

A Preliminary Checklist of the Damselflies of Virginia, with Notes on Distribution and Seasonality (Odonata: Zygoptera)

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Virginia has a diverse fauna of aquatic insects, although much additional inventory is needed to fully catalog this diversity. Species new to science continue to be discovered in the state (e.g., Kondratieff & Kirchner, 1994). The aquatic groups treated in the "Insects of Virginia" series to date are limited to the true bugs and several families of beetles and flies (Bobb, 1974; Gladney & Turner, 1969; Matta, 1974, 1976; Michael & Matta, 1977; Pechuman, 1973). Species checklists have been compiled for the stoneflies (Kondratieff & Voshell, 1979; Kondratieff & Kirchner, 1987), mayflies (Kondratieff & Voshell, 1983), caddisflies (Parker & Voshell, 1981), and dragonflies (Carle, 1978, 1979, 1982) of the state. The present contribution is the first attempt to publish a comprehensive list of the damselfly species known from Virginia. Carle (1988) compiled a checklist of 51 species which was not published.

Compared to dragonflies, the damselfly fauna of Virginia has received little attention in the past. Literature pertaining in whole or part to the Zygoptera of the state is very limited. I have been unable to find as many as ten references which discuss this element of the state's fauna to any degree. Most of the references that I found are listed in Table 1. The only other paper of note is that by Kennedy (1977). I did not have an opportunity to consult the unpublished thesis of Davis (1938) while preparing this manuscript. However, I reviewed the catalogs of Calvert (1893), Hagen (1861, 1875), and Muttkowski (1910), as well as books by Dunkle (1990), Needham & Heywood (1929), and Walker (1953) for any mention of Virginia damselfly records. It is important to note that the "Berkeley Springs, Virginia" locality which Hagen (1861) listed for seven species (it is the type locality for several of them) is now part of Morgan County, West Virginia. Although this change in Vir-

ginia's boundaries occurred in 1862 (R. L. Hoffman, pers. comm.), subsequent authors (e.g., Muttkowski, 1910; Needham & Heywood, 1929) failed to account for it in their range descriptions for several species. Valid Virginia records have since been published for all but one (*Ischnura prognata*) of these species.

The following annotated checklist of the state's damselfly fauna should be considered as preliminary. I have not conducted an exhaustive search of available collections in preparing this list. In addition to published records, my sources are primarily limited to the collection of the United States National Museum of Natural History, Washington, D.C. (abbreviated as USNM hereafter) and specimens collected statewide from 1988-1994 by the zoological staff of the Division of Natural Heritage (DNH). Only adult damselflies in these two collections were examined by me. Most USNM specimens were collected by the sister and brother team of Bertha P. Currie and Rolla P. Currie during the early part of this century. The majority of their collections were made at Great Falls in Fairfax County. Many of these records were included in Donnelly (1961). At various times during the past quarter century, Oliver S. Flint, Jr., current curator of neuropteroid insects at the USNM, has collected Odonata in Virginia, making several significant discoveries in the process. Recent Malaise trap collections from Clarke and Essex counties were obtained by David R. Smith during trapping for sawflies.

The DNH reference collection has grown considerably during the past three years, particularly through my own efforts, and more recently, those of Christopher S. Hobson. Rather surprisingly, it contains a greater number of species from Virginia than does the USNM collection (Table 1). Surveys by DNH staff have generally emphasized natural ponds and boggy habitats, with less effort

directed towards lotic environments and swamps. Man-made lakes and ponds, as well as eutrophic natural habitats, have received little of our attention. Specimens obtained by DNH staff have been identified using the following references: Carpenter (1991), Dunkle (1990), Garman (1927), Johnson & Westfall (1970), Needham & Heywood (1929), and Walker (1953). I have reconfirmed all of these determinations during the process of preparing this paper. Additional sources used in compiling the present list were a small number of specimens collected (1948-present) by Richard L. Hoffman, and selected records of uncommon or rare species provided to DNH by Frank L. Carle. Table 1 summarizes the records obtained from most of these sources.

The checklist is arranged alphabetically by species within each family. Scientific names follow Garrison (1991), except for the spelling of the specific epithet of *Enallagma daeckii*. I retain the original spelling of Calvert (1903), while acknowledging that the species was named for a Mr. V. A. E. Daecke, collector of the holotype. I also diverge from Garrison (1991) in recognizing Hagen rather than Selys as the author of *Chromagrion conditum* (originally described as *Erythromma conditum*), because this agrees with all other references except Soltesz (1991) that I have consulted.

I have not attempted to provide a comprehensive listing of localities for each species nor attempted to analyze their geographic distribution patterns within the state. The reader is referred to Hoffman (1969) and Woodward & Hoffman (1991) for discussions of the state's physiographic provinces. Seasonality data should be treated as the minimum duration of the flight period in Virginia because of the limited number of specimen records that I have examined. Species indicated by a "+" apparently have not been previously reported from Virginia, although they were presumed to occur in the state on the basis of the range descriptions provided by Dunkle (1990), Needham & Heywood (1929), and Walker (1953), or the continental range maps contained in A. F. Beatty & G. H. Beatty (1971). Other species which I believe are being reported from Virginia for the first time are indicated by an "**".

CALOPTERYGIDAE

This family is represented in Virginia by two genera and seven species. All of these species are associated with flowing water. Available records indicate that only two of them are common in the state.

**Calopteryx aequabilis* Say 1839

This northern species was not reported from Virginia in Johnson's (1974) review of the geographic distribution patterns of the members of this genus. The nearest localities plotted on his range map are in central Pennsylvania. Shiffer (1985a) also did not include Virginia within the known range of *C. aequabilis*. Howe (1921) mentioned that an old record from Virginia had been expunged. Presumably this refers to Hagen's (1875) discussion of a female specimen of *Calopteryx virginica* Drury, which he determined was a synonym of *C. maculata* (Beauvois) rather than *C. aequabilis* Say. Carle (1988) listed five records for this species in Virginia, but I have not seen these specimens and do not know the counties in which they were collected. The sites are in the northwestern part of the state (F. L. Carle, pers. comm.). Both the DNH and USNM collections lack Virginia records of this species. The flight period of *C. aequabilis* is early to mid-summer (Montgomery, 1947), but no dates are available to me for Virginia. The preferred habitat is rocky, spring-fed streams and small rivers (Shiffer, 1985a).

Calopteryx amata Hagen 1889

This northern species was not reported from Virginia by Johnson (1974), although the USNM has specimens collected prior to that date. The only published records for this species in Virginia are two sites included in Carle's (1989) range map. One of these sites appears to be in Alleghany or Bath County, the other in Highland County. I have no information on the former site, but am aware of the following records from Highland County: Laurel Fork at Route 642, 3 July 1971, O. S. Flint, Jr., 3 males (USNM); Jackson River, 1.6 km N of Mustoe, 23 June 1978, F. L. Carle, 2 males, 1 female (Carle collection). The single record listed in Carle (1988) refers to the latter site. Additional surveys in western Virginia should yield more locations for this species, because it occurs at several sites in the mountains of western North Carolina and eastern West Virginia (Johnson, 1974). The preferred habitat is cold, shallow, rocky rivers. The species typically flies during early summer. Virginia flight dates extend at least from 23 June to 3 July. Beatty & Beatty (1970) reported possible communal oviposition in *C. amata*.

**Calopteryx angustipennis* (Selys, 1853)

This Appalachian species was not reported from Virginia

by Johnson (1974) or Tennessen (1979), although Richard Hoffman first collected it in Alleghany County in 1951 (material in INHS). Subsequent records indicate that *C. angustipennis* is widespread but local in the western mountains of the state. The records known to me are from Alleghany, Botetourt, Craig, Culpeper, Rockbridge, and Russell counties. Capture dates of Virginia specimens range from 25 May to 10 July. This species inhabits riffle areas of rocky rivers where sand and gravel predominate (Tennessen, 1984). It is the only species of *Calopteryx* which lacks any trace of brown or black markings on its wings.

