

PRESIDENT'S ADDRESS  
ENTOMOLOGISTS AND ENTOMOLOGY IN INDIANA

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An entomologist has been defined as a collector of bugs, but in my remarks this evening may I assure you that I will not include dogs or chambermaids. May I assure you further that an entomologist is more than merely a collector of insects. And may I preface my talk this evening with an explanation for considering a discussion of "Entomologists and Entomology in Indiana" as a suitable one for this body of scientists.

Dr. S. A. Forbes, my first chief and who, by the way, received an honorary doctor's degree from Indiana University, and is one of the greatest entomologists America has ever produced, made the following appropos remarks some 21 years ago in addressing a group of teachers and farmers.<sup>1</sup>

"When, a year and a half ago, entomology was separated from zoology as a department at the University of Illinois, I was asked by one of the college deans if I did not think that it was too limited and subordinate a subject for departmental independence. I replied that entomology was really the larger half of zoology—an answer which was taken as jocular and received with some amusement, but which was intended seriously, and which can be substantially justified from several points of view." This comment made by a man internationally famous as a zoologist and as an entomologist, is well substantiated in the continuing remarks made in the address from which the above introductory statement is quoted.

Insects are important not only to the farmer, as is so often supposed,—they are of importance to builders, to the housewife, and in fact to every citizen regardless of his vocation or position in life. Great calamities may be traced to insects,—as the bubonic plagues, typhus and trench fevers, malaria and yellow fevers. And on the other hand some of the greatest achievements have been possible by subduing insects, as for example the building of the Panama Canal as a direct result of mosquito control, and also by the utilization of insects, as the honey-bee for honey production and the pollination of fruit flowers.

I briefly refer to these facts to assure you that the problems confronting the entomologist are great and to emphasize the importance of the subject before us this evening. Indiana entomologists have played no small part in unraveling many of the intricate entomological problems which have confronted us and it is to them we will pay tribute this evening.

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<sup>1</sup>The Insect, The Farmer, The Teacher, The Citizen, and the State. Illinois State Laboratory of Natural History, 1915. Address given at Normal, Illinois, December 13, 1910.

"Proc. Ind. Acad. Sci., vol. 41, 1931 (1932)."

Insects and insect depredations were doubtless present from the beginning of civilization. Indeed the earliest records in the Bible and early Egyptian writings tell us of insect abundance and insect problems. The same statement is doubtless true for the area now including Indiana. While we have found no reference to insects in earliest Indiana records for Indiana, we do know that the Indians held numerous superstitions about insects and these doubtless applied to Indiana as well as other sections of North America. We also know that insects damaged the crops of the early North American Indians and that several kinds of insects were commonly used by the Indians for food.

Our earliest published Indiana insect records are to be found in a collection of statements published by the Indiana Historical Commission in 1916, under the title "Indiana as Seen by Early Travelers."<sup>2</sup> In this publication David Thomas, a pomologist of note, referred frequently to insects. Under date of June 30, 1816, he advises that in some taverns sleep was almost impossible because of bedbugs (p. 43), these pests probably having been brought in with the settlers. Crops were also subject to insect attacks, according to Thomas, for on July 7, 1816, he reports (p. 76) destruction of timothy and corn by army worms in the vicinity of Shakertown, some 18 miles above Vincennes. It is interesting to note that the method then used for the control of the army worm is even today used in some localities. Thomas described the control as follows: "Some fields and meadows have been saved by deep furrows, in which logs were constantly drawn by horses, so long as their devourers continued to approach. In this manner thousands upon thousands have been destroyed." Again, referring to conditions in the general vicinity of Vincennes, Thomas states (p. 114, 1818) that the army worm is a periodical pest and that the cutworm and "the caterpillar" are annual pests but the weevil, probably referring to the grain weevil, is unknown. Thomas Jefferson was of the opinion that the honeybee was not a native of North America and to help answer the question Thomas (p. 114, June 16, 1818) quotes from correspondents in Indiana. From these reports it would appear that the honeybee, although common in the woods in 1818, was not observed prior to about 1795, the Indians calling them "white peoples' flies," indicating that the Indians did not observe them until after the advent of the white settlers.

That mechanical insect control devices were employed by early settlers of Indiana, is shown from the following statement made by Thomas (p. 79, July 8, 1816): "At Vincennes I observed a curious fly-flapper. The construction is simple, and in hot weather the fresh air that attends its motion, is scarcely less agreeable than relief from these troublesome insects. Its position is over the centre of the table.

"Two strips of lath three feet long, with a hole in the lower end of each to receive a gudgeon, are first prepared. A broad board with gudgeon so placed in each end, that one edge shall always preponderate, is then connected with the strips. To that edge a piece of linen one foot wide is fastened; and a handle, eighteen inches long, projects from the opposite edge. The upper ends of the laths are then nailed at the ceil-

<sup>2</sup> Lindley, Harlow. Indiana as Seen by Early Travelers. Indiana Historical Commission. 1916.

ing, and a small cord attached to the handle communicates motion to the instrument.

"A joint in the laths near the ceiling would afford the convenience of elevating or removing it at pleasure."

In his "Journal of a Tour to Fort Wayne and the Adjacent Country, in the Year 1821,"<sup>3</sup> Teas refers to annoying pests as follows:

"Myriads of fleas" prevented sleep and during the day the "mosquitoes and gnats are as numerous here as along the sea shore and are very troublesome." (p. 246, July 10, 1821, 30 miles north of Richmond on the Mississinewa River.) Again on page 252, writing from the vicinity of Fort Wayne, July 14, Teas refers to the mosquitoes as very annoying pests.

Writing from New Harmony, September 27, 1825, William Pelham<sup>4</sup> refers to the annoyances of mosquitoes.

William Cobbett<sup>5</sup> relating his experiences in his travels through Indiana in 1828, writes as follows from near Princeton: "Our horses were very much tormented with flies, some as large as the English horsefly and some as large as the wasp; these flies infest the prairies that are unimproved about three months in the year, but go away altogether as soon as cultivation begins."

Scattered through such publications as the reports of the Indiana State Board of Agriculture, beginning with the very first volume in 1851, we find references to the destructiveness of such insects as horse bots, cutworms, wireworms, chinch bugs, white grubs, Hessian fly, grain weevil and others. In the report of 1879, it is interesting to note an extensive article by Harvey W. Wiley, on "The Relation of Science to Agriculture", in which he refers to the insect problems in the following words:

"One of the numerous difficulties which adds to the burdens of the agriculturist is the fight which he is constantly compelled to carry on against injurious insects. Almost every year he is compelled to engage in an unequal contest with the potato bug, the fly, the weevil, the caterpillar and the borers of his fruit trees, while at intervals the locust, the army worm and the grasshopper pour over his fields with resistless power. It is the province of the entomologists to study the habits and methods of reproduction of these injurious insects and to provide some way to arrest their almost marvelous fertility."

"Much has already been accomplished in this direction, but much more remains to be done. It is evident that it is useless for a farmer to fight potato bugs in his field while they are left to increase unmolested in the field of his neighbor. Action against insects must be concerted and intelligent to be effective. Bushwhacking and guerilla warfare can never accomplish anything more than a local result. The campaign to be effective must be regular, with full equipments and a perfect knowledge of the ground to be fought over and the number and disposition of the forces of the enemy."

<sup>3</sup> *loc. cit.* p. 246.

<sup>4</sup> *loc. cit.* p. 384.

<sup>5</sup> *loc. cit.* p. 511.

"The farmer looks to the entomologist to direct him in the campaign and furnish him all needful information."

