NATURAL HISTORY

OF THE FISHES OF THE OHIO RIVER AND ITS TRIBUTARY STREAMS,

BY C. S. RAFINESQUE,

Professor of Botany and Natural History in Transylvania University.

INTRODUCTION.

Nobody had ever paid any correct attention to the fishes of this beautiful river, nor indeed of the whole immense basin, which empties its water into the Mississippi, and hardly twelve species of them had ever been properly named and described, when in 1818 and 1819, I undertook the labour of collecting, observing, describing, and delineating those of the Ohio. I succeeded the first year in ascertaining nearly eighty species among them, and this year I added about twenty more, making altogether about one hundred species of fish, whereof nine tenths are new and undescribed.

Many of them have compelled me to establish new genera, since they could not properly be united with any former genus; and I could have increased their number, had I been inclined, as will be seen in the course of this ichthyology; but I have in many instances proposed sub-genera and sections instead of new genera. I sent last spring to Mr. Blainville of Paris, a short account of some of them, to be published in his Journal of Natural History, in a Tract named *Prodromus of seventy new genera of Animals and fifty new genera of Plants from North America*, and I now propose to publish a complete account of all the species I have discovered. I am confident that they do not include the whole number existing in the Ohio, much less in the Mississippi; but as they will offer a great

proportion of them, and, as the additional species may be gradually described in supplements, I venture to introduce them to the acquaintance of the American and European naturalists; being confident that they will not be deemed an inconsiderable addition to our actual knowledge of the finny tribes. To the inhabitants of the western states, to those who feed daily upon them, their correct and scientific account ought to be peculiarly agreeable. I trust they will value the exertions through which I have been able to accomplish so much in so short a period of time, and I wish I could induce them to lend me their aid, in the succession of my studies of those animals, by communicating new facts, details, and rare species. I may assure them that their kind help shall be gratefully received and acknowledged.

The science of Ichthyology has lately received great additions in the United States. A few of the atlantic fishes had been formerly enumerated by Catesby, Kalm, Forster, Garden, Linnæus Schoepf, Castiglione, Bloch, Bosc, and Lacepede; but Dr. Samuel L. Mitchell has increased our knowledge, with about one hundred new species at once, in his two memoirs on the Fishes of New-York, the first published in 1814, in the Transactions of the Literary and Philosophical Society of New-York, and the second in the American Monthly Magazine in 1817. Mr. Lesueur was the first naturalist who visited Lake Erie and Lake Ontario, where he detected a great number of new species, which he has already begun to publish in the Journal of the Academy of Sciences of Philadelphia, and which he means to introduce in his General History of American Fishes, a work on the plan of Wilson's Ornithology, which he has long had in contemplation. And I have added thereto about forty new species, which I discovered in Lake Champlain, Lake George, the Chesapeake, the Hudson, near New-York, Philadelphia, the Atlantic, &c. and published in my *Precis des Decouvertes*, my Memoirs on Sturgeons, my decads and tracts in the American Monthly Magazine, the American Journal of Science, &c. besides three new fishes of the Ohio, published in the Journal of the Academy of Philadelphia.

Many other fishes of the United States have been partially

described by Bartram, Carver, Lewis and Clarke and other travellers. It is reasonable to suppose that several others have escaped their notice, and my discoveries in the Ohio prove this assertion. I calculate that we know at present about five hundred species of North American fishes, while ten years ago we hardly knew one hundred and twenty. Among that number about one half are fresh water fishes, and one fourth at least belong to the waters of the western states; but, although there are fifty other species imperfectly known, I should not wander far from reality if I should conjecture that, after all, we merely know one third of the real numbers, when we consider that the whole of the Mexican Provinces is a blank in Ichthyology, as well as California, the North West Coast, the Northern Lakes, and all the immense bason of the Missouri and Mississippi, except the eastern branch of the Ohio: all those regions having never been explored by any real naturalists. From those who are actually surveying the river Missouri much may be expected; but I venture to foretell that many of the fishes of the Ohio will be found common to the greatest part of the streams communicating with it, and therefore throughout the Mississippi and Missouri, whence the ichthyology of the Ohio, will be a pretty accurate specimen of the swimming tribes of all the western waters; while in Mexico, the North West Coast, and in the basin of the St. Lawrence or even in the Floridian waters, a total difference of inhabitants may be detected: since I have already ascertained that out of one hundred species of Ohio fishes, there are hardly two similar to those of the atlantic streams.

