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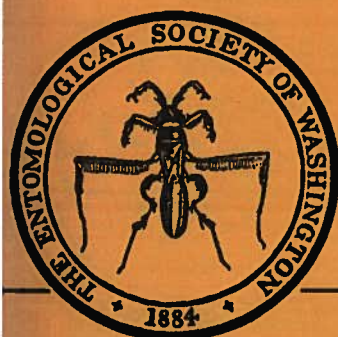
PROCEEDINGS

of the

ENTOMOLOGICAL SOCIETY

of

WASHINGTON



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PROCEEDINGS OF THE
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No. 1

THE ODONATA OF WASHINGTON, D. C., AND VICINITY

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For more than a century the Washington, D. C., area has been intensively studied by naturalists. Significantly, a large part of our knowledge of the natural history of this area has come from government biologists who have found the woods and streams of nearby Maryland and Virginia rewarding places for weekend study, and the flora and fauna of this area is as a result, quite well documented. However, in spite of the existence of a fine collection of local dragonflies and damselflies in the U. S. National Museum, no study of the Odonata has been published. It seems desirable to record this Odonate fauna, not only to document the thorough collecting of the past fifty years and to present to entomologists a description of an eastern Odonate fauna, but also to provide an example of the effect of the growth of a large city on an aquatic insect fauna, which has been significantly impoverished during the last forty years.

Early collectors of dragonflies around Washington include H. S. Barber, Nathan Banks, J. S. Hine, W. L. McAtee, and Rolla Currie and his sister Bertha. These early workers, especially the Curries, collected extensively just prior to the first World War and succeeded in collecting nearly all of the presently known species. So thorough was their work, in fact, that recent collectors have been able to add only eleven species to their total of one hundred and three. Carl Cook collected here during World War II, and the author has collected extensively since 1949. Very few dragonflies were collected during the period between the World Wars.

The area covered by this report includes, in addition to the District of Columbia itself, adjacent Maryland (Montgomery, Prince Georges, Charles, and the southeastern corner of Frederick Counties) and Virginia (Fairfax, Arlington, and Prince William Counties). The entire area falls within Merriam's Carolinian Life Zone. The topography is mature, and there are very few natural lakes or ponds. The Potomac River and its tributaries drain all of the area except the northeast corner, which is drained by the Patuxent River. The two

natural subdivisions of the area are the Piedmont and the Coastal Plain. The Piedmont is underlain by ancient crystalline rocks and by Triassic sediments and diabase. Piedmont streams are characterized by boulder or cobble bottoms, with intervening reaches with mud and leaf trash bottoms. Emergent vegetation is usually sparse, except in the smallest streams. Streams in the regions underlain by Triassic sediments are commonly choked with finely cominuted red shale fragments and have in these places a somewhat limited insect fauna. The Coastal Plain is underlain largely by unconsolidated quartzose sands and gravels, and streams in this area have well sorted sand and gravel bottoms, with mud in the slower reaches. Unwise farming practices have probably been responsible for a layer of silt covering many of the former sandy stream bottoms.

Except for the fact that Piedmont streams commonly have a much greater variety of habitats than do Coastal Plain streams, there are no important factors which have promoted the development of distinct Odonate faunas in these two physiographic provinces. Generalizations regarding the restriction to one or the other of these two areas may be made from the known distribution of certain species in the Washington area, but these generalizations may fail rather badly in the consideration of the overall range of the species in North America. Thus, *Didymops transversa* may be seen flying in late May along nearly every slowly flowing Coastal Plain stream, but it is absent from Piedmont streams in our area. This same species, however, is also characteristic of cold, spring-fed streams in the mountains of Pennsylvania and New York. The ability of Odonata to disperse themselves widely and the limited dependence of Odonate nymphs and imagoes upon their environment makes the ranges of species of this order among the least satisfactory to reconcile to simple explanations based upon climatic, physiographic, or biological considerations.

The distributions of a few species within our area are, however, rather clearly defined by physiographic and climatic factors. Swift Piedmont streams with alternating boulder and cobble-choked reaches and slower, muddy reaches have several Odonate species which will probably not be collected on the Coastal Plain except as chance strays. *Erpetogomphus designatus*, *Dromogomphus spinosus*, *Macromia illinoensis*, *Hetaerina americana*, *H. titia*, *Argia apicalis*, *A. sedula*, and *Enallagma exulans* certainly belong to this group, and *Epicordulia princeps*, *Stylurus laurae*, *S. spiniceps*, *Argia moesta*, *A. tibialis*, and *A. translata* probably belong here. Five rare species (*Ophiogomphus rupinsulensis*, *Stylurus amnicola*, *Macromia alleghaniensis*, *Neurocordulia obsoleta*, and *Archilestes grandis*) are considered to be of probable Piedmont distribution. Only two species (*Somatochlora filosa* and *Calopteryx apicalis*) are probably limited to Coastal Plain streams. Both of these species are southern in distribution and reach their northern limits south of New York City, their limitation to Coastal Plain streams in the Washington area, then, may be the result of climatic restrictions of the nymphal range. The common spring damselfly *Enallagma divigans* is far more abundant in our area on

Coastal Plain than on Piedmont streams, but its distribution in the eastern United States as a whole is not at all limited to habitats resembling the Coastal Plain streams in the vicinity of Washington. Four stream species which are found in abundance on both Coastal Plain and Piedmont streams are *Gomphus exilis*, *Bayeria vinosa*, *Calopteryx maculata* and *Argia violacea*.