Calopteryx dimidiata Burmeister 1839

Johnson (1973b, 1974) listed Virginia records only from Fairfax and Powhatan counties. This species is broadly distributed in the Coastal Plain and Piedmont physiographic regions of North Carolina (Johnson, 1974). More recent records from Appomattox, Bedford, Brunswick, Caroline, Culpeper, Dinwiddie, Greenville, Henrico, and Patrick counties reveal that *C. dimidiata* has a similar range in Virginia. The preferred habitat is sandy streams and small rivers. The flight period in Virginia extends from at least 18 May to 9 August. In North Carolina, it continues until early October (Paulson & Jenner, 1971).

Calopteryx maculata (Beauvois, 1805)

This very common species, which is easily recognized by its completely black wings (females have white stigmas), has been known from Virginia for more than a century (Hagen, 1875). Although subsequently recorded from only four counties by Johnson (1974), it probably occurs in every county of the state because it is found from very small streams (preferred habitat) to medium-sized rivers. I am aware of at least 20 additional counties in Virginia where *C. maculata* has been documented, including Accomack County on the Delmarva Peninsula. Carle (1988) tallied more than 100 sites in the state for this species. It has the longest flight period of the genus (Montgomery, 1947), extending from at least 21 May through 6 October in Virginia. The breeding behavior of the species has been studied more extensively than that of any other North American damselfly (Alcock, 1983; Forsyth & Montgomerie, 1987; Waage, 1979, 1984; and numerous references in Bick & Bick, 1980).

Hetaerina americana (Fabricius, 1798)

The ruby-spot has been known from Virginia for nearly a century (Williamson, 1903), and is much more common here than the following species. Johnson (1973a) reported *H. americana* from twelve counties, all but one (Prince George) being in the northern or western parts of the state. Matta (1978) did not include it in his list for southeastern Virginia, but DNH staff have recently found it along the Nottoway River on the Greensville-Sussex County line. Additional new county records (Albemarle, Augusta, Botetourt, Carroll, Grayson, Page, Rockbridge, and Rockingham) confirm that it is widespread in the northern and western regions of the state. This species has an extended flight period (Montgomery, 1947). In Virginia, it ranges from at least 31 May to 4 November. This attractive species is typically found along large streams and rivers with moderate to fast current. Males are easily recognized by the presence of a ruby spot near the base of their clear wings. The head and thorax are metallic red and the abdomen is metallic green.

Hetaerina titia (Drury, 1773)

This is a southern species which is uncommon in Virginia. It has been known from the state for nearly a century on the basis of specimens collected along the Clinch River in Tazewell County (Williamson, 1903). Gloyd (1951) later captured it in Henrico County. Johnson (1973a) reported only these two Virginia localities in his geographic distribution study of this species. The USNM has more recent specimens from the New River in Carroll and Grayson counties in southwestern Virginia. Chris Hobson and I have collected *H. titia* along the Nottoway River straddling the Brunswick-Dinwiddie County line in the southeastern part of the state. Frank Carle (pers. comm.) has also found this species along the Nottoway River. Both species of *Hetaerina* can be found along the Clinch, New, and Nottoway rivers in Virginia. The flight period of *H. titia* in the northern part of its range is considerably shorter than that of *H. americana* (Montgomery, 1947), being restricted to the fall months. Virginia collection dates known to me range from 18 August to 23 September.

LESTIDAE

This family is represented in Virginia by two genera and ten species. All of the *Lestes* species are typically

associated with standing water, particularly ponds. *Archilestes* also prefers still or slow-moving water, especially willow or alder-lined sections of small streams (Usinger, 1956). The members of this family are commonly referred to as spreadwings, owing to the fact that their wings are partially spread when at rest, which is atypical of most damselflies. Only two species appear to be common in Virginia.

Archilestes grandis (Rambur, 1842)

Kennedy (1977) published the first Virginia records for this large species, which has spread eastward across the continent in the past half century. The first Virginia specimen was collected in Charlottesville in October, 1947 by Richard Hoffman (Kennedy, 1977; R. L. Hoffman, pers. comm.). The only additional Virginia records listed by Kennedy were from Fairfax and Montgomery counties. Carle (1988) listed three sites for the state, presumably referring to these same records. Chris Hobson and I recently discovered a population of *A. grandis* in Scott County. This species has a fall flight period, the range of dates of Virginia specimens being 20 August to 14 October (Kennedy, 1977).

+ *Lestes congener* Hagen 1861

This is a small boreal species which approaches the southern limits of its range in Virginia. The continental range map prepared by A. F. Beatty and G. H. Beatty (1971) seems to indicate that *L. congener* is widespread in the state, but the scale of their map makes this difficult to ascertain. With the exception of this map, I am not aware of any previously published records for this species from Virginia. Carle (1988) was not aware of any Virginia records, although Richard Hoffman first collected it in the state (Alleghany County) in 1952 (material in INHS). The USNM and DNH collections reveal that it has since been recorded (all USNM specimens are post-1971) from the following counties: Augusta, Bath, Caroline, Clarke, Highland, and Scott. Tarter (1976) listed only two county records (Preston and Raleigh) for West Virginia. Tennesen (1979) mentioned the capture of a single male in Alabama, but it has not been reported from the Carolinas (Huggins & Brigham, 1982). The flight period of this species is primarily during the fall months (Montgomery, 1948). The collection dates of mature specimens taken in Virginia range from 11 September to 23 October. This species was common at the Augusta County site on 21

October, suggesting that some individuals may survive into November. This appears to be the latest emerging damselfly in Virginia. However, the USNM has a general male from Clarke County that was collected in a Malaise trap during the period of 15-24 June, indicating that some individuals emerge in mid-summer. The preferred habitats of *L. congener* are small ponds and vernal pools.

Lestes disjunctus Selys 1862

Both of the recognized subspecies inhabit Virginia. The nominate form has a northern distribution which barely extends into the state. It is known from Bath, Giles, Highland, and Prince William counties. I observed this subspecies in abundance on 6-7 September in the Locust Springs area of northwestern Highland County. Its flight period extends from mid-summer into the fall. Virginia specimens seen by me were collected between 3 July and 12 September. *Lestes disjunctus australis* Walker 1952 has a more southern distribution and is widespread in Virginia. I collected one male in the Locust Springs area on 19 June, suggesting that the two subspecies may be syntopic at this site, with the nominate form predominating. The flight period of *L. d. australis* in Virginia is much longer than that of *L. d. disjunctus*, extending from early April (4-15 April Malaise-trapped specimens in USNM) through at least 5 October. The preferred habitat of both subspecies is vegetated ponds.

**Lestes dryas* Kirby 1890

This metallic green species has a northern distribution, occurring in Asia and Europe as well as North America (Walker, 1953). Its range barely extends into Virginia. Carle (1988) listed one record for the state, but I am not aware of the county or date of this collection. The nearest published records are from Bell County, Kentucky (Resener, 1970); Baltimore, Maryland (Fisher, 1940); and Mineral and Ritchie counties, West Virginia (Tarter, 1976). The Kentucky county borders Lee County, Virginia, in the extreme southwestern corner of the state. *L. dryas* also occurs in Tennessee (Walker, 1953). The flight period typically spans the summer months (Donnelly, 1992; Walker, 1953). The preferred habitats are bogs and small ponds (Donnelly, 1992).

Lestes eurinus Say 1839

This is a large northern species which is near the south-

ern limit of its range in Virginia. The species was first reported from the state by Dunkle (1983); although it had been collected as early as 1974 by Frank Carle. It seems to prefer mountain ponds in Virginia, including some that are man-made in origin. The North Carolina population studied by Lutz (1968) inhabited a small impoundment. I am aware of records from the following counties in Virginia: Alleghany, Amherst, Augusta, Giles, Highland, Prince William, Rockingham, and Scott. *L. eurinus* has a relatively short flight period in early summer (Montgomery, 1948). Virginia collection dates range from 25 May to 2 August, although the majority of the specimens have been taken in July. This species is easily distinguished from its congeners in Virginia by its large size and amber-yellow wings.

