family and his own were also mentioned in Letters Nos. 1-3).

How he financed his trip we do not know, but Cope was able to finagle lodging and meals wherever and whenever he could: "*I followed the custom of the country in stopping to meals and lodging where my business happened to find me, sometimes paying, but mostly not*" (Letter No. 3). And lastly, but most important to our understanding of Cope and his collections of fishes from North Carolina, we gained additional insight from his letters regarding the species he collected. For example, from the French Broad River system he stated: "*I procured a fine lot of river fishes & expressed them N. One of these was an 8 lb. "Jack" which I believe a new sp. & possibly genus, near Leucioperca (pike-perch). It reaches 20 lbs. wt. & is the most savage fish as well as most active & vigorous of the fresh water fishes I know. The black & green perches, the next most active species, can scarcely be taken in a net, but I took two from the stomach of my Leucioperca one of 2 lb. & they are taken out, of 3-5 lbs. I discovered 31 sp. fishes in the French Broad riv. & its tributaries, of which the "Jack" is the largest*" (Letter No. 2). And further on, in Letter No. 2 from the Catawba River system, Cope stated: "*I have found already 25 sp. of which 6-7 are new; it bears quite or near a resemblance to the Delaware in this respect as to the French Broad. The large species I have not yet secured. So far I have obtained on this trip about 70 sp., of which about 20 are new to the books*."

From these letters, there remain several unresolved questions about Cope's travels to North Carolina. For example, we did not learn what occupied his family's time while he pursued his explorations, being gone for weeks at a time. It was also unclear as to how much time he actually devoted to collecting fishes. Where he stayed raised several questions: where in Asheville did his family stay while he spent a week exploring the Black Mountains east of Asheville; or how long did he stay in Hendersonville and where did he collect fishes while staying there; and how he arrived and how long did he stay at the Koontz plantation? As previously stated from Letter No. 2, Cope was to: "*go slowly east to Raleigh or near there*", but he did not provide details of his route eastward. We assume that the routes he took followed the Southern Railway from Marion (Pleasant Garden) to Statesville then onto Salisbury where he then took a horse-drawn carriage or coach to the plantation (Figures 3 and 4). We also assume he traveled by a horse-drawn conveyance from the plantation to nearby Lexington and then traveled once again aboard the Southern Railway to New Garden and Raleigh. His travels in the eastern part of the state may have been aboard the Southern Railway to Goldsboro and then aboard the Atlantic Coast Railway to Wilmington and to unnamed sites in Halifax, Edgecombe, and Wayne counties (Figure 4). For shorter distances of travel, Cope remarked: "*In traveling through the country I hired horses or more frequently was kindly furnished with animals for my use"* (Letter No. 3). And lastly, but also important to our understanding of Cope and his collections of fishes from North Carolina, we did not gain any further insight into who might have helped him with the seine which he had borrowed from the Smithsonian Institution (Cope 1870b, p448). We can only assume he was aided by some unnamed locals to help carry out his fish collections

Insights Beyond the Scientific Descriptions with a Focus on North Carolina's Fauna

Review of Cope's two seminal 1870 publications on North Carolina fishes revealed additional insights into his collection locations in Tennessee and North Carolina in 1869. For example, from Cope (1870b, p448) he completed: "*A journey from the Cumberland Mountains of Tennessee to the ocean*"; in other words, from eastern Tennessee northwest of Knoxville to Wilmington near the Atlantic Ocean. Cope's collections covered: "*five hydrographic basins, viz.: those of the Cumberland, Tennessee, Catawba, Yadkin, and Neuse*" (Cope 1870b, p448). However, most of his localities were written in general and often nondescript terms, e.g., "*tributaries of the French Broad River*." We can speculate as to where he might have collected based upon where he stayed, the species he collected, and the species that currently inhabit these streams. For example, while staying at Hot Springs in Madison County Cope might have collected at Shut-in, Big Laurel, and Paint Rock creeks; and while staying in Hendersonville in Henderson County – perhaps Cope collected from the Mills River and Boylston and Cane creeks. Although Cope explored the Black Mountains, travelling up the Swannanoa and North Fork Swannanoa rivers up to Mount Mitchell, there is no mention of any collections in this area. While staying at Pleasant Gardens in McDowell County, Cope most likely collected from nearby Curtis, Swannanoa, and Mackey creeks and from the North Fork Catawba River; nearby in Burke County, collecting from the Linville River and Paddy Creek were also possibilities. In the Piedmont while finding lodging at the Koontz Plantation in Davidson County, Gobble and Dyker creeks were adjacent to the property. Approaching the end of his trip and while staying in Raleigh, if Cope did collect at the Falls of the Neuse River and from the Neuse River at Milburnie Dam, he may have also collected at nearby Richland, Perry, and Crabtree creeks.

Cope acquired his specimens, mostly from small, wadeable streams, by using a small seine of unknown length with fine meshes of unknown mesh size. We do not know if he also used a dip net, but the seine would have been ideally suited for capturing smaller specimens and smaller species such as minnows, mosquitofish, and darters. It would have been unsuitable for using in larger streams and non-wadeable rivers in attempting to capturing larger specimens of suckers and catfish. Those he obtained or "*procured*" from locals and from "*fishermen's apparatuses, especially weir traps, furnished most of the species inhabiting the river channels. Passing many of the latter at the time of year when the migratory fishes were descending, the writer was able to examine and procure them in great numbers*" (Cope 1870b, p 448). We are unsure as to how Cope had knowledge of fall migrations of potadromous catostomid (sucker) species in the Yadkin River, unless he had acquired this information from local fishermen manning the weir traps. Potadromous migrations of suckers typically occur in the early-late Spring onto the shoals where they stage and quickly spawn and then migrate back downstream to deeper waters (REJ, pers. obs.). Cope also sought specimens by visiting fish markets in Morganton and in New Bern. How the specimens were preserved is unknown, but most likely in "*spirits*" (Cope 1870b, p454), i.e., some sort of alcohol solution.

Besides new species descriptions, Cope also provided identification keys to the certain species of darters (*Etheostoma*, *Poecilichthys*, and *Boleosoma*), sunfish (*Lepomis*), minnows (*Alburnellus*), suckers (*Ptychostomus* and *Carpiodes*) and catfish (*Amiurus*). Cope also commented on the palatability and piscivorous behavior of such species as Walleye: "*It is the most valued food-fish of the French Broad, the flesh being very tender as well as rich*"; and "*Its swiftness*

enables it to take the black perch (Micropterus fasciatus) with ease . . ."); the abundance of sunfish and minnows: "*The P. pyrrhomelas is the most abundant fish in the tributaries of the upper Catawba River, North Carolina*", and the challenges and difficulties in collecting darters: ". . . *were taken with some difficulty. . . . They inhabit shallow, swift waters with rocky bottoms, and take refuge under stones with great rapidity, whence much patience is required to draw them*" [presumably to draw them out from beneath the cobble]. Cope also wrote eloquently on the beauty of the Southern Appalachian Mountains: "*The effect of these is heightened by the crystal clearness of the waters of the mountain streams, which reflects as well the beauty of a southern sky, and the noble trees and flowering shrubs that border them in the rich wilderness of the Cumberland range. Few more attractive spots to the naturalist can be found . . ..*" Cope shared the common (regional) names of several fish, such as "*Jack*" for Muskellunge, "*salmon*" for Walleye, "*green bass*" for Largemouth Bass, "*red-eyed bream*" for Warmouth, "*Shiner*" for the V-lip Redhorse, "*blue mullet"* for Shorthead Redhorse, "*White Mullet*" for Notchlip Redhorse, and "*jumping mullet*" for Striped Jumprock (Cope 1870b).

Cope provided details on the abundance, size, weight, and palatability of suckers. For example, regarding the edibility of *Ptychostomus collapsus*, Cope commented: "*It is not as good a fish as the P. pappillosus and P. robustus, but is not at all to be rejected*" (Cope 1870b, p471). And then for *Ptychostomus robustus:* "*It is highly valued for the table by the people living near the river*" (Cope 1870b, p473) which led us to speculate that Cope might have eaten the type specimen of Robust Redhorse that he obtained from the fishing weirs at the Koontz Plantation. Likewise, the consumption of catfishes was not overlooked by Cope either: "*It* [referring to *Ictalurus coerulescens*] *is everywhere much used as food, though in my estimation inferior to the large Amiuri of the East, for though the flesh is whiter, it is drier*" (Cope 1870b, p489). After acknowledging the consumption of suckers, Cope also wrote in great detail regarding how this family of fishes were over harvested by the use of spring-nets and the ultimate consequences of such over harvesting: "*The repopulation of a river is a very different matter from its preservation, and involves much time, attention and expense. It would be far cheaper for the State of North Carolina to enact laws preservative of this important product of her waters, similar to those in force in many of our older States. The execution* [in italics] *of such laws is, however, the important point, and the destruction by officers, of the spring traps and weirs in the Neuse, Cape Fear, Yadkin and Catawba River, every spring, at the time of running of the fishes, would allow of the escape of immense numbers of them, before the traps could be repaired"* (Cope 1870b, p473-474).

Although Cope described 10 species of suckers under the genus name *Ptychostomus* from North Carolina, we learned that specimens of large suckers were inaccessible and ultimately lost (Cope 1870b, pp474–475, 479). In February 1870, Cope remarked to his father that he was unable to obtain the boxes and specimens, presumably from his Fall 1869 trip, because of a financial disagreement on paying the freight charges to Germantown Academy near Philadelphia (Letter No. 4). We assume that this shipment contained his larger river specimens (Letter No. 2) and possibly any larger specimens he obtained during his travels in eastern Tennessee. Specimens of possible species lost might have included River Redhorse, *Moxostoma carinatum*, (which might have been the 12 pound specimen caught in the French Broad River which Cope referred to as *Ptychostomus erythurus* (Cope 1870b, p474), Smallmouth Redhorse, *Ictiobus* spp., and *Carpiodes* spp. We do not know if Cope made other shipments of material from specimens obtained from the

Catawba, Yadkin, and Neuse basins, but he did comment that he had lost material obtained from a market in New Bern (Cope 1870b, p475).

The loss of specimens or their unavailability to be examined by Cope, led us to question as to whether Cope hastily wrote some of his fish descriptions as he studied the specimens in the field or were descriptions written from memory shortly afterwards in his lodging. We also questioned as to what happened to his field book with his notes, if one ever existed. These questions led us to question how Cope was able to successfully achieve his rapidity in naming species and writing, and publishing his three papers (Cope 1870a, 1870b, 1870c). In mid-December 1869, Cope, writing to his father, stated: "*We expect to start home in a day or two* [December 12 or 13]" (Letter No. 3). Remarkably, by December 21, 1869, Cope was back in Philadelphia where he made a presentation before the Academy of Natural Sciences of Philadelphia on the fossils of a fin whale which he helped excavate in Edgecombe County the previous November (Cope 1869c) and had written about in Letter No. 3. By January 07, 1870, Cope had made a presentation before the American Philosophical Society on new and previously named species of Percidae which he encountered during his travels in North Carolina and Tennessee in Fall 1869 and by November 21, 1870, his percid paper was published (Cope 1870a). By June 07, 1870, he had presented before the American Philosophical Society more detailed results from his 1869 travels; by June 17, 1870, reported that the manuscript was ready for publication; and by November 21, 1870, his 51 page paper on North Carolina's fish fauna plus descriptions of other species from North American had been published (Cope 1870b).

As Cope (1870b, pp492–495) concluded his partial synopsis on North Carolina's freshwater fishes, he offered some of the earliest known zoogeographical remarks on the distributional differences between the fauna of the Atlantic Slope streams and those of the streams draining into the Tennessee River system on the west side of the Appalachian Mountains. He noted that the diversity of darters was greater in the west and those streams were the: "*exclusive range of Ambloplites, Micropterus fasciatus* [*dolomieu*], *and Polyodon*"(Cope 1870b, p492). He then went on to note that: "*On the East, the Catawba and Yadkin are peculiar in their poverty in Etheostominae Perch, and the absence of the forms just named, while the extraordinary development of Catostomidae, and abundance of Amiurus, Anguilla, and Esox . . .*" (Cope 1870b, 492).

What Did Cope Bring Back, Describe, and Archive at the Museums?