I have in contemplation to visit many other western streams and lakes, where I have no doubt to reap many plentiful harvests of other new animals; meantime communications on the fishes of every western stream are solicited from those, who may be able and willing to furnish them.

It is probable that some of the fishes of the Mississippi are anadromic or come annually from the gulf of Mexico to spawn in that stream and its lower branches; but all the fishes of the Ohio remain permanently in it, or at utmost travel down the Mississippi during the winter, although the greatest proportion dwell during that season in the deep spots of the Ohio

This is proved by their early appearance at the same time in all the parts of the river and even as high as Pittsburgh. This happens even with the Sturgeons and Herrings of the Ohio, which are in other countries periodical fishes, travelling annually from the sea to the rivers in the spring, and from the rivers to the sea in the fall.

Fishes are very abundant in the Ohio, and are taken sometimes by thousands with the seines: some of them are salted; but not so many as in the great lakes. In Pittsburgh, Cincinnati, Louisville, &c. fish always meets a good market, and sells often higher than meat; but at a distance from those towns you may buy the best fish at the rate of one or two cents the pound. It affords excellent food, and, if not equal to the best sea fish, it comes very near it, being much above the common river fish of Europe: the most delicate fishes are the Salmon-perch, the Bubbler, the Buffaloe-fish, the Sturgeons, the Catfishes, &c. It is not unusual to meet such fishes of the weight of thirty to one hundred pounds, and some monstrous ones are occasionally caught, of double that weight. The most usual manners of catching fish in the Ohio are, with seines or harpoons at night and in shallow water, with boats carrying a light, or with the hooks and lines, and even with baskets.

I am sorry to be compelled to delay the publication of my figures of all the fishes now described: these delineations shall appear at another period.

To facilitate the knowledge of the streams mentioned, I prefix a physical description of the Ohio and its principal branches.

Lexington, Kentucky, 15th November, 1819.

RIVER OHIO.

HEAD. It is formed by the junction of the rivers Alleghany and Monongahela, in Pennsylvania, at Pittsburgh, near the 40½ degree of north latitude. It is difficult to say which of them is the main branch or stream, the Alleghany being the longest and in the most direct course, while the Monongahela appears to be the largest at the junction, and to have similar waters.

Direction. Although the Ohio is exceedingly crooked in its course, its general direction is south west and west south west: it assumes every other direction; but very seldom the opposite one, N. E.

Mouth. It empties into the Mississippi, near the 37th degree of latitude, dividing the state of Kentucky from that of Illinois, which lies north.

Connections. The Ohio is one of the principal branches of the Mississippi, and properly its great eastern branch. The two great western branches, the Arkansas, which is about 1800 English miles long, and the Red River, which measures about 1600 miles, exceed it in length, but not in size,nor in the number of tributary streams; nor in the extent of their basins. The northern branch or upper Mississippi is much inferior to it in all respects (it is only 775 miles long, and receives only seven large rivers,) although it has been mistaken for the main branch. The real main branch is the Missouri, which takes the name of Mississippi after its junction with the upper Mississippi. It flows 2700 English miles above that junction, receiving thirty-three rivers above 100 miles long, and 1300 miles below, receiving twelve such rivers, having a total course of 4000 miles and forty five large branches. It is yet undecided whether the Yellow Stone or the Western Missouri is the principal upper branch.

Length. From Pittsburgh to the mouth, it is 500 geographic miles in a direct course (60 to a degree) and 960 in the regular course, equal to 1120 English miles, (of 69½ to a degree;) but if the Monongahela be deemed the main upper branch, the whole course will be 1360 English miles, while if the Allegany be considered as such, the whole length of the Ohio will be found equal to 1405 such miles.

Adjacencies. It flows through Pennsylvania as far as Mill creek below Georgetown; it divides afterwards the state of Ohio, which lie on the right bank from Virginia; this state extends on the left bank as far as Sandy river, where Kentucky begins, and it occupies the remainder of the left bank, as far as the Mississippi. While the state of Ohio terminates on the north side at the Miami river: the state of Indiana follows as far as

the Wabash river, and from thence the state of Illinois extends to the mouth.