Two species whose ranges may be limited by chemical conditions are *Libellula neodhami* and *Erythrodiplax bernice*, the latter of which has not been taken recently in the Washington area. The overall ranges of these species and their distribution in the Washington area suggest that these are halophilous insects rarely found any great distance from brackish water. One characteristic bog species now apparently limited to the Suitland Bog of Prince Georges County (which the author has not visited) is the miniscule dragonfly *Nannothemis bella*, which was taken in large numbers fifty years ago at Beltsville and Hyattsville.

Lentic habitats of the Piedmont and the Coastal Plain have similar Odonate faunas, although *Celithemis elisa*, *C. monomelana*, *Tramea carolina* and *Pantala flavescens* are found in greater abundance on Coastal Plain ponds. The pond Odonates which may be found on nearly every pond or lake in the Washington area are *Anax junius*, *Perithemis tenera*, *Libellula cyanea*, *L. incesta*, *L. luctuosa*, *L. pulchella*, *Plathemis lydia*, *Sympetrum rubicundulum*, *S. vicinum*, *Erythemis simplicicollis*, *Pachydiplax longipennis*, *Lestes rectangularis*, *Enallagma civile*, *Ischnura posita*, and *I. verticalis*.

A unique lentic micro-habitat in the Piedmont is found in potholes high above the present water level in the Potomac River gorge, as at Great Falls. These potholes are filled by rainfall only and all of them are probably dry at times. In the summer the water becomes uncomfortably hot, and the general aspect of these small ponds is not what the collector would consider generally favorable to Odonates. However, one species of damselfly (*Lestes forcipatus*) is abundant here and has not been taken elsewhere in the area in recent years. This damselfly oviposits endophytically in emergent vegetation, thus surviving the occasional periods of drought. Nymphs of *Pantala hymenaea* and *Acshua umbrosa* have been found in these ponds, and imagoes of *Anax junius*, *Libellula incesta*, *L. pulchella*, and *Sympetrum rubicundulum* are abundant around these ponds, but do not necessarily breed here.

The Chesapeake and Ohio Canal, paralleling the Potomac River from Cumberland, Maryland, to Washington, belongs in a special ecological category. The restored canal, from Washington to Seneca, Maryland, is about fifty feet wide and five feet deep, with steep sides, a mud and leaf trash bottom, and only a fringe of emergent vegetation. The water current is in most places so slow as to be imperceptible. The unrestored canal, from just below Seneca to Cumberland, is in some places a marshy depression and in other places a series of unconnected woodland pools. The unrestored canal has not been seriously studied by the writer, though cursory collecting has shown that, with a few exceptions, its Odonate fauna is rather limited. The restored canal is best characterized as lotic-lentic, and its Odonate fauna is strikingly

varied. Sixty species have been taken in the immediate vicinity of the canal, and fifty of these have been found in recent years. *Epicordulia princeps* is much more abundant here than elsewhere, and *Macromia alleghaniensis* and *Gomphus vastus* are apparently now limited to the canal. Six species of *Argia*, *Perithemis tenera*, *Libellula incesta*, *Erythemis simplicicollis*, *Pachydiplax longipennis*, *Enallagma cyathigerum*, and *E. signatum* may be found in abundance on any summer day, and at least two dozen other species can be taken daily at almost any season. If the proposed Chesapeake and Ohio Canal Parkway is constructed one of the most interesting fresh water environments in the vicinity of Washington may be extensively damaged.

An area the recent destruction of which perhaps presages the doom of the Chesapeake and Ohio Canal is the upper Anacostia River system. In these bottomlands were once a variety of streams and ponds, including the famous magnolia bogs (McAtee, 1918). Rolla and Bertha Currie and their colleagues collected in this area extensively and collected seventy-five species of Odonates, including twenty-one species now unknown from the Washington area (*Gomphus parvidens* [type locality], *Anax longipes*, *Aeshna tuberculifera*, *Ac. verticalis*, *Macromia georgina*, *Tetragoncuria spinosa*, *Libellula flavida*, *Erythrodiplax connata minuscula*, *Sympetrum semicinctum*, *S. obtrusum*, *Lestes congener*, *L. disjunctus australis*, *L. inaequalis*, *L. unguiculatus*, *Nehalennia gracilis*, *N. irene*, *N. integricollis*, *Enallagma carunculatum*, *E. double-dayi*, *E. durum*, and *Telocordulia dacekii*). Although a few of these species were recorded by the Curries in other parts of the Washington area, all were apparently typical of the Hyattsville area, and many were abundant there. Within the last forty years sewage disposal has fouled the streams and housing developments have spread over the once rich bottomlands, so that little of the original flora and fauna remain. However, Greenbelt Lake, a new artificial lake in this area, has yielded several interesting records recently, including *Tachopteryx thorcyi*, *Tetragoncuria williamsoni*, *T. semiaqua*, and *Enallagma basidens*. At another locality within this general area (Northwest Branch in College Park) the first specimens of *Archilestes grandis* found east of the Appalachians were collected in 1949, but this locality became a housing development shortly after the damselflies were collected, and the species was driven from this area shortly after becoming established.

Of the eleven species added to the local list in recent years, two may be chance strays (*Gomphus fraternus*, *Stylurus amicola*), but seven may be well established and may have been overlooked by the Curries (*Nasiacchna pentacantha*, *Macromia alleghaniensis*, *Tetragoncuria williamsoni*, *T. semiaqua*, *Helocordulia uhleri*, *Somatoclora tincaris*, and *S. tenebrosa*). However, two species have probably migrated into our area from the southwestern United States in the last few decades (*Archilestes grandis* and *Enallagma basidens*). Records of the first captures reported for the large, spectacular damselfly *Archilestes grandis* shows that this species spread northeastward into the mid-western States during the nineteen-thirties, but did not cross the Appa-

luchians until the forties. *Enallagma basidens* probably also spread into the area from the southwestern United States after World War I, although documentation of the movement of this species is less complete than that for *Archilestes*. *Archilestes grandis* is unlikely to have been overlooked by the Curries because of its large size and spectacular appearance; on the other hand, *Enallagma basidens* is unlikely to have been missed because of its almost invariable local abundance and the ease with which it can always be captured. In all probability neither *Archilestes grandis* nor *Enallagma basidens* were present during the time of the Curries' collecting.

