

A Century of Odonatology in Indiana

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Although probably not as familiar to the average citizen as bees, beetles, butterflies, and a few other common insects, members of the order Odonata appear to be rather well known to the ordinary Hoosier, and are especially noted by those who frequent the banks of streams or the shores of lakes. In Indiana the most usual common names for an insect of this order are dragonfly, snake feeder, and snake doctor. Darning needle, Devil's darning needle, spindler, and, for the Zygoptera, damselfly, are used less widely. The widespread use of the name dragonfly was shown some years ago when a class in Introductory Entomology at Purdue University was given a recognition test on insects at the first meeting of the class. Dragonflies were named correctly by more students than were any other insects, even butterflies.

Without doubt, the exact application of these names is somewhat hazy, even considerably confused, in the mind of the average Hoosier. According to Walton (1922) Madison Cawein, the Kentucky poet, who wrote more than a dozen complete poems on insects, "spoiled a perfectly good poem on the 'ant-lion' by confusing the insect with the dragon-fly, when he could instantly have settled his doubts in the matter by referring to any good, general work on natural history." However, Cawein called this poem *Old Snake Doctor*, and he did write a poem, *Dragonflies*, showing a rather extensive and accurate knowledge of the habits and life history of the Odonata.

Reference to dragonflies occur in the lines of many poets but I know only one reference to snake feeder. This is found in that well-known poem, *The Old Swimm'-Hole*, by our own James Whitcomb Riley,

"And the snake-feeder's four gauzy wings fluttered by
Like the ghost of a daisy dropped out of the sky,
Or a wounded apple-blossom in the breeze's controle
As it cut acrost some orchurd to'rds the old swimm'-hole."

Riley also knew these insects as dragonflies, and he knew something of the habits and structure of different species. He referred to the resting habits of some zygopteron in *The Brook Song*,

"Little brook—sing a song
Of a leaf that sailed along
Down the golden-braided center of your current swift and strong,
And a dragon-fly that lit
On the tilting rim of it
And rode away and wasn't scared a bit."

He described the shuttle-like flight of some hawking form in *With the Current*,

"Back and forth, to and fro—
Flashing scale and wing as one,—
Dragon-flies that come and go,
Shuttled by the sun."

In *The South Wind and the Sun*, he referred to the metallic appearance, the hard exoskeleton, and the hurried flight of some aeshnid (or cordulid?),

"Till the dragon-fly, in light
Gauzy armor, burnished bright,
Came tilting down the waters
In a wild, bewildered flight."

The history of the scientific study of the Odonata in Indiana covers a period of more than 100 years. The first paper listing records of dragonflies from the state, which was also the first paper on the Odonata published in America, was Thomas Say's *Descriptions of North American Neuropterous Insects, and Observations of Some Already Described*. This paper was probably written only a short time before the death of the author (October 10, 1834); it was read before the Academy of Natural Sciences of Philadelphia, July 12, 1836, but was not published until 1839.

Of the 17 species listed from Indiana by Say, 16 were described as new, but two of these, *Aeshna multicincta* [= *Epiaeschna heros* (Fabricius)] and *Lestes basalis* [= *Hetaerina americana* (Fabricius)], were synonyms. No locality records beyond the statement "Inhabits Indiana" were given, except for *Gomphus fraternus* which, although listed from "North America" was noted to be "common in June on the banks of the Wabash." A list of 17 species does not seem very impressive when compared with our present state list of 140 species, and one may well wonder how Say missed such common species as *Argia violacea*, *Enallagma civile*, *Calopteryx maculata* (which he described from Massachusetts under the names *materna* and *opaca*), and many others. Oddly enough, however, his list included three species—*Cordulegaster obliquus*, *Somatochlora linearis*, and *Neurocordulia obsoleta*—which are now considered as very rare in Indiana; *N. obsoleta* has not been taken in Indiana again. Without doubt, much change had been effected in the Odonate fauna of the state during the 60 or more years following Say's collecting before another great Indiana naturalist began his intensive study of dragonflies. As the latter has observed, "In these sixty-five years . . . the State had passed from a wilderness to cultivated lands. Where the farmer as a boy caught cat-fish and snapping turtles, he plowed corn as a man. The smaller streams became tile ditches, the primitive forests, fields and pastures. What changes took place in the original plant and animal inhabitants of the State are known very meagerly even for the most conspicuous forms. The passing of the obscurer has not left a trace. Of the wild turkey and the deer we know something, but who has concerned himself with the extinction of an orchid, or the loss of a dragonfly?" (Williamson 1912).