Parts. The Ohio is naturally divided into three parts, containing each two sections, the head branches Alleghany and Monongahela form the two sections of the first part. The second or upper part lies between their junctions and the falls, being divided into two sections by Letart's rapids; while the third or lower part includes the space below the falls, the first section of which terminates at the end of the narrow valley above Troy in Indiana, and the second which includes the broad and flat valleys reaches to the the mouth. The upper part of the river is the longest, being about seven hundred miles long.

Breadth. At Pittsburgh the Ohio is about one quarter of a mile wide, above the falls and near the mouth it is over one mile: its average breadth may be reckoned at half a mile or rather two thousand five hundred feet.

Depth. Very variable according to places and times. The mean depth at low water may be reckoned at three feet, and at high water at about thirty feet. Average medium fifteen feet.

Velocity. The current of the Ohio is generally gentle, except at the falls and ripples. Its average at low water may be stated at two miles an hour and at high water at four miles an hour.

Bulk. The quantity of waters flowing in the Ohio may be therefore calculated, upon a general medium of the above breadth, depth, and velocity, at about forty millions of cubic feet, during an hour at low water, and at more than eight hundred millions of such feet at high water. Average medium three hundred and eighty millions in an hour, nine thousand one hundred and twenty millions in a day, and more than three millions of millions of feet in one year.

Waters. They are slightly turbid, and become much more so in the rises. At a low stage they are almost clear, and at all times very salubrious. The Monongahela has the same character, while the Alleghany is almost perfectly clear. The turbidity of the waters is produced by very fine particles of earthy matter dissolved in it, and which are not easily deposited, unless at high water, when mud and earth become mixed with them.

VALLEY. The Ohio flows in a narrow valley as far as Utica, above Louisville. This valley averages about one mile in breadth, and about three hundred feet in depth, but in some parts it is nearly five hundred feet deep. There are evident proofs that the river has formerly filled it. The sides are formed by steep cliffs and hills of sandstone as far as Vanceburg and the knobs below the mouth of the Scioto; beyond which all the strata are of limestone. Beyond those cliffs the country is broken, but much raised above the bottom of the Ohio Valley. The river meanders through it, leaving on each side, or only on one side, a level tract of alluvial and deep soil, which are called *bottoms* and were once the bed of the river. The cliffs correspond together, keeping at a equal distance, and every salient angle or elbow has an opposite bend. Below Utica and as far as Otter creek below Salt river begins the site of an ancient Lake, forming now a plain, which is about twenty-five miles long and ten miles broad; the falls are situated in the middle of it: the silver hills bound it to the west, the knobby hills to the east and the barren hills to the south. Immediately below it are the narrows of Otter creek, where the valley begins again; but is not larger than at Pittsburgh, being hardly half a mile wide and the river is less than one thousand feet across. They both expand gradually until they reach the rocky narrows above Troy, where the valley, after being contracted to three fourths of a mile, while the river is nearly half a mile broad, expands at once into a low country or broad valley, (the river being often one mile wide) which was formerly a second lake, extending about one hundred miles to Cave-hill narrows, with a variable breadth of four to twenty miles; only a few bluffs appearing occasionally on the banks, and the boundary hills being only one hundred and fifty feet high on an average. At Cave-hill or Cave in the rock, the river, from a mile broad, becomes at once very narrow, and the hills come very near the banks on both sides, forming a short narrows, below which stands another plain, which was once a third Lake, about twelve miles long and six miles wide: it ends at Grand Pierre creek, and the broad narrows between the north and south bluffs. Here begins the lowest part of the Ohio Valley, which grows wide gradually

and extends as far as the Mississippi, being from six to twenty miles wide and bounded by hills one hundred feet high on an average, and with very few stones.

Basin. The basin of a river, must not be mistaken for its valley, since it includes the whole regions watered by the streams flowing into it. The basin of Ohio is very extensive, including the greater share of the states of Kentucky, Tennessee, Ohio, and Indiana, with parts of Pennsylvania, New-York, Virginia, Alabama and Illinois, and a small corner of North Carolina, Georgia and Mississippi, watering therefore twelve states of the Union. It occupies eight degrees of latitude from the thirty-fourth to the forty-second degrees, and about twenty-six degrees of longitude. Its whole surface includes at least half a million of square miles, and three hundred and twenty millions of square acres.