"With such scientific aid he should not despair of eventually freeing his fields of these insignificant but destructive pests which now cause him so much loss and trouble."

Beginning with the 1885 report, and coincident with the coming of F. M. Webster to Indiana as an agent of the U. S. Department of Agriculture and collaborator with Purdue University, we find more frequent and well illustrated discussions of the insect problems confronting the farmer.

The above comments are given as a matter of interest and record of early insect problems.

We might well entitle this talk a "Century of Entomology in Indiana", for if we investigated the history of insect research in Indiana, we find it began only a few years more than a hundred years ago when Thomas Say, the Father of American Entomology, came to Indiana in 1826, to continue his entomological studies. Even with this early beginning we did not, until recent years, make the apparent progress of our sister states, Illinois and Ohio. Probably this was due to the fact that our state institutions did not have departments of entomology. Indiana University has never had a separate Department of Entomology and Purdue University did not have such a department until 1912, although some entomology was taught at both institutions in the early 80's.

And yet, if one reviews the development and achievements of entomology in Indiana they at once realize that an unusually high percentage of Indiana Entomologists have attained a national or even an international reputation. Few states can boast of a Thomas Say, a Blatchley, a Webster or a Williamson. In the brief time at our disposal this evening we can only briefly discuss the entomologists who have labored within our borders and the achievements they have attained.

*Thomas Say.* Back of the house known as the William Maclure home, in the historic town of New Harmony, is the tomb of Thomas Say and over it the simple but impressive monument erected in memory of Say by Alexander Maclure, at the request of his brother, William Maclure, in 1845, (fig. 1). On one side of the monument is the following inscription:

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

On another surface of the monument we read:

Votary of Nature even from a child  
He sought her presence in the trackless wild,  
To him the shell, the insect and the flower,  
Were bright and cherished emblems of her power.  
In her he saw a spirit all divine  
And worship'd like a pilgrim at her shrine.



Fig. 1. Tomb and monument over the grave of Thomas Say at New Harmony, Indiana.

Thomas Say, (fig. 2) was doubtless the first student of Indiana insects. In 1826, at the age of 39, Say arrived at New Harmony with a



Fig. 2. Thomas Say, 1787-1834. Photograph loaned by Mrs. Nora Frétagot.

group of scientists known as "The Boatload of Knowledge". Already recognized as a scientific authority, and as one of the founders of the Academy of Natural Science of Philadelphia in 1812, Say later became known as the "Father of American Entomology". Previous to coming to Indiana for residence, he was connected with a number of important scientific expeditions. Say died at New Harmony in 1834, at the age

of 47 and although a resident of Indiana for less than nine years, it was during this period of his life that the major part of this work was accomplished.

I find several interesting notes touching on the life of Say at New Harmony in "Indiana as Seen by Early Travelers." For example, Earl Bernhard writes, "This gentleman (Say) appeared quite comical in the costume of the society, before described, with his hands full of hard lumps and blisters, occasioned by the unusual labour he was obliged to undertake in the garden." In the same volume V. C. Duclos writes that Mr. Lesueur "and Thomas Say spent most of their leisure in the woods or in the rivers searching for shells and catching fish which they painted and described. \* \* \* Mr. Thomas Say was a fine gentleman and the scholars thought a great deal of him, in fact he was beloved by the whole community. I spent a part of almost every day at his home on the northwest corner of Granary and West Streets".<sup>7</sup> That Say must have had an appreciable sense of humor might be inferred from the fact that he very appropriately described a new species of mosquito under the name *Culex dummosus*.

Say was a taxonomist, as were most of the early entomologists, and he described considerably more than 1,000 new species of beetles and over 400 insects of other orders, including species in every important insect order. A hasty check of his writings shows 404 new species definitely listed from Indiana, including eight orders, as follows: 205 Hymenoptera, 111 Diptera, 17 Coleoptera, 38 Hemiptera, 11 Homoptera, 1 Neuroptera, 5 Ephemera and 16 Odonata. Many of the species described by Say are major economic species. Checking over one of the recent economic entomology books we find that not less than 10 per cent of the 250 most important insect pests in America, were described by Say. A few of the common economic species are as follows: common wire-worm (*Melanotus fissilis*), thief ant (*Solenopsis molesta*), northern corn root worm (*Diabrotica longicornis*), chinch bug (*Blissus leucopterus*), false wireworms (*Eleodes opaca* and *E. suturalis*), Hessian fly (*Phytophaga destructor*), wheat strawworm (*Dolerus arvensis*), Colorado potato beetle (*Leptinotarsa decimlineata*), potato stalk borer (*Trichobaris trinitata*), striped sweet potato beetle (*Cassida bivittata*), imbricated snout beetle (*Epicaerus imbricatus*), apple flea weevil (*Orchestes pallicornis*), apple curculio (*Anthonomus quadrigibbus*), peach tree borer (*Aegeria exitiosa*), grape leafhopper (*Erythroneura comae*), strawberry weevil (*Anthonomus signatus*), poplar borer (*Saperda calcarata*), rhubarb curculio (*Lixus concavus*), common bean weevil (*Mylabris obtectus*), hickory bark beetle (*Scolytus quadrispinosus*), malarial mosquitoes (*Anopheles quadrimaculatus* and *A. punctipennis*), the common house mosquito of the tropics and important carrier of elephantiasis (*Culex quinquefasciatus*), the two-striped grasshopper (*Melanoplus bivittatus*), pale striped flea beetle (*Systema tenuiata*), many important insect parasites, such as *Apanteles congregatus*, and the important Texas fever tick (*Margaropus annulatus*).

Although we honor Say because of his remarkable achievements in

<sup>6</sup> loc. cit. p. 426.

<sup>7</sup> loc. cit. pp. 546-47.

entomology, he is also recognized as one of the greatest zoologists and naturalists. He described a large proportion of our common shells, as well as many crustaceans, birds, mammals, reptiles and a certain number of fossils.

*W. S. Blatchley.* One who can be spoken of as the first "Hoosier" entomologist is W. S. Blatchley (fig. 3), a charter member and former president of the Indiana Academy of Science, still alive and entomologically active at the age of 72. Although born in Connecticut in 1859

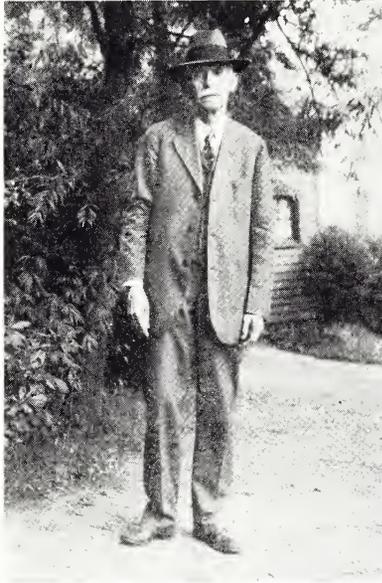


Fig. 3. W. S. Blatchley. (Photo by Wm. T. Davis, Sept. 1929).

he was brought to Indiana by his parents when only one year old and has maintained his residence to our State ever since.

Blatchley entered Indiana University in 1883 and received his A. B. degree in 1887, his A. M. in 1891 and was honored by his Alma Mater in 1921 with the LL. D. degree.