Thomas Say was a general collector and probably made no special effort to secure specimens of the Odonata. Our present set of records is the result of innumerable hours of intensive search, extending over a period of about 45 years, mostly by Edward Bruce Williamson, the most indefatigable and skilled naturalist who ever worked with the Odonata.

Furthermore, very little was known of the group in Say's time; none of the classics of Odonatology had been written. Although de Selys had published his first paper in 1831, his second did not appear until three years after Say's death. His third appeared in print the same year Say's paper was published, 1839, which was also the date of Hagen's first contribution to Entomology, and of the appearance of Burmeister's *Handbuch*. Rambur's *Nevropteres* was published in 1842.

The science of Odonatology may well be said to have had its origin at this time (1839-1842), as previous authors had given dragonflies only causal attention in general entomological lists or discussions. Linnaeus in the twelfth edition of the *Systema Naturae*, the last published during his life, described only 20 species of Odonata, placing all of them in the genus *Libellula* of the order Neuroptera. Fabricius in his *Entomologia Systematica* and supplements increased the number of species to 75 and added two genera. Other authors, as a rule, had confined their discussions of the Odonata to a compilation of the works of Fabricius, enriched occasionally with notes on development and life history borrowed from the most part from DeGeer and Reaumur. Burmeister described 159 species, arranged in six genera, Rambur more than 360 in 33 genera. Even these authors considered the Odonata as a family of the Neuroptera, and their discussions of the group were parts (although in the case of Rambur much the greater part) of more extensive works on that heterogeneous Linnean order.

The delay in the publication of Say's paper until 1839 was very unfortunate because in that year Burmeister named eight of the species which Say had named. Since the exact date (month and day) of publication of neither paper is known, it cannot be determined which set of names has priority. Hagen (1890) and Calvert (1906) discussed this matter, and Hagen insisted that Say's names had precedence because his paper had been read publicly in 1836. Although there is no basis in the Rules of Nomenclature for Hagen's contention, Calvert and other authors have continued to use such of Say's names (in preference to those of Burmeister) as are not invalid for other reasons.

After the publication of Say's paper, it was 56 years before another paper dealing directly with Indiana Odonata appeared. "Indiana was too far west to be visited by the eastern entomologists and too far east to share in the great western explorations of the period." In 1895 Professor Kellicott of Ohio State University prepared a list of 14 species from Turkey Lake (Lake Wawasee), Kosciusko County, based upon collections made by Doctor Eigenmann and his students in July and August of that year. This was published as part of a study of *Turkey Lake as a Unit of Environment, and the Variation of its Inhabitants* (Kellicott 1895).

In 1897 E. B. Williamson, who had been a student of Kellicott, prepared a list of 25 species from Round and Shriner lakes, Whitley County, for the annual report of the Indiana Department of Geology and Natural Resources. In the following year he described a new species (*Ischnura kellicotti*) from this same locality.

During the autumn of 1898, R. J. Weith and Williamson prepared a list of species for the state. This list included 83 species, with dates of capture, localities, and collectors. When this was submitted to Professor Blatchley for publication in the annual report of the Department of Geology and Natural Resources, he requested that it be enlarged to include keys and descriptions of the species listed. Weith turned his notes over to Williamson, who prepared that well-known paper, *The Dragonflies of Indiana*, which was published by Professor Blatchley in his report for 1899 (1900). The original list of 83 species was expanded to include a new species from Wells County (*Enallagma piscinarium*) and 41 species which the author considered as likely to be found in the state with additional collecting. Many, but by no means all, of these have been taken in Indiana since 1899.