Lestes forcipatus Rambur 1842

This species was originally reported from the state more than a century ago (Calvert, 1890). However, because it is easily confused with both subspecies of *L. disjunctus*, particularly *L. d. australis*, it is possible that these specimens were misidentified. Walker (1952, 1953) provided several characters for separating these three taxa. *L. forcipatus* seems to be somewhat local in occurrence in Virginia. Carle (1988) knew of nine sites in the state. The only USNM records are recent collections from Clarke County. DNH records are limited to several sites in the Shenandoah Valley region of Augusta County. This species flies during the summer and fall months (Montgomery, 1948). The few Virginia records available to me range from 25 May to 21 October. I found only one female on the latter date at a site where this species was abundant on 26 September.

Lestes inaequalis Walsh 1862

This species also seems to be uncommon in Virginia. Carle (1988) listed only three records for the state. All USNM specimens were collected in 1914 in Arlington and Fairfax counties. Donnelly (1961) indicated that he did not find *L. inaequalis* in this area during his surveys. I have found it at several ponds and swamp edges in Accomack, Caroline, Prince George, and Surry counties. Other DNH records are from Fairfax and Isle of Wight counties. All of the above counties are in the Coastal Plain or extreme eastern edge of the Piedmont, although the range map prepared by A. F. Beatty & G. H. Beatty (1971) indicates a statewide distribution for this species.

The flight period in Virginia extends from at least 2 June to 25 August. Males are easily identified by the fact that their inferior appendages are conspicuously longer than the superior ones.

Lestes rectangularis Say 1839

This species is widespread in Virginia, probably occurring in every county of the state. It has an exceptionally long abdomen. The flight period is relatively long, spanning the summer and fall months (Montgomery, 1948). In Virginia, it extends from at least 25 May to 30 September.

**Lestes vidua* Hagen 1861

This southern species reaches its northern range limit in Virginia, where it is apparently very rare. The USNM collection contains a female specimen obtained by Donald R. Davis, current curator of microlepidoptera, at an unspecified location in Virginia Beach on 21 September 1974. The capture site was probably in either Fort Story or Seashore State Park (D. R. Davis, pers. comm.). This is the only Virginia record of this species known to me. Matta (1978) did not find *L. vidua* in the southeastern corner of the state. This species is very similar to *L. disjunctus australis* (Dunkle, 1990). The eyes and face (labrum) are purple in *L. vidua* males but blue in those of *L. d. australis*. The preferred habitat is grassy ponds (including temporary ones), where these two species often occur syntopically in Florida (Dunkle, 1990).

Lestes vigilax Hagen in Selys 1862

This species seems to be somewhat uncommon in Virginia. The USNM contains only older specimens from the City of Suffolk that were reported by Gloyd (1951), and very recent material from Prince William County. Matta (1978) recorded *L. vigilax* from Sussex County. Carle (1988) listed only five sites for the state, but DNH staff have recently found it in abundance at about two dozen acidic beaver ponds in Caroline County. I have also encountered this species at ponds and small lakes in Augusta, Cumberland, Dinwiddie, Giles, Highland, and Sussex counties, as well as in a swamp that straddles the Greenville-Sussex county line. The flight period in Virginia ranges from at least 25 May to 21 October. Dunkle (1990) indicated that this species prefers acidic environments.

COENAGRIONIDAE

This family is represented in Virginia by six genera and 36 species. The various species utilize a wide variety of aquatic habitats. Members of the genus *Enallagma* are commonly known as bluets, although several of the species found in Virginia possess little or no blue coloration. This genus accounts for one-third of the total number of species known from the state.

Amphiagrion saucium (Burmeister, 1839)

This dainty reddish species is rather local in occurrence, typically being associated with boggy seepage habitats. Adults fly close to the ground, usually remaining in or near the shelter of grasses and sedges. Published records for Virginia are in Gloyd (1951), Donnelly (1961), and Matta (1978). Carle (1988) tallied 12 Virginia sites. Richard Hoffman has collected the species in Albemarle, Alleghany, Bedford, and Dickenson counties. I have taken it in Grayson, Highland, and Montgomery counties. The USNM has specimens from Arlington, Fairfax, and Highland counties. These records indicate that *A. saucium* is widespread (but local) in the state. I have found it in two seepage headwater streams (both at 4800 feet, or 1463 m) near the base of Mount Rogers, the state's highest peak (5729 feet or 1746 m). This species has a relatively long flight period in Virginia, as indicated by my personal collection dates, which range from 10 May to 1 September. The latter is apparently among the latest capture dates for *A. saucium*, as it exceeds published dates in Carpenter (1991), Donnelly (1961, 1992), Fisher (1940), Garman (1927), Kormondy (1958), Montgomery (1944), Paulson & Jenner (1971), Walker (1953), White & Morse (1973), and White et al. (1983). The only reference that I have found which reports a later record is Beatty et al. (1969). Their flight period graph does not show any September records, but indicates that one to several individuals of this species have been found in early October in Pennsylvania.

Argia apicalis (Say, 1839)

This is a common stream, river and pond-dwelling species of widespread occurrence in Virginia. It has been known from the state for more than a century (Calvert, 1893) and probably occurs in a majority of its counties. The flight period spans the summer and early fall months (Montgomery, 1944). In Virginia, it extends from at least

30 May to 23 September. Females exhibit several color morphs (Dunkle, 1990).

Argia bipunctulata (Hagen, 1861)

This species is very local in occurrence, preferring open (sunny), boggy seepage habitats (Dunkle, 1990). Its small size and color pattern are much more similar to several species of *Enallagma* than they are to its congeners in the state. Adults fly close to the ground. Published records for *A. bipunctulata* in Virginia apparently are limited to those of Shiffer (1985b) and Roble & Stevenson (1994), although the only USNM specimens were collected in Essex County nearly a century ago (1899). Carle (1988) was aware of six Virginia sites. Chris Hobson and I have collected this species at eight sites in Accomack, Caroline, and Scott counties, indicating that it is apparently widespread (but very local) in Virginia. The elevations of these sites range from sea level to 2900 feet (884 m). Several of the populations that we discovered appear to be quite small, possibly containing fewer than 50 adults. My personal collection dates range from 8 July to 4 October. The latter date is apparently rather late for this species because it exceeds published dates in Donnelly (1961), Dunkle (1990), Paulson & Jenner (1971), Shiffer (1985b), Soltesz (1991), and White et al. (1983). The nearest published dates known to me for *A. bipunctulata* are in Williamson (1934). He collected this species on 28-29 September and 3 October in Georgia. The latest record in the USNM is for a male collected on 29 September in Hyattsville, Maryland.

Argia fumipennis violacea (Hagen, 1861)

This common species is typically associated with flowing water of some sort, including streams, small rivers, and pond or lake outlets (e.g., beaver dams). It is widely distributed in Virginia, ranging from Accomack County on the Eastern Shore to Lee County in the extreme southwestern corner, and probably occurs in every county of the state. It has been known from Virginia for more than a century (Calvert, 1893). The flight period of this species spans the summer and early fall months (Montgomery, 1944). In Virginia, it extends from at least 14 May to 4 October.

Argia moesta (Hagen, 1861)

This common species prefers swift-flowing streams and

rivers. Adult males typically perch on rocks in mid-stream. It has been known from the state for nearly a century (Williamson, 1903, reported as *Argia putrida*) and is widely distributed. Carle (1988) listed 28 sites. The flight period spans the summer and early fall months (Montgomery, 1944). In Virginia, it extends from at least 14 May to 24 September. Females exhibit two color morphs (brown and blue).

Argia sedula (Hagen, 1861)

This species is typically associated with small to medium-sized rivers. It has been known from the state for nearly a century (Williamson, 1903) and is relatively common. Carle (1988) was aware of 13 sites. Its flight period in Virginia extends from mid-June to mid-October (Donnelly, 1961).

