g. A List of the Dragonflies of Winona Lake.

Clarence Hamilton Kennedy.

The dragonflies in the list below were collected by the writer during the summer of 1900 and by Mr. E. B. Williamson and the writer during the summer of 1901. The writer is especially indebted to Mr. E. B. Williamson for assistance and encouragement in the work.

The region indicated in this paper by the term "Winona Lake" includes not only the present body of water of that name but also the lowlands surrounding it, which, together with the present lake-bed once formed the bed of a much more extensive body of water. There are thus included the two short tributaries of the present lake, Cherry Creek and Clear Creek, and also about a quarter of a mile of the present outlet down as far as the old glacial dam. This gives a small, well-defined region in which, with the exception of the surroundings afforded by larger streams, are included nearly all types of dragonfly environment, swamp, meadow, woodland, lake and stream.

Consequently the number of species found is relatively large. The list, if we count *Sympetrum assimilatum* as a distinct form, now numbers forty-five species. It is fairly complete for the smaller kinds but will probably have several additions yet from among the larger, swift-flying, rarer species.

The outlet as far as the old glacial dam should be well worked. Here will probably be found several stream inhabiting species not at present included in the list. Thorough collecting during May and June might add a species or two not found later in the season. Practically no collecting has been done previous to June 25.

1. *Calopteryx maculata* (Beauvois).

This species is extremely abundant in the heavy shade along the banks of Cherry Creek during the early and middle summer. In 1900, after a few heavy rains about the 1st of August their numbers were greatly diminished.

2. *Hetærina americana* (Fabricius).

Common in the old outlet below the first wagon bridge. A male was taken at the mouth of Cherry Creek about the first of August, 1900.

3. *Lestes disjunctus* Selys.

A male and female taken by Mr. E. B. Williamson in the swamp south of the lake on July 13, 1900. One female taken by the writer south of the lake July 23, 1900.

4. *Lestes rectangularis* Say.

Four males taken by Mr. E. B. Williamson in the swamp south of the lake, July 13, 1900. One male taken by the writer at the same place, July 6, 1901.

5. *Lestes vigilax* Hagen.

One female was taken August 15, 1900, south of the lake.

6. *Lestes inequalis* Walsh.

One female was taken in the spatterdock beds on the south shore of the lake, July 8, 1901.

7. *Argia putrida* (Hagen).

Occasional on the sand bank and pier at the mouth of Cherry Creek.

8. *Argia violacea* (Hagen).

Fairly common about the water. This species is especially abundant along the banks of Cherry Creek during August.

9. *Argia sedula* (Hagen).

One specimen, a male, was taken July 8, 1901, along the south shore of the lake.

10. *Argia tibialis* (Rambur).

Three males of this species were taken south of the lake, July 13, 1900, E. B. Williamson.

11. *Argia apicalis* (Say).

Two males were taken by Mr. E. B. Williamson, south of the lake, July 13, 1900. One female was taken by the writer July 26, 1901, in the same swamp.

12. *Nehalennia posita* (Hagen).

Common in the grass about the laboratory.

13. *Nehalennia irene* (Hagen).

One specimen, a male, was taken by Mr. E. B. Williamson near the Biological Station, June 22, 1901.

14. *Enallagma hageni* (Walsh).

This species is common in the vegetation along the shores of the lake until the middle of July.

15. *Enallagma carunculatum* Morse.

Common everywhere about the lake. Next to *En. signatum* this is the most common species of *Enallagma* about the lake.

16. *Enallagma aspersum* (Hagen).

"A single female was taken June 27, 1901, in the woods on Chapman Hill, near Winona Lake. The female of this species of *Enallagma* is so distinctively colored that I do not hesitate to record the species for the State on such scanty material."*

17. *Enallagma traviatum* Selys.

This species is common on the willows and in the sedges about Winona Lake until the middle of July.

18. *Enallagma geminatum* Kellicott.

Very common on the willows near the laboratories until the middle of July. They have generally become rare by August 1.

19. *Enallagma exsulans* (Hagen).

This species occurs with *En. traviatum*, *En. geminatum* and *En. carunculatum*. It is common until August 1.

20. *Enallagma antennatum* (Say).

This species is common about the laboratories during June. One male was taken, July 6, 1901, along the south shore of Winona Lake.

21. *Enallagma signatum* (Hagen).

This is the most abundant form of *Enallagma*. It is especially abundant over the lily beds where it reaches its maximum abundance during the latter part of the summer after most other *Enallagmas* have disappeared.

22. *Enallagma pollutum* (Hagen).

This species is common on the lily beds along the south shore of Winona Lake during July where it appears only at dusk, probably remaining secreted in the dense vegetation of the adjoining swamp during the daytime. One specimen, a male, was taken on the lily beds at the old outlet August 17, 1900, by Dr. Howe.

23. *Ischnura verticalis* (Say).

This is common about the sedges and lily beds. The females are apparently much more abundant than the males, especially is this so among those found in the sedges and grasses.

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* E. B. Williamson. Proceedings Indiana Academy of Science, 1901, p. 119.

24. *Progomphus obscurus* (Rambur).

Taken along the shore in front of the laboratories during the latter part of June, 1901. E. B. Williamson.

25. *Dromogomphus spinosus* Selys.

Taken during July several times at Winona Lake. E. B. Williamson.*

26. *Boyeria vinosa* (Say).

