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The Scolopendromorph Centipedes of North Carolina, with a Taxonomic Assessment of Scolopocryptops gracilis Peregrinator (Crabill) (Chilopoda: Scolopendromorpha)

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Abstract

The scolopendromorph centipede fauna of North Carolina consists of eight species. Scolopocryptops sexspinolus (Say), S. nigridius McNeill, Theatops posticus (Say), and Cryptops hyalinus Say occur in all three physiographic provinces. Theatops...
spinicaudus (Wood) is prevalent in the Blue Ridge Province and western Piedmont Plateau, and Hemiscelopendra punctiventris (Newport) is widespread east of the mountains. Scolopendra viridis Say, ranging from the sandhills to the southeastern coastal islands, and Scolopocryptops peregrinator (Crawford), in Ashe County, are newly recorded from the state. The latter, ranging from southern Pennsylvania to northwestern North Carolina and westward to eastern Kentucky, is elevated from subspecific status under S. gracilis Wood.

RESUMEN

La fauna de cienpies escelopendromorfo de Carolina del Norte, consiste de ocho especies. Scolopocryptops sexsopinosus (Say), S. nigridius McNeill, Theatops posticus (Say), y Cryptops hyalinus Say ocurren en las tres provincias fisiográficas. Theatops spinicaudus (Wood) es prevalente en la Provincia Blue Ridge y en el oeste de Piedmont Plateau, y Hemiscelopendra punctiventris (Newport) se extiende al este de las montañas. Se reporta por primera vez de este estado a Scolopendra viridis Say, que habita desde las lomas arenosas hasta las islas al suroeste de la costa, y Scolopocryptops peregrinator (Crawford) en el Condado de Ashe. El último, se extiende desde el sur de Pennsylvania al noroeste de Carolina del Norte, y hacia el oeste hasta el este de Kentucky, y se llevó a un estado sub-específico bajo S. gracilis Wood.

The centipede fauna of the southeastern United States is poorly known. Records can be gleaned from general works on North America by Say (1821) and Wood (1862, 1865), and reviews of Nearctic Lithobiomorpha (Chamberlin 1912a, 1913, 1914, 1917, 1922, 1925a,b). The southeastern Lithobiomorpha and Geophilomorpha were summarized by Chamberlin (1911, 1912a), and Crawley (1960) provided a key to, and commentary on, the Scolopendromorpha north of Mexico. Many nominal southeastern species have been described in short miscellaneous papers, too numerous to cite here, along with forms from other parts of the country. Specific regional publications in the past half-century include incomplete state listings for North Carolina (Brimley 1938, Causey 1940, Wray 1960, 1967), South Carolina (Crawley 1960), Georgia (Chamberlin 1944, 1945), and Florida (Chamberlin 1958); descriptions of new lithobiomorphs from North Carolina (Chamberlin 1940a, Causey 1942) and Florida (Chamberlin 1940b); descriptions of new geophilomorphs from Alabama (Crawley 1953) and Tennessee (Crawley 1958); a report on the scolopendromorphs in the Coastal Zone of South Carolina (Shelley 1978); and a key to the five Floridian species of the scolopendromorph genus Cryptops, with a description of a congener from the tip of the peninsula (Crawley 1969). This key to Cryptops is the only published identification guide to southeastern chilopods, but its utility is limited because it refers only to one genus and one state. The most proximal modern key to all American chilopod taxa is for the north-central states (Summers 1979).

I have been sampling North Carolina centipedes and examining preserved specimens for 10 years to prepare a checklist of the state's fauna. Scutigera coleoptrata (L.), the introduced European scutigeromorph that occurs statewide, is the sole representative of this order, and eight scolopendromorphs are distributed among the three physiographic provinces. The Lithobiomorpha and Geophilomorpha are more speciose, but their compositions are uncertain because of pervasive taxonomic and nomenclatorial problems, which are discussed by Lewis (1981) in his comprehensive text on chilopod biology. Many years will pass before these difficulties are rectified and a checklist is feasible. A report on North Carolina scolopendromorphs is possible, however, since all plausible indigenous species have been recorded.
With 21 or 23 pairs of legs the scolopendromorphs are among the better known land invertebrates because of their generally large size and their ability to deliver a painful bite if handled. They are prominent in woodland habitats because the striking yellow, orange, and blue-green pigmentation contrasts markedly with the darker colored substrates. Both families, Scolopendridae and Cryptopidae, occur in North Carolina. The two scolopendrids are larger (average lengths of specimens in this study are 47.4 mm for Hemiscolopendra punctiventris (Newport) and 54.9 mm for Scolopendra viridis Say) and occur only in association with decaying pine logs and stumps, especially beneath bark. Occasional specimens of Scolopocryptops sexspinosus (Say) also are more than 50 mm long, but the cryptopids in general are smaller and are encountered in open litter, under rocks, and under pine and deciduous logs.