Since 1900 numerous additions to the state list of species and much information on the life history, taxonomy, habits, etc., of the Indiana fauna have been published. Weith added four species in a short note published in 1900, and in the following year, as co-author with Needham, he published an excellent account of the life history of *Nannothemis bella* based upon observations made around the lakes of Elkhart County. Williamson published papers containing additions and corrections in the Proceedings of this Academy for 1900 and 1901, bringing the state list to 97 species. C. H. Kennedy published two papers in the Proceedings for 1902, one a list of species from Winona Lake, the other a discussion of certain specific characters of the Indiana species of *Argia*.

From the time of his first work on Indiana dragonflies until his death in 1933, Williamson continued his collection and study of the Odonate fauna of the state. Some of the results of this work appeared in a number of short papers published in the *Entomological News* (*A Hybrid Dragonfly of the Genus Gomphus*, 1903; *Oviposition of Tetragoneuria*, 1905; *The Known Indiana Somatochloras*, 1912; *Variation in Color Pattern of the Dragonfly Gomphus crassus*, 1919; *Two Days with Indiana Odonata*, 1921; *Indiana Somatochloras Again*, 1922; and *Odonatological Results of an Auto Trip across Indiana, Kentucky, and Tennessee*, 1923). Many other papers, as *The North American Dragonflies of the Genus Macromia*, 1909; *A New Species of Celithemis*, 1910; and *Two New Species of Stylurus*, 1932, which would seem from their titles not to be concerned with the Indiana fauna, are based in no small part upon his Indiana observations and field experiences and list many state records. Of course, Williamson's activities extended far beyond the boundaries of the state and the study of its fauna—he collected in many parts of the United States and Canada and made four collecting trips to tropical America. By collection, exchange, and the purchase of specimens, he built up one of the largest and most representative collections of Odonata in the world; he developed a system of collection, preservation, and study of specimens which has become the standard method of work in Odonatology everywhere; he distributed thousands of specimens to students and museums in many countries. Furthermore, he aided and encouraged many other students by loans of specimens and literature, by entertaining them in his home while they studied his collection, by

suggestions and criticism of their work, and by financial assistance in field work.

At one time or another, or repeatedly, most of the American students of the Odonata—Calvert, Walker, Kennedy, Needham, Hine, Garman, Montgomery, and others—came to study in the Williamson "Bug Room." This was a large upstairs room in the Williamson home at Bluffton; there was a separate stairway to this room and it had no inside connection with the remainder of the house. The collection was arranged in cigar boxes, alphabetically by genera and species in the six great groups of the order—Calopterygidae, Agonidae, Gomphidae, Aeshnidae, Cordulidae, and Libellulidae. These boxes occupied rows of shelves across one entire side of the room. Tables stood along most of the remaining wall space and provided ample room for specimens and literature to be spread out for study. The largest private library on the Odonata, including thousands of titles (book, periodicals, and separata), was housed in cabinets in the room. A most valuable accessory to this library and an essential aid to taxonomic work of the quality found in Williamson's papers was the card index to generic and specific references. This index, on 3x5 cards filling 25 standard file drawers, included an author section and a genera-species section. The latter section, arranged alphabetically in the same manner as the collection, consisted of references to each mention of a genus or species in all papers on the Odonata published after 1890 which Williamson had been able to obtain. It was very complete for the taxonomic literature and for papers on the American fauna. Papers on physiology, (non-taxonomic) morphology, and Old World faunistics were somewhat less completely indexed. The author's introduction to dragonfly literature was obtained by indexing the papers which had appeared during the period from 1918 to 1928 for this index. The original index, now in the Museum of Zoology at Ann Arbor, and a copy in the author's laboratory at Lafayette have been maintained reasonably well up-to-date. Many students have used this index as the basis, or the only source, for all references in monographic studies. Frequently copies of the portions covering particular groups were sent to workers who found it impossible to consult the index in person.

