

A CENTURY OF ZOOLOGY IN INDIANA, 1816-1916

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One hundred year ago Indiana was, zoologically, scarcely more than a *terra incognita*. At the beginning of the nineteenth century not a single naturalist had set foot within its borders; its wonderful hard wood forests,—the richest the world has ever seen, its broad prairies, its multitude of beautiful lakes and gently flowing streams, had never been invaded by the collector. The only information the world had regarding the fauna of Indiana was contained in brief mention by travelers of certain of the more conspicuous animals seen by them in their journeys. In the Paris Documents, 1718, as quoted by Mr. Butler, it is stated that “from the summit of the hill at Ouiatenon* nothing is visible to the eye but prairies full of buffaloes.”

Col. George Croghan in his journal for 1765, published in 1831, tells of a trip he made down the Ohio, and mentions buffalo, deer, bear, and other animals which he observed. Doubtless many of these were seen on the Indiana side of the river.

Thomas Hutchins who in 1778, published in London a “Topographical description of Virginia, Pennsylvania and North Carolina, comprehending the rivers Ohio, Kanawha, Cherokee, Wabash, Illinois, Mississippi,” etc., mentions the buffalo as being “innumerable” northwest of the Ohio River, from the mouth of the Kanawha, far down the Ohio. This clearly covered Indiana.

In April, 1808, the great ornithologist, John James Audubon, came with his young wife to Louisville, Kentucky. He had floated down the Ohio in an “Ark,” and doubtless noted many birds and mammals on the way. Although he probably saw no buffalo, he has this to say of that animal: “In the days of our boyhood and youth, buffaloes roamed over the small and beautiful prairies of Indiana and Illinois, and herds of them stalked through the open woods of Kentucky and Tennessee; but they have dwindled down to a few stragglers, which resorted chiefly to the ‘Barrens,’ but towards the years 1808 and 1809, and soon after they entirely disappeared.”

During his residence at Louisville from 1808 to 1811, and at Hendersonville for several years from 1811, Audubon’s collecting trips doubtless took him sometimes to the Indiana side of La Belle Rivière and doubtless he added to his cabinet a number of birds taken on Indiana soil.

In March, 1810, that other great American ornithologist, Alexander Wilson, floated down the Ohio from Pittsburgh to Louisville. In a letter to

*Also spelled Ouatenon. This was in the Wea Prairie near the Wabash in Tippecanoe County.

his friend, Alexander Lawson, dated February 22, 1810, just before starting on this memorable trip, Wilson wrote: "I have therefore resolved to navigate myself a small skiff, which I have bought, and named the *Ornithologist*, down to Cincinnati, a distance of five hundred and twenty-eight miles." On February 23 he adds: "My baggage is on board—I have just time to despatch this and set off. The weather is fine, and I have no doubt of piloting my skiff in safety to Cincinnati. Farewell! God bless you!"

On April 4, he again wrote Lawson, from Lexington, Kentucky, giving a most interesting account of the trip down the river. He did not terminate his river journey at Cincinnati as originally intended, but went on to Louisville, 192 miles further, where he arrived March 18. On March 5 when about 10 miles below the mouth of the Sciota, he saw his first flock of paroquets. That night he spent on the Kentucky side where he was entertained by a squatter who explained to him the art and mystery of bear-treering, wolf-trapping, and wild-cat hunting. "But notwithstanding the skill of this great master," Wilson remarks, "the country here is swarming with wolves and wild cats, black and brown; according to this hunter's own confession he has lost sixty pigs since Christmas last; and all night long the distant howling of the wolves kept the dogs in a perfect uproar of barking." He spent the night of March 16 at Vevay, Indiana, where he found about the only people, during his entire trip, for whom he had a kindly word. The next day he observed a number of turkeys from time to time on the Indiana shore and "lost half the morning in search of them." "On the Kentucky shore," he remarks, "I was decoyed by the same temptations, but never could approach near enough to shoot one of them."

On March 18, Wilson reached Louisville where he remained until the 24th and where he met Audubon, of which fact, however, he makes no mention in either his journal or his letters. But Audubon does. He says: "One fair morning I was surprised by the sudden entrance into our counting-room at Louisville of Mr. Alexander Wilson, the celebrated author of the 'American Ornithology,' of whose existence I had never until that moment been apprised. This happened in March, 1810. How well do I remember him, as he then walked up to me! His long, rather hooked nose, the keenness of his eyes, and his prominent cheekbones, stamped his countenance with a peculiar character. His dress, too, was of a kind not usually seen in that part of the country; a short coat, trousers, and a waistcoat of gray cloth. His stature was not above the middle size. He had two volumes under his arm, and as he approached the table at which I was working, I thought I discovered something like astonishment in his countenance. He, however, immediately proceeded to disclose the object of his visit, which was to procure subscriptions for his work. He opened his books, explained the nature of his occupations, and requested my patronage. I felt surprised and gratified at the sight of his volumes, turned over a few of the plates, and had already taken a pen to write my name in his favor, when my partner rather

abruptly said to me, in French, 'My dear Audubon, what induces you to subscribe to this work. Your drawings are certainly far better; and again, you must know as much of the habits of American birds as this gentleman.' Whether Mr. Wilson understood French or not, or if the suddenness with which I paused, disappointed him, I cannot tell; but I clearly perceived that he was not pleased. Vanity and the encomiums of my friend prevented me from subscribing. Mr. Wilson asked me if I had many drawings of birds. I rose, took down a large portfolio, laid it on the table, and showed him,—as I would show you kind reader, or any other person fond of such subjects,—the whole of the contents, with the same patience with which he had shown me his own engravings. His surprise appeared great, as he told me he never had the most distant idea that any other individual than himself had been engaged in forming such a collection. He asked me if it was my intention to publish, and when I answered in the negative, his surprise seemed to increase. And, truly, such was not my intention; for, until long after, when I met the Prince of Musignano in Philadelphia, I had not the least idea of presenting the fruits of my labors to the world. Mr. Wilson now examined my drawings with care, asked if I should have any objections to lending him a few during his stay, to which I replied that I had none. He then bade me good-morning, not, however, until I had made an arrangement to explore the woods in the vicinity along with him, and had promised to procure for him some birds, of which I had drawings in my collection, but which he had never seen. It happened that he lodged in the same house with us, but his retired habits, I thought, exhibited either a strong feeling of discontent or a decided melancholy. The Scotch airs which he played sweetly on his flute made me melancholy too, and I felt for him. I presented him to my wife and friends, and seeing that he was all enthusiasm exerted myself as much as was in my power to procure for him the specimens which he wanted. We hunted together, and obtained birds which he had never before seen; but, reader, I did not subscribe to his work, for, even at that time, my collection was greater than his. Thinking that perhaps he might be pleased to publish the results of my researches, I offered them to him, merely on condition that what I had drawn, or might afterwards draw and send to him, should be mentioned in his work as coming from my pencil. I at the same time offered to open a correspondence with him, which I thought might prove beneficial to us both. He made no reply to either proposal, and before many days had elapsed, left Louisville, on his way to New Orleans, little knowing how much his talents were appreciated in our little town, at least by myself and my friends.

"Some time elapsed, during which I never heard of him, or his work. At length, having occasion to go to Philadelphia, I, immediately after my arrival there, inquired for him, and paid him a visit. He was then drawing a white-headed eagle. He received me with civility, and took me to the exhibition rooms of Rembrandt Peale, the artist, who had then portrayed Napoleon

crossing the Alps. Mr. Wilson spoke not of birds or drawings. Feeling, as I was forced to do, that my company was not agreeable, I parted from him; and after that I never saw him again. But judge of my astonishment some time after, when on reading the thirty-ninth page of the ninth volume of 'American Ornithology,' I found in it the following paragraph:

"March 23, 1810.—I bade adieu to Louisville, to which place I had four letters of recommendation, and was taught to expect much of everything there; but neither received one act of civility from those to whom I was recommended. one subscriber, nor one new bird; though I delivered my letters, ransacked the woods repeatedly, and visited all the characters likely to subscribe. Science or literature has not one friend in this place."

Evidently the lonesome trip down the Ohio must have been a hard one for our Scotch ornithologist or else he must have been a dyspeptic, as witness the following in his Journal under the same date, March 23; "Every one is so intent on making money that they can talk of nothing else; and they absolutely devour their meals that they may return the sooner to their business. Their manners correspond with their features. Good country this for lazy fellows; they plant corn, turn their pigs into the woods, and in the autumn feed upon corn and pork,—they lounge about the rest of the year." And again on March 24: "Weather cool. Walked to Shelbyville to breakfast. Passed some miserable log houses in the midst of rich fields. Called at a Squire C's, who was rolling logs. Sat down beside him, but was not invited in, though it was about noon."

And on March 29: "Wherever you go you hear people talking of buying and selling land; no readers, all traders. The Yankees, wherever you find them are all traders. * * * * Restless, speculating set of mortals here, full of lawsuits, no great readers, even of politics or newspapers." And he concludes: "These few observations are written in Salter White's garret, with little or no fire, wood being a scarce article here, the forest being a full *half mile* distant."

After remaining at Louisville three years Audubon moved his store to Hendersonville, Kentucky, where he conducted a store and grist mill for several years. While there he was visited by that enthusiastic, albeit, somewhat eccentric naturalist, Constantine Samuel Rafinesque. It was during this visit to Audubon, probably about 1818, that occurred the amusing incident of the violin and the new species of bat. According to Audubon:

"That night, after we were all abed, I heard of a sudden a great uproar in the naturalist's room. I got up and opened the door, when to my astonishment I saw my guest running naked, holding the handle of my favorite Cremona, the body of which he had battered to pieces in attempting to kill the bats which had entered the open window! I stood amazed, but he continued jumping and running around and around till he was fairly exhausted, when he begged me to procure one of the animals for him, as he felt convinced that they belonged to a new species. Although I was convinced

of the contrary, I took up the bow of my demolished violin, and giving a smart tap to each bat as it came up, we soon has specimens enough."

Most of the dates I have thus far given are before the beginning of the one hundred years with which we are primarily concerned at this time. I call attention to them simply to remind you that our state was in the original "Buffalo belt," and that our forefathers were quite justified in placing that magnificent animal on the the Great Seal of Indiana.

Even a cursory examination of the State Seal will enable us to understand why the buffalo became extinct in Indiana. At the rate of speed shown in the Great Seal, if kept up, the buffalo must have reached the plains of Kansas within a few hours!

With the possible exception of a few specimens of birds collected by Audubon and Wilson on Indiana soil, the first naturalist to pay any attention to the Indiana fauna was Rafinesque. This indefatigable student of nature came from Philadelphia to Lexington, Kentucky, in 1818, where, through the good offices of his friend, John D. Clifford, whom he had known in Philadelphia, he secured the professorship of botany and natural history in Transylvania University, located at Lexington.