Of the 242 described species of freshwater fishes in North Carolina, 45 were described by Cope between 1865 and 1871 (Table 1) (Tracy et al. 2020a). From his trip across North Carolina in 1869, Cope (1870a, 1870b) scientifically described 25 species solely from North Carolina (Table 2) of which 15 species are presently considered to be valid (Table 1) with the remaining 10 species having since been synonymized with other species (Table 2). He recounted collecting 91 described and undescribed species during his trip (Table 2), excluding four genera, *Acipenser, Carpiodes, Ictiobus,* and *Sander* (*Stizostedion*), whose specimens were lost, unavailable, or unseen. Based upon Cope's two publications, he documented 44 species occurring in the French Broad, 38 in the Catawba, 27 in the Yadkin, and 38 in the Neuse River systems (Table 3).

Table 1. Species of fish that were described by Edward D. Cope between 1865 and 1871 that occur in North Carolina. * = Currently accepted species described by Cope (1870a, 1870b) from North Carolina.

Currently Accepted Scientific Name	**Currently Accepted Common Name**
Leuciscidae	
Chrosomus oreas Cope 1868	Mountain Redbelly Dace
Cyprinella galactura (Cope 1868)	Whitetail Shiner
Cyprinella labrosa (Cope 1870)*	Thicklip Chub
Cyprinella nivea (Cope 1870)*	Whitefin Shiner
Cyprinella pyrrhomelas (Cope 1870)*	Fieryblack Shiner
Cyprinella spiloptera (Cope 1868)	Spotfin Shiner
Erimonax monachus (Cope 1868)	Spotfin Chub
Hybopsis hypsinotus (Cope 1870)*	Highback Chub
Luxilus cerasinus (Cope 1868)	Crescent Shiner
Luxilus coccogenis (Cope 1868)	Warpaint Shiner
Lythrurus ardens (Cope 1868)	Rosefin Shiner
Lythrurus matutinus (Cope 1870)*	Pinewoods Shiner
Nocomis micropogon (Cope 1865)	River Chub
Notropis altipinnis (Cope 1870)*	Highfin Shiner
Notropis bifrenatus (Cope 1869)	Bridle Shiner
Notropis chalybaeus (Cope 1869)	Ironcolor Shiner
*Notropis chiliticus (*Cope 1870)*	Redlip Shiner
Notropis chlorocephalus (Cope 1870)*	Greenhead Shiner
Notropis leuciodus (Cope 1868)	Tennessee Shiner
Notropis micropteryx (Cope 1868)	Highland Shiner
Notropis photogenis (Cope 1865)	Silver Shiner
Notropis procne (Cope 1865)	Swallowtail Shiner
Notropis rubricroceus (Cope 1868)	Saffron Shiner
Notropis scabriceps (Cope 1868)	New River Shiner
Notropis spectrunculus (Cope 1868)	Mirror Shiner
Notropis telescopus (Cope 1868)	Telescope Shiner
Notropis volucellus (Cope 1865)	Mimic Shiner
Phenacobius teretulus Cope 1867	Kanawha Minnow
Catostomidae	
Moxostoma breviceps (*Cope* 1870)	Smallmouth Redhorse
Moxostoma carinatum (Cope 1870)	River Redhorse
Moxostoma cervinum (Cope 1868)	Blacktip Jumprock
Moxostoma collapsum (Cope 1870)*	Notchlip Redhorse
Moxostoma pappillosum (Cope 1870)*	V-lip Redhorse
Moxostoma robustum (Cope 1870)*	Robust Redhorse
Atherinopsidae	
Labidesthes sicculus (Cope 1865)	Brook Silverside
Menidia beryllina (Cope 1869)	Inland Silverside
Centrarchidae	
Ambloplites cavifrons Cope 1868	Roanoke Bass
Percidae	
Etheostoma rufilineatum (Cope 1870)*	Redline Darter
Etheostoma simoterum (Cope 1868)	Snubnose Darter
Etheostoma vitreum (Cope 1870)*	Glassy Darter
Etheostoma vulneratum (Cope 1870)*	Wounded Darter
Etheostoma zonale (Cope 1868)	Banded Darter
Percina aurantiaca (Cope 1868)	Tangerine Darter
Percina nevisense (Cope 1870)*	Chainback Darter
Eleotridae	
Eleotris amblyopsis (Cope 1871)	Largescaled Spinycheek Sleeper

Table 2. Species that Cope collected, saw, or heard about occurring in North Carolina in Fall 1869 (Cope 1870a, 1870b). * = Species described by Cope from North Carolina (Cope 1870a, 1870b). ** = Additional species that were not listed in Cope (1870a, 1870b), but were vouchered with Cope's material and discovered at a later date at the Academy of Natural Sciences [of Philadelphia] of Drexel University.

Family/Scientific Name Applied by Cope	**Current or Reidentified Scientific Name**	**Currently Accepted Common Name**	**Comments**
Petromyzontidae			
Petromyzon Linnaeus	*Petromyzon marinus* Linnaeus	Sea Lamprey	Only reported in Cope's appended table (Cope 1870b, p494)
Acipenseridae			
Acipenser Linnaeus	Acipenser Linnaeus sp.	Sturgeon	Only reported in Cope's appended table (Cope 1870b, p494)
Polyodontidae			
Polyodon folium Bloch & Schneider	*Polyodon spathula* (Walbaum)	Paddlefish	Only reported in Cope's appended table (Cope 1870b, p494)
Lepisosteidae			
Lepidosteus huronensis Richardson	*Lepisosteus osseus* Linnaeus	Longnose Gar	Cope did not see in NC, but did in TN
Lepidosteus osseus Linnaeus	*Lepisosteus osseus* Linnaeus	Longnose Gar	
Lepidosteus Lacepède	*Lepisosteus osseus* Linnaeus	Longnose Gar	
Amiidae			
? Amia Linnaeus	*Amia calva* Linnaeus	Bowfin	Only reported in Cope's appended table (Cope 1870b, p494)
Anguillidae			
Anguilla Schrank	*Anguilla rostrata* Lesueur	American Eel	
Leuciscidae			
Campostoma anomalum Rafinesque	*Campostoma anomalum* (Rafinesque)	Central Stoneroller	
Clinostomus affinis Girard	*Clinostomus funduloides* Girard	Rosyside Dace	
Hypsilepis analostanus Girard	*Cyprinella analostana* Girard	Satinfin Shiner	
Hypsilepis analostanus Girard	*Cyprinella chloristia* (Jordan & Brayton)	Greenfin Shiner	
Hypsilepis galacturus Cope	*Cyprinella galactura* (Cope)	Whitetail Shiner	
Ceratichthys labrosus Cope	*Cyprinella labrosa* (Cope)	Thicklip Chub	
Hybopsis niveus Cope*	*Cyprinella nivea* (Cope)	Whitefin Shiner	
Photogenis pyrrhomelas Cope*	*Cyprinella pyrrhomelas* (Cope)	Fieryblack Shiner	
Ceratichthys labrosus Cope*	*Cyprinella zanema* (Jordan & Brayton)	Santee Chub	
Hybognathus argyritis Girard	*Hybognathus regius* Girard	Eastern Silvery Minnow	
Ceratichthys hyalinus Cope	*Hybopsis amblops* (Rafinesque)	Bigeye Chub	
Ceratichthys hypsinotus Cope*	*Hybopsis hypsinotus* (Cope)	Highback Chub	

Table 2 (continued).

Family/Scientific Name Applied by Cope	Current or Reidentified Scientific Name	Currently Accepted Common Name	Comments
Hypsilepis cornutus Mitchill Var. *cornutus* Cope	*Luxilus albeolus* (Jordan)	White Shiner	
Hypsilepis cornutus, var. *fontinalis* Cope	*Luxilus chrysocephalus* Rafinesque	Striped Shiner	Only reported in Cope's appended table (Cope 1870b, p494)
Hypsilepis coccogenis Cope	*Luxilus coccogenis* (Cope)	Warpaint Shiner	
Alburnellus matutinus Cope	*Lythrurus matutinus* (Cope)	Pinewoods Shiner	
Ceratichthys biguttatus Kirtland	*Nocomis leptocephalus* (Girard)	Bluehead Chub	
Ceratichthys biguttatus Kirtland	*Nocomis micropogon* (Cope)	River Chub	
Stilbe americana Linnaeus.	*Notemigonus crysoleucas* (Mitchell)	Golden Shiner	
	Notropis alborus (Hubbs & Raney)**	Whitemouth Shiner	ANSP 2027
Photogenis leucops Cope Var. *aaaa*a	*Notropis amoenus* (Abbott)	Comely Shiner	
Hybopsis chiliticus Cope*	*Notropis chiliticus* (Cope)	Redlip Shiner	
Hybopsis chlorocephalus Cope*	*Notropis chlorocephalus* (Cope)	Greenhead Shiner	
Hybopsis amarus Girard	*Notropis hudsonius* (Clinton)	Spottail Shiner	
Photogenis leuciodus Cope	*Notropis leuciodus* (Cope)	Tennessee Shiner	
? *Alburnellus micropteryx* Cope	*Notropis micropteryx* (Cope)	Highland Shiner	Only reported in Cope's appended table (Cope 1870b, p494)
	Notropis petersoni Fowler**	Coastal Shiner	ANSP 2031
Photogenis leucops Cope Var. *aaaa*	*Notropis photogenis* (Cope)	Silver Shiner	
Photogenis leucops Cope Var. *aaaa*a	*Notropis scepticus* (Jordan & Gilbert)	Sandbar Shiner	
Hybopsis spectrunculus Cope	*Notropis spectrunculus* (Cope)	Mirror Shiner	
Photogenis telescopus Cope	*Notropis telescopus* (Cope)	Telescope Shiner	
Argyreus lunatus Cope (*Rhinichthys lunatus* Cope)	*Rhinichthys obtusus* Agassiz	Western Blacknose Dace	
Semotilus corporalis Mitchill	*Semotilus atromaculatus* (Mitchill)	Creek Chub	
Catostomidae			
Carpiodes Rafinesque sp.	*Carpiodes* Rafinesque sp.	Quillback and River Carpsucker	Only reported in Cope's appended table (Cope 1870b, p494)
Catostomus teres Mitchill	*Catostomus commersonii*	White Sucker	
Moxostoma oblongum Mitchill	*Erimyzon oblongus* (Mitchill)	Eastern Creek Chubsucker	
Catostomus nigricans Lesueur	*Hypentelium nigricans* (Lesueur)	Northern Hog Sucker	
Amblodon Rafinesque	*Ictiobus* Rafinesque spp.	Buffalo	Only reported in Cope's appended table (Cope 1870b, p494)
Ptychostomus pidiensis Cope*	*Minytrema melanops* Rafinesque	Spotted Sucker	

Table 2 (continued).

Family/Scientific Name Applied by Cope	Current or Reidentified Scientific Name	Currently Accepted Common Name	Comments
Ptychostomus cervinus Cope	*Moxostoma cervinum* (Cope)	Blacktip Jumprock	
Ptychostomus collapsus Cope*	*Moxostoma collapsum* (Cope)	Notchlip Redhorse	
Ptychostomus albus Cope*	*Moxostoma collapsum* (Cope)	Notchlip Redhorse	
Ptychostomus robustus Cope*	*Moxostoma robustum* (Cope)	Robust Redhorse	
Ptychostomus thalassinus Cope*	*Moxostoma collapsum* (Cope)	Notchlip Redhorse	
	Moxostoma duquesnei (Lesueur)*	Black Redhorse	ANSP 6732
Ptychostomus erythurus Rafinesque	*Moxostoma erythrurum* (Rafinesque)	Golden Redhorse	
Ptychostomus coregonus Cope*	*Moxostoma macrolepidotum* (Lesueur)	Shorthead Redhorse	
Ptychostomus lachyrmalis Cope*	*Moxostoma macrolepidotum* (Lesueur)	Shorthead Redhorse	
Ptychostomus crassilabris Cope*	*Moxostoma macrolepidotum* (Lesueur)	Shorthead Redhorse	
Ptychostomus conus Cope*	*Moxostoma macrolepidotum* (Lesueur)	Shorthead Redhorse	
Ptychostomus pappillosus Cope*	*Moxostoma pappillosum* (Cope)	V-lip Redhorse	
Ptychostomus crassilabris Cope	*Moxostoma macrolepidotum* (Lesueur)	Shorthead Redhorse	
Ptychostomus cervinus Cope	*Moxostoma rupiscartes* Jordan & Jenkins	Striped Jumprock	
Ictaluridae			
	Ameiurus brunneus Jordan**	Snail Bullhead	ANSP 8474
Amiurus lynx Girard	*Ameiurus catus* (Linnaeus)	White Catfish	"Some specimens which I obtained at from Newberne, on the Neuse River were lost, but I suspect them to have been this species" (Cope 1870b, p475)
	Ameiurus nebulosus (Lesueur)**	Brown Bullhead	ANSP 8438
Amiurus niveiventris Cope*	*Ameiurus catus* (Linnaeus)	White Catfish	
Amiurus platycephalus Girard	*Ameiurus platycephalus* (Girard)	Flat Bullhead	Cope misidentified *A. brunneus* as *A. platycephalus* (Jordan and Brayton 1878)
Ictalurus coerulescens Rafinesque	*Ictalurus punctatus* (Rafinesque)	Channel Catfish	
Noturus marginatus Baird	*Noturus insignis* (Richardson)	Margined Madtom	
Hopladelus olivaris [*Opladelus olivaris*] Rafinesque	*Pylodictis olivaris* (Rafinesque)	Flathead Catfish	Only reported in Cope's appended table (Cope 1870b, p494)

Table 2 (continued).