His first publication appeared in 1885, when he was 26 years of age, and since then has published 200 titles, 80 on entomological subjects, the remaining 120 on a variety of subjects, including geology, birds, reptiles, batrachians and plants. Included in his papers are descriptions of 14 new genera and subgenera and 470 new species and varieties in the orders Coleoptera, Orthoptera and Heteroptera. For 16 years Blatchley was State Geologist of Indiana, during which time he continued his entomological studies and in his reports will be found many of his papers. He was a close friend of James Whitcomb Riley and I recall a story related about Riley by Blatchley. One day, when Blatch-

ley was State Geologist and had his office in the State Capitol, Riley came in and asked him if "whirligig" beetles possessed wings for flight. Blatchley proceeded to dissect a specimen and reported that the flight wings were aborted and therefor it was apparent they could not fly. To this Riley replied, "Well, I'll have to change a poem I have written because I had them flying." "Ever since a little experience several years ago," continued Riley, "I've been careful about my Natural History. After writing my poem 'When the Frost is on the Pumpkin' - - - I was approached by a farmer lad and asked if I ever lived on the farm and replying in the negative the boy said: 'Well I didn't think so, because you know in your poem you say:

When the frost is on the punkin and the fodder's in  
the shock,  
And you hear the kyouck and gobble of the struttin'  
turkey cock—

"'Well,' said the boy, 'it's only the turkey cock that gobbles, the turkey hen kyoucks.' Since that time I've always been careful of my natural history."

Blatchley is a taxonomist and especially a taxonomist who has presented his studies in monographic form and in a language understandable to the average entomologist and even to the high school student. This, in my opinion, was his greatest achievement. He was a collector, for which I can personally vouch. He was a humorist and to verify this point I will quote the opening paragraphs from one of his popular nature books, "A Nature Wooing at Ormond by the Sea", as follows:

"March 3, 1899—This morning I leave Louisville, Kentucky, southward bound, seeking, as did Ponce de Leon, renewed health and vigor in the 'Land of Flowers.' A heavy mist at first veils everything from view. Occasionally it lifts for a few rods back from the railway, and I see a clump of Kentucky coffee trees, *Gymnocladus dioica* L., still bearing their last year's crop of thick, chocolate brown pods; or, perchance, the curly head and ebony face of a smiling pickaninny gleams for an instant through the mist, which quickly settles down about him as the train rushes on.

"I change my title twice within twenty minutes. The Pullman conductor, as he collects my berth fare, dubs me 'Captain.' He hails from St. Louis, where captains are plentiful on the Mississippi River boats. Shortly comes along the regular train conductor, a portly gentleman from Louisville. True to his Kentucky instinct, he calls me 'Colonel.' I am not possessed of that universal accompaniment of a Kentucky Colonel, a bottle of moonshine or old Bourbon whiskey but I have the next thing to it, a flask of Burgundy wine, so here's to the health of the train conductor who raised my rank on first sight. Long may he live and prosper! At the present rate of promotion I shall be a Major-General many hours before I reach my destination."

Aside from his numerous short contributions, Blatchley is the author or co-author of four magnificent entomological volumes which will ever stand as monuments to his achievements in his favored field of science. I refer, of course, to his books on the Coleoptera, Rhyncho-

phora, Orthoptera and Heteroptera. A year ago he published his "Blatchleyana," which includes a list of his published writings and a chronology of his life. This gives to us in graphic form the wonderful achievements in a variety of fields by a single individual.

*E. Bruce Williamson* (fig. 4), is another entomologist who has brought fame to Indiana as an international authority. He has collected and studied dragon flies (Odonata) in every section of the State and has



Fig. 4. E. B. Williamson.

in addition collected in other states and in South America. He is a past president of this Academy.

In 1929 he gave his large collection of Odonata to the University of Michigan and since that date has been Research Associate of the Zoological Museum of that institution, although continuing to spend six months of each year at his justly famous iris breeding farm at Bluffton. Williamson has published about 115 papers (1900-1931) on the Odonata, and to him we owe our complete knowledge of the Odonata fauna of Indiana.

I have referred to the three men—Say, Blatchley and Williamson—who have made outstanding contributions to the entomology of Indiana. Several others, who will be referred to later, should be included among the important contributors to Indiana Entomology. Among these are Kinsey for his work with the gall wasps (Cynipidae), Montgomery with the dragonflies (Odonata), Morrison and Dietz with the scale insects (Coccidae), and Webster in economic entomology.

Many others contributed to our knowledge of the insects of the State, and we will here briefly refer to their interests and contributions.

*George Mitten* (fig. 5) was born in England in 1826 where as a boy he became interested in entomology and made an extensive collection, which, however, was left in his native home when he came to America in 1875. Upon his arrival in America, Mr. Mitten went to Goodland where he resided for 31 years or until 1906. It was during this period that he was most active as an insect collector, at first using cigar boxes for his collections, later substituting spool-thread cabinets and later transferring his extensive collections to mahogany cabinets.

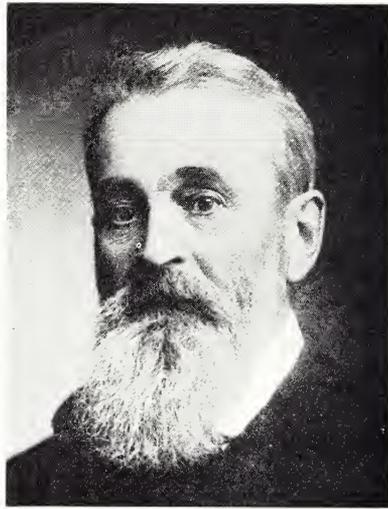


Fig. 5. George Mitten, 1826-1916.

Mr. Mitten was not only a collector. During the summer months he was almost continuously engaged in rearing specimens, collecting the eggs or larvae or pupae and observing their development. Although interested primarily in butterflies and moths, Mr. Mitten was interested in insect life in general.

Two cabinets of this excellent collection were presented to Purdue University a few years ago by Arthur Mitten, a son of George Mitten.

It is interesting to note that George Mitten's brother was a prominent English botanist whose daughter married the great scientist Alfred Russell Wallace.

The Mitten Memorial Building, recently erected at Goodland, Indiana, bears a tablet to George Mitten which reads as follows:

“He was a Christian gentleman, a kind father,  
A lover of Nature and good books.”

*Samuel G. Evans* (fig. 6) was born in Virginia in 1839 and being much interested in the natural sciences, he prepared himself to teach this subject, even though such studies were not in much favor at the time. Shortly after the Civil War he located at Evansville, his home until his death in 1929. He had an ardent interest in all of the sciences, study-

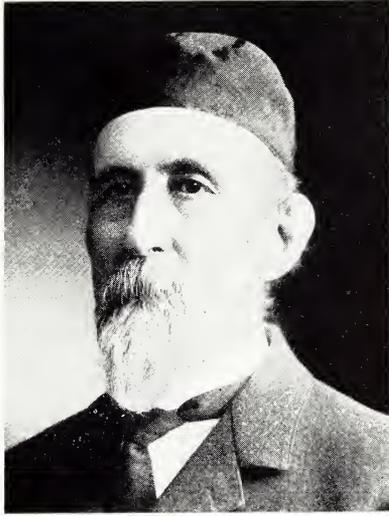


Fig. 6. Samuel G. Evans, 1839-1929.

ing at one time or another birds, Indian relics, fossils, shells, minerals, and wild flowers. He was actively interested in the collection of insects, particularly butterflies and moths for 35 or 40 years, and his collection

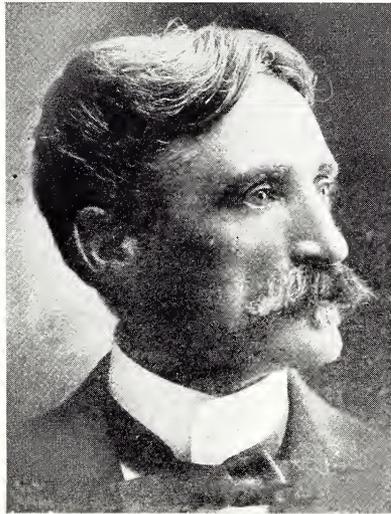


Fig. 7. R. J. Weith, 1847-1902.

of Lepidoptera was one of the finest ever made in the State. According to the Academy Proceedings he prepared a paper dealing with certain groups of Lepidoptera in 1890, but the paper was never printed. Some

30 years ago some energetic and enthusiastic Evansville people planned a museum and induced Mr. Evans to deposit his fine collection of butterflies and moths in the museum. However, the appointment of a curator did not materialize and as a result the valuable material accumulated over a period of 40 years, has long since gone the way of many another fine collection and lost to future generations by museum pests. Mr. Evans was a business man of Evansville but appreciated not only the pleasures of collecting specimens but of associations with others interested in the sciences and was a member of the Indiana Academy of Science and of the American Association for the Advancement of Science.