Argia tibialis (Rambur, 1842)

This rather common species is typically associated with small to medium-sized rivers. I have also collected it at a beaver pond, as well as Lake Drummond in the Dismal Swamp (also USNM records). Carle (1988) reported 13 sites for this species in Virginia. The flight period spans the summer and early fall months (Montgomery, 1944). In Virginia, it extends from at least 30 May into September (Donnelly, 1961). Females exhibit two color morphs (brown and blue).

Argia translata Hagen in Selys 1865

This species inhabits ponds, lakes, and slow streams with shady borders (Walker, 1953). I have also found it along small to medium-sized rivers, particularly those with gravelly substrates. *Argia translata* has been known from Virginia for nearly a century (Williamson, 1903). It ranges south into South America (A. F. Beatty & G. H. Beatty, 1971). This is a common, late-season species in the vicinity of Washington, D.C. (Donnelly, 1961). Carle (1988) knew of 15 Virginia sites, but USNM records are limited to Bath and Fairfax counties. I have collected *A. translata* in Augusta, Bath, Page, Rockbridge, and Smyth counties. It appears to be restricted to the northern and western counties of Virginia. Matta (1978) did not report this species from the southeastern portion of the state. The flight period in Virginia extends from at least 8 July to 15 September. I found *A. translata* on 29 July along the South Fork of the Shenandoah River in Page County in

association with *Argia apicalis*, *A. moesta*, *A. sedula*, *Enallagma exsulans*, and *Hetaerina americana*.

Chromagrion conditum (Hagen, 1876)

This species is widespread but rather local in occurrence, preferring spring-fed or boggy ponds and streams. Howe (1921) and Donnelly (1961) reported this species from Great Falls. Matta (1978) found *C. conditum* in Sussex County, and Richard Hoffman has collected it in Alleghany County. Carle (1988) listed 12 sites for the state. USNM records are from Clarke, Dickenson, Fairfax, Floyd, Highland, and Washington counties. DNH records are from Augusta, Caroline, Lee, and Scott counties. The blue and black males are easily recognized by the presence of a bright yellow spot on the side of the thorax. Females have a similar but paler mark. The flight period of this species is quite early, extending from at least 25 April to 1 July in Virginia.

Enallagma aspersum (Hagen, 1861)

This species is widespread and relatively common in Virginia. It has been known from the state for more than a century (Calvert, 1890). Tim Vogt (pers. comm.) discovered an enormous population (approximately 3000 adults estimated) on 25 May 1991 at a sinkhole pond in Augusta County. The flight period in Virginia extends from late April or early May (29 April–9 May, Malaise-trapped specimen in USNM) until at least 26 September. The preferred habitat is ponds.

Enallagma basidens Calvert 1902

This is a Midwestern species which has spread eastward during the past half century (Cannings, 1989; Dunkle, 1990; Huggins, 1978b). It was first reported from Virginia by Donnelly (1961) and is now apparently fairly well established in the state. Carle (1988) listed 12 sites. Voshell & Simmons (1978) recorded *E. basidens* at the Lake Anna reservoir within a year of its creation. USNM records are limited to recent collections in Shenandoah County. I have collected this species in Augusta, Grayson, and Prince William counties. The flight period extends from late spring to early fall (Montgomery, 1942). Capture dates in Virginia range from at least 5 June to 21 October. Dunkle (1990) stated that females exhibit three color morphs.

Enallagma civile (Hagen, 1861)

This species is widespread and abundant in Virginia, probably occurring in every county. It has been known from the state for more than a century (Calvert, 1893). *E. civile* has a very extensive range, stretching from southern Canada to northern South America (Dunkle, 1990). It inhabits a wide variety of ponds. Daigle (1991) reported that its presence can be indicative of very low oxygen levels and possible organic pollution. It has a prolonged flight period (Montgomery, 1942). Flight dates in Virginia range from at least 8 May to 21 October.

**Enallagma cyathigerum* (Charpentier, 1840)

This is a northern circumpolar species which inhabits North America, Europe, and Asia (Donnelly, 1989; Montgomery, 1942). It has the widest distribution of any New World *Enallagma* (Needham & Heywood, 1929) and is the type species of the genus. The nominate subspecies is found in Canada and the northern United States, barely extending into Virginia. The subspecies *E. c. vernale* Gloyd 1943 (synonymized by Donnelly (1989) but still considered a full species by many odonatologists) may eventually be found in the state. The flight season of *E. c. cyathigerum* is limited to a brief period in early to mid-summer (Montgomery, 1942). All Virginia records known to me are from extreme northwestern Highland County: George Washington National Forest, Locust Spring Picnic Area beaver ponds, 3-4 July 1971, O. S. Flint, Jr., 1 male (USNM); 1 July 1972, C. M. and O. S. Flint, Jr., 1 male (USNM); 19 June 1992, S. M. Roble, 3 males, 1 female (DNH). Frank Carle (pers. comm.) has also collected it at this site. The preferred habitat is marshy ponds.

+ *Enallagma daeckii* (Calvert 1903)

This elongate southern Coastal Plain species appears to be uncommon in Virginia. Carle (1988) listed only three sites for the state and the USNM lacks Virginia specimens. I have collected it at nine sites in Accomack, Caroline (mostly), and Prince George counties between 31 May and 12 August. I observed nearly 300 adults at one site on 8 July. Dunkle (1990) stated that the preferred habitats in Florida are swamps, shady ponds, and vegetated stream backwaters. Most of my sites are acidic beaver ponds with limited canopy cover. The nymph was described fairly recently (Huggins, 1984), but the breeding

behavior remains unknown (Dunkle, 1990). I found mating pairs of *E. daeckii* during the late morning and early afternoon hours on 2, 8, and 28 July, but did not observe oviposition. The pairs were resting on emergent or shoreline vegetation, including various grasses, bur-reed (*Sparganium* sp.), and lizard's tail (*Saururus cernuus*).

Enallagma divagans Selys 1876

This species is widespread and fairly common in Virginia. Published records include Donnelly (1961) and Matta (1978). Carle (1988) was aware of 22 sites, but USNM records are limited to Great Falls (Fairfax County) and Lake Drummond in the Dismal Swamp (City of Suffolk). The only DNH collections (both obtained by Chris Hobson) are from Caroline and Lee counties. The flight period is apparently limited to a brief span in early summer (Montgomery, 1942). Virginia records range from 14 May to 24 June.

Enallagma doubledayi (Selys, 1850)

This species ranges in the coastal states from Massachusetts to Florida and west to Louisiana (Carpenter, 1991; Dunkle, 1990). It has also been reported from Kentucky and Ohio (Montgomery, 1967; Resener, 1970). Although Needham & Heywood (1929) state that this is one of the most common damselflies in the southern United States, it appears to have a spotty distribution in Virginia. Carle (1988) listed 11 sites, but the USNM lacks specimen records. Matta (1978) failed to find *E. doubledayi* in the southeastern portion of the state. The only published record for Virginia is in Gloyd (1951). She reported that a male was collected on 15 April in Blacksburg, Montgomery County. The only DNH specimen is a male that I obtained on 9 August in Augusta County. The color pattern of adult males is very similar to that of *E. civile*, but the postocular spots and anal appendages are diagnostic.

Enallagma dubium Root 1924

This is a southern Coastal Plain species which appears to be uncommon in Virginia. It ranges from Delaware to Florida and west to Texas and Oklahoma (Dunkle, 1990). The burgundy color of the adults is quite unusual for the genus. The species is somewhat difficult to detect in the field owing to its phantom-like appearance in flight. *E. dubium* was first reported from Virginia by Gloyd (1951),

who found it on 14 September 1934 near the Dismal Swamp in Nansemond County (now City of Suffolk). Matta (1978) failed to find this species in southeastern Virginia. Carle (1988) listed five sites and indicated that the preferred habitat is cypress swamps. The USNM lacks Virginia specimens. Chris Hobson and I have recorded *E. dubium* at five sites in Caroline County, all of which are acidic beaver ponds. Our collection dates range from 24 June to 27 September. Dunkle (1990) reported that adults generally retreat from the water by late afternoon.

