

## Purse-web Spiders, Genus *Sphodros*, in Virginia (Mygalomorphae: Atypidae)

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### ABSTRACT

The four native species of the purse-web spider genus *Sphodros* known to occur in Virginia are discussed in the context of their spatial and seasonal distribution in the state. Illustrations of taxonomic characters and distribution maps are provided for each species. Attention is directed to the disjunct occurrence of *S. niger* on the Eastern Shore of Virginia.

*Key words:* Purse-web spiders, Atypidae, *Sphodros*, Virginia, distribution, phenology.

### INTRODUCTION

Among the nearly 900 species of spiders thought to occur in Virginia (Hoffman, unpub. data), four are so unusual in their structure and lifestyles as to lay a special claim on our interest and attention. These are the so-called “purse-web” spiders: species of the genus *Sphodros* and family Atypidae.

Within the broader context of spider classification, atypids belong in a supposedly primitive group called Mygalomorphae, commonly referred to as “tarantulas” – robust, often large and hairy, animals which personify the worst of spiderhood to arachnophobic humans. Although identified in the popular mind as inhabitants of deserts or tropical forests, mygalomorphs occur also in temperate forests of North America and Eurasia. Nine species are known to reside in Virginia, some of them actually widespread and abundant spiders although rarely seen, nor collected except by specialized techniques.

The four species of atypids make up almost half of our endemic mygalomorph fauna. Three decades ago, only two of them were known here, and even those only from single localities. In 1980, the genus *Sphodros* was documented in a careful study by Gertsch & Platnick which added a third, previously undescribed species, and set the stage for more detailed local studies. Initiation of numerous statewide inventory surveys of the soil and litter fauna of Virginia by staff of the Division of Natural Heritage, Virginia Department of Conservation and Recreation (DCR-DNH) and the

Virginia Museum of Natural History (VMNH) since the founding of those two agencies in the late 1980s resulted in an order of magnitude increase in knowledge of this cryptic fauna, justifying use of the term “well-known” for many groups previously only “poorly-known”. Our local atypids fall into this category, and were the subject of a preliminary report published in the first issue of *Banisteria* (Hoffman, 1992). Material acquired subsequently is sufficient to justify a more detailed summary of these spiders, along with the graphic information needed to achieve confident identifications. While we now have a fairly adequate concept of the Virginia species, there is still plenty to do as regards details of life history and fine-tuning the instate ranges.

Atypids are only rarely found by cursory hand-search of forest floor litter, and have gained a reputation for rarity. The use of pitfall trapping techniques has reversed this impression, as the quantitative data provided in the following species accounts will show. An interesting generality is that only males are captured in this way, often in surprising numbers. Females must spend their entire lives in the seclusion of burrows at the end of their curious tubular webs, the form of which resembles the elongated silken purses carried by women of former generations. A good description and photograph of the web of *S. abboti* was given by Comstock (1912), and the biology of *S. rufipes* (under the name *bicolor*) by Muma (1945). Although the latter author found a number of females (33 webs) in the vicinity of College Park, Maryland, he located no males

despite prolonged search and the use of unspecified “traps”. In these two species, the female may extend the tubular web a foot or more up the trunk of a tree. The web is not sticky and the spider depends on her speed and alertness to get to the place where an insect has been slowed or delayed in crossing. The elongated cheliceral fangs execute an upward or outward stab through the web fabric into the victim, which is then dragged inside to be consumed at leisure. Observations on the biology of both *S. abboti* and *S. rufipes* in northern Florida have been published by Shear & Coyle (1981).

Species of *Sphodros* embody the appearance common throughout their family and suborder: a relatively robust body with short, strong legs. The rear half of the cephalothorax is strikingly flattened, the anterior half abruptly sloped upward with a median cluster of eight tiny eyes on the front margin. From the other local genera (*Ummidia*, *Antrodiaetus*, *Myrmekeiaphila*) they are immediately distinguished by the large porrect chelicerae that approximate the length of the cephalothorax itself in males (Fig. 1).

The sternal region in both sexes is provided with four or five pairs of round to oval glabrous impressions (*sigilla*), which are characteristic for each species and offer the easiest way to distinguish females (Figs. 6-9). The sternal element between the coxae of the pedipalps (“labium”) is coalesced with the major sternal sclerite, although traces of a suture line are evident in occasional specimens. The anterior end of this “labiosternum” is notably prolonged and strongly convex in *S. atlanticus*, displacing the reduced anteriormost pair of sigilla into an inconspicuous site near the coxal condyles.