*R. J. Weith*, (fig. 7) a native of Posen, Germany, where he was born in 1847, came to the United States and located at Elkhart in 1865 at the age of 18. He died in Elkhart in 1902. He was an extensive collector and is best known for his work in Hymenoptera and Odonata, in which branches he made some interesting discoveries and captures although I believe did not himself publish his observations. He was a member of the Entomological Society of Washington. His collection is scattered, having been given to the schools of Elkhart and to friends.

*Dr. T. G. M. Levette* of Indianapolis was one of the best all around naturalists of the State and accumulated a large collection of beetles. Very little is known of this man except that he was an assistant in the State Geologist's office from its organization in 1869 until 1878 or possibly later. During this time he carried on various lines of work, including surveys of the northern Indiana lakes, although he was apparently engaged during most of his service in chemical and metallurgical analyses.

An extensive collection of beetles which was purchased by T. L. Casey in 1890, and which is now with the Casey Collection in the U. S. National Museum, was made by Levette, but according to those who have seen the material, few of the specimens carried locality or date labels although presumably most of the insects came from Indiana.

*Dr. F. Stein*, a German physician who practiced medicine in Indianapolis, accumulated an excellent collection of beetles (Coleoptera). Although he collected extensively in the State, unfortunately he paid little attention to properly labeling his specimens. Blatchley became acquainted with him about 1890 and frequently came to Indianapolis from Terre Haute on week ends to study the collection and exchange ideas. The collection was given to a friend who knew nothing of the care such a collection required and as a result museum pests destroyed most of the specimens, the remaining few hundred being turned over to Blatchley who retains them in his collection. It is interesting to note that during President Benjamin Harrison's administration, Dr. Stein was appointed Superintendent of Improvements on the Wabash River below New Harmony. While here he made extensive collections of shells and beetles. The collection of shells is now in the Field Museum at Chicago.

*W. P. Shannon*, (fig. 8) a fellow in the Indiana Academy of Science, was an early student of Indiana insects and at the December, 1887, meet-

ing of this Academy he presented a paper entitled "A list of the butterflies of Decatur County, Indiana." This paper was never published. He was a very good general naturalist, interested in every branch of natural science and made collections and observations not only on insects but on fishes, birds, shells, plants, fossils, minerals and Indian relics. His



Fig. 8. W. P. Shannon, 1847-1897.

collections are scattered and probably much of the material lost because of improper care. His collection of butterflies, moths and beetles, for example were purchased by Mrs. Shannon's brother, then superintendent of the Evansville schools, for that institution, but so far as we can learn they have long been lost to science by neglect and the depredation of museum pests. Mr. Shannon was principal or superintendent of the Greensburg, Indiana, schools from 1875 till his death in 1897.

*George C. Hubbard* was a member of this Academy and an insect collector who furnished Blatchley with records of butterflies collected in the vicinity of Madison. Hubbard was a resident of Moores Hill and presented papers before the Academy in 1887 and 1888 on the butterflies and the solitary wasps of Jefferson County, but so far as can be learned neither paper was published. He died about 1895.

*Mel T. Cook*, at present Vice-Director of the Insular Experiment Station of Porto Rico, was connected with the Biology Department of DePauw University from 1895 to 1904 and although a plant pathologist, he contributed several papers on the insect galls of Indiana, one in the 29th Annual Report of the Geological and Natural Resources of Indiana for 1904, and two in the Proceedings of the Indiana Academy of Science for 1907 and 1908, respectively.

*J. Speed Rogers*, born at Dayton, Indiana, in 1892, is one of the few outstanding specialists on the crane flies or Tipulidae. Rogers has

collected extensively in Indiana, especially in Jefferson and adjacent counties during the summers of 1919, 1921, 1922 and in the fall of 1930 and spring of 1931. In a recent letter he writes: "Have found Jefferson County a very interesting and profitable place to work and between the deep ravines, such as Clifty Falls State Park and the flats and beech woods, have found a very rich fauna with surprising mixtures of northern, southern and western crane flies." He advises further that 200 species of Tipulidae were collected in southern Indiana and much life history and ecological data obtained which will soon be published.

*O. S. Roberts*, at present connected with the State Chemist's Office, made extensive collections, especially Lepidoptera, in the vicinity of his home at Lafayette. He also assisted Webster, during his connection with Purdue University, mounting and caring for specimens collected and reared by Webster.

*Walter N. Hess*, a member of this Academy and until recent years a member of the Zoology Department staff of DePauw University, taught a course in general entomology at that institution, which was offered every other year. Hess was interested in entomological research and in spite of his instructional duties was able to conduct investigations which resulted in the publication of two papers on the biology and morphology of fire flies (Lampyridae).

*Will P. Morgan* has made a number of excellent contributions, all of which have been published in the Proceedings of this Academy (1924-1927). His studies have dealt with the morphology and physiology of earwigs (Dermaptera).

*C. F. Adams*. Indiana is indeed fortunate in having acquired another outstanding entomologist. I refer to C. F. Adams, Director of the Bacteriological Laboratory of the Indiana State Board of Health. Previous to coming to Indiana, April 1, 1927, Doctor Adams was collaborator with the world-famous dipterist, W. S. Williston, and director, dean and entomologist of the Arkansas Agricultural College and the Arkansas Agricultural Experiment Station. It was during this time that he became recognized as one of the outstanding authorities of Diptera. His first collection, developed previous to severing his connections with Arkansas on account of his health, was left with the Arkansas Agricultural College. His collections since that date (1913), were recently donated to Purdue University. Doctor Adams is now carrying on special studies of the fungus gnats (Mycetophilidae) of the world and the mosquitoes (Culicidae) of Indiana.

The Dunes Region of Northwestern Indiana has proven an attractive and profitable collecting grounds and several insect collectors of Chicago have made frequent and extensive collections in that area. Wm. J. Gerhard of the Field Museum has provided me with information on these Chicago collectors as follows:

*Emil Beer* collected Lepidoptera from 1898-1930. Most of the specimens collected are in his personal collection.

*Wm. J. Gerhard* was an active collector of all orders from 1903 to 1925 and all of the material, with the exception of the Hemiptera, are in the Field Museum. The Hemiptera are in his personal collection.

*Emil Liljeblad* collected Lepidoptera and Coleoptera in Northern Indiana from 1883 to 1925 and his entire collections, with the exception of the Mordellidae (Coleoptera), are in the University of Michigan Museum of Zoology at Ann Arbor.