Enallagma durum (Hagen, 1861)

This species is a coastal inhabitant, where it can often be found in abundance in brackish ponds and marshes. It has been known from Virginia for more than a century (Calvert, 1893). I am aware of records from Fairfax, Mathews, and Westmoreland counties, as well as the cities of Norfolk (Chesapeake), Suffolk, and Virginia Beach. *E. durum* is occasionally taken at inland freshwater ponds, as evidenced by recent specimens obtained by Nancy E. Adams of the USNM from Prince William Forest Park in Prince William County. The flight period in Virginia extends from at least 17 April to 19 October.

**Enallagma ebrium* (Hagen, 1861)

This is a northern species which barely reaches Virginia. Carle (1988) listed two sites for the state. It has been collected in Highland County (F. L. Carle, pers. comm.). I am not aware of any additional records from Virginia. The nearest published records are from Hickman County, Kentucky, and Baltimore County, Maryland (Fisher, 1940; Resener, 1970). The species was not listed for West Virginia by Tarter (1976). The flight period is early to mid-summer (Montgomery, 1942). I lack specific dates for Virginia specimens.

Enallagma exsulans (Hagen, 1861)

This species is typically found along rivers, although it occasionally inhabits shores of lakes and large ponds. It is widespread in Virginia, where it has been known for nearly a century (Williamson, 1903). Carle (1988) listed more than 50 sites. Its flight period extends from late spring to early fall (Montgomery, 1942). Virginia records known to me range from 14 May to 23 September.

Enallagma geminatum Kellicott 1895

This species is widespread but somewhat local in occurrence. It typically flies just above the water surface of ponds, particularly those with abundant stands of water lily. At a distance, males closely resemble those of *Ischnura kellicotti* in size and color. Both species often rest on water lily leaves. Its flight period extends from spring to fall (Montgomery, 1942). Capture dates in Virginia range from 30 April to 19 September.

Enallagma hageni (Walsh, 1863)

This is a northern species of very limited distribution in the mountains of western Virginia. It was first reported from the state by Dunkle (1983), although it had been collected as early as 1951 by Richard Hoffman. Virginia records are limited to Alleghany, Giles, Highland, and Washington counties. The flight period in the state extends from at least 12 June to 12 September. Males are nearly identical in color pattern to those of *E. ebrium* and very similar to those of *E. cyathigerum* (Walker, 1953). The anal appendages are diagnostic and can be used to distinguish all three species. Needham & Heywood (1929) stated that this is one of the most abundant damselflies in the northeastern United States and Canada.

+*Enallagma pallidum* Root 1923

This is a southern species that was originally discovered in Maryland (Root, 1923). It ranges north to Delaware, south to Florida, and west to Mississippi (Dunkle, 1990), but has not been previously reported from Virginia. The typical habitat is swampy lake shores (Dunkle, 1990). This species most closely resembles *E. daeckii*. It appears to be very rare in Virginia. I am aware of only one record for *E. pallidum* in the state: City of Suffolk, Feeder Ditch near Lake Drummond, Dismal Swamp, 26 May 1938, M. Davis-Ries, 4 males, 4 females (all teneral). This record may be listed in Davis (1938), and is the basis of Carle's (1988) lone site. The specimens are in the entomological collection of Virginia Polytechnic Institute and State University (F. L. Carle, pers. comm.). This is the only species included in the present checklist which has not, to my knowledge, been collected in the state during the past quarter century.

Enallagma signatum (Hagen, 1861)

This species is widespread and common in Virginia, inhabiting a variety of lakes, ponds, reservoirs, and slow-moving portions of rivers. It is semicrepuscular in its activity pattern. Males exhibit an orange and black color pattern. Dunkle (1990) reported that mature females in Florida are of three color varieties (blue, green, and orange). Teneral adults of both sexes are blue. Most of the females that I have noted in the field in Virginia were pale yellow. This agrees with the descriptions of females from Canada and Massachusetts (Carpenter, 1991; Walker, 1953). The flight period of *E. signatum* in Virginia ranges from at least 15 May to 27 September.

Enallagma traviatum Selys 1876

This species appears to be somewhat uncommon in Virginia. Although the published range map in Donnelly (1973) lacks Virginia records, it suggests that both of the currently recognized subspecies may occur in the state. The nominate subspecies occurs east of the Appalachians and *E. t. westfalli* Donnelly 1964 is found to the west (Donnelly, 1973). The Virginia records of Donnelly (1961) and Matta (1978), as well as my collections from Caroline and Prince Edward counties, undoubtedly refer to the nominate form. USNM specimens from Breaks Interstate Park in Dickenson County along the Kentucky border were recently determined as belonging to this subspecies also (R. C. Glotzher, pers. comm.). Carle (1988) listed 12 sites under the name *E. t. westfalli*, but I do not know any of these locations nor have I had an opportunity to evaluate the subspecific status of these specimens.

The distribution of *E. traviatum* in southwestern Virginia is worthy of further study because this may be a zone of contact between the two subspecies. The flight period is early to mid-summer (Montgomery, 1942). Virginia collection dates range from 26 May to 9 July.

+ *Enallagma vesperum* Calvert 1919

This species is undoubtedly more common in Virginia than the relatively few available records suggest. Its crepuscular habits reduce the likelihood of its collection at an occupied site. Carle (1988) was aware of 11 sites from the state. The only USNM records are of old specimens from Great Falls. I have found *E. vesperum* in

Caroline County in the company of *E. geminatum* and *Ischnura kellicotti* at several beaver ponds with abundant water lilies. The flight period spans the summer and early fall months (Montgomery, 1942). Virginia collection dates range from 14 May to 12 August.

+ *Enallagma weewa* Byers 1927

This is a southern Coastal Plain species which ranges north to New Jersey, but appears to be rare in Virginia. Carle (1988) listed only one record for the state, but I do not know the county (presumably in southeastern Virginia) or date of this collection. I am not aware of any additional records from Virginia. This species prefers slow, shady streams and rivers, where it typically hides in shaded vegetation beyond the banks (Dunkle, 1990). Reported flight dates in other states are 25 February to 7 November in Florida (Dunkle, 1990), 21 April to 5 October in South Carolina (White et al., 1983), and 8 May to 4 October in North Carolina (Paulson & Jenner, 1971). Soltesz (1991) found it between 19 June and 27 August in Cape May County, New Jersey.

Ischnura hastata (Say, 1839)

This delicate little damselfly has been known from Virginia for more than a century (Calvert, 1890). It is locally common and widespread, probably occurring in every county of the state. However, its small size (this is the smallest species in the state), slow flight, and tendency to fly low to the ground render it somewhat inconspicuous in the field. I have found it in a wide variety of habitats, ranging from oligotrophic seepage wetlands to eutrophic brackish marshes. Daigle (1991) reported that its presence can be indicative of very low oxygen levels and possible organic pollution. *I. hastata* has one of the longest flight periods of any damselfly in the state, extending from at least 5 April to 30 October. It has been recorded between late March and mid-December in North Carolina (Paulson & Jenner, 1971). *I. hastata* ranges south into northern South America (Dunkle, 1990). Females change color as they mature, from predominately orange as juveniles to bluish black as adults. Until recently, this species was placed in its own genus (*Anomalagrion*) because males are unique among Zygoptera in that their forewing stigma does not touch the leading edge of the wing. Most odonatologists now regard this as a subgeneric character.

+ *Ischnura kellicotti* Williamson 1898

This southern species appears to be uncommon and local in Virginia. Carle (1988) knew of only one locality for the state, and the USNM lacks Virginia specimens. I have recorded it at six sites in Accomack, Caroline, and Dinwiddie counties. It is typically associated with ponds containing abundant populations of water lilies. Adults fly low over the water and perch on the lily pads. Successful capture usually requires wading or canoeing into a pond until you are in a stand of water lilies and then submerging your net while attempting to collect the adults (Calvert, 1898). The larvae reportedly live on the stems and undersides of water lily leaves (Huggins & Brigham, 1982). As noted previously, males are easily confused with those of *Enallagma geminatum* at a distance because of their similar size, coloration, and behavior. Females exhibit two color forms (orange and blue). I have observed *I. kellicotti* in Virginia between 31 May and 8 September.