Islands. The Ohio has a great many, about one hundred and thirty; they are commonly long and narrow. Some sand-bars, lying in the middle of the river, are gradually becoming islands; most of them are overflowed at the high waters. There are very few ancient islands, forming now insulated hills; I have detected however half a dozen, the first of which lies just below Pittsburgh on the right bank.

Bars. They are very common, are generally sand bars, and lie on one side or round the islands, very few stretch across the river: they produce ripples or a broken current. Some of them have hardly six inches of water, at the low stage of the river.

Channels. The current of the Ohio is digging another bed, deeper than the actual one, which forms the real channel of navigation. It does not experience many changes; sometimes it happens to be very crooked, particularly near islands and bars. It generally follows and grazes the highest cliffs or banks, and sometimes becomes double round some islands.

Banks. The actual banks are all alluvial and of a deep and rich soil, seldom quite sandy or muddy. There are in many bottoms a second and even a third bank, all very steep and from ten to forty feet high. The first bank is almost every where overflowed at high waters, the second never. The platforms behind the banks are sometimes lower than the edge of the

bank. Many banks sink or are washed away in inundations, when the channel sets against them.

Rapids. Many ripples become rapids at low water, and all the rapid disappear at high water, even those called the falls, which lie below Louisville. They are several passages of the river between rocky islands, the waters flowing with great rapidity; but hardly ever pitching over, except on the Kentucky side of the falls, where at very low water there is a small fall of less than two feet. Their noise is heard at a great distance. A Canal will soon be cut on each side of them. Letart's rapids and the Hurricane rapids are the most dangerous after the falls, yet they are merely large rock ripples.

Bayous. They are narrow channels into which the waters flow at a certain stage of rise, forming temporary islands; they are not uncommon in the lower vallies, and are sometimes called cut offs; the longest lies below Evansville, forming occasionally a very large island opposite Hendersonville.

Inundations. The Ohio is subject to periodical rises and to many adventitious ones. The highest happens in the spring, when the snow melts in the Alleghany mountains, and it has sometimes risen to fifty feet above the low water at some particular places, covering all the islands and bottoms of the first banks, and overflowing the towns built on those bottoms, such as Marietta, Shippingport, Lawrenceburgh, Shawneetown, &c. to the depth of ten feet or more. Another happens in the fall after the first rains; both subside pretty soon. Many others occur throughout the year, occasioned by rains. They are either general or partial, sudden or gradual; but during the months of July, August, and September the waters are very low, while in January and February, they are covered with floating ice and even frozen over in the northern and upper part. The overflowings do not rise so high in the lower valleys; but they expand more over the bottoms, often leaving behind pools and marshes.

Phenomena. Eddies and whirlpools are common, particularly at high waters; but not dangerous. A natural echo is heard throughout the narrow valley. Fogs are common dur-

ing the winter and spring in the valley, they collect in the morning and last until the sun dissipates them: they preserve the valley from the chilling frosts, and render its climate milder than that of the adjacent country. The prevailing winds are westerly,and four times out of five a breeze blows up the stream, following the meanders of the valley: it is a deviated branch of the Mexican trade wind. Thunder storms are frequent in summer, and hurricanes have sometimes happened. Waves then rise high against the current and are dangerous. Intermittent fevers are not uncommon in the fall near some low banks and in the low bottoms; but the climate is otherwise very healthy. Many springs are found along the banks and cliffs and many more appear at low water.

Scenery. All the banks, and cliffs, and nearly all the islands are covered with trees, among which the *Platanus occidentalis* (Sycamore,) the *Populus angulata*, (Cotton tree,) and the *Salix nigra* (Willow) are the most common and conspicuous. The cliffs and islands offer every where very fine views and prospects, and the cultivation increases those natural beauties; this is very conspicuous near Cincinnati, Maysville, Pittsburgh, &c.