Thirty-two species of the total one hundred and fourteen have not been taken in recent years, and eleven species were not recorded by the Curries and their contemporaries. Two of the thirty-two species (*Cordulegaster maculatus*, *Aeshna umbrosa*) almost certainly occur in limited numbers today but have not been taken because the imagoes fly either very early or very late in the season, when little recent collecting has been done. In spite of the recent creation of lentic habitats (such as Greenbelt Lake) there can be no doubt that the Odonate fauna of the Washington area has been significantly impoverished since the First World War and may be even further reduced by the construction of the proposed Chesapeake and Ohio Canal Parkway, which would entail partial filling in of the Canal.

List of Localities (*denotes those localities not visited by the author and represented only by specimens in the United States National Museum).

Maryland, Frederick Co.: Fr1, Lilypons; Fr2, Bennett's Creek at Park Mills. All localities are within the Piedmont.

Maryland, Montgomery Co.: M1, quarry lake at Dickerson; M2, Little Monocacy River at Dickerson; *M3, Barnesville; *M4, Poolesville; *M5, Travilah; M6, Tridolphia Reservoir; M7, Seneca Creek at Seneca; M8, C & O Canal at Rushville; M9, Muddy Branch at River Road; M10, C & O Canal at Pennyfield; M11, Watt's Branch at River Road; M12, Great Falls (including C & O Canal here); M13, C & O Canal at Carderock; *M14, Plummer's Island; M15, Cabin John; M16, C & O Canal at Glen Echo; M17, C & O Canal at Brookmont; M18, Little Falls Branch at River Road; *M19, Chevy Chase Lake; *M20, Garrett Park; *M21, Forest Glen; *M22, Woodside; *M23, Kensington; *M24, High Island; *M25, Potomac River Gorge; *M26, Little Falls; *M27, "C & O Canal" (no specific locality). Localities 2, 4, 7 and 8 are in areas of Triassic sediments. All other localities are in areas of Piedmont crystalline rocks.

Maryland, Prince Georges Co.: PG1, Northwest Branch at College Park; *PG2, Laurel; PG3, Beltsville; PG4, Greenbelt Lake; *PG5, Berwyn; *PG6, Lakeland; *PG7, Hyattsville; *PG8, Bladensburg; *PG9, Suitland; PG10, Silesin; *PG11, Woodyard; PG12, Piscataway Creek at Piscataway; *PG13, West Hyattsville; *PG14, East Branch of Anacostia River; *PG15, Branchville; *PG16, College Park. All localities are within the Coastal Plain.

Maryland, Charles Co.: C1, Mattawoman Creek at Mason Springs; *C2, Marshall Hall; C3, Cedarville State Forest; C4, Port Tobacco River 2 miles west of La

Plata; C5, Zekiah Swamp Run near Dentsville; C6, Allens Fresh Marsh (mouth of Zekiah Swamp Run); *C7, "Charles Co." (no specific locality). All localities are within the Coastal Plain.

Virginia, Fairfax Co.: *Fa1, Great Falls; *Fa2, Difficult Run; *Fa3, Dead Run; *Fa4, Enola; *Fa5, Falls Church; *Fa6, Glen Carlyn; *FA7, Hunting Creek; *Fa8, Dyke; *Fa9, Mt. Vernon; Fa10, Pohick Creek at Gunston Cove; Fa11, Bull Run at Centreville; Fa12, "Pohick Creek" (no specific locality). Localities 7, 8, 9 and 10 are within the Coastal Plain; the others (except possibly No. 12) are within the Piedmont.

Virginia, Prince William Co.: PW1, Youngs Branch at U.S. Highway 29-211; PW2, Broad Run at Lake Jackson; *PW3, Colechester. Locality 3 is within the Coastal Plain; the other two are within the Piedmont.

Virginia, Arlington Co.: *A1, Arlington; A2, Potomac River at Gravelly Point; *A3, Chain Bridge; *A4, Rosslyn; A5, Roosevelt Island. Locality 2 is within the Coastal Plain; localities 3, 4 and 5 are within the Piedmont.

District of Columbia: DC1, "Washington" (no specific locality); *DC2, Soldier's Home; *DC3, High Island; *DC4, Chain Bridge; DC5, Georgetown; DC6, Kenilworth Aquatic Gardens; *DC7, Piney Branch; *DC8, Rock Creek Park; *DC9, East Branch of Anacostia River; *DC10, Hamilton Hill; DC11, Potomac Park; *DC12, Brightwood; *DC13, Potomac Flats. Localities 2, 6, 9, 10, 11, 12 and 13 are within the Coastal Plain; the remainder (except No. 1) are within the Piedmont.

List of Species

Of the one hundred and fourteen species listed, complete records are given for forty five, and only a list of localities and inclusive dates for the remainder. The symbol (†) denotes those species not collected since the First World War. The symbol (*) denotes those species collected only since about 1940. It should be noted that only a handful of records were available from the period between the World Wars.