Although most species tend to be dark in life (really black in *S. niger*), most tend to fade after some time in alcohol and assume an overall orange color with dark gray or purplish abdomen. This may be a function of preservation medium or exposure to sunlight. Some samples of *S. coylei* contain mostly testaceous specimens, in others all are very dark reddish-brown. The legs of *S. atlanticus* may also become orange, causing such specimens to resemble *S. rufipes*.

Reproductive organs of the male, localized in the terminal article of the first pair of legs (referred to as “pedipalps” in the spider literature), are of relatively simple structure that effectively distinguish the species (Figs. 2-5). The long, flagelliform *embolus* is carried distally by a sclerotized laminate blade, the *conductor*, the shape of which displays the most obvious differences and apparently reflects relationships. *Sphodros atlanticus* and *S. rufipes*, for example, share a very similar palpal configuration, while *S. niger* and *S. coylei* differ in conductor shape as well as overall form

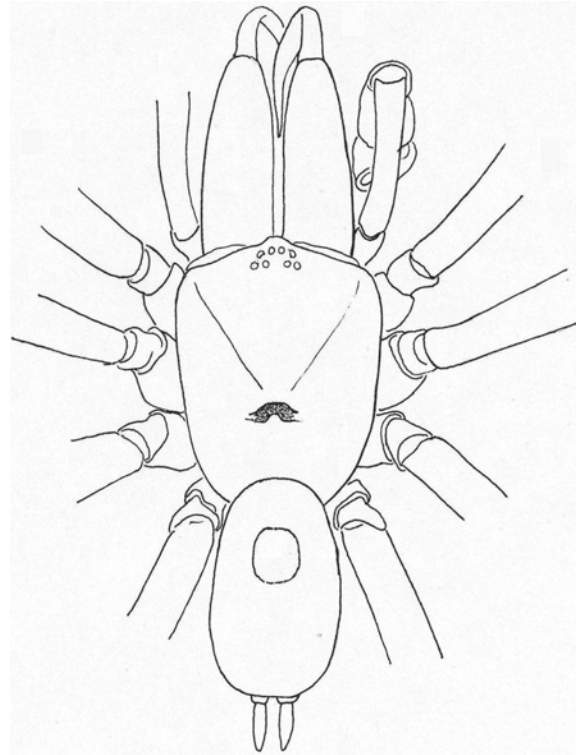
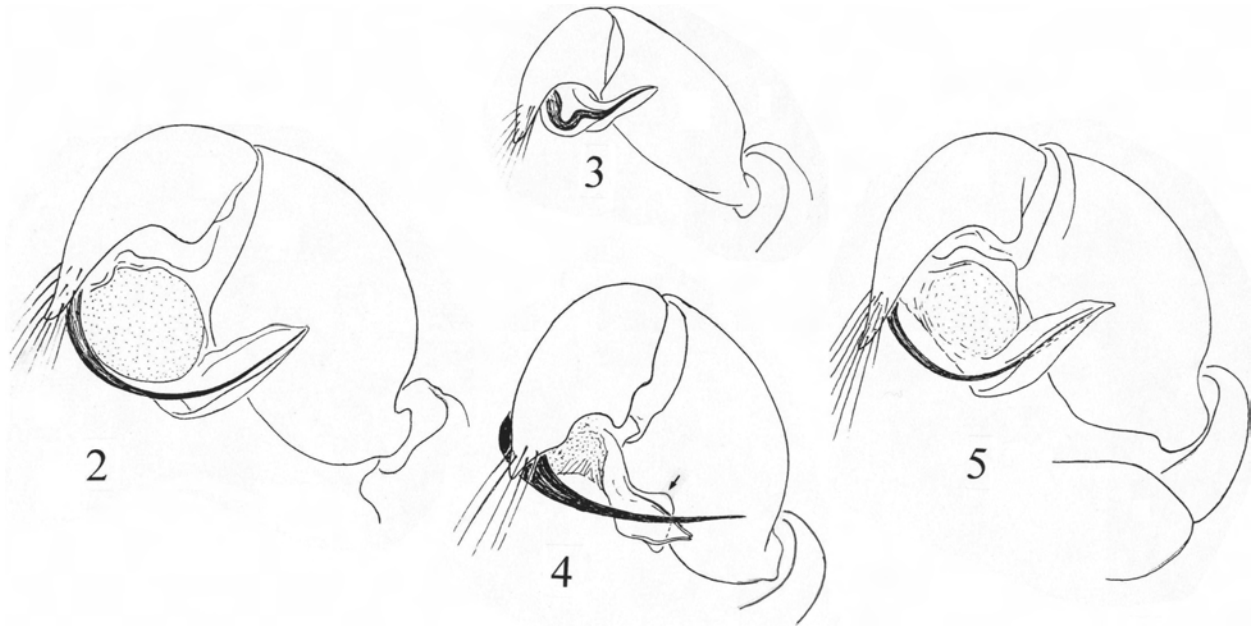