Navigation. The River is navigated by Steam boats, Barges, Keel boats, Schooner barges, Rowing boats, Flat boats or Arks, Skiffs, Pirogues, Rafts, &c. of which many thousand annually descend the stream. Those which ascend it again amount annually to many hundred, among which there are already more than sixty Steam boats, averaging the burthen of 150 tons each. The ascent is effected, besides steam, by sailing, poling, warping,and rowing, and is very tedious. The difficulties of the navigation consist in bars, sunken rocks, rocky ledges, snags or sunken logs, sawyers or moving snags, drifted logs, planters or upright trees, falling trees, sinking banks, sudden storms, rises and falls, drifting ice, rejecting currents, whirlpools, shallow water, ripples and rapids, &c.: but they are not dangerous except at some particular stages of the waters. In the spring rise the water is so deep that it may easily float vessels of 500 tons, even over the falls. Many large ships were built at Pittsburgh and Marietta, which safely reached the sea;

but since the introduction of Steam boats, Ships have been disused.

Towns. There are already more than 125 towns and villages built on the Ohio. The city of Pittsburgh, at the head of it, contains nearly 15000 inhabitants. Cincinnati, in Ohio, contains above 10,000. The other principal towns are: Louisville, in Kentucky, at the falls, about 5000: Steubenville, in Ohio about 3000: Maysville or Limestone, in Kentucky, about 2000: besides, Beavertown, in Pennsylvania: Wheeling, in Virginia: Marietta, in Ohio, at the mouth of the Muskingum: Gallipolis in Ohio: Portsmouth, Ohio, at the mouth of the Scioto: Augusta, in Kentucky: Newport, K. at the mouth of Licking River: Owensborough, K. Hendersonville, K. Vevay, in Indiana: Lawrenceburg, Ind. at the mouth of the great Miami: Madison, Indiana: Jeffersonville and New-Albany, Indiana, both at the falls: Evansville, Indiana: Shawneetown, in Illinois, &c.

Branches. The Ohio receives immediately about 400 streams, of which 20 are rivers above 100 miles long, 54 are small rivers or large creeks, and more than 300 are brooks and runs. Its largest branches empty into the lower parts of the River, such as the Tennessee, Cumberland, and Wabash. They all flow in valleys similar to that of the Ohio and proportioned to their size. Many of them, such as the Scioto, Miami, Tennessee, Wabash, &c. have plains, which indicate former lakes. Most of them have rapids, ripples, bars, islands, &c. and offer the same phenomena as the Ohio, particularly the periodical rises and falls. I shall give some account of the 20 principal streams, which fall into the Ohio, in the order in which they join it.

PRINCIPAL BRANCHES OF THE OHIO.

1. Alleghany. It rises in Lycoming county, Pennsylvania, near the 42d degree of latitude, on the northern parts of the Alleghany mountains, and, after flowing through a small part of the state of New-York, it returns into Pennsylvania, until it joins the Monongahela at Pittsburgh and forms the Ohio. General direction S. W. Length in a direct course 170 geographic miles, in the natural course 250, equal to 285 English miles. It has five great branches, the Conemaugh, Conewa-

go, Tobas, &c. It is navigable throughout, and its stream is gentle and clear.

2. Monongahela. Rises in the Alleghany mountains of Virginia, near latitude 38. Direct course N. and 150 miles, in the natural course 210 miles, or 245 English miles. It has three great branches, of which the Yohogheny is the principal. Its breadth at Pittsburgh is 1350 feet, being wider and deeper than the Alleghany. It flows in a deep valley, is subject o sudden rises, and has a turbid but navigable stream.

3. Mahoning or Big Beaver. Rises near Lake Erie, in latitude 42, and runs south through Pennsylvania, emptying on the right side of the Ohio, of which it is one of the smallest branches, and is even sometimes called a Creek, although its direct course is 80 miles long, and the natural nearly 140, or about 163 English miles, being very crooked; but it is shallow, full of falls, and hardly navigable. It is formed by the junction of the Shenango and Neshanock.

4. Muskingum. It flows through the state of Ohio, in a southerly direction, about 100 miles, but being very winding its natural course is 150 miles or about 175 English miles It rises in a small lake of the Ohio ridge, which separates the bason of the Ohio from that of Lake Erie, near the 41st degree of latitude, and it joins the Ohio at Marietta. It is a large and navigable river, although it has a large rapid or fall at Zanesville and some other smaller rapids elsewhere. At the mouth it is 750 feet wide. It flows through a large valley, and receives four or five large branches, called Wills, Licking, Mohecan, &c.