A number of circumstances doubtless contributed to induce Rafinesque to go west. Perhaps the most potent of all was the *wanderlust*. Early in life he determined to become a great traveler; and in his writings he tells, with evident pleasure, of many of his long journeys and collecting trips. In one place he mentions his "32 years of travels in America." He had no doubt heard of the famous New Harmony community on the Wabash, a society that must have appealed to him strongly. He also had heard of Audubon at Henderson, Kentucky, and longed to visit him, which he did in 1818. Then at Louisville, at the Falls of the Ohio, dwelt Taraseon, a friend of his youth in Marseilles.

These, and his desire to see new places and new animals and plants, were too strong for him to resist, so, in the summer of 1818, he started out on foot, for the west. Reaching Pittsburgh, he continued his journey down the Ohio in an "ark," a sort of flatboat common on the Ohio in those days. Opportunities were afforded for many stops on the way, which Rafinesque fully improved by making short and hurried trips ashore, in which he obtained collections of natural history specimens of many kinds. Perhaps he paid most attention to the fishes and the plants. He doubtless made a number of landings on the Indiana side of the river between Cincinnati and the Falls of the Ohio, and a number of the fishes he later described were obtained or observed in Indiana waters. We can imagine with what child-like delight and enthusiasm our pioneer naturalist viewed this new world, for it was to him, as Professor Call has so well said, "a veritable new world; the plants and animals had never before been either collected or studied. The hand of the husbandman had not yet destroyed much of the primitive forest; untold wealth of natural forms appealed to Rafinesque, the nature-lover, as they have

rarely appealed to any man. Today even, in the face of the check which specialization furnishes to scientific investigators, few men could withstand this lavish display of new and unknown forms! They were on every hand, in every glade and mead, in every brook and spring, the creeks, the rivers, the very rocks, themselves. Like a schoolboy, Rafinesque searched and found, studied, described, drew, sent abroad, the wonderful forms in which he almost alone, now reveled."

Rafinesque remained at Lexington eight years, teaching students and collecting and studying the local fauna and flora during the college year, but during the vacations going far afield in search of new and undescribed plants, fishes and shells. That on more than one of these excursions he came to the Ohio and crossed over into the Hoosier state, is quite certain. The Falls of the Ohio was a favorite collecting ground, and that place is the type locality for many of his new species of fishes. It is also the type locality for seven new species of lightning which he described in perfectly proper binominal form! We may not, however, count this circumstance as a part of the century's progress in zoology in Indiana! The evidence of progress lies, perhaps, in the failure of our later naturalists to discover any additional new species in that field!

In the fall of 1825, upon returning to Lexington from one of his long collecting trips, Rafinesque found that during his absence, his effects had been removed from his room in the college building and stored in the garret, and the room which he had formerly occupied turned over to another professor.

This was an indignity which our sensitive naturalist could not endure, and he at once left the college as he says "with curses both on it and the president, which reached them both soon after, for the President died of yellow fever in New Orleans, and the college was burned with all its contents."

Recently, while looking over a number of Rafinesque's original field notebooks, now in the library of the United States National Museum, I found in one of them a loose sheet evidently the last sheet of a letter which had been addressed to Rafinesque by the librarian of Transylvania University, asking the return of certain books. The situation had evidently become acute, as evidenced by the closing words of the letter, which are in the nature of an ultimatum, as follows: "I am directed to commence such suit without delay if the books are not returned to the library.

Yours respectfully,

H. GRAHAM."

On the back of this sheet are lead pencil drawings of three fishes,—Rafinesque's way of showing his contempt for the librarian's ultimatum.

I cannot resist the temptation of recording here a most remarkable and important fact regarding Rafinesque, which is not generally known. It is no less than complete evidence that our eccentric naturalist had a very clear comprehension of the essential principles of evolution as early as 1832, twenty-six years before Darwin.

In 1832 and 1833 Rafinesque published in Philadelphia a periodical which he called the "Atlantic Journal and Friend of Knowledge." In March, 1915, while examining a bound copy of this journal, kindly loaned to me by my friend Dr. John Van Denburgh, I was amazed to find on page 163, a most remarkable document, which I here quote verbatim et literatim. This extremely interesting letter shows clearly that our eccentric naturalist, regarded by some as a fool, by others as a knave, was neither—certainly not a fool—but a man of remarkable vision who grasped clearly all the essential principles of the evolutionary origin of species. Much of what he said in this letter to John Torrey would sound well today in a discussion of the origin of species. He even uses the word 'mutation', in a strictly De Vresian sense, thus anticipating Professor De Vries's "Die Mutations-theorie" by nearly three-quarters of a century. And all this 26 years before Darwin's "Origin of Species," and just as Darwin was entering upon his voyage around the world in the *Beagle*, to which he was indebted for so much of the data which led him to his theory!

The article to which I refer is as follows:

124. Principles of the Philosophy of new Genera and new species of Plants and Animals.

Extract of a letter to Dr. J. Torrey of New York dated 1st Dec. 1832 . . . I shall soon come out with my avowed principles about G. and Sp. partly announced 1814 in my principles of Somiology, and which my experience and researches ever since have confirmed. The truth is that *Species and perhaps Genera also, are forming in organized beings* by gradual deviations of shapes, forms and organs, taking place in the lapse of time. There is a tendency to deviations and mutations through plants and animals by gradual steps at remote irregular periods. This is a part of the great universal law of PERPETUAL MUTABILITY in every thing.

Thus it is needless to dispute and differ about new G. Sp. and varieties. Every variety is a deviation which becomes a Sp. as soon as it is permanent by reproduction. Deviations in essential organs may thus gradually become N. G. Yet every deviation in form ought to have a peculiar name, it is better to have only a generic and specific name for it than 4 when deemed a variety. It is not impossible to ascertain the primitive Sp. that have produced all the actual; many means exist to ascertain it: history, locality, abundance, &c. This view of the subject will settle botany and zoology in a new way and greatly simplify those sciences. The races, breeds or varieties of men, monkeys, dogs, roses, apples, wheat * * * and almost every other genus, may be reduced to one or a few primitive Sp. yet admit of several actual Sp. names may and will multiply as they do in geography and history by time and changes, but they will be reducible to a better classification by a kind of genealogical order or tables.

My last work on Botany if I live and after publishing all my N. Sp. will be on this, and the reduction of our Flora from 8000 to 1200 or 1500

primitive Sp. with genealogical tables of the gradual deviations having formed our actual Sp. If I cannot perform this, give me credit for it, and do it yourself upon the plan that I trace.

C. S. R."

But Rafinesque did not live to do this, neither did John Torrey do it for him.*

I shall not take time here to list the numerous papers relating to the fauna of the Ohio Valley which Rafinesque published between 1818 and 1832, nor to enumerate the many new species of fishes, mollusks, and plants which he described. Many of his papers dealt directly with fishes and shells that occur in Indiana; in many instances the specimens on which the descriptions were based came from Indiana streams, and many others from that portion of the Ohio bordering Indiana.

Rafinesque was therefore the first naturalist to study the fishes of the Ohio. Our first knowledge of the ichthyological fauna of southern Indiana dates from Rafinesque's arrival at Lexington in 1818, when Indiana as a State was but two years old. To the Transylvania University belongs the honor of having had as a member of its faculty this all round naturalist who was the first to collect and study the fishes beyond the Alleghenies; and to that institution must attach also the stigma of having driven from its halls the only member of its faculty whose name has survived to this day.

THE NEW HARMONY COMMUNITY

In 1815 there was established on the banks of the Wabash in Posey County, Indiana, a settlement or community which was destined to play a most important part in the social, literary and scientific life of the state. The settlement was established by George Rapp and his followers who migrated to the Wabash Valley from Butler County, Pennsylvania. These people called themselves Rappists or Harmonists, and their new village they named New Harmony. The society was a communistic organization, all property being held in common.

In 1824 Robert Owen purchased the land and other property of the Harmonists. He and his followers undertook to continue the venture along somewhat the same lines. Among the members of the new community were many men and women destined to become prominent in the affairs of the state and the nation. The vanguard of these came to New Harmony in 1825. They were spoken of as the "boat load of knowledge." Among those whom we should mention and who concern us most, were Robert Owen, David Dale Owen, Richard Owen, Alexander Maclure, William Maclure, Thomas Say, Mrs. Say and Charles Alexander LeSueur.

*Dr. L. Stejneger also discovered this interesting letter and re-printed it in *Science* for May 18, 1906, pp. 785-786, where it apparently did not attract the attention it deserved.

Among still others who were either members of the community or who visited New Harmony in the early days should be mentioned the following:

Francis Joseph Nicholas Neef, a native of Alsace and an officer of the Rhine, for some time an assistant of Pestalozzi at Neufchâtel, whose system of education he was the first to introduce in America. Both David Dale Owen and Richard Owen married daughters of Professor Neef. Madame Mary D. Fratageot, an able Pestalozzian teacher and head of the Industrial School; Frances Wright, anti-slavery lecturer; Maximilian von Neu Wied, Prince, Prussian classicist and naturalist who visited New Harmony twice; Sir Charles Lyell, the English geologist; H. R. Schoolcraft, artist and Indian authority; Josiah Warren, merchant, printer and musician; Dr. Gerard Troost, geologist and naturalist, for whom Holbrook named the yellow-bellied terrapin (*Pseudemys troosti*); John Chappellsmith, artist and engineer, who made the cuts of fossils for various scientific reports of that day; Robert Henry Fauntleroy, a native of Virginia, prominent in the U. S. Coast and Geodetic Survey, who studied at New Harmony magnetic declination and intensity; James Sampson, born in Boston, 1806, came to New Harmony about 1825 where he died 1890, collector of natural history specimens, especially land and freshwater shells and archæological specimens; Col. Charles Whittlesay, geologist; F. B. Meek, eminent paleontologist; Leo Lesquereux, distinguished paleobotanist; E. T. Cox, a Virginian, state geologist of Indiana 1868-1880, who got his training under the Owens; Dr. Elderhurst, eminent chemist; Dr. C. C. Parry, noted botanist; and Prof. A. H. Worthen, state geologist of Illinois 1858-1886.

All of these had more or less to do with the development of science, literature and art in Indiana.

To us the most important of these was Thomas Say, who has been called "the Father of American Entomology," "the Father of American Conchology," and, as if that were not enough, "the Father of American Zoology."

Thomas Say was born in Philadelphia, July 27, 1787. As a child his greatest delight was in collecting beetles and butterflies. In 1825 he was induced to accompany William Maclure and the Owens to New Harmony where "science and letters, it was confidently affirmed, would soon arise like the orient sun to enlighten our benighted western world."

And the prophesy was not entirely lacking of fulfillment. New Harmony did become, and remain for many years, the literary, scientific and art center west of the Alleghenies; and even to this day, it continues to hold its place among the most enlightened and cultured communities in a state distinguished for its scientific and literary prestige.