Fig. 1. *Sphodros coylei* Gertsch & Platnick. Dorsal aspect of male, only basal podomeres are shown. The distal segment of the chelicerae (fang) is here seen in a foreshortened perspective, actually it is as long as the basal segment against which it is normally reflexed.

#### Key to male specimens of *Sphodros* in Virginia

1. Tibial article of pedipalp not notably incrassate (Fig. 3); base of embolus sigmoidally curved as seen in prolateral aspect; body length (including chelicerae) less than 10 mm, typically 7-8 mm ..... *coylei*
  - Tibia of pedipalp strongly incrassate, as broad as long (Figs. 2, 4, 5); base of embolus straight; body length typically greater than 10 mm..... 2
2. Conductor broadened distally, with subterminal laminate lobe, membranous basal region much reduced (Fig. 4).....*niger*
  - Conductor evenly and gradually acuminate distally, unmodified; basal region prominent (Figs. 2, 5) ..... 3
3. Anterior third of sternum not convexly enlarged, anteriormost sigilla removed from edge of sternum; legs of living specimens bright orange-red ..... *rufipes*
  - Anterior third of sternum prolonged and strongly convex, anteriormost sigilla reduced in size and obscurely placed at its base near coxal condyle; legs of living specimens black (often fading to clear yellow after preservation)..... *atlanticus*



Figs. 2-5. Pedipalps of four species of *Sphodros*, prolateral aspect, to same scale. 2. *S. atlanticus*. 3. *S. coylei*. Note the sigmoid curvature of the embolar base and relatively slender palpal tibia. 4. *S. niger*. Subterminal lamina of the conductor indicated by the arrow. 5. *S. rufipes*. General similarity of form with that of *S. atlanticus* is evident.

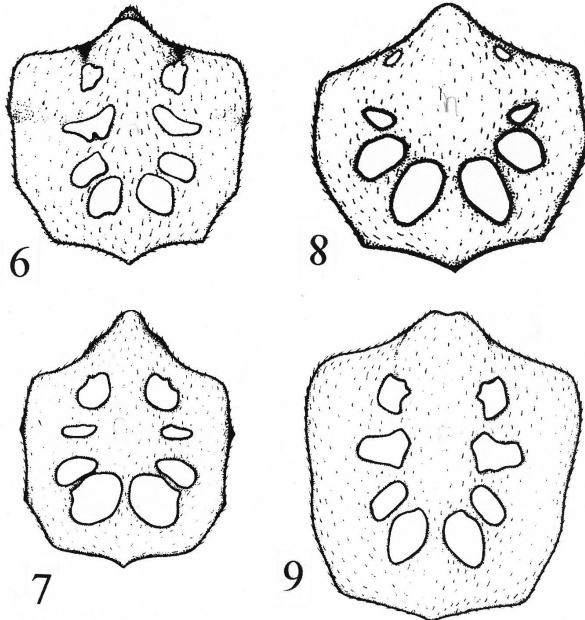
of the palpomeres. Basally, the conductor merges into a region of white membrane of variable extent (stippled lightly in the drawings), possibly serving in some functional capacity during sperm transfer.

In the following species accounts, if no collector or source is attributed, it is implied that the material resulted from inventory work conducted by VMNH staff. Cited numbers are those of males only unless otherwise specified. All specimens are in the VMNH collection unless another museum acronym is cited. All length measurements cited include chelicerae but not spinnerets.