Ischnura posita (Hagen, 1861)

The nominate subspecies is probably the most abundant and widely distributed damselfly in Virginia, undoubtedly occurring in every county of the state. It inhabits a wide variety of aquatic habitats, ranging from oligotrophic to eutrophic. Daigle (1991) reported that its presence can be indicative of very low oxygen levels and possible organic pollution. Males and juvenile females are easily recognized by the presence of an exclamation mark-like pattern on the thorax. Mature females become bluish gray and mostly lose this pattern. *I. posita* has a prolonged flight period (Montgomery, 1944). In Virginia, it extends from late March or early April to October. The USNM collection contains a male specimen that was collected in a Malaise trap between 26 March and 8 April. I have observed this species as late as 4 October, but suspect that it flies for at least several additional weeks.

Ischnura prognata (Hagen, 1861)

This is the largest and rarest species of *Ischnura* in Virginia. Juvenile females are predominately orange and black, becoming brown as they mature. However, the sides of the thorax are green in adult females. *I. prognata* is widespread but very local throughout its range in the eastern United States (Dunkle, 1990; Johnson & Westfall, 1970; White et al., 1983). The limited number of

records from Virginia suggest that it is rare in the state. The preferred habitats are shaded seepage areas and swamp edges (Dunkle, 1990). The species is difficult to detect in these habitats because of the poor light conditions and its phantom-like flight behavior (Dunkle, 1990). Hagen (1861) originally described *I. prognata* on the basis of a male from Berkeley Springs, Virginia, a locality which became part of Morgan County, West Virginia, upon secession of that state in 1861. Therefore, the inclusion of Virginia in range statements by Muttkowski (1910) and Needham & Heywood (1929) was in error. Tarter (1976) listed *I. prognata* only from Morgan County in his summary table for West Virginia. The current disposition of the holotype is unknown to me. It is not among the type material or many other Hagen specimens housed in the Museum of Comparative Zoology at Harvard University (P. D. Perkins, pers. comm.).

I am aware of only two subsequent records for *I. prognata* from within the current political boundaries of Virginia, neither of which have been published previously. A male specimen captured by Mary Davis-Ries on 25 May 1938 in Williamsburg is in the entomological collection of Virginia Polytechnic Institute and State University (F. L. Carle, pers. comm.). This record may be listed in Davis (1938), and is the basis of Carle's (1988) lone site. The most recent record dates from 12 July 1994 when I captured an adult female in a nearly dry bald cypress-tupelo swamp near Dendron in Surry County. Regrettably, the specimen escaped the following day as I was preparing to preserve it and was irretrievably lost. Despite two subsequent visits to this site during the following week, and five hours of intense searching, I was unable to secure a second specimen.

Ischnura ramburii (Selys, 1850)

This species is common in the coastal regions of the state where it is typically found in brackish marshes. I have collected or examined specimens from the coastal counties of Accomack, Lancaster, Mathews, Northampton, Northumberland, Westmoreland, and York, as well as the cities of Hampton and Virginia Beach. Chris Hobson and I have also collected it at several beaver ponds in Caroline and Fairfax counties. Carle (1988) tallied 17 sites for this species in the state and Matta (1978) reported it from Isle of Wight County and the City of Norfolk (Chesapeake). *I. ramburii* is very widespread in tropical America, ranging south to Chile (Donnelly, 1992; Dunkle, 1990).

Daigle (1991) reported that its presence can be indicative of very low oxygen levels and possible organic pollution. Females exhibit three color forms (Dunkle, 1990). The flight period in Virginia extends from at least 25 April to 14 October.

Ischnura verticalis (Say, 1839)

This species is very common and widely distributed in the northern and western counties of Virginia. It is apparently absent from the southeastern portion of the state, as there are no records in Matta (1978) or the DNH and USNM collections. *I. verticalis* inhabits a wide variety of freshwater habitats. It has a very long flight period (Montgomery, 1944), extending in Virginia from at least 6 April to 29 September.

+ *Nehalennia gracilis* Morse 1895

All three species of *Nehalennia* which inhabit Virginia are small and delicate, with metallic greenish bodies. They fly low to the ground and are easily overlooked. All three are very local in occurrence, typically preferring boggy ponds. This species, which ranges from southern Canada to Florida, also inhabits grassy ponds (Dunkle, 1990). Carle (1988) listed only five sites for Virginia. The USNM lacks specimens from the state. The only DNH specimens were obtained by Chris Hobson on 16 June in Fairfax County. The unidentified *Nehalennia* reported from the North Anna River by Voshell & Simmons (1978) probably refers to *N. gracilis*. The USNM has a large series (> 100 specimens) collected in Hyattsville, Maryland, during 1915-17, with capture dates ranging from 18 May to 10 September.

Nehalennia integricollis Calvert 1913

The only published record from Virginia for this southern Coastal Plain species is that of Gloyd (1951). She collected a single male near the Dismal Swamp (City of Suffolk) on 14 September 1934 (reported as 17 September in Matta, 1978). Carle's (1988) lone site for the state is based on this same record. The USNM lacks Virginia specimens. Chris Hobson and I have collected *N. integricollis* at five sites in Caroline County, the range of dates being 1 June to 17 August. We observed only a handful of individuals at four of these sites; I found several hundred adults on 8 July at the fifth site. I have also discovered a small population of this species at one site in

the Shenandoah Valley region of Augusta County which harbors several Coastal Plain disjuncts among its flora and fauna. The reproductive behavior of *N. integricollis* remains unknown (Dunkle, 1990). I noted mated pairs during the late morning hours on 8 and 28 July at the site of the largest known Virginia population. They were hidden among grasses and sedges at the edge of this boggy pond. However, I did not have an opportunity to observe them at length and was unable to document oviposition.

+ *Nehalennia irene* (Hagen, 1861)

This is a northern species which ranges south to the Carolinas (Brimley, 1938; Huggins & Brigham, 1982; White et al., 1983). Carle (1988) listed two sites for Virginia. The USNM has records from Highland (1971-72) and Prince William (1993) counties. My only encounter with *N. irene* in the state was on 19 June in the Locust Springs area of extreme northwestern Highland County, where it has also been collected by both O. S. Flint, Jr., and F. L. Carle. Flight dates in Virginia extend from at least 19 June to 16 July.

DISCUSSION

The diversity of Virginia's damselfly fauna is comparable to or greater than that reported for most other eastern states and provinces (Table 2). Furthermore, it equals the number of species known from Texas (Johnson, 1972) and exceeds by three the number reported from all of Canada and Alaska (Walker, 1953). Overall, slightly less than half of the North American damselfly fauna (listed at 119 species by Bick & Bick, 1980) is present in Virginia. Carle's (1991) figure of 61 species for the state apparently is erroneous, because it presumably includes numerous species of hypothetical status (listed in Carle, 1988). Each of the latter, plus one additional species, is discussed below. Two other species (*Lestes congener* and *L. vidua*) that were listed as hypotheticals by Carle (1988) have been confirmed for the state and were discussed in the accounts above.

Enallagma antennatum (Say, 1839) is a Midwestern species which has been recorded as far east as Massachusetts (USNM specimen), New York (Donnelly, 1992), and Pennsylvania (A. F. Beatty & G. H. Beatty, 1971). The USNM has a small series collected by B. Elwood Montgomery in June 1970 at the Frostburg Reservoir in Garrett County, Maryland. The species has also been reported from three counties in West Virginia (Tarter, 1976), with

Preston County being the nearest to the Virginia border. Roback & Westfall (1967) dubiously reported nymphs from two stations along the North Anna River in Louisa and Spotsylvania counties in Virginia. Until additional material from these or other sites in Virginia can be positively identified, I do not regard *E. antennatum* as a confirmed element of the state's fauna. In Canada, this species inhabits quiet streams and springy margins of small lakes (Walker, 1953). In New York, it prefers relatively open habitats, including some disturbed sites as well as large rivers (Donnelly, 1992, 1993).