5. Little Kenhaway. It rises in the Laurel hills, and flows through Virginia in a N. W. course of 90 miles, or 140 in a natural course, equal to about 163 English miles. It empties at Parkenburg, is partly navigable and has several small branches.

6. Hockhocking. Flows through Ohio. Direction, S. E. length seventy five miles, by the real course one hundred and twenty five, or about one hundred and forty English miles. It is a deep but narrow stream, navigable however as far as the two cascades. It had lakes formerly.

7. Great Kenhaway. Rises in the Alleghany Mountains,

near latitude 36, in North Carolina, and flows through Virginia. Course northerly, one hundreed and seventy five miles, real course very crooked, about two hundred and seventy miles or three hundred and fifteen English miles. It joins the Ohio at Point Pleasant. It is a fine, navigable and broad river, with many branches.

8. Big Guyandot. It rises in the Cumberland Mountains, and runs N. through Virginia, emptying itself at Guyandot It is navigable sixty miles; length seventy miles, real course one hundred miles, or about one hundred and twenty English miles.

9. Sandy River. Rises also in the Cumberland Mountains near the 37th degree of latitude, and separates Virginia from Kentucky. It is a large but shallow river, with three branches. Common course north, ninety miles in length, natural course one hundred and twenty five miles, or one hundred and forty six English miles. It is also called Pottery river and Big Sandy.

10. Scioto. It flows through the state of Ohio, rising in a morass of the Ohio ridge or table land, near latitude 40 1-2. It empties near Portsmouth after a southerly course of one hundred and ten miles, real course about one hundred and ninety miles or two hundred and twelve English miles. It is navigable one hundred and thirty miles, and is four hundred and fifty feet broad at the mouth. It has many bars and snags, but no falls. Its four principal branches are Whetstone river, Paint, Darby, and Walnut creeks. It had lakes formerly.

11. Little Miami. Runs through Ohio in a S. S. W. direction of sixty miles, natural course one hundred miles or one hundred and fifteen English miles. It is not navigable. It joins the Ohio near Columbia and has several small branches. Near its head, it runs for a mile through a narrow chasm, with successive falls of two hundred feet.

12. Licking River. It flows through Kentucky in a N. W. course of one hundred and sixty miles, rising in the Cumberland Mountains, near latitude 37. It has two great branches, is hardly navigable, and winds very much. It empties between Newport and Covington, opposite Cincinnati. Real course about three hundred miles or nearly three hundred and fifty English miles.

13. Great Miami. It rises in the Ohio ridge, near latitude 40 1-2 and flows through Ohio in a S. S W. direction, dividing that state from Indiana at its mouth, near Lawrenceburgh. Common course one hundred and ten miles, real course one hundred and eighty, or about two hundred and ten English miles. Its current is very rapid, and difficult to ascend. It has four principal branches, such as Mad river, Whitewater, &c. The mouth is six hundred feet wide, and its valley is very large. It was forerly called Rocky river.

14. Kentucky. This fine river gives its name to the state throughout which it flows, in a N W. direction. It rises in the Cumberland Mountains, near the 37th degree of latitude, a high spot from which the Tennessee, Cumberland, Licking, &c. flow westward. Common course 180 miles, real course 340 and very winding, or about 400 english miles. It has 5 principal branches, Dick river, Black river, &c. It overflows in the spring and is then navigable even for Steam-Boats, &c. It has many rapids, but no real fall. Its valley is deep and often narrow; in the narrows, the limestone cliffs are 300 feet high, and very near each other, without any bottoms. It had formerly a few small lakes and hilly islands. It empties at Port William. Former name Cuttawa.

15. Salt River. Flows in Kentucky, rises in the knobby hills, course N. W. 80 miles long, natural course winding about 140 miles, or 160 english miles. It is partly navigable and has many branches. It empties at Adamsville.

16. Green River. It rises in Kentucky, in the knobby hills, which are spurs of the Cumberland Mountains, and flows West and N. W. into that state. Direct course 175 miles, usual course about 350 or more than 400 english miles. It has four large branches, such as Barren river, Rough and Panther creeks, &c. It has a gentle current and is navigable. Its valley is very wide in the lower part, and when it joins the Ohio, above Evansville, its stream is almost as large as the Ohio. It was formerly called Buffaloe river.