*A. B. Wolcott* collected Coleoptera during the period 1902-1925, and has made special studies of the beetle fauna of the tamarack swamp near Mineral Springs. With the exception of the family Cleridae, all of his beetles are in the possession of Dr. F. J. Psota of Chicago.

*Alex K. Wyatt* has been an active collector of Lepidoptera in Northern Indiana since 1898 and with few exceptions all of his material is retained in his private collection.

### INSTITUTIONAL ACTIVITIES

*Indiana University.* Although Indiana University does not have a separate department of entomology, courses in entomology are given. According to W. S. Blatchley, the first course was given in 1886 by J. C. Branner, geologist of the institution and president of the Indiana Academy of Science in 1889. Blatchley recalls only three members of this class, Charles Boleman, Jerome McNeill and himself, all of whom became recognized authorities. Boleman graduated from the University and became the American authority on Myriopoda but died in 1889, soon after his graduation, of malarial fever in Wycross, Georgia, at the age of 21. McNeill graduated in 1886 and later became an authority on the Orthoptera, publishing a number of excellent papers although none especially referred to the fauna of Indiana. The marvelous achievements of Blatchley, the dean of Indiana entomologists, who is without doubt one of the outstanding entomologists in America, have already been discussed. Since Branner's time no courses in entomology have been given at Indiana University, as far as I can find, until A. C. Kinsey came to that institution in 1920. Previous to this time several graduates of Indiana University, specializing in Zoology, have become well known or very prominent American entomologists. These include T. J. Headlee, head of the Entomology Department of Rutgers College and the New Jersey Agricultural Experiment Station; C. H. Kennedy, Professor of Entomology of Ohio State University and an authority on the Odonata; Leonard Haseman, Head of the Entomology Department of the University of Missouri and the Missouri Agricultural Experiment Station; W. L. McAtee, of the U. S. Biological Survey, who has made notable contributions to our knowledge of the insect food habits of birds; N. E. McIndoo, of the U. S. Bureau of Entomology, who is a recognized authority on insect physiology; and George Shafer who has made notable studies on various phases of entomology, especially on how insecticides kill. Although, as far as I know, S. A. Forbes, Dean of American Entomologists, never carried on studies in Indiana, Indiana Uni-

versity may well be proud of the Ph.D. degree which they bestowed on this unsurpassed entomologist, in 1884, whom I am proud to know as my teacher and later my chief. According to records this degree was conferred "by examination and thesis" as a result of private study, although Forbes had taken no academic course and did not hold a bachelor's degree.

Since Kinsey came to Indiana in 1920 more emphasis has been given the subject of entomology. Kinsey's studies of the Cynipidae or gall wasps have a nation-wide if not a world-wide influence and are recognized as among the most notable taxonomic and phylogenetic contributions in entomology. Under Kinsey two students have completed Ph.D. requirements, namely Ralph Voris and H. T. Spieth.

*Purdue University.* Entomology had its beginning at Purdue University in 1884. It was in that year that Francis Marion Webster (fig. 9), one of the outstanding economic entomologists this country has ever produced, came to Lafayette as Special Agent of the U. S. Depart-



Fig. 9. F. M. Webster, 1849-1916.  
Photograph furnished by L. O. Howard;  
taken about 1891 when located in Indiana.

ment of Agriculture and Consulting Entomologist of the Purdue University Agricultural Experiment Station. Although not a college graduate, he showed a great interest in nature and in matters scientific. Being a farmer in northern Illinois during his early life, he recognized the many insect problems confronting the corn grower and made careful observations and practical deductions for control recommendations. As early as 1874 he published newspaper articles suggesting methods of insect control. The first real work in economic entomology in Indiana was done by Webster during his residence at Lafayette from 1884 to 1891. His writings appeared in the Proceedings of the Indiana Acad-

emy of Science as well as in other state and federal publications and it is of special interest to note that Webster wrote the first bulletin of the Purdue University Agricultural Experiment Station as Bulletin No. 1, The Hessian Fly, Dec. 30, 1884 (1885). Webster later became chief of the Division of Cereal and Forage Insects of the U. S. Department of Agriculture, which position he held until his death in 1916, at the age of 66.

Indiana owes much to Webster, not only for the work which he did while located in the state but also because he continued his interest in the entomology of the state, evidenced in part by the fact that he established one of his first federal field stations in Indiana in 1905.

The same year Webster came to Indiana, James Troop (fig. 10) arrived at Purdue as Head of the Department of Horticulture and En-



Fig. 10. J. Troop.

tomology. During his early connection with Purdue, Troop gave instruction in a variety of subjects, including horticulture, entomology, agricultural botany, forestry, and veterinary science. He continued as Head of the Department of Horticulture and Entomology until 1912 when the department was divided, Troop retaining the headship of the Entomology Department, which position he held until 1920. Since that time he has been essentially Professor Emeritus, which position he holds at this date. As second oldest man, in point of service, at Purdue University, Professor Troop has been actively associated with the institution for 47 years.

Until 1910 Troop was the sole instructor in Entomology at Purdue. In that year P. W. Mason came to Purdue as assistant instructor, remaining with the school until 1914.

In 1914, W. A. Price was appointed to take the position left vacant by the resignation of Mason. Price remained until June, 1929, at which time he was Associate Professor of Entomology.

J. J. Davis became head of the department in 1920, which position he now holds. Thus it is observed that for a period of 47 years (1884-1931), the headship of the department has been held by but two persons.

During the scholastic years 1923-24 and 1924-25, G. M. Stirrett was laboratory assistant and from 1925-1927 C. O. Dirks was instructor during the illness of Professor Price.

H. O. Deay came to Purdue in February, 1929, and B. E. Montgomery in September, 1929, both men still retaining membership on the Purdue instructional staff.

The present personnel of the Department of Entomology of Purdue University is J. J. Davis, Head; J. Troop, Professor Emeritus; H. O. Deay and B. E. Montgomery, Instructors.

Until 1928 the Department of Entomology was solely a service department, providing instruction in entomology for students specializing in the various lines of Agriculture. In 1928 a special curriculum was provided for students wishing to specialize in the subject and at the present time the Department provides the following courses: seven courses strictly for undergraduates including an introductory course and courses in fruit and garden insects, field crop insects, entomology for education students, forest entomology, greenhouse insects, pharmacal entomology and beekeeping; three courses available to undergraduate and graduate students, in insect physiology, morphology and taxonomy and entomological problems; four courses solely for graduate students, which include advanced economic, special research and seminar.

Since the introduction of the entomology curriculum in 1928, nineteen students, not including graduate students, have enrolled for entomology, and previous to 1930 the following who have taken up entomology as a vocation have received graduate or undergraduate degrees from Purdue University: G. M. List, P. W. Mason, W. H. Larrimer, G. M. Stirrett, B. E. Montgomery, S. W. Clark, K. A. Haines, H. K. Rippey and C. D. Herod.

The Purdue University Agricultural Experiment Station has maintained an entomology department for practically the same period as the same department directing the instruction work, and with the same heads, namely James Troop until 1920 and J. J. Davis since that date. The entomologists connected with this research division of the institution include the following: C. R. Cleveland (1922-1927), H. K. Riley (1927-1931), G. A. Ficht (1927-date), L. F. Steiner (1927-1930), G. E. Marshall (1930-date) and G. E. Gould (1931-date). Field laboratories are maintained at Bedford, for fruit insect investigations, at Warsaw for garden and canning crop insect investigations and at Monroe, Michigan<sup>8</sup>, in co-operation with the U. S. Bureau of Entomology, for corn borer studies.

