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DRAGONFLIES COLLECTED IN KENTUCKY, TENNESSEE, NORTH AND SOUTH CAROLINA, AND GEORGIA IN 1931

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THE following records are based on a collecting trip of only three weeks' duration. The members of the party were W. H. Ditzler, his wife and daughter, and myself. Actual collecting began on September 22 and ceased on October 8, 1931. There were only a few captures in Kentucky and Tennessee but, because of their season, records of these are included for whatever they may be worth.

The known seasonal distribution of many plants and animals, and this is especially true of insects, coincides more closely than it should with the school vacation period, which is the time of greatest activity of the larger number of collectors and observers. This period extends for about three months, so our knowledge of insect life in May and October, for example, is much less than it might be. The following records, therefore, derive their chief value from their dates, as they are of little interest geographically.

Under no circumstances must it be assumed that I regard the locality lists as of approximately equal completeness. During the three weeks we encountered some rain, some unseasonably cool weather, and many partially or completely cloudy

days. The country was entirely new to all of us, and we found our collecting sites as we travelled. Because of early or late hours or bad weather we undoubtedly passed many good places which we saw necessarily under adverse circumstances. Such a trip as the one here discussed is not even an approximation of "scratching the surface." Indeed, we invaded the region primarily to locate good sites to visit on some later occasion. A trip during June and July, distributed between the Piedmont Upland and the Southern Section of the Blue Ridge Province (Fenneman) should yield really worth-while collections.

I am under deep obligations to the Ditzler family who made the trip possible and who did their full share of the collecting. Incidentally for those cynics who scoff at the joys of dragonfly hunting, it may be related that one evening I overheard Mrs. Ditzler, speaking to her husband, say, "Will, this collecting dragonflies really does beat fishing, doesn't it?"

Description of Locations[1]

Location 1. Little Tennessee River, near Tallassee, Blount County, Tennessee, on State Road 72. River 100–150 feet wide, mostly ripples, in full sun with only scanty bordering vegetation. Water level very low. September 22. Dragonflies: 7, 9, 23, 24, 29, 34.

Location 2. A low lying, damp, brushy pasture, without standing water; a short distance from the river near Location 1. September 22. Dragonflies: 51.

Location 3. Shop Creek, Blount County, Tennessee, where State Road 72 crosses it. I have not found Shop Creek on maps; the name was given us by a local resident who said the elevation was about 2000 feet. It is 5–12 feet wide, swift, rocky, and heavily wooded—a cold, dark, mountain torrent. Water falls were abundant; in the short stretch we explored

[1] Numbers following "Dragonflies" indicate species, correspondingly numbered in the list of species. Italicized numbers indicate that the association is accidental, temporary, or otherwise doubtful.

the largest was about 4–5 feet high. September 22. Dragonflies: 35.

Location 4. A small creek flowing through Robbinsville, Graham County, North Carolina. We collected less than half an hour a few miles south of Robbinsville, along State Road 108, where the creek is 5–10 feet wide in open fields. September 22. Dragonflies: 34.

Location 5. Otter Creek, Macon County, North Carolina. It is a tributary of White Oak Creek, the latter a tributary of the Nantahala River. We collected a short time on Otter Creek from near its mouth to about one mile upstream, arriving at the creek where the National Forestry Road from Nantahala to Franklin crosses it about 7–8 miles from Nantahala. This road is in good repair and is surrounded by lovely scenery. Otter Creek was 8–12 feet wide, all in rock, mostly rapids with frequent small falls. The water was not noticeably chilling, seldom over 18–24 inches deep. Mixed forest comes down to the water's edge at places, but the creek flows mostly through alders. Local residents told us the elevation was about 2,650 feet. September 23. Dragonflies: 33.

Location 6. Queen's Creek (after an Indian named Queen), Swain County, North Carolina, flowing into the Nantahala River near Nantahala. Following a heavy thunder shower about 2:30 P. M., we collected on the lower mile or less of Queen's Creek which resembled Otter Creek but was darker, with fewer alders, and more forest, and carrying possibly twice as much water. The National Forestry Road leaving Nantahala follows Queen's Creek for some distance. September 23. Dragonflies: 33, 34, 35.

Location 7. Acona Lufty River, near Smokemont and along the Indian Reservation, Swain County, North Carolina. We motored from our camp, about a mile below Nantahala, on U. S. Road 19 to Bryson City, and on State Road 107 to Smokemont. The river here is wide and slow flowing. September 24. Dragonflies: 34.

