

**SPIDERS OF THE GENUS *PIRATA* IN NORTH AMERICA,
CENTRAL AMERICA AND THE WEST INDIES
(ARANEAE: LYCOSIDAE)**

H. K. Wallace

Department of Zoology
University of Florida
Gainesville, Florida 32611

Harriet Exline¹

Rolla Gardens
Missouri

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¹Mrs. Don L. Frizzell, deceased

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ABSTRACT

Thirty-two species of *Pirata*, including nine new species, from North and Central America and the West Indies are described and illustrated with photographs on 39 plates. Keys to males and females are included. Data on distribution, life history, and ecology are summarized. Photographs of all available types are included.

INTRODUCTION

Wolf spiders of the genus *Pirata* have been recorded from all the continents and many islands. In the area covered by this study most of them are small with a body length of a centimeter or less and are easily overlooked by collectors or passed up as immatures. The object of this study was to describe all of the species known from North and Central America and the West Indies. No attempt was made to determine the limits of the genus; this would require a study on a much wider basis. We have followed Chamberlin, Gertsch, Kaston and others in recognizing *Pirata* as those species that have a tuning-fork pattern on the carapace, plus a few others, one or two of doubtful affinity. The genitalia of the species included in this study differ enough to suggest that several lines of descent are involved and that they will fall into several genera when the family has been studied thoroughly.

Members of *Pirata* occur typically around bodies of water, upon which they run with great ease, or in bogs, swamps and marshes. Several species may be found in damp meadows or on mesic slopes. One species was collected originally in Florida in a rotten log in a mesic hammock.

The cocoon is carried around attached to the spinnerets. This behavior makes these little spiders much more conspicuous to the eyes of the collector than is usually the case.

As early as 1963 Harriet Exline wrote to Wallace that she was beginning a study of the genus *Pirata* and during the next five years they exchanged specimens and information at infrequent intervals. Shortly after Harriet's death in 1968 Dr. William B. Peck, who had been entrusted with her collection and spider papers, wrote to Wallace and inquired if he would be interested in finishing her manuscript on *Pirata*. Wallace replied in the affirmative and shortly thereafter received the manuscript and began to study the collections. It soon became obvious that Miss Exline had studied all of the larger collections except the Chamberlin collection and Wallace was pleased to note that they agreed on every identification except in two or three cases where it appeared she had put a wrong label in a vial with species with which she was perfectly familiar.

As the work progressed Wallace recorded on 3 × 5 cards all of the data available on every specimen examined and it finally appeared to him that it would be simpler in writing up the results of the study to start from scratch in describing the species and to use his 3 × 5 cards in compiling the data on distribution, life history and ecology. As a result, only the specimens examined by Wallace are recorded in this study (those examined by Miss Exline would be included). Records from the literature are not included. In fairness to Miss Exline it should be pointed out that any mistakes or faulty judgements in this paper are attributable to Wallace and not to her.

During this investigation Wallace found photographs of the genitalia and, indeed, of the whole spider, to be very useful in studying diagnostic characters and in comparing species. As he progressed from one species to the next it was very convenient and necessary to compare photographs dozens of times and often this made it unnecessary to locate a vial and remove specimens for study under a microscope. Photographs are used to illustrate this paper because, even though the picture may not be as good as one might wish for, still it is a more accurate representation of the structure than Wallace could have made in a drawing. The small size of the genitalia in *Pirata* often makes securing a good photograph almost impossible. Nevertheless, the characteristics necessary to distinguish between species can be illustrated on film.

SYNONYMS

- **Pirata agilis* Banks, 1892 = *P. montanus* Emerton
- **Pirata arenicola* Emerton, 1909, female = *P. piraticus* (Clerck)
- **Pirata arenicola* Emerton, 1909, male = *P. aspirans* Chamberlin
- Pirata californicus* Banks, 1904 = *P. sedentarius* Montgomery
- **Pirata elegans* Stone, 1890 = *P. montanus* Emerton
- **Pirata exigua* Banks, 1892 = *P. minutus* Emerton
- Pirata febriculosa* Becker, 1881 = *P. piraticus* (Clerck)
- **Pirata humicolus* Montgomery, 1902 = *P. minutus* Emerton
- **Pirata liber* Montgomery, 1902 = *P. insularis* Emerton
- **Pirata loennbergi* Tullgren, 1901 = *Sosippus floridanus* Simon
- **Pirata nigromaculatus* Montgomery, 1904 = *P. montanus* Emerton

Pirata piraticus Emerton, 1885 = *P. marxi* Stone

Pirata procursor Montgomery, 1902 = *Pardosa xerampelina* (Keyserling)

Pirata prodigiosa Keyserling, 1876 = *P. piraticus* (Clerck)

**Pirata sylvestris* Emerton, 1909, female = *P. piraticus* (Clerck)

**Pirata sylvestris* Emerton, 1909, male = *P. insularis* Emerton

**Pirata transversolineatus* Tullgren, 1901 = *Sosippus floridanus* Simon

**Pirata wacondana* Scheffer, 1904 = *P. sedentarius* Montgomery

*Type examined by H. K. Wallace.

METHODS

All of the descriptions and measurements in this paper are of specimens preserved in ethyl or isopropyl alcohol (we use 70%). The measurements were made with an ocular micrometer in a Leitz stereoscopic microscope. All data on every specimen examined are recorded by species on printed 3 × 5 data cards which will be deposited in the Florida State Collection of Arthropods, Division of Plant Industry, University of Florida, Gainesville, Florida. These cards could be useful to students wishing to make life history or distributional studies. More than three thousand photographs were taken; these will be deposited with the 3 × 5 cards. Collection of adult males and females, egg sacs, and penultimate males was tallied by species for each month of the year and the distribution of each species plotted on an outline map of North America. This information is summarized in the treatment of each species.

A large number of hours were spent trying to work out a system of numbering and locating the ventral spines on legs I and II that could be used in distinguishing between species with unsatisfactory results.

INTRODUCTION TO THE KEYS

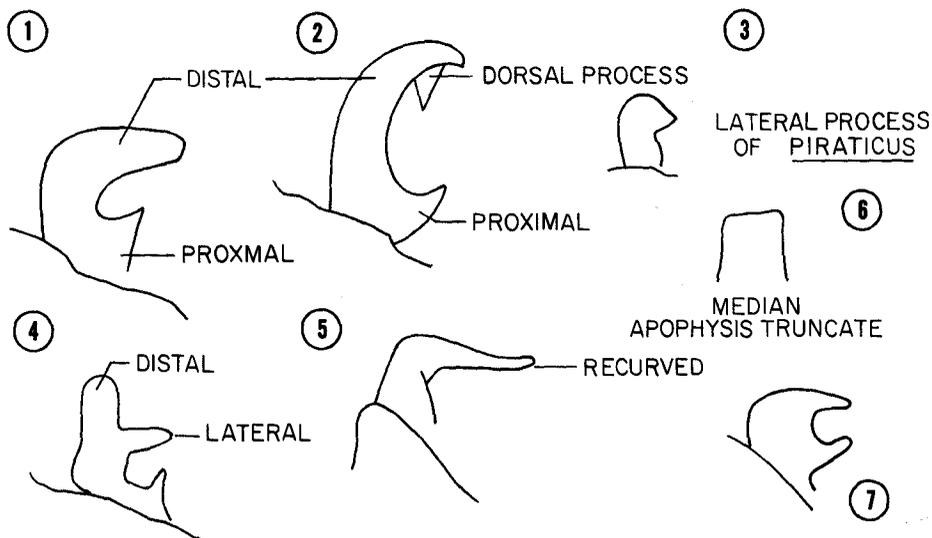
Some of the characters in the keys are based upon average specimens. For example, with respect to the markings on the carapace: the tuning-fork pattern may be distinct or broken up into pigmented spots in different individuals of the same species—these are keyed as having a tuning-fork mark; the amount of pigment varies so that the carapace in normally pigmented specimens appears to have a submarginal light stripe with pigmented margin, while lightly pigmented specimens appear to have a wide marginal light band and heavily pigmented specimens no light band at all—these may be keyed both with a submarginal light band and a marginal light band. In some species the annulae on the legs vary from distinct to very faint. These are keyed as with annulae.

KEY TO MALE *PIRATA*

- 1a. Tibia I with eight or fewer long overlapping ventral spines 2
 1b. Tibia I with more than eight long overlapping ventral spines *spiniger*
- 2a(1a). Tibia I distinctly swollen, metatarsus I with a distinct brush of hairs on ventral surface *cantralli*, n. sp.

- 2b. Tibia I not swollen, metatarsus I without brush 3
- 3a(2b). Carapace dark, heavily pigmented without tuning-fork mark or lateral light stripes 4
- 3b. Carapace with tuning-fork pattern or head region unpigmented 7
- 4a(3a). Lower margin of furrow of chelicerae with two teeth, femur I quite dark; carapace 1.7 mm long or less *minutus*
- 4b. Lower margin of furrow of chelicerae with three teeth, (lateral tooth may be quite small); carapace more than 1.7 mm long 5
- 5a(4b). Anterior eye row strongly procurved; femur, patella and tibia I dark . *bryantae*
- 5b. Anterior eye row weakly procurved or straight; femur I light or banded; tibia I not dark 6
- 6a(5b). Median apophysis of palpus small, chunky, terminating in a sharp point, without a proximal process (Fig. 3) *piraticus*
- 6b. Median apophysis larger, distal process forms almost a right angle with base, ending in a rounded tip; with a proximal process (Fig. 1) *sedentarius*
- 7a(3b). Lower margin of furrow of chelicerae with two teeth 8
- 7b. Lower margin of furrow of chelicerae with three teeth (sometimes lateral tooth is quite small) 10
- 8a(7a). Carapace 3.0 mm long or more *marxi*
- 8b. Carapace less than 2.0 mm long 9
- 9a(8b). Femur I dark, sides of carapace dark, legs not banded *minutus*
- 9b. Femur I light or banded; carapace with a wide marginal light area . . 50
- 10a(7b). Sides of carapace dark, without lateral light area 11
- 10b. Sides of carapace with lateral light area 13
- 11a(10a). Median apophysis of palpus with long distal or lateral process 12
- 11b. Distal process of median apophysis broadly truncate, with rounded distal edge (Figs. 6, 228) *montanus*
- 12a(11b). Carapace less than 1.8 mm long, femur I dark; distal process of median apophysis forms an arc with base which has another, pointed proximal process (Fig. 2) *minutus*
- 12b. Carapace more than 1.8 mm long; femur I not much darker than other leg segments; distal process of median apophysis forms an angle with base; tip of distal process recurved somewhat; base of median apophysis with a rounded proximal process (Fig. 5) *pagicola*
- 13a(10b). Sides of carapace with a wide marginal light area, with or without pigmented rim 14

- 13b. Sides of carapace with a distinct submarginal light area separated from rim by conspicuous band or areas of pigment 32
- 14a(13a). Femur I dark *hiteorum*, n. sp.
- 14b. Femur I light or banded or not much darker than other leg segments 15
- 15a(14b). Carapace less than 2.0 mm long 16
- 15b. Carapace 2.0 mm long or longer 27
- 16a(15a). Anterior eye row as wide as posterior medium row, straight *seminola*
- 16b. Anterior eye row narrower than posterior median row 17
- 17a(16b). Distal process of median apophysis truncate, not pointed or rounded 18
- 17b. Distal process pointed or rounded 19
- 18a(17a). Distal process short, truncate (Fig. 6); anterior eye row procurved and much narrower than posterior median row *hiteorum*, n. sp.
- 18b. Distal process elongate, hatchet-shaped; femur I light or banded; anterior eye row straight or only slightly procurved *alachuus*
- 19a(17b). Distal process almost as short as proximal process so that median apophysis is robust, but small and chelate in appearance (Fig. 7) *suwaneus*
- 19b. Median apophysis not chelate in appearance 20



Figs. 1-7.—Explanation of key to the males. For key purposes there is no lateral process unless a distal process is present also, except in the case of *P. triens*, which appears to be of the *P. aspirans* type, and *P. piraticus*. Median apophysis: 1, *P. sedentarius*, *P. seminola*, *P. veracruzae*; 2, *P. insularis*, *P. minutus*; 3, *P. piraticus*; 4, *P. aspirans*, *P. triens*, *P. iviei*; 5, *P. mayaca*, *P. pagicola* (median apophysis recurved); 6, *P. montanus*, *P. hiteorum* (median apophysis truncate); 7, *P. suwaneus*.

- 20a(19b). Apex of distal process of median apophysis pointed, without an egg-tooth-like structure on tip 21
- 20b. Apex of distal process rounded, with an egg-tooth-like structure on tip 23
- 21a(20a). Median apophysis with a distinct proximal process 22
- 21b. Median apophysis without a distinct proximal process (Fig. 183) *davisi*, n. sp.
- 22a(21a). Median apophysis viewed from beneath with a curved distal process, the tip of which is spatulate in lateral view *nanatus*
- 22b. Median apophysis viewed from beneath with a distal process that has a straight distal edge then angles sharply to apex; not spatulate in lateral view 30
- 23a(20a). Anterior median eyes twice as large as laterals 24
- 23b. Anterior median eyes not much larger than anterior laterals 25
- 24a(23a). Median apophysis with a large, plate-like circular distal process continuous with a short lateral process *iviei*, n. sp.
- 24b. Median apophysis with a finger-like distal process rather than a plate-like one with a proximal process *allapahae*
- 25a(23b). Distal process, in ventral view, forms almost a right angle with body of median apophysis 26
- 25b. Distal process in ventral view evenly curved or forms only a slight angle with body of median apophysis; tip round, usually lighter in color than rest of median apophysis *apalacheus*
- 26a(25a). Tip of distal process of median apophysis round; without egg-tooth-like process; proximal process not pointed *welakae*, n. sp.
- 26b. Tip of distal process pointed or with egg-tooth-like process; proximal process pointed 54
- 27a(15b). Median apophysis short, chunky, with a short pointed lateral process and no distal process which gives whole median apophysis the silhouette of the head of a bird with a short beak (Fig. 3) *piraticus*
- 27b. Median apophysis with distal or lateral process or both, not short or chunky 28
- 28a(27b). Median apophysis with both distal and lateral process 53
- 28b. Median apophysis with distal or lateral process, but not both 29
- 29a(28b). With distal process and no lateral process 31
- 29b. Median apophysis without distal process and with a very much enlarged lateral process, spatulate at tip (Fig. 75) *triens*, n. sp.
- 30a(22b). Distal arm narrower than body of median apophysis and forming a right angle with it; cymbium 0.49 mm long *turrialbicus*, n. sp.

- 30b. Distal arm as wide or wider than body and forming less than a right angle with it; cymbium 0.59 mm long *felix*
- 31a(29a). Tip of Distal arm at median apophysis truncate, hatchet-shaped *alachuus*
 31b. Tip of distal arm not truncate or hatchet-shaped 45
- 32a(13b). Carapace 2.9 mm or less long 34
 32b. Carapace 3.0 mm or more long 33
- 33a(32b). Lower margin of furrow of chelicerae with two teeth; median apophysis very large (Fig. 201) *marxi*
 33b. Lower margin with three teeth *sedentarius*
- 34a(32a). Anterior eye row straight or only slightly procurved 36
 34b. Anterior eye row distinctly procurved 35
- 35a(34b). Median apophysis small, chelate, the distal and basal processes almost same length (Figs. 7, 126-127) *suwaneus*
 35b. Median apophysis with long, robust distal process with tip round and normally lighter in color than body *apalacheus*
- 36a(34a). Carapace 1.9 mm or less long 37
 36b. Carapace 2.0 mm or more long 42
- 37a(36a). Anterior eye row straight and as wide or almost as wide as posterior median row *seminola*
 37b. Anterior eye row slightly procurved; narrower than posterior median row . . 38
- 38a(37b). Median apophysis with long, curved distal process bearing dorsal process near its tip; with a short basal process (Fig. 2) *insularis*
 38b. Not so 39
- 39a(38b). Median apophysis with a finger-like lateral process and a flat, round plate-like distal process *iviei*, n. sp.
 39b. Median apophysis with a lateral or distal process, but not both 40
- 40a(39b). Distal process forms almost a right angle with the body of the median apophysis and is drawn out into a long recurved tip (Figs. 5, 92) *mayaca*
 40b. Distal process forms almost a right angle with body of median apophysis, but is shorter, thicker and not recurved 41
- 41a(40b). Distal process curved and gradually narrows to a point in ventral view; spatulate in lateral view; lacks proximal process. ARE=PME; anterior eye row straight *seminola*
 41b. Distal process more angular and wider, often with what looks like a small egg-tooth on tip; not spatulate in lateral view; with a proximal process. ARE narrower than PMR *allapahae*, *sedentarius*, *veracruzae*

- 42a(36b). With a brush at hair-like structures on metatarsus I, tibia I and II swollen *cantralli*, n. sp.
- 42b. Metatarsus I without brush; tibia I and II not swollen 43
- 43a(42b). Median apophysis with well developed distal or lateral process, or both . . . 44
- 43b. Distal process not developed, median apophysis small, similar to that of *P. piraticus*, but with a rounded tip instead of a pointed tip like that of *P. piraticus* (Fig. 3) *zelotes*, n. sp.
- 44a(43a). Median apophysis with well developed distal and lateral process *aspirans*
- 44b. With distal process well developed, but no lateral process 47
- 45a(31b). Distal process of median apophysis robust, gently