Ever since the organization of Extension work at Purdue the entomologists of the Station and teaching staff have been active in extension activities although funds have never been available for so-called extension specialists in entomology. The federal Department of Agri-

<sup>8</sup> Entomological corn borer studies are largely conducted outside of the State at present because of the comparatively small infestation in Indiana.

culture provided an extension bee specialist from 1918-1920, this position being held during that time by E. G. Baldwin.

In addition to these field laboratories maintained by the Experiment Station, two federal entomological laboratories, with which active co-operation is maintained by the Purdue Station, are located in the State. One is the U. S. Cereal and Forage Crop Insect Laboratory at West Lafayette and the other the U. S. Deciduous Fruit Insect Laboratory at Vincennes.

*U. S. Cereal and Forage Insect Laboratory.* Recognizing the necessity of establishing field laboratories at strategic points throughout the United States the late Prof. F. M. Webster, in charge of cereal and forage insect investigations, established the first federal laboratory in Indiana at Richmond in 1905, with W. J. Phillips in charge. This laboratory was transferred to West Lafayette in 1909, with headquarters in the Purdue Experiment Station Building until 1913 when a separate building nearby was leased to accommodate the enlargement of the work. Phillips remained in charge until 1913 when he was succeeded by J. J. Davis who continued in charge until 1919. From 1919 and 1925, the laboratory was in charge of W. H. Larrimer. W. B. Cartwright was temporarily in charge in the interim (Aug., 1925-Aug., 1926) between Larrimer's leave and the permanent appointment of C. M. Packard, who is the present entomologist in charge of this important laboratory.

During the period 1905 to date the following entomologists have been connected with this laboratory: W. J. Phillips, 1905-1913 (in charge, 1905-1913); T. H. Parks, Apr. 1909-July, 1909; Philip Luginbill, March, 1910-July, 1912; J. J. Davis, March, 1911-Jan., 1919 (in charge, 1913-1919); C. W. Creel, Aug., 1911-Sept., 1912; Henry Fox, Sept., 1912-Nov., 1913; A. F. Satterthwait, April, 1913-Dec., 1916; R. J. Kewley, 1914-1916; D. G. Tower, 1915-1916; F. A. Fenton, Sept., 1915-Sept., 1916; W. H. Larrimer, Dec., 1916-Aug., 1925, excepting during Army service, 1917-1919 (in charge, 1919-1925); J. M. Aldrich, 1917-1918; W. O. Hollister, March, 1918-March, 1919; R. J. Fiske, March, 1919-March, 1920; A. L. Ford, March, 1919-May 1920; C. F. Turner, July, 1919-Sept., 1919; F. L. Simanton, Sept., 1919-March, 1920; R. A. Blanchard, April, 1920-Sept., 1920; W. B. Cartwright, May, 1920-Aug., 1926 (in charge, 1925-1926); S. Blum, May, 1920-Sept., 1920; H. R. Painter, Sept., 1920-date; G. B. Pearson, Sept., 1920-May, 1922; W. B. Noble, June, 1922-date; Curtis Benton, July, 1924-date; C. M. Packard, Aug., 1926-date (in charge, 1926-date), and Geo. G. Ainslie, Nov. 1929-Dec., 1930.

During this period of over 25 years, many important studies have been made. From 1909 to 1913, under the direction of W. J. Phillips, the important studies included the wheat jointworm and aphids. From 1911 to 1919, under the direction of J. J. Davis, emphasis was given to the white grub problem, although much progress was made on a study of several species of aphids, the extensive Hessian fly sowing plots were begun and cutworm studies were started. It was during this interim, at the time of the war when wheat and wheat products were scarce, that studies were made which permitted substitution of sawdust for bran in

cutworm and grasshopper poison baits. From 1919-1925, under W. H. Larrimer, the Hessian fly was the major project although grasshoppers and other clover and grass insects were important projects. Under the direction of C. M. Packard, the Hessian fly continued as the major project, although other studies of importance were undertaken, including webworms, cutworms and clover insects.

*Federal Deciduous Fruit Insect Laboratory.* Because of the demand for federal assistance in studying the many insect problems of the fruit grower in the central west, Dr. A. L. Quaintance, in charge of deciduous fruit insect investigations of the U. S. Department of Agriculture, established a laboratory at Vincennes, with B. A. Porter in charge, in 1923. This was truly a co-operative laboratory as the Purdue Station and the growers in the vicinity contributed funds to aid the work. The San Jose scale and peach tree borer investigations which had been conducted by the Purdue entomologists since 1921 were turned over to the federal agents and they also inaugurated research on several other important problems, including the tarnished plant bug and codling moth. In October, 1929, after Porter's transfer to the Washington office, F. H. Lathrop was placed in charge. Lathrop continued the investigations inaugurated by Porter and started new studies as conditions demanded, especially detailed studies of insecticides for orchard use.

In 1929 a rather limited series of experiments with baits for attracting the Oriental fruit moth yielded such promising results that the project was greatly enlarged and W. P. Yetter, Jr., was placed in charge of extensive experimental orchard work of trapping the Oriental fruit worm moths, inaugurated in 1930.

The personnel of the laboratory since its establishment is as follows: B. A. Porter, 1923-1928 (in charge, 1923-1928); R. A. Sazama, Nov., 1925-date; W. P. Yetter, Jr., May, 1929-date; F. H. Lathrop, Oct., 1929-date (in charge, 1929-date), and James Cooper, April, 1930-date.

Much of value to the Indiana fruit grower has been accomplished by the work of this laboratory, including investigations leading toward the solution or improvement of controls of the major fruit insect problems of southern Indiana.

*Federal Vegetable Insect Laboratory.* For a few years the U. S. Department of Agriculture maintained a laboratory at Plymouth for the investigation of truck crop insects. H. K. Larrimore, a graduate of Purdue, was first in charge of this station. M. R. Smith was connected with this laboratory from June, 1917 to September, 1918, being in charge during 1918. During that last year of the existence of the station, Smith was assisted by J. M. Craig. Incidental to the economic studies, Smith made a study of the syrphid fly fauna of that area and published a list of 45 species of the family Syrphidae (Diptera) collected during the summer of 1918 in the vicinity of Plymouth.<sup>9</sup>

*State Entomologist's Office.* The original Indiana San Jose Scale and Nursery Inspection Law was passed by the State Legislature in 1899 and the enforcement was in charge of James Troop, Indiana's first

<sup>9</sup> Can. Ent., vol. 51, Dec. 1919, p. 273.

State Entomologist, until the reorganization and establishment of the present State Entomologist's Office at Indianapolis in 1907.

The original law was passed to control the San Jose scale and avoid spread of this insect in particular, on nursery stock. The present office of State Entomologist was later created to take care of the increasing regulatory obligations. At present this office enforces quarantine regulations as they refer to insects and diseases, as well as nursery and apiary inspection. Although originally an independent office the State Entomologist's Office became a part of the Department of Conservation with the origin of that department in 1919.

Since the organization of the present State Entomologist's Office, three persons have occupied the office. The first appointee under the new organization (the second State Entomologist of Indiana) was B. W. Douglass, June 10, 1907, who was replaced by C. H. Baldwin Jan. 1, 1911, the latter continuing until Jan. 1, 1915. The present State Entomologist, F. N. Wallace was appointed Jan. 1, 1915.