Location 8. Along the Acona Lufty in the hills above the Indian Reservation towards the Tennessee–North Carolina

state line, Swain County, North Carolina. We collected where the stream had shrunk to 15–20 feet wide. Here it was of varied character, some small forest but more full sun, rocky with pools and ripples, with less fall than Locations 5 and 6, and less attractive than either. September 24. Dragonflies: 33, 35.

Location 9. Alarka Creek, along U. S. Road 19, between Nantahala and Bryson City,[2] Swain County, North Carolina. We collected here too late in the afternoon to do justice to the stream. It was a pleasant little creek, 10–15 feet wide, with many alders. September 24. Dragonflies: 34.

Location 10. Ivy Log Creek, Union County, Georgia, where U. S. Road 19 crosses it 6 miles north of Blairsville.[3] A small sandy creek which seemed interesting. September 25. Dragonflies: 34.

Location 11. Notala River about 2 miles north of Blairsville, Union County, Georgia. A fine stream, probably with an interesting dragonfly fauna. September 25. Dragonflies: 24.

Location 12. Baggs Creek, White County, Georgia, about a mile from its mouth in the Chestatee River, on U. S. Road 19. It is 10–15 feet wide and flows swiftly in rock, sand, and mud, with frequent low rapids. Much of its course was in full sun, and only lower vegetation lined its banks. September 25. Dragonflies: 31, 33, 34.

Location 13. Chestatee River, White County, Georgia, about 11 miles above Cleveland, on U. S. Road 19. This is a lovely stream which we reached too late in the day to do much collecting. It is 30–60 feet wide, in sand and mud, with deep pools and rocky rapids; its shores were clothed with a varied flora of which conspicuous members were cross-vines, strawberry bushes (*Euonymus*), and muscadine grapes. It might

[2] The elevation of Bryson City is 2000 feet; of Nantahala, 2250 feet; and at Topton, where North Carolina State Road 108, by which we had travelled from the Tennessee state line, intersects U. S. Road 19, the elevation is 2650 feet.

[3] Elevation 1926 feet.

well repay an entire season's collecting. September 25. Dragonflies: 25, 34.

Location 14. A small sandy creek about 12 miles northwest of Washington, Wilkes County, Georgia. · September 26. Dragonflies: 25.

Location 15. Little River, McDuffie County, Georgia, where it is crossed by U. S. Road 78, midway between Washington and Thomson. It is a sluggish stream 50–70 feet wide and, while not as attractive as the Chestatee, would probably repay careful collecting. September 26. Dragonflies: 4, 6, 24, 34, *42*.

Location 16. Mill Pond Creek at Boneville, McDuffie County, Georgia, where U. S. Road 78 crosses it. Above the bridge where we collected this small sandy creek is 5–10 feet wide, partly in shade, and partly in full sun. We collected from the bridge upstream past the mill, and along the mill race to where the latter is crossed by a road just below a large artificial pond. September 26. Dragonflies: 2, 3, 11, 12, *15, 21, 22,* 24, 25, *49*.

Location 17. Mill Pond Creek (see Location 16), from the bridge downstream to Lokey Pond (see Location 19). The creek is largely in sun, in a despoiled grass and brush pasture, until it runs into a morass of tiny pools and rivulets in an almost impenetrable jungle of alders just above Lokey Pond. September 2. Dragonflies: 2, 3, 11, 24, 25.

Location 18. A small, sunny, rocky ripple in woods on Mill Creek (see Location 16), a short distance below Lokey Pond—the only rocky place we found on the creek. September 27. Dragonflies: 5, 24.

Location 19. Lokey Pond, named for the present owner, on Mill Creek, about a half to three-quarters of a mile below the bridge at Boneville (see Location 16). The pond results from an earthen dam, impounding a water area of about 10 acres. At the upper end it passes into a dense alder thicket below which the pond is in full sun. The upper end was largely grown up in sedges, some alive and some dead. Along the western side as well as the upper end the pond was largely

bordered with alders. Alders and willows grew along the banks at the lower and deeper part. September 27. Dragonflies: 2, 8, 9, 10, *11,* 12, 13, 14, 16, 17, 19, 20, 22, *34,* 37, 41, 42, 43, 44, 45, 47, 48, 49, 50, 54, 55, 56, 57.

Location 20. Brier Creek, near Keysville, Burke County, Georgia. A deep, dark, cold stream, 30–60 feet wide, meandering through a swamp forest (or its remnants), in a bed of sand and leaf muck, choked with logs and dead tree tops, with occasional stretches of swifter water but without ripples. It is a difficult stream to collect even at the low water stage at which we found it. In higher water stages it would be almost unworkable. September 28. Dragonflies: 2, 3, 5, 24, 26, 27, 28, 29, 34, 40, *51.*

Location 21. Adjacent to Brier Creek (see Location 20) were many weed and brush-grown pools, some in shade and some in sun. September 28. Dragonflies: 12, 22, 43, 45, 48, 50.