The majority of the dates cited represent the last day of pitfall sampling periods usually two weeks in duration (occasionally a month or longer). They are therefore misleading, in that a specimen dated July 1 was almost certainly trapped during the last two weeks of June, and should be registered as active during that month rather than July.

***Sphodros atlanticus* Gertsch & Platnick**

Figs. 2, 6, Map 1



Figs. 6-9. Sterna of females of four species of *Sphodros* (from Gertsch & Platnick, 1980; sizes adjusted for uniformity). 6. *S. atlanticus*. 7. *S. coylei*. 8. *S. niger*. 9. *S. rufipes*.

Although the most common member of the genus in Virginia, this species was not recognized until described by Gertsch & Platnick in 1980, at which time *S. atlanticus* was known only from single localities in Virginia, South Carolina, Georgia, and Illinois, and two in North Carolina. Its capture at sites in 15 Virginia counties and cities testifies to the effectiveness of pitfall trapping and surely presages discovery of the species over an extensive Lower Austral range upon application of that technique.

In Virginia, the species seems most abundant in the Coastal Plain, although sporadic populations occur on the Piedmont nearly to the Blue Ridge (Map 1). Records for Prince William, King George, and Northampton counties suggest that *S. atlanticus* probably occurs in Maryland, possibly even as far north as southern New Jersey. A total of 49 male specimens (all but one in VMNH) was examined from the following localities:

*Cumberland Co.*: 7 km SSW of Columbia, hardwoods, 1 July 1990, J. C. Mitchell (1). *Fluvanna Co.*: 1 km SW of Kent's Store, 14 June 1995 (1). *Greensville Co.*: 1 mile E of Claesville, end of Rt. 666, 10-21 June 1993 (1); 25 March-25 May 1994 (3); 25 May-30 June 1994 (4); 3 miles SW of Skippers, 30 May 1990, J. C. Mitchell (2). *Henrico Co.*: National Guard Armory, ca. 2 miles SE of Sandston, 16 May-19 June 2001, K. L. Derge (1). *Isle of Wight Co.*: pine barrens 4 miles S of Zuni, 24 May 1985 (1), 4 June 1985 (2), both C. A. Pague. *King George Co.*: Naval Weapons Laboratory, Dahlgren, 26 June 1991, K. A. Buhlmann (1). *Mecklenburg Co.*: Elm Hill Wildlife Management Area, 11-29 May 1995 (1); ca. 4 miles SE of Boynton, Rt. 692, 16 June 1990, J. C. Mitchell (1). *Northampton Co.*: Savage Neck Dunes Natural Area Preserve, Eastville, 9 May-19 June 2004, D. Field (1). *Pittsylvania Co.*: ca. 4 miles ENE of Axton, 13 May-15 June 1992 (1). *Prince William Co.*: Prince William Forest Park, 14 June 1988 (3), 28 June 1988 (1), both D. A. Young. *Spotsylvania Co.*: Fredericksburg, 30 May 1917 (AMNH 1, collector not specified). *Stafford Co.*: Quantico Marine Corps Base, pitfall site 6, 22 May 1991, J. C. Mitchell (1). *York Co.*: Grafton Ponds, 27 May 1991 (5), 14 June 1991 (1), 25 June 1991 (2), all K. A. Buhlmann; Naval Weapons Station, Cheatham Annex, 2 June 1989 (2), 19 June 1989 (1), 14 May 1990 (1), 30 May 1990 (1), all K. A. Buhlmann. *City of Chesapeake*: Fentress Naval Air Station, 6 June 1989, K. A. Buhlmann (1). *City of Virginia Beach*: Little Creek Amphibious Base, 22 June 1989, K. A. Buhlmann (3); Munden Point, 3 May 1990 (1), 3 June 1990 (3), both N. L. Bland; Pungo, 18 June 1990, N. L. Bland (1).