Before going to New Harmony, Thomas Say had already made valuable contributions to entomological literature. At New Harmony and in the surrounding country he found a rich field and he continued without abatement his collecting of specimens and describing of new species.

During the ten years which Say lived at New Harmony, he devoted all his leisure time to his favorite pursuits.

Two parts of his "American Entomology" were published in Philadelphia before he went to New Harmony, and the third part was also completed and soon afterwards published.

Little or no time, however, was lost on account of his moving. New contributions to entomological science began to appear soon, and continued until his death. During these years Say described more than a thousand new species of insects, some 400 of which are mentioned specifically as having been found in Indiana. Doubtless many of the great number which he recorded simply "Inhabits the United States," were actually found by him in the vicinity of New Harmony.

Many of Say's entomological papers were printed at New Harmony, and bear the imprint, "New Harmony, Indiana. Printed at the School Press."

But Say was more than an entomologist. Besides being the foremost American of his time in that field of zoological science, he was also the foremost American conchologist of his time.

Perhaps the most pretentious single work undertaken by Say was his "American Conchology, or Descriptions of the Shells of North America, illustrated by colored figures from original drawings executed from nature." "The object of this work," said the author, "is to fix the species of our molluscous animals by accurate delineations in their appropriate colours, so that they may be readily recognized even by those who have not extensive cabinets for comparison."

It was Say's intention to elucidate the mollusks of all North America. His plan was to introduce in the first part or number of the publication the species found in the United States so that those subscribers who might wish to limit their inquiries or expenditure to the shells of the Union might be accommodated.

The work was issued in parts or numbers and was sold by subscription. The price per number was \$1.50, the subscriber having the privilege of withdrawing his name after having received and paid for four numbers, should he desire to do so. The publishers, however, pledged themselves to reduce the price of future numbers to one dollar, "after the subscription list shall justify a reasonable hope of a *reimbursement of the actual expenditures.*"

I have not been able to determine that this very desirable situation was ever realized; apparently it never was, as I find that No. 5 was advertised at the usual price, \$1.50.

The plates in Say's American Conchology are from drawings by Mrs. Say, are all excellent in every way and faithfully portray the species represented. They far surpass in artistic merit and scientific accuracy many of the illustrations found in modern zoological publications. Mrs. Say was Miss Lucy May Sistare, evidently an accomplished and talented woman of unusual artistic ability and her assistance was invaluable to her husband in his scientific work.

Although only about a dozen species are definitely credited to Indiana

in this work, it is certain that Say conceived the idea of writing an American Conchology after he came to New Harmony. He no doubt wrote all of it at New Harmony. He doubtless spent much time observing and collecting the shells of that region.

It is hardly conceivable that he could have lived nine years on the banks of the Wabash without becoming deeply interested in the wonderfully rich molluscous fauna of that river, a stream richer in the Unionidæ (freshwater clams) than any other river in the world; a river which has supplied more and better shells to the pearl button manufacturers during the last two decades than any other stream in the world. The Wabash has more species of freshwater mussels than any other stream. I recall with great pleasure many delightful days spent with the late Dr. J. T. Scovell collecting Unios in the Wabash near Terre Haute, and our pleasant evenings identifying our specimens and arranging them in our cabinets. When I tell you that we obtained at least 47 species within a few miles of Terre Haute, you can understand how rich the Unio fauna of the Wabash really is. And we can appreciate with what delight Thomas Say entered upon the study of this wonderfully interesting fauna at a time when most of the species were new and undescribed.

It will ever remain a matter of profound regret that Say died prematurely, before he had completed his studies of the mollusks of the Wabash valley.

The house in which Say first lived was still standing in 1888 when I had the pleasure of visiting New Harmony. It has since been remodeled and is said to be now not recognizable. In this house Say doubtless did much of the work on his "American Conchology," and here were written many of his later entomological papers.

Thomas Say died at New Harmony, October 10, 1834. In the yard at the rear of the house in which he died is a monument of white marble about 6 feet high, erected in 1846 by Alexander Maclure at the request of his brother William Maclure, the life-long friend of Say.

On a beautiful day in September, 1888, Dr. Richard Owen took me to view this monument. Although in his seventy-ninth year, Dr. Owen, without the aid of glasses, read to me the inscriptions on this simple but beautiful shaft. It is worth while to record them here. On the east face:

Thomas Say. The Naturalist. Born in Philadelphia, July 27, 1787. Died at New Harmony, October 10, 1834.

On the south face:

One of the founders of the Academy of Natural Sciences of Philadelphia January 25, 1812.

On the west face:

The friend and companion of William Maclure whose surviving brother erected this monument, 1846. A. M.

And on the north face:

Votary of science even from a child,
 He sought her presence in the trackless wild;
 To whom the shell, the insect, and the flower
 Were bright and cherished emblems of her power.
 In her he saw a spirit all divine,
 And worshipped like a pilgrim at her shrine."

Charles Alexandre Le Sueur, artist, traveler, and naturalist (probably about 1780-1846), was another distinguished member of "the boat load of knowledge" that came to New Harmony in 1825, and who contributed materially to the knowledge of the zoology of the state. Le Sueur had been a great traveler. He had gone around the world with Péron and La Pérouse. He had traveled widely in New England, New York and Pennsylvania, and only shortly before coming to New Harmony he had returned to the United States from the West Indies. He had already gained recognition as an artist of unusual ability. He was one of the founders of the Academy of Natural Sciences of Philadelphia, in the museum of which he was a curator from 1817 to 1825.

To the *Journal* of the Philadelphia Academy he contributed, between the years 1817 and 1825, no fewer than 27 papers in which he described about 187 new species of which about 90 were fishes, many of which occur in the Great Lakes and in the streams of Indiana.

Le Sueur was a naturalist in a broad sense, interested in many groups, including fishes, mollusks, reptiles, worms, corals, and ascidians, his chief interest, however, being in fishes. Dr. Richard Owen says that Agassiz apparently regarded Le Sueur second only to himself as an ichthyologist! His chief interest lay in fishes, and he was "the first to study the ichthyology of the Great American Lakes." He even projected an ichthyology of North America and issued a prospectus of the proposed publication.

Immediately on his arrival at New Harmony Le Sueur began studying the fishes, turtles and mollusks of the region. He was the first naturalist to explore the Indian mounds in Indiana. Professor Richard Owen, in a letter dated December 14, 1886, to Dr. Jordan, described Le Sueur as he knew him in 1828, as "about 50 to 55 years of age, tall, rather spare of muscle, but hardy and enduring. He permitted his beard to grow, which at that time was quite unusual; hence he sometimes platted it and tucked it almost out of sight when he went from home. In New Harmony he usually went barenecked, often bareheaded, and in summer occasionally barefooted, or at least without socks. His hair had been dark, but was sprinkled (as well as his beard) with gray. His manner and movements were quick; his fondness for natural history (as it was then called) led him to hunt and fish a good deal. In summer he was fond of swimming in the Wabash, and I frequently accompanied him. He instructed me how to feel with my feet for *Unios* and other shells as we waded sometimes up to our necks in the rivers and ponds searching to add to our collections. When he went fishing with

others he always exchanged his fine common fishes for the smallest and to them most indifferent-looking, when he recognized some new species or even variety."

Two of our most common turtles, the Map Turtle (*Malacoclemmys geographicus*) and the Soft-shelled Turtle (*Aspidoonectes spinifer*) were described by Le Sueur.

Dr. Eigenmann has called my attention to an article by the late French naturalist Vaillant, "Note sur L'Oeuvre Ichthyologique de C. A. LeSueur," in the "Extrait du Bulletin de la Société Philomathique de Paris, tome VIII, No. 1, page 15, 1895-1896."

Vaillant states that LeSueur, after having returned to France from the expedition to Australia in 1804 and after having aided in the publication of the first volume of the narrative of that voyage, accompanied William Maclure to North America from whence he did not return to France until 1838. He was made conservateur of the Museum of Havre, his native city, and there he died December 12, 1846.

It appears that LeSueur projected a large work on the ichthyology of North America. He even went so far as to issue a prospectus giving the conditions of publication. This was issued in 1827 while he resided at New Harmony.

The wording is as follows:

"Proposals
for publishing by subscription
a work on the
Fishes of North America
with plates drawn and colored from nature
By
C. A. Le Sueur.

This will be published at New Harmony, Indiana, in numbers, with four colored plates in each, and the necessary letter-press containing descriptions of the species represented. Twelve numbers will constitute a volume.

Messrs. Tiebout and other artists from Philadelphia, who were there occupied on the "American Entomology," are engaged for this work.

Books with colored plates are generally beyond the reach of persons of limited means; but it is intended that the present work shall be adapted to the circumstances of all. The price to subscribers will therefore be forty cents each number.

<i>Subscribers</i>	<i>Names</i>	<i>Residence</i>	<i>Copies."</i>
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Apparently this prospectus and a first brochure of six leaflets accompanied by five plates, is all of this work which was ever published. Some other parts and a number of original drawings, are among the articles which LeSueur's family deposited in the library of the Museum of Natural History at Paris.

After the death of Thomas Say, a number of years passed before any naturalist appeared to continue the study of the fauna of Indiana. So far as I have been able to learn it was not until sometime in the 50's that we had another productive zoologist within our borders. This was Dr. Rufus Haymond of Brookville. Dr. Haymond was a practicing physician of Brookville with a deep interest in natural history. He apparently was a keen observer with the instincts of a real naturalist. He not only noted the species of animals that came under his observation, but he studied their habits, abundance, and distribution. He was especially interested in mammals and birds. In 1856 he published in the Proceedings of the Academy of Natural Sciences of Philadelphia, a paper on the "Birds of Southeastern Indiana," in which he lists 138 species. Thirteen years later, in the Eleventh Annual Report of the Indiana State Board of Agriculture and the Report of Prof. E. T. Cox, State Geologist, for 1869, Dr. Haymond published lists of the mammals and birds of Franklin County, Indiana.

On pages 203-208 of this report is found his list of the "Mammals found at the present time in Franklin County." In this, the first faunal list of the mammals of Indiana, Dr. Haymond records 32 species. The list is annotated with many interesting and valuable notes on the habits and abundance of the various species.

Speaking of the otter, he thinks it barely possible that a few still linger along the Whitewater, but he had seen none for many years. He says the last black bear was seen in the country about 1839. "They once were very numerous and their claw marks may still be seen on the smooth bark of hundreds of beech trees." Speaking of gray squirrels and black squirrels he believed them to be different species, contrary to the view held by mammalogists. He states that "30 to 40 years ago about one in six of the squirrels was black but now (1869) there are no black squirrels in southeastern Indiana."