Family/Scientific Name Applied by Cope	Current or Reidentified Scientific Name	Currently Accepted Common Name	Comments
Esocidae			
Esox ravenelii Holbrook	*Esox americanus* Gmelin	Redfin Pickerel	
Stizostedium americanum Cuvier	*Esox masquinongy* Mitchell	Muskellunge	
Esox affinis Holbrook	*Esox niger* Lesueur	Chain Pickerel	
Salmonidae			
Salmo fontinalis Mitchill	*Salvelinus fontinalis* (Mitchell)	Brook Trout	
Apherdoderidae			
Apherdodirus sayanus Gilliams	*Aphredoderus sayanus* (Gilliams)	Pirate Perch	
Poeciliidae			
Haplochilus melanops Cope*	*Gambusia holbrooki* Girard	Eastern Mosquitofish	
Cottidae			
Uranidea carolinae Gill	*Cottus carolinae* (Gill)	Banded Sculpin	
Moronidae			
Roccus lineatus Bloch	*Morone saxatilis* (Walbaum)	Striped Bass	
Centrarchidae			
Ambloplites rupestris Rafinesque	*Ambloplites rupestris* (Rafinesque)	Rock Bass	
Centrarchus irideus Cuvier	*Centrarchus macropterus* (Lacepède)	Flier	
Enneacanthus guttatus Morris	*Enneacanthus gloriosus* (Holbrook)	Bluespotted Sunfish	
Lepomis rubricauda Holbrook	*Lepomis auritus* (Linnaeus)	Redbreast Sunfish	
Pomotis maculatus Mitchill	*Lepomis gibbosus* (Linnaeus)	Pumpkinseed	
Chænobryttus gillii Cope	*Lepomis gulosus* (Cuvier)	Warmouth	
Lepomis notatus Agassiz	*Lepomis macrochirus* Rafinesque	Bluegill	
Lepomis purpurescens Cope*	*Lepomis macrochirus* Rafinesque	Bluegill	
Lepomis megalotis Rafinesque	*Lepomis megalotis* (Rafinesque)	Longear Sunfish	
Micropterus fasciatus DeKay	*Micropterus dolomieu* Lacepède	Smallmouth Bass	
Micropterus nigricans Cuvier	*Micropterus salmoides* (Lacepède)	Largemouth Bass	
Pomoxys hexacanthus Cuvier	*Pomoxis nigromaculatus* (Lesueur)	Black Crappie	
Percidae			
Hyostoma cymatogrammum Abbott	*Etheostoma blennioides* Rafinesque	Greenside Darter	
Poecilichthys flabellatus Rafinesque Var. Cope	*Etheostoma brevispinum* (Coker)	Carolina Fantail Darter	
Poecilichthys flabellatus Rafinesque	*Etheostoma flabellare* Rafinesque	Fantail Darter	Only reported in Cope's appended table (Cope 1870b, p494)
Boleosoma efflulgens Girard	*Etheostoma olmstedi* Storer	Tessellated Darter	Cope did not collect, but identified for Samuel C. Collins (Cope 1870b)

Table 2 (continued).

Family/Scientific Name Applied by Cope	**Current or Reidentified Scientific Name**	**Currently Accepted Common Name**	**Comments**
Boleosoma maculaticeps Cope*	*Etheostoma olmstedi* Storer	Tessellated Darter	
Poecilichthys rufilineatus Cope*	*Etheostoma rufilineatum* (Cope)	Redline Darter	
Hyostoma simoterum Cope	*Etheostoma simoterum* (Cope)	Snubnose Darter	Only reported in Cope's appended table (Cope 1870b, p494)
Poecilichthys vitreus Cope*	*Etheostoma vitreum* (Cope)	Glassy Darter	
Poecilichthys vulneratus Cope*	*Etheostoma vulneratum* (Cope)	Wounded Darter	
Poecilichthys zonalis Cope	*Etheostoma zonale* (Cope)	Banded Darter	
Perca flavescens Cuvier	*Perca flavescens* (Mitchill)	Yellow Perch	
Cottogaster aurantiacus Cope (*Hypohomus aurantiacus* Cope)	*Percina aurantiaca* (Cope)	Tangerine Darter	
Etheostoma maculatum Girard	*Percina crassa* Jordan & Brayton	Piedmont Darter	
Etheostoma nevisense Cope*	*Percina nevisense* (Cope)	Chainback Darter	
Stizostedium Rafinesque sp.	*Sander* Oken sp.	Walleye and Sauger	Cope did not see
Stizostedium americanum Cuvier	*Sander vitreus* (Mitchell)	Walleye	
Stizostedium salmoneum Rafinesque	*Sander vitreus* (Mitchell)	Walleye	Only reported in Cope's appended table (Cope 1870b, p494)

Table 3. Species identified by Cope, their verbatim collection localities as written in Cope (1870a, 1870b), where vouchered, and type specimens are currently curated (ANSP = Academy of Natural Sciences of Drexel University, USNM = the National Museum of Natural History, and UMMZ = University of Michigan Museum of Zoology (UMMZ). If the verbatim locality was not mentioned in the body of Cope's text, but only as recorded from a specific basin (Cope 1870, p494-495), the record is listed as "basin." * = Lot that was gifted to USNM and split into two species. ** = *Moxostoma cervinum* was reported from the Roanoke River in North Carolina (Cope 1870b, p479). *** = Species subsequently identified, but not listed in Cope (1870b). **** = Identified by H. W. Fowler

			River Basin					
Publication/ Page No.	**Cope's Scientific Name**	**Current Scientific Name**	**French Broad**	**Catawba**	**Yadkin**	**Neuse**	**Cape Fear**	**Specimens Vouchered?**
	Petromyzontidae							
1870b, p495	*Petromyzon*	*Petromyzon marinus*		Catawba Basin				No
	Acipenseridae							
1870b, p492	*Accipenser*	*Acipenser* sp.				in the Atlantic rivers		No
	Polyodontidae							
1870b, p492	*Polyodon folium*	*Polyodon spathula*	ascends the same river [French Broad] to near Asheville					No
	Lepisosteidae							
1870b, p492	*Lepidosteus huronensis*	*Lepidosteus osseus*	French Broad					No
1870b, p492	*Lepidosteus osseus*	*Lepidosteus osseus*			Yadkin and other eastern rivers of the State	Yadkin and other eastern rivers of the State		No
1870b, p495	*Lepidosteus*	*Lepidosteus osseus*		Catawba Basin				No
	Amiidae							
1870b, p492	*? Amia*	*Amia calva*				Neuse River		No
	Anguillidae							
1870b, p491	*Anguilla*	*Anguilla rostrata*				all the Atlantic waters of North Carolina		No

Table 3 (continued).

			River Basin					
Publication/ Page No.	**Cope's Scientific Name**	**Current Scientific Name**	**French Broad**	**Catawba**	**Yadkin**	**Neuse**	**Cape Fear**	**Specimens Vouchered?**
	Leuciscidae							
1870b, p495	*? Alburnellus micropteryx*	*Notropis micropteryx*	French Broad Basin					No
1870b, p465	*Alburnellus altipinnis*	*Notropis altipinnis*			Yadkin River, Roane County, ANSP 2846 (lectotype), 2847 (paralectotype)			
1870b, p465	*Alburnellus altipinnis*	*Notropis petersoni****			Yadkin River, Roane County, ANSP 2031 (paratype)			
1870b, p465	*Alburnellus matutinus*	*Lythrurus matutinus*				Neuse River, in Wake County, ANSP 2844 (syntypes)		
	*Alburnellus umbratilis*****	*Notropis leuciodus*	French Broad River, ANSP 2315, 2400					
1870b, p459	*Argyreus lunatus*	*Rhinichthys obtusus*	tributaries of the French Broad River, ANSP 4966, 5339					
1870b, p466	*Campostoma anomalum*	*Campostoma anomalum*	French Broad River, ANSP 5978	Catawba River, ANSP 5848				

Table 3 (continued).

			River Basin					
Publication/ Page No.	**Cope's Scientific Name**	**Current Scientific Name**	**French Broad**	**Catawba**	**Yadkin**	**Neuse**	**Cape Fear**	**Specimens Vouchered?**
1870b, p459	Ceratichthys biguttatus	Nocomis leptocephalus	rivers of East Tennessee and North Carolina, from the heads of the Cumberland, to, and including the Neuse	rivers of East Tennessee and North Carolina, from the heads of the Cumberland, to, and including the Neuse, ANSP 1826	rivers of East Tennessee and North Carolina, from the heads of the Cumberland, to, and including the Neuse, ANSP1850, 2028	rivers of East Tennessee and North Carolina, from the heads of the Cumberland, to, and including the Neuse		
1870b, p459	*Ceratichthys biguttatus*	*Nocomis micropogon*	rivers of East Tennessee and North Carolina, from the heads of the Cumberland, to, and including the Neuse	rivers of East Tennessee and North Carolina, from the heads of the Cumberland, to, and including the Neuse	rivers of East Tennessee and North Carolina, from the heads of the Cumberland, to, and including the Neuse	rivers of East Tennessee and North Carolina, from the heads of the Cumberland, to, and including the Neuse		No
1870b, p459	*Ceratichthys hyalinus*	*Hybopsis amblops*	French Broad River, ANSP 2143, 5981					

Table 3 (continued).

			River Basin					
Publication/ Page No.	**Cope's Scientific Name**	**Current Scientific Name**	**French Broad**	**Catawba**	**Yadkin**	**Neuse**	**Cape Fear**	**Specimens Vouchered?**
1870b, p459	*Ceratichthys hypsinotus*	*Hybopsis hypsinotus*		in creeks heading the Catawba R., in Macdowell Co.	in tributary to the Yadkin River in Roane Co., ANSP 2005 (lectotype), 2006 (paralectotype), 2033 (paralectotype), 2024, USNM 118113 (syntype)			
1870b, p459	*Ceratichthys hypsinotus*	*Nocomis leptocephalus*			in tributary to the Yadkin River in Roane Co., USNM 343603 (syntype), ANSP 2003 (paralectotype), 2023 (paralectotype)			
1870b, p459	*Ceratichthys hypsinotus*	*Moxostoma pappillosum*			in tributary to the Yadkin River in Roane Co., ANSP 2022 (paralectotype)			

Table 3 (continued).

			River Basin					
Publication/ Page No.	**Cope's Scientific Name**	**Current Scientific Name**	**French Broad**	**Catawba**	**Yadkin**	**Neuse**	**Cape Fear**	**Specimens Vouchered?**
1870b, p458	*Ceratichthys labrosus*	*Cyprinella labrosa*		clear and rapid creeks which flow into the upper waters of the Catawba River, in Macdowell and Burke Counties, ANSP 2045 (lectotype), 2046 (paralectotype)	1870b, p458	*Ceratichthys labrosus*	*Cyprinella labrosa*	
1870b, p458	*Ceratichthys labrosus*	*Cyprinella zanema*		clear and rapid creeks which flow into the upper waters of the Catawba River, in Macdowell and Burke Counties, ANSP 2041 (paralectotypes), 2044 (paralectotype), 2047 (paralectotype)				
1870b, p465	*Clinostomus affinis*	*Clinostomus funduloides*		waters of the Catawba, ANSP 4200	waters of the Yadkin, ANSP 2032			
1870b, p466	*Hybognathus argyritis*	*Hybognathus regius*		Catawba River, ANSP 2720, 5097				
1870b, p494	*Hybopsis ? amarus*	*Notropis hudsonius*				Neuse Basin		No

Table 3 (continued).