Since the organization of this office the following men with some entomological training have been connected with the State Entomologist's office: B. W. Douglass, 1907-1913 (State Entomologist, 1907-1912); F. N. Wallace, 1908-1912, 1915-date (State Entomologist, 1915-date); Max Ellis, 1908-1912; Harry F. Dietz, 1909-1916 (excepting few intervals), 1920-1929; C. H. Baldwin, 1909-1915 (State Entomologist, 1911-1915); Harold Morrison, 1910-1914, 1915-1916; A. P. Swallow, 1912-1915; M. E. Kimsey, 1913-1917; Paul Ulman, 1915-1917, 1926-date; R. E. Snodgrass, 1915-1917; R. W. Kely, 1917-1918; Phillip Spong, 1917-1919; Everett White, 1924-1930; E. Walters, 1926-1927; M. F. Miller, 1927-1931; D. H. Schultz, 1926-date; F. E. Sheaffer, 1927-date; R. K. Rippey, 1930-date, and O. V. Lopp, 1931-date.

There is not time to comment on the activities of each of these men, but particular reference must be made to three of these men, Dietz, Morrison and Snodgrass, who are outstanding entomologists in this nation, although, unfortunately no longer working in the State.

Harry Dietz is well known to every member of this Academy for his active services in its promotion. Dietz has a knowledge of entomology in its broadest sense. He is an authority on greenhouse insects and co-author with Morrison in the preparation of a notable taxonomic paper, "The Coccidae of Indiana."

Harold Morrison, at present curator of the Division of Insects of the U. S. National Museum, was an active student of Indiana insects and is now recognized as an international authority of the Coccidae.

R. E. Snodgrass wandered westward to Indiana with an artist friend early in 1915. Being interested in entomology he visited the entomologist's office in the State Capitol at the time Dietz and Morrison were at work on the Coccidae of Indiana. He was engaged to prepare illustrations for this study and remained with the office until the fall of 1917, preparing illustrations and conducting insect studies. At the present time, as a member of the staff of the U. S. Bureau of Entomology, Snodgrass has become one of the outstanding authorities on insect physiology and morphology.

The State Entomologist's Office, since 1908, has conducted inspections of apiaries, with special reference to foul brood disease. The chief inspectors since the organization of this work were as follows: Geo. S. Demuth, 1908-1911; B. F. Kindig, 1912-1916; C. O. Yost, 1918-1931; J. E. Starkey, 1931-date.

All have been outstanding in their particular field. Special mention should be made of George Demuth who was born near Peru where he established an apiary in 1885 at the age of 14. In 1911 he carried on extensive and important research in beekeeping for the U. S. Department of Agriculture, continuing his official connections with that department until 1920, since which time he has held responsible connections with the A. I. Root Company. He still maintains several commercial apiaries near Peru.

Nine reports were published previous to 1919 when the office became a division of the State Department of Conservation. Since that time brief reports have been issued as a part of the Department of Conservation report.

#### ORGANIZATION ACTIVITIES

*Entomological Organizations.* Shortly after assuming his duties with Purdue University in 1920, the speaker, appreciating the value of close contact and association with colleagues in adjoining states where conditions are similar and warrant practically identical control recommendations, called a meeting of entomologists of the North Central States. At this first conference in 1921, four states and the federal government were represented by H. A. Gossard and T. H. Parks of Ohio, S. A. Forbes and W. P. Flint of Illinois, L. Haseman of Missouri, J. J. Davis of Indiana and W. H. Larrimer of the Federal Bureau of Entomology (fig. 11). This conference proved so successful that a similar conference has been held every year since 1921, excepting in



Fig. 11. The first North Central States Entomologists' Conference, held at Lafayette in 1921, was attended by the men in this group who from left to right are: T. H. Parks of Ohio, L. Haseman of Missouri, W. H. Larrimer of the U. S. Bureau of Entomology, H. A. Gossard of Ohio, S. A. Forbes and W. P. Flint of Illinois.



Fig. 12. Annual meeting of the North Central States Entomologists held at Lafayette, March, 1930. Note growth of this organization by referring to figure 11, showing the group nine years before.

1922. The 1925 and 1930 conferences were also held at Lafayette at which meetings 30 and 78 entomologists (fig. 12) attended each meeting, respectively. This will give you some idea of the recognized appreciation of such conferences.



Fig. 13. First conference of Indiana entomologists held at Lafayette, October 26, 1923. Lower row from left to right: B. E. Montgomery, W. H. Larrimer, W. A. Price, H. F. Dietz, A. C. Kinsey. Second row: W. B. Noble, C. R. Cleveland, L. Greene, F. N. Wallace, G. M. Stirritt. Back row: E. B. Williamson, H. R. Painter, B. A. Porter, W. S. Blatchley, J. Troop, J. J. Davis.



Fig. 14. The first outing of the student Entomological Society of Purdue University, May, 1928.

Two years later a meeting of all persons interested in entomology in the State was called, the object being to develop a better understanding and co-operation within the State. This conference was held at Lafayette October 26, 1923, and was attended by 15 persons as follows: W. S. Blatchley, C. R. Cleveland, J. J. Davis, H. F. Dietz, A. C. Kinsey, W. H. Larrimer, B. E. Montgomery, W. B. Noble, H. R. Painter, B. A. Porter, W. A. Price, G. M. Stirritt, J. Troop, F. N. Wallace and E. B. Williamson (fig. 13). Here again the conference was so successful that it was decided to meet annually and to avoid repetition of meetings, it was decided to hold the meeting each year at the time of the State Academy Meetings.

More recently, students interested in insect study at Purdue University have organized an active society known as the Thomas Say Entomological Society of Purdue University. This Society meets each month during the school year and has biennial field trips or picnics, one in the fall and one in the spring (fig. 14).

### JUVENILE INSECT CONTESTS

Realizing that the general public knows too little about the animals belonging to the important Class Insecta and further recognizing the

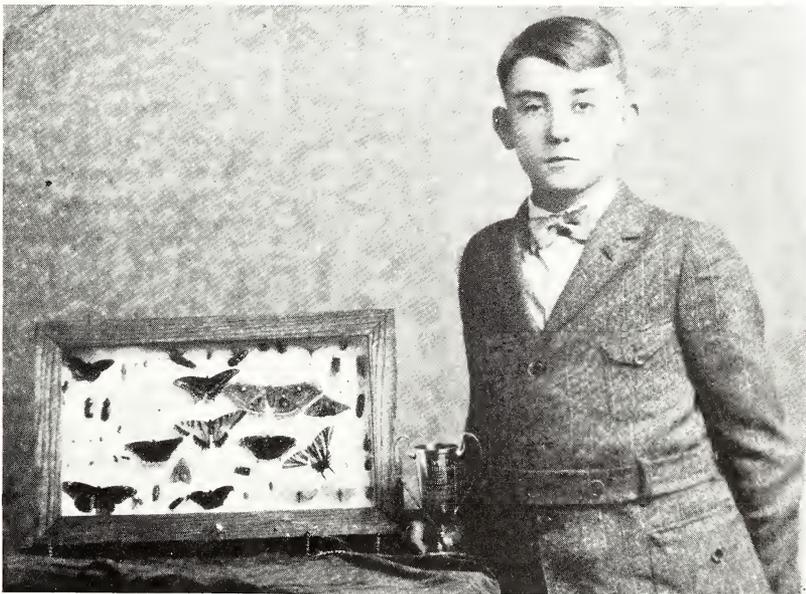


Fig. 15. The first Insect Collection Contest at the 4-H Club Round Up at Purdue in May, 1925, was won by Eldo Brown of Hartford City, Ind.

need of a better understanding of insects and insect life by the younger generation who will soon be our active citizens, an insect collection contest was inaugurated in 1925 (fig. 15) for the Boys' and Girls' 4-H Club

Round-Up, held annually at Purdue University. This contest has been continued each year since that date. An additional feature was started in 1929. This is known as the Insect Identification Contest and club members from all parts of the State have participated, 25 to 35 boys and girls entering the contest each year. In addition the State Board of Agriculture included a juvenile insect collection contest among the State Fair premiums, the first one being in 1928. As a result of these state-wide contests, several counties have arranged county contests, which have aroused much interest and competition.

