

The Guardstone Spiders of the *Phrurotimpus palustris* Group (Araneae, Phrurolithidae)

NORMAN I. PLATNICK¹

ABSTRACT

The type species of *Phrurotimpus*, *Herpyllus alarius* Hentz, was based on a female from Alabama; because Hentz's type specimens were destroyed long ago, the identity of this species has been controversial for over a century. Examination of Hentz's original color paintings of his specimen indicates that earlier authors, such as Bishop and Crosby, and Chamberlin and Ivie, were correct in arguing that Emerton erred in assigning the name to a species common in the northeastern United States. Unfortunately, Kaston (who had access only to the published, black-and-white illustrations) subsequently sided with Emerton, and that misidentification has been followed in all more recent literature. *Phrurotimpus palustris* (Banks) and *P. annulatus* Chamberlin and Ivie are removed from the synonymy of *P. alarius* and considered valid. *P. palustris* refers to the common northeastern species, whereas *P. annulatus* refers to a sibling species apparently restricted to the southeastern United States; Hentz's *P. alarius* is a member of a different species group entirely. Four other species are assigned to the *palustris* group, which is known only from the eastern United States and Canada: *P. umbratilis* (Bishop and Crosby), *P. wallacei* (Gertsch, here transferred from *Phrurolithus*), and two new species: *P. sorkini* from Georgia and Florida and *P. bernikeræ* from Florida.

INTRODUCTION

Phrurolithid spiders have been recognized as a group since Simon (1897: 146) established the Micariosomateae, based on a generic name now placed as a junior synonym of *Phrurolithus* C. L. Koch (1839), but the taxon was only recently elevated to family status by Ramírez (2014:

¹ Division of Invertebrate Zoology, American Museum of Natural History.

342). Having previously been lumped into the Corinnidae, Liocranidae, or even Clubionidae, the group has never even received a common name. After consultation with the American Arachnological Society's committee on common names, I've adopted the suggestion (by the late Robin Leech) of "guardstone spiders" for these taxa. That name reflects the etymology of the type genus, *Phrurolithus*, which is a compound adjective that means "guarding the stone" and refers to the habits of the type species, as described by C.L. Koch (1839: 101), and translated by Cameron (2005: 315):

Her abode, as Hahn already observed, is always under stones. Underneath them the female lays her eggs in a spherical lump and spins over them a light, transparent web, on which the mother awaits the hatching of her young.

Whether all species of the family share this egg sac guarding behavior is uncertain; Dondale and Redner (1982: 130) indicated that in the genus *Phrurotimpus* Chamberlin and Ivie (1935), "the ovipositing female fastens her flat, scalelike, shiny red egg sacs to stones and then abandons them." However, in 1967 William Shear collected a female of *Phrurotimpus borealis* (Emerton), under a stone in West Virginia, that was guarding a bright red egg sac (per label with specimen).

North America is a major center of diversity for the family; seven of the 13 genera and 91 of the 223 species recognized in the World Spider Catalog (2019) occur in North America, but the New World fauna has been seriously neglected; there are numerous undescribed species, especially from Mexico and Central America. Only the small, basal genus *Drassinella* Banks (1904) has been revised (see Platnick and Ubick, 1989); aside from that revision and an unpublished thesis by Penniman (1985), the most recent description of a new species from the United States or Canada was published by Roddy (1957)! The bulk of the known taxa were first described between 1925 and 1945; most of those descriptions were based on few specimens, and are often marred by inadequate diagnoses, missing sexes or locality data, and poor or no illustrations. The present paper deals with part of the genus that is most commonly encountered in collections from the United States and Canada, *Phrurotimpus*.

Generic limits within the Phrurolithidae have seldom been well supported, especially in North America. Early workers seem to have started with the presumption that at least some New World species belong to the type genus, *Phrurolithus*, the type species of which is from Europe. In establishing their new genus *Phrurotimpus*, Chamberlin and Ivie (1935: 34) provided only this justification:

Phrurotimpus is proposed as a new generic name for a group of species previously considered as belonging to *Phrurolithus*. *Phrurolithus* Chamberlin ... was created for a number of distinct species grouped around *Phrurolithus formica* Banks as the genotype, while *Phrurolithus alarius* (Hentz) and related species were regarded as belonging to the true *Phrurolithus*. According to Dr. Willis J. Gertsch of the American Museum, *Phrurolithus formica* is congeneric with *Phrurolithus festivus* C. Koch, the genotype of *Phrurolithus*. Thus *Phrurolithus* becomes a synonym of *Phrurolithus*, and the group represented by *alarius* is in need of a new name.

In other words, no diagnostic characters were mentioned by Chamberlin and Ivie, and their proposal of *Phrurotimpus* fails to meet Article 13.1.1 of the International Code of Zoological Nomenclature, which requires that every new name published after 1930 must “be accompanied by a description or definition that states in words characters that are purported to differentiate the taxon.” However, the following article (13.1.2) allows this provision to be met by “a bibliographic reference to such a published statement.” Chamberlin and Ivie’s (1935) paper did not contain a list of references, but their decision clearly reflected comments that had been published a few months earlier by Gertsch (1935: 1):

In 1921, Dr. R. V. Chamberlin ... separated the American species referred to the genus *Phrurolithus* into two groups. For one of these was erected the new genus *Phruoronellus*, with *P. formica* Banks as the type, a species which is characterized by its general dark color, the presence of a conspicuous femoral apophysis and a furcate tibial apophysis on the male palpus. In the other group were left such species as *P. alarius*, *palustris*, and *minutus*, in which the general color is much lighter, the femur of the male palpus is provided with a tubercular nodule, and the tibia of the palpus armed with a single retrolateral apophysis. A study of the genotype, the European *Phrurolithus festivus* C. Koch, shows that the dark forms referred to *Phruoronellus* are in all respects congeneric and that, if a new genus were needed, it should have been applied to the forms of which *alarius* is an example. While it is true that the characters on which these groups are based are in no way intergrading, the close agreement in general structure seems to make a new genus unnecessary.

Thus, I consider Gertsch’s mentioned characters to be the ones that Chamberlin and Ivie intended to be diagnostic. There is a problem with Gertsch’s discussion, however; although he was correct that the two North American genera have very different kinds of modifications of the male palpal femur and tibia, it is the species like *P. alarius* that correspond to the European *Phrurolithus* species in those features. Gertsch later recognized this error, and advocated using the generic name *Scotinella* Banks (1911) for the species resembling *P. formica*. Should others consider Chamberlin and Ivie’s mention of Gertsch’s views an insufficient indication, the authorship and availability of *Phrurotimpus* would devolve to the next subsequent publication that provided diagnostic information. That would apparently be Gertsch (in Comstock, 1940: 589).

Although there are many Holarctic spider genera, including the type genera of many classical family-group names, it appears that, as Gertsch eventually concluded, *Phrurolithus* is not one of them. Its Palearctic type species, *P. festivus*, has been well illustrated by several authors, including Grimm (1986: figs. 49a, b, 52, 53a, b) and Wang et al. (2015: 15A–G). The male palps of that species, and of at least its closest relatives in Europe, do resemble those of *Phrurotimpus* in the shape of the femur, which has a setose ventral expansion, and in having only a single, large retrolateral tibial apophysis. However, the palpal bulb is much shorter and more rounded than in *Phrurotimpus* species, and the female genitalia are very different, with an unusual sclerotized plate that occupies the posterior third of the dorsal (internal) side. There are no

known native North American species that share those characters with the European species. Penniman (1985: 231) identified three specimens purportedly collected in Onondaga County, New York, in 1980, as *P. festivus*, but those specimens appear to have been a chance introduction, and there is no evidence of any established American populations of *P. festivus* or any other species that actually belong to *Phrurolithus*. In other words, none of the New World species currently placed in *Phrurolithus* actually belong to that genus.

Given the historical ambiguity of the limits of these genera, it is not surprising that several members of *Phrurotimpus* are still listed as members of *Phrurolithus* in recent and current catalogs. The reason, in part, is that Roewer (1955) did not accept some published transfers of names (presumably because little or no evidence was presented to justify those transfers). Penniman (1985) presented the first cladistic analysis of generic-level relationships within the family; although he was primarily concerned with other taxa, he treated *Phrurotimpus* as monophyletic on the basis of two characters: the presence of a pair of apical spines under tibia IV, and of a retrolateral groove on the male palpal cymbium. The first character was presumed to be “secondarily derived,” as most higher phrurolithines have lost all ventral and lateral spines on the posterior legs, and the second character was presumed to occur convergently also in the members of *Piabuna* Chamberlin and Ivie (1933).

Penniman “tentatively paired” *Phrurotimpus* with the single Mediterranean species now placed in the genus *Liophrurillus* Wunderlich (1992), based on the presence in both groups of iridescent scales, but acknowledged that it is unclear whether all species of *Phrurotimpus* actually have such scales. The scales are sometimes conspicuous, and were illustrated even by Emerton (1890). A thorough, scanning electron microscope comparison of setal structure across all body regions of both sexes of all species would be needed to assess accurately the potential phylogenetic value of the iridescent scales, but having both the carapace and the dorsum and sides of the abdomen conspicuously coated with such scales seems to be a characteristic of only one of the two species groups that comprise *Phrurotimpus*.

Those two species groups are easily distinguishable by other characters as well. Members of the group with iridescent scales tend to have the dorsum and sides of the abdomen dark, with light markings, and have a distinctive, thumb-shaped distal lobe on the retrolateral side of the palpal tegulum. Members of the other group have the dorsum and sides of the abdomen white, with dark markings, and have strongly annulated legs. Despite these obvious differences, the groups have not previously been recognized. There are even two cases, the original descriptions of *Phrurolithus paludivagus* Bishop and Crosby (1926) and *Phrurolithus kentuckyensis* Chamberlin and Gertsch (1930), in which males belonging to one species group were mismatched with females of species belonging to the other group!

More recent cladistic analyses have merely treated a single exemplar species of *Phrurotimpus*. In the analysis by Bosselaers and Jocqué (2002), that species, which they identified as *P. alarius*, was paired with *Scotinella minnetonka* (Chamberlin and Gertsch, 1930), on the basis of three homoplasious characters (presence of a retrocoxal hymen in males, presence of that feature in females, and presence of a wide indentation on the retrolateral side of patellae I and II). In the more recent analysis by Ramírez (2014), the same species was resolved instead as

the sister group of *Phrurolithus* plus *Otacilia* Thorell (1897), uniquely sharing with them the presence of basally globose endites in males.

All these analyses are at best suggestive; only after the genera are accurately delimited will it be possible to incorporate taxon sampling that is thorough enough to produce credible results. There will likely be significantly more genera than are currently recognized; for example, it seems unlikely even that all the Palearctic species currently assigned to *Phrurolithus* constitute a monophyletic group.

The earliest descriptions of American phrurolithids were published as part of the pioneering work of Nicholas Marcellus Hentz, a Frenchman who learned the art of miniature painting in Paris before immigrating to the United States. Hentz (1847) described 20 species that he assigned to the gnaphosid genus *Herpyllus* Hentz (1832); the last three species he treated under that heading were transferred to *Phrurolithus* by Marx (1890), and those three names have since had rather different histories.

As is typical for such early publications, Hentz's descriptions were short and not very informative, focusing on color patterns; he provided few details about genitalic characters but did present habitus illustrations for most of his species. Hentz's specimens were deposited in the Boston Society of Natural History, but were dry, pinned like insects, and were subsequently eaten by beetles. Thus there are no existing type specimens and modern workers have had to rely entirely on the original publications to try to identify Hentz's taxa. In Hentz's papers, the illustrations were printed only in black and white, but Hentz actually executed his habitus drawings as miniature color paintings. In the 1970s, two sets of those original color paintings surfaced; one set is now housed in the library of the American Museum of Natural History, and the other in that of the Museum of Comparative Zoology. The color paintings are of course in many cases much more informative than the published illustrations.

One of the three names, *Herpyllus alarius* Hentz (1847), was based on a female from Alabama and was chosen as the type species of *Phrurotimpus* by Chamberlin and Ivie (1935), but by that time the identity of the species had already been thoroughly confused. The first significant re-description of *P. alarius* was published by Emerton (1890), who included specimens belonging to each of the two species groups under that name. Most of Emerton's figures show a species in whose members the abdomen is darkened and bears lighter dorsal markings, but one shows a dorsal view of the abdomen of a "light-colored variety" in which the dorsum is white with dark chevrons. Emerton (1911) subsequently distinguished the two species, assigning the light-colored one to *P. alarius* and describing the darker one as *Phrurolithus borealis* Emerton (1911).

Bishop and Crosby (1926: 191) disagreed with Emerton's decision, pointing out that in Hentz's original figure of *P. alarius*, "the pattern on the abdomen is exactly like that of dark specimens of this form [*P. borealis*] and does not even suggest the markings of the other form."

Chamberlin and Ivie (1935: 34) evidently concurred with Bishop and Crosby, as they regarded their earlier species *Phrurolithus utus* Chamberlin and Ivie (1933), which has a similarly dark abdomen, as a junior synonym of *P. alarius*.

Emerton's erroneous decision was nevertheless followed by Kaston (1945: 5), who acknowledged that "in Hentz's figure we have only the pigmentation pattern to go by" but argued that

“While it is true, as observed by Bishop and Crosby, that as far as the cephalothorax and abdomen are concerned the drawing more nearly resembles what Emerton has described as *borealis*, the drawing very plainly shows black spots on legs III and IV.” Kaston was correct in recognizing that in members of the species group with light abdomens, at least the posterior legs bear distinct dark annulations, whereas members of the species group with dark abdomens have at most gray smudges on the posterior legs.

Unfortunately, Kaston was misled by the published, black and white version of Hentz’s paintings; the color paintings show only the smudges one would expect on a specimen of the group with dark abdomens. Also, Hentz described tibia I as “blackish hairy,” which again fits only members of the species group with dark abdomens. Subsequent authors have followed Kaston in using the name *P. alarius* to refer to a member of the wrong species group (the one in which the abdomen is light and the legs are distinctly annulated). Of the species known from Alabama, Hentz’s original paintings most closely match the females with dark abdomens that have previously been assigned to a close relative of *P. borealis*, not the species misidentified by Emerton (1911), Kaston (1945), and all later authors as *P. alarius*.