Location 22. Near our camp at Keysville (see Location 20) was a spring which spread out over a little bog of low sedges before passing into the swampy woods adjoining the river. September 28. Dragonflies: 1, 16.

Location 23. A small mill pond near Brier Creek, about one and a half miles below Keysville (see Location 20). September 29. Dragonflies: 1, 2, 12, 16, 19, 22, 45, 48, 50.

Location 24. Same as Location 20. September 29.

Location 25. Butler's Mill Pond, about 4 miles southwest of Keysville, on Brushy Creek (see Location 20), is a large diversified pond of possibly 80–100 acres, mostly brushy, with 20–30 acres of open water with numerous beds of yellow water lilies, in deep water, leaves all floating or submerged, none erect. Most of our collecting here was necessarily done from a boat. It would probably prove richer than Lokey Pond (Location 19), but during our brief visit we found odonate life much less abundant. September 30. Dragonflies: 12, 16, 18, 22, 27, 45, 47, 48, 49, 53.

Location 26. Brushy Creek (see Locations 20 and 25), just above Butler's Mill Pond, was 12–20 feet wide and in general

was a smaller Brier Creek. Because it is more easily waded it will probably offer more fertile collecting than the larger stream. September 30. Dragonflies: 24, 25, 26, 27, 28, 34, *52*.

Location 27. Same as Location 19. October 1.

Location 28. Same as Location 20. October 2.

Location 29. Brushy Creek, Jefferson County, Georgia, about 13 miles west of Keysville, where U. S. Road 1 crosses it; below the bridge, was a nice little sandy creek 4–10 feet wide in forest. October 3. Dragonflies: 2, 25, 34.

Location 30. Brier Creek, Jefferson County, Georgia, about 5 miles west of Keysville, where U. S. Road 1 crosses it, resembles the same stream at Keysville but is about one-half to one-third as large. Where we collected in the woods below the bridge, black gum was the dominant tree. We were on the stream too late in the day to form any opinion of its dragonfly fauna. October 3. Dragonflies: 2, 3, 26, 34, 40.

Location 31. Brier Creek at the railroad bridge, Keysville, about 4: 00–5: 00 P. M. See Location 20. October 3.

Location 32. Same as Location 22. October 3.

Location 33. A large shallow pond in pasture on the east side of U. S. Road 25, about 7 miles north of Augusta, Georgia, in Aiken County, South Carolina. There were a few scattered cypress trees on one side of the pond, which was literally a mud hole, filled with white water lilies, and great half floating masses of *Cyperus*. A yellow flowered *Utricularia* was very abundant. October 4. Dragonflies: 18, 41, 42, 50.

Location 34. Turkey Creek, Greenwood County, South Carolina, where U. S. Road 25 crosses it about 4 miles south of the Saluda River. October 4. Dragonflies: 25, 34.

Location 35. A small left bank tributary of the Saluda River, Laurens County, South Carolina, a short distance below where U. S. Road 25 crosses the Saluda. October 4. Dragonflies: 25, 34.

Location 36. A farm yard on right hand bank of the North Saluda River, below the bridge on U. S. Road 25, 21 miles north of Greenville, Greenville County, South Carolina. At sundown, October 4. Dragonflies: 36.

Location 37. North Saluda River, below the bridge on U. S. Road 25 (see Location 36), was beautiful and easy to wade, so naturally we think of it as the finest stream seen on our trip. It is 20–50 feet wide, generally shallow and rapid, but with diverse habitats, in sun and shade. Leaving the highway bridge we followed a road down the right bank until we came to a crossroad, where we turned left and soon crossed the river on a wooden bridge. We turned at once to the right and went downstream about a hundred yards or less to a suitable camping site along the road. The site is at the mouth of a small gully which has a good spring a short distance above the road. It is hoped this information may be of value to some one who can collect the North Saluda at other seasons and for longer periods than were available to us. October 5. Dragonflies: 11, 24, 25, 29, 30, 31, 34, 39.

Location 38. Same as Location 37. October 6.

Location 39. North Saluda River 4 to 5 miles above the bridge on U. S. Road 25 (see Location 36), where the stream leaves the mountains in an abrupt descent of about 25 feet over water-smoothed crystalline rock. October 6. Dragonflies: 31, 33, 34, 39.

Location 40. Shelton Laurel Creek, Madison County, North Carolina. October 7. Dragonflies: 24, 34.