### ***Sphodros coylei* Gertsch & Platnick**

Figs. 1, 3, 7, Map 2

Although known for 20 years only from the two type specimens taken at Clemson, South Carolina, this small atypid may be considered one of the two most widespread and abundant members of the genus in Virginia (Map 2); it is often taken in large numbers in

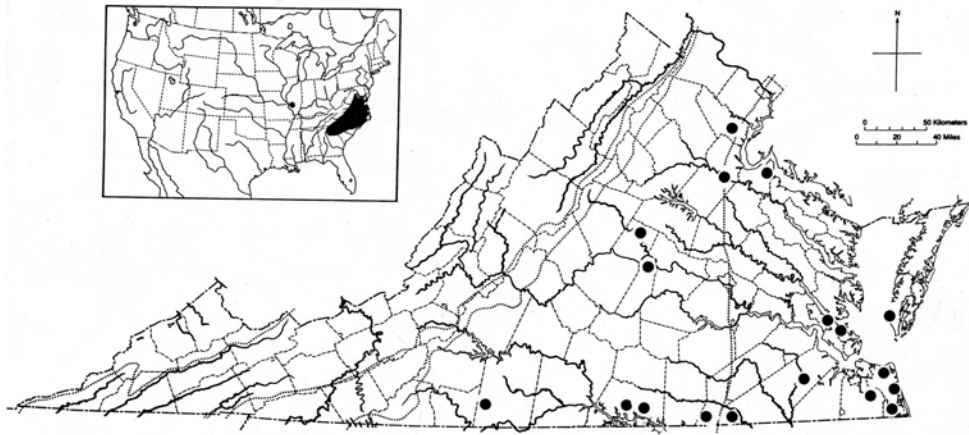
pitfall traps.

The northernmost known locality, in Prince William County, is less than 30 miles (50 km) from the District of Columbia and anticipates discovery of the species both there and in adjacent Maryland. It seems likely that *S. coylei* also occurs on the Eastern Shore of Virginia. One curious aspect of the species' distribution in Virginia is the presence of apparently disjunct populations in Pittsylvania and Franklin counties. As shown on Map 2 by "x" symbols, the species has not been found at five sites where extensive, year-round pitfall trapping was conducted, and at which other species of *Sphodros* were collected. The map is based on material (all VMNH) in the following samples:

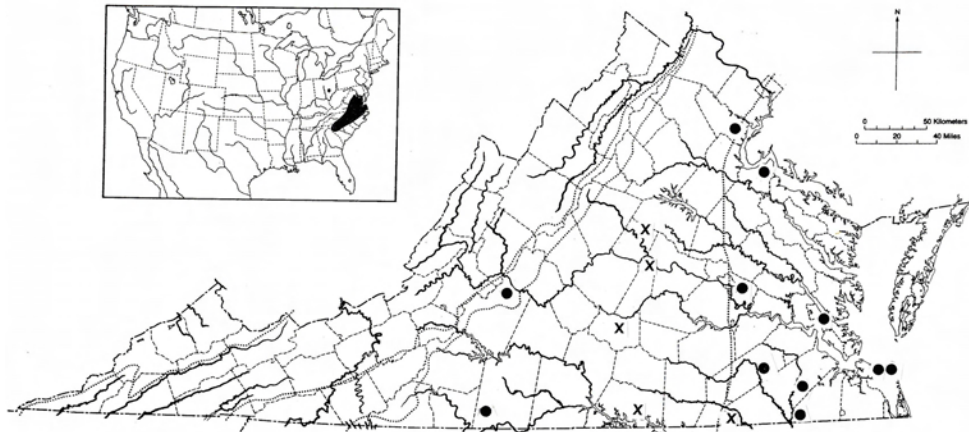
*Franklin Co.*: Smith Mountain 4-H Center, ca. 9 miles ENE of Rocky Mount, 13 March-17 April 1995 (4). *Henrico Co.*: Elko Natural Area, 1 mile W of Elko, 15 June 1990, C. A. Pague (3). *Isle of Wight Co.*: Blackwater Ecological Preserve, ca. 4 miles S of Zuni, 24 May 1985 (1), 17 April 1986 (1), both C. A. Pague. *King George Co.*: Naval Weapons Laboratory, Dahlgren, 26 June 1991, K. A. Buhlmann (1). *Pittsylvania Co.*: pitfall site ca. 3 miles ENE of Axton, 29 March-23 April 1992 (4). *Prince William Co.*: Prince William Forest Park, 19 April 1988, C. A. Pague (2), 8 May 1991, J. C. Mitchell (2). *Sussex Co.*: Chub Sandhill Natural Area Preserve, 6 miles SSE of Sussex, 30 April 2002, P. Koury (1). *York Co.*: Grafton Ponds, 4 April 1990 (24), 16 April 1990 (11), 1 May 1990 (5♂/1♀), 17 August 1990 (1), all K. A. Buhlmann; Yorktown Naval Weapons Depot, Cheatham Annex, 16 April 1990 (3), Jones Millpond site, 16 April 1990 (25), both K. A. Buhlmann. *City of Suffolk*: South Quay, ca. 6 miles S of Franklin, 4 April-6 June 2003, S. M. Roble (3). *City of Virginia Beach*: First Landing (Seashore) State Park, 1 April 1990 (9), 4 April 1990 (20), 14 April 1990 (17), 26 April 1990 (6), 1 May 1990 (10), 22 May 1990 (1), 7 June 1990 (1), all K. A. Buhlmann; Munden Point, 25 March 1990, N. L. Bland (12).