			River Basin					
Publication/ Page No.	**Cope's Scientific Name**	**Current Scientific Name**	**French Broad**	**Catawba**	**Yadkin**	**Neuse**	**Cape Fear**	**Specimens Vouchered?**
1870b, p460	*Hybopsis amarus*	*Notropis hudsonius*		Catawba River, ANSP 3057				
1870b, p462	*Hybopsis chiliticus*	*Notropis chiliticus*			tributaries of the Yadkin River, in Roane County, ANSP 4378 (lectotype), 4379 (paralectotypes)			
1870b, p461	*Hybopsis chlorocephalus*	*Notropis chlorocephalus*		tributaries of the Catawba River, ANSP 2755 (lectotype), 2756 (paralectotypes), 2803 (paratypes)				
1870b, p461	*Hybopsis chlorocephalus*	*Hybopsis hypsinotus*		tributaries of the Catawba River, ANSP 2768 (paralectotype)				
1870b, p461	*Hybopsis longiceps*	*Notropis alborus****		ANSP 2027 (Yadkin River)				
1870b, p461	*Hybopsis niveus*	*Cyprinella nivea*		upper waters of the Catawba River, ANSP 2930 (lectotype), 2931 (paralectotypes), 2948 (paratype)		1870b, p461	*Hybopsis niveus*	*Cyprinella nivea*

Table 3 (continued).

			River Basin					
Publication/ Page No.	**Cope's Scientific Name**	**Current Scientific Name**	**French Broad**	**Catawba**	**Yadkin**	**Neuse**	**Cape Fear**	**Specimens Vouchered?**
1870b, p460	*Hybopsis spectrunculus*	*Notropis spectrunculus*	tributaries of the French Broad in the high valley of Henderson County, ANSP 2142, 4354					
1870b, p459	*Hypsilepis cornutus Var. cornutus*	*Luxilus albeolus*				Neuse River, ANSP 2325, 3237, 3238, 4352		
1870b, p459, 494	*Hypsilepis analostanus*	*Cyprinella analostana*			Yadkin Basin, ANSP 3196, 3239	Neuse River, ANSP 3028		
1870b, p459	*Hypsilepis analostanus*	*Cyprinella chloristia*		Catawba River, ANSP 2722, 3479				
1870b, p459	*Hypsilepis coccogenis*	*Luxilus coccogenis*	French Broad River, ANSP 3661					
1870b, p494	*Hypsilepis cornutus*, var. *fontinalis* Cope	*Luxilus chrysocephalus*	French Broad Basin					No
1870b, p459	*Hypsilepis galacturus*	*Cyprinella galactura*	all tributaries of the French Broad, ANSP 3321	ANSP 3218, [Catawba River - Incorrect locality; Cope (1870b, p459): "*It does not occur east of the Alleghenies*"]				

Table 3 (continued).

			River Basin					
Publication/ Page No.	**Cope's Scientific Name**	**Current Scientific Name**	**French Broad**	**Catawba**	**Yadkin**	**Neuse**	**Cape Fear**	**Specimens Vouchered?**
1870b, p463	*Photogenis leuciodus*	*Notropis leuciodus*	tributaries of the French Broad River, ANSP 2363					
1870b, p463	*Photogenis leucops Var. aaaa*	*Notropis photogenis*	French Broad River, ANSP 3132					
1870b, p463	*Photogenis leucops Var. aaaaa*	*Notropis amoenus*				Neuse River, near Raleigh, ANSP 3027		
1870b, p463	*Photogenis leucops Var. aaaaa*	*Notropis scepticus*		head waters of the Catawba River, ANSP 3063				
1870b, p464	*Photogenis pyrrhomelas*	*Cyprinella pyrrhomelas*		tributaries of the upper Catawba River, ANSP 2631 (lectotype), 2632 (paralectotype)				
1870b, p463	*Photogenis telescopus*	*Notropis telescopus*	French Broad River, ANSP 2146, 2257, 2387					
1870b, p494	*Rhinichthys lunatus*	*Rhinichthys obtusus*	French Broad Basin					No
1870b, p457	*Semotilus corporalis*	*Semotilus atromaculatus*	French Broad River	Catawba River	Yadkin River, ANSP 4640	Neuse River, ANSP 4731	Deep River	
1870b, p465	*Stilbe americana*	*Notemigonus crysoleucas*		still and sluggish water of the Catawba Basin, ANSP 4405	still and sluggish water of the Yadkin Basin	still and sluggish water of the Neuse Basin, ANSP 2328, 4541		

Table 3 (continued).

			River Basin					
Publication/ Page No.	**Cope's Scientific Name**	**Current Scientific Name**	**French Broad**	**Catawba**	**Yadkin**	**Neuse**	**Cape Fear**	**Specimens Vouchered?**
	Catostomidae							
1870b, p494	*Amblodon*	*Ictiobus* sp.	French Broad Basin					No
1870b, p479	*Carpiodes sp.*	*Carpiodes* sp.	French Broad					No
1870b, p468	*Catostomus nigricans*	*Hypentelium nigricans*	French Broad River					No
1870b, p468	*Catostomus teres*	*Catostomus commersonii*	all rivers of the State and on both sides of the Allegheny water-shed, ANSP 6726	all rivers of the State and on both sides of the Allegheny water-shed, ANSP 6721	all rivers of the State and on both sides of the Allegheny water-shed	all rivers of the State and on both sides of the Allegheny water-shed		
1870b, p468	*Moxostoma oblongum*	*Erimyzon oblongus*				Neuse River		No
1870b, p472	*Ptychostomus albus*	*Moxostoma collapsum*		Catawba River				No
1870b, p478	*Ptychostomus cervinus*	*Moxostoma cervinum***						No
1870b, p478	*Ptychostomus cervinus*	*Moxostoma rupiscartes*		Catawba River, ANSP 6920, 6922, 6927				
1870b, p471	*Ptychostomus collapsus*	*Moxostoma collapsum*		Catawba River	Yadkin River	Neuse River, ANSP 6949 (lectotype), 6950 (paralectotype)		
1870b, p478	*Ptychostomus conus*	*Moxostoma macrolepidotum*			Yadkin River			No
1870b, p472	*Ptychostomus coregonus*	*Moxostoma macrolepidotum*		Catawba River	Yadkin River			No

Table 3 (continued).

			River Basin					
Publication/ Page No.	**Cope's Scientific Name**	**Current Scientific Name**	**French Broad**	**Catawba**	**Yadkin**	**Neuse**	**Cape Fear**	**Specimens Vouchered?**
1870b, p472	*Ptychostomus coregonus*	*Moxostoma rupiscartes*		Catawba River, ANSP 6925 (syntype?)				
1870b, p477	*Ptychostomus crassilabris*	*Moxostoma macrolepidotum*				Neuse River, near Raleigh, ANSP 6957, 6960 (holotype)		
	Ptychostomus duquesnei	*Moxostoma duquesnei****	French Broad River, ANSP 6732					
1870b, p474	*Ptychostomus erythurus*	*Moxostoma erythrurum*	French Broad Basin, ANSP 6730					
1870b, p475	*Ptychostomus lachyrmalis*	*Moxostoma erythrurum*****				Neuse River at New Bern [incorrect and unknown locality], ANSP 6848		
	Ptychostomus lachyrmalis	*Moxostoma macrolepidotum*				Neuse River at New Bern, ANSP 6849		
1870b, p470	*Ptychostomus pappillosus*	*Moxostoma pappillosum*		Catawba River, ANSP 6921 (syntype?), 6926 (syntype?)	Yadkin River			

Table 3 (continued).

			River Basin					
Publication/ Page No.	**Cope's Scientific Name**	**Current Scientific Name**	**French Broad**	**Catawba**	**Yadkin**	**Neuse**	**Cape Fear**	**Specimens Vouchered?**
1870b, p471	*Ptychostomus pidiensis*	*Minytrema melanops*			traps in the Yadkin River, at the plantation of John Kuntz, ANSP 6968 (lectotype)			
1870b, p471	*Ptychostomus pidiensis*	*Moxostoma collapsum*			traps in the Yadkin River, at the plantation of John Kuntz, ANSP 6969 (paralectotypes)			
1870b, p473	*Ptychostomus robustus*	*Moxostoma robustum*			Yadkin River			No
	Ptychostomus robustus	*Moxostoma macrolepidotum*			Yadkin River [Incorrect locality; not from the Yadkin River], ANSP 6958 (lectotype), 6959 (paralectotype)			
1870b, p473	*Ptychostomus thalassinus*	*Moxostoma collapsum*			Yadkin River			No
	Ptychostomus velatus	*Moxostoma collapsum*			Yadkin River, ANSP 6954 (lectotype), 6955 (paralectotype)			

Table 3 (continued).

			River Basin					
Publication/ Page No.	**Cope's Scientific Name**	**Current Scientific Name**	**French Broad**	**Catawba**	**Yadkin**	**Neuse**	**Cape Fear**	**Specimens Vouchered?**
	Ictaluridae							
1870b, p487	*Amiurus lynx*	*Ameiurus catus*				Newberne, on the Neuse River		No
1870b, p489	*Amiurus niveiventris*	*Ameiurus catus*				Neuse River, ANSP 8466 (syntypes)		
1870b, p486	*Amiurus platycephalus*	*Ameiurus platycephalus*		Catawba River	Yadkin River			No
	Amiurus platycephalus	*Ameiurus brunneus****		Catawba River, ANSP 8474				
	Amiurus platycephalus	*Ameiurus nebulosus****		Catawba River, ANSP 8438				
1870b, p495	*Hopladelus olivaris*	*Pylodictis olivaris*	French Broad Basin					No
1870b, p489	*Ictalurus coerulescens*	*Ictalurus punctatus*	French Broad					No
1870b, p484	*Noturus marginatus*	*Noturus insignis*		Catawba River, ANSP 8437	Yadkin River, ANSP 8433			
	Esocidae							
	Esox	*Esox* sp. [E. americanus]		Catawba River, ANSP 7686				
1870b, p457, 494	*Esox affinis*	*Esox niger*		Catawba Basin (locality or identification mistake)		Neuse River, ANSP 7673		
1870b, p457, 494	*Esox raveneli*	*Esox americanus*		Catawba River, ANSP 7682, UMMZ 157006		Neuse Basin		
	Salmonidae							
1870b, p489, 494	*Salmo fontinalis*	*Salvelinus fontinalis*	one of the heads of the French Broad	Catawba Basin				No

Table 3 (continued).

			River Basin					
Publication/ Page No.	**Cope's Scientific Name**	**Current Scientific Name**	**French Broad**	**Catawba**	**Yadkin**	**Neuse**	**Cape Fear**	**Specimens Vouchered?**
	Aphredoderidae							
1870b, p455	*Aphredodirus sayanus*	*Aphredoderus sayanus*				sluggish waters tributary to the Neuse River in Wake County		No
	Poeciliidae							
1870b, p457	*Haplochilus melanops*	*Gambusia holbrooki*				still waters of the Neuse basin, Wake Co., ANSP 7143 (syntypes)		
	Cottidae							
1870b, p455	*Uranidea carolinæ*	*Cottus carolinae*	French Broad River in Madison County, ANSP 11838					
	Uranidea carolinæ	*Cottus carolinae****	French Broad River [Henderson County, incorrect county; most likely Madison County], USNM 14985					
	Moronidae							
1870b, p448, 493	*Roccus lineatus*	*Morone saxatilis*			Yadkin River	Neuse River		No

Table 3 (continued).

			River Basin					
Publication/ Page No.	**Cope's Scientific Name**	**Current Scientific Name**	**French Broad**	**Catawba**	**Yadkin**	**Neuse**	**Cape Fear**	**Specimens Vouchered?**
	Centrarchidae							
1870b, p451	*Ambloplites rupestris*	*Ambloplites rupestris*	French Broad, ANSP 2317, 12837					
	*Ambloplites rupestris*****	*Ambloplites rupestris*		Catawba River [Incorrect locality; Cope (1870b, p451): "*none found east of the Alleghenies*"], ANSP 12824	Tributary of the Yadkin River [Incorrect locality; Cope (1870b, p451): "*none found east of the Alleghenies*"], ANSP 13083			
1870b, p451	*Centrarchus irideus*	*Centrarchus macropterus*				Neuse River		No
1870b, p452	*Chœnobryttus gillii*	*Lepomis gulosus*		all streams of North Carolina east of the Allegheny Mountains, ANSP 12790	all streams of North Carolina east of the Allegheny Mountains	all streams of North Carolina east of the Allegheny Mountains, ANSP 12774		
1870b, p452	*Enneacanthus guttatus*	*Enneacanthus gloriosus*				Neuse River in still water, ANSP 12783		
1870b, p452	*Lepomis megalotis*	*Lepomis megalotis*	upper waters of the French broad [near Henderson]					No

Table 3 (continued).