The following abbreviations are used:

BPC—Bertha P. Currie

RPC—Rolla P. Currie

TWD—Thomas W. Donnelly

USNM—United States National Museum

n.d.—no date

Petaluridae

Tachopteryx thoreyi (Hagen): Fr2, M12, *M14 (nymph and imago), PG3, PG4, *Fa1, *PW3; May 22-July 6.

Cordulegasteridae

Cordulegaster diastatops (Selys): *PG13 (1 ♀, "1914, V. Busck," "USNM"), FA10 (1 ♀ May 1, 1949, TWD).

Cordulegaster erroneus Hagen: M12, *M14, *M23, *Fa3, *DC1; June 8- August 22.

†*Cordulegaster maculatus* Selys: *M14, *PG8, *Fa1, *Fa4, *A1, *DC1; April 12-May 5.

†*Cordulegaster obliquus* (Say): *Fa4 (1 ♂ "May 27, 1915, E. W. Reynolds, USNM"), *DC1 (n.d. [Howe, 1921, p. 122]).

Gomphidae

†*Progomphus obscurus* (Rambur): *M14 (1 ♂ "June 17, 1913, J. D. Hood," USNM), *M5 (1 ♂ n.d., "F. C. Pratt," USNM), *PG6 (1 ♂ "July 2, 1915, RPC," USNM). Found today on the Middle Patuxent River, near Savage, Md., just outside our area.

Hagenius brevistylus (Selys): M12, *M14, M15, *PG14, C1, PW2, *DC8; June 17-September 11.

Ophiogomphus rupinsulensis Walsh: M10 (1 ♀ May 31, 1949, TWD), M15 (n.d. [Howe, 1921, p. 122]).

Erpetogomphus designatus Hagen: Fr1, M7 (nymph), M10, M11, M12, M15, M17, M20, *Fa1, DC5; July 2-September 20. This species is probably the most abundant gomphine dragonfly along the Potomac River at and above Great Falls, and also along the larger tributary streams to this river. The nymph lives among cobbles in swift streams.

Dromogomphus spinosus (Selys): Fr1, M6, M8, M10, M11, M12, *M14, *PG15, *Fa1, *Fa2, Fa11, PW2; June 15-September 11. This is a very common species and inhabits slower streams than does the preceding species.

Lanthus albistylus (Hagen): M11 (1 ♂ reared, June, 1951, TWD), C4 (1 ♀, species emerging in large numbers, May 25, 1957, TWD), *Fa1 (1 ♀ June 2, 1914, RPC, USNM). Found on small, swift streams.

Gomphus exilis Selys: M8, M10, M13, *PG2, PG4, *PG6, *PG7, *Fa1, PW1; May 26-June 25. Locally abundant near slow streams.

**Gomphus fraternus* (Say): M12 (1 ♀, n.d., from a packet of dragonflies collected by T. Goldsmith along the C & O Canal.)

Gomphus lividus Selys: *Fa1, *Fa2, Fa10; April 30-May 9. An early and uncommon species in our area.

†*Gomphus parvidens* Currie: *PG6 (1 ♂, May 22, 1915, BPC, Holotype; present whereabouts of the type specimen are not known.)

Gomphus vastus Walsh: M8, M9, M10, M13, *M14, *Fa1, *DC8; May 14-July 31. Common near slow Piedmont streams.

†*Gomphus ventricosus* Walsh: *Fa1 (May 21, 24, 26, June 2, 1914; May 14, 1915, RPC, USNM).

**Stylurus amnicola* (Walsh): M8 (1 ♂, June 17, 1951, TWD).

Stylurus laurae Williamson: M2, M7, M11, *PG6 (1 ♀, July 2, 1915, labeled "*Gomphus notatus*", RPC, USNM), *Fa1. This species has been taken locally in the imago stage only by Currie. However, the author has reared many specimens from Watt's Branch and Pohick Creek. The nymph is quite common in Piedmont streams generally, but no imagoes have been seen since Currie's specimen was taken.

†*Stylurus plagiatus* (Selys): *M14, M15, *M24, *PG8, *C2, *DC1; June 1-September 14.

Stylurus spiniceps (Walsh): M7 (nymphs), M15, M16, *PG7; September 19-September 28. An uncommon species.

Aeshnidae

†*Gomphaeschna antilope* (Hagen): *DC1 (U.S. National Museum Building, May 20, 23, June 2, 22, 1920, USNM).

Basiaeschna janata (Say): M7, M11, M12, *Fa1, *Fa12; April 30-May 15. Nymphs of this species are very common in small Piedmont streams.

Boyeria vinosa (Say): M6, M7, M11, M12, M17, *PG7, C1, *Fa1, *DC1, *DC8; June 15-September 9. A very common semi-crepuscular species on all small woodland streams.

**Nasiaeschna pentacantha* (Rambur): C5 (1 ♂ May 25, 1957, TWD). At least two other specimens were identified nearby on the above date. This species should be looked for on small Coastal Plain woodland streams.

Anax junius (Drury): Fr1, M8, M10, M12, PG4, *PG6, *PG7, *PG16, C6, *DC9; April-October. A very common species easily identified on the wing but collected only occasionally. Prefers lentic habitats.

†*Anax longipes* Hagen: *PG7 (1 ♀ eating a *Libellula cyanea*, June 3, 1916, RPC, BPC, USNM), *DC1, (1 ♀, Post Office Building, June 13, year ?, W. Brown, USNM).

Epiaeschna heros (Fabricius): M8, M12, *M19, PG4, *PG7, *DC1, *DC4; May 22-August. There are several records from buildings in downtown Washington (U.S. National Museum, U. S. Dept. of Agriculture, etc.).