The earliest reports of North Carolina Scolopendromorpha are by Wood (1862), who cited Opisthemesa postica (= Theatops posticus Say) from Goldsboro and S. sexspinosus from Salem. Bollman (1888, 1893) recorded CRYPTOPS hyalinus Say from unspecified localities, Scolopocryptopus nigrinus McNeill and S. sexspinosus from Chapel Hill, and Scolopendra woodi Meinert (= Hemiscolopendra punctiventris) from Deaftont. Droleeman (1896) listed Theatops spinicaudus (Wood) and all these species except C. hyalinus from unspecified sites in the state. Brimley (1938) and Causey (1940) gave specific localities for all species except T. spinicaudus, which were repeated by Wray (1950, 1967). However, the citations of Scolopendra viridis from Duke Forest, Durham County, must be discounted as based on a misidentification of Hemiscolopendra punctiventris, which is common in this part of the state. The specimen is no longer available, and the closest authentic locality for S. viridis is near Fayetteville, Cumberland County, some 96 km south of Durham. Thus, the present North Carolina records are the first verifiable ones for S. viridis, and I also add Scolopocryptops peregrinator (Crabill), elevated from subspecific status under S. gracilis Wood.

The color of young individuals may be pale but the external anatomical features mentioned in the key are applicable to all stages, because scolopendromorphs are epiomorphic and hatch with the full complement of legs and pedal segments. Except for Scolopocryptops peregrinator, only prior North Carolina references are cited in the ensuing species accounts, and distributions are solely within the state. The diagnoses are pertinent only among those eight species and will not distinguish them from congeners in other parts of America. North Carolina locality data are presented for Scolopendra viridis, but generalized range statements are provided for the widely distributed species, since a detailed listing is prohibitively long. Scolopocryptops peregrinator is known only from the original description, based on the holotype and paratype from localities in Virginia and Maryland, respectively (Crabill 1952), and from Pine Ridge, Wolfe County, Kentucky (Branson and Batch 1967). I have access to 24 individuals in 13 samples from different sites and report variation, provide detailed locality data,

1Because it is small and its bite cannot pierce skin, Cryptops hyalinus can be collected by hand. The other species should be grasped by forceps behind the head, so that the animal cannot flex the anterior end and strike the collector.

2Considerable confusion has existed about the gender of the -ops genus-group suffix, and as noted by Crabill (1955) both masculine and feminine species-group names have been published arbitrarily for many scolopendromorph species. Some authors published Scolopocryptops sexspinosus, while others have reported S. sexspinosa. Citing the recommendation of the 1968 Copenhagen Decisions on Zoological Nomenclature [p. 51, paragraph 84(1)(b)(ii)] (Heming 1967), Crabill (1955) attempted to stabilize treatments by using only the feminine termination. However, this recommendation was recently superseded by article 30 (a)(ii) of the 1984 edition of the International Code of Zoological Nomenclature, which declares that all genus group names with the -ops ending are to be considered masculine regardless of derivation or treatment by the author.
and assess its taxonomic status by comparison with specimens of *Scolopocryptops gracilis* from California. In the distribution maps, figures 11-16, open symbols denote uncorroborated literature records considered reliable, and acronyms for physiographic provinces are CP, Coastal Plain; PP, Piedmont Plateau; BR, Blue Ridge; RV, Ridge and Valley; and AP, Appalachian Plateau. Acronyms of sources of preserved study material are AAW, private collection of Andrew A. Weaver, Wooster, Ohio; ANSP, Academy of Natural Sciences, Philadelphia; and NMNH, National Museum of Natural History, Smithsonian Institution, Washington, DC. The invertebrate catalog number is provided for specimens housed at the North Carolina State Museum of Natural History, Raleigh.