Location 41. Roadside pond 3 miles south of Whitesburg, Letcher County, Kentucky. October 8. Dragonflies: 9, 19.

Location 42. Roadside pond 11 miles north of Whitesburg, Letcher County, Kentucky. October 8. Dragonflies: 9, 19.

List of Species

1. *Argia bipunctulata* (Hagen)

Loc. 22, 2 ♂ 1 ♀. Loc. 23, 1 ♂. Loc. 32, 4 ♂ 1 ♀.

2. *Argia fumipennis* (Burmeister)

Loc. 16, 3 ♂. Loc. 17, 14 ♂ 1 ♀. Loc. 19, 5 ♂ 4 ♀. Loc. 23, 9 ♂ 5 ♀. Loc. 27, 12 ♂ 3 ♀. Loc. 28, 1 ♂. Loc. 29, 2 ♂ 1 ♀. Loc. 30, 2 ♂ 1 ♀.

A common species, found on ponds and creeks, often far from water, resting in various situations in grasses or sedges, on bushes, rocks, or bare ground.

3. *Argia tibialis* (Rambur)

Loc. 16, 2♀. Loc. 17, 1♂. Loc. 20, 1♂ 1♀. Loc. 24, 1♂ 1♀. Loc. 28, 1♂ 1♀. Loc. 30, 2♂ 2♀.

4. *Argia apicalis* (Say)

Loc. 15, 1♂.

5. *Argia moesta* (Hagen)

Loc. 18, 4♂ 3♀. Loc. 20, 9♂ 11♀. Loc. 24, 3♀. Loc. 28, 2♀.

6. *Argia* (*Chalcargia*) *sedula* (Hagen)

Loc. 15, 1♂.

7. *Argia* (*Chalcargia*) *translata* Hagen

Loc. 1, 2♂ 1♀.

8. *Enallagma geminatum* Kellicott

Loc. 19, 18♂. Loc. 27, 17♂.

This series shows a high and varying degree of melanism, as compared with typical specimens, often unsymmetrical and not constant over the entire body. The more conspicuous melanistic areas of one specimen may be briefly described for comparison. (1) The pale antehumeral divided into a superior spot and an inferior stripe, separated by about .7 mm. (The humeral is divided on 69 sides and undivided on 1 side. On one side the antehumeral pale stripe was divided twice to make two spots above and a stripe below. In 2 specimens the upper spot was lost, only the inferior reduced stripe remaining. In typical northern specimens reduction of the stripe is rare, and I have seen it divided in only one or two instances, and then unsymmetrically.) (2) Segment 2 black; in side view is a superior basal geminate blue spot in tandem, lengthwise of the segment, the anterior spot circular and 3–4 times as large as the roughly elliptical spot which follows it; along

the posterior edge is a large triangular blue spot, slightly below midheight; and along the inferior border is a paler elliptical spot; widest opposite the penis. (The geminate spot may be divided into two spots separated by a distance equal to about the diameter of the anterior spot, or they may be broadly joined into a longitudinal blue bar.) (3) At base of 3 at about midheight is an isolated rounded blue spot about the size of the apical blue spot on 2; on 4 the corresponding spot is less than half as large as on 3, and on 5 it is all but obliterated, disappearing entirely on 6. (On 6 in northern specimens the spot is about as large as the spot on 3 in the Georgia specimens.) (4) On 8 and 9 the inferior lateral black rises to nearly midheight in lateral view, and at the apex of 8, indistinctly, and at the apex of 9, distinctly encircles the segment.

Melanism is present but less conspicuous on other regions. In specimens from Georgia the postocular spots are more reduced, and the hind lobe of the prothorax is blue only at its extremities, instead of entirely across as in northern specimens.

9. *Enallagma civile* (Hagen)

Loc. 1, 1♂. Loc. 27, 2♂. Loc. 41, 11♂ 5♀. Loc. 42, 1♂. (See under *doubledayi.*)

10. *Enallagma doubledayi* Selys

Loc. 19, 2♂. Loc. 27, 4♂ 1♀.

On Lokey Pond *doubledayi* and *civile* were much more active than associated enallagmas. They flew almost continuously over wider stretches and were captured with more difficulty.

The females of this species and of *civile* are not separable by existing keys or descriptions. Differences in the mesostigmal lamina are discernible on direct comparison but would be difficult to describe or figure. Comparison of a few females of each species indicates that the following differences may be of specific value. Hind border of prothorax black with a central point and the extremities pale in *doubledayi:* entirely pale in *civile.* Lower end of the antehumeral pale stripe rounded,

narrowly separated from the external end of the mesostigmal lamina, and broadly separated from the postero-dorsal angle of the mesinfraepisternum in *doubledayi:* in *civile* the lower end of the antehumeral pale stripe roughly triangular, widely separated from the external end of mesostigmal lamina, and meeting the dorso-posterior angle of the mesinfraepisternum.

