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NOTES ON A COLLECTION OF ODONATA FROM  
SCHOOLCRAFT COUNTY, MICHIGAN.

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During the month of July, 1915, the writer was a member of the Bryant Walker Expedition to Schoolcraft County in the upper peninsula of Michigan. The following paper embodies the results of his observations during that time, and is the first of a series of papers on the Odonata of the state. Eventually it is hoped that a comprehensive account of the state fauna may be published.

The vicinity of the Manistique River offers particularly favorable breeding grounds for aquatic insects, as the whole country is cut up by small streams, ponds, small lakes, and oxbow lakes formed by the river, while the river itself, tho it carries a quantity of silt and is stained by the drainage from the extensive swamps, supports such forms as require running water. From these conditions it might be expected that the odonate

fauna would be large, a supposition corroborated both as regards species and individuals.

The odonate habitats may be divided into three groups, the Manistique River, the small streams flowing into it, and the small lakes and ponds. Two habitats common in northern Michigan were lacking, viz., clear, rapid streams, and rocky lake shores, factors which undoubtedly excluded many species from the region.

The imagoes were found widely distributed, tho many species, exhibited marked preferences for certain sets of conditions. *Calopteryx aequabilis* was found only along the river, usually flying over the water, *Calopteryx maculata* in smaller numbers was frequently associated with it, but was more often found in shady, rather open woods in company with species of *Lestes*. *Libellula quadrimaculata* preferred high, dry, open country, while *Libellula pulchella* was only seen flying over the waters of an oxbow lake. The various species of *Enallagma* were found among the reeds and grasses on the shores of small lakes and ponds. The species of *Aeschninae* were most often seen in open woods, as was true of the single species of *Cordulegaster*. The species of *Sympetrum* were widely distributed in open woods, meadows, ponds, small streams—anywhere that there was an abundance of sunlight. All of the species of *Leucorhinia* save *L. intacta* were taken at lakes and ponds, while it frequented the edges of woods in sunny openings. The various species of *Somatochlora* were all found along old logging roads cut thru heavy woods.

In all, specimens of fifty-one species were secured, of which thirty-three belong to the suborder Anisoptera and eighteen to the suborder Zygoptera. One new species was taken, and described by Mr. Kennedy as *Somatochlora walkeri*. All the specimens are in the Museum of Zoology at Ann Arbor.

I wish to acknowledge my indebtedness to Dr. E. H. Walker and to Mr. C. H. Kennedy for the determination of the Somatochloras, and to Mr. E. B. Williamson for assistance with several other forms.

LIST OF SPECIES.

Suborder ZYGOPTERA.

Family Calopterygidae.

*Calopteryx maculata* Beauvois.—The species was abundant and was widely distributed. It was seen thruout the month, most commonly along paths and roads in the woods, rarely in the open and never in abundantly lighted places. The flight is noticeably weak and irregular. Copulating pairs were taken on July 10. The females outnumbered the males thruout the month.

*Calopteryx aequabilis* Say.—This species was somewhat less numerous than the preceding. It was closely associated with the river, and most often noted in groups of four or five to twenty. Individuals gathered in the sunlight at the foot of steep banks along the river, and seemed on the whole rather inactive. The species seemed to increase in abundance thruout the month.

Family Agrionidae.

*Lestes uncatus* Kirby.—This species was found with the two following forms, and was rather rarer than either.

*Lestes rectangularis* Say.—A quite common species which preferred the thick, dark woods. It was never seen in the open nor about water. The first specimen secured was an immature male taken July 15. The males outnumbered the females.

*Lestes disjunctus* Selys.—Like the preceding forms of the genus, this species frequented the thick woods and was rarely seen in the open.

*Nehalennia irene* Hagen.—This delicate metallic green species was taken first on July 6. Its color and small size make it very inconspicuous among the long grasses at pond edges where it seems to live exclusively.

*Nehalennia posita* Hagen.—The species seems identical with the preceding in habits.

*Nehalennia gracilis* Morse.—A single male taken on July 13, in company with the last species, is the only record.

*Enallagma calverti* Morse.—This species was common during the month, and was probably the most abundant representative of the genus. In common with all the species of the genus it frequented the grassy and reedy edges of still water to the exclusion of all other habitats.

*Enallagma hageni* Walsh.—This species is very similar in habits to the above.

*Enallagma carunculatum* Morse.—The above data applies to this species.

*Enallagma ebrium* Hagen.—This species was found associated with other members of the genus but did not appear till July 23.

*Enallagma civile* Hagen.—This form was common thruout the month.

*Enallagma doubledayi* Say.—This exceedingly quiet and retiring species was recorded thruout the month, and was rarely noted on the wing.

*Enallagma piscinarium* Williamson.—A single male taken July 23 in the rank grass about a small pond was the only record for the species.

*Ischnura verticalis* Say.—This single representative of the genus was common thruout the month and was usually associated with the preceding genus.