†*Aeshna tuberculifera* Walker: *PG7 (1 ♂, 1 ♀, September 18, 1916, V. Busck, USNM; 1 ♀, September 20, 1916, RPC, USNM).

†*Aeshna umbrosa* Walker: M15, *M19, *M21, *M25, *PG7, *A3, *DC8; September 20-October 3. Imagoes have been seen but not taken in recent years. Nymphs have been collected in potholes in the gorge of the Potomac River.

†*Aeshna verticalis* Hagen: *PG7 (4 ♂, 3 ♀, September 9, October 1, 4, 6, 1914, USNM).

Corduliidae

Didymops transversa (Say): PG4, *PG6, *Fa1; April 30-June 12. A common, early season species on small woodland streams of the coastal plain.

**Macromia alleghaniensis* Williamson: M12 (1 ♂, 1 ♀, August 10, 1952, TWD; 3 ♂, July 30-31, 1953, TWD; 1 ♂, n.d., T. Goldsmith). At Great Falls this species flies with the more abundant *M. illinoensis*, from which it may sometimes be distinguished by its slower, more deliberate flight.

†*Macromia georgina* (Selys): PG7 (1 ♂, July 4, 1899, USNM). This specimen was called *M. australensis* by Williamson (1909). It is, however, clearly *georgina*, although it is slightly smaller than typical specimens of this species from New Jersey and Texas. Recent sight records of *Macromia* from Coastal Plain streams of Charles County may be this species. *Illinoensis* seems to be confined to the Piedmont in our area, and *georgina* has been taken on the Eastern Shore of Maryland and is abundant in the Coastal Plain of New Jersey.

Macromia illinoensis Walsh: M7, M11, M12, *M14, *PG8, *Fa1, *Fa3, Fall; June 4-September 3. This species is common on nearly all Piedmont streams.

†*Macromia taeniolata* Rambur: *Fa8 (1 ♂, August 17, 1916, USNM), *A4 (1 ♀, July 30, 1899, G. N. Collins, USNM), *DC1 (1 ♀, July 10, 1907, W. C. Weedon, USNM).

Neurocordulia obsoleta (Say): *M14, M15, M16, *Fa1, DC8; May 28-July 6. Though only half a dozen specimens have been taken in our area, this rarely seen crepuscular species is probably not uncommon along fairly swift Piedmont streams.

Epicordulia princeps (Hagen): M7, M12, M16, *Fa1, *Fa8, PW1, *DC1 (U.S. National Museum Building); May 31-July 31. A common early summer species along slowly flowing streams (C & O Canal, for example). Half a dozen older specimens and a dozen recent ones from the Potomac River above Washington show markedly reduced wing maculation. The basal spot in the front wing is nearly absent, the nodal spot of both wings is only 2 mm. in diameter, and the apical spots are somewhat smaller than normal. This reduced maculation is easily observed in the field, and of many dozen specimens observed at close range in recent years, as well as all the collected specimens, none has shown "normal" maculation. Specimens from the lower Potomac River and from Prince William County, however, are normal. Specimens with reduced maculation have been observed in many places in the eastern United States, usually flying with normal specimens. The upper Potomac River population is perhaps unique in its apparent total absence of normal forms. This reduced maculation may be the result of a limnologic condition, or it may be a local, but temporally persistent, genetic condition.

Tetragoneuria cynosura (Say): M13 (nymph), *Fa1; May 2-June 17. No imagoes have been taken in recent years.

***Tetragoneuria semiaquea** (Burmeister): PG4 (1 ♀, reared, emerged April 17, 1954, TWD). This specimen is referred to *semiaquea* because of its short (24 mm.) broad abdomen, and because of its hind wing spot, which reaches the fourth antenodal.

†**Tetragoneuria spinosa** (Hagen): *PG7 (1 ♂, May 1, 1915, USNM).

***Tetragoneuria williamsoni** Muttikowski: PG4 (n.d., C. Cook, personal communication).

***Helocordulia uhleri** (Selys): Fa12 (n.d., C. Cook, personal communication).

Somatochlora filosa (Hagen): PG10 (2 ♂, 1 ♀, September 11, 1949, TWD), *C7 (1 ♂, 1 ♀, August 8, year ?, Hagen Coll., MCZ, [Walker, 1925]), *DC1 (1 ♂, n.d., Smithsonian Stable, N. R. Wood, USNM; 1 ♀, found dead, September 13, 1921, Mrs. McConnell, USNM).

***Somatochlora linearis** (Hagen): C1 (1 ♀, August 22, 1953, TWD), C5 (1 ♂, 1 ♀, August 22, 1953, TWD), Fa11 (1 ♀, August 15, 1953, TWD). Found on small woodland streams. The female at Mason Springs was observed ovipositing in damp sand at the water's edge.

***Somatochlora tenebrosa** (Say): M12 (1 ♂, August 20, 1950, G. B. Vogt, USNM; 1 ♂, July 31, 1953, TWD).

Libellulidae

Nannothemis bella (Uhler): *PG3, *PG7; PG9; May 28-July 4. Today found only at the Suitland Bog.

Perithemis tenera (Say): M6, M8, M10, M12, *M19, PG4, C6, Fa8, PW2, A2, A5, *DC2, *DC10, *DC11; June 4-September 15. Very common on ponds and slow streams with emergent vegetation.

Celithemis elisa (Hagen): M12, PG4, *PG7, C6; June 3-June 27. Found today only on coastal plain ponds with sand bottoms.

Celithemis eponina (Drury): PG3, *Fa1, *Fa9, PW1, *DC1; June 27-July 28. Rare in our area today.