Pages 209-235 of the same report are devoted to the "Birds of Franklin County, Indiana." This list is an extremely interesting one. The total number of species recorded is 163, and Dr. Haymond remarks: "This concludes the list of all the birds of the county which I have observed and been able to identify. Doubtless many others visit this section which I have not observed, and I have seen many which I have not been able to identify."

His annotations are so interesting that I feel constrained to quote a few of them, as they will impress us with the great changes which have taken place in our avi-fauna in the last 50 years.

Of the Pigeon Hawk he says: "Occasionally seen following the flight of pigeons in their migrations; very rarely seen at other times." He says the "Cooper's Hawk destroys more young chickens and quails than all the other hawks together. They fly with amazing rapidity, and scarcely ever miss taking their prey."

Of the Carolina Parakeet he states that he never saw but one flock, and "that in June, many years ago;" but old inhabitants assured him this bird was very numerous at the time of the first settlement of the country.

Of the Wild Pigeon he says it is "Still seen in large numbers, though evidently they have been constantly diminishing in numbers for the last forty years, and are probably not half so numerous as they formerly were. In the months of January and February, 1854, these birds roosted about two miles from Brookville, notwithstanding the country is thickly inhabited. No one who did not see them, or who has not seen a 'pigeon roost,' can form any adequate conception of their numbers."

The Wild Turkey had become practically extinct in Franklin County even as early as 1869, and the Ruffed Grouse was becoming rare.

The Wood Duck he says was very common along the Whitewater.

Dr. Haymond never saw but one Canvasback Duck in the county. That was in March, 1855. He had a chance to taste it and pronounced it "very tender and juicy, but with such a fishy flavor that it could scarcely be eaten."

Of the White Pelican he says its visits are like those of the angels, "few and far between."

It is thus seen that many of our most interesting native birds had become or were becoming quite rare as early as 1869.

At a meeting of the State Board of Agriculture, January 6, 1870, an appropriation of \$100 was made and placed at the disposal of the State Geologist, Prof. E. T. Cox, for the purpose of putting up a case in the room of the Indiana State Board of Agriculture, for the specimens of Indiana birds and mammals. This was apparently the first allotment of funds for state museum purposes. It shows that but little attention had been given by the state authorities to the natural history of the state.

In the Geological Survey report for 1873 mention is made of the commercial fisheries of Lake County. For the year 1873 the shipments of fish from Michigan City totaled about 270 tons, valued at \$27,000. The whitefish made up nine-tenths of the entire catch, the muskallunge and Mackinaw trout forming the other tenth.

These important food fishes are much less abundant now in Lake Michigan; indeed, the muskallunge is practically extinct in that lake, and the Mackinaw trout is rare.

It was stated that the fishermen often take the species of duck known as oldwife (*Harelda glacialis*) in their gillnets set at a depth of 180 feet. On one occasion as many as 300 were taken at one haul.

In 1873, in a report on the geology of Lawrence County, Professor John

Collett called attention to the interesting animal life found in some of the caves in southern Indiana. In Donnelson's cave "thousands of bats gather in the fall and remain through the winter in hibernation, hanging in clusters, like swarms of bees, from the ceiling or sides of the cave; the clusters of bats varying from 20 to several hundred, or in measure, from a quart to a bushel."

He also records other species of animals found in Connelley's, Hamer's and Donnelson's caves. Eyeless fishes, crustaceans and eriekets are mentioned. Collections were made by Doctors Elrod and Sloan and forwarded to Prof. A. S. Packard and Dr. E. D. Cope, who identified the specimens.

This appears to have been the first study made of the fauna of Indiana caves, so exhaustively continued recently by our own Dr. Eigenmann.

Under instructions from Professor E. T. Cox, State Geologist, Dr. George M. Levette assisted by Mr. Caleb Cooke, in 1875, took soundings and temperatures of 13 of the small lakes in northern Indiana.

Besides making soundings and taking temperatures of the water, these gentlemen made notes on the fishes and mollusks of the lakes examined. This was, so far as I know, the first serious attempt to learn anything about the fauna of our northern lakes. Dr. Levette's report was published in the Seventh Annual Report of the Geological Survey of Indiana, for 1875. It is an extremely interesting and valuable document. Considerable attention was given to the fishes and turtles and a great deal to the mollusks.

Dr. Levette was primarily a conchologist. In this report he records some 20 species of Unionidæ which he obtained in Indiana north of the Wabash. He also lists 19 species of univalves which he collected in the same waters and which had been identified for him by John W. Byrkit of Indianapolis. He also recorded 9 species of turtles from the same region.

Dr. Levette was the first naturalist I ever met. As a young man I spent a portion of the summer of 1876 in Indianapolis in the office of Professor Daniel Hough in the bookstore of Bowen and Stewart, on Washington Street. Professor Hough and Dr. Levette were intimate friends and were frequently together. Professor Hough, one of the best men I ever knew, was interested in archeology, as also was Dr. Levette. They both occupied rooms in a building which I think, stood at the southwest corner of Washington and Illinois streets. I frequently visited them there. In the rooms of each were what seemed to me at that time great quantities of specimens of Indian axes, mortars, spear and arrow heads, Unios and other mollusks, and turtle shells.

Many of the shells and turtles were the collections Dr. Levette had made the previous summer in northern Indiana. And I remember with what delight he exhibited them to me, and how interested he was when I showed some slight knowledge of the habits and distribution of some of the species, gained from my days of loitering as a boy along Wild Cat Creek and "on the banks of Deer Creek."

Dr. Levette's report on "Observations on the Depth and Temperature of

some of the Lakes of Northern Indiana" was transmitted to Prof. E. T. Cox, State Geologist, December 31, 1875. It is printed as pp. 469-503, of the Indiana Geological Survey Report for 1875.

Caleb Cooke, who was Dr. Levette's assistant in these investigations, was one of the curators in the Peabody Museum at Salem, Massachusetts. Dr. Levette speaks of him as a "gentleman of extended and varied experience in collecting and preserving natural history specimens for museum use, as well as for scientific study." Mr. Cooke being associated in the same institution with Prof. F. W. Putnam, an arrangement was effected by which all the fishes collected would be examined by Professor Putnam, and full suites of the species collected, properly labeled, would be supplied to the State Museum at Indianapolis; and all new species figured and described in the Indiana Geological Survey reports. This arrangement, however, was never carried out.

While Prof. E. T. Cox was not a zoologist, he was nevertheless appreciative of the importance of making known the fauna and flora of the state. He did much to call attention to these natural resources of Indiana, and in his various reports as State Geologist are found numerous references to the birds, mammals, fishes and mollusks of our commonwealth.

ICHTHYOLOGY

The greatest impetus ever given to zoological research and investigation in Indiana occurred when David Starr Jordan (Gainesville, N. Y., Jan. 19, 1851—), came to Indianapolis in 1874 as a teacher of natural history in the high school of that city. He was then a young man scarcely out of his teens, of great physical and mental vigor, with unbounded energy and enthusiasm, and already appreciative of the richness of the fauna and flora of the state. After one year in the Indianapolis high school Jordan was called to the professorship of natural history in the Northwestern Christian University (now Butler University) at Irvington, and his college chum at Cornell, Herbert Edson Copeland, came to take his place in the high school. Copeland was also interested in fishes and he and Dr. Jordan spent many a happy day along Fall Creek, Pogue's Run and White River observing, collecting and studying the fishes which inhabit those waters. This was the beginning of serious study of the fish fauna of Indiana, and one of the most delightful nature stories that has ever been written resulted directly from these days spent along Fall Creek. I refer to the story of the "Johnny Darters" by Jordan and Copeland, published in the *American Naturalist* for 1876.

Herbert Copeland (1849—Indianapolis, 1876) was an enthusiastic student of these fishes, and a most active and well-equipped naturalist, whose early death at Indianapolis in 1876 deprived American Ichthyology of one of its ablest workers.

Fortunately for the Indianapolis schools and for Indiana, another of Jordan's college associates came to take the place in the high school made

vacant by the death of the lamented Copeland. This was Alembert Winthrop Brayton, our own distinguished fellow member, Dr. Brayton, who has ever since been a resident of Indianapolis, who has brought honor and renown to the city and the state, and whom we all love and delight to honor. Professor Brayton at once became associated with Dr. Jordan in ichthyological investigations.

Dr. Jordan's career as ichthyologist and all round naturalist may be said to date from his arrival at Indianapolis in 1874. Indeed, the first new species of fish Dr. Jordan ever described came from Indiana. This was the Cisco and the type locality is Tippecanoe Lake. The specimens were collected by Judge J. N. Carpenter of Warsaw, Indiana, and were by Prof. E. T. Cox turned over to Dr. Jordan who described them under the name *Argyrosomus sisco*, in the American Naturalist, Vol. IX, for 1875. And it is an interesting and singular coincidence that the last new species of fish Dr. Jordan has described from Indiana is *Etheostoma tippecanoe* from the outlet of that lake.

The considerable collection of fishes made in the small lakes in northern Indiana in the summer of 1875 by Caleb Cooke under the direction of Dr. Levette, and which, it was originally intended would be reported on by Professor F. W. Putnam, was really turned over to Dr. Jordan who published a full report thereon in Vol. 29 of the Proceedings of the Academy of Natural Sciences of Philadelphia in 1877. In this paper 10 new species were described. From this time on fish papers from Dr. Jordan's pen or from those of his students and collaborators came thick and fast, and many of these papers related to the fish fauna of Indiana.

I do not know that I can do better than to enumerate the students and others who received their inspiration directly or indirectly from Dr. Jordan and who have contributed to our knowledge of the fishes of Indiana. In doing so I may be permitted to comment briefly on the work they did.

As already mentioned the first to be associated with Dr. Jordan in ichthyological work was Herbert Copeland. Then came Alembert W. Brayton, Charles H. Gilbert, Joseph Swain, Seth Eugene Meek, Carl H. Eigenmann, Elizabeth Hughes, Charles L. Edwards, Morton W. Fordice, Barton Warren Evermann, David Kopp Goss, Bert Fesler, Willis Stanley Blatchley, Charles Harvey Bollman, William L. Bray, Oliver P. Jenkins, Howard Walton Clark, Fletcher B. Dresslar, Martin Luther Hoffman, Jennie E. Horning (Mrs. Francis M. Walters), Chancey Juday, Clarence Hamilton Kennedy, Edward M. Kindle, Philip N. Kirsch, Charles Leslie McKay, William J. Moenkhaus, Robert Newland, Herbert G. Reddick, Douglass Clay Ridgley, Albert B. Ulrey, Joseph H. Voris, Fred C. Test, Albert J. Woolman, Ulysses O. Cox, J. Rollin Slonaker, and doubtless others.

Nearly all of this rather formidable list of zoologists were students of Dr. Jordan, chiefly at Indiana University, where he went from Butler University in 1879.