11. *Enallagma weewa* Byers

Loc. 16, 4♂ 1♀. Loc. 17, 7♂ 6♀. Loc. 27, 1♀. Loc. 37, 1♀.

In spite of its relationship to *E. exsulans,* there is nothing in general appearance or habits, at least when we saw it, to suggest that species. At Locations 16 and 17 *weewa* flew in full sun at low elevations, resting in grass, but when disturbed it sought shade. I failed to recognize it as an *Enallagma.* The creek was a smaller one than *exsulans* would frequent. Below Location 18 it was in dense shade for a short distance and at a relatively deep, bush-overhung pool *weewa* had selected a habitat and was poising in the air and resting on leaf tips in a typically protoneurine manner.

The male is much darker than the male of *exsulans,* and this is especially noticeable in the thoracic colors of older individuals where the color pattern is retained by *exsulans,* but in *weewa* the thoracic dorsum is entirely black with the metepisternum and metepimeron pruinose. The dorsal black of 2 has the lateral edges straight from base to apex; sides of 8 and 10 entirely black or dark and 9 broadly black below; in very old males 9 tends to blacken and is almost or quite as dark as the segments adjoining it. The dorsal head pattern is also lost, becoming entirely black. The females of the two species may be distinguished by characters of the mesostigmal lamina.

12. *Enallagma signatum* (Hagen)

Loc. 16, 1♂. Loc. 21, 1♀. Loc. 23, 1♀. Loc. 25, 4♂. Loc. 27, 12♂. (See under *dubium.*)

13. *Enallagma concisum* Williamson

Loc. 19, 3♂. Loc. 27, 20♂ 2♀. (See under *dubium.*)

14. *Enallagma dubium* Root

Loc. 19, 12 ♂ 2 ♀. Loc. 27, 10 ♂.

This is the darkest and possibly the most handsome species of the *pollutum* group. The "black" areas of the male thorax, as described by Dr. Root, are in reality the metallic red-purple (structural color) areas of the living insect. The female may be briefly described as follows: The postocular pale spots are linear like the occipital border, with which they may be connected or narrowly separated; otherwise the postclypeus and dorsum of the head are without pale markings. Dorsum of middle lobe of prothorax entirely black, the prothoracic pits placed far in front of the middle on the anterior face of the lobe. Antehumeral pale stripe very narrow, almost linear; humeral dark stripe about .55 mm. wide, broadly joined above with the broadened superior short stripe on the first lateral suture; below the humeral stripe carries straight across the outer end of the mesostigmal lamina and the mesinfraepisternum, occupying all the latter but a triangular area on the inferior margin; the tubercle of the postero-mesal angle of the mesostigmal lamina is pale (yellow), but there is no other well-defined pale area on the lamina so that middorsal and humeral black are broadly joined at this point; the lower end of the mesostigmal lamina indents the mesinfraepisternum; the dark stripe on the second lateral suture is broad and continuous below and across the anterior area of the metinfraepisternum, nearly equal in area to the pale area on the metepisternum. Dorsum of 9 and 10 black.

This species and *concisum* received most of our attention at Lokey Pond. We cannot explain the ratios of the two species during the two days we collected there. On October 1, we were at the pond about 9:00 A. M., but neither species appeared until about noon, and by 4:00 P. M. we could find no more. October 1 was a slightly cooler day than September 27. Sunshine and wind were similar on the two days. Yet on September 27, *concisum* made only 12 per cent of our total catch of the two species, while on October 1 it made 69 per

cent. *Enallagma signatum,* common on October 1, was not seen on September 2.

The enallagmas on the pond flew together in a scanty sedge growth, consisting mostly of dead flower stems, on which all the species rested, usually at the extreme edge of open water. In Mr. Ditzler's case, had the water where we waded been one inch deeper, a boat would have been necessary. *Enallagma concisum,* with its brilliant orange coloration, was the much more conspicuous species, discernible at greater distances than the smaller, darker *dubium,* whose brilliancy was evident only when the insect was in one's hand.

15. *Enallagma vesperum* Calvert

Loc. 16, 1 ♂.