Occasional in the woods about the lake, where they are generally found flying slowly in and out among the bushes hunting small diptera.

27. *Basiaeschna janata* (Say).

One specimen, a female, was taken August 5, 1900, in the bacteriological tent by Mr. Showers. The specimen is not at hand. The late date makes us doubt the identification.

28. *Anax junius* (Drury).

This species is common during the early summer about the shores and over the lily beds. A few badly frayed individuals remain the entire season.

29. *Epicordulia princeps* (Hagen).

Common during the entire summer along the shores of the lake, over the lily beds, and back over the swamps and meadows. It is a very strong flier and is on the wing from dawn to dark, never being seen to alight, and seldom seen in copulation.

30. *Tramea lacerata* Hagen.

This is common about the shores and over the lily pads the entire summer. It is a high, swift flier and, though common, is seldom taken.

31. *Perithemis domitia* (Drury).

This little dragonfly is common over the lily and potamogeton beds. Of the two sexes the males are much the more abundant.

32. *Celithemis eponina* (Drury).

Very common over the lily and potamogeton beds during the middle and latter part of summer. Constantly pairing.

33. *Celithemis elisa* (Hagen).

This very pretty species is moderately common in the swamp south of Winona Lake during the middle and late summer.

34. *Sympetrum rubicundulum* (Say).

This species is very common in the meadows and fields about the lake during the latter part of summer. It is especially common south of the

* Proceedings Indiana Academy of Science, 1901, p. 121.

lake. Though a good flier it spends most of its time alighted on some weed or fence. A male of Var. *assimilatum* Uhler was taken July 30, 1900, by Mr. Cyrus Rutor.

35. *Sympetrum obtrusum* (Hagen).

One specimen, a female, taken July 13, 1900, was doubtfully referred to this species by Mr. E. B. Williamson. This species should be fairly common.

36. *Sympetrum vicinum* Hagen.

Two females were taken during the summer of 1900, one by Dr. J. R. Slonaker, and one by the writer.

37. *Sympetrum corruptum* (Hagen).

"Near Winona Lake, August 10, 1901, one male. Miss N. O. Harrah."*

38. *Mesothemis simplicicollis* (Say).

Common during the entire summer over the lily beds, along the sandy shores and over the sloughs and swamps.

39. *Pachydiplax longipennis* (Burmeister).

Generally associated with *Mesothemis simplicicollis*, but very much less abundant.

40. *Libellula basalis* Say.

This is the most conspicuous species of dragonfly about the lake, and of the larger forms the most abundant. It is found everywhere over the meadows and swamps, along the shores and over the lily beds.

41. *Libellula incesta* Hagen.

Seldom. One male was taken on the lily bed at the outlet, July 28, 1900. Another was seen earlier in the season flying slowly up and down Cherry Creek.

42. *Libellula cyanea* Fabricius.

Occasional. Associated with *Mesothemis simplicicollis* and *Pachydiplax longipennis* over the lily beds.

43. *Libellula pulchella* Drury.

Next to *Libellula basalis* this is the most abundant of the larger species. Common in nearly all situations.

44. *Plathemis lydia* (Drury).

This species is common about the drain ditches in the fields south of the lake. An occasional specimen is seen near the mouth of Cherry Creek.

A *Tramea*, either *carolina* or *onusta*, was seen in 1901 several times about the laboratories. Also in the field just back of Chapman Hill a *Pantala*,

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* Williamson, Proceedings Indiana Academy of Science 1901, p. 120.

probably *hymenaea*, gave the collectors several wild chases. Both *Celethemis fasciata* and *Libellula semifasciata* are almost certain to be taken sooner or later.

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h. A New Diagnostic Character for the Species of the Genus Argia.

Clarence Hamilton Kennedy.

The following paper was undertaken at the suggestion of Mr. E. B. Williamson, to whom the writer is also indebted for other suggestions and for much of the material examined.

The paper is the result of an attempt to find some character, if possible structural, by which the females of the five species of Argia found in Indiana could be separated.

The characters generally used in the classification of Odonata are the venation of the wings, the shape of the prothorax, the shape of the abdominal appendages, and the color pattern. A distinction upon the basis of venation has not been attempted. The color pattern is notoriously inadequate, and after careful comparison I find that the structure of the prothorax and abdominal appendages is equally so.

After a close study of the thorax a structure was discovered rarely, if ever, used in classification, which in the case of the five Indiana species is sufficiently different to separate the females readily. This is the peculiar shield-shaped structure on the anterior end of the mesepisternum. I can find no mention of this very peculiar structure except in Selys' "Synopsis des Agrionines." Here, just as I was finishing this paper, I found the following, in which Selys recognizes the diagnostic value of this character in the case of the females of the genus Argia: "De grandes difficultés se présentent pour donner les diagnoses des quarante-six espèces (Argia) Américaines, dont plusieurs sont très voisines les unes des autres. Les appendices anals des mâles et *les lames du devant du thorax* des femelles fournissent, il est vrai, pour la plupart, des caractères positifs; mais ils eussent rendu les diagnoses très-longues, et ces organes ne pouvant etre bien vus qu' avec un certain grossissement, j'ai cherché dans les diagnoses de ce Synopsis, à me passer de ces caractères, qui seront réservés pour une monographie spéciale."*

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* De Selys-Longchamps, Synopsis des Agrionines, Bulletins de l'Academie royale de Belgique, 2me série, tome XX, No. 8, p. (9).