In the spring or early summer of 1879 it became known that a professor

of natural sciences was to be selected by the Board of Trustees of Indiana University to succeed Dr. Richard Owen who had resigned on account of age. Our fellow-member, Dr. A. W. Brayton (Avon, N. Y., March 3, 1848—) thought he might like the place, so he made a trip to Bloomington to look into the matter. Dr. Jordan went along to recommend him to the trustees. I remember very distinctly meeting them on the train as they were returning to Indianapolis and Dr. Jordan telling me, jokingly, that he had done all he could to induce the board to offer the position to his friend Brayton. He told them all the good things he could about Brayton and how eminently well-fitted he was to succeed the distinguished Dr. Owen. The trustees listened to Dr. Jordan most respectfully and then offered the position to *him!* Brayton moved to make it unanimous and there was nothing Dr. Jordan could do but accept!

The twelve years (1879–1891) spent by Dr. Jordan at Indiana University were among the most productive of his life, not only in relation to zoological science in general but to zoology in Indiana in particular. The influence upon the state was epoch making. The effect upon the state of training so many of its young men and women in the method of science and sending them out over the state and beyond its borders imbued with the spirit of the real naturalist who seeks truth, who sees things as they are, and who knows animals when he meets them in the open, can not be overestimated. Many and varied were the problems in zoological science that these young men and women investigated, studied, and attempted to solve. They were by no means confined to the fauna of Indiana. In ichthyology their field was world-wide. It is true, however, that the richness of the Indiana fauna appealed to many of these young naturalists, and zoological literature has been greatly enriched by their contributions. I shall first refer briefly to some of the work that relates especially to the fish fauna of Indiana. I shall begin with Dr. Jordan's life-long and most able and distinguished ichthyological associate,

CHARLES HENRY GILBERT

(Rockford, Ill., Dec. 5, 1859 —)

Gilbert was discovered in the Indianapolis high school by Herbert Copeland, and it was Copeland who started in him the fire which has never ceased to burn. Upon Copeland's death Gilbert, while yet a mere boy, went with Jordan to Butler University, and with him he has ever since remained most intimately associated.

The first joint paper by Jordan and Gilbert was published January 17, 1877, in the *Indiana Farmer*, and, very appropriately, it was a list of the fishes of Indiana. Gilbert was then scarcely more than 17 years old. In the same year Dr. Jordan published in the *Proceedings of the Philadelphia Academy* a paper "On the Fishes of Northern Indiana," based on the Levette-Cooke collections.

Then followed in 1878 to 1883 nearly a hundred papers by Jordan and Gilbert on systematic ichthyology, most of them concerning the fishes of the Pacific Coast of the United States.

In 1883 appeared the Synopsis of the Fishes of North America, by Jordan and Gilbert, a great work of more than a thousand pages in which were described all the species of fishes then known from North American waters. Many original references to the fishes of Indiana are found in this work.

Most of Dr. Gilbert's ichthyological work has been extra-limital so far as Indiana is concerned, as has also that of Dr. Jordan. But much of the actual study was done in Indiana. Among Dr. Gilbert's studies of the fish fauna of Indiana may be mentioned his work on the fishes of the Switz City Swamp in Greene County and that on the fishes of White River. Of course, both he and Dr. Jordan devoted much time to the fishes in the various streams about Indianapolis. Dr. Gilbert's more recent papers have been among the most important contributions to our knowledge of the fishes of the Pacific and of the life history of the species of Pacific coast salmon.

JOSEPH SWAIN

Doctor Swain (Pendleton, Ind., June 16, 1857 —), the distinguished president of Swarthmore College, was deeply interested in fishes in the early 80's. With Dr. Jordan and various students he collected fishes in the streams of Kentucky and Indiana. The subject of Swain's graduating thesis at Indiana University in 1883, was "The Rainbow Darter." Besides describing a new darter (*Hadropterus scierus*) from Bean Blossom Creek, Indiana, he, as junior author with Dr. Jordan, contributed some 15 papers to the literature of systematic ichthyology.

SETH EUGENE MEEK

The late Dr. Meek (Hicksville, O., April 1, 1859—Chicago, Ill., July 6, 1914), was one of Dr. Jordan's most enthusiastic and energetic students. He studied the fishes of the region about his home (Hicksville, Ohio) and those in the vicinity of Chicago, the studies in each case extending across the line into Indiana. He also collected extensively in Iowa, Nebraska and Arkansas, but his most important work was done on the fishes of Mexico, Central America and the Canal Zone. Dr. Meek contributed more than 50 papers on fishes and reptiles. At the time of his death Dr. Meek was the best authority on the fishes of Mexico and Central America. Dr. Meek and the present writer began their contributions to ichthyological literature in 1883 in a paper entitled "A review of the species of the genus *Gerres*," of which they were joint authors. From that date until Dr. Meek's untimely death we remained most intimately associated in scientific work.

CARL H. EIGENMANN

(Flehing, Germany, March 9, 1863 —)

Dr. Eigenmann of the Indiana University contingent, is one of the most able and productive of American ichthyologists. He has been and still is, indefatigable in ichthyological investigation; his list of publications embraces more than 150 titles, many of them important monographs. During his long residence in Indiana he has naturally given much attention to the fish fauna of the state. He first studied the fishes of Bean Blossom Creek and he and Morton W. Fordice published an interesting paper on the results. They list 40 species, 32 of which were obtained in a single day's collecting. Among Dr. Eigenmann's more important papers that relate directly to the zoology of Indiana are those giving the results of his studies of cave faunas. It may be doubted if any phase of American zoology has been more comprehensively or satisfactorily studied than this by Dr. Eigenmann and his student assistants.

BARTON WARREN EVERMANN

The present writer (Monroe Co., Iowa, Oct. 24, 1853 —), who also sat at Dr. Jordan's feet at Indiana University and there received inspiration, has published more than 200 articles, reports and books on various natural history subjects, chiefly fishes and birds. Many of the fish papers were as junior author with Dr. Jordan. In 1882 to 1886 he explored the streams of Carroll and Howard counties and, jointly with Dr. Jenkins, published an annotated list of the species of fishes obtained. In 1886 to 1891 he studied the fish fauna of Vigo County. In 1888, with the assistance of Charles H. Bollman, he collected the fishes of southwestern Indiana, and with Albert J. Woolman (then one of his students) he examined St. Joseph River at South Bend and Mishawaka, Yellow River at Plymouth, Lake Maxinkuckee, Eel and Wabash rivers at Logansport, and Deer Creek at Camden. The results of these investigations were set forth in a paper published by Dr. Jordan. In 1899 to 1913, as a part of the survey of Lake Maxinkuckee, much attention was given to the fishes by Dr. Evermann, Mr. H. Walton Clark and Dr. Seovell, with the result that more is now known of the fishes of that lake than of any similar body of water in America. The total number of species of fishes known to inhabit Lake Maxinkuckee is 63, a much larger number than has been found in any other lake, even of much greater size, anywhere in the world. The report on this work has been completed and is now awaiting publication. He has also published reports on the food-fishes of Indiana (junior author with Dr. Jordan), two new darters (*Etheostoma aubeenaubei* and *Hadropterus maxinkuckiensis*) from Lake Maxinkuckee, a new shad (*Alosa ohioensis*) from the Ohio River, with notes on the other food-fishes of that river, a list of the fishes known from the Great Lakes, and a list of the fishes of Franklin County, Indiana. He is also junior author with Dr.

Jordan of a four-volume work of over 3,300 pages on the Fishes of North and Middle America in which all species then known are described, and of another large popular work on American Food and Game Fishes.

WILLIS STANLEY BLATCHLEY

Professor Blatchley (North Madison, Conn., Oct. 6, 1859 —) is perhaps the most active and enthusiastic naturalist that Indiana has ever produced. He has not specialized in any one subject to the exclusion of interest in others. He is an all-round naturalist, deeply and intelligently interested in nature in all her various aspects. Having been a student of Dr. Jordan's very naturally his first published papers relate to fishes, but very soon he turned his attention more strongly to other fields, chiefly entomology. Only Mr. Blatchley's work in ichthyology will be considered here, his other activities being reserved for mention elsewhere in this report.

Blatchley's first paper was on the American species of the genus *Umbra*, published in 1885. In the same year appeared two other papers, one a review of the species of the genus *Pimephales*, the other on the genus *Aphredoderus*. These fishes all occur in Indiana.

OLIVER PEEBLES JENKINS

(Bantam, O., Nov. 3, 1850 —)

Professor Jenkins has contributed ten or more papers to ichthyological literature. Two of them relate to the fishes of Indiana, namely, a list of the fishes of Vigo County, Indiana, published in 1885 and 1888, and Notes on Indiana fishes (with Barton Warren Evermann), published in 1888. In the summer of 1887, Dr. Jenkins and the present writer collected and studied the fishes of the Gulf of California particularly in the vicinity of Guaymas, the results of which were published by the National Museum in 1889 and 1891. Later, Dr. Jenkins studied the fishes of the Hawaiian Islands, on which he published four important papers in 1900 to 1903.

WILLIAM J. MOENKHAUS

Dr. Moenkhaus (Huntingburgh, Ind., Jan. 6, 1871 —) has contributed a number of interesting papers on fishes: Variation in the color-pattern of *Etheostoma caprodes*, 1893; Some cases of mimicry in fishes, 1894; Variation of North American fishes, 1894; Notes on a Collection of fishes from Dubois County, Indiana, 1895; Variation of North American fishes, II, 1895; Material for the study of the variation of *Etheostoma caprodes* Rafinesque, and *Etheostoma nigrum* Rafinesque, in Turkey Lake and Tippecanoe Lake, 1897; Experiments in the hybridization of fishes, 1901; An aberrant *Etheostoma*, 1901; Description of a new darter (*Hadropterus evermanni*) from Tippecanoe Lake, 1903.

Besides those who have contributed several papers each to the elucidation of the fish fauna of Indiana there are several others who have written one or more short papers on the fishes of the state.

I shall refer to them briefly.

Charles Harvey Bollman, was joint author with Barton Warren Evermann of a list of the fishes observed in the vicinity of Brookville, Indiana.

Ernest P. Bicknell and Fletcher Bascom Dresslar reviewed the genus *Semotilus*, 1889, a genus represented in Indiana by one of our most abundant and familiar species.

Morton William Fordice, as joint author with Carl H. Eigenmann, published a list of the fishes of Bean Blossom Creek, Indiana, in 1885; also a review of the North American species of *Petromyzontidæ*, in 1886 (joint author with Dr. Jordan); also a review of the sturgeons of North America, in 1889 (joint author with Philip H. Kirsch). Dr. Philip H. Kirsch, for several years Indiana State Fish Commissioner, besides his official reports as Commissioner, wrote several fish papers. One of these was an account of the fishes of Eel River and its tributaries, another was on the fishes of the Maumee River basin, both published in 1894.