Key to Families, Subfamilies, Genera, and Species

1. With four ocelli on each side of cephalic plate (Fig. 1) ............ Scolopendridae 2
   Ocelli absent (Figs. 5-6, 8) ........................................ Cryptopidae 3

2. Proximotarsi of legs 1-20 with prominent ventrodistal spur (Fig. 2); color
   green, with or without lighter lateral stripes; Moore and Richmond to New
   Hanover and Brunswick counties ................................. *Scolopendra viridis* Say
   Without this character; color uniformly bluish gray; Piedmont Plateau and
   Coastal Plain ........................................ Hemiscopelopendra punctiventris* (Newport)

3. Ultimate legs greatly enlarged and thickened, heavily sclerotized (Figs.
   3-4) ........................................................................ Theatopinae 4
   Ultimate legs only slightly larger and more sclerotized than preceding pair .... 5

4. Prefemora of ultimate legs with dorsal, pigmented, distomedial spine (Fig. 4);
   Blue Ridge Province to central Piedmont Plateau. *Theatops spinicaudus* (Wood)
   Prefemoral spine absent (Fig. 3); statewide, rare in Blue Ridge Province
   ............................................................................ *Theatops posticus* (Say)

5. 21 pairs of legs and pedal segments; statewide .................................. Cryptopidae, *Cryptops hyalinus* Say

6. Cephalic plate not margined; tergites 4-22 with complete paramedian sutures
   (Figs. 8-9); color light yellowish; Ashe County ..................................... *Scolopocryptops peregrinator* (Crabill)
   Cephalic plate margined laterally; all tergites without complete paramedian
   sutures (Figs. 5-7) ................................................................. 7

7. Dorsal surface of second antennomere sparsely hirsute (Fig. 5); color usually
   dark brownish-orange, with or without scattered irregular blue splatches;
   statewide .................................................. *Scolopocryptops nigridius* McNeill
   Dorsal surface of second antennomere densely hirsute (Fig. 6); color usually
   uniformly bright orange to yellowish-orange, without darker patches; state-
   wide ................................................................. *Scolopocryptops sexspinosus* (Say)

Family Scolopendridae

*Hemiscopelopendra punctiventris* (Newport 1844)

Figs. 1, 11


*Diagnosis*. Color uniformly blue-gray; 21 pairs of legs and pedal segments; prox-
imotarsi without ventrodistal spurs; ocelli present.
Figs. 1-10. 1. right side of cephalic plate of Hemiscolopendra punctiventris, dorsal view. 2. midbody leg of Scolopendra viridis, ventral view. 3, ultimate legs and terminal tergite of Theatops posticus, dorsal view. 4, ultimate legs and terminal tergite of T. spinicaudus, dorsal view. 5, right side of cephalic plate and basal antennomeres of Scolopocryptops nigridius, dorsal view; the arrow indicates the lateral margination. 6, right side of cephalic plate and basal antennomeres of S. sexspinosus, dorsal view; the arrow indicates the lateral margination. 7, tergites 1-5 of S. sexspinosus, dorsal view. 8, right side of cephalic plate and basal antennomeres of S. peregrinator, dorsal view. 9, tergites 1-5 of S. peregrinator, dorsal view. 10, tergites 1-5 of S. gracilis, dorsal view.

Ecology. Occurs only in association with decaying pine logs and stumps, usually under bark.

Distribution. Piedmont Plateau and Coastal Plain.

Remarks. Hemiscolopendra punctiventris is sluggish and easy to collect. A specimen will sometimes stay motionless for 10 to 15 seconds after exposure, leaving ample time to reach for forceps and a vial.

Though occurring only in association with pines, H. punctiventris rarely is found with small and medium-size branches. It is usually encountered on large logs whose
bark peels cleanly. Loblolly pine (Pinus taeda) seems to be the preferred species, and the centipede's apparent absence from the mountains may relate to the diminished occurrence of this tree. *Hemiscolopendra punctiventris* is abundant in the central Piedmont and Coastal Plain and likely to be found in any sub-climax woodland, being particularly plentiful in areas ravaged by the southern pine beetle. Literature records considered valid are Beaufort, Carteret County (Bollman 1893), and Duke Forest, Durham County (Causey 1940).

