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extinction the prairie wolf, *Canis latrans*, of which in boyhood I shot one and trapped one; the otter, the mink, and the raccoon; also the black squirrel, the pinnated grouse, the partridge and the quail. As a citizen of Lake County I may say, with most of them we dislike to part. We had them, some of them by the thousands, once, but now they are rapidly disappearing. Yet, notwithstanding our fourteen railroads, our thirty towns and villages, with their constant hum of business, and our thousands of farms, we still have of mammals, birds and reptiles, of both vertebrates and invertebrates, quite a rich fauna left for the study of childhood and youth, for the investigations of the naturalist; but very little now for the sportsman, the hunter, or the trapper, where, according to the estimate of E. W. Dinwiddie, "250,000" wild fowls have been shot in a single season, and some sixty thousand musk rats have been trapped in a single year; where a thousand ducks have been in one sportsman's house at one time; where the wild geese have been, almost by the million, but where along our southern marsh they make their nests no more.

All these that I have named are becoming so rapidly extinct that they will soon no longer form a part of our fauna, and Lake County will lose its former renown as the sportsman's paradise.

THE SYNONYMY OF THE OHIO RIVER UNIONIDE. BY R. ELLSWORTH CALL.

[ABSTRACT.]

The Ohio River is the original source of most of the earlier described Unionide of North America. The French explorers collected these forms and sent them to Europe. Among naturalists there, who described these collections, was Lamarek, who thus becomes the original source of information. Later Sav, Rafinesque, Conrad, Barnes and Lea severally studied the Unios collected in the Ohio and gave different names to the same forms. There has resulted a confusion of specific names that has greatly retarded a correct understanding of the shells of this river. This paper redescribes the shells of such species as are imperfectly known, gives the synonymy of the several forms, has complete bibliographic references to original publications and illustrations, and has full notes on the geographic distribution of the several forms throughout the drainage basin of the Ohio.

An attempt at a natural grouping has also been made. An early—the earliest described—form has been made the type of the several divisions which are to be taken, not as sub-generic divisions, but as arbitrary morphologic sections, each of which will include forms that are closely alike in essential details. Through this grouping the facts lead to a rather extensive synonymy.

THE STREPOMATIDÆ OF THE FALLS OF THE OHIO. BY R. ELLSWORTH CALL.

[ABSTRACT.]

This paper lists the various forms of the several genera which occur at this locality. Notes on habits and abundance, on synonymy and geographic distribution are included. The species found number only ten nominal ones, and of these several are synonyms. There are bibliographic references to original descriptions and to published figures.

The ten species found, are distributed unequally, among four genera.

The conditions at the falls of the Ohio are well suited to this form of molluscan life, and they may be summed up in terms of the rich development of the several species in the matter of number and perfection of form. The locality is one of optimum conditions for the development of strepomatid life.

THE SWAMPS OF FRANKLIN COUNTY. BY M. H. STOOFS.

To one entering Franklin County by rail, he gains the impression that he is far distant from a swamp. On either side of the White Water River are high hills, which overlook the river valley. At times the train seems to be rushing into one of the hills, when it suddenly glides around the side, leaving the traveler to gaze at the side of the hill, which rises abruptly to a height of three hundred feet.

This river valley owes its origin to the glacial period. In this section of the State the drift extends south into Kentucky. It is doubtful whether the ice extended farther south than this point. The melting of the vast quantity of ice formed a mighty river that rushed to the south and cut out the White Water valley. The present White Water River was the main channel of the glacial river for southeastern Indiana. This river wore through the rocks to a depth of over five hundred feet. Although the present hills are only from three hundred to four hundred feet high. The valley has been filled with drift to the depth of about one hundred and fifty to one hundred and seventy-five feet at Brookville. On either side of the valley, after ascending the hills, the country is comparatively level in places, except close to the tributaries of the river. Some parts of the county are very level and can only be cultivated because of artificial drainage.

In the northeastern part of Franklin County was the swampy region. The early settlers in this county ignored that section, they settled the river valley and hills before any one had the courage to even try the highest portions of the swampy region at that time, what is now Bath Township, and the wealthiest township in

Franklin County was the through the early spring a quack of the wild duck at divide between the White drained by the Miami and caused by large quantities the water was carried off debris was left on the ground and left large ponds of water.

As the soil carried down did not very easily escape excavation they were again filled.

They varied in size from four or five feet high. As the settlers became more nearer the wet lands, as it settler began to devise means there are only two or three out the wooded portion of rains and hold the water that is known as the "big mile wide at its greatest willows and soft maples. a new tile ditch so that the land in the county. This a heavy rain the water is of frogs that can be heard ney crawfish rear their children visit it, but snipe are common.

This swamp was for supply of water he built they are about seventy to beavers knew how to excavate point where it would require in two directions. It is White Water, and the swampy river. When it was the deep. An open ditch at

ER. BY C. H. EIGENMANN.

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The arms are formed by the

have reached 10 mm. The
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characteristic of the sexes.

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and no other cells are ever

III. BY J. C. ARTHUR.

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N. ELROD.