Albert J. Woolman wrote a valuable paper on the fishes of Kentucky, published in 1890. He also assisted the present writer in collecting and studying the fishes of Northern Indiana in 1888. He also wrote on the fishes of Florida and Mexico.

Albert B. Ulrey studied the fishes of Wabash County, Charles Leslie McKay who lost his life in Alaska in 1883, reviewed the family of sunfishes, of which there are many species in Indiana. David Kopp Goss, Charles Lincoln Edwards, Bert Fesler, William L. Bray, Martin Luther Hoffman, Jennie E. Horning (the late Mrs. F. M. Walters), Elizabeth Hughes, Rosa Smith (now Mrs. C. H. Eigenmann), and Robert Newland, while students at Indiana University under Dr. Jordan, did more or less work on fishes, and each published one or more papers, none of them, however, dealing directly with Indiana fishes. Among the students of Dr. Eigenmann who have done some work on the fish fauna of Indiana, I may mention C. H. Kennedy, Edward M. Kindle, Herbert C. Reddick, D. C. Ridgley, Joseph H. Voris, and Earl E. Ramsey. Most of these did work at the Indiana University Biological Station at Turkey and Winona lakes. Among the students of Dr. Evermann who have worked more or less in ichthyology may be mentioned Albert J. Woolman, Cloudsley Rutter, Hiram W. Monical, D. C. Ridgely, Joseph H. Voris, William J. Moenkhaus, J. Rollin Slonaker, Ulysses O. Cox, and Fred M. Chamberlain. Each of these has made contributions of value to our knowledge of fishes. Special mention should be made of Mr. Chamberlain's valuable studies of the life histories of Pacific Coast Salmon.

From the foregoing review of the progress of ichthyology in Indiana during the century just ending, it is seen that nothing whatever was known of the fishes of Indiana in 1816. Not until two years after Indiana became

a state were any of its fishes collected or studied. The first work was that of Rafinesque in 1818. Then came a period of more than half a century during which practically nothing was added to our knowledge of the fishes of the state. But with the coming of Jordan to the state in 1874, the study of the fish-fauna of Indiana began in earnest and has so continued to this day. The streams and lakes of Indiana have been more carefully examined than have those of any other state. The fishes have been more carefully collected and studied and are better known. More species are known from Indiana than from any other state. The Wabash has the richest fish fauna of any river in the world; it has more than three times as many species of fishes as are found in all the waters of the United States draining into the Pacific. Lake Maxinkuekee, with its 63 species, has the richest fish fauna of any lake in America, if not in the world.

Practically all this work on the fishes of Indiana has been done by home talent, by native Hoosiers and by others who came to the state to live and do their scientific work; but, great as has been their contribution to the ichthyology of Indiana, their contributions to the ichthyology of the rest of the world are vastly greater.

While much work has been done on the fishes of Indiana, a vast amount still remains to be done. There are many streams and lakes in which there has been no collecting. Indeed, not a single stream has been thoroughly studied, and only one or two lakes have received even a fraction of the attention they deserve. The geographic distribution of each species within the state, its food, enemies, rate of growth, spawning habits, food value, and ecological relations, are all important problems concerning which our knowledge is far from complete. These are some of the problems that the right sort of State Fish and Game Commission would take up for serious investigation.

MAMMALOGY

Mention has already been made of Haymond's list of the mammals of Franklin County, Indiana. Reference should also be made to a number of general publications in the early part of the century in which some Indiana mammals are mentioned. Audubon and Bachman in their quadrupeds of North America, Vol. 2, 1851, mention the buffalo as having occurred in Indiana. Robert Kennicott in his quadrupeds of Illinois, injurious and beneficial to the farmer (1856), refers to several mammals from Indiana. Professor Baird in his mammals of the Pacific Railroad Survey, 1857; Doctor Jordan in the various editions of his Manual of Vertebrates (1876, 1878, 1880, 1888, 1890, 1899); Dr. J. A. Allen in his history of the American bison (1877), Dr. Elliott Coues in his Fur-bearing animals (1877), and Coues and Allen in their North American Rodentia, all make some references to certain mammals as occurring in Indiana.

After Dr. Haymond, the next paper of a faunistic nature dealing with

our mammals is Dr. Frank W. Langdon's *Mammalia of the vicinity of Cincinnati*, published in 1881. In this list are several references to Indiana localities for the species mentioned. A year later Dr. Langdon published a synopsis of the Cincinnati fauna in which similar Indiana references occur. In this same year (1882) Dr. Brayton published his report on the mammals of Ohio, containing many references to Indiana localities.

Many of these publications were compilations which did not represent any original investigation or study of the Indiana mammalian fauna. But about this time there began to appear in the *Journal of the Cincinnati Society of Natural History*, the *American Naturalist*, the *Bulletin of the Brookville Society of Natural History*, the *Indiana Farmer*, and elsewhere, short papers of a very different character, papers which told about the animals which the writers themselves had seen, observed and studied in the open, in their natural environment. These papers were by two young men at Brookville,—Edgar R. Quick and Amos W. Butler, some of them joint productions. The first was by Mr. Quick in 1881 on the white-footed mouse, which was followed the next year by one on the common meadow mouse; also by another short paper on mammals found in Franklin County. In 1884 Quick and Butler published in the *American Naturalist* a valuable paper on the habits of some *Arvicolinæ*. In the same year Mr. Butler published a paper on *Local Weather Lore* in which interesting references are made to various animals. Then followed numerous papers on Franklin County mammals by Mr. Butler: *Observations on the muskrat*; *Observations on faunal changes*; *The common meadow mouse*; *Some more mice*; *Meadow mice in southeastern Indiana*, all in 1885; *Zoological miscellany* in 1887 and 1888. Our smaller mammals and their relation to horticulture, in 1891; *Our Indiana shrews*, in 1892; *Bibliography of Indiana mammals and a preliminary list of Indiana mammals* (joint author with Barton W. Evermann) in 1893; *The mammals of Indiana*, in 1894; *Indiana—a century of changes in the aspects of nature*, in 1895; and *Life in the forest—mammals*, in 1898.

Barton Warren Evermann has made a few contributions to our knowledge of the mammalian fauna of Indiana. In 1888 he published the first record of the occurrence of the star-nosed mole in Indiana; in 1894, a bibliography of Indiana mammals and a preliminary list of Indiana mammals (with Amos W. Butler); and in 1911 (with H. Walton Clark) an annotated list of the mammals of Lake Maxinkuckee and vicinity.

Another Indiana naturalist who made valuable contributions to the literature of the Indiana mammalian fauna is the late Dr. Walter L. Hahn. Dr. Hahn spent the month of August, 1905, in field work studying the mammals of the Kankakee region in northwestern Indiana, the results of which he published in 1907 as "*Notes on mammals of the Kankakee Valley.*" In 1908, there appeared from Dr. Hahn's pen, three valuable papers dealing with Indiana mammals: "*Some habits and sensory adaptations of cave-habiting bats*;" "*Notes on the mammals and cold-blooded vertebrates of*

the Indiana University farm, near Mitchell, Indiana;" and "the Mammals of Indiana." The last of these, published in the "Indiana Department of Geology and Natural Resources" for 1908, is the most important publication yet issued on the mammalian fauna of Indiana.

In it are given full descriptions of all the 66 species known from the State, and much interesting and valuable information regarding their abundance, distribution, and habits.

In Dr. Hahn's untimely death on St. Paul Island, Bering Sea, May 31, 1911, zoological science lost one of its most promising young men.

While considerable collecting of the mammals of the state has been done, our knowledge is very incomplete. There are doubtless many species belonging to the local fauna which have never as yet been recorded from the state.

And then, the habits and the economic relations of the various species have been studied scarcely at all. As an illustration, the possibilities of fur-farming in Indiana have received no serious attention. This is a matter well worthy serious consideration. The muskrat is particularly worth experimenting with. The hundreds of small lakes and ponds dotting every county in the northern part of the state, each surrounded or bordered by large areas of marsh land such as affords an ideal home for muskrats, should be considered with reference to muskrat farming. The muskrat is very prolific; its fur is popular and brings a good price, that of northern Indiana muskrats being particularly fine and bringing very high prices.

A little attention to this question, a little experimental muskrat farming, will demonstrate, I confidently believe, that northern Indiana is an ideal country for this industry; an industry which once started, will add thousands of dollars to the income of the farmers of northern Indiana.

ORNITHOLOGY

Mention has already been made of the relation to our state of the two great American ornithologists, John James Audubon, and Alexander Wilson. This relation was slight at best. It is certain that Wilson on his trip down the Ohio in March, 1810, observed certain species of birds on the Indiana side of the river and actually tried, apparently without success, to collect specimens of the wild turkey just below Vevay. That Audubon in the several years that he lived at Louisville and Henderson, on the Kentucky side of the Ohio River, made some collecting trips to the Indiana shore, is a very safe assumption. But neither of them so far as I have been able to learn, ever published anything on the birds of Indiana. I have also mentioned Dr. Rufus Haymond and his list of birds of Franklin County. I shall now speak of the more recent ornithologists who have contributed to our knowledge of the avi-fauna of Indiana.

ROBERT RIDGWAY

(Mount Carmel, Ill., July 2, 1850 —)

And first of all, it is a great pleasure to head the list with the greatest and most productive systematic ornithologist that America has ever produced. Mt. Carmel, Illinois, where Mr. Ridgway was born, is so close to the Indiana line that we may with propriety claim him as one of our own; indeed, he was a resident of Wheatland, Knox County, Indiana, for some years where he studied the birds and wrote much regarding them. Professor Ridgway has contributed more than 500 papers, some of them formidable volumes of hundreds of pages, to the literature of ornithology and other natural history subjects. Some of these deal directly or indirectly with the avi-fauna of Indiana. His first paper, a note on the nesting habits of the belted kingfisher, appeared in the *American Naturalist* for March, 1869, after which followed numerous papers on the birds of southeastern Illinois, all of which were almost equally applicable to southwestern Indiana.