*Scolopendra viridis* Say 1821
Figs. 2, 11

**Diagnosis.** Color green, with or without pale lateral stripes; 21 pairs of legs and pedal segments; proximotarsi of legs 1-20 with ventrodistal spurs; ocelli present.

**Ecology.** Occurs only in association with pine logs and stumps, usually under bark.

**Distribution.** Southeastern North Carolina, from the sandhills to the coastal islands of New Hanover and Brunswick counties. As this is the first report of *S. viridis* from North Carolina specifically and its range in the state is limited, detailed locality data are provided. The sight record is by the author.

*Richmond Co.*, 26 km W Hoffman (A1870) and 6.6 km NE Rockingham (2979). *Moore Co.*, 8.3 km W Aberdeen (2964). *Cumberland Co.*, Fayetteville (A370) and 16.6 km NNW Fayetteville (sight record). *Hoke Co.*, 6.4 km SW Ashley Heights (2945). *Scotland Co.*, Wagram (2976) and 15.2 km W Laurinburg (2981). *Bladen Co.*, 8.0 km NE Kelly (2918). *New Hanover Co.*, 11.4 (328) and 13.6 km (2999) S Wilmington; 7.2 km NW Carolina Beach (A1449); 1.6 km SW Carolina Beach (1091); and Carolina Beach St. Pk. (A3919-A3921). *Brunswick Co.*, Boiling Springs Lakes (2255) and Southport (ANSP).

**Remarks.** On the average about 7 mm longer than *H. punctiventris*, *S. viridis* is also much swifter and will usually move the instant it is uncovered. One must therefore be ready with forecups in hand before stripping a prospective log. The two scolopendrids occur in the same biotopes and appear to occupy closely similar niches; I have never found them together.

In his key to American scolopendromorph genera, Crabill (1960) stated that the proximotarsal spurs occurred on the first 15 to 20 legs in *Scolopendra*, and Summers (1978) indicated that they were present on the anterior legs in general in *S. viridis*. In
the nearly 30 North Carolina individuals taken in this study, spurs are present on all but the ultimate leg pair.

Crabill (1960) reported that *S. viridis* ranges northward along the Atlantic Coast from Florida to southern Virginia, and it should therefore be expected throughout our Coastal Plain. However, repeated searches in suitable habitats north of Cumberland, Bladen, and New Hanover counties have only yielded *H. punctiventris*. In 1983 I spent a day near the Virginia border in the Dismal Swamp area of northeastern North Carolina but did not find *H. punctiventris*. Thus, I cannot confirm Crabill's report, but it is logical since the Dismal Swamp-southeastern Virginia area is a known biogeographical boundary and the northern distributional limit for the bald cypress (*Taxodium distichum*) (Radford et al. 1968) and such southern vertebrates as the yellow-bellied turtle (*Trachemys scripta*), brown water snake (*Nerodia taxispilota*), southern dusky salamander (*Desmognathus auriculatus*), southern toad (*Bufo terrestris*), squirrel treefrog (*Hyla squirella*), and little grass frog (*Lithobates ocularis*) (Corant 1975). With all the field work in North Carolina's Coastal Plain, *S. viridis* should have been discovered if it occurred north of the southeastern corner. Perhaps the Virginia population, if it still exists, is isolated from the main range. Otherwise, southeastern North Carolina is the northern distributional limit along the Atlantic Coast.

Family Cryptopidae
Subfamily Cryptopinae
*Cryptops hyalinus* Say 1821
Fig. 12


*Diagnosis.* Color uniformly yellow; 21 pairs of legs and pedal segments; ultimate legs not conspicuously broader than preceding pair; ocelli absent.

*Ecology.* Occurs primarily under bark of decaying pine logs and stumps; less commonly found in litter and in association with deciduous logs.

*Distribution.* Statewide; apparently less common in the Coastal Plain.