			River Basin					
Publication/ Page No.	**Cope's Scientific Name**	**Current Scientific Name**	**French Broad**	**Catawba**	**Yadkin**	**Neuse**	**Cape Fear**	**Specimens Vouchered?**
1870b, p453	*Lepomis notatus*	*Lepomis macrochirus*	upper French Broad River [near Henderson], ANSP 12996					
1870b, p454	*Lepomis purpurescens*	*Lepomis macrochirus*			tributary of the Yadkin River in Roane County, ANSP 13067 (paralectotypes), 13066 (lectotype)			
1870b, p452	*Lepomis rubricauda*	*Lepomis auritus*		hydrographic basin of the Catawba, ANSP 13108	hydrographic basin of the Yadkin, ANSP 13078	hydrographic basin Neuse		
1870b, p450	*Micropterus fasciatus*	*Micropterus dolomieu*	French Broad					No
1870b, p451	*Micropterus nigricans*	*Micropterus salmoides*	upper and lower French Broad, ANSP 12724, 12758	Catawba, ANSP 12707, 12915	Yadkin, ANSP 12728	Neuse, ANSP 15973		
1870b, p455	*Pomotis maculatus*	*Lepomis gibbosus*		all the rivers of North Carolina east of the Allegheny Range, ANSP 12910*	all the rivers of North Carolina east of the Allegheny Range, ANSP 13079*, USNM 343603*	all the rivers of North Carolina east of the Allegheny Range		

Table 3 (continued).

			River Basin					
Publication/ Page No.	**Cope's Scientific Name**	**Current Scientific Name**	**French Broad**	**Catawba**	**Yadkin**	**Neuse**	**Cape Fear**	**Specimens Vouchered?**
	Pomotis maculatus	*Lepomis gibbosus*	French Broad River [Incorrect locality; Cope (1870b, p455): "*From all rivers of North Carolina, east of the Alleghany Range*"], ANSP 13011*, USNM 118113*					
1870b, p451	*Pomoxys hexacanthus*	*Pomoxis nigromaculatus*				Neuse River, ANSP 15974		
	Percidae							
1870a, p269	*Boleosoma effulgens*	*Etheostoma olmstedi*					tributary of Deep River, Guilford co.	No
1870b, p450	*Boleosoma effulgens*	*Etheostoma olmstedi*					Deep River, Guilford Co.	No
1870a, p269; 1870b, p450	*Boleosoma maculaticeps*	*Etheostoma olmstedi*		upper waters of the Catawba River, ANSP 13862 (lectotype), 13863 (paralectotypes)				

Table 3 (continued).

			River Basin					
Publication/ Page No.	**Cope's Scientific Name**	**Current Scientific Name**	**French Broad**	**Catawba**	**Yadkin**	**Neuse**	**Cape Fear**	**Specimens Vouchered?**
1870b, p494	*Boleosoma maculaticeps*	*Etheostoma olmstedi*		Catawba Basin	Yadkin Basin, ANSP 13823	Neuse Basin		
1870a, p262	*Cottogaster aurantiacus*	*Percina aurantiaca*	French Broad River in Madison co.					No
1870a, p262	*Etheostoma maculatum*	*Percina crassa*		upper waters of the Catawba River				No
1870b, p449	*Etheostoma maculatum*	*Percina crassa*		rapid waters of Buck Creek, which empties into the Catawba in Marion Co., ANSP 14000				
1870a, p262	*Etheostoma nevisense*	*Percina nevisense*				boisterous water at the falls of the Neuse River, 8 miles east of Raleigh		No
1870b, p449	*Etheostoma nevisense*	*Percina nevisense*				turbulent waters of the Neuse River		No
1870a, p270; 1870b, p450	*Hyostoma cymatogrammum*	*Etheostoma blennioides*	French Broad River, ANSP 22642					
1870b, p494	*Hyostoma simoterum*	*Etheostoma simoterum*	French Broad Basin					No
1870b, p449	*Hypohomus aurantiacus*	*Percina aurantiaca*	French Broad River in Madison co.					No
1870b, p448	*Perca flavescens*	*Perca flavescens*				Neuse River		No

Table 3 (continued).

			River Basin					
Publication/ Page No.	**Cope's Scientific Name**	**Current Scientific Name**	**French Broad**	**Catawba**	**Yadkin**	**Neuse**	**Cape Fear**	**Specimens Vouchered?**
1870a, p263	*Poecilichthys flabellatus*	*Etheostoma brevispinum*		upper waters of the Catawba River				No
1870b, p450	*Poecilichthys flabellatus*	*Etheostoma brevispinum*		Catawba River, ANSP 13476				
1870b, p494	*Poecilichthys flabellatus*	*Etheostoma flabellare*	French Broad Basin					No
1870a, p267	*Poecilichthys rufilineatus*	*Etheostoma rufilineatum*	Warm Springs Creek, which flows into the French Broad River, in Madison co., ANSP 13791 (lectotype), 13792 (paralectotypes)					
1870b, p450	*Poecilichthys rufilineatus*	*Etheostoma rufilineatum*	same localities as the past [Warm Springs Creek, Madison Co., N. Ca., a tributary of the French Broad River]					No
1870a, p264	*Poecilichthys vitreus*	*Etheostoma vitreum*				Walnut Creek, a tributary of the Neuse River, in Wake co., N. Carolina		No
1870b, p450	*Poecilichthys vitreus*	*Etheostoma vitreum*				Walnut Creek, a tributary of the Neuse River		

Table 3 (continued).

			River Basin					
Publication/ Page No.	**Cope's Scientific Name**	**Current Scientific Name**	**French Broad**	**Catawba**	**Yadkin**	**Neuse**	**Cape Fear**	**Specimens Vouchered?**
1870a, p267	*Poecilichthys vulneratus*	*Etheostoma vulneratum*	Warm Springs Creek, a tributary of the French Broad River, Madison co.					No
1870b, p450	*Poecilichthys vulneratus*	*Etheostoma vulneratum*	Warm Springs Creek, Madison Co., ANSP 13798 (holotype)					
1870a, p263	*Poecilichthys zonalis*	*Etheostoma zonale*	a tributary of the French Broad River, Madison co.					No
1870b, p450	*Poecilichthys zonalis*	*Etheostoma zonale*	French Broad River, ANSP 13771					
1870b, p448	*Stizostedium americanum*	*Sander vitreus*	French Broad, ANSP 13690					
1870b, p449	*Stizostedium salmoneum*	*Sander vitreus*	French Broad					No
1870b, p449	*Stizostedium* sp.	*Sander sp.*				Neuse		No

From his North Carolina trip, 138 lots representing 63 species and 943 specimens were subsequently curated at ANSP, the National Museum of Natural History (USNM), and the University of Michigan Museum of Zoology (Table 3). No additional lots of Cope's from his 1869 trip to North Carolina were found at any other museums (Muséum National d'Histoire Naturelle-Paris, American Museum of Natural History, Harvard Museum of Comparative Zoology, California Academy of Sciences, Cornell University Museum of Vertebrates, Field Museum of Chicago, Yale Peabody Museum of Ichthyology, Museum für Naturkunde-Germany, or the Natural History Museum-England). Various type specimens, including holotype, paratype, lectotype, paralectotype, or syntype, are represented in 49 lots (Table 3), with the remaining 89 lots representing non-type specimens. Of these 89 non-type lots, 57 of them were labeled and identified by Henry W. Fowler. In 2015, Mark Sabaj commented: "*the Cope non-types need some ID work*" (Mark Sabaj, ANSP, pers. comm.). In 2018 BHT reidentified eight of these lots (ANSP 2315, 2400, 2720, 2722, 3063, 3218, 3479, and 12824) as part of the Annotated Atlas of the Freshwater Fishes of North Carolina project (Tracy et al. 2020a). Although the remaining 49 lots bear re-examination, it was beyond the financial and time resources for either author to travel to the museum to verify the lots. We had to assume that Fowler's identifications were correct. Based upon this additional material curated at ANSP and USNM (Table 3), Cope's totals (from combining Tables 2 and 3) for these river systems are revised to: French Broad – 45 species, Catawba – 41 species, Yadkin – 29 species, and Neuse – 38 species.

Unfortunately, none of Cope's *Moxostoma* of subadult and adult size from the Yadkin and Catawba are extant at ANSP (REJ, pers. obs.), nor are the several species of *Moxostoma* that Cope described such *Ptychostomus albus, P. conus, P. coregonus,* and *P. thallasinus,* along with many other species (Table 3). The type specimens of Chainback Darter, *Percina nevisense,* and Glassy Darter, *Etheostoma vitreum*, do not exist at ANSP or were lost as were his specimens of Snubnose Darter, *E. simoterum*, from the French Broad system (USNM 14982; Tracy et al. 2020a).

DISCUSSION

Cope's Errors and Foibles as Viewed by Others and Those Which We Encountered

When Cope visited North Carolina, he was only 29 years of age, in the early part of his career, and had, up until that time, made only one serious scientific mistake - his placement of the *Elasmosaurus* cranium on the wrong end of the spinal cord (Cope 1868b; Cope 1869a; Davidson 2002). Herein, we narrowly focus only on issues that we have had to deal with when studying Cope's North Carolina material and his two keystone publications - Cope (1870a; 1870b).

Much has been written regarding Cope's mistakes, personally and professionally, throughout his life, most recently by Brinkman (2015, 2016), Davidson (2016), Hilton et al. (2014), Parker (2021), and Smith (2021). However, after Cope's death Gill (1897) and Myers (1932) took exception to many of his critics. In his remembrance of Cope Gill (1897) noted: "*Cope was the first to make known the richness of the cyprinoid and especially the catostomoid fauna of North Carolina. He added also very much to the nomenclature of those families. A large proportion of his names, it is true, have proved to be synonyms, but the fault was not entirely his. The ichthyologist who becomes familiar with the history of our fishes and the state of the literature respecting them when Cope began his labors is well prepared to condone his apparent lapses. The*

descriptions, so called, were mostly pure verbiage, and no well-constructed analytical tables of those families or any of the genera had been published. The comprehension of the range and character of specific variation was also then very vague. If any one ventured in the field at all, he was bound to fail more or less in recognizing the meaning of the old authors. Cope was one not to be deterred from investigation (as some were) by fear of such consequences and his work was at least superior to that of any of his predecessors. He cleared the way by his collections and his descriptions for those who might enjoy more facilities and the advantage of assembled specimens from many regions. Some of the most interesting genera of North America were first made known by him".

In celebration of the 100th anniversary of Cope's birth, Case (1940) counteracted Cope's distractors and Myers (1940) was even more defensive of Cope: "*To a modern student, Cope's faunal papers on fishes look strangely antiquated and shot through with peculiar errors. But to understand them we must force ourselves backward into the time when those papers were written, and consider the state in which knowledge then rested. . . . Above all, Cope had no named collections of consequence available to him; his only comparative material was what he himself collected! Viewed in this light, those antiquated papers on the fishes of the Holston, Clinch, Roanoke, Yadkin, Kanawha, and Youghiogheny take on a new meaning. Cope had entered the richest region of speciation in the North American fish fauna, and, over a good part of the area, he was the first naturalist to collect in it. It is a thrill long to be remembered to pull a seine in the upper reaches of the Yadkin, Roanoke, Holston, and James and to see each haul of the net complete a little of the picture of the most gorgeously colored array of fresh-water fishes that is known to exist anywhere on earth . . . those diagnoses formed the first really accurate and concise set of descriptions of North American darters and minnows ever published. . . . Cope made mistakes, but a great number of the worst ones fade out when examined closely. . . . Cope did not have the comparative material now available. . . . Cope has been vilified throughout the land for his carelessness with valuable specimens, which (one would suppose) he almost always (1) lost, (2) dissected, (3) untagged, or (4) mixed with others. . . . It is true that Cope was careless with his specimens. But it is also true that he was the only available man competent to handle most of the material that came to him, and he utilized this material with a thoroughness and brilliance that few subsequent investigators have equaled*".

We have long concluded that Cope must have been extremely impatient and perhaps consumed by his paleontological interests when writing Cope (1870a; 1870b). Between the time he spent in North Carolina and the date of these two publications (November 21, 1870), Cope had published an additional 37 papers, totaling 407 pages plus illustrations (Osborn 1929). In his haste to publish, Cope was inconsistent and erratic in his use of abbreviations, citations, years, pagination, punctuation, spelling, units of measurement (lines, inches, and metric), site (locality) descriptions, and errors of omission and addition in his only table on pages 494 and 495 (Cope 1870b). Despite describing 34 species in these two publications, Cope offered only two small illustrations. By contrast, Cope (1868a) had three plates of 25 beautifully illustrated and hand-painted fishes and Cope (1869b) had illustrations of 20 sets of pharyngeal teeth and 23 illustrations of whole body fishes.