Given this long history of misidentification, two options are possible. One could designate a neotype for *P. alarius* that corresponds to the species consistently misidentified as *P. alarius* since Kaston (1945). That approach would have two drawbacks. First, the neotype would have to come from a more northern locality, as the species misidentified by Kaston as *P. alarius* appears not to occur as far south as Alabama. Second, it would saddle *Phrurotimpus* with a significantly misidentified type species; when Chamberlin and Ivie (1935) established the genus, with *P. alarius* as its type, they clearly intended the type species to be one with a darkened abdomen. As first revisor, I would then have to choose either the newly resolved *P. alarius* or the member of an entirely different species group thought to be *P. alarius* by Chamberlin and Ivie (1935) as the type species. Moreover, the choice might, in the long run, affect the use of the generic name, as the two species groups recognized here could easily be treated as separate genera. I have chosen instead to consider both species groups as members of *Phrurotimpus*, as there seems to be a synapomorphic genitalic character uniting them (the presence of U-shaped bursae originating near the copulatory openings of females, as in figs. 13, 26).

Long-term stability would therefore seem to be best served by choosing as a neotype that specimen from Alabama that most closely matches Hentz’s original color paintings. Thus the neotype, to be designated in a subsequent paper dealing with that species group, will represent the species that I think is truly *alarius*. There is an available name, *P. palustris* (Banks, 1892), for the species misidentified as *P. alarius* by Kaston and later authors. Interestingly, Gertsch (1935: 1, quoted above) apparently concurred with Bishop and Crosby (1926) and Chamberlin and Ivie (1933), as he considered *P. palustris* and *P. alarius* to be separate species.

Distinguishing the species of *Phrurotimpus* is not easy, as both the male and female genitalia are relatively simple. For males, most published illustrations have focused on the retrolateral tibial apophyses, as those structures tend to show more differences than does the palpal bulb, which provides relatively few characters; even scanning electron micrographs of the embolar region (e.g., Ramírez, 2014: fig. 165C) show no specialized structures. Most of the

previously published treatments of these species do not even show the details of the embolus, probably because they are often obscured by the cymbial setae; for the ventral views provided here, the tip of the cymbium was mechanically moved out of the way, or removed when necessary, so that the tip of the palpal bulb could be imaged.

The female epigyna can also be difficult to study, as the copulatory openings are often covered by a dark, dense plug that is presumably secreted by the male during mating and can be difficult or impossible to remove without damaging the epigynum. As indicated by Uhl et al. (2010), the source of the amorphous material forming the plug is unknown, but it probably originates from the male palpal bulb, as similarly dark material can sometimes be seen inside the bulb (figs. 31, 32). For this project, the female genitalia were digested using enzymatic contact lens cleaning solution. In *Phrurotimpus*, the primary spermathecae (those leading directly to the fertilization duct) are situated posteriorly, but there is sometimes a pair of tiny, secondary spermathecae situated anteriorly, close to the copulatory openings (see Ramírez, 2014: fig. 180F). More conspicuous, however, are the pair of U-shaped bulbous expansions; Ramírez (2014: 265) described these as a “globose membranous extension of [the] proximal copulatory duct,” but these lightly sclerotized structures are here termed the *bursae*, after Penniman (1985: 144). Despite the number of structures, epigynal differences between species are often minimal. Fortunately, the meager genitalic differences are sometimes accompanied by more obvious differences in color patterns.

Thanks to the institutions, curators, and collectors listed below, this study was based on the examination of over 3400 adult specimens. That total could easily have been enlarged, as several of the major collections contain huge series of individual species captured in long-term pitfall trapping studies conducted at single sites. Rather than confirm the prior identifications of all such redundant specimens, representative samples were selected to cover the temporal ranges of the trapping regimes at those sites. Locality data were entered in the Arthropod Easy Capture (AEC) software hosted at the American Museum of Natural History; that database was used to generate both the material examined lists and files of geographic coordinates for mapping, which was done via the SimpleMappr software (Shorthouse, 2010) originally designed for the oonopid Planetary Biodiversity Inventory project. For the most commonly collected species, *P. palustris* (with over 2400 specimens examined), only county records are provided here, but full details on those specimens should become available, after publication, online (www.discoverlife.org). Users should note that the coordinates exported from the AEC database are often substantially less accurate than the number of significant digits would suggest, as the geocoding of many of the localities was done by a wide variety of people, for a wide variety of purposes; my purpose was only the creation of large-scale distribution maps that require relatively low accuracy. The format of the leg spination descriptions follows that of Platnick and Shadab (1975); all measurements are in mm.

COLLECTIONS EXAMINED

- | | |
|------|---|
| AMNH | American Museum of Natural History, New York, NY |
| CAS | California Academy of Sciences, San Francisco, CA |

CDU	collection of Darrell Ubick
CKR	collection of Kimberley Russell
CMM	collection of Marc Milne
CNC	Canadian National Collection, Ottawa, Canada
CUC	Cornell University Collection, housed at AMNH
DNHC	Denver Museum of Nature & Science, Denver CO
FMNH	Field Museum of Natural History, Chicago IL
FSCA	Florida State Collection of Arthropods, Gainesville, FL
MCZ	Museum of Comparative Zoology, Harvard University, Cambridge MA
MEMU	Mississippi Entomological Museum, Mississippi State University, MS
MSUC	Midwestern State University Invertebrate Collection, Wichita Falls TX
USNM	National Museum of Natural History, Smithsonian Institution, Washington DC
VMNH	Virginia Museum of Natural History, Martinsville VA

Phrurotimpus Chamberlin and Ivie

Phrurotimpus Chamberlin and Ivie, 1935: 23 (type species by original designation *Herpyllus alarius* Hentz).

DIAGNOSIS: Males differ from those of the other New World genera by having a setose ventral expansion on the papal femur and a single, large retrolateral tibial apophysis (as in figs. 7, 20); females similarly differ by having a pair of large, U-shaped, translucent bursae obscuring much of the other epigynal structures in dorsal view (as in figs. 13, 26).

DESCRIPTION: A detailed generic description must await treatment of the other species group.

The *palustris* Group

Members of this species group are easily recognized by their distinctly annulated posterior legs (as in figs. 10, 23), and are known only from eastern North America. The six known species seem to form three pairs of sister species (see diagnoses below); *P. palustris* plus *P. annulatus*, and *P. sorkini* plus *P. wallacei*, are all largely allopatric and probably constitute a monophyletic group that is the sister to *P. umbratilis* plus *P. bernikeræ*, which are allopatric with regard to each other but not to the other four species.

Key to Species of the *palustris* Group

1. Base of retrolateral tibial apophysis extended laterally, far to the side of the cymbium (figs. 5, 7, 18, 20); copulatory openings situated anteriorly on epigynum (figs. 11, 12, 24, 25).....2
- Base of retrolateral tibial apophysis not extended laterally (figs. 33, 46, 59, 72); copulatory openings situated medially on epigynum (figs. 37, 50, 63, 76).....3
2. Embolus with relatively long base and short tip (fig. 6); ridges over copulatory openings angular (figs. 11, 12); tibia I usually darkened for most of its length (fig. 4).....*palustris*

- Embolus with relatively short base and long tip (fig. 19); ridges over copulatory openings rounded (figs. 24, 25); tibia I usually with subdistal dark annulation (fig. 17)....*annulatus*
- 3. Distal end of retrolateral surface of palpal bulb with wide sclerotized ridge (figs. 33, 46); copulatory ducts extending posteriorly from openings (figs. 38, 51); sternum unmarked (figs. 29, 42)..4
- Distal end of retrolateral surface of palpal bulb without wide sclerotized ridge (figs. 59, 72); copulatory ducts extending anteriorly from openings (figs. 64, 77); sternum usually with median longitudinal dark marking (figs. 55, 62, 68, 75).....5
- 4. Embolus relatively long, directed retrolaterally (fig. 32); copulatory openings directed posteriorly (figs. 37, 38)*sorkini*
- Embolus relatively short, directed ventrally (fig. 45); copulatory openings directed laterally (figs. 50, 51).....*wallacei*
- 5. Retrolateral tibial apophysis relatively short (fig. 59); copulatory ducts relatively short (figs. 63, 64).....*umbratilis*
- Retrolateral tibial apophysis relatively long (fig. 72); copulatory ducts relatively long (figs. 76, 77).....*bernikeræ*

Phrurotimpus palustris (Banks)

Figures 1–13; map 1

- Phrurolithus alarius* (misidentification): Emerton, 1890: 189, pl. VI, fig. 5a (“light-colored variety”) only; 1911: 405, figs. 4, 4a (erroneously considered a senior synonym of *P. palustris*). – Chickerling, 1939: 78, figs. 76–79.
- Phrurolithus palustris* Banks, 1892: 23, pl. I, fig. 70 (female holotype from Ithaca, Tompkins Co., New York, in MCZ; examined). – Bishop and Crosby, 1926: 193 (correctly rejected synonymy with *P. alarius* by Emerton, 1911).
- Phrurolithus kentuckyensis* (misidentification): Chamberlin and Gertsch, 1930: 141, fig. 23 (females only).
- Phrurotimpus palustris*: Chamberlin and Ivie, 1944: 188 (N.B.: the listed females from Georgia are misidentified specimens of *P. sorkini*).
- Phrurotimpus alarius* (misidentification): Kaston, 1945: 5, figs. 38, 39 (again erroneously considered a senior synonym of *P. palustris*); 1948: 387, figs. 1354, 1355, 1383, 1384. – Dondale and Redner, 1982: 132, figs. 240–242. – Penniman, 1985: 231, figs. 15, 25. – Bosselaers and Jocqué, 2002: 269, fig. 3C. – Paquin and Dupérré, 2003: 152, figs. 1675, 1676. – Ramírez, 2014: 369, figs. 9F, 15B, 31A–C, 43D, 125C, D, 165C, D, 180F.

DIAGNOSIS: This appears to be the northern sister species of *P. annulatus*; males share a retrolateral tibial apophysis that extends far to the side of the tibia, producing a distinctive, triangular gap between the tibia and the shaft of the apophysis (figs. 5, 18). Adults of both sexes can often be distinguished by the coloration of tibia I; in *P. palustris* the proximal four-fifths of the segment is usually darkened (fig. 4), whereas in *P. annulatus* the proximal portion is typically unmarked and there is a subdistal dark annulation (fig. 17). Genitalic differences are minor; in males of *P. palustris* the embolus has a longer base and shorter tip (compare figs. 6,



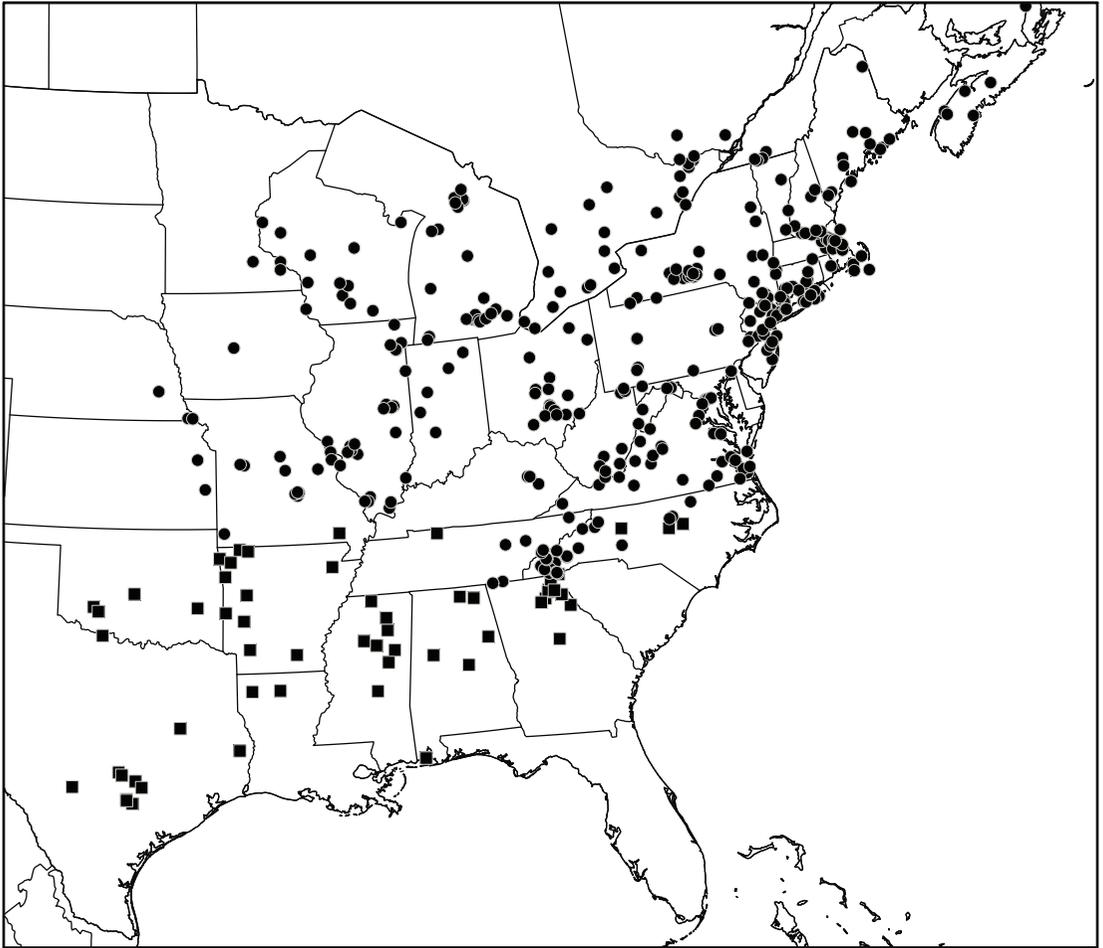
FIGURES 1–13. *Phrurotimpus palustris* (Banks), male (1–7) and female (8–13). 1, 8. Carapace, dorsal view. 2, 9. Abdomen, same. 3, 10. Habitus, ventral view. 4. Left leg I, prolateral view. 5. Left palp, prolateral view. 6. Left palpal bulb and embolus, ventral view. 7. Left palp, retrolateral view. 11. Epigynum, ventral view. 12. Same, cleared. 13. Cleared epigynum, dorsal view.