The single male, taken late in the afternoon on the mill race, is insufficient for determination of definite relationship to typical specimens. It is certainly closer to *vesperum* than is any other species of the *pollutum* group to its nearest relative, but before anything definite as to its status can be affirmed large series of northern and southern specimens must be studied. As to this Boneville male, its superior appendages are apparently of lighter build than those of northern specimens; the sides of 10 are bright lemon yellow, instead of blue as in northern specimens, thus contrasting strongly with the blue of 9; the distinct black humeral stripe, about .20 mm. above, widens below to a maximum of about .28 mm., and, with a narrow interruption, is carried across the upper side of the mesinfraepisternum as a black bar; the antehumeral pale stripe is about .38 mm. wide.

16. *Ischnura posita* (Hagen)

Loc. 19, 6 ♂ 12 ♀. Loc. 23, 4 ♂ 1 ♀. Loc. 25, 1 ♀. Loc. 27, 3 ♂ 8 ♀. Loc. 32, 1 ♀.

Adult females of *I. posita* and *Anomalagrion hastatum* often fly together. They may be readily separated by the following differentials: *posita* has a distinct dark stripe on the second

lateral suture; wanting in *hastatum; posita* has two subequal antenodal postquadrangular cells; *hastatum* has three subequal antenodal postquadrangular cells, or rarely, two very unequal cells.

17. *Ischnura ramburii* Selys

Loc. 27, 1 ♂.

18. *Ischnura kellicotti* Williamson

Loc. 25, 13 ♂ 9 ♀. Loc. 33, 3 ♂.

In Butler's Mill Pond the yellow water lilies vegetatively resembled the white water lilies of northern glacial lakes, and about these floating leaves *kellicotti* flew in greater numbers than I have ever seen it in the north. Blue and orange females and many pairs were seen. *Enallagma signatum,* in limited numbers, flew with them, but we looked in vain during the brief time at our disposal for *E. concisum* and *dubium.*

At Butler's Mill Pond the yellow water lilies were in deep water; at Location 33 the white water lilies were even out on the muddy banks, and in no place did the water exceed a foot or two in depth. Yet here *kellicotti* was in greater numbers possibly than at Butler's Mill Pond, though the site was a forsaken expanse of hog-trampled mire.

19. *Anomalagrion hastatum* (Say)

Loc. 19, 2 ♂ 21 ♀. Loc. 23, 12 ♀. Loc. 27, 4 ♂ 18 ♀. Loc. 41, 1 ♀. Loc. 42, 3 ♂ 6 ♀. See under *Ischnura posita.*

This large number of specimens resulted from our diligent search for nehalennias.

20. *Nehalennia integricollis* Calvert

Loc. 19, 8 ♂ 5 ♀. Loc. 27, 9 ♂ 4 ♀.

The nehalennias were all taken at the upper end of the pond where dense grass and sedge growths, about a foot high, stood in or about small pools of shallow water in full sun.

21. *Lestes rectangularis* Say

Loc. 16, 1♀.

In shade at the lower end of the mill race.

22. *Lestes vigilax* Hagen

Loc. 16, 6♂ 1♀. Loc. 19, 22♂ 21♀. Loc. 21, 4♂ 1♀. Loc. 23, 9♂ 8♀. Loc. 25, 2♀.

On Lokey Pond *vigilax* occurred in great numbers; many were pairing and ovipositing, just inside the bordering alders where vegetation was relatively abundant, in shallow water.

23. *Hetaerina americana* (Fabricius)

Loc. 1, 1♂ 1♀.

24. *Hetaerina titia* (Drury)

Loc. 1, 1♂. Loc. 11, 1♂. Loc. 15, 1♂. Loc. 16, 1♂. Loc. 17, 1♂. Loc. 18, 1♂. Loc. 20, 3♂. Loc. 26, 5♂ 1♀. Loc. 37, 2♂. Loc. 40, 1♂.

25. *Calopteryx maculata* (Beauvois)

Loc. 13, 1♂. Loc. 14, 2♂ 2♀. Loc. 16, 1♂. Loc. 17, 1♀. Loc. 26, 1♂ 2♀. Loc. 29, 4♂ 5♀. Loc. 34, 1♂. Loc. 35, 1♂. Loc. 37, 3♀.

26. *Calopteryx apicale* Burmeister

Loc. 20, 15♂ 8♀. Loc. 24, 6♂ 3♀. Loc. 26, 3♂ 5♀. Loc. 28, 5♂ 1♀. Loc. 30, 1♂.

I have not seen enough material to justify a decision on the status of this name, but such opinion as I have is that *apicale* and *dimidiata* are one species.

Early in the day *apicale* often rested in grass or sedge clumps at the water's edge and on small live bushes, usually in sun. Later in the day many of them left these more sheltered perches and came to the twigs of dead tree tops, resting far from either bank, over swift stretches of water above which the males performed their beautiful play antics. An uncanny suspicion of the collector or his insect net makes their capture difficult. At rest, high above one's head, they are al-

most undetectable, and it is to such perches that they move with swift flight as the collector, occupied with problems relating to logs, submerged brush, and precipitately deep pools, approaches.