Enallagma boreale Selys 1875 is a very wide-ranging northern species (see map in A. F. Beatty & G. H. Beatty, 1971) which has been reported from Tucker County in northeastern West Virginia (Tarter, 1976). It inhabits ponds and boggy or marshy lakes, and is very similar in size and color pattern to *E. cyathigerum* (Walker, 1953). This species should be sought in the mountains of western Virginia.

Enallagma carunculatum Morse 1895 is a northern transcontinental species (A. F. Beatty & G. H. Beatty, 1971) which was collected once (1914) in Hyattsville, Prince Georges County, Maryland (Donnelly, 1961). It has also been reported from three counties in central Kentucky, but is unknown in West Virginia (Resener, 1970; Tarter, 1976). *E. carunculatum* prefers lakes and rivers, although it occasionally inhabits ponds (Walker, 1953). It may eventually be found in the northern or western counties of Virginia.

Enallagma concisum Williamson 1922 and *Enallagma davisii* Westfall 1943 are southern Coastal Plain species which have been found as far north as North Carolina (Dunkle, 1990). The preferred habitat of both species is sand-bottomed lakes, where adults of *E. davisii* may be found only during early spring (Dunkle, 1990). Paulson & Jenner (1971) reported that *E. davisii* is the first *Enallagma* to emerge in North Carolina and has the shortest flight period of any damselfly in that state. In contrast, the flight period of *E. concisum* is prolonged (Dunkle, 1990). Matta (1978) did not find either of these species in southeastern Virginia. Of the hypothetical species discussed in this section, I believe that these two are the least likely to occur in Virginia.

Enallagma minusculum Morse 1895 is a Coastal Plain species which ranges from Nova Scotia and New Brunswick south to Long Island, New York (historic), with disjunct populations in southeastern North Carolina (Carpenter, 1991; Cuyler, 1968; Donnelly, 1992; Tennessen & Knopf, 1975). Cuyler (1968) reported that it

was abundant at the North Carolina sites. Matta (1978) remarked that suitable habitat (sandy ponds or lakes) for *E. minusculum* exists in southeastern Virginia, but to my knowledge it remains undiscovered in the state.

Enallagma sulcatum Williamson 1922 is a southern Coastal Plain species which ranges from Maryland to Alabama (Dunkle, 1990). However, it was not included in Carle's (1988) hypothetical list. The preferred habitat is grassy, sandy lakes (Dunkle, 1990). This species may occur in southeastern Virginia, but it was not found by Matta (1978) and I have no knowledge of any recent records.

Lestes unguiculatus Hagen 1861 is a wide-ranging species (A. F. Beatty & G. H. Beatty, 1971) which was collected once each in Prince Georges County, Maryland, and the District of Columbia 80 and 95 years ago, respectively (Donnelly, 1961). It has also been reported from Hardy County, West Virginia, and seven counties in central and western Kentucky, as well as from Tennessee (Resener, 1970; Tarter, 1976; Williamson, 1903). The West Virginia county borders both Rockingham and Shenandoah counties in Virginia. The flight period of *L. unguiculatus* spans the summer and early fall months (Montgomery, 1948; Resener, 1970). The preferred habitats are temporary or semi-permanent ponds in open environments (Walker, 1953). It seems likely that this species will eventually be found in northern or western Virginia.

Bick & Bick (1980) indicated that there was no published information on the reproductive behavior of twelve of the damselfly species confirmed from Virginia. Waage (1984, 1988) subsequently documented this in considerable detail for *Calopteryx dimidiata*, and Dunkle (1990) provided brief descriptions of reproductive behavior for six more of these species. The remaining five species for which published information is apparently still lacking are *Amphiagrion saucium*, *Argia bipunctulata*, *Enallagma daeckii*, *E. traviatum*, and *Nehalennia integricolis*.

The immature stages of all 53 damselfly species recorded from Virginia are now known, although several of them have not been formally described. Data in Walker (1953) and Johnson & Westfall (1970) indicate that the larvae of 39 of these species were known as of the latter date. Subsequent descriptions have appeared for five additional species (Huggins, 1978a, 1984; Tennessen, 1984; Westfall & Tennessen 1973). Paulson & Jenner (1971) collected hundreds of *Enallagma aspersum* larvae, but they did not describe them. However, this species, as well as *Argia bipunctulata*, *Enallagma weewa*, and *Ischnura*

prognata, was included in the illustrated larval keys of Huggins & Brigham (1982). Daigle (1991) provided illustrations of the gills, and a brief mention of key characters, for four additional species (*Enallagma dubium*, *Ischnura kellicotti*, *Nehalennia integricollis*, and *Lestes vidua*). Detailed larval descriptions apparently are still lacking for all eight of these species. The immature stage of the single remaining species (*Lestes forcipatus*) is also known, but it has not been illustrated or described to my knowledge. Westfall & May (in prep.) will contain illustrated keys to the known North American damselfly larvae, including all of the Virginia species (M. L. May, pers. comm.).

SUMMARY

Fifty-three species of damselflies in three families and ten genera are confirmed from Virginia. Fourteen of these are reported here as apparent additions to the state's fauna. The first records of *Ischnura prognata* from within the current political boundaries of Virginia are also presented, while the original record for the state is shown to be in West Virginia. Eight hypothetical species are also discussed. Considerable opportunities exist for both professional biologists and amateur naturalists to add to our knowledge of the damselfly fauna of Virginia. In addition to seeking to document the hypothetical species, more effort is needed to identify new populations of uncommon or rare species that are already known from the state. Also, the reproductive behavior of several species remains unknown.

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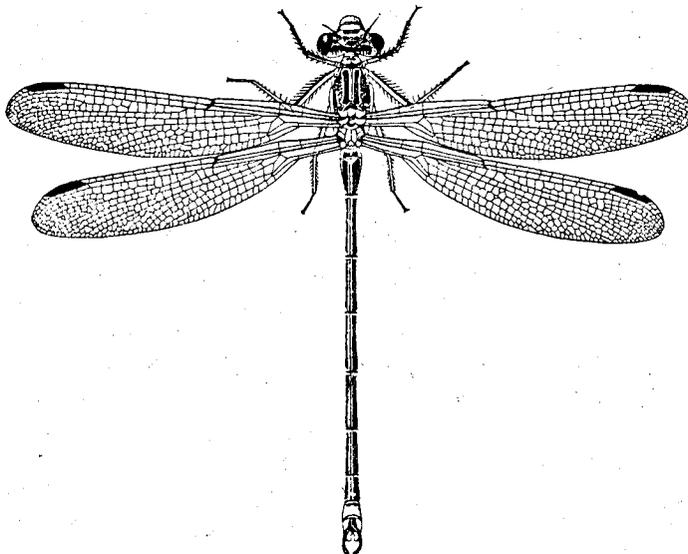


Table 1. Summary of primary collection and literature records reviewed in preparing this checklist. The sources are identified on the following page.