19). Females of *P. palustris* have more angular ridges over the copulatory openings (compare figs. 11, 24) and the globose bursae originating from the copulatory duct are longer (compare figs. 13, 26).

MALE (AMNH_IJC 294695, figs. 1–7): Total length 1.78. Carapace pale orange with thin gray margins, broad unmarked submarginal band, paramedian gray bands; sternum yellow, without pattern; mouthparts yellow; abdomen white, with W-shaped dark chevrons extending across dorsum to sides, dorsal scutum yellow-brown, covering most of dorsum, venter with two paramedian gray spots at about two-thirds of length; legs yellow, femora with subdistal gray markings, patellae with distal gray markings, tibia I gray over proximal four-fifths of its length, without ventral fringe of setae, tibiae II, III, IV with gray, ringlike annulations at about three-fifths of segment length, metatarsi with proximal plus subdistal gray rings. Leg spination: femora: I d1-0-0, p0-0-2; II–IV d1-0-0; tibiae: I v6-4-2; II v4-4-2; IV v0-0-2; metatarsi I, II v4-2-1p. Palpal tibia distally excavated on ventral surface, base of retrolateral apophysis extending far to side, producing triangular gap separating tibia from shaft of apophysis, bulb slender, elongated, embolus abruptly bent at about half its length.

FEMALE (AMNH_IJC 294695, figs. 8–13): Total length 2.32. Coloration as in male except abdomen without dorsal scutum, with longer ventral gray spots. Leg spination as in male except tibia II v4-4-1p; metatarsus II v4-1p-1p. Epigynum with copulatory openings situated anteriorly, margins of openings with parallel median edges demarcating long, Y-shaped median plate; anterior spermathecae tiny, situated at about one-fifth of copulatory duct length, posterior spermathecae short, wide, dwarfed by globose bursae originating from wide ducts extending almost to copulatory openings.

RECORDS (county records only; N = 2480): **CANADA: Nova Scotia:** Annapolis, Hants, Inverness, Kings, Lunenburg. **Ontario:** Bruce, Chatham-Kent, Elgin, Essex, Hastings, Lambton, Lanark, Leeds and Grenville, Muskoka, Niagara, Norfolk, Ottawa, Peel, Simcoe, York. **Québec:** Brome-Missisquoi, La Rivière-du-Nord, La Vallée-de-la-Gatineau, Montérégie, Outaouais, Papineau. **UNITED STATES: Connecticut:** Fairfield, Litchfield, Middlesex, New Haven, Tolland. **District of Columbia.** **Illinois:** Bond, Calhoun, Champaign, Coles, Cook, DuPage, Jackson, Jersey, Kankakee, Lake, Macoupin, Madison, Montgomery, Piatt, Pope, Union. **Indiana:** LaPorte, Noble, Owen, Parke, Posey, Tippecanoe. **Iowa:** Boone. **Kansas:** Douglas, Linn. **Kentucky:** Breathitt, Powell, Wolfe. **Maine:** Aroostook, Hancock, Kennebec, Penobscot, Sagadahoc, Washington, York. **Maryland:** Cecil, Garrett, Montgomery, Prince George's. **Massachusetts:** Barnstable, Berkshire, Dukes, Essex, Middlesex, Nantucket, Norfolk, Plymouth, Suffolk. **Michigan:** Berrien, Calhoun, Cheboygan, Clare, Clinton, Emmet, Jackson, Leelanau, Livingston, Mackinac, Muskegon, Oakland, Washtenaw. **Minnesota:** Rice, Wabasha, Winona. **Missouri:** Boone, Cole, Franklin, Johnson, Newton, Phelps, St. Charles, St. Louis. **Nebraska:** Lancaster, Richardson. **New Hampshire:** Belknap, Carroll, Cheshire, Hillsborough. **New Jersey:** Bergen, Burlington, Hunterdon, Mercer, Middlesex, Monmouth, Morris, Ocean, Sussex. **New York:** Albany, Allegany, Cattaraugus, Chautauqua, Chenango, Essex, Genesee, Monroe, Nassau, New York, Onondaga, Orange, Queens, Rensselaer, Richmond, Rockland, Schuyler, Steuben, Suffolk, Tompkins, Ulster, Warren, Westchester, Yates. **North Carolina:** Buncombe, Caldwell, Durham,



MAP 1. Eastern North America, showing records of *Phrurotimpus palustris* (circles) and *P. annulatus* (squares).

Haywood, Jackson, Macon, Mecklenburg, Orange, Swain, Watauga. **Ohio:** Athens, Fairfield, Franklin, Hocking, Knox, Lake, Licking, Marion, Muskingum, Pike, Ross, Trumbull, Vinton. **Pennsylvania:** Adams, Bucks, Erie, Schuylkill, Venango, Warren, Westmoreland. **Rhode Island:** Kent. **Tennessee:** Carter, Grundy, Hamilton, Knox, Morgan, Sevier, Sullivan. **Vermont:** Lamoille, Washington, Windsor. **Virginia:** Amherst, Augusta, Botetourt, Chesapeake, Falls Church, Franklin, Giles, Greensville, Highland, Lunenburg, Mecklenburg, Nelson, Norfolk, Northampton, Prince William, Richmond, Stafford, Suffolk, Surry, Sussex, Tazewell, Virginia Beach, Wise, York. **West Virginia:** Berkeley, Fayette, Greenbrier, Mercer, Monongalia, Morgan, Pendleton, Pocahontas, Preston, Raleigh, Summers, Tucker, Wood. **Wisconsin:** Columbia, Dane, Door, Grant, Jackson, Sauk, Vernon, Walworth, Waupaca.

DISTRIBUTION: Eastern Nebraska east to Nova Scotia and North Carolina (map 1), apparently absent further south, where replaced by *P. annulatus*, *P. sorkini*, and *P. wallacei*. The AMNH collection includes three specimens from outside this area that are presumably either mislabeled or represent chance introductions. These include a female putatively from Albu-

querque, New Mexico (no further data), a female putatively from Jamaica (collected “7-11-13”), and a male supposedly taken at an elevation of 4800 ft on Mt. Roraima, Brazil, by G. Tate. The MCZ collection includes three similarly enigmatic specimens. One female was supposedly collected in Nassau, Bahama Islands, by N. Banks (and may actually be from Nassau County, Long Island); one male was reportedly collected by N. Banks in Olympia, Washington (and may actually be from Washington, D.C.); another female was purportedly collected on Barro Colorado Island, Panama, by A. Chickering in 1958 (and may be mislabeled from Chickering’s voluminous Michigan collections of the species).

NATURAL HISTORY: Adult males have been taken from February to mid-October, adult females from late January to late December. Specimens have frequently been collected in pitfall traps, by leaf-litter sifting, and in Berlese samples, and have been taken in deciduous forests (oak, scrub oak, beech, alder, white ash, aspen, birch, willow, maple, basswood, hazel, and hickory), as well as forests with some cedar, red spruce, pitch pine, and white pine, in meadows, saltmarshes, potato and strawberry fields, along roads, streams, ponds, summit bogs, and marshes, on old dunes, and in rotted logs and decaying grass under cartons, at elevations up to 4070 ft.

Phrurotimpus annulatus Chamberlin and Ivie

Figures 14–26; map 1

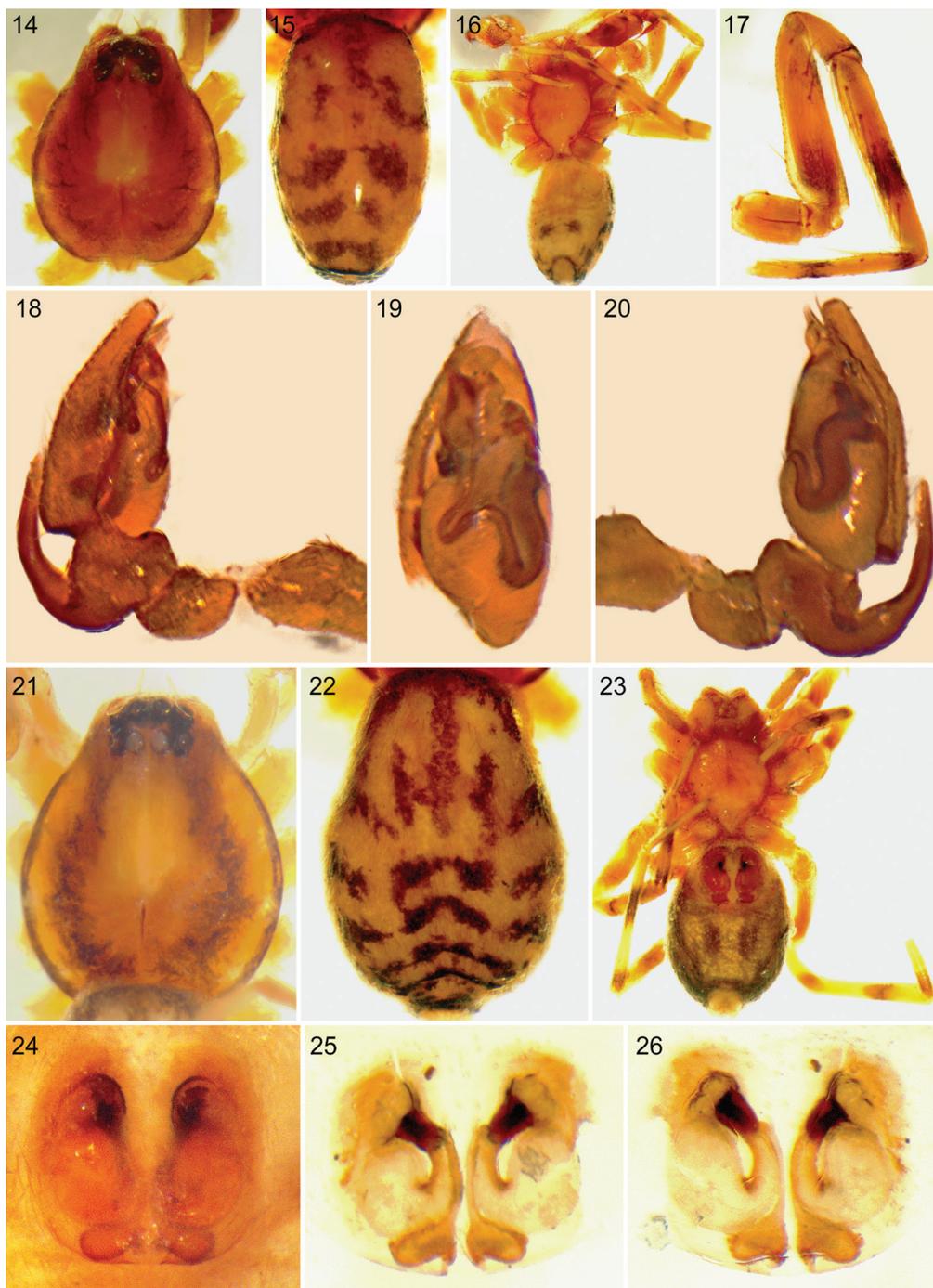
Phrurotimpus annulatus Chamberlin and Ivie, 1944: 187, figs. 194–198 (male holotype and female allotype from Demorest, Habersham Co., Georgia, in AMNH; examined).

Phrurotimpus alarius: Ivie, 1967: 126 (synonymy, here rejected).

DIAGNOSIS: This appears to be the southern sister species of *P. palustris*; see the diagnosis of that species for details. Specimens are often easily separated from those of *P. palustris* by the coloration pattern on tibia I, which is as annulated as are the other legs (fig. 17).

MALE (AMNH_IZC 294822, figs. 14–20): Total length 2.07. Carapace pale orange with thick gray margins, broad unmarked submarginal band, paramedian gray bands; sternum yellow, without pattern; mouthparts yellow except basal half of anterior surface of paturon with gray markings; abdomen white, with W-shaped dark chevrons extending across dorsum to sides, dorsal scutum yellow-brown, covering most of dorsum, venter with two paramedian gray spots at about two-thirds of length; legs yellow, femur I with sides darkened for most of length, femora II–IV with subdistal gray annulations, patellae with distal gray annulations, tibiae with subdistal gray annulations, metatarsi with basal plus subdistal gray annulations. Leg spination: femora: I d1-0-0, p0-0-2; II–IV d1-0-0; tibiae: I v6-4-2; II v4-4-2; IV v0-0-2; metatarsi: I v4-2-1p; II v3-2-1p. Palp as in *P. palustris* except embolus with shorter, more laterally directed base, longer tip.

FEMALE (AMNH_IZC 294822, figs. 21–26): Total length 2.14. Coloration as in male except abdomen without dorsal scutum, with longer ventral gray spots. Leg spination as in male except tibia II v4-4-3. Epigynum as in *P. palustris* except margins of openings more rounded, more obliquely directed, globose bursae off copulatory ducts shorter.



FIGURES 14–26. *Phrurotimpus annulatus* Chamberlin and Ivie, male (14–20) and female (21–26). 14, 21. Carapace, dorsal view. 15, 22. Abdomen, same. 16, 23. Habitus, ventral view. 17. Left leg I, prolateral view. 18. Left palp, prolateral view. 19. Left palpal bulb and embolus, ventral view. 20. Left palp, retrolateral view. 24. Epigynum, ventral view. 25. Same, cleared. 26. Cleared epigynum, dorsal view.