†**Celithemis martha** Williamson: *PG7 (1 ♂, August 14, 1916, V. Busck, USNM).

Celithemis monomelaena Williamson: M12, PG4, *Fa1; July 4-July 27. Found today only at Greenbelt lake, where it is fairly common.

Libellula semifasciata Burmeister: M8, *M19, PG1, *PG6, *PG7, *DC1; April 27-September 24. Common in marshy places early in the season.

Libellula deplanata Rambur: C6 (1 ♂, April 27, 1950, TWD), *Fa1 (1 ♂, 1 ♀, April 30, 1915, RPC; 1 ♀, May 19, 1917, RPC, USNM).

Libellula cyanea Fabricius: Fr1, M8, M12, *M19, PG1, PG4, *PG6, *PG7, *Fa1, *A1, *DC8, DC10; May 15-July 27. A very common early season species around large ponds.

†*Libellula flavida* Rambur: *PG7 (1 ♀, August 25, 1916, BPC, USNM; 1 ♀, June 6, 1916, BPC, USNM), *DC12 (1 ♂, 1 ♀, July 16, 1899, N. R. Wood, USNM).

Libellula incesta Hagen: M8, M10, M12, M15, M17, PG1, PG4, *PG7, *Fa1; June 11-September 6. One of the most common pond dragonflies.

Libellula luctuosa Burmeister: *M4, M6, M8, M10, M12, M13, M15, *M19, PG1, *PG2, PG4, *Fa1, PW1, PW2, *DC13; June 11 ?-September. Another very common pond species.

Libellula needhami Westfall: C6, *A1, *DC1; June 16-August 22. An uncommon species, limited apparently to the Coastal Plain.

Libellula pulchella Drury: M6, M8, M10, M12, *M19, PG1, PG3, PG4, *PG7, C1, *Fa1, Fa10, DC5, DC6, *DC9, *DC11; May 15-September 8. An abundant, easily recognized pond species.

Plathemis lydia (Drury): M6, M8, M10, M12, M13, *M19, *M22, PG1, PG4, *PG6, *PG7, C1, Fa10, DC5, *DC8, *DC10; May 1-September 8. Abundant on ponds and slow streams. In our area this species shows more tolerance to organic pollution than does any other dragonfly.

†*Erythrodiplax bernice* (Drury): *DC1 (Borror, Ohio State Univ., n.d.); *DC10 (1 ♂, July 8, 1899, USNM). A Coastal Plain species not taken recently here.

†*Erythrodiplax connata miniscula* (Rambur): *PG6 (1 ♂, August 14, 1916, BPC, USNM), *PG7 (1 ♂, September 24, 1915, BPC, USNM).

Sympetrum ambiguum (Rambur): M8, M12, M17, *PG7; July 4-September 24. An uncommon late season species.

†*Sympetrum obtrusum* (Hagen): *M19 (1 ♂, 1 ♀, September 13, 1917, BPC, USNM), *PG7 (1 ♀, August 14, 1916, BPC, USNM).

Sympetrum rubicundulum (Say): *M4, M8, M12, *M19, *PG7, A2, *DC11; June 6-October 12. A common pond species, especially in the late summer.

†*Sympetrum semicinctum* (Say): *PG7, *DC12; June 21-September 24.

Sympetrum vicinum (Hagen): *M5, M8, M12, *M14, M17, PG1, *PG7, *Fa1, A3, *DC1, *DC10; June 25-November 7. Probably our most common autumn dragonfly.

Erythemis simplicicollis (Say): M8, M10, M12, M13, PG1, PG2, PG4, *Fa1, *DC1, DC6, *DC13; May 28-September. An abundant pond species.

Pachydiplax longipennis (Burmeister): Fr1, M8, M12, M15, *M19, *M24, PG4, *PG6, *PG7, C2, *Fa1, *DC2, DC5, *DC8, *DC10; May 30-September. Abundant, usually occurring with the preceding species.

Tramea carolina (Linnaeus): *M19, PG4, *PG7, C6, *Fa1; May 6-August 5.

Tramea lacerata Hagen: M17, *M19, PG4, *Fa1; June 24-August 23.

Pantala flavescens (Fabricius): *M19, C6, *DC13; July-August. This species may be seen frequently in the late summer flying over small park areas in Washington. Females have been seen on several occasions ovipositing on shiny, black automobile roofs.

Pantala hymenea (Say): Fr1, M7, M12; August 24–September. This specimen is common around Great Falls, where its nymphs have been collected in semi-temporary pothole ponds high above the present river level.

Calopterygidae

Calopteryx apicalis Burmeister: *PG6 (July 4, 1917, BPC, USNM; 2 ♂, 3 ♀, July 2, 1915, BPC, USNM; 1 ♂, June 25, 1906, D. H. Clemons, USNM), Fa10 (1 ♂, June 15, 1952, TWD).

Calopteryx maculata (Beauvois): Fr2, *M3, *M5, M7, M8, M10, M12, M13, M15, M16, *M19, *M20, *M22, *M23, PG3, PG4, *PG6, C1, C3, C4, C5, *Fa1, Fa11, DC5, *DC12; May 28–September 18. Abundant on all Piedmont streams; less common on Coastal Plain streams.

Hetaerina americana (Fabricius): Fr2, *M3, M8, M10, M12, M17, *M24, *PG7, *Fa1, *Fa2, Fa11, PW2, *DC4, DC5, *DC8; May 31–September 11. This species is almost ubiquitous along the shores of large Piedmont streams, especially in late summer. It is not found on the Coastal Plain in our area.