Cope's understanding of geographical relationships were sometimes forgotten, for example when he reported that *Alburnellus matutinus* was the first species of the genus in Atlantic waters

where the preceding species, *A. altipinnis*, was reported: "*From the Yadkin River, Roane County, North Carolina*" (Cope 1870b, p465). In Cope (1870b) the numbering of species was erratic and his designation of new species was inconsistent; for example, new species were designated as Sp. nov, Spec. nov, *Spec. nova.*, *Species nova.*, or no designation at all. Lastly, Cope also did not specify his locales and general sites were described several different ways (Table 4). Case in point - did Cope sample multiple localities or a smaller number of localities, but described them differently in the various species descriptions? For example, while staying at Hot Springs in Madison County (Table 4) do sites ii, iii, iv, vii, xiii, xiv, and xv all refer to Spring Creek or to multiple creeks? If they referred to the same creek, why did Cope use different names? Or if they referred to different creeks, why were their proper names not given? This discrepancy in stream locales persisted across all his drainages (Table 4).

Table 4. Verbatim descriptions of the localities Cope collected at in the Fall 1869 based upon the chronological order of the letters to his father and Cope (1870a, 1870b).

Departing From/ Site No.	**Destination and Site Description**
Warm Springs, Madison Co., NC (Figure 5)	
i	"*French Broad in Madison co., N. Ca.*" (Cope 1870a)
ii	"*tributary of the French Broad River, Madison co., N. Ca.*" (Cope 1870a)
iii	"*Warm Springs Creek, a tributary of the French Broad River, Madison co., N. Carolina*" (Cope 1870a)
iv	"*Warm Springs Creek, which flows into the French Broad River, in Madison co., N. Ca*." (Cope 1870a)
v	"*French Broad River, N.Ca.*" (Cope 1870a)
vi	"*French Broad River, in Madison Co., North Carolina*" (Cope 1870b)
vii	"*Warm Springs Creek, Madison Co., N. Ca., a tributary of the French Broad River*" (Cope 1870b)
viii	"*French Broad River*" (Cope 1870b)
ix	"*French Broad*" (Cope 1870b)
x	"*lower French Broad*" (Cope 1870b)
xi	"*French Broad River in Madison County, North Carolina*" (Cope 1870b)
xii	"*French Broad River in North Carolina*" (Cope 1870b)
xiii	"*tributaries of the French Broad in North Carolina*" (Cope 1870b)
xiv	"*tributaries of the French Broad*" (Cope 1870b)
xv	"*waters of the tributaries of the French Broad River*" (Cope 1870b)
Mossy Creek, Jefferson Co., TN	
i	"*headwaters of the Cumberland River, Campbell co., Tenn*." (Cope 1870a)
ii	"*South fork of the Cumberland River, Campbell co., Tenn*." (Cope 1870a)
iii	"*South Fork of the Cumberland, Tenn*." (Cope 1870a)
iv	"*head of the Cumberland, Tenn.*" (Cope 1870a)
v	"*tributary of the Clinch River, Tenn.*" (Cope 1870a)
vi	"*Clinch*" (Cope 1870b)
vii	"*Cumberland*" (Cope 1870b)
viii	"*Clinch in Tennessee*" (Cope 1870b)
ix	"*head of Cumberland*" (Cope 1870b)
x	"*Coal Creek a tributary of the Clinch River*" (Cope 1870b)
xi	"*tributaries of the Clinch, East Tennessee*" (Cope 1870b)
xii	"*Coal Creek, a tributary of the Clinch, in East Tennessee*" (Cope 1870b)
xiii	"*Clinch River*" (Cope 1870b)
xiv	"*heads of the Cumberland*" (Cope 1870b)
xv	"*tributaries of the Holston River in Tennessee*" (Cope 1870b)

Table 4 (continued).

Departing From/ Site No.	Destination and Site Description
xvi	"*Coal Creek, a tributary of the Clinch River in Tennessee*" (Cope 1870b)
xvii	"*tributaries of the Clinch and Cumberland*" (Cope 1870b)
xviii	"*headwaters of the south fork of the Cumberland River in Tennessee*" (Cope 1870b)
xix	"*head waters of the Cumberland River*" (Cope 1870b)
xx	"*Coal Creek, a branch of the Clinch River, Tennessee*" (Cope 1870b)
xxi	"*tributary of the Clinch*" (Cope 1870b)
xxii	*Coal Creek, a tributary of the Clinch River, Tennessee*" (Cope 1870b)
xxiii	"*Holston and French Broad Rivers, in Tennessee*" (Cope 1870b)
xxiv	"*Clinch River, in Tennessee*" (Cope 1870b)
xxv	"*heads of the Cumberland or Clinch*" (Cope 1870b)
xxvi	"*French Broad from near Dandridge, E. Tennessee*" (Cope 1870b)
xxvii	"*South Fork of the Cumberland, in the Cumberland Mountain region, near Kentucky*" (Cope 1870b)
New River, Scott Co., TN	
i	*"Beech Fork of the head of the Cumberland*" (Cope 1870b
Alexander, Buncombe Co., NC	
i	Cope mentions stopping in this town for the night and procuring specimens and shipping them northward, but there is no record of what he obtained because the specimens were either lost or discarded (Letter No. 2).
Hendersonville, Henderson Co., NC	
i	*"upper French Broad*" (Cope 1870b)
ii	"*upper waters of the French broad*" (Cope 1870b)
iii	"*upper French Broad River, North Carolina*" (Cope 1870b)
iv	"*tributaries of the French Broad River in the high valley of Henderson County, North Carolina*" (Cope 1870b)
v	"*heads of the French Broad*" (Cope 1870b)
Asheville, Buncombe Co., NC	
i	Although Cope explored the Black Mountains, travelling up the Swannanoa and North Fork Swannanoa rivers up to Mount Mitchell, there is no mention of any collections in this area.
Pleasant Gardens, McDowell Co., NC (Figure 5)	
i	"*upper waters of the Catawba River*" (Cope 1870a; Cope 1870b)
ii	"*upper waters of the Catawba River, N. Ca.*" (Cope 1870a)
iii	"*upper waters of the Catawba River, N. Carolina*" (Cope 1870a)
iv	"*rapid waters of Buck Creek, which empties into the Catawba, in Marion* [McDowell] *Co., N. Ca."* (Cope 1870b)
v	"*Catawba River*" (Cope 1870b)
vi	"*Catawba*" (Cope 1870b)
vii	"*Catawba River, N. Ca.*" (Cope 1870b)
viii	"*clear and rapid creeks which flow into the upper waters of the Catawba River, in Macdowell* [McDowell] *and Burke Counties, N.Ca.*" (Cope 1870b)
ix	"*creeks heading the Catawba R., in Macdowell* [McDowell] *Co., N. Ca.*" (Cope 1870b)
x	"*upper waters of the Catawba River, North Carolina*" (Cope 1870b)
xi	"*clear waters which it inhabits, viz : the tributaries of the Catawba River*" (Cope 1870b)
xii	"*head waters of the Catawba River*" (Cope 1870b)
xiii	"*tributaries of the upper Catawba River, North Carolina*" (Cope 1870b)
xiv	"*waters of the Catawba*" (Cope 1870b)
xv	"*still and sluggish water of the Catawba Basin*" (Cope 1870b)
xvi	"*Catawba River, North Carolina*" (Cope 1870b)

Table 4 (continued).

Departing From/ Site No.	Destination and Site Description
Morganton, Burke Co., NC	
i	In the description of *Ceratichthys labrosus* (Cope 1870b, p 458) Cope mentions Burke County for the first time, although we have no additional evidence of where he collected in Burke County. Burke County is approximately 14 km northeast of Pleasant Gardens where he stayed.
ii	In the description of *Ptychostomus coregonus* (Cope 1870b, p 472) Cope mentions that: "*at Morganton it is called, "blue mullet"* " alluding to procuring the species from a fish market at Morganton. Morganton is approximately 35 km east-northeast of Pleasant Gardens where he stayed.
iii	There is no evidence as to if or where he collected in the vicinity of Morganton.
Koontz Plantation, Davidson Co., NC (Figure 6)	
i	"*Yadkin*" (Cope 1870b)
ii	"*tributary of the Yadkin River in Roane County, North Carolina*" (Cope 1870b)
iii	"*tributary to the Yadkin River in Roane Co.*" (Cope 1870b)
iv	"*tributaries of the Yadkin River, in Roane County, North Carolina*" (Cope 1870b)
v	"*Yadkin River, Roane County, North Carolina*" (Cope 1870b)
vi	"*waters of the Yadkin*" (Cope 1870b)
vii	"*still and sluggish water of the Yadkin Basin*" (Cope 1870b)
viii	"*traps in the Yadkin River, at the plantation of John Kuntz*" (Cope 1870b)
ix	"*in a tributary stream*" (Cope 1870b)
x	"*Yadkin River, North Carolina*" (Cope 1870b)
xi	"*small tributary of the Yadkin River, in Roane Co., N. Ca.*" (Cope 1870b)
New Garden, Guilford Co., NC	
i	Cope left his wife and daughter to stay at the New Garden Friends settlement while he traveled to eastern North Carolina
ii	There is no evidence that any fish collections were made in the vicinity of Greensboro or in Guilford County
iii	He did identify specimens from Guilford County for Samuel Collins
Eastern North Carolina (including Craven Edgecombe, Halifax, and Wayne counties)	
i	"*sold in the market of the city of Newbern, N.C.*" (Cope 1870b)
ii	"*Roanoke River in North Carolina*" (Cope 1870b, p 479)
iii	"*Some specimens which I obtained at Newberne, on the Neuse River* (Cope 1870b)
iv	There is no evidence he made any collections in the Tar drainage or in any of his travels to and from eastern North Carolina
Wilmington, New Hanover Co., NC	
i	There is no evidence that any fish collections were made in the vicinity of Wilmington
New Garden, Guilford Co., NC	
i	Cope returned from eastern North Carolina and traveled to the New Garden Friends settlement to reunite with his family and return travel to Raleigh
ii	There is no evidence that any fish collections were made in the vicinity of Greensboro or in Guilford County
Raleigh, Wake Co., NC (Figure 7)	
i	"*boisterous waters at the falls of the Neuse River, 8 miles [12.8 km] east of Raleigh, North Carolina*" (Cope 1870a). [Note: Cope's distance and direction are in error. Falls of the Neuse is approximately 18.6 kilometers north-northeast of Raleigh. The Neuse River, at the now removed Milburnie Dam, is about 9.6 kilometers due east of Raleigh, but Cope did not mention visiting the river at this location.]
ii	"*Walnut Creek, a tributary of the Neuse River, in Wake co., N. Carolina, late in November*" (Cope 1870a)
iii	"*Neuse River*" (Cope 1870b)
iv	'*Turbulent waters of the Neuse River*" (Cope 1870b)

Table 4 (continued).

Departing From/ Site No.	Destination and Site Description
v	"*Walnut Creek, a tributary of the Neuse River*" (Cope 1870b)
vi	"*Neuse*" (Cope 1870b)
vii	"*Neuse River in still water*" (Cope 1870b)
viii	"*sluggish waters tributary to the Neuse River in Wake County, North Carolina*" (Cope 1870b)
ix	"*still waters of the Neuse basin*" (Cope 1870b)
x	"*Neuse River, near Raleigh*" (Cope 1870b)
xi	"*Neuse River, in Wake County, North Carolina*" (Cope 1870b)
xii	"*still and sluggish water of the Neuse Basin*" (Cope 1870b)
xiii	"*Neuse River, near Raleigh, N. Ca.*" (Cope 1870b)
xiv	"*Neuse River, N. Ca.*" (Cope 1870b)

Cope made most of his collections during the late-summer to early fall in 1869. Yet, in some of the species descriptions, he described the breeding colors and tuberculation of several species of minnows, for example of *Hybopsis chlorocephalus* and *H. chiliticus,* which would not have been possible at that time of year. Such descriptions must have obtained from conversations from locals and/or fishermen. How did Cope know what was new? Did he bring his library of fish publications with him? Did he bring along a microscope or other magnification and dissecting equipment to aid in his identifications and descriptions? We know that Cope did not always have his material close at hand when writing the descriptions because some of the material had already been shipped northward (Letter No. 2) or had been lost (Cope 1870b, p475, p479). In these instances, being unable to reexamine some specimens before publishing, he would have had to rely on his memory or his field notes. And finally, the titles of Cope (1870a, 1870b) are somewhat misleading because of the inclusion of other species, such as *Boleosoma brevipinne* and the numerous descriptions of new species found in other states, such as *Placopharynx carinatus* and *Ptychostomus velatus,* several species of *Carpiodes*, and even a species of *Fundulus* from Gabon, Africa which was actually mislabeled and from the west Atlantic.