In one corner of the "Bug Room" was a section of shelving with twenty or thirty cigar boxes, each labelled with the name of a student of the Odonata or the curator of a museum which had a collection of Odonata—Sjostedt, Ris, Martin, Calvert, Ruthven, Banks, Navas, Tillyard, Needham, Lucas, etc. Whenever a season's collection was determined and recorded or a generic revision based on specimens accumulated over a period of years was completed, the duplicate specimens were distributed among these boxes. The accumulated duplicates in a box were sent to the individual designated whenever the box became full. The reply "E B" made to a remark concerning the magnanimity and kindness of this practice was typical of the manner in which he always dismissed his acts of helpfulness to others. "Just pure selfishness. I hope to have everyone in the world who has specimens to distribute or exchange, owing me material all the time, so that my collection will receive the first and best of any dragonflies passed out."

However, this practice not only helped to make the Williamson Collection one of the richest and most representative in the world, but also sent Indiana specimens to all of the leading museums and private Odonata collections. This easy availability of Indiana material to students everywhere has led to its frequent use in monographic and other studies. If a complete bibliography of papers on the Indiana Odonata were prepared, it would contain, even if it included only those with direct discussion or mention of Indiana material, contributions by many authors, in several languages, and published in almost every part of the world. The papers which would appear in such a list vary in size from brief notes of a few lines to the monumental 1278-paged *Libellulinen* of Ris.

In 1917 Williamson compiled all Indiana records into *An Annotated List of the Odonata of Indiana*, which included 125 species and indicated the seasonal distribution (by thirds of months) and the counties from which there were records for each. He published a note giving additional records for many of these species and listing another from the state for the first time, in the Proceedings of the Academy for 1920.

In 1924 Williamson influenced the author to take up the study of the Odonata. During that year collections were made in Gibson, Knox, Posey, and Tippecanoe counties, in which no dragonfly collecting had been done previously, and three species new to the state were taken. Records of the 1924 collections and of those made by Williamson during the period of 1921-1924 were published in the Proceedings for 1924 (1925) under the title *Records of Indiana Dragonflies—I*. Since that date similar papers have been published at intervals of one to four years; the latest (1941) which consisted of records for 1937 to 1940 inclusive is the tenth of the series. These papers have included "additions to the state list of species . . . new county records, or captures of rare species already known from Indiana, and important and interesting ecological or descriptive notes on the species concerned." One hundred forty-one species are now known from the state.

In 1928 Williamson went to Ann Arbor, Michigan, as a Research Associate in the Museum of Zoology at the University of Michigan and, at his death in 1933, his "collection, library, indices, microscope, and other equipment were deposited in the Museum, where, as was his wish, they are readily available to any qualified students of the Odonata" (Gaige 1934). Indiana specimens make up no inconsiderable portion of the collection, which contains about 50,000 specimens, representing more than 1700 species, and including almost 350 types. One of the features of the collection which is most delightful to the systematist is the long series of specimens of many rare species, for example, those of gomphid species from the streams of northern Indiana.

The detailed records of most of the Odonata collected in Indiana since 1899 have been preserved in the note books of Williamson and of the author. Except for the first eight years of this period and three later years for which the number of specimens of each species have not been preserved, these records include for each collection, the species taken, the number of specimens of each, exact locality, date and, frequently, notes on time of day, weather conditions, the observed habits and the

other years, 1901, 1909, and 1937 (32, 31, and 29 species respectively) were less than 35 species collected. The best years were 1932-1933 (over 2500 specimens of 90 species), 1927-1928 (3040 of 74 species), 1916 (an unrecorded number of specimens of 71 species), and 1934 (2105 specimens of 62 species).

These records appear to be sufficiently extensive and representative to provide a measure of the relative abundance of the different species in the state. The latest papers on Indiana Odonata have been a series of articles (Montgomery 1942, 1944, 1945) summarizing the records to give such a measure. The records were tabulated by thirds of months, and time-frequency graphs were constructed to show the relative abundance of each species during the season of flight (or period of adult life).

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* For other references not completely cited in the text, see bibliography in paper by Gaige.