27. *Hagenius brevistylus* Selys

Loc. 20, 1 ♂. Loc. 24, 2 ♂. Loc. 26, 1 ♀. Loc. 28, 1 ♀.

Seen also at Location 16.

28. *Dromogomphus armatus* Selys

Loc. 24, 1 ♂ 1 ♀. Loc. 26, 2 ♂. Loc. 31, 2 ♀.

At Location 31, during a brief interval of sunshine which reached the ripple just below the bridge, 6–8 males of *Stylurus plagiatus* and 3 females of *D. armatus* appeared. A male of *S. plagiatus* caught a female *D. armatus* on one side of the river, flew over the river (instead of the normal direct flight of pairing gomphines to grass, bushes, or trees) then back again and started to return, when Ditzler netted them. The two were in plain sight during the flights and the female was trying unsuccessfully to copulate. The barrier to the misalliance was obviously not the structures concerned in coupling but those involved in copulation.

29. *Stylurus plagiatus* (Selys)

Loc. 1, 1 ♂. Loc. 20, 3 ♂ 1 ♀. Loc. 28, 2 ♂ 1 ♀. Loc. 31, 2 ♂. Loc. 37, 1 ♂ 1 ♀.

At Location 28, I noted: "*Stylurus plagiatus* and *ivae* almost invariably, if not always, plunge into the water 2–5 times before going up into the trees, usually but not always, to a considerable height. Standing waist deep in the water a short distance from a willow overhanging a deep pool, I heard a peculiar rustling noise which I located as coming from a female *plagiatus* resting on a willow leaf about 3 feet above the water and about 10 feet distant from where I stood. Her wings were nearly or quite invisible due to their rapid vibration, and I detected moisture on her body (probably from a recent plunge) before I netted her."

See under *Dromogomphus armatus.* In all the specimens of *plagiatus* collected on the trip the mesothoracic dorsal pale stripe is isolated.

30. *Stylurus spiniceps* (Walsh)

Loc. 37, 2 ♀.

Two males and a female or two escaped capture.

31. *Stylurus laurae* Williamson

Loc. 12, 2 ♂. Loc. 37, 21 ♂ 3 ♀. Loc. 38, 29 ♂ 2 ♀. Loc. 39, 3 ♂.

32. *Stylurus ivae* Williamson

Loc. 20, 2 ♂. Loc. 26, 2 ♀. Loc. 28, 1 ♂.

33. *Stylurus scudderi* (Selys)

Loc. 5, 7 ♂. Loc. 6, 2 ♂. Loc. 8, 6 ♂. Loc. 12, 1 ♂. Loc. 39, 1 ♂.

Larger, and with the paler markings of thorax and abdomen bluer (as contrasted with yellower) than in a long series of northern specimens. More material from strategic localities may show a subspecific relationship.

34. *Boyeria vinosa* (Say)

Loc. 1, 1 ♂. Loc. 4, 1 ♂. Loc. 6, 2 ♂. Loc. 7, 5 ♂. Loc. 9, 1 ♂. Loc. 10, 1 ♂. Loc. 12, 10 ♂ 1 ♀. Loc. 13, 4 ♂. Loc. 15, 1 ♂. Loc. 19, 1 ♂. Loc. 20, 2 ♂. Loc. 24, 1 ♂ 1 ♀. Loc. 26, 1 ♂ 1 ♀. Loc. 29, 1 ♂. Loc. 30, 1 ♂. Loc. 31, 2 ♂. Loc. 34, 1 ♂. Loc. 35, 1 ♂. Loc. 37, 53 ♂ 3 ♀. Loc. 38, 36 ♂ 3 ♀. Loc. 39, 5 ♂. Loc. 40, 1 ♂.

Boyeria vinosa is actually adaptable and relatively common, but its long hours on the wing, relative conspicuousness, and indifference to meteorological conditions play a large part in making such an extended list of localities. Collecting over the season in the Ozarks, when both adults and tenerals were taken, and spending much time at greater or lesser distances from water, we took 63 ♂ and 25 ♀ as compared with the 140 ♂ and 9 ♀ of this trip, all of which were adults captured on streams.

At Location 24: "*B. vinosa* was seen several times today ovipositing in damp wood, a few inches above the water." At Location 37: "Males rest with the superior appendages rather widely spread—wider than the abdomen adjacent to them; females oviposit in damp wood above water as observed elsewhere."