MATERIAL EXAMINED (N = 459): UNITED STATES: **ALABAMA: Cleburne Co.:** Talladega National Forest at Highway 431, 33.55833°N 85.70972°W, 24 Jun 1984, Berlese, deciduous forest, R. Bennett, 1 ♀ (CNC). **Coosa Co.:** Hatchet Creek, 32.85096°N 86.4441°W, Jun 1940, A. Archer, 1 ♀ (AMNH_IJC 294825). **Jackson Co.:** Scottsboro, 34.6514°N 86.0426°W, 04–08 Apr 1967, S. Peck, 1 ♂ (MCZ 63908). **Madison Co.:** Monte Sano, 34.73148°N 86.50416°W, 04–08 Apr 1967, bait traps, S. Peck, 1 ♂, 1 ♀ (MCZ 63904, 63906). **Mobile Co.:** Mon Louis, 30.4405°N 88.1058°W, 09 Jan 1941, A. Archer, 1 ♂ (AMNH_IJC 294823). **Tuscaloosa Co.:** Tuscaloosa, 33.20972°N 87.56917°W, 1941, A. Archer, 1 ♀ (AMNH_IJC 294824). **ARKANSAS: Benton Co.:** Beaver Lake, 6 mi S Avoka, 36.4213°N 93.8476°W, 18 Aug 2006, J. T. Fassbender, 1 ♀ (AMNH_IJC 294944). Siloam Springs, 36.18806°N 94.54028°W, 27 Apr 1966, open woods, litter, stream bed, W. Peck, 3 ♂, 1 ♀ (CAS 33373). **Bradley Co.:** no specific locality, 06 Apr 1963, W. Whitcomb, 2 ♂ (DNHC 1615). Sumpter, 33.4856°N 92.0492°W, 15 Mar–11 May 1963–5, pine-oak woods, Leslie, 16 ♂ (CAS 68143, etc.), 19 Apr–05 Oct 1963–5, Leslie, 46 ♀ (CAS 6108, etc.). **Carroll Co.:** Berryville, 36.3683°N 93.5683°W, Jun 1940, C. Wilton, 2 ♀ (MCZ 63653). **Craighead Co.:** no specific locality, 24 Nov–01 Dec 1962, M. Hite, 1 ♂ (CAS 68101); 19–26 Jan 1967, M. Hite, 2 ♂ (CAS 68137); Mar 1967, M. Hite, 12 ♂, 8 ♀ (CAS 68141). **Hempstead Co.:** Hope, 33.6669°N 93.5914°W, 22 May, 2 ♀ (AMNH_IJC 294943). **Logan Co.:** Mount Magazine, N slope, Mossback Ridge, 35.16713°N 93.64476°W, 23 Jun 1990, pitfalls, B. Leary, 1 ♂, 1 ♀ (MEMU 387093, 387095). **Montgomery Co.:** Box Springs, off State Highway 8, 34.45°N 93.76667°W, 08 May 2012, elev. 251 m, H. Robison, 3 ♀ (DNHC 29404). **Polk Co.:** Rich Mountain, ca. 12 mi W Mena, 34.68667°N 94.36194°W, 08 May 2012, H. Robison, 2 ♀ (DNHC 29435). **Washington Co.:** no specific locality, 25 Apr–30 May 1961, H. Exline, 12 ♂ (CAS 68128, etc.); 12 May 1961, pitfall, leaf litter, W. Whitcomb, 1 ♀ (DNHC 1616). Cove Creek Valley, Boston Mountains, 15 mi W Prairie Grove, 35.67981°N 94.35938°W, Apr–June 1956–1957, elev. 1000 ft, M. Hite, 4 ♂, 5 ♀ (MCZ 63881, 63882, 63884, 63886, ex 63885); 05 Mar–26 May 1961–3, old field, M. Hite, 17 ♂, 2 ♀ (CAS 68111, etc.). **GEORGIA: Banks Co.:** NE Lula, 34.3897°N 83.6641°W, 26 Apr 1943, W. Ivie, 3 ♂, 3 ♀ (AMNH_IJC 294814). **Elbert Co.:** NW Elberton, 34.1097°N 82.8656°W, 30 Apr 1943, W. Ivie, 1 ♀ (AMNH_IJC 294812). **Franklin Co.:** W Lavonia, 34.4361°N 83.1064°W, 29 Apr 1943, W. Ivie, 1 ♀ (AMNH_IJC 294813). **Habersham Co.:** Clarkesville, 34.6105°N 83.525°W, 27 Apr 1943, W. Ivie, 3 ♂, 2 ♀ (AMNH_IJC 294815); Clarkesville to Toccoa, 28 Apr 1943, W. Ivie, 2 ♀ (AMNH_IJC 294811). Demorest, 34.565°N 83.5453°W, 26 Apr 1943, W. Ivie, 13 ♂ (including holotype), 8 ♀ (including allotype) (AMNH_IJC 294821, including types; 294822). **Hall Co.:** Gainesville, 34.29778°N 83.82417°W, 24 Apr 1943, W. Ivie, 2 ♂, 7 ♀ (AMNH_IJC 294818); 5 mi NE Gainesville, 26 Apr 1943, W. Ivie, 2 ♂, 4 ♀ (AMNH_IJC 294820). **Putnam Co.:** 6 mi S Eatonton, 33.23974°N 83.3885°W, 01 Apr 1984, leaf litter, R. Bennett, 3 ♀ (CNC). **Rabun Co.:** no specific locality, 12 Jul 1960, under rotting wood, S., D. Mulaik, 1 ♀ (AMNH_IJC 294817). Clayton, 34.8829°N 83.4057°W, 28 Apr 1943, W. Ivie, 4 ♂, 3 ♀ (AMNH_IJC 294819). Ellicott Rock Wilderness Area, 34.99611°N 83.115°W, 22–26 May 1993, hardwood forest, elev. 750–800 m, J. Bond, R. Dobyns, 1 ♂, 1 ♀ (USNM). **Stephens Co.:** SE Toccoa, 34.57732°N 83.33239°W, 29 Apr 1943, W. Ivie, 7 ♂, 2 ♀ (AMNH_IJC 294816). **LOUISIANA: Bossier Par.:** Barksdale Air Force Base, 32.52139°N 93.55028°W, 16 May–29 Jun 1996, pitfalls, D. Pollock, 7 ♀, 1 ♂ (MEMU 387104). **Lincoln Par.:** 10 mi E Ruston, 32.5297°N 92.6406°W, 11 Apr 1963, W. Gertsch, W. Ivie, 1 ♂, 1 ♀ (AMNH_IJC 294827). **MISSISSIPPI: Grenada Co.:** T21N, R2E, Sec. 12, 13N & R3E, Sec. 7S, 18N, 23 Apr 1992 - 05 May 1992, pitfall, deciduous woods, G. Snodgrass, 1 ♂ (MEMU 387154); 05 Jun–24 Jul 1991, pitfalls, deciduous woods, on sandbar of creek, P. Miller et al., 21 ♀ (MEMU 387108, etc.). T22N R3E Sec. 31 NW, 20 Mar–18 May 1992, pitfalls, deciduous woods, G. Snodgrass et al., 3 ♂ (MEMU 387158, etc.); 18 May–17 Sep 1991–2, pitfalls, deciduous woods, P. Miller et al., 6 ♀ (MEMU 387160, etc.). **Lafayette Co.:** 8 mi SE Oxford, 34.00474°N 89.007°W, 03 Jun–15 Jul 1992, pitfalls, pine hardwoods, G. Stratton, P. Miller, 1 ♂, 8 ♀ (MEMU 387164, etc.). **Marshall Co.:** Strawberry Plains Audubon Center, 34.83306°N 89.475°W, 25 Apr–03 May 2009, ground search, pitfalls, open deciduous forest, J. Ryndock, 28 ♂, 16 ♀ (MEMU 387032, etc.); 12 Jul–19 Jul 2009, same, J. Ryndock, 14 ♀ (MEMU 387051, etc.). **Oktibbeha Co.:** Starkville,

33.45028°N 88.81833°W, 07 Apr–08 Apr 1981, white pan trap, W. Cross, 1 ♂ (MEMU 387058). **Pontotoc Co.:** 1 mi SE Ecu, 34.34636°N 89.00985°W, 24 Apr–06 Jul 1980, pitfalls, cultivated cotton, deciduous woods, swamps, W. Cross, 5 ♂, 9 ♀ (MEMU 387059, etc.); 19 Jun–14 Aug 1980, same, W. Cross, 6 ♀ (MEMU 387077, etc.). **Scott Co.:** 3 mi W Forest, 32.36444°N 89.47417°W, 11 Apr 1963, W. Gertsch, W. Ivie, 2 ♀ (AMNH_IZC 294826). **Webster Co.:** 7 mi W Walthall, 33.613°N 89.40933°W, 01 Jul–25 Aug 1988, pitfalls, T. Schiefer, 5 ♀ (MEMU 387185, etc.). **Winston Co.:** Louisville, 33.12389°N 89.055°W, 24 Mar 1981, hardwood litter, R. Brown, 3 ♂, 8 ♀ (MEMU 387081). **MISSOURI: Butler Co.:** Poplar Bluff, 36.7569°N 90.3928°W, 11 Nov 1983, Berlese, rotting bark on ground, P. Miller, 1 ♂ (MEMU 387082). **NORTH CAROLINA: Chatham Co.:** Pittsboro, 35.72°N 79.177°W, 28 Mar 1949, leaf mold near Haw River, D. Wray, 3 ♂, 2 ♀ (AMNH_IZC 294809). **Iredell Co.:** Harmony, 35.95569°N 80.77174°W, 16 Jul 1948, D. Wray, 1 ♀ (MCZ 64023). **Wake Co.:** Lake Raleigh, 35.76487°N 78.68223°W, 06 Mar 1949, D. Wray, 1 ♀ (AMNH_IZC 294810). **OKLAHOMA: Cleveland Co.:** Norman, 35.22°N 97.44°W, 1928, M. Brown, 1 ♂, 1 ♀ (AMNH_IZC 294950). **Comanche Co.:** no specific locality, T. Hubbell, 2 ♀ (AMNH_IZC 295438). Wichita Mountains, 34.83944°N 98.80361°W, 28 Oct 1977–01 Jan 1978, oak leaf litter, J. Cokendolpher et al., 8 ♂, 3 ♀ (MSUC); 13 May 1978, oak leaf litter, J. Cokendolpher, 1 ♂ (MSUC). Wichita Mountains, Quanah Parker Visitor Center, 34.83944°N 98.80361°W, 16 Jun 1979, leaf litter, L. Sorkin, 1 ♀ (AMNH_IZC 294949). **Latimer Co.:** no specific locality, 34.83503°N 95.31025°W, Oct 1990, K. Stephan, 2 ♂, 1 ♀ (FSCA); Nov 1990, K. Stephan, 3 ♂, 1 ♀ (FSCA). **TENNESSEE: Robertson Co.:** Glenraven, 36.52866°N 87.04778°W, Jun–Jul 1904, W. Fox, 4 ♀ (MCZ 63678). **TEXAS: Austin Co.:** Brackenridge Field Laboratory, 30.34339°N 97.84581°W, 18 Nov 1968, B. Vogel, 1 ♀ (DNHC 691); 27 Jan–15 May 1969–1971, B. Vogel, 6 ♂ (DNHC 694–697, 711). **Bastrop Co.:** Bastrop State Park, 30.11028°N 97.315°W, 24–27 May 1983, S., J. Peck, carrion trap, oak woods, 1 ♀ (AMNH_IZC 294955), Berlese, oak-pine litter, 1 ♀ (AMNH_IZC 294954). **Caldwell Co.:** Lockhart State Park, 29.5°N 97.4°W, 13 Apr 1963, W. Gertsch, W. Ivie, 3 ♂, 8 ♀ (AMNH_IZC 294953). **Gonzales Co.:** 1 mi N Ottine, 29.61283°N 97.58627°W, 19 Dec 1969, leaf litter, B. Vogel, 1 ♂ (DNHC ex 701); 24 Jan 1970, leaf litter, B., C. Durden, 12 ♂, 11 ♀ (DNHC 704). Palmetto State Park, NW Gonzales, 29.58694°N 97.58194°W, 13 Apr 1963, W. Gertsch, W. Ivie, 3 ♀ (AMNH_IZC 294952). **Jasper Co.:** 5 mi N Jasper, 30.9222°N 93.9989°W, 06 Jun 1936, S. Mulaik, 1 ♀ (AMNH_IZC 294951). **Kerr Co.:** Raven Ranch, 29.9102°N 99.2945°W, Jul–Aug 1940, S., D. Mulaik, 1 ♀ (AMNH_IZC 294957). **Leon Co.:** SW Oakwood, 31.55°N 95.9°W, 12 Apr 1963, W. Gertsch, W. Ivie, 1 ♀ (AMNH_IZC 294958). **Tarrant Co.:** Grapevine Lake, 2.99381°N 97.11202°W, 01 May 1954, L. Roberts, 1 ♀ (AMNH_IZC 294959). **Travis Co.:** Austin, 30.26694°N 97.74278°W, 1 ♀ (AMNH_IZC 294956). **Wichita Co.:** Perkins Scout Reservation, 1 mi S Red River, 34.05954°N 98.47311°W, 15 Jun 1979, N. Platnick, 1 ♀ (AMNH_IZC 294960).

DISTRIBUTION: Central Oklahoma and Texas east to North Carolina (map 1); apparently absent in eastern Georgia and Florida, where replaced by *P. sorkini* and *P. wallacei*.

Phrurotimpus sorkini, new species

Figures 27–39; map 2

Phrurolithus paludivagus (misidentification): Bishop and Crosby, 1926: 192, fig. 40 (female allotype and paratype only).

Phrurotimpus palustris (misidentification): Chamberlin and Ivie, 1944: 188.

TYPES: Female holotype, male allotype, and two female paratypes from Jekyll Island, 31.06833°N 81.41361°W, Glynn County, Georgia (December 15, 1967; W. Ivie), deposited in AMNH (AMNH_IZC 294992).

ETYMOLOGY: The specific name is a patronym in honor of Louis Sorkin (AMNH), who provided an enormous amount of logistic support for this study.

DIAGNOSIS: This appears to be the northern sister species of *P. wallacei*; males share a relatively short retrolateral tibial apophysis and a broad transverse sclerotization at the tip of the retrolateral side of the palpal bulb (figs. 33, 46), and adults of both sexes have relatively extensive dark markings on the abdominal dorsum (figs. 28, 35, 41, 48). Males of *P. sorkini* have a much longer, more retrolaterally directed embolus (compare figs. 32, 45), females have posteriorly (rather than medially) directed copulatory openings (compare figs. 37, 50).