Hetaerina titia (Drury): M12, M13, *M14, M17, *M24, *M27, *PG6, *DC1; August 6–October 9. This species is much less common than the preceding and prefers swifter water. It is most common along the banks of the Potomac in late September.

Lestidae

***Archilestes grandis** (Rambur): M18 (1 ♂, August 24, 1951, TWD), PG1 (2 ♂, October 10, 1949, TWD). The College Park specimens are the first taken east of the Appalachian mountains.

†**Lestes congener** (Hagen): *PG7 (1 ♂, October 4, 1916, BPC, USNM).

†**Lestes disjunctus australis** Walker: *M19, *PG6, *PG7; April 30–September 24. This species was apparently most abundant in the spring and early summer.

Lestes forcipatus Rambur: M12 (August 10, 1952, TWD), *PG6 (1 ♂, July 14, 1917, RPC, USNM), PG7 (1 ♂, June 6, 1916, RPC, USNM), *DC1 (n.d., RPC, USNM). The only recent record for this species is from Great Falls, where it was found flying in abundance around small, semitemporary pothole ponds.

†**Lestes inequalis** Walsh: M12, *M26, *PG7, *Fa1; June 2–July 27.

Lestes rectangularis Say: Fr1, M8, *M19, PG1, *A3, *DC1; May 30–July 24. Characteristic of very small, weedy ponds.

†**Lestes unguiculatus** Hagen: *PG6 (1 ♂, August 16, 1914, USNM), *DC2 (1 ♂, July 31, 1899, USNM).

†**Lestes vigilax** Hagen: *PG6 (1 ♂, 1 ♀, July 29, 1915, RPC, USNM), *PG7 (1 ♀, September 3, 1914, BPC, USNM; 1 ♀, June 6, 1916, RPC, USNM).

Cornagrionidae

Argia apicalis (Say): *M3, M8, M11, M12, M13, *M14, M15, M17, *Fa1, Fa11, PW2, *DC2, *DC4; May 30–September 11. One of our most abundant species of *Argia*. The imagoes prefer bare places on the banks of slow streams.

†**Argia bipunctulata** Hagen: *PG7 (1 ♂, June 6, 1916, RPC, USNM; 1 ♂, September 1, 1914, BPC, USNM), *PG9 (1 ♀, May 20, 1918, W. L. McAtee,

USNM), *DC2 (1 ♀, July 7, 1899, W. R. Maxon, USNM), *DC12 (5 ♂, July 16, 1899, N. R. Wood, USNM).

Argia moesta Hagen: *M3, *M4, M7, M12, *M14, M15, *M24, PG4, *Fa1, Fa11, PW2, DC5; June 2-September 9. A very common *Argia* on large, boulder-choked streams. This species shuns vegetation, ovipositing under water both on logs and in algae on rocks.

Argia sedula Hagen: M8, M10, M11, M12, M13, M15, M17, *M24, *Fa1, Fa11, PW1, PW2; June 16-October 10. The most common *Argia* along slow streams, such as the C & O Canal. This species prefers slow streams with abundant emergent vegetation along the banks.

Argia tibialis (Rambur): M7, M10, M12, *M14, *M20, *PG6, *PG8, C1, *Fa1; May 30-September. A rather local species in our area. This species is usually found in shady places along slow streams.

Argia translata Hagen: Fr2, M12, M15, M17, *M24, *Fa1, Fa11, PW2, A2, DC4, DC5; July 10-September 15. A common late season *Argia*. This species is found in a variety of lotic habitats, but prefers streams with vegetated banks. It oviposits on floating pieces of bark, branches, and other debris.

Argia violacea (Hagen): M1, M8, M12, M13, M15, M17, *M19, *M20, M23, C5, *Fa1, Fa11, PW2, *DC1, *DC12; May 28-September 17. Though found in many habitats, this *Argia* is most abundant along small upland streams with a moderate current and abundant emergent vegetation.

†*Amphiagrion saucium* (Burmeister): M12, PG3, *PG7, *PG9, *PG11, *Fa1, *Fa8, *DC7; May 18-July 4.

†*Nehalennia gracilis* Morse: *PG7 (1 ♂, 1 ♀, May 28, 1915, BPC, USNM; 2 ♂, 1 ♀, June 6, 1916, RUC, USNM).

†*Nehalennia integricollis* Calvert: *PG7 (3 ♂, 3 ♀, July 6, 1914, BPC, USNM; 1 ♂, July 21, 1914, BPC, USNM; 1 ♀, June 10, 1915, BPC, USNM; 1 ♂, "June to Sept.", BPC, USNM).

†*Nehalennia irene* (Hagen): *PG7 (1 ♂, May 28, 1915, BPC, USNM; 1 ♂, July 21, 1915, BPC, 1 ♀, May 18, 1916, BPC, USNM).

Chromagrion conditum (Hagen): M8, PG4, *PG7, *Fa1; May 15-June 21. Local along small streams.

†*Teleallagma daeckii* (Calvert): *PG7 (1 ♀, May 28, 1915, BPC, USNM; 1 ♂, June 6, 1915, G. Chestnut, USNM; 1 ♂, June 6, 1915, RPC, USNM).

Enallagma aspersum (Hagen): M1 (1 ♀, September 17, 1954, TWD), PG4 (1 ♂ seen, August 1, 1954, TWD), *PG7 (1 ♂, 1 ♀, June 6, 1916, RPC, USNM).

**Enallagma basidens* Calvert: M1 (5 ♂, September 18, 1953, TWD), PG4 (2 ♂, August 10, 1954, TWD), PW1 (1 ♂, August 19, 1951, TWD). This species is now probably well established in our area.