*Agrion resolutum* Williamson.—This species was found in company with the species of the two preceding genera.

*Chromagrion conditum* Hagen.—The single representative of this genus was common thruout the last half of July. It is decidedly secretive in habits.

Suborder ANISOPTERA.

Family Aeschnidae.

*Cordulegaster maculatus* Selys.—This species was rather rare, but seemed to be on the increase toward the latter part of July. It was found only patrolling roadways thru the forest.

*Gomphus graslinellus* Walsh.—Two females taken in thick woods on July 14 were the only records for this species.

*Gomphus amnicola* Walsh.—The first specimen of this species was taken on July 17 in the thick woods. Further specimens were taken July 19 and 27 in similar habitats. On July 26 several nymphs about to transform were found on the river bank, one of which proved to be a female, the only one of the sex taken.

*Gomphus cornutus* Tough.—A much worn specimen of the species was collected on July 6, and from then until the end of the month the form was frequently noted. It was observed along the river, in meadows, in open woods and about small lakes and ponds, differing in this respect from most of the genus. It is interesting to note that the but recently described female was taken on several occasions.

*Gomphus brevis* Hagen.—This rather rare species was found only along an old logging road thru the forest. It was seen thruout the month.

*Gomphus scudderi* Selys.—The only specimen of this species secured were those from nymphs which transformed under observation. From July 18 to the 30th the nymphs were fre-

quently found crawling up the low sandy river banks during the early morning hours.

*Aeschna verticalis* Hagen.—This species occurred only in open woods not far from the river. In the afternoon, individuals were often noted resting on the sunny side of tree trunks, but became more active toward sundown.

*Aeschna canadensis* Walker.—The species was much associated with the preceding, and had very similar habits.

*Aeschna constricta* Say.—This species was rather rarer than the two preceding, and of very similar habits.

*Aeschna eremita* Walker.—A single specimen taken on July 29 in open, sunny woods was the only record for the species.

*Aeschna interrupta* Walker.—This species was found under very similar conditions to the others of the genus.

*Tetragoneuria spinigera* Selys.—The few specimens obtained of this locally rare species were all secured about a meadow near the river. They were very active and wary, and when alighting usually took a very inaccessible position.

*Somatochlora williamsoni* Walker.—This species was rather rare, and was usually seen in the woods and along small streams. A female was observed ovipositing in a little brook on July 24.

*Somatochlora walshii* Scudder.—The two specimens of this species that were collected were both taken on an old logging road in dense woods on July 24.

*Somatochlora minor* Calvert.—This species was usually found in the dense woods, especially along old roadways, but was occasionally noted in the open. It was observed at intervals thruout the month.

*Somatochlora forcipata* Scudder.—This species was found only on July 26, when several specimens were taken in the deep woods.

*Somatochlora walkeri* Kennedy.—This species, described by Kennedy from the material collected, was taken in a roadway thru partly cleared woodland. It seemed to prefer the low, wet spots in the road.

*Dorocordulia libera* Selys.—A single specimen taken in the deep woods on July 17 was the only record for the species.

*Cordulia shurtleffi* Scudder.—This species was taken only on July 6 near a small lake. But a single specimen was taken.

*Leucorhinia hudsonica* Selys.—A single specimen, a female, taken on high, open ground on July 17 was the only representative of the species found.

*Leucorhinia proxima* Hagen.—This species was found flying over lakes and ponds during the month.

*Leucorhinia frigida* Hagen.—This species was very similar in habits to the preceding.

*Leucorhinia intacta* Hagen.—This form was closely associated with the preceding one.

*Leucorhinia glacialis* Hagen.—This species was common thruout the month. It frequented small ponds, and mating pairs were seen commonly during the entire time.

*Sympetrum vicinum* Hagen.—A much worn female was found in a clearing on July 8, and was the first record of the species. Later it became common about wet clearings that were well lighted, but seemed to avoid the river.

*Sympetrum obtrusum* Hagen.—This species was quite common after July 15, but up to that date but a single specimen was taken. It frequented wet, sunny clearings.

*Sympetrum rubicundulum* Say.—Like the preceding species, this form was not frequently noted till after July 15. It seemed to prefer high, rather dry, open spaces.

*Sympetrum scoticum* Donovan.—A single specimen of this species was taken in a wet marsh, July 29.

*Libellula pulchella* Drury.—This dragonfly was rarely noted about one end of an ox-box lake along the river. It was noted from July 9 to 19. The species was very restless and shy.

*Libellula quadrimaculata* Linne.—Nearly all of the specimens of this species taken were old and worn. They were usually observed in dry, open meadows, and disappeared after the twenty-fifth of the month.

*Libellula exusta* Say.—Altho this species was noted thruout the month, it was rare. Like the preceding form, the specimens were old and worn. They were mostly taken about ponds and damp clearings. A female was observed ovipositing on July 19.