MALE (AMNH_IZC 294993, figs. 27–33): Total length 2.02. Carapace pale orange with thick gray margins, broad unmarked submarginal band, broad paramedian gray bands; sternum yellow, without pattern; mouthparts yellow-brown except medial portion of anterior surface of paturon with gray markings; abdomen white, but most of dorsum covered with about five medially interrupted W-shaped dark chevrons extending across dorsum to sides, dorsal scutum yellow-brown, covering about half of length, two-thirds of width, venter with pair of gray spots; legs yellow, femur I not darkened, femora II–IV with subdistal gray annulations, patellae with distal gray annulations, tibia I gray except near tip, tibia II–IV with subdistal gray annulations, metatarsi with basal plus subdistal gray annulations. Leg spination: femora: I d1-0-0, p0-0-2; II–IV d1-0-0; tibiae: I v4-4-4; II v4-4-3; IV v0-0-2; metatarsi: I v4-2-2; II v3-2-2. Palp as in *P. palustris* except tibial apophysis very short, base not extending far to side, bulb with wide, heavily sclerotized ridge on retrolateral side near embolus, tip of embolus very long, directed retrolaterally.

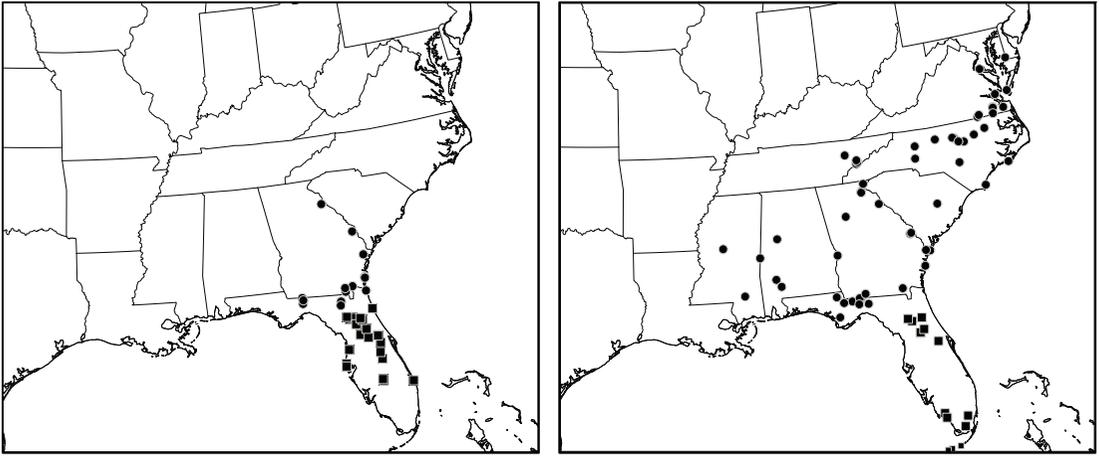
FEMALE (AMNH_IZC 294993, figs. 34–39): Total length 2.16. Coloration as in male except abdomen without dorsal scutum, most posterior W-shaped chevron entire. Leg spination as in male except tibia I v4-4-5, metatarsus I 4-2-1. Epigynum with copulatory openings situated at about half of bursal length, plugged portions of copulatory ducts extending posteriorly from openings, median plate reduced to narrow longitudinal strip slightly expanded at anterior and posterior ends; bursae hypertrophied, kidney-shaped, posterior spermathecae short, widely separated.

OTHER MATERIAL EXAMINED (N=23): UNITED STATES: **FLORIDA: Columbia Co.:** no specific locality, 18 Feb 1960, under *Quercus laevis* bark, H. Weems, 1 ♀ (FSCA). 12 miles N Lake City, 30.33333°N 82.6°W, 22 Dec 1962, W. Ivie, 1 ♀ (AMNH_IZC 294994). **Leon Co.:** Tall Timbers Research Station, Tallahassee, 30.67019°N 84.24923°W, 23 Apr 1969, W. Baker, 1 ♂ (FSCA); 29 Jun–19 Jul 1971, pitfall, soybean field, D. Harris, 1 ♀ (FSCA). Tallahassee, 30.45049°N 84.2465°W, Mar–Apr 1938, 3 ♀ (AMNH_IZC 295410, 295411). **Nassau Co.:** N Amelia City, 30.59°N 81.4575°W, 08 Dec 1962, W. Ivie, 2 ♂, 1 ♀ (AMNH_IZC 294993). **GEORGIA: Bryan Co.:** Ways Station [=Richmond Hill], 31.93806°N 81.31361°W, 13 Feb 1936, 1 ♀ (AMNH_IZC 295412). **Charlton Co.:** Folkston, 30.83028°N 82.01°W, 18 Feb 1936, 1 ♀ (AMNH_IZC 295413). **Clinch Co.:** W entrance, Okefenokee Swamp, 30.66689°N 82.33318°W, 22 Dec 1962, W. Ivie, 1 ♀ (AMNH_IZC 294999). **Elbert Co.:** Elberton to Bell, 34.0489°N 82.8208°W, 30 Apr 1943, W. Ivie, 1 ♀ (AMNH_IZC 294998). **Glynn Co.:** Jekyll Island Park, 31.1°N 81.41666°W, 06 Dec 1962, W. Ivie, 1 ♀ (AMNH_IZC 294991). **Scriven Co.:** Brier Creek, 7 mi N Sylvania, 32.85203°N 81.63678°W, 12 Apr 1943, W. Ivie, 2 ♀ (AMNH_IZC 294995). **Ware Co.:** Okefenokee Swamp, Billy's Island, 30.80522°N 82.3404°W, Jun 1912, C. Crosby, S. Bishop, 2 ♀ (AMNH_IZC 294997).

DISTRIBUTION: Eastern Georgia and northern Florida (map 2).



FIGURES 27–39. *Phrurotimpus sorkini*, new species, male (27–33) and female (34–39). 27, 34. Carapace, dorsal view. 28, 35. Abdomen, same. 29, 36. Habitus, ventral view. 30. Left leg I, prolateral view. 31. Left palp, prolateral view. 32. Same, ventral view. 33. Same, retrolateral view; arrow points to sclerotized ridge at distal end of bulb. 37. Epigynum, ventral view. 38. Same, cleared. 39. Cleared epigynum, dorsal view.



MAPS 2, 3. 2. Southeastern United States, showing records of *Phrurotimpus sorkini* (circles) and *P. wallacei* (squares). 3. Same, showing records of *P. umbratilis* (circles) and *P. bernikeræ* (squares).

Phrurotimpus wallacei (Gertsch), **new combination**

Figures 40–52; map 2

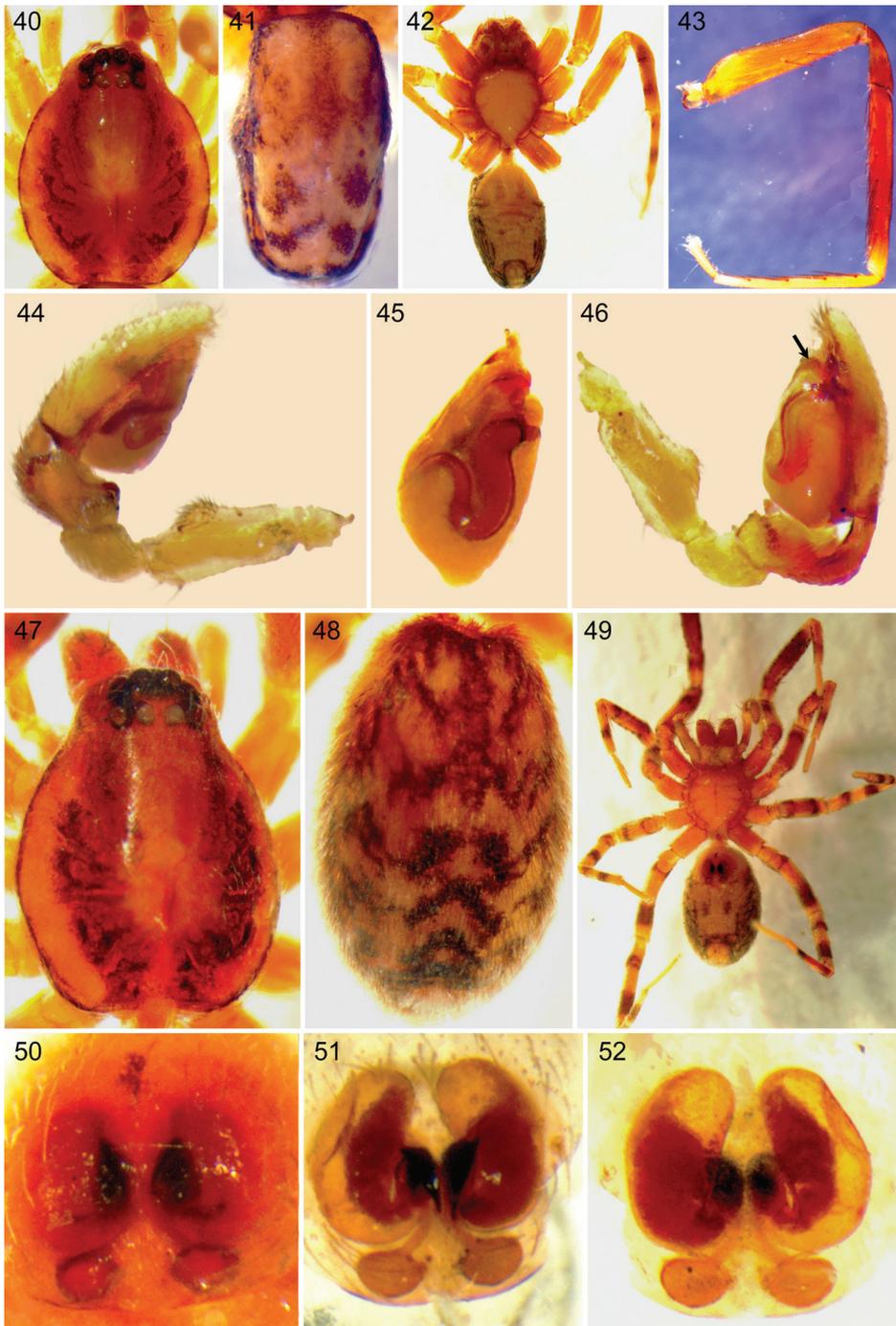
Phrurolithus wallacei Gertsch, 1935: 8, figs. 13–15 (male holotype from Alachua Co., Florida, and female allotype from Benson Springs [= Enterprise], Volusia Co., Florida, in AMNH; examined). *Scotinella wallacei*: Muma, 1973: 182.

NOTE: In his unpublished thesis, Penniman (1985: 54) correctly indicated that *P. wallacei* belongs to *Phrurotimpus* rather than *Scotinella*, but his suggestion that *P. wallacei* may be a synonym of *P. alarius* (i.e., the misidentified *P. palustris*) is incorrect.

DIAGNOSIS: This appears to be the southern sister species of *P. sorkini*; see the diagnosis of that species for details. Males have a short embolus with a ventrally directed tip (fig. 45); females have more laterally directed copulatory openings (fig. 50).

MALE (AMNH_IZC 294978, figs. 40–46): Total length 2.21. Carapace pale orange with thick gray margins, broad unmarked submarginal band, very broad paramedian gray bands; sternum yellow, without pattern; mouthparts yellow-brown except medial portion of anterior surface of paturon with gray markings; abdomen white, with only three medially interrupted W-shaped dark chevrons extending across dorsum to sides, dorsal scutum yellow-brown, covering most of dorsum, venter with or without pair of gray spots; legs yellow, femur I with sides darkened for most of length, femora II–IV with subdistal gray annulations, patellae with distal gray annulations, tibia I gray except near tip, tibia II–IV with subdistal gray annulations, at least posterior metatarsi with basal plus subdistal gray annulations. Leg spination: femora: I d1-0-0, p0-0-2; II–IV d1-0-0; tibiae: I v6-4-4; II v4-4-4; IV v0-0-2; metatarsi: I v4-2-2; II v3-2-2. Palp as in *P. palustris* except tibial apophysis very short, base not extending far to side, bulb with wide, heavily sclerotized ridge on retrolateral side near embolus, tip of embolus directed ventrally.

FEMALE (AMNH_IZC 294978, figs. 47–52): Total length 2.05. Coloration as in male except abdomen without dorsal scutum, with five entire, W-shaped chevrons. Leg spination as in male. Epigynum



FIGURES 40–52. *Phrurotimpus wallacei* (Gertsch), male (40–46) and female (47–52). 40, 47. Carapace, dorsal view. 41, 48. Abdomen, same. 42, 49. Habitus, ventral view. 43. Left leg I, prolateral view. 44. Left palp, prolateral view. 45. Left palpal bulb and embolus, ventral view. 46. Left palp, retrolateral view; arrow points to sclerotized ridge at distal end of bulb. 50. Epigynum, ventral view. 51. Same, cleared. 52. Cleared epigynum, dorsal view.

with copulatory openings situated anteriorly but bursae extending anteriorly beyond them, margins of openings with rounded median edges demarcating long, Y-shaped median plate, plate abruptly narrowed behind openings; bursae hypertrophied, spermathecae short, widely separated.