	1	2	3	4	5	6	7	8	9	10	11
CALOPTERYGIDAE											
<i>Calopteryx aequabilis</i> Say	-	-	-	-	-	-	-	-	-	-	-
<i>Calopteryx amata</i> Hagen	-	x	-	-	-	-	-	-	-	-	-
<i>Calopteryx angustipennis</i> (Selys)	x	x	x	-	-	-	-	-	-	-	-
<i>Calopteryx dimidiata</i> Burmeister	x	x	x	-	-	-	x	-	-	-	-
<i>Calopteryx maculata</i> (Beauvois)	x	x	x	x	x	x	x	x	x	x	-
<i>Hetaerina americana</i> (Fabricius)	x	x	x	-	-	-	-	x	-	-	x
<i>Hetaerina titia</i> (Drury)	x	x	-	-	-	-	+	x	-	x	-
LESTIDAE											
<i>Archilestes grandis</i> (Rambur)	x	x	x	-	-	-	+	-	-	-	-
<i>Lestes congener</i> Hagen	x	x	x	-	-	-	+	-	-	-	-
<i>Lestes disjunctus australis</i> Walker	x	x	x	-	x	-	+	x	-	-	-
<i>Lestes disjunctus disjunctus</i> Selys	x	x	-	-	-	-	-	-	-	-	-
<i>Lestes dryas</i> Kirby	-	-	-	-	-	-	-	-	-	-	-
<i>Lestes eurinus</i> Say	x	x	-	-	-	-	-	-	-	-	-
<i>Lestes forcipatus</i> Rambur	x	x	-	-	-	-	+	-	-	-	x
<i>Lestes inaequalis</i> Walsh	x	x	-	-	-	-	x	-	-	-	-
<i>Lestes rectangularis</i> Say	x	x	x	-	x	-	x	-	-	-	-
<i>Lestes vidua</i> Hagen	-	x	-	-	-	-	-	-	-	-	-
<i>Lestes vigilax</i> Hagen	x	x	-	-	x	-	+	x	-	-	-
COENAGRIONIDAE											
<i>Amphiagrion saucium</i> (Burmeister)	x	x	x	-	x	-	x	x	-	-	-
<i>Argia apicalis</i> (Say)	x	x	x	x	x	x	x	-	x	x	-
<i>Argia bipunctulata</i> (Hagen)	x	x	-	-	-	-	+	-	-	-	-
<i>Argia fumipennis violacea</i> (Hagen)	x	x	x	-	-	x	x	x	-	x	-
<i>Argia moesta</i> (Hagen)	x	x	x	-	-	x	x	x	x	x	-
<i>Argia sedula</i> (Hagen)	x	x	-	-	-	x	x	-	x	x	-
<i>Argia tibialis</i> (Rambur)	x	x	x	-	x	x	x	-	x	x	-
<i>Argia translata</i> Hagen	x	x	-	-	-	-	x	-	x	x	-
<i>Chromagrion conditum</i> (Hagen)	x	x	x	-	x	-	x	-	-	-	-
<i>Enallagma aspersum</i> (Hagen)	x	x	x	-	x	-	+	-	-	-	x
<i>Enallagma basidens</i> Calvert	x	x	-	x	-	-	x	-	-	-	-
<i>Enallagma civile</i> (Hagen)	x	x	-	x	x	x	x	x	x	-	-
<i>Enallagma cyathigerum</i> (Charpentier)	x	x	-	-	-	-	-	-	-	-	-
<i>Enallagma daeckii</i> (Calvert)	x	-	-	-	-	-	+	-	-	-	-
<i>Enallagma divagans</i> Selys	x	x	-	-	x	-	x	-	-	-	-
<i>Enallagma doubledayi</i> (Selys)	x	-	-	-	-	-	+	x	-	-	-
<i>Enallagma dubium</i> Root	x	-	-	-	-	-	-	x	-	-	-
<i>Enallagma durum</i> (Hagen)	x	x	-	-	x	-	+	-	-	-	-
<i>Enallagma ebrium</i> (Hagen)	-	-	-	-	-	-	-	-	-	-	-
<i>Enallagma exsulans</i> (Hagen)	x	x	-	-	-	x	x	-	x	x	-
<i>Enallagma geminatum</i> Kellicott	x	x	-	-	x	-	x	x	-	-	-
<i>Enallagma hageni</i> (Walsh)	x	x	x	-	-	-	-	-	-	-	-
<i>Enallagma pallidum</i> Root	-	-	-	-	-	-	-	-	-	-	-
<i>Enallagma signatum</i> (Hagen)	x	x	x	-	x	-	+	x	-	-	-
<i>Enallagma traviatum</i> Selys	x	x	-	-	x	-	x	-	-	-	-
<i>Enallagma vesperum</i> Calvert	x	x	-	-	-	-	-	-	-	-	-
<i>Enallagma weewa</i> Byers	-	-	-	-	-	-	-	-	-	-	-
<i>Ischnura hastata</i> (Say)	x	x	x	-	x	-	+	x	-	-	x
<i>Ischnura kellicotti</i> Williamson	x	-	-	-	-	-	-	-	-	-	-
<i>Ischnura posita</i> (Hagen)	x	x	x	-	x	-	x	x	-	-	-
<i>Ischnura prognata</i> (Hagen)	x	-	-	-	-	-	-	-	-	-	-
<i>Ischnura ramburii</i> (Selys)	x	x	x	-	x	-	+	-	-	-	-
<i>Ischnura verticalis</i> (Say)	x	x	x	-	-	-	x	x	x	-	-
<i>Nehalennia gracilis</i> Morse	x	-	-	-	-	-	+	-	-	-	-
<i>Nehalennia integricollis</i> Calvert	x	-	-	-	-	-	+	x	-	-	-
<i>Nehalennia irene</i> (Hagen)	x	x	-	-	-	-	+	-	-	-	-
Total number of taxa (54)	47	42	21	4	18	8	21	16	8	9	3

Table 2. Number of damselfly species recorded from Virginia and various other states or provinces in eastern North America.

State/province	No. of species	Source(s)
Carolinas	54 ^a	Huggins & Brigham (1982)
Connecticut	38	Garman (1927)
Florida	44	Dunkle (1990)
Illinois	40	Cashatt et al. (1987), Garman (1917), Montgomery (1967), Needham & Heywood (1929), Vogt & McPherson (1985)
Indiana	46	Montgomery (1942-48, 1967), Williamson (1917)
Kentucky	40	Montgomery (1967), Resener (1970)
Maryland	48	Donnelly (1961), Dunkle (1990), Fisher (1940), Johnson (1974)
Massachusetts	48	Carpenter (1991), Leahy (1976)
Michigan	42	Kormondy (1958), Montgomery (1967)
New Hampshire	35	White & Morse (1973)
New Jersey	47 ^b	Calvert (1903), Carle (1989), Soltész (1991)
New York	55	Donnelly (1992, 1993)
North Carolina	51	Brimley (1938), Cuyler (1968), Paulson & Jenner (1971), Westfall (1942)
Ohio	48	Glotzhofer (1994), Montgomery (1967)
Ontario	41	Walker (1941, 1953), Montgomery (1967)
Pennsylvania	53	G. H. Beatty & A. F. Beatty (1971)
Quebec	36	Hellebuyck (1993), Walker (1934, 1953)
South Carolina	44	White et al. (1983)
Virginia	53	This study
West Virginia	40	Cruden (1962), Tarter (1976)
Wisconsin	36	Montgomery (1967), Hilsenhoff (1981)

^aCombined total for North and South Carolina

^bPartial total

Table 1 Sources:

- 1 = Division of Natural Heritage records
 2 = National Museum of Natural History, Washington, D.C.
 3 = Richard L. Hoffman collections (most specimens are deposited in the Illinois Natural History Survey or Virginia Museum of Natural History)
 4 = Voshell & Simmons (1978); records of unidentified *Ischnura* and *Nehalennia* species are not included in the table.

- 5 = Matra (1978)
 6 = Roback & Westfall (1967)
 7 = Donnelly (1961) + = species recorded from the District of Columbia and nearby Maryland only
 8 = Gloyd (1951)
 9 = Byers (1951)
 10 = Williamson (1903)
 11 = Calvert (1890)

Damselflies of Virginia

ERRATA

Page 3, column 1, line 5: 1994 should read 1993

Page 4, column 2:

Calopteryx angustipennis was previously reported from Virginia (Alleghany County) in:

Opler, P. A. 1979. Freshwater and terrestrial insects. Pp. 171-183 *in* D. W. Linzey (ed.). Proceedings of the Symposium on Endangered and Threatened Plants and Animals of Virginia. Center for Environmental Studies, Virginia Polytechnic Institute and State University, Blacksburg, Virginia.

Page 13, column 2, line 9: 1861 should read 1862

Page 19, column 1, line 21: 1994 should read 1993