Despite this wealth of 167 male individuals from numerous collection sites, only a single female was captured (in a pitfall trap). She is substantially larger (12 mm total length) than accompanying males, and of interest in that the sigilla pattern resembles that of *S. niger* more than that of obviously conspecific males.

Aside from the relatively small mid-Atlantic range known for this species, it has also been reported from Ohio (Sierwald et al., 2005). Dr. Richard Bradley has informed me (pers. comm.) that this record is based on a male in the Ohio State University Chelicerates Collection from Youngs Branch, Lawrence County,



Map 1. Distribution of *Sphodros atlanticus* in Virginia. The Prince William County site is the northernmost known so far for this species.



Map 2. Distribution of *Sphodros coylei* in Virginia. The X symbols represent sites at which pitfall trapping was conducted for at least one year without capturing this species.

Ohio, taken on 7 May 1998. This is a remarkable disjunction across the entire Appalachian range, analogous to the Illinois record for *S. atlanticus* (Gertsch & Platnick, 1980), which is otherwise sympatric with *S. coylei*. Perhaps intensified pitfall collecting in Kentucky and Tennessee will provide additional substantiating records for both of these species in central United States.

As already noted in my earlier paper (Hoffman, 1992), males of *S. coylei* are definitely surface-active in spring and early summer; VMNH has only a single specimen taken later than 15 June. Seasonal partitioning in this genus is summarized in a concluding section.

One of the characters cited as diagnostic for *S. coylei* was the presence of "false sutures" in both the tarsi and metatarsi. In the Virginia material, I could not

confirm this condition for the metatarsal podomeres despite examination of legs in alcohol, air dried, or cleared in ethylene glycol, all of which showed about 10-12 annulations in the tarsi.

### ***Sphodros niger* (Hentz)**

Figs. 4, 8, Map 3

Originally described from Northampton, Massachusetts, *S. niger* is the northernmost member of the genus, and occupies an extensive range: Massachusetts to Wisconsin and Kansas, south through the Appalachians to North Carolina (Gertsch & Platnick, 1980). This pattern is reflected in Virginia, where all but one (see discussion following) of our capture records are for the inner Piedmont and

mountains. The palpal conductor in this species departs somewhat from the generic norm by the development of a distinct subterminal lamina (Fig. 4, arrow). The illustrations given by Gertsch & Platnick (1980; Figs. 53, 54) show this development in a perspective that emphasizes the lamina at the expense of the true apex. I have examined what I believe is the specimen they illustrated (AMNH, Bergen Co., New Jersey) and find that, perhaps as the result of preservation, the palpal bulb is rotated out of the usual position and in prolateral view the lamina is seen "head-on" in its broadest dimension in both figures. The drawing provided here is from a Virginia specimen in which the normal orientation (confirmed by inspection of specimens from across the species' range) is represented.

Gertsch & Platnick (1980) cited only one locality for *S. niger* in Virginia. Even though we now have records from 12 counties, the species seems less abundant than either *S. atlanticus* or *S. coylei*, and most samples, even from prolonged pitfall trapping runs, contain only one or two specimens. The males of this species may be more normally surface active than any of its local relatives: several of the specimens cited below were found moving about during the day and collected by hand. This has not been true for any of the other three species of *Sphodros* in Virginia.