17. Wabash. It rises in Indiana, on the ridge dividing the basons of the Ohio and the Lakes, near latitude 41½, and below it forms the limits between Indiana and Illinois. Direction S.

S. W. Length 250 miles, real course 450 miles or nearly 525 English miles. It is a large and deep stream, navigable even in summer, as far as the falls. Its lower valley is wide and shallow, with many islands and bayous. It has five large branches, such as Little Wabash, White river, &c. This last is very considerable and extends its numerous and large branches throughout Indiana; the longest is 350 miles long, one of them runs parallel with the Ohio. It empties above Shawneetown.

18. Saline River. It flows through Illinois in a S. E. direction, emptying below Shawneetown. Length 55 miles, real course about 90, or 105 English miles; it is therefore the smallest of the rivers emptying into the Ohio, although Big Blue river, Tradewater river, Little Muskingum, and Little Scioto, are still smaller and rather large creeks; their course being less than 100 miles, I have not noticed them. The Saline river is partly navigable and has three principal branches.

19. Cumberland. It rises in the Cumberland Mountains of Kentucky, and after watering Tennessee, returns into Kentucky, its course being W. and N. W. about 300 miles; real course about 500 miles or about 585 English miles. It is a fine navigable river, flowing in a broad valley, and with many small branches, but no large ones. It has also been called the Shawanee.

20. Tennessee. The last and largest of the branches of the Ohio. It is formed by the union of the Holstein and Clinch rivers in Tennessee, the former rising in Virginia near lat. 37, and the second in North Carolina, within the Alleghany Mountains near lat. 35. The whole course, if the Clinch river is deemed the main branch, will be three hundred and fifty miles, and the real course six hundred and fifty, equal to about seven hundred and sixty english miles. Duck river is another large branch of it, and there are three others besides. The direction is S. W. then west and next north, watering Tennessee, Alabama, Kentucky, &c. and emptying into the Ohio a few miles below the Cumberland, from which basin it is divided by a high ridge, and not far above the mouth of the Ohio. The Tennessee is a very large and fine navigable river, almost equal to the Ohio in size, but not in depth. Its valley is wide and has had many lakes, one of them was at the Muscle Shoals, which forms now a

small lake, full of rocky islands and rapids, and are a great impediment to navigation. It was formerly called the Cherokee river.

SMALLER BRANCHES.

The fifty four small rivers and large creeks, flowing into the Ohio are the following, of which thirty three empty on the right and twenty one on the left. They are all over thirty miles long in their natural course.

In Pennsylvania, 3. Right bank, Little Beaver; and on the left bank Chartier's Creek, Raccoon Creek.

In Ohio, 17. Big Yellow creek, Warren creek, Indian Wheeling creek, Captina creek, Sunfish creek, Opossum creek, Little Muskingum river, Duck creek, Shade river, Kaygers creek, Campaign creek, Raccoon creek, Symmes' creek, Brush creek, Little Scioto river, Eagle creek, White Oak creek.

In Virginia, 7. Short creek, Wheeling creek, Big Grave creek, Fishing creek, Stony creek, Big Sandy creek, Little Guyandot river.

In Kentucky, 12. Little Sandy river, Tygert creek, Kinniconick, Gunpowder creek, Bigbone creek, Harrod creek, Beargrass creek, Otter creek, Sinking creek, Blackford creek, High land creek, Tradewater river.

In Indiana, 12. Tanner's creek, Houghan creek, Loughery creek, Indian Kentucky, Silver creek, Buck creek, Corydon creek, Big Blue river, Little Blue river, Anderson river, Little Pigeon creek, Big Pigeon creek.

In Illinois, 3. Lusk's creek, Bigbury creek, Cash river.

FISHES OF THE OHIO.

FIRST PART. THORACIC FISHES.

Having complete gills, with a gill cover, and a branchial membrane. Lower or ventral fins situated on the breast or thorax, under the pectoral or lateral fins.

1 Genus. Perch. Perca. Perche.

Body elliptical, scaly; head without scales, mouth large, jaws with unequal acute teeth, gill cover with a serrate preopercule