There is no question regarding the value of such contests in arousing an interest and appreciation of natural history and in developing a keen sense of observation. In the opinion of the speaker, the Junior Academies of Science or Junior Science Clubs can be developed to best advantage if we can include not only insect collection contests but contests relating to all other branches of science sponsored by the State Academy.

### BEEKEEPING IN INDIANA

Beekeeping has been practiced in Indiana, probably as long as Agriculture, and during the early history of the State most farmers kept a few hives of bees. Even at the present time a surprisingly large number of farmers maintain colonies of bees, although, unfortunately, very few properly care for them and not infrequently they become infected with foulbrood and are not only not profitable but are a definite menace to those who practice modern methods of beekeeping.

It is interesting to note that the Indiana State Beekeepers Association was organized January 13, 1880, apparently following a preliminary meeting the year before. A report of this organization meeting, together with the constitution and by-laws, and proceedings of the meeting, was published in the report of the Indiana State Board of Agriculture for 1879.<sup>10</sup> A list of 62 members was given. For at least 10 years this organization apparently flourished, judging from the reports published in the State Department of Agriculture reports. The State Association exists today but whether the State Beekeepers Association has been a continuous organization since it started over 50 years ago I am unable to say.

### RESULTS AND FUTURE OF ENTOMOLOGICAL RESEARCH IN INDIANA

*Taxonomic Contributions.* Early entomological studies necessarily required the description of the different kinds of insects found. Thus it was the problem of describing new species that confronted Thomas Say when he took up his residence and studies in Indiana. As already stated Say described hundreds of new species, over 400 from specimens collected in Indiana. After Say's death in 1834 practically no insect studies were made for over 50 years. With the coming of such men as Blatchley and Williamson, who, without doubt, have made the greatest contributions to our knowledge of the insect fauna of Indiana, en-

<sup>10</sup> 29th Ann. Rept. Indiana St. Bd. Agriculture for 1879 (1880), pp. 461-475.

tomological research has made steady and notable progress. The taxonomic works of these two men are outstanding and are recognized as authoritative studies, not only in Indiana but throughout the world.

W. S. Blatchley, who is still an active worker, and whom we are proud to have with us tonight, is responsible for the greatest amount of taxonomic work in the State. His work, however, includes not only Indiana but applies to the eastern half of the United States and the popularization of insect classification is largely through his published studies. I need call to your attention only his major published studies, including the following:

- A Catalogue of the Butterflies known to Occur in Indiana, 1893.
- Indiana Caves and Their Fauna, 1897.
- The Orthoptera of Indiana, 1903.
- An Illustrated Descriptive Catalogue of the Coleoptera or Beetles Known to Occur in Indiana, 1910.
- Rhynchophora or Weevils of Northeastern America (with C. W. Leng), 1922.
- Heteroptera or True Bugs of Eastern North America with Special Reference to the Fauna of Indiana and Florida, 1926.

E. B. Williamson, an international authority on the Odonata or dragonflies, is responsible for our complete knowledge of this order of insects in Indiana. His collection, which perhaps is unsurpassed, and which is especially rich in Indiana specimens, has been given to the University of Michigan Museum.

The Coccidae of Indiana (1916) by Harold Morrison and H. F. Dietz is a recognized authority, as are also the studies on the gall wasps (Cynipidae) by A. C. Kinsey. Other minor taxonomic studies have been published and at present Indiana has a group of taxonomic workers which assures a continuous output of valuable results.

A list of the families and orders of insects being investigated at the present time follows:

- Orthoptera:<sup>11</sup> W. S. Blatchley and H. R. Painter.
- Ephemera: H. T. Spieth.
- Odonata: E. B. Williamson and B. E. Montgomery.
- Homoptera: H. O. Deay.
  - Family Coccidae: J. M. Amos.
  - Family Aphididae: J. J. Davis.
  - Family Jassidae.<sup>12</sup>
- Hemiptera: W. S. Blatchley and H. O. Deay.
- Coleoptera:<sup>13</sup> W. S. Blatchley.

<sup>11</sup> P. W. Mason made an excellent collection of Orthoptera and prepared a Masters' thesis on the Orthoptera of Indiana. The paper was never published and the collection is a part of the Purdue University Collection.

Henry Fox made intensive ecological studies of the Orthoptera in the vicinity of Lafayette. This paper was published in the Proceedings of the Indiana Academy of Science, 1914 (1915) pp. 287-321.

<sup>12</sup> No one within the state at present time. W. H. Larrimer made extensive collections when located in Indiana but he has not yet published.

<sup>13</sup> G. M. Stirritt made collections and studies of the fleabeetles (Halticini) for his Masters' degree thesis. The collection is with the Purdue University collections but his paper has never been published.

Families Carabidae and Cicindellidae: B. E. Montgomery.

Family Scarabaeidae: J. J. Davis.

Lepidoptera:

Rhopalocera: Robt. W. Montgomery.

Microlepidoptera: G. E. Marshall.

Diptera: C. F. Adams<sup>14</sup> and T. B. Harrison.

Hymenoptera:

Family Cynipidae: A. C. Kinsey.

*Economic Contributions.* A large amount of work on the control of harmful insects and the utilization of beneficial forms, commonly referred to as economic or applied entomology, has been done within the State and most of it within the past decade. Since the federal laboratories of the Bureau of Entomology of the U. S. Department of Agriculture and the Department of Entomology of the Purdue University Agricultural Experiment Station are organizations established primarily for research in economic entomology, most of the economic results have come from these institutions.

The results of these research laboratories have been published in government and experiment station publications and in the several entomological and research journals. The list is entirely too long to give at this time and I will merely briefly list the problems on which important and valuable results have been obtained. They include the following subjects:

Field Crop Insects: Wheat joint worm, Hessian fly, white grub, corn bill bugs, corn root aphid, cutworms, clover insects, European corn borer, and webworms.

Vegetable Crop Insects: Insects in relation to transmission of plant diseases, cutworms, potato leafhopper, greenhouse centipede, cabbage worm, striped cucumber beetle, blister beetles, mint flea beetle, false cabbage aphid, onion maggot, Mexican bean beetle, and squash vine borer.

Fruit Insects: Codling moth, Oriental fruit worm, peach tree borer, San Jose scale, and tarnished plant bug.

Shade Tree Insects: Cottony maple scale, elm scurfy scale, European elm scale, and oyster shell scale.

Animal Parasites: Poultry feather mite and cattle flies.

Stored Grain Insects: Wheat-infesting beetles.

Miscellaneous: Utilization of natural enemies for the control of introduced insects and studies tending to develop methods of predicting insect troubles.

I have taken more time than originally intended and yet I have given you but a hasty sketch of the entomologists of Indiana and their accomplishments in the scientific and economic fields of research. Insect study is no longer a hobby. Insects constitute a problem which can only be met by thorough and up-to-date research. We can well be proud of our predecessors and strive to carry on the work which has been so well begun.

<sup>14</sup> At the present time Adams is making special studies of the mosquitoes (Culicidae) and fungus gnats (Mycetophilidae). J. Speed Rogers has made extensive collections and studies of the crane flies (Tipulidae) in southern Indiana and plans to publish his results in the near future.