*Remarks.* The smallest scleropodin of North Carolina, *C. hyalinus* is abundant under bark of loblolly pine logs in the eastern Piedmont, where it can be mistaken for geophilomorphs, which it resembles in length and color. It is a common urban chilopod in the Raleigh-Durham-Chapel Hill area and probably occurs in all major piedmont cities. In the mountains it occurs in association with hardwood logs. Although known from all three physiographic provinces, *C. hyalinus* has only been collected

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![Figure 12](image_url)

Fig. 12. Distribution of *Cryptops hyalinus* in North Carolina.
Fig. 13. Distributions of *Theatops posticus*, dots, and *T. spinicaudus*, squares, in North Carolina.

three times in the Coastal Plain, one each from Cumberland, Sampson, and New Hanover counties. As considerable chilopod sampling has taken place in the eastern counties and countless logs have been peeled, this diminished occurrence seems real and not a reflection of insufficient field work. The small size of *C. hyalinus* should not disproportionately affect its discovery in the Coastal Plain in comparison to other regions.

I have examined most specimens of *Cryptops* collected in North Carolina, and all are *C. hyalinus*, even ones taken in urban areas. *Cryptops hortensis* Leach, a European centipede introduced into urban environments in several eastern states, may occur in the major cities, but is currently unknown.

**Subfamily Theatopinae**

*Theatops posticus* (Say 1821)

*Figs. 3, 13*


*Diagnosis*. Color yellow to yellowish-orange; 21 pairs of legs and pedal segments; ultimate legs much larger and more heavily sclerotized than preceding pair, prefemora unarmed; ocelli absent.

*Ecology*: Primarily inhabits moist deciduous litter, occasionally found in predominantly pine litter.

*Distribution*. Statewide; rare in mountains, particularly at high elevations.

*Remarks*. The records from Goldsboro, Wayne County (Wood 1862, Bollman 1888) and Duke Forest, Durham County, and Greensboro, Guilford County (Causey 1940, Chamberlin 1951), are considered valid.

*Theatops spinicaudus* (Wood 1862)

*Figs. 4, 13*

*Theatops spinicaudus*: Brolemann, 1896:50-51.

*Diagnosis*. Color yellow to yellowish-orange; 21 pairs of legs and pedal segments; ultimate legs much larger and more sclerotized than preceding pair, prefemora with dorsal, distomedial spines; ocelli absent.
Fig. 14. Distribution of Scolopocryptops nigridius in North Carolina.

Ecology. Primarily inhabits moist deciduous litter, occasionally found in predominantly pine litter.


Remarks. In North Carolina the ranges of T. spinicaudus and posticus overlap, with the former prevalent in the west and the latter more common in the east (Fig. 13). Theatops posticus is rare in the mountains and generally absent from higher elevations, while T. spinicaudus is common, particularly in the Black and Great Smoky Mountains. Most collections of T. posticus in the Blue Ridge province are from low elevations in Cherokee and Clay counties, which have piedmont characteristics. The chilopods have similar ecological preferences but have not been found syntopically. The records of T. spinicaudus from Mt. Pisgah, Haywood-Transylvania counties (Wray 1950, 1967), are considered valid.

Subfamily Scolopocryptopinae

Scolopocryptops nigridius McNeill 1887

Figs. 5, 14


Scolopocryptops nigridius: Causey, 1940:66.

Diagnosis. Color dark brownish-orange, with or without irregular purple spots; 23 pairs of legs and pedal segments; ultimate legs not conspicuously thicker than preceding pair; 2nd antennomers sparsely hirsute; ocelli absent; head margined laterally; tergites without complete paramedian sulci.

Ecology. Usually found in moist predominantly pine or deciduous litter also occurs under rocks and either hardwood or pine logs but rarely under bark.

Distribution. Statewide.

Remarks. The record from Duke Forest, Durham County (Causey 1940), is considered valid.

Scolopocryptops sexspinatus (Say 1821)

Figs. 6-7, 15

Scolopocryptops sexspinatus: Brolemann, 1895:50.

Fig. 15. Distributions of *Scolopocryptops sexspinulosus*, dots, and *S. peregrinator*, star, in North Carolina.