The History and Condition of Cope's Collection

Before discussing the fish collections that Cope brought from North Carolina back to Haddonfield, one must understand the condition of those specimens after their return and their identities up until the present day. Summaries of their state can be found in Osborn (1929), Fowler (1959, 1963), Smith-Vaniz and Peck (1991), and history of ichthyology at ANSP (https://ansp.org/research/systematics-evolution/ichthyology/ichthyology-history/).

In his will, Cope: "*directed that all those preserved as wet preparations shall be given to the Academy of Natural Sciences [of Philadelphia] for their museum*" (Osborn 1929). Prior to the collection being transferred to the Academy and perhaps for most of his professional career, his collection was kept at his personal residences. Fowler (1959) commented on the condition of Cope's wet collection at Cope's Pine Street house in Philadelphia: "*. . . endless jars all over the floor full of fishes and reptiles. . . the alcohol looked as black as vinegar or tar almost in some cases.*" Fowler (1963) further commented on the wet collection: "*The vintages of the alcohol he had used were of every description and odor. . . . In the bathroom of the Pine Street house was an improvised rack with several shelves that held great numbers of small jars filled with specimens*

in alcohol. . . . A list of the different species in-side each of the larger jars or containers usually was on a sheet of white typewriter paper pasted to the outside. However, the name or identification of a species frequently was written on a small scrap of paper in lead pencil." Visiting Cope's house on Pine Street in 1894, Fowler commented: "*All about the floor were numbers of old-fashioned screw-topped pale green preserve jars filled with reptiles and fishes in alcohol. Large ones of several gallons in content were parked about nearer the walls or in protected places. They appeared very formidable, as each had a large sheet of foolscap or other white paper pasted on the outside, each containing long columns of scientific names. No other clues to the contents appeared*" (Henry W. Fowler in Smith-Vaniz and Peck 1991).

Fowler, 1878-1965, first became acquainted with the Academy's fish collection in 1894. He described the collection: "*At that time most of the fishes, as well as the amphibians and reptiles, were stacked in wall cases in the original Race Street building. Unfortunately, many had been marked with outside labels, written in ink and tied about the neck of the jar by a strong cord. As the cases were often damp and with poor light, many of the labels moulded or became illegible. A hundred or more dried specimens were placed in flat cases, often before the windows*." In 1897, Fowler became the first full-time curator of the newly-formed Department of Ichthyology and Herpetology. In 1898, Cope's entire personal collection of fishes, reptiles and amphibians was bequeathed to the Academy where most of his type specimens became part of the Academy's collection, with others gifted to the National Museum of Natural History (USNM). Beginning in 1898 Fowler: " *oversaw the transfer of Cope's entire alcoholic collection to the museum and spent the next several years trying to decipher Cope's cryptic notes and organize the collection*" (Smith-Vaniz and Peck 1991). Cope's specimens, in a precarious condition for many decades, might have suffered further indignity when in August 1899 unusually heavy rains and a broken water main caused the Academy's basement to fill with more than five feet of water, further damaging the external labels on many of the fish specimens that were stored there (Smith-Vaniz and Peck 1991). Fowler (1959) reminiscing about the sewers flooding and its impact on some of the Academy's fish collection which had been housed in the basement : ." . . *some of the bottle that had specimens, . . . having glass stoppers, the stoppers came out and the specimens floated around and whoever picked them up why may have put them in bottles that had other labels and locality labels, so it is always a suspicious thing to take any of those old specimens and not study them carefully before you assign a label to them even though it is on them*."

Over the past 150 years, Cope's North Carolina specimens have been identified, reidentified, and had their labels deciphered by numerous ichthyologists besides Fowler, including Collette and Knapp (1966), Gilbert (1978, 1998), Jenkins (1970), and many others. A common thread when working with Cope's material has stemmed from their historically poor curation of the specimens (gauze-wrapped specimens in paraffin-sealed crocks with moldy labels), inaccessibility of material in the crocks, "*labels which he wrote from bits of paper he tore up at the time"* (Fowler 1959), and the deteriorated condition of some of the specimens and labels which often led to Fowler's misidentifications and mislabeling the localities of the specimen labels (Figure 8; REJ, pers. obs.).

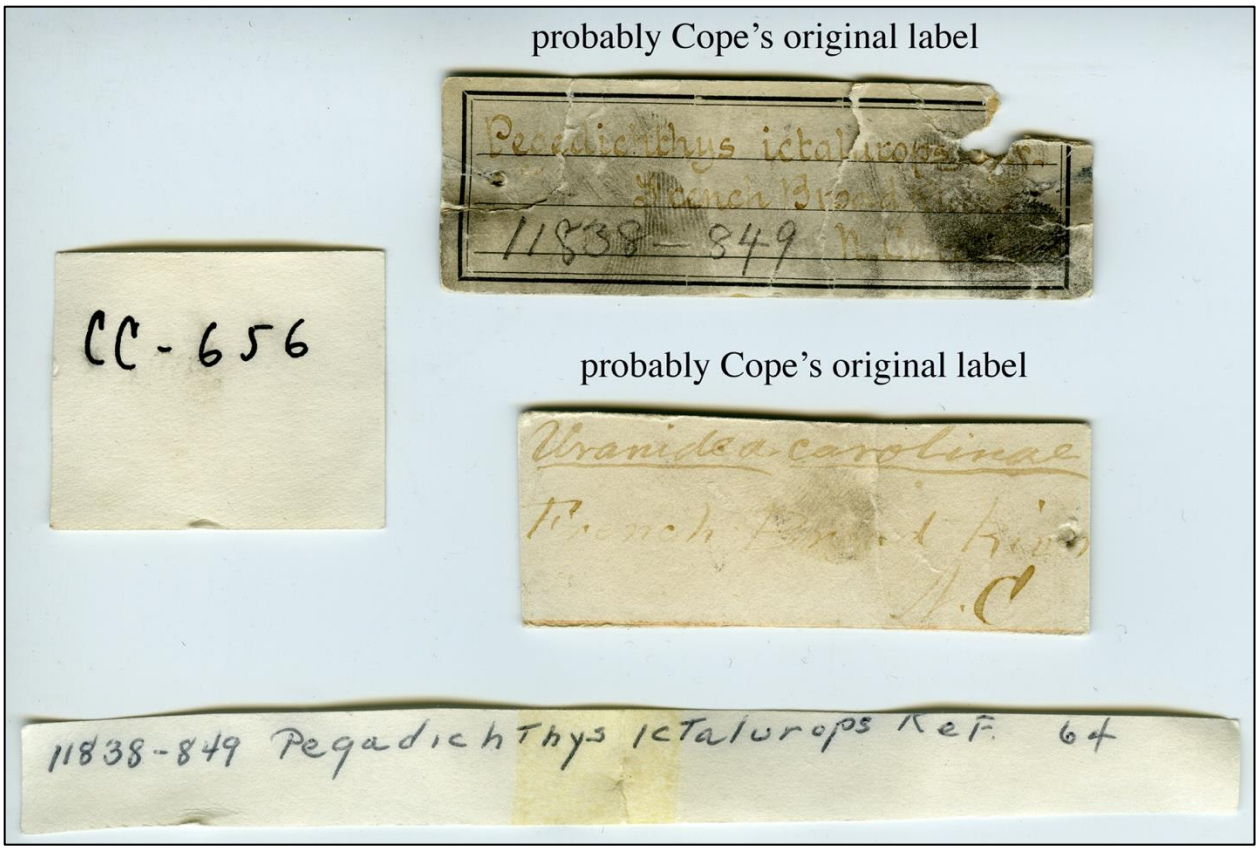

Figure 8. Examples of jar labels from ANSP 11838, *Cottus carolinae* (= *Pegedichthys (Pegadichthys) ictalurops*), collected by Edward D. Cope from the French Broad River at Hot Springs, Madison County, North Carolina, Fall 1869.

Notable Absences of Species in Cope's Collections from North Carolina

Although Cope collected many species in total and would not have been expected or been able to collect all the species from any particular site, there are several species that are noticeably absent from Cope (1870b) based upon what we know now about their current distribution in North Carolina (Tracy et al. 2020a). For example, from none of the drainages did he report collecting or encountering any Clupeidae. Small stream inhabiting species from the French Broad River system that Cope should have, but did not encounter included Mountain Brook Lamprey, *Ichthyomyzon greeleyi*, American Brook Lamprey, *Lethenteron appendix*, Blotched Chub, *Erimystax insignis*, Fatlips Minnow, *Phenacobius crassilabrum*, Spotfin Shiner, *Cyprinella spiloptera*, Spotfin Chub, *Erimonax monachus*, Saffron Shiner, *Notropis rubricroceus*, Longnose Dace, *Rhinichthys cataractae*, Mountain Madtom, *Noturus eleutherus*, Stonecat, *N. flavus*, Mottled Sculpin, *Cottus bairdii*, Greenfin Darter, *Etheostoma chlorobranchium*, Swannanoa Darter, *E. swannanoa*, Gilt Darter, *Percina evides*, and Olive Darter, *P. squamata*. And from the Neuse River basin near Raleigh, Cope failed to collect Swallowtail Shiner, *N. procne*, Carolina Madtom, *N. furiosus*, and Roanoke Bass, *Ambloplites cavifrons*. Whether he was unable to collect some of these more common species or if he failed to record them if he did, we do not know.

Across all basins, Cope encountered most of the species of suckers he should have encountered. But noticeably absent was any mention of River Redhorse, Smallmouth Redhorse, *M. breviceps*, Black Redhorse, *M. duquesnei* (although it was later found in his specimens, ANSP 6732), and three undescribed species of suckers: "Sicklefin" Redhorse, *Moxostoma* sp., "Carolina" Redhorse, *Moxostoma* sp., and "Brassy" Jumprock, *Moxostoma* sp. (Tracy et al. 2020a). If Sicklefin Redhorse had ever occurred in the French Broad River, Cope surely would have encountered and described it, through his associations with local fishermen and their utilization of weirs and traps and by his acquisition of a "*fine lot of river fishes*" during his stopover in Alexander (Letter No. 2). Today, the Sicklefin Redhorse is found only in the Hiwassee and Little Tennessee basins in Georgia, North Carolina, and Tennessee (Tracy et al. 2020a). It is also conceivable that Cope was befuddled in the field when identifying some species among masses, or only a few of adult redhorses, despite being able to: " . . . *examine and procure them in great numbers. The opportunity of seeing fishes in life, it is believed, is no small aid to their proper specific determination*" (Cope 1870b, p448).

Lastly, if Cope had collected in eastern North Carolina during late Fall 1869, water temperatures would have been cool-cold and perhaps no longer conducive to wet-leg wading and dragging a seine. Had he done so, he would have encountered many common species and reported on their occurrence such as Lake Chubsucker, *Erimyzon sucetta*, Yellow Bullhead, *Ameiurus natalis*, Eastern Mudminnow, *Umbra pygmaea*, Mud Sunfish, *Acantharchus pomotis*, and Banded Sunfish, *Enneacanthus obesus* (Tracy et al. 2020a). He would have also remarked upon the tannin-stained streams and their unique fauna as he travelled further east from Raleigh. To our knowledge he did not collect in the adjacent Tar River basin and seemed to focus his efforts solely on obtaining fossils in this portion of his travels (Letter No. 3).

Comparing Cope's Collections with our Knowledge of the Current Distribution of Species in North Carolina

In the 150 years since Cope's visit to North Carolina, stream fish communities across North Carolina have been altered by: landuse changes; water quantity, habitat alterations, and stream connectivity through the construction of dams; changes in water quality; the introduction of nonindigenous species; and the over harvesting of important food fishes which Cope predicted would occur (Cope 1870b, p473–474). Many of the streams that Cope collected at, for example Spring Creek in Madison County, clear and rapid creeks which flow into the upper waters of the Catawba River in McDowell and Burke counties, Gobble Creek in Davidson County, and Walnut Creek in Wake County, have been surveyed multiple times by ichthyologists since then using more modern, high-tech, and efficient collecting techniques such as backpack electrofishers and crews of several people. Although site-by-site comparisons cannot be made because of Cope's non-specific locality descriptors (Table 4) and our use of current collecting techniques, some generalized comments and comparisons of some species collected by Cope and the current distribution of species in North Carolina (Tracy et al. 2020a) are offered as examples.