MATERIAL EXAMINED (N = 100): UNITED STATES: **FLORIDA: Alachua Co.:** no specific locality, 18 Oct 1933, H. Wallace, 1 ♂ (AMNH_IJC 294977); 31 Oct 1933, H. Wallace, 1 ♂ (holotype, AMNH_IJC 294974), 1 ♂ (paratype, FSCA); 20 Nov 1934, T. Hubbell, 1 ♀ (FSCA); 17 Oct 1937, H. Wallace, 2 ♂, 2 ♀ (AMNH_IJC 294978); 27 Oct 1937, H. Wallace, 1 ♂ (AMNH_IJC 294976); 02 Nov 1948, H. Wallace, 2 ♂ (FSCA); 24–30 Jan 1949, J. Oliver, 1 ♀ (FSCA); 25 Oct 1949, H. Wallace, 1 ♂, 3 ♀ (FSCA). Gainesville, 29.65139°N 82.325°W, R. Chamberlin, 1 ♀ (AMNH_IJC 295407); 03 Feb 1927, 18 ♀ (AMNH_IJC 295409); 12 Mar 1927, 1 ♀ (AMNH_IJC 295408); 20 Oct 1934, Kilby, 3 ♂ (AMNH_IJC 295363); 14 Jan 1939, 1 ♀ (AMNH_IJC 294985); 19 Feb 1942, W. Ivie, 1 ♂, 8 ♀ (AMNH_IJC 294986); 17–30 Jan 1979, pitfall, E. Becker, 1 ♀ (CNC); 30 Jan 1979, sifting near lake, E. Becker, 1 ♀ (CNC); 01–05 Feb 1979, malt trap, pine-oak, E. Becker, 1 ♀ (CNC); 01–15 Feb 1979, pitfall, oak-pine, E. Becker, 1 ♀ (CNC); 27 May 1983, G. Edwards, 1 ♀ (FSCA). Gainesville, Lake Alice, 29.64028°N 82.36139°W, 23 Nov 1962, small depression in grassy field, J. Anderson, 1 ♀ (FSCA); 01 Jan 1963, under rock in dump, J. Anderson, 1 ♀ (FSCA). Micanopy, 29.00841°N 82.00466°W, R. Chamberlin, 3 ♀ (AMNH_IJC 295406). Newnans Lake, 29.67°N 82.22°W, 2 ♀ (AMNH_IJC 294983); 19 Mar 1938, W. Gertsch, 3 ♀ (AMNH_IJC 294984); 28 Mar 1957, W. Gertsch, R. Forster, 1 ♀ (AMNH_IJC 294982); Newnans Lake, W side, 12 Feb 1942, W. Ivie, 4 ♀ (AMNH_IJC 294981, 294979); 21 Dec 1962, W. Ivie, 3 ♀ (AMNH_IJC 294980). San Felasco Preserve, 29.73512°N, 82.45222°W, 11 Oct 1992, J. Judge, 1 ♂ (FSCA). **Hernando Co.:** no specific locality, 09 Nov 1946, H. Wallace, 1 ♀ (FSCA). Weeki Wachee, 28.5153°N 82.5731°W, 27 Mar 1947, H. Wallace, 1 ♀ (FSCA). **Highlands Co.:** Archbold Biological Station, 27.18833°N 81.33778°W, Apr 1956, *Quercus chapmani* litter, C. Hoff, 1 ♀ (AMNH_IJC 294987). Lake Placid, 27.24977°N 81.36646°W, 16 Nov 1965, sand-pine litter, M. Muma, H. Greene, 1 ♀ (FSCA). **Lake Co.:** Eustis, 28.85277°N 81.68535°W, 30 Oct 1959, *Pinus clausa* litter, H. Denmark, 1 ♀ (FSCA). **Marion Co.:** Citra, 29.41167°N 82.11°W, Nov, R. Chamberlin, 1 ♀ (AMNH_IJC 00294996). Juniper Springs, Ocala National Forest, 29.18386°N 81.71202°W, 31 Oct 1960, *Pinus clausa* debris, H. Denmark, 2 ♂, 1 ♀ (FSCA). **Martin Co.:** Jonathan Dickinson State Park, 27.00639°N 80.11493°W, 29 Oct 1959, *Pinus clausa* litter, H. Denmark, 1 ♂ (FSCA). **Orange Co.:** 3 mi NW Maitland, 28°N 81.24°W, 10 Dec 1962, W. Ivie, 3 ♂, 4 ♀ (AMNH_IJC 294989). Orlando, University of Central Florida Campus, 28.60243°N 81.20008°W, Jan 1983, D. Corey, 1 ♀ (USNM). **Osceola Co.:** Saint Cloud, 28.24861°N 81.28139°W, 04 Nov 1965, sand-pine litter, M. Muma, H. Greene, 1 ♀ (FSCA). **Pinellas Co.:** Dunedin, 28.027°N 82.77126°W, 1927, W. Blatchley, 1 ♀ (MCZ 63650). Largo, 27.92221°N 82.78669°W, 06 Mar 1963, buildings, H. Levi, 1 ♀ (MCZ 63911). **Putnam Co.:** Interlachen, 29.61333°N 81.89306°W, 18 Oct 1926, M. Leonard, 1 ♂ (AMNH_IJC 294988). ca. 4 mi W Rodman, 29.53829°N 81.82295°W, 08 Mar 1949, turkey oak scrub, F. Young, 1 ♀ (FSCA). **St. Johns Co.:** St. Augustine, 29.8947°N 81.3144°W, 20 Feb 1936, S. Bishop, 1 ♀ (AMNH_IJC 00294973). **Volusia Co.:** Benson Springs (=Enterprise), 28.8689°N 81.2669°W, 11 Oct 1933, H. Wallace, 1 ♀ (allotype, AMNH_IJC 294975), 1 ♀ (paratype, FSCA). 2 mi S Orange City, 28.88333°N 81.28333°W, 09 Dec 1962, W. Ivie, 1 ♀ (AMNH_IJC 294990).

DISTRIBUTION: Known only from Florida (map 2).

Phrurotimpus umbratilis (Bishop and Crosby)

Figures 53–65; map 3

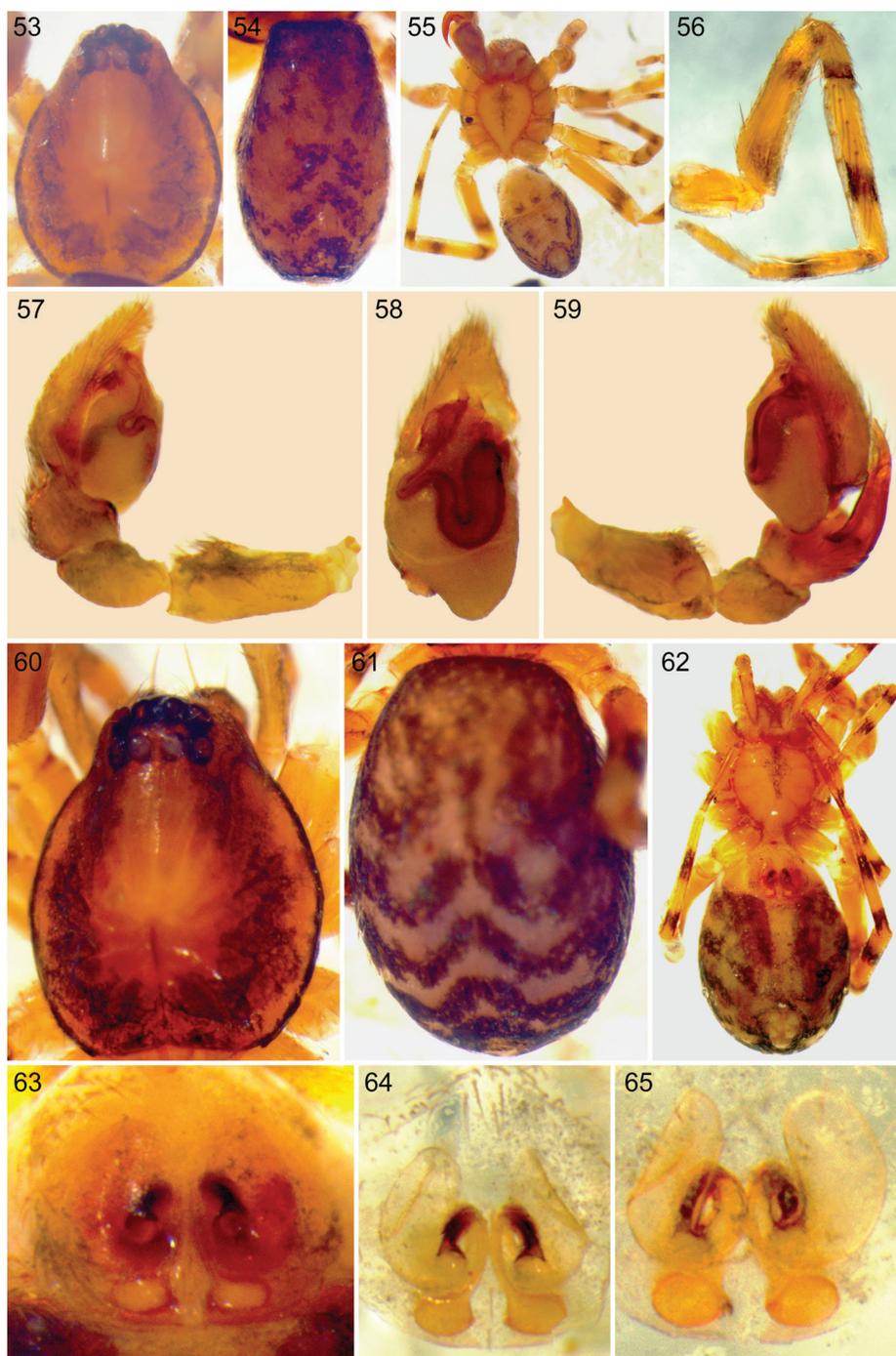
Phrurolithus umbratilis Bishop and Crosby, 1926: 194, figs. 41–43 (male holotype and female allotype from Billy's Island, Okefenokee Swamp, Ware Co., Georgia, in CUC; examined).
Phrurotimpus umbratilis: Muma, 1944: 11. – Chamberlin and Ivie, 1944: 189.

DIAGNOSIS: This seems to be the northern sister species of *P. bernikeræ*; both sexes of both species typically (but not always) have a distinctive, longitudinal dark stripe along the midline of the sternum (figs. 55, 62, 68, 75). Males of *P. umbratilis* differ in having a humped embolar base (fig. 58), and have the tip of the retrolateral tibial apophysis bent toward the cymbium; females have small, separated copulatory openings (fig. 63).

MALE (AMNH_IZC 295007, figs. 53–59): Total length 1.83. Carapace pale orange with thick gray margins, narrow unmarked submarginal band, very broad paramedian gray bands; sternum yellow, usually with longitudinal, medial gray band occupying anterior three-fourths of length; mouthparts yellow-brown except medial portion of anterior surface of paturon with gray markings; abdomen white, with anterior T-shaped dark marking followed by four W-shaped dark chevrons extending across dorsum to sides, anterior chevron interrupted at middle, dorsal scutum yellow-brown, covering most of dorsum, venter with or without pair of gray spots; legs yellow, femur I with sides darkened for most of length, femora II–IV with subdistal gray annulations, patellae with distal gray annulations, tibia I–IV with subdistal gray annulations, metatarsi with basal plus subdistal gray annulations. Leg spination: femora: I d1-0-0, p0-0-2; II–IV d1-0-0; tibiae: I v4-4-4; II v4-2-2; IV v0-0-2; metatarsi: I v4-2-2; II v2-2-1p. Retrolateral tibial apophysis originating distally, reaching to about half of cymbial length, straight except tip reflexed prolaterally toward cymbium, bulb with narrow ridge on retrolateral side near embolus, embolus with humped base.

FEMALE (AMNH_IZC 295007, figs. 60–65): Total length 2.05. Coloration as in male except abdomen without dorsal scutum, sides of femur I not darkened, with subdistal gray annulation. Leg spination as in male except tibia II v4-4-3; metatarsi: I v4-2-1p, II v3-2-1p. Epigynum with copulatory openings situated at about half of epigynal length, rounded, separated by more than their diameter, leading to darkened, anteromedially directed copulatory ducts; bursae hypertrophied, spermathecae short, widely separated.

MATERIAL EXAMINED (N = 314): UNITED STATES: **ALABAMA: Clarke Co.:** Grove Hill, 31.7061°N 87.7743°W, 10 Apr 1940, A. Archer, 1 ♂ (AMNH_IZC 295017). **Monroe Co.:** Randons Creek, 31.42790°N 87.5705°W, 11 Apr 1940, A. Archer, 1 ♂ (AMNH_IZC 295018). **Tuscaloosa Co.:** Tuscaloosa, River Road and Guild Woods Road, 33.20972°N 87.56917°W, 01–04 Jul 1981, forest, J. Coddington, 6 ♀ (MCZ 63528, 63907). **FLORIDA: Gadsden Co.:** Quincy, 30.58694°N 84.58333°W, 11 Apr 1938, W. Gertsch, 1 ♂ (AMNH_IZC 295016). **Gulf Co.:** Honeyville, 30.058°N 85.1899°W, 25 Jul 1965, Berlese, oak logs, pine buttresses in oak-magnolia woods, W. Suter, 1 ♀ (FMNH 70577). **Jackson Co.:** Florida Caverns State Park, 30.81389°N 85.23333°W, 24 Jul 1981, cypress-pine forest, D. Ubick, 1 ♀ (CDU). **Jefferson Co.:** no specific locality, 30.42°N 83.9°W, 06 May–03 Jun 1968, W. Whitcomb, 3 ♂ (MCZ 64001, 64002, 64004). **Leon Co.:** Lake Hall, 30.5221°N 84.2484°W, 13 Apr 1927, 1 ♂ (AMNH_IZC 295014). Tall Timbers Research Station, 30.65333°N 84.20806°W, 01 Jun 1969, E. Komarek, W. Baker, 12 ♂ (FSCA); 24 Jun 1978, mixed mesophyll forest, A Penniman, 1 ♀ (AMNH_IZC 295404). 1 mi W Tallahassee on Fla. 20 just S of intersection with US 90, 30.44842°N 84.3023°W, 01 Jul 1965, W. Suter, 4 ♀ (FMNH 85731). **Liberty Co.:** Torreya Ravine, 30.56908°N 84.9477°W, 29 May 1931, N. Davis, 1 ♀ (AMNH_IZC 295405). Torreya State Park, 30.56805°N 84.94777°W, 04 Apr 1957, W. Gertsch, R. Forster, 14 ♀ (AMNH_IZC 295015); 31 Mar 1989, leaf litter, R. Bennett, 2 ♂, 1 ♀ (CNC). **GEORGIA: Chatham Co.:** 3 mi NW Savannah Beach, 32.02461°N 80.88475°W, 14 Mar 1954, W. Ivie, 17 ♂, 9 ♀ (AMNH_IZC 295007). 3 mi SE Savannah, 32.06666°N 81.06666°W, 04 Apr 1943, W. Ivie, 2 ♂ (AMNH_IZC 295005); 03 May 1943, W. Ivie, 4 ♂, 1 ♀ (AMNH_IZC 295006). **Chattahoochee Co.:** Fort Benning, 32.35237°N 84.9689°W, 03 Apr



FIGURES 53–65. *Phrurotimpus umbratilis* (Bishop and Crosby), male (53–59) and female (60–65). 53, 60. Carapace, dorsal view. 54, 61. Abdomen, same. 55, 62. Habitus, ventral view. 56. Left leg I, prolateral view. 57. Left palp, prolateral view. 58. Left palpal bulb and embolus, ventral view. 59. Left palp, retrolateral view. 63. Epigynum, ventral view. 64. Same, cleared. 65. Cleared epigynum, dorsal view.