*Diagnosis.* Color bright orange to yellowish-orange, without purple patches; 23 pairs of legs and pedal segments; ultimate legs not conspicuously thicker than preceding legs; 2nd antennomeres densely hirsute; ocelli absent; head margined laterally; tergites without complete paramedian sulci.

*Ecology.* Usually found in moist litter, either predominantly pine or deciduous; also occurs under rocks and either hardwood or pine logs but rarely beneath bark.

*Distribution.* Statewide.

*Remarks.* The records from Salem, Forsyth County (Wood 1862, Rollman 1893); Chapel Hill, Orange County (Rollman 1893); Greensboro, Guilford County (Chamberlin 1951); and Linville, Burke County, and Mt. Pisgah, Haywood-Transylvania counties (Causey 1940) are considered valid. A specimen was found in the digestive tract of a southeastern crowned snake (*Tantilla coronata*) collected in Robeson County, 11.2 km SE Red Springs.

The two common species of *Scolopocryptops* occupy the same habitats, occur statewide, are about equally abundant, and can even occur syntopically under the same log. Summers and Uetz (1979) found *S. sexspinulosus* exclusively in leaf litter in east-central Illinois, and I have rarely encountered either species under bark of decaying logs in North Carolina. However, Lee (1980) found 63 specimens of *S. sexspinulosus* under bark and none in litter in central Ohio. Externally, the two centipedes resemble each other, but they are readily distinguished by the characters in the key and diagnoses. *Scolopocryptops sexspinulosus* tends to be larger, occasionally growing to nearly 55 mm in length. In any part of North Carolina, urban or rural, one can hardly spend 15 minutes sifting through litter or turning over logs without encountering one of these centipedes.

*Scolopocryptops peregrinator* (Crabill 1952), new status
Figs. 8-9, 15-16

*Otocryptops gracilis peregrinator* Crabill, 1952:124-126, Figs. 4-5.

*Diagnosis.* Color light yellow; 23 pairs of legs and pedal segments; ultimate legs not conspicuously thicker than preceding pair; 2nd antennomeres sparsely hirsute; ocelli absent; head not margined laterally; complete paramedian sulci beginning on 4th tergite.
Fig. 16. Distribution of Scolopocryptops peregrinator.

Ecology. The two specimens from Pine Ridge, Wolfe Co., Kentucky, were taken in March and April 1966 from beneath decaying leaves (Branson & Batch 1967). No habitat information accompanies the newly reported samples.

Distribution. Southern Pennsylvania to northwestern North Carolina and westward to eastern Kentucky; in North Carolina, known only from Ashe County (Figs. 15-16). The range includes parts of the Piedmont Plateau, Blue Ridge, Ridge and Valley, and Appalachian Plateau physiographic provinces. Material was examined from the following new localities.

Pennsylvania: Lebanon Co., Lebanon, Oct 1892 (NMNH); and unknown site in "western" part of state (not plotted in fig. 16), date unknown (NMNH).

District of Columbia: Catholic University Campus; Apr 1893 (NMNH).

Virginia: Frederick Co., east of Winchester, date unknown (NMNH). Rappahannock Co., 12.8 km NW Sperryville, Oct 1957 (NMNH). Pulaski Co., near Claytor Lake,

*In Virginia, S. peregrinator has also been taken from an unknown site in Shenandoah National Park (NMNH), which spans over 160 km (100 miles) of the Blue Ridge Province and occupies parts of eight counties. For convenience a dot is placed centrally in the Park area in figure 16.
Shelley: North Carolina Centipedes


NORTH CAROLINA: Ashe Co., 4.8 km NW Lansing along SR 1367, 0.3 km SW jet. SR 1368, 13 Apr 1984 (A4215).

Remarks. Despite considerable collecting in its known range the past century, S. peregrinata has only been taken 16 times. It may therefore be rare and population sizes may be small, but seasonality could also explain the paucity of specimens. The samples were collected in September, October, March, and April, suggesting that surface activity may be restricted to cooler months when less field sampling usually occurs. Concentrated investigations in the fall and spring may provide a truer picture of the abundance and distribution of S. peregrinata.