The map is based on material (all but one specimen in VMNH) in the following samples:

*Alleghany-Bath Cos.*: west side of Little Mountain along FS 342, ca. 1 mile W of Carlover, 31 July 1994, NZP-CRC small mammal survey (1 imm.). *Augusta Co.*: Maple Flats area near Sherando, 26 May 1987, on road in daylight, R. L. Hoffman and K. A. Buhlmann (1); GWNF, 5 miles W of Stokesville, 16 June 1989 (4), 17 June 1989 (4), 9 July 1989 (1), all B. Flamm. *Botetourt Co.*: FS 812 on Apple Orchard Mountain, 3 miles W of Blue Ridge Parkway, 20 May 2000, J. Turner (1). *Cumberland Co.*: pitfall sites 2-7 km S of Columbia, 1 May 1990 (2), 17 May 1990 (4), 1 June 1990 (9), all J. C. Mitchell. *Fluvanna Co.*: pitfall site at Kent's Store, 14 May 1995 (7). *Northampton Co.*: Savage Neck Dunes Natural Area Preserve, Eastville, 9 May-19 June 2004, D. Field (1). *Pittsylvania Co.*: ca. 3 miles ENE of Axton, 15 June-14 July 1992 (1). *Prince Edward Co.*: Hampden-Sydney College campus, 29 November 1989, W. A. Shear (1 imm.); Farmville, 28 June 1993, Justin Shear (1), 4 June 2001, W. A. Shear (1). *Prince William Co.*: Manassas National Battlefield Park, 24 May-21 June 1999, A. C. Chazal (1). *Roanoke Co.*: Fort Lewis Mountain, NW of Salem, 10 June 1993, M. W. Donahue (1). *Rockbridge Co.*: Big Mary's Creek, 3 miles SE of Vesuvius, on road in daylight, 24 June 1956, R. L. Hoffman (AMNH 1).

*Warren Co.*: NZP-CRC site, ca. 3 miles SE of Front Royal, 2-28 May 1996 (1). *Wise Co.*: Powell Mountain Karst Preserve, 4.5 miles SE of Big Stone Gap, 27 May-10 June 2009 (2), 29 June-2 July 2009 (1), all C. S. Hobson.

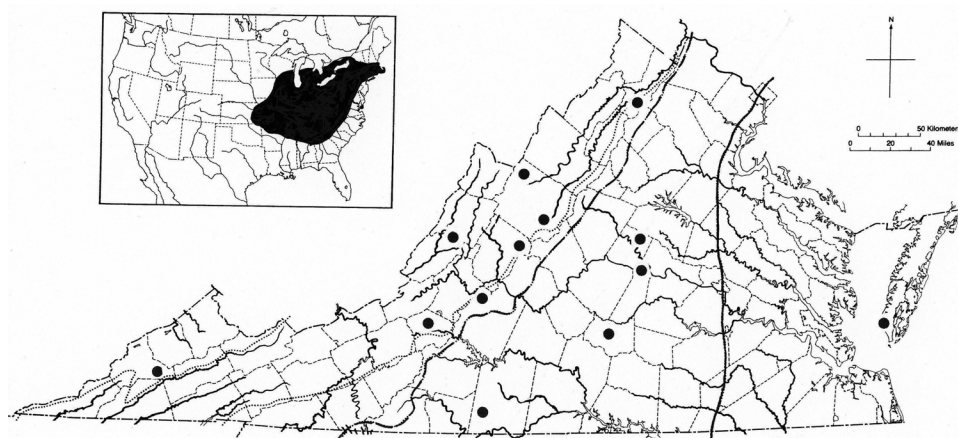
Known Virginia localities (Map 3) reflect the basically subboreal distribution of the species: the great majority of collection sites lie west of a line drawn between Great Falls and Danville, Virginia. The single male captured at Savage Neck Dunes is thus a remarkable departure from this pattern, for which I have no explanation other than a small relict population surviving after a post-glacial westward retraction of the species (even the four Piedmont sites may fall under this premise). There can be no doubt of the provenance because I personally sorted the pitfall sample from which it was extracted. That sample contained two specimens of *Sphodros*, the other one being a male *S. atlanticus*. If I had chosen that one to examine, I would surely have assumed that both were the same species, and the occurrence of *S. niger* on the Eastern Shore would have gone unnoticed indefinitely.