35. *Boyeria grafiana* Williamson

Loc. 3, 6 ♂. Loc. 6, 2 ♂. Loc. 8, 5 ♂.

The larger, greener abdominal spots and usually freer and higher flight, as compared with *vinosa,* make this species recognizable on the wing.

36. *Aeshna umbrosa* Walker

Loc. 36, 1 ♀.

37. *Anax junius* (Drury)

Loc. 19, 2 ♂.

38. *Macromia taeniolata* Rambur

Loc. 25, 1 ♂.

Caught by Laura Ditzler.

39. *Somatochlora tenebrosa* (Say)

Loc. 37, 1 ♀. Loc. 39, 1 ♂.

Both caught by E. B. Williamson; the only ones seen.

40. *Somatochlora linearis* (Hagen)

Loc. 28, 1 ♂. Loc. 30, 1 ♀.

Both caught by W. H. Ditzler; the only ones seen.

41. *Plathemis lydia* (Drury)

Loc. 19, 1 ♂.

Seen also at Location 33.

42. *Libellula* (*Neotetrum*) *pulchella* Drury

Loc. 19, 1 ♂.

Seen also at Locations 15 and 33.

43. *Libellula* (*Holotania*) *flavida* Rambur

Loc. 19, 3 ♂. Loc. 21, 1 ♂.

44. *Libellula* (*Holotania*) *auripennis* (Burmeister)

Loc. 19, 1 ♂.

Several more seen.

45. *Libellula* (*Holotania*) *incesta* Hagen

Loc. 19, 6 ♂ 1 ♀. Loc. 21, 6 ♂ 2 ♀. Loc. 23, 1 ♂ 1 ♀. Loc. 25, 2 ♀.

46. *Libellula* (*Holotania*) *vibrans* Fabricius

Loc. 21, 7 ♂ 1 ♀. Loc. 23, 1 ♂.

47. *Perithemis tenera* (Say)

Loc. 19, 3 ♀. Loc. 27, 4 ♂ 7 ♀.

Abundant at Location 25.

48. *Pachydiplax longipennis* (Burmeister)

Loc. 19, 6 ♂. Loc. 21, 2 ♂ 1 ♀. Loc. 23, 1 ♂. Loc. 25, 3 ♂ 12 ♀.

49. *Erythemis simplicicollis* (Say)

Loc. 19, 1 ♂ 1 ♀. Loc. 25, 3 ♂ 7 ♀.

Seen also at Location 16.

50. *Erythrodiplax minuscula* (Rambur)

Loc. 19, 13 ♂ 1 ♀. Loc. 21, 1 ♂. Loc. 23, 5 ♂. Loc. 33, 3 ♂ 2 ♀.

51. *Sympetrum ambiguum* (Rambur)

Loc. 2, 4 ♂. Loc. 20, 1 ♂. Loc. 28, 2 ♀.

52. *Sympetrum vicinum* (Hagen)

Loc. 26, 1 ♂.

53. *Celithemis eponina* (Drury)

Location 25, 3 seen and positively identified. We approached them in a boat, but lacked the time to follow them all over the pond as they obviously intended we should.

54. *Celithemis elisa* Hagen

Loc. 19, 1 ♂. Loc. 27, 2 ♂.

55. *Celithemis fasciata* Kirby

Loc. 27, 3♂ 1♀.

On our first visit to Lokey Pond we saw none of this species. Possibly a dozen, including two or three pairs, were seen on the day the four were caught, but we were giving most of our time to enallagmas. Those captured were old individuals. In all, the dark areas of the wings were more reduced than in the few specimens I had previously seen. In one male there is no trace of yellow in the wings, and the antenodal dark area in the front wing is separated from Cu_1 by one cell, instead of being produced posteriorly beyond Cu_1.

56. *Celithemis ornata* (Rambur)

Loc. 19, 1♂.

57. *Celithemis amanda* (Hagen)

Loc. 27, 1♂.

58. *Tramea lacerata* Hagen
59. *Pantala hymenaea* (Say)
60. *Pantala flavescens* (Fabricius)

On October 4, driving on U. S. Road 25 from Augusta, Georgia, to the North Saluda River (Location 37), as on other days, specimens of the above three species were observed along the road and positively identified. Near Location 11, for example, about a farm yard and adjacent roads and fields both species of *Pantala* were flying in numbers. Since specific field identifications were possible, and our time was limited, we made no effort to take specimens of these species whose geographical distribution in the area we covered means little or nothing. As the matter stands, of the 60 species recorded, these three and a fourth, *Celithemis eponina,* are not represented in our collection by specimens. Another species, seen but not captured, was determined almost certainly, but is not mentioned in this paper.