1960, D. Campbell, P. Craig, B. Couchman, 1 ♂ (CAS 9033334). **Elbert Co.:** Elberton to Bell, 34.0489°N 82.8208°W, 30 Apr 1943, W. Ivie, 1 ♀ (AMNH_IJC 295012). **Fulton Co.:** Atlanta, 33.74889°N 84.38806°W, May 1899, J. Emerton, 1 ♀ (AMNH_IJC 295008). **Habersham Co.:** Clarkesville, 34.6105°N 83.525°W, 27 Apr 1943, W. Ivie, 24 ♂, 7 ♀ (AMNH_IJC 295013). Demorest, 34.565°N 83.5453°W, 26 Apr 1943, W. Ivie, 1 ♂ (AMNH_IJC 295011). **McIntosh Co.:** Blackbeard Island, 31.491°N 81.2122°W, 13 Jul 1942, 1 ♀ (AMNH_IJC 295002). **Rabun Co.:** Clayton to Tallulah Falls, 34.87815°N 83.40099°W, 28 Apr 1943, W. Ivie, 2 ♂ (AMNH_IJC 295010). NW Clayton, 34.87815°N 83.40099°W, 28 Apr 1943, W. Ivie, 2 ♂ (AMNH_IJC 295009). **Screven Co.:** 1 mi N Sylvania, 32.76496°N 81.63678°W, 07 Apr 1943, W. Ivie, 2 ♂ (AMNH_IJC 295001); 10 Apr 1943, W. Ivie, 3 ♂, 1 ♀ (AMNH_IJC 295004). 4 mi NE Sylvania, 32.79148°N 81.58797°W, 09 Apr 1943, W. Ivie, 13 ♂ (AMNH_IJC 295000). **Thomas Co.:** Millpond Plantation, 30.80083°N 83.97194°W, 16 Jul 1974, W. Sedgwick, 1 ♀ (MCZ 63651). **Ware Co.:** Okefenokee Swamp, Billy's Island, 30.80522°N 82.3404°W, Jun 1912, sifting decaying leaves in heavy woods close to edge of swamp, C. Crosby, S. Bishop, 1 ♂ (holotype), 1 ♀ (allotype) (CUIC), 1 ♂, 1 ♀ (paratypes) (AMNH_IJC 295403). **MARYLAND: Wicomico Co.:** Sharptown, 38.5406°N 75.7189°W, 15 Jun 1942, sweeping low bushes, M. Muma, 1 ♀ (FSCA). **MISSISSIPPI: Forrest Co.:** Camp Shelby, Hattiesburg, 31.18777°N 89.19916°W, A. Archer, 1 ♂ (AMNH_IJC 295035). **Lauderdale Co.:** 7 mi E Lauderdale, 32.56083°N 88.40194°W, 12 Mar 2009, Berlese, litter from sandy roadside with lots of native grasses, J. Hill, 1 ♂ (MEMU 387171). **Washington Co.:** 2 mi N Stoneville, 33.00755°N 90.01525°W, 20 Jun–15 Aug 1983, pitfalls, deciduous woods, margins, T. Lockley, 4 ♀ (MEMU 387080, etc.). **NORTH CAROLINA: Carteret Co.:** Beaufort, 34.71777°N 76.66055°W, 16 Jun 1952, R. Barnes, 1 ♂ (palp only, AMNH_IJC 295026). **Cumberland Co.:** Fayetteville, 35.06035°N 78.86611°W, 08 May 1949, leaf mold near swamp, D. Wray, 4 ♂, 6 ♀ (AMNH_IJC 295023). **Durham Co.:** Durham, Duke Forest, 36.01706°N 78.98256°W, 21 Apr 1945, A. Pearse, 1 ♂ (MCZ 64021), 5 May–28 Jul 1945, A. Pearse, 3 ♀ (MCZ 63655, 63662, 64061); 29 May 1969, sifting litter in woods, W. Ivie, 1 ♀ (CNC). W Durham, 35.98861°N 78.90722°W, 04 May 1993, Berlese, oak-pine woods, R. Hoffman, 1 ♂ (AMNH_IJC 295022). **Guilford Co.:** Greensboro, 36.0725°N 79.7922°W, 01 Jun 1948, leaf mold, D. Wray, 1 ♀ (AMNH_IJC 295024). **Halifax Co.:** Scotland Neck, 36.1296°N 77.42025°W, 11 Jun 1948, D. Wray, 2 ♀ (MCZ 63779). **Iredell Co.:** Harmony, 35.95569°N 80.77174°W, 16 Jul 1948, D. Wray, 1 ♀ (MCZ 63646). **Mecklenburg Co.:** Davidson, 35.49888°N 80.84808°W, 20 May 1949, under stone on golf course, R. Barnes, 1 ♀ (AMNH_IJC 295021). **Nash Co.:** Nashville, 35.9694°N 77.9614°W, 11 Jun 1948, leaf mold, D. Wray, 1 ♀ (AMNH_IJC 295025). **New Hanover Co.:** Carolina Beach, Wilmington, 34.035°N 77.89389°W, 20 May 1986, underside of boards, R. Bennett, 1 ♀ (CNC). **Wake Co.:** Knightdale, 35.78944°N 78.4821°W, 24 Apr 1976, H. Levi, 1 ♂ (MCZ 63573). Raleigh, 35.83269°N 78.72941°W, 30 Apr 1943, M. Wing, 1 ♂ (MCZ 63900). **SOUTH CAROLINA: Clarendon Co.:** W Manning, near intersection Highways 301, I-95, 33.69516°N 80.21091°W, 25 Mar 1976, sifting leaf litter, deciduous forest thick with small trees, W. Maddison, 4 ♂ (CNC). **TENNESSEE: Knox Co.:** Riechert property, Powell, 36.03055°N 84.06024°W, 16 May–06 Jun 1996, K. Russell, 47 ♂, 6 ♀ (CKR). **Sevier Co.:** Gatlinburg, 35.71166°N 83.51513°W, 25 Jun 1936, 10 ♀ (AMNH_IJC 00295428). 3 mi SW Gatlinburg, 35.68348°N 83.54806°W, 14 Oct 1965, J. W. Ivie, 1 ♀ (AMNH_IJC 295019). Elkmont, 35.6537°N 83.58044°W, 11 Jun 1939, elev. 2500 ft, B. Kaston, 4 ♀ (AMNH_IJC 295020). Pigeon Forge, 35.78842°N 83.55433°W, 29 Apr 1976, H. Levi, 1 ♀ (MCZ 63496). **VIRGINIA: Chesapeake Co.:** 4 mi S Deep Creek on Highway 17, 36.7425°N 76.3425°W, 17 May 1968, M., E. Sabath, 1 ♂ (MCZ 64019). **Greensville Co.:** 2.3 mi NE Slates Corner, 36.58679°N 77.62923°W, 18 Jun 1990, J. Mitchell, 2 ♂ (VMNH). 2.5 mi N Skippers, 36.64807°N 77.54665°W, 18 Jun 1990, pitfall, J. Mitchell, 1 ♀ (VMNH). **Isle of Wight Co.:** Antioch Pines Natural Area Preserve, 30 Apr 2002, P. Koury, 1 ♂ (VMNH); 06 Jun 2002, P. Koury, 42 ♂, 4 ♀ (VMNH). Blackwater Ecological Preserve, 7 km S Zuni, 36.80294°N 76.83079°W, 21 May 1996, 1 ♂ (VMNH); 2 Jun 2007, found dead in pitcher of *Sarracenia purpurea*, M. Milne, 1 ♂ (CMM). **King George Co.:** Naval Weapons Lab, Dahlgren, 38.33124°N 77.05109°W, 08 May 1992, K. Buhlmann, 1 ♂ (VMNH). **Northampton Co.:** Savage Neck Dunes State Natural Area Preserve,

37.33208°N 76.00299°W, 09 May–01 Jun 2004, drift fence, dunes, D. Field, 1 ♂ (VMNH). **Suffolk Co.:** South Quay, 6 mi SSE Franklin, 36.59714°N 76.88129°W, 06 Aug–16 Sep 2003, drift fence pitfall, S. Roble, 2 ♀ (VMNH). South Quay barrens, ca. 10 km SSE Franklin, 36.59432°N 76.87985°W, 04 Apr–06 Jun 2003, xeric pine woods, S. Roble, 1 ♂ (VMNH); 04 Apr–10 Jun 2003, drift fence, S. Roble, 2 ♂ (VMNH). **York Co.:** Cheatham Annex Navy Base, 37.28403°N 76.59051°W, 06 Jul 1989, drift fence, K. Buhlmann, 1 ♂ (VMNH).

DISTRIBUTION: Eastern Maryland south to southern Mississippi, Alabama, Georgia, and the Florida panhandle (map 3).

Phrurotimpus bernikerae, new species

Figures 66–78; map 3

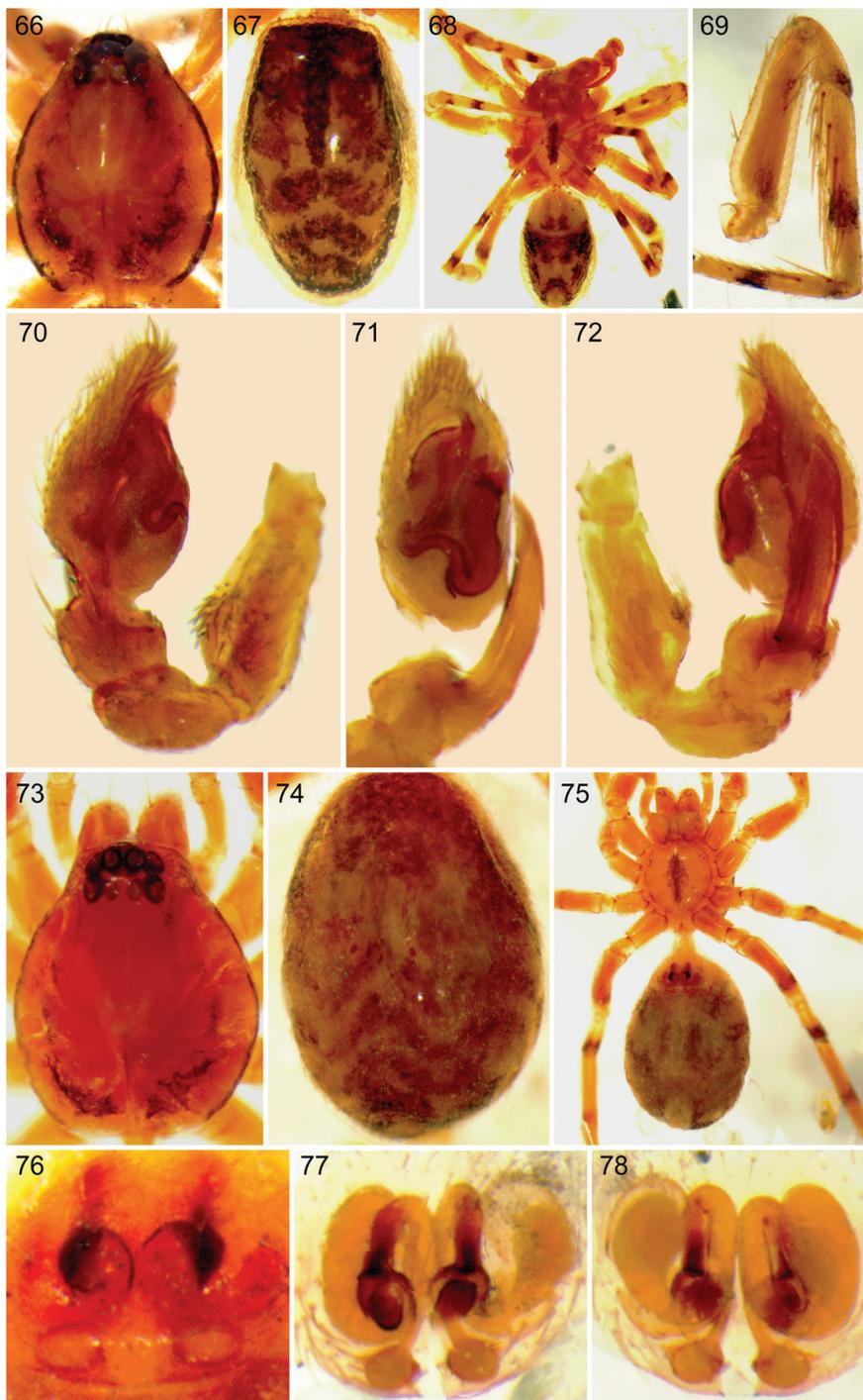
YPES: Female holotype and male allotype taken in malaise-flight intercept traps set in pinelands on Long Pine Key, Everglades National Park, 25.409°N 80.68617°W, Miami-Dade Co., Florida (May 28–June 8, 1986; S., J. Peck), deposited in AMNH (AMNH_IZC 295032).

ETYMOLOGY: The specific name is a patronym in honor of Lily Berniker (AMNH), who provided invaluable logistic support for this study.