For instance, Cope reported on the occurrence of Longear Sunfish, *Lepomis megalotis*, in the state and Sea Lamprey, *Petromyzon marinus*, in the upper Catawba River system (Cope 1870b, p452 and p495, respectively), but there is no evidence to support these claims (Tracy et al. 2020a; Tracy et al. 2020b). Similarly, Chain Pickerel, *Esox niger*, has never again been documented in

the upper Catawba River system. Striped Shiner, *Luxilus chrysocephalus*, continues to be rare in the French Broad River system as it is known only from one locality in Buncombe County (North Carolina Museum of Natural Sciences, NCSM 34051) and from the Cane River watershed in Yancey County. Coastal Shiner, *Notropis petersoni*, has never again been collected from the middle Yadkin River system; Highfin Shiner, *Notropis altipinnis*, continues to be rare in the middle Yadkin River system in Davidson County; and Humpback Chub, *Hybopsis hypsinotus*, has not been collected from Davidson County since 1869 (Tracy et al. 2020a). Cope (1870b, p.492) did claim that Paddlefish, *Polyodon spathula*, inhabited the French Broad River near Asheville, but his claim was routinely dismissed by ichthyologists as improbable. However, recently discovered newspaper articles from 1873 and 1874 also reported on its occurrence near Asheville and Brevard (Anon. 1873; Anon. 1874; Luke Etchison, North Carolina Wildlife Resources Commission, pers. comm.). Unfortunately, Paddlefish has not been documented in North Carolina since then.

If Cope's report of Blacktip Jumprock, *Moxostoma cervinum*, from the Roanoke River in North Carolina in the vicinity of Halifax County (Letter No. 3; Cope 1870b, p479; Cope 1875) was accurate, then this species has not been collected since 1869 in any of the tributaries or river downstream from the existing chain of hydroelectric and flood control dams (Tracy et al. 2020a). Did Cope see "Carolina" Redhorse or "Brassy" Jumprock in material obtained from the fish traps at the Koontz Plantation? We speculate that he did based on unclearly described nominal species of redhorse (e.g., *Ptychostomus albus* and *P. thalassinus*), a description of an unnamed species (Cope 1870b, p474, last paragraph under *P. erythurus*), and because of its (i.e., Brassy Jumprock) widespread distribution in the middle Yadkin River system. Robust Redhorse was described by Cope (1870b, p473-474) from the Yadkin River, but its true identity was "lost to science" until the 1980s (Bryant et al. 1996). Today, in North Carolina Robust Redhorse is only known from the Pee Dee River system upstream from the North Carolina-South Carolina state line to the Blewett Falls dam (Tracy et al. 2020a).

Wounded Darter, *Etheostoma vulneratum*, was described by Cope from a single male specimen from Warm Springs Creek in Madison County (Cope 1870a p266-267), but it has never again been documented in Madison County or the entire the French Broad River system. Snubnose Darter, *E. simoterum*, was reported by Cope (1870b, p494) from an unknown locale in the French Broad basin. It was unknown from any stream in the basin in North Carolina until 2009 when two specimens (NCSM 55217) were collected from a small tributary to the French Broad River near Hot Springs (Tracy et al. 2020a). Previously, Snubnose Darter was only known in North Carolina from 17 specimens (NCSM 77814) collected in 1969 from a tributary to the Nolichucky River in Mitchell County.

CONCLUSIONS

We were unable to identify the existence or location of Cope's field notes or field notebook from our review of his letters and publications emanating from his 1869 trip to North Carolina. Repeated searches failed to locate such documents at Haverford College, University of Pennsylvania, American Museum of Natural History, or at the Academy of Natural Sciences of Drexel University. At the American Philosophical Society, they have his field diaries from 1872-1892, but none from 1869. If at one time they did exist, were they accidentally (or deliberately) discarded

by Cope or were they thrown away after his death by his relatives? We still do not have the answer to that question. Even without his notes or field book, Edward D. Cope's two publications and his preserved material primarily at Academy of Natural Sciences of Drexel University resulting from his trip in 1869 laid a solid foundation for all ensuing studies of North Carolina's rich freshwater fish fauna for the past 150 years.

LITERATURE CITED

American Association for the Advancement of Science (AAAS). 1869. Proceedings of Scientific Societies. The American Naturalist. 3:435–447.

Anonymous (Anon.). 1873. A new fish. The Asheville Weekly Citizen. Asheville, NC. Thursday, July 24, 1873.

Anon. 1874. An odd fish. Weekly Pioneer. Asheville, NC. Saturday, June 27, 1874.

Brinkman, P.D. 2015. Remarking on a blackened eye: Persifor Frazer's blow-by-blow account of a fistfight with his dear friend Edward Drinker Cope. Endeavor. 39:188–1952.

Brinkman, P.D. 2016. Edward Drinker Cope's final feud. Archives of Natural History. 43:305–320.

Bryant, R.T., J.W. Evans, R.E. Jenkins, and B.J. Freeman. 1996. The mystery fish. Southern Science. 1:27–35.

Case, E.C. 1940. Cope-the man. Copeia. 1940 (2):61-65.

Collette, B.B. and L.W. Knapp. 1966. Catalog of type specimens of the darters (Pisces, Percidae, Etheostomnatini). Proceedings of the United States National Museum. Volume 119. Number 3550. 88pp.

Cope, E.D. 1868a. On the distribution of fresh-water fishes in the Allegheny region of southwestern Virginia. Journal of the Academy of Natural Sciences of Philadelphia. (New Series [2]) 6 (Part 3, Article 5):207–247, Plates 22-24.

Cope, E.D. 1868b. Remarks on a new Enaliosaurian, *Elasmosaurus platyurus*. March 24, 1868. Proceedings of the Academy of Natural Sciences of Philadelphia. 20: 92–93.

Cope, E.D. 1869a. Synopsis of the extinct Batrachia, Reptilia, and Aves of North America. Part 1. Transactions of the American Philosophical Society. 14:1–104 + 16 plates.

Cope, E.D. 1869b. Synopsis of the Cyprinidae of Pennsylvania. Transactions of the American Philosophical Society. (New Series [2]) 13 (Part 3, Article 13):351–399, Plates 10–13.

Cope, E.D. 1869c. Untitled [Remarks on dinosaurs from North Carolina]. Proceedings of the Academy of Natural Sciences of Philadelphia. 21:191–192.

Cope, E.D. 1870a. On some Etheostomine perch from Tennessee and North Carolina. Proceedings of the American Philosophical Society. 11:261–270.

Cope, E.D. 1870b. A partial synopsis of the fishes of the fresh waters of North Carolina. Proceedings of the American Philosophical Society. 11:448–495.

Cope, E.D. 1870c. Observations on the fauna of the southern Alleghanies. American Naturalist. 4 (7):392–402.

Cope, E.D. 1875. Synopsis of the vertebrata whose remains have been preserved in the formations of North Carolina. Appendix B. pp 29–52, 4 plates. In Kerr, W.C. 1875. Report of the Geological Survey of North Carolina. Volume I. Physical geography, resume, economical geology. North Carolina Geological Survey, Raleigh, NC.

Davidson, J.P. 2002. Bonehead mistakes: The background in scientific literature and illustrations for Edward Drinker Cope's first restoration of *Elasmosaurus platyurus*. Proceedings of the Natural Sciences of Philadelphia. 152:215–240.

Davidson, J.P. 2002. The last time: Edward Drinker Cope's last trip to Kansas. Transactions of the Kansas Academy of Science. 119:363–374.

Fowler, H.W. 1959. Reminiscences on old naturalists. A tape recording of Fowler's remembrances of Philadelphia naturalists who were affiliated with the Academy of Natural Sciences of Philadelphia. Call Number Mss.Rec.32. American Philosophical Society. Philadelphia, PA.

Fowler, H.W. 1963. Cope in retrospect. Copeia. 1963 (1):195–198.

Frazer, P. 1900. The life and letters of Edward Drinker Cope. The American Geologist. 36:67–128.

Fricke, R., W.N. Eschmeyer, and R. Van der Laan. (eds). 2020. Eschmeyer's catalog of fishes: genera, species, references. (http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp). Electronic version accessed January-June 2020.

Gilbert, C.R. 1978. Type catalogue of the North American cyprinid fish genus Notropis. Bulletin of the Florida State Museum. Biological Sciences. 23 (1):1–104.

Gilbert, C.R. 1998. Type catalogue of recent and fossil North American freshwater fishes: Families Cyprinidae, Catostomidae, Ictaluridae, Centrarchidae and Elassomatidae. Florida Museum of Natural History. Special Publication No. 1. 284p.

Gill, T. 1897. Address in memory of Edward Drinker Cope. Herpetological and ichthyological contributions. Ichthyology. Proceedings of the American Philosophical Society. Memorial

Volume 1. pp 284–293.

Hilton, E.J., J.C. Mitchell, and D.G. Smith. 2014. Edward Drinker Cope (1840–1897): Naturalist, namesake, icon. Copeia. 2014 (4):747–761.

Jenkins, R.E. 1970. Systematic studies of the Catostomid fish tribe Moxostomatini. Doctoral dissertation. Cornell University, Ithaca, NY.

Jenkins, R.E., and N.M. Burkhead. 1994. Freshwater fishes of Virginia. American Fisheries Society. Bethesda, MD. 1080p.

Jordan, D.S. 1889. Report of explorations made during the summer and autumn of 1888, in the Alleghany region of Virginia, North Carolina and Tennessee, and in western Indiana, with an account of the fishes found in each of the river basins in those regions. Bulletin of the United States Fish Commission 8:97–173.

Jordan, D.S. and A.W. Brayton. 1878. On the distribution of the fishes of the Alleghany region of South Carolina, Georgia, and Tennessee, with descriptions of new or little known species. Bulletin of the United States National Museum. 12:3–95.

Myers, G.S. 1932. Review. Cope: Master naturalist. The life and letters of Edward Drinker Cope with a bibliography of his writings classified by subject. A study of the pioneer and foundation periods of vertebrate paleontology in America. By Henry Fairfield Osborn with the co-operation of Helen Ann Warren. xvi+740 p. 30 pls. Princeton University Press, Princeton, New Jersey. 1931.

Myers, G.S. 1940. Cope as an ichthyologist. Copeia. 1940 (2):76–78.

Osborn, H.F. 1929. Biographical memoir of Edward Drinker Cope, 1840–1897. Presented to the Academy at the Annual Meeting. National academy of Sciences of the United States of America. Biographical Memoirs. Third Memoir. Volume 13:127–317.

Osborn, H.F. 1931. Cope: Master naturalist. The life and letters of Edward Drinker Cope with a bibliography of his writings classified by subject. A study of the pioneer and foundation periods of vertebrate paleontology in America. Princeton University Press, Princeton, NJ. 740 p. 30 pls.

Page, L.M., H. Espinosa-Pérez, L.T. Findley, C.R. Gilbert, R.N. Lea, N.E. Mandrak, R.L. Mayden, and J.S. Nelson. 2013. Common and scientific names of fishes from the United States, Canada, and Mexico. 7th edition. American Fisheries Society, Bethesda, MD. 384p.

Parker, M.R. 2021. Refusing to Cope with a name. Ichthyology and Herpetology. 109:3-4.

Smith, H.M. 1907. The fishes of North Carolina. North Carolina Geological and Economic Survey, Raleigh. Volume 2. 453p.

Smith, W.L. 2021. Introduction to Ichthyology and Herpetology. Ichthyology and Herpetology. 109:1-2.

Smith-Vaniz, W.F. and R.M. Peck. 1991. Contributions of Henry Weed Fowler (1878–1965), with a brief early history of ichthyology at the Academy of Natural Sciences of Philadelphia. Proceedings of the Academy of Natural Sciences of Philadelphia. 143:173–191.

Tracy, B.H. 2010. Edward D. Cope's contributions to our knowledge of the North Carolina fish fauna and re-visiting North Carolina's type localities. Annual meeting of the Southeastern Fishes Council, November 2010, Athens, GA.

Tracy, B.H., R.E. Jenkins, and W.C. Starnes. 2013. History of fish investigations in the Yadkin-Pee Dee River drainage of North Carolina and Virginia with an analysis of nonindigenous species and invasion dynamics of three species suckers (Catostomidae). Journal of the North Carolina Academy of Science. 129:82–106.

Tracy, B.H., F.C. Rohde, and G.M. Hogue. 2020a. An annotated atlas of the freshwater fishes of North Carolina. Southeastern Fishes Council Proceeding. No. 60. Volume 1. 198p.

Tracy, B.H., F.C. Rohde, and G.M. Hogue. 2020b. Ghost sightings made by ichthyologist past: *Lepomis megalotis*, Longear Sunfish, in North Carolina. Southeastern Naturalist. 19:297–307.