THE UNIONIDÆ OF THE OHIO RIVER. BY R. ELLSWORTH CALL.

[ABSTRACT.]

There are now recognized in the freshwater molluscan fauna of North America more than one thousand representatives of the great family of Unionidæ, or freshwater mussels. A few of these forms, which constitute a peculiarly well-marked division of the family, occur in Mexico and in Central America. Less than a score of species are found in Canada. The rest are peculiar to the United States and, for the greater part, are found east of the Rocky Mountains. More than ninety per cent. of all known forms are from the regions east of the Mississippi and south of the Ohio Rivers. The center of distribution for the described southern forms is the great central plateau region of Middle Kentucky and Tennessee, Western North and South Carolina, and Northern Georgia and Alabama. Within the area as above limited, occur nearly all the species that are known—outside of the great Unionidæ group known as the *complanatus* division. In all the larger streams, and in most of the smaller, throughout all this region, the members of the family flourish in both great numbers of individuals and species. About eighty per cent. of all described North American forms come from this area, and some thirty per cent. of all are from Tennessee, Alabama and Chattahoochee Rivers, and their tributaries.

This singular, but interesting fact, has never yet received the attention it deserves, for geographic distribution, abundance in individuals, and diversity of form are herein correlated clearly with certain geologic factors. For instance, the family is a very ancient one, and dates back to Devonian times at the latest. The region under consideration has constituted a unique land-mass since a very early period in the history of the continent. It has scarce been subjected to glaciation—at least has not since the geologic record exhibited in its country rock began. The very great diversity of form and the great abundance of these modern representatives of a very ancient type, appear plainly to be related in no small degree to these factors.

In investigating in this field, for some twelve years or more past, the species and distribution of these mollusks, attention was necessarily directed to that peculiar Unionine fauna which lies on the northern border of this area. This was rendered necessary, in the first place, by the fact that the Ohio River had itself furnished most of the earlier described types. The literature of the subject reveals some sixty species, distributed unequally among the three Unionine genera, *Unio*, *Anodonta* and *Margaritana*, and shows the forms distributed among these genera in an abundance which has the relation just given, viz: *Unio* has the greater number of species and *Margaritana* the least.

It was further discovered that as the Ohio River forms of *Unio* are traced over the regions southwards and their geographic and geologic environment becomes changed, that a large number of them sensibly change their external particular characters and grade into forms to this time regarded as peculiar to the region. At once here was opened up the great question of synonymy, with all the consequences which are involved in a wholesale reduction of species.

This study, then, in its final form, will seek to investigate the synonymy—First, of the shells which have been described from the Ohio River. Second, it will select the most marked species of these river mussels and about them, as types, attempt a natural grouping of the Unionine fauna of the valley and the region south. Third, it will attempt to eliminate the synonyms which have been so multiplied by earlier students who were misled by inadequate data or by the older notions of what constituted a species. It will, further, explain in a measure the way in which the different forms assumed by the sexes came to be regarded as species—an unfortunate condition which the *dilettante* of the present day are making worse. It will, fifth, seek to collect, for convenient reference, all figures and descriptions, in the hope that in this way the historic importance of the earlier descriptions may become apparent. These will be arranged chronologically. The Ohio River constitutes historic conchologic ground: from it must begin, as began the old, the new study of the *Unionidae*.

THE STREPOMATIDE OF THE FALLS OF THE OHIO. BY R. ELLSWORTH CALL.

[ABSTRACT.]

The *Strepomatid* molluscan fauna of the Falls of the Ohio is one that is very rich in numbers, but rather poor in species. Including some which will eventually pass into synonymic lists, the total number comprizes but ten species which are distributed among four genera, to wit: *Pleurocera* with three nominal species, *Lithasia* with one species, *Auculosa* with two species, and *Goniobasis* with four species.

The falls mark the line of junction of the Silurian and Devonian strata, which may here be differentiated with very great success and ease. For a distance of some five or six miles the bed of the river is very rocky, with numerous islets of rock, which are always exposed at low water. From one end to the other are innumerable pools in which flourishes a very rich *coniferoid* flora, and which furnish a very variable but favorable station for these forms. In numerous places the changes in the current are so marked that at different seasons of the year the

Strepomatid fauna varies with seasons, and an abundant flora abounds. At another, where the confervoid vegetation, the numerous small falls over and the bottom is either of the four species of *Goniobasis* the water is changed, a relation which exhibits a certain habit, serves to explain the place, at different periods.

The earliest forms that they were discovered and have long since been merging to allow his claim to go with indifferent success, to the literature of conchologic place. Here it is simply their synonymy as now a habit which manifestly retards the progress of the family.

The species of *Pleurocera moniliferum* and *P. celeratum* determination, when studied forms of extreme variation names which ought to have been monger could erect, by error from the simple variations done. Thus *Pleurocera* can three and even four revolve which are entirely purple. Hundreds of individuals have no tendency to other color, colored whorls, on which the that have plain and well marked characteristic grooving. The action of the effects of differer