AMOS WILLIAM BUTLER

(Brookville, Ind., Oct. 1, 1860 —)

We now come to the Father of the Ornithological Renaissance in Indiana, the Father of the Indiana Academy of Science, our own distinguished and much beloved Vice-President, Amos W. Butler. Mr. Butler has contributed more to our knowledge of Indiana birds than all other writers combined. His first paper, which appeared when he was scarcely more than 21 years old, was a list of the birds of Franklin County, Indiana. This was in 1882, some 13 years after the appearance of Dr. Haymond's list of birds of the same county. Since 1882, numerous papers and reports on the ornithology of Indiana have been published by Mr. Butler, as follows: Observations on faunal changes, 1885; A list of the birds observed in Franklin County, Indiana, 1886; The Cerulean warbler, 1884; Zoological Miscellany, 1887 and 1888; Notes on the range of the prothonotary warbler in Indiana, 1888; A catalogue of the birds of Indiana, 1890: Our birds and what they do for the farmer, 1890; Notes on the range and habits of the Carolina parakeet, 1892; Some notes concerning the evening grosbeak, 1892; Notes on Indiana birds, 1891; Further notes on the evening grosbeak, 1893; The range of the crossbills in the Ohio valley, 1892; 1893; Bibliography of Indiana Ornithology, 1893; Notes on Indiana birds, 1893; Notes on the birds of 1894; An orchard talk, 1895; The Birds of Winona, 1895; Indiana; a century of changes in the aspects of nature, 1895; Additional notes on Indiana birds, 1895; From wilderness to civilization, 1896; The Bobolink in Indiana, 1896; Some additions to the Indiana bird list, 1896; Notes on Indiana heronries, 1897; The recent occurrence of the raven in Indiana, 1897; The birds of Indiana, 1897; Brünnich's Murre in Indiana, 1897; Bird life in Indiana, 1898; Notes on Indiana birds, 1899; Conditions affecting the distribution of birds in Indiana, 1903.

Mr. Butler has given special attention to the occurrence of rare species in Indiana; he has been, and still is, most persistent and indefatigable in verifying all reports and records of rare birds in the state.

EDWARD WILLIAM NELSON

(Manchester, N. H., May 8, 1855 —)

In Nelson's "Additions to the avi-fauna of Illinois, with notes on other species of Illinois birds," published in 1876, a number of references to birds in the Wabash Valley may be found. In 1877, he recorded the Louisiana heron as occurring in Indiana, and in his birds of Northeastern Illinois published the same year, he recorded many observations made on birds in Indiana about the south end of Lake Michigan. In still another paper published in 1877 on birds observed in southern Illinois he includes species noted on the Wabash and White rivers in Indiana.

BARTON WARREN EVERMANN

The present writer began studying the birds of Indiana in the fall of 1877. His first published notes appeared in the *Delphi Journal* in the winter of 1878-79, and related to the winter birds observed in the vicinity of Camden. After these brief notes, followed other short articles and faunal lists of which the following may be mentioned: An unusual nesting site of the chewink, 1881; Bluebirds' eggs, 1882; Bird notes from Bloomington, Indiana, 1883; Bird migration, 1884; Arrivals of birds at Camden, Indiana, 1884; A day with the birds of a Hoosier swamp, 1886; White eggs of the bluebird, 1886; Some rare Indiana birds, 1887; Bird migration, 1887; Birds of Monroe County, Indiana, 1887; An addition to the list of birds of Monroe County, Indiana, 1887; Birds of Carroll County, Indiana, 1888; The Wood Ibis in Indiana, 1889; The movements of birds, 1889; Migratory birds, 1889; Notes on owls, 1890; The Indiana bird law, 1891; The feeding habits of the coot and other water birds, 1902; Habits of the chimney swift, 1905; Bird life on an Indiana farm, 1906; Owls of Carroll County, Indiana, 1909; The birds of Lake Maxinkuckee and vicinity (with H. Walton Clark). Besides these he has published a number of papers relating to the birds of California.

Various other persons have made contributions to our knowledge of the birds of Indiana. Among these may be mentioned the following:

Dr. Frank W. Langdon in his study of the birds of the vicinity of Cincinnati no doubt often wandered across the Indiana line.

William Brewster in an article on the prothonotary warbler recorded observations made in Knox and Gibson counties, Indiana.

Joel Asaph Allen in the *Memoirs of the Boston Society of Natural History* for December, 1868, published a list of 72 species of birds which he had observed the preceding June at Richmond, Indiana. Dr. Allen also published in 1878 a note on the early nesting of the shore lark near Indianapolis.

Dr. Jared Potter Kirtland (1793-1877) of Cleveland, Ohio, in a letter dated 1857, published in 1874, mentions a number of Indiana birds.

Dr. Elliott Coues in his *Birds of the Northwest* makes reference to some Indiana birds.

Dr. David Starr Jordan in the various editions of his *Manual of Vertebrates* (1876-1900) has numerous Indiana references to birds. In 1879, Dr. A. W. Brayton published in the *Transactions of the State Horticultural Society* a catalogue of the birds of Indiana, with keys and descriptions. This was the first important list of the birds of the entire state.

In 1881 Edgar R. Quick recorded the occurrence near Brookville of *Catharista atrata* and *Chen hyperboreus*, and in 1882, published some notes on the winter birds in the vicinity of Brookville. In the same year Dr. J. M. Wheaton published his large volume on the birds of Ohio in which there are numerous Indiana references.

Fletcher M. Noe of Indianapolis published brief notes on rare Indiana birds in 1884, 1885, 1886, 1888 and 1890.

In 1889, Maurice Thompson published in the *Indiana Geological Survey Report* a preliminary sketch of the aquatic and shore birds of the Kankakee region. Three years later R. Wes McBride published some notes on Indiana birds; Prof. A. B. Ulrey published some notes on the American bittern; James E. Gould had a note on the nesting of the bald eagle at English Lake; and E. M. Kindle wrote of the arrival of some migratory birds in Johnson County, Indiana. In 1893, U. O. Cox published a list of the birds of Randolph County, Indiana, and Mr. McBride published notes on the rose-breasted grosbeak in Michigan and Indiana.

In concluding the list of ornithologists who have added to our knowledge of Indiana birds I must not fail to mention Mrs. Jane Louisa Hine who died at her home at Sedan, Indiana, February 11 of the present year, in the eighty-fifth year of her age. Early in her long and useful life Mrs. Hine became interested in birds. When the present writer was superintendent of bird migration observers in Indiana and the southern peninsula of Michigan during the eighties, Mrs. Hine was one of his most energetic and reliable observers. She published numerous articles on birds in the *Farmer's Guide*, of Huntington, Ind., and supplied many interesting notes to Mr. Butler which he published in his *Birds of Indiana*. She also published in the *Auk* in 1894, a very interesting article on the ruby-throated hummingbird.

HERPETOLOGY

Much good work has been done on the reptiles and batrachians of Indiana. A little was done by Rafinesque, Say, and Le Sueur between 1818 and 1835; a little by Dr. Haymond between 1850 and 1870, after which the field was left practically unworked until 1882 when the *Reptiles and Amphibians of Ohio* by W. H. Smith, was published in Vol. IV of the *Geological*

Survey of Ohio. This annotated list mentions most of the species found in Indiana.

In the American Naturalist for 1885, Mr. Butler published a paper on Hibernation of the lower Vertebrates in which there are recorded interesting observations on certain species of turtles and frogs. To the Journal of the Cincinnati Society of Natural History Mr. Butler furnished several contributions to Indiana herpetology.

1886, Edward Hughes published in the Bulletin of the Brookville Society of Natural History a preliminary list of the reptiles and batrachians of Franklin County. This list is annotated and records 40 species.

In 1887, Dr. O. P. Hay (Jefferson Co., Ind., May 22, 1846 —) published a preliminary catalogue of the Amphibia and Reptilia of Indiana; and in 1893 appeared Hay's "Batrachians and Reptiles of Indiana," a very useful publication of more than 200 pages in which are given full descriptions of all the species then known from this state.

Professor Blatchley has observed, collected and studied the reptiles and batrachians of Indiana for many years, and has contributed a number of faunal lists and other important papers, among which may be mentioned the following: Notes on the batrachians and reptiles of Vigo County, Ind., (1891); How plants and animals spend the winter (1897); Indiana caves and their fauna (1896); Notes on the batrachians and reptiles of Vigo County, Ind. (1900); and On a small collection of batrachians and reptiles, with descriptions of two new species (1900).

As a part of their survey of Lake Maxinkuckee Evermann and Clark gave attention to the reptiles and batrachians of that region, and in the Proceedings of this Academy for 1914 they published an annotated list of the snakes. The number of species recorded by them as occurring in the vicinity of Lake Maxinkuckee is 10. They have ready for publication similar annotated lists of the turtles and batrachians, 9 species of the former and 18 of the latter.

CONCHOLOGY

As already stated in the introduction to this paper, the study of the molluscous fauna of Indiana began with Thomas Say at New Harmony in 1825 to 1834. But even earlier than Thomas Say was that versatile naturalist, Constantine Samuel Rafinesque, who visited New Harmony in 1818, and who began describing the fishes and mollusks of the Ohio the same year. His first paper dealing in part with the shells of Indiana appeared in 1818 and was entitled "Discoveries in natural history in the Western States." This was followed in rapid succession in 1818 to 1820, by a half dozen other papers each dealing more or less with the mollusks of Indiana. In these various papers several new species are described.

In M'Murtie's Sketches of Louisville and its Environs, etc., first edition, 1819, is a list of the mollusca of the vicinity of Louisville and the Falls of

the Ohio, for which the author says he is indebted to the "politeness of that accomplished and skillful naturalist, Mr. Rafinesque."

In 1823, D. H. Barnes published a paper on the genera *Unio* and *Alasmodonta* in which some Indiana shells are described and figured. Five years later Barnes published another paper entitled *Reclamation of Unios*.

In the general works of Poulson, Conrad, Lea, Binney, Prime, Stimpson, Tryon, Harper and Wetherby, Call, Wright, Walker and others, will be found much of value and interest, but practically nothing relating to mollusks as a part of the fauna of Indiana.

Not until 1844, or 10 years after the death of Say, was anything further published on the shells of this state. In that year, Dr. John T. Plummer published in the *American Journal of Science and Arts*, a list of the shells observed about Richmond, Wayne County, Indiana. About 30 species are recorded. In the summer of 1875 Dr. George M. Levette of Indianapolis, in connection with his study of the lakes of northern Indiana, made considerable collections of shells in that region. The species were listed in the State Geological Survey report for 1875. Mr. John W. Byrkit of Indianapolis identified the univalves of which there are 19 species and subspecies in the list. Besides these there are 20 species of *Unionidæ*.

Five years later (1880) Mr. Fred Stein contributed to the Indiana Geological Survey Report a paper on the mollusks of the state. This appears to have been the first attempt to catalogue the mollusks of the entire state. In 1885 Dr. R. Ellsworth Call (Brooklyn, N. Y., May 13, 1856-1916) published a paper on the geographic distribution of the *Unionidæ* of the Mississippi Valley.

Then followed a number of valuable papers by Dr. Call: On the genus *Campeloma*, in 1886, and 1887; Contribution to a knowledge of Indiana Mollusca, in 1894; On the Geographic and hypsometric distribution of North American *Viviparidæ*, in 1894; The *Unionidæ* of the Ohio River, in 1894; The *Strepomatidæ* of the Falls of the Ohio, in 1894; A Revision and Synonymy of the *Parvus* group of the *Unionidæ*, in 1896; Second Contribution to a knowledge of Indiana Mollusca, in 1896; On a small collection of Mollusks from Northern Indiana, in 1896; Fishes and shells of the Falls of the Ohio, in 1896; and the hydrographic basins of Indiana and their molluscan fauna, in 1897.