†*Enallagma carunculatum* Morse: *PG7 (1 ♂, October 3, 1914, V. Busck, USNM).

Enallagma civile (Hagen): Fr1, M4, M6, M12, *M19, A2, *A4, *DC2; May-September 15. This species prefers bare banks around open ponds.

Enallagma divigans Selys: M12, C3, C5, C6, PW1; May 21-June 24. Very common on small Coastal Plain streams in the early summer.

†*Enallagma doubledayi* Selys: *M19 (1 ♂, June 1, 1900, C. N. Collins, USNM), *PG7 (2 ♂, August 25, 1916, BPC, USNM).

†*Enallagma durum* Hagen: *M19, *M24, *M27, *PG6, *C2, *DC4, *DC11; July 14-September 5.

Enallagma exulans (Hagen): Fr1, M3, M7, M8, M11, M12, M13, *M14, M15, M17, *M24, *Fa1, Fa11, PW1, *DC8; May 28-August 6. Very common along Piedmont streams.

Enallagma geminatum Kellieott: M13, *PG7, *Fa1; May 21-June 24. A rare species today around Washington.

Enallagma signatum (Hagen): M6, M12, M13, *M19, *M24, C5, *DC1; May 28-August 30. Flies late in the afternoon along very slow streams, such as the C & O Canal.

Enallagma traviatum Selys: M10, M12, M13, M15, *M19, *Fa1, DC6; June 2-July 9. A local pond species.

Ischnura posita (Hagen): M8, M10, M12, M13, M17, *M19, PG1, PG4, C6, PW1, A2, *DC1, *DC7, *DC10, *DC12; April 22-September 15. Very common in the spring around the tiniest of ponds and marshy depressions.

Ischnura ramburii Selys: *M19, PG4, *PG6, *PG7, *DC1; May 18-August 31. An uncommon Coastal Plain species around Washington.

Ischnura verticalis (Say): M8, M10, M12, M13, M17, *M19, PG1, *PG6, *C2, *Fa4, Fa10, *A4, *DC7, *DC8; April 30-September. Occurs abundantly around small ponds or in marshy areas, usually with *I. posita*.

Anomalagrion hastatum (Say): *PG7, C6, *DC1; April 22-September 1. Locally common in marshy places.

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SPURIOUS RECORDS OF THE GENUS PYRGOMORPHA AUDINET-SEVILLE, 1839, IN THE AMERICAS (ORTHOPTERA: ACRIDOIDEA: PYRGOMORPHIDAE)

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In former times, a number of species of Acridoidea, allegedly belonging to the Old World genus *Pyrgomorpha*, have been recorded from the Americas, but most of these have long since been assigned

to other genera outside the Pyrgomorphidae. There remain, however, two species of the genus, namely *P. tricarinata* I. Bolívar, 1884 and *P. dispar* I. Bolívar, 1884, whose occurrence in the western hemisphere ("Brazil" and "Mexico" respectively) has never been completely refuted.

Whilst examining material of the genus, kindly lent to me by Dr. Max Beier of the Naturhistorisches Museum in Vienna, I was fortunate enough to discover authentic material of both these species.

1. *Pyrgomorpha tricarinata* Bol.

A single female specimen, undoubtedly from the type series, is in the Vienna Museum and is labelled "Brésil," on a small blue label, and "Coll. Camille Van Volxem" on a white one. There are also further labels: *P. trincarinata* Bol., Brasil, Coll. Br.v.W." and Brun-

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ner's reference number, 12. 189. This specimen is presumably not a true type since it does not bear Bolívar's own determination label and no type is stated to be in Vienna. It does however, have the same measurements as those given by Bolívar in his original description, with which it agrees very closely.

In the Brussels Museum there are three female specimens each bearing, in addition to blue and white labels similar to those mentioned above, a red-printed "type" label together with a hand-written label "Bolívar det.: *Pyrgomorpha tricarinata* Bol.". One also has two printed labels "M.R.Belg." and "N.7" (this specimen lacks the tip of the abdomen); the other two carry old labels "(Pyrgomorphidae)" and "Sphenarium sp." One of the latter (the most complete specimen) also bears Bolívar's own determination label "*Pyrgomorpha carinata* Boliv. Type". I have examined all three specimens through the courtesy of M. A. Collart of the Institut Royal des Sciences Naturelle de Belgique, Brussels, and designate the last mentioned specimen as lectotype.

P. tricarinata is an undoubted *Pyrgomorpha*, but comparison with North African material (including types—♂ lectotype and ♀ syntype, Marrneecos, Mazagán, VI.1907, *Escalera*—Instituto español de Entomología, Madrid) indicates that it is synonymous with *P. proccera* I. Bolívar, 1908, and that its data label had undoubtedly been misplaced.¹

¹ M. A. Collart has kindly drawn my attention to some valuable information concerning the scientific expeditions of Camille Van Volxem published in 1875 (*Ann. Soc. ent. Belg.* 18: Comptes-Rendus des Séances, pp. (III-CVI), an extract of which is as follows:—"En avril 1871, il entreprit son premier voyage scientifique, . . . IC parcourut successivement la partie méridionale du Portugal, les côtes du Maroc [my italics] et le midi de l'Espagne et revint en Belgique le 29 juillet . . . En 1872, après une rapide excursion dans l'Elifel, il accompagna notre savant collègue, M. E. Van Beneden, chargé par la Gouvernement d'une mission scientifique au Brésil et à la Plata . . . qui dura du 1er juillet 1872 à fin janvier 1873. . . ." This undoubtedly explains how *C. tricarinata*, a Moroccan species, came to be described as Brazilian.