I examined the holotype, the Kentucky specimens, and 25 individuals from the above sites plus the paratype locality, Woodside, Montgomery County, Maryland, and compared these with specimens of S. gracilis from California. All specimens of S. peregrinata agree closely with the anatomical description by Crabill (1952). The degree of pilosity of the second antennomere varies but is always considerably less than that of the third and more distal articles, and the paramedian sulci on the third tergite extend beyond midlength on a few individuals. Both species lack lateral marginations on the cephalic plates, but the distinctions between S. peregrinata and gracilis cited by Crabill (1952) are readily apparent when the two are placed side by side and seem of comparable magnitude to those between S. sexspinatus and nigrandus. The tergal sulcal differences on segments 2-4 are particularly noteworthy (complete paramedian sulci begin on segment 4 in S. peregrinata and segment 2 in S. gracilis), as shown in figures 9-10 in contrast to the pattern in S. sexspinatus (similar to that in S. nigrandus) in Figure 1. The ranges of S. gracilis and peregrinata are segregated by over 3,200 km (2,000 miles) and neither extant linkage nor the occurrence of an intervening form with the "non-margined" cephalic plate has been demonstrated. The supposed occurrence of S. gracilis in Houston, Texas (Chamberlin 1943a), is surely a labeling mixup, as the sample was taken at the same time and by the same collector, Russell Scott from September to December 1941, as the holotype of the millipede Sigmaria (Falloria) houstoni Chamberlin (1943b). Shelley and Whitehead (1986) showed that the millipede actually occurs in southeastern Tennessee, and the chilopod record is probably equally erroneous. I could not locate the specimen in the NMNH collection in April 1986, and the Houston record of S. gracilis must be discounted until confirmed with fresh material. Shelley and Whitehead (1986) defined subspecies in the xystodeomid millipede tribe Aphanorini as "taxa which are reasonably homogeneous throughout their ranges but which connect with other such taxa through intergrade or intermediate forms," and where range disjunctions occurred the populations were considered either separate species or consubspecific. This approach seems applicable to chilopods and S. peregrinata deserves elevation on a geographical basis alone, since gene flow is impossible with S. gracilis in California. The anatomical differences substantiate this change and reflect lengthy geographical isolation, if the chilopods ever shared a common ancestor as the "non-margined" cephalic plates suggest. Considering the structural differences and the vast geographical segregation, an equally plausible interpretation of the cephalic similarity is that it represents convergence and that scolopocryptopines displaying it evolved independently in both eastern and western North America. The true relationships of S. gracilis and peregrinata may therefore lie elsewhere; the latter, for example, may be sister to S. rubiginosus Koch, a more proximal midwestern species, which exhibits complete paramedian sulci on most tergites. An analysis of relationships in Scolopocryptops is beyond the scope of the present study, but peregrinata and gracilis have been repro-
ductively isolated for a long time. I therefore formally elevate peregrinator to the specific level.

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TWO NEW SPECIES OF CHIONASPIS (HOMOPTERA: COCCOIDEA: DIASPIDIDAE) FROM NORTH AMERICA

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ABSTRACT

During our study of the genus Chionaspis in North America, two new species were found. Chionaspis hamoni, n. sp. is described from Salix spp. in Florida, and Chionaspis gilli, n. sp. is described from Tamarix spp. in the southwestern United States. The adult females of both species are illustrated. The diagnostic characters, hosts, distributions, relationships with other species in the genus are also given and discussed.

RESUMEN

Se encontraron dos especies nuevas durante nuestro estudio del género Chionaspis en Norte América. Chionaspis hamoni, nueva especie, es descrita de Salix spp., en la Florida y C. gilli, nueva especie, es descrita de Tamarix spp. en el suroeste de los Estados Unidos. Se ilustran las hembras adultas de ambas especies. Se presentan y discuten los caracteres diagnósticos, hospederos, distribución, y relaciones con otras especies del género.

Adult females of the 59 known species in the genus Chionaspis are similar to one another in general appearance and morphology. The pygidal lobes bear the characters most useful for identification. However, identification is not simply a matter of discerning differences between specimens, and the non-specialist may find it exceedingly difficult to identify an unknown specimen for the following reason. Several species in the genus have recently been discovered to be polymorphic (dimorphic or trimorphic); this