The most voluminous and complete contribution to the conchology of Indiana is that by Dr. R. Ellsworth Call, a Descriptive Illustrated Catalogue of the Mollusca of Indiana, printed in the 24th Annual Report of the Indiana Geological Survey for 1899. This document lists 186 species of mollusks for the state, and is by far the most valuable contribution to Indiana conchology.

In the 26th annual report of the Indiana Department of Geology and Natural Resources, for 1901, Mr. L. E. Daniels has a useful Check-list of

Indiana Mollusca, with localities, in which 276 species of mollusks are credited to the State.

In 1898, Frank C. Baker (Warren, R. I., Dec. 14, 1867—) of the Chicago Academy of Sciences, published a valuable report on the mollusca of the Chicago area, which contains a good deal of matter relating to Indiana localities.

In 1885, D. R. Moore and Amos W. Butler published in the Bulletin of the Brookville Society of Natural History a list of the land and freshwater mollusca observed in Franklin County, Indiana. This paper enumerated 63 species as occurring in that county, and was, up to then, the most important local list of Indiana mollusks that had been published.

In 1893, E. Pleas printed in the NAUTILUS a list of some 123 species and subspecies of mollusks found within five miles of his home near Dunreith. This is a mere list without annotations.

Charles Dury of Cincinnati has published some brief notes on the mollusks of the vicinity of Cincinnati in which mention is made of some Indiana localities.

Ulysses O. Cox, in 1893, published some notes on the mollusks of Randolph County, Indiana.

The late Josiah T. Seovell (Vermontville, Mich., July 29, 1841—Terre Haute, Ind., May 8, 1915) one of the founders of this Academy and until his death in 1915, an honored member, during the years of his long residence at Terre Haute, was deeply interested in the Unionidæ of the Wabash River, as was also the present writer while a resident of Terre Haute from 1886 to 1891. We worked together in collecting, caring for and studying the shells. Many a day we spent together wading in the Wabash searching for new or desirable specimens and many an evening was even more pleasantly devoted to studying, identifying and arranging our collections. The freshwater mussel fauna of that portion of the Wabash is a remarkably rich one, as evidenced by the fact that our collections contained representatives of at least 47 species of Unionidæ taken within 10 miles of Terre Haute.

During the physical and biological survey of Lake Maxinkuckee, conducted more or less intermittently from 1899 to 1913, much attention was devoted to the Unionidæ of that lake. These studies were carried on by Dr. J. T. Seovell, H. Walton Clark and the present writer. Special attention was given to the life histories of the different species, and it is doubted if the molluscous fauna of any other body of water in America has been so thoroughly studied. The number of species of Unionidæ known to inhabit this lake is 13, one or two of them, as *Lampsilus luteolus*, being very abundant and of commercial importance.

In 1903, T. J. Headlee and James Simonton made a study of the mussels of Winona Lake, from which they recorded eight species. In the same year Blatchley and Daniels published a paper on some mollusca known to occur in Indiana.

But as Dr. Call has truthfully said: "There has never been made a geographic study, within this state, of its mollusks. Nor have systematic collections ever been made of so much as even a single stream. * * * * The first essential condition to a complete study of the geographic distribution of Indiana mollusca lies in complete and painstaking local collections. This is not the task of a week nor of a single season. * * * * What is done must be done systematically and thoroughly and at once" before the great changes being brought about by civilization result in the extinction of the species.

ENTOMOLOGY

As loyal Hoosiers, either by birth or choice, we can all feel a just pride in the fact that the "Father of American Entomology," Thomas Say, chose Indiana as the field of his labors and as his home. Here he lived from 1825 until his death in 1834; here he did much, perhaps most, of his entomological field work and laboratory study; and here, in historic and beautiful New Harmony, rest his remains.

With the passing of Say, the study of the insects of Indiana practically ceased for nearly 50 years. I have not been able to examine the literature critically; for my present purpose it is not necessary that I should do so. ■ ■

It is enough to know that since Say's time, very little entomological work was done in Indiana for many years.

The subject of entomology seems to have lain dormant until about 1885 when John Caspar Branner, (New Market, Tenn., July 4, 1850 —), distinguished geologist, came to Indiana University as head of the department of geology in that institution. Dr. Branner was, and is, more than a geologist. His interests are many. Among the things in which he was deeply interested in those days was entomology, not as a field in which he himself was working or intended to work, but as a field which offered splendid opportunities for original investigation to those of his students whose tastes inclined then in that direction. Dr. Branner told some of his students of the richness of this field. Some of them became interested. Perhaps the first of all was my college classmate, Jerome Fee McNeil who studied the *Myriopoda* of Indiana, and in 1886, published descriptions of twelve new species, chiefly from Indiana. Later he published other papers on this group and upon the *Orthoptera*.

Another young man whom Dr. Branner discovered was Charley Bollman at that time a boy of 17 or 18 of unusual promise. He very soon became interested in birds, fishes and myriapods, but most deeply in myriapods.

He and McNeil did much collecting together, and each soon began to publish the results of his studies. Bollman's first paper on these animals was one describing ten new species of myriapods in 1887. This was followed by 12 or more papers containing descriptions of many new species of myriapods, a large proportion of which were from Indiana.

At the time of Mr. Bollman's untimely death at Waycross, Georgia, July 13, 1889, he left several uncompleted manuscripts dealing with myriopoda. These and all his previously published papers were brought together, edited, and published by Dr. L. M. Underwood, in Bulletin 46, United States National Museum. Practically all that is known about the myriapods of Indiana we owe to Charles H. Bollman. His early death was a great loss to zoological science and to Indiana.

But the one who has done most for Indiana entomology is another Indiana University man who received inspiration from Jordan and Branner. I refer to W. S. Blatchley. Blatchley began observing and studying the insects of the state in the early 80's, and soon began publishing papers on grasshoppers, butterflies and beetles. Following a number of short papers, there appeared in 1903 a large volume of 558 pages on the Orthoptera of Indiana, an illustrated descriptive catalogue of all the species of this group known to occur in the state. In 1910 appeared another monumental work of 1,386 pages on the Coleoptera or Beetles of Indiana. And only recently (November, 1916) Professor Blatchley has published another volume of 682 pages and 155 illustrations on the "Rhynchophora of Northeastern America." This monograph includes of course descriptions of all the species of that group known from Indiana.

These three great volumes are among the most important entomological publications ever issued and contribute enormously to the knowledge of the insects of Indiana.

Another Indiana man who has contributed many important papers to the entomological literature of the state is Mr. Edward Bruce Williamson (Marion, Ind., July 10, 1878 —) of Bluffton. Mr. Williamson has specialized in the Odonata or dragonflies and is the American authority on that group.

I have not been able to consult a full list of his papers, but I find that he has contributed probably more than half a hundred titles to this subject. Mr. Williamson has studied the Odonata of Indiana very carefully. One of his first papers, published in the 24th Annual Report of the Department of Geology and Natural Resources of Indiana in 1900, is a descriptive list of all the species of dragonflies then known to occur in Indiana. Many of Mr. Williamson's papers which followed relate to the Odonata fauna of Indiana. These papers are not only taxonomic and faunistic, but they contain much regarding the life histories of these interesting insects.

Still another Indiana man who has written on the Odonata of Indiana is Clarence H. Kennedy, who studied the dragonflies of the Winona Lake region and published a list of the species. Dr. Charles B. Wilson (Exeter, Me., Oct. 20, 1861 —) of Westfield, Massachusetts, while a member of the Lake Maxinkueke survey party studying the parasites of the fishes of that lake, also collected and studied the dragonflies of that region. His

report is now in the hands of the U. S. Bureau of Fisheries, awaiting publication.

The late Dr. F. M. Webster (Lebanon, N. H., Aug. 8, 1849 — 1916), one of the ablest economic entomologists that America has ever produced, in the several years during which he was a member of the faculty of Purdue University, made important studies of the economic relations of many of the insects of the state, the results of which are found in the bulletins of the Purdue University Agricultural Experiment Station and elsewhere.

Various others have contributed to our knowledge of the insect fauna of Indiana, but space and time will not permit even an enumeration of them, even if the literature were at hand to enable me to do so.

It will suffice to say that in the century's progress in zoology in Indiana, entomology has not lagged behind.

"A century of zoology in Indiana" is a pretty broad subject. The field of zoology is very wide. The different groups of living things which come under the term zoology are many. I have in this paper treated of only a few of them; I have considered only the mammals, birds, reptiles, batrachians, fishes, mollusks and insects. The crustaceans, worms, and various other groups I have not considered at all.

So numerous and so productive have been the workers in zoology in Indiana that the limits of this paper have permitted me merely to enumerate the more active ones and to comment in the briefest manner on the splendid work they have done for Indiana.

I must not fail to mention, briefly at least, the educational institutions in Indiana which have been centers of zoological research and inspiration. While it is true that it is the workers in the subject, the men themselves, who create the enthusiasm, nevertheless the institutions, with which they are connected exert a collective influence which augments that of the individual workers. It is with pleasure that I mention Earlham, Moores Hill, Hanover, Wabash, Vincennes and Butler Colleges; DePauw, Indiana and Purdue universities; the Indiana State Normal School and Valpariso Normal University, as institutions which have each contributed much to the progress of zoological science in Indiana. Each of these has had in its faculty men of enthusiasm, magnetism and vision,—such as Joseph Moore and David Worth Dennis at Earlham; Charles Wesley Hargitt and A. J. Bigney at Moores Hill; Glen Culberson at Hanover; John Merle Coulter at Wabash; O. P. Jenkins and W. W. Norman at DePauw; Stanley Coulter at Purdue; and O. P. Hay and H. L. Bruner at Butler. All these as teachers have done much for zoological science. There are other institutions and other teachers that I might mention, did space permit.

The list of investigators and teachers whom I have mentioned is a formidable one. What these men have done and what a number of them are still doing for the zoology of Indiana, great as it is, is only a small part of what they have done and are still doing for zoology in general. These men

have by no means confined their studies to the fauna of Indiana; indeed, their work on the animals of Indiana has been largely merely incidental to their studies of the larger problems of systematic zoology, geographic distribution, and other phases of zoological science to which they have contributed of their time and thought. Nor was the work of many of these students of nature confined to any one field. Nearly all of them were and are all round naturalists, interested in and appreciative of nature in whatever garb she may be dressed. A number of them have contributed much to the popularization of natural history.

Indiana authors have during recent years put Indiana in the front rank in the field of literature as a producer of fiction of lasting value, and about this we hear a great deal and are justly proud. It is no less true, though we hear little about it, that Indiana occupies in the world of science even a more distinguished place. Her chemists, her botanists and her zoologists have put Indiana on the science map and are keeping her there. ,