DIAGNOSIS: This seems to be the southern sister species of *P. umbratilis*, sharing (in most cases) the longitudinal dark stripe along the midline of the sternum (figs. 55, 62, 68, 75). Males of *P. bernikerae* differ in having a wider embolar base (fig. 71) and a longer retrolateral tibial apophysis (fig. 72); females have extended, almost touching ridges over the copulatory openings (fig. 76).

MALE (AMNH_IZC 295032, figs. 66–72): Total length 1.45. Carapace pale orange with thick gray margins, narrow unmarked submarginal band, paramedian gray bands largely restricted to posterior half of carapace; sternum yellow, usually with strong longitudinal, medial gray band occupying middle three-fifths of length; mouthparts yellow-brown except dorsal portion of anterior surface of paturon with gray markings; abdomen white, with anterior T-shaped dark marking followed by three entire W-shaped dark chevrons extending across dorsum, sides, chevrons sometimes reduced to scattered dots, dorsal scutum yellow-brown, covering most of dorsum, venter with paramedian pair of gray spots, more posteriorly situated pair of lateral dark spots; legs yellow, femur I with sides darkened for most of length, femora II–IV with subdistal gray annulations, patellae with distal gray annulations, tibiae I–IV with subdistal gray annulations, metatarsi with basal plus subdistal gray annulations. Leg spination: femora: I d1-0-0, p0-0-2; II–IV d1-0-0; tibiae: I v4-4-4; II v4-4-2; IV v0-0-2; metatarsi: I v2-2-2; II v2-2-1p. Retrolateral tibial apophysis originating at middle of tibia, reaching to about two-thirds of cymbial length, straight except tip reflexed prolaterally toward cymbium, bulb with narrow ridge on retrolateral side near embolus, embolus with wide, humped base much longer than tip.

FEMALE (AMNH_IZC 295032, figs. 73–78): Total length 1.83. Coloration as in male except abdomen without dorsal scutum. Leg spination as in male except tibia II v4-2-2. Epigynum with copulatory openings situated at about half of epigynal length, with ridges forming almost com-



FIGURES 66–78. *Phrurotimpus bernikeræ*, new species, male (66–72) and female (73–78). 66, 73. Carapace, dorsal view. 67, 74. Abdomen, same. 68, 75. Habitus, ventral view. 69. Left leg I, prolateral view. 70. Left palp, prolateral view. 71. Same, ventral view. 72. Same, retrolateral view. 76. Epigynum, ventral view. 77. Same, cleared. 78. Cleared epigynum, dorsal view.

plete circle, almost touching medially, leading to darkened, anteriorly directed copulatory ducts; distal (lateral) portion of bursae hypertrophied, spermathecae short, narrowly separated.

OTHER MATERIAL EXAMINED (N=53): UNITED STATES: **FLORIDA: Alachua Co.:** 4 mi N Cross Creek on highway 325, 29.54444°N 82.1651°W, 22 May 1981, pine flatwoods litter, G. Edwards, 2♂, 1♀ (FSCA). Gainesville, 29.65163°N 82.32483°W, 27 May 1983, mud flat, R. Reeves, 3♂, 3♀ (CNC). **Marion Co.:** 1.5 mi S Moss Bluff, 29.06153°N 81.88369°W, 22 May 1958, mixed hardwood, M. Muma, H. Greene, 1♂ (FSCA). Juniper Springs, Ocala National Forest, 29.18386°N 81.71202°W, 25 Jul 1960, sand pine debris, H. Denmark, 1♀ (FSCA). Moss Bluff, 29.08331°N 81.88369°W, 22 May 1958, oak leaf mold, M. Muma, H. Greene, 1♂, 1♀ (FSCA). **Miami-Dade Co.:** Everglades, 20 mi W Miami, 25.77391°N 80.51629°W, 24 Aug 1933, W. Ivie, 1♂ (AMNH_IZC 295031). Royal Palm Hammock, Everglades National Park, 26.00871°N 81.42247°W, Jul 1981, malaise trough, S. Peck, 6♀ (CNC); 02 May–02 Aug 1985, malaise-flight intercept trap, hammock forest, S., J. Peck, 3♂ (AMNH_IZC 295033). **Monroe Co.:** Big Pine Key, Watsons Hammock, 24.68643°N 81.36715°W, 03 May–03 Aug 1985, malaise-flight intercept trap, hardwood hammock, S., J. Peck, 1♂ (AMNH_IZC 295003); 23 Feb–03 Jun 1986, malaise-flight intercept trap, hammock forest, S., J. Peck, 2♂ (AMNH_IZC 295027); 03 Jun–27 Aug 1986, malaise-flight intercept trap, hammock forest, S., J. Peck, 8♂, 2♀ (AMNH_IZC 295028). Everglades National Park, 25.83095°N 81.36829°W, 29 Apr 1959, hammock, R. Baranowski, 2♀ (FSCA). Fat Deer Key, 24.73698°N 81.00745°W, 04 Jun–28 Aug 1986, malaise-flight intercept trap, hammock, S., J. Peck, 4♂ (AMNH_IZC 295029). Sugarloaf Key, 24.65595°N 81.53742°W, malaise-flight intercept trap, trough, hammock forest, 06 Jun–29 Aug 1986, S., J. Peck, 1♀ (AMNH_IZC 295030). **Putnam Co.:** no specific locality, 02 Jun 1947, H. Wallace, 1♀ (AMNH_IZC 295034), 2♀ (FSCA). **Seminole Co.:** Oviedo, 28.65972°N 81.19583°W, 21 May 1964, sand pine litter, M. Muma, H. Greene, 2♀ (FSCA); 01 Apr 1965, sand pine litter, M. Muma, H. Greene, 3♂ (FSCA).

DISTRIBUTION: Peninsular Florida (map 3).

ACKNOWLEDGMENTS

I thank Louis Sorkin and Lily Berniker (AMNH) for their substantial help with the logistics of this project. Charles Dondale (CNC) provided helpful advice on nomenclatural issues; Mai Reitmeyer (AMNH) and Dana Fisher (MCZ) provided access to the original Hentz paintings. Andy Penniman kindly provided the original photographs used in his thesis. I'm deeply indebted to the curators of the collections studied here for making specimens available for study: Jonathan Coddington and Dana DeRoche (USNM), Paula Cushing and Jeff Stephenson (DNHC), G. B. Edwards (FSCA), Gonzalo Giribet and Laura Leibensperger (MCZ), Charles Griswold and Darrell Ubick (CAS), Norman Horner (MSUC), Kal Ivanov (VMNH), Owen Lonsdale (CNC), Pat Miller (MEM), Lorenzo Prendini and Louis Sorkin (AMNH), and Petra Sierwald and Crystal Maier (FMNH). Steve Thurston kindly composed the plates; Marc Milne and an anonymous reviewer provided helpful comments on a draft of the manuscript.

REFERENCES

- Banks, N. 1892. The spider fauna of the Upper Cayuga Lake Basin. Proceedings of the Academy of Natural Sciences of Philadelphia 1892: 11–81.
- Banks, N. 1904. Some Arachnida from California. Proceedings of the California Academy of Sciences (ser. 3) 3: 331–376.

- Banks, N. 1911. Some Arachnida from North Carolina. *Proceedings of the Academy of Natural Sciences of Philadelphia* 63: 440–456.
- Bishop, S.C., and C.R. Crosby. 1926. Notes on the spiders of the southeastern United States with descriptions of new species. *Journal of the Elisha Mitchell Scientific Society* 41: 165–212.
- Bosselaers, J., and R. Jocqué. 2002. Studies in Corinnidae: cladistic analysis of 38 corinnid and liocranid genera, and transfer of Phrurolithinae. *Zoologica Scripta* 31: 241–270.
- Cameron, H.D. 2005. An etymological dictionary of North American spider genus names. In D. Ubick, P. Paquin, P.E. Cushing, and V. Roth (editors), *Spiders of North America: an identification manual*: 274–330. [Poughkeepsie, N.Y.]: American Arachnological Society.
- Chamberlin, R.V., and W.J. Gertsch. 1930. On 15 new North American spiders. *Proceedings of the Biological Society of Washington* 43: 137–144.
- Chamberlin, R.V., and W. Ivie. 1933. Spiders of the Raft River Mountains of Utah. *Bulletin of the University of Utah* 23 (4): 1–79.
- Chamberlin, R.V., and W. Ivie. 1935. Miscellaneous new American spiders. *Bulletin of the University of Utah* 26 (4): 1–79.
- Chamberlin, R.V., and W. Ivie. 1944. Spiders of the Georgia region of North America. *Bulletin of the University of Utah* 35 (9): 1–267.
- Chickering, A.M. 1939. Anyphaenidae and Clubionidae of Michigan. *Papers of the Michigan Academy of Science, Arts and Letters* 24: 49–84.
- Comstock, J.H. 1940. *The Spider book*, revised and edited by W. J. Gertsch. Ithaca, NY: Cornell University Press, xi + 727 pp.
- Dondale, C.D., and J.H. Redner. 1982. The sac spiders of Canada and Alaska: Araneae: Clubionidae and Anyphaenidae. *Research Branch Agriculture Canada Publication* 1724: 1–194.
- Emerton, J.H. 1890. New England spiders of the families Drassidae, Agalenidae, and Dysderidae. *Transactions of the Connecticut Academy of Arts and Sciences* 8: 166–206.
- Emerton, J.H. 1911. New spiders from New England. *Transactions of the Connecticut Academy of Arts and Sciences* 16: 383–407.
- Gertsch, W.J. 1935. New American spiders with notes on other species. *American Museum Novitates* 805: 1–24.
- Grimm, U. 1986. Die Clubionidae Mitteleuropas: Corinninae und Liocraninae (Arachnida, Araneae). *Abhandlungen des Naturwissenschaftlichen Vereins in Hamburg (NF)* 27: 1–91.
- Hentz, N.M. 1832. On North American spiders. *American Journal of Science and Arts* 21: 99–122.
- Hentz, N.M. 1847. Descriptions and figures of the araneides of the United States. *Boston Journal of Natural History* 5: 443–478.
- Ivie, W. 1967. Some synonyms in American spiders. *Journal of the New York Entomological Society* 75: 126–131.
- Kaston, B.J. 1945. New spiders in the group *Dionycha* with notes on other species. *American Museum Novitates* 1290: 1–25.
- Kaston, B.J. 1948. Spiders of Connecticut. *Bulletin of the Connecticut State Geological and Natural History Survey* 70: 1–874.
- Koch, C.L. 1839. *Die Arachniden*. Band 6: 1–156. Nürnberg: Zeh'schen.
- Marx, G. 1890. Catalogue of the described Araneae of temperate North America. *Proceedings of the United States National Museum* 12: 497–594.
- Muma, M.H. 1944. A report on Maryland spiders. *American Museum Novitates* 1257: 1–14.

- Muma, M.H. 1973. Comparison of ground surface spiders in four central Florida ecosystems. *Florida Entomologist* 56: 173–196.
- Paquin, P., and N. Dupérré. 2003. Guide d'identification des araignées (Araneae) du Québec. *Fabriques Supplément* 11: 1–251.
- Penniman, A.J. 1985. Revision of the *britcheri* and *pugnata* groups of *Scotinella* (Araneae, Corinnidae, Phrurolithinae) with a reclassification of phrurolithine spiders. Unpublished Ph.D. dissertation, Ohio State University, available online (http://rave.ohiolink.edu/etdc/view?acc_num=osu1346165025).
- Platnick, N.I., and M.U. Shadab. 1975. A revision of the spider genus *Gnaphosa* (Araneae, Gnaphosidae) in America. *Bulletin of the American Museum of Natural History* 155: 1–66.
- Platnick, N.I., and D. Ubick. 1989. A revision of the spider genus *Drassinella* (Araneae, Liocranidae). *American Museum Novitates* 2937: 1–12.
- Ramírez, M.J. 2014. The morphology and phylogeny of dionychan spiders (Araneae: Araneomorphae). *Bulletin of the American Museum of Natural History* 390: 1–374.
- Roddy, L.R. 1957. Some spiders from southeastern Louisiana. *Transactions of the American Microscopical Society* 76: 285–295.
- Roewer, C.F. 1955. *Katalog der Araneae von 1758 bis 1940, bzw. 1954*. Vol. 2: 1–1751. Brussels: Institute Royale des Sciences Naturelles de Belgique.
- Shorthouse, D.P. 2010. SimpleMappr, an online tool to produce publication-quality point maps. Online resource (<https://www.simplemappr.net>), accessed August 31, 2019.
- Simon, E. 1897. *Histoire naturelle des araignées*. Vol. 2: 1–192. Paris: Roret.
- Thorell, T. 1897. Viaggio di Leonardo Fea in Birmania e regioni vicine. LXXIII. Secondo saggio sui Ragni birmani. I. Parallelodontes. Tubitelariae. *Annali del Museo Civico de Storia Naturales de Genova* (2) 17 [= 37]: 161–267.
- Uhl, G., S.H. Nessler, and J.M. Schneider. 2010. Securing paternity in spiders? A review on occurrence and effects of mating plugs and male genital mutilation. *Genetica* 138: 75–104.
- Wang, L.-Y., H.-M. Chen, K.-X. Zhou, F. Zhang, and Z.-S. Zhang. 2015. Diversity of spiders in Fanjing Mountain Nature Reserve, Guizhou, China, I: Six new species of Phrurolithidae (Araneae). *Zootaxa* 4012: 447–464.
- World Spider Catalog. 2019. World spider catalog, Natural History Museum Bern. Online resource (<http://wsc.nmbe.ch>), version 20.5, accessed Aug. 29, 2019.
- Wunderlich, J. 1992. Die Spinnen-Fauna der Makaronesischen Inseln: Taxonomie, Ökologie, Biogeographie und Evolution. *Beiträge zur Araneologie* 1: 1–619.

All issues of *Novitates* and *Bulletin* are available on the web (<http://digitallibrary.amnh.org/dspace>). Order printed copies on the web from:

<http://shop.amnh.org/a701/shop-by-category/books/scientific-publications.html>

or via standard mail from:

American Museum of Natural History—Scientific Publications
Central Park West at 79th Street
New York, NY 10024

Ⓢ This paper meets the requirements of ANSI/NISO Z39.48-1992 (permanence of paper).