#### ***Sphodros rufipes* (Latreille)**

Figs. 5, 9, Map 4

For many years this striking species was known as either *Atypus bicolor* or *A. milberti* (both names occur on museum specimen labels) - the older name *rufipes* was not restored until Gertsch & Platnick (1980) confirmed its priority. It is the largest member of the genus (females up to 25 mm in length) and perhaps the most widely distributed: Rhode Island to Texas, mostly in the Coastal Plain but extending northward in the Mississippi embayment to Illinois. The species also invades the southern end of the Appalachians at low elevations. This range is allopatric with the structurally similar Midwestern taxon *S. fitchi*.

*Sphodros rufipes* is certainly not abundant in Virginia. For many years the only record was for Falls Church, where Nathan Banks located a population in 1909, and collected a small series over the next several years. That the species still exists in the metropolitan area is suggested by a telephone call that I received in 2008 from a resident in Alexandria who described a large black spider with red legs in her home (specimen was not captured or destroyed). The VMNH sample from Greensville County was taken by sheer good luck, in a pitfall that had operated for a year and only at the last minute was given another month extension beyond its intended lifespan. During that final month two males rewarded that impulsive reprieve. The male from First Landing State Park was the sole representative of its



Map 3. Distribution of *Sphodros niger* in Virginia. The disjunct record for Northampton County is the only site in the Coastal Plain south of Long Island at which this species is known. Does it portend eventual discovery elsewhere on the Delmarva Peninsula, perhaps even in New Jersey?



Map 4. Distribution of *Sphodros rufipes* in Virginia.

species taken in extensive pitfall collecting at six adjacent localities for a year. During April and May of that period, more than 60 specimens of *S. coylei* were trapped at the First Landing site.

Many of the VMNH specimens of *S. atlanticus* are discolored by preservation, their legs fading to a clear yellow, and at first were thought to be *S. rufipes* because the palpal organ is similar in both species. Fortunately, the strongly convex sternum and obsolete anteriormost sigilla of *S. atlanticus* provide an unequivocal way to distinguish males of these two spiders, and the sternal sigilla pattern separates females.

Virginia records (and those from farther north) of *S. rufipes* imply an eastern, lowland range:

*Fairfax Co.*: Falls Church, 1912 [exact date(s) not specified], Nathan Banks (MCZ 1♂/6♀); East Falls Church, 11 April 1909, Nathan Banks (MCZ 1♂/2♀).

*Greensville Co.*: pitfall site at end of Rt. 666, 1.2 miles E of Claesville, 25 May-30 June 1994 (2). *City of Virginia Beach*: First Landing (Seashore) State Park, 21 June 1989, K. A. Buhlmann (1).

#### SEASONAL ACTIVITY OF MALES

My previous treatment of this genus (Hoffman, 1992) provided a curious tabular distribution of three species by dates of collection. This approach was not optimal, aside from highlighting the early activity season of *S. coylei*. I now offer a somewhat better summary (Table 1) that indicates the actual numbers of specimens collected in specific months. No attempt was made to subdivide the data by locality, although it may be assumed that surface activity begins earlier in the eastern, warmer part of the state.

Table 1. Seasonal surface activity of *Sphodros* species in Virginia, as documented by pitfall trapping (number of specimens captured per month).\*

<u>Species</u>	<u>March</u>	<u>April</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Range</u>
<i>S. atlanticus</i>			13	27	1	3 May-1 July
<i>S. coylei</i>	12	133	20	1		25 March-15 June
<i>S. niger</i>			11	34	1	1 May-9 July
<i>S. rufipes</i>				3		21-30 June

\*Actual capture dates were likely earlier than dates on which pitfall traps were checked.

#### ACKNOWLEDGEMENTS

It is a pleasure to express my gratitude to Dr. Norman Platnick (American Museum of Natural History) for advice and suggestions over many years in connection with atypids and many other spiders, examination of types at my request, and loans of specimens. Dr. Richard Bradley (Ohio State University at Marion) provided information on the occurrence of *S. coylei* in Ohio.

Virtually all of the specimens collected by DCR-DNH inventory work prior to 1992 were put into my hands by Christopher A. Pague, and after that date by his successor Steven M. Roble: my debt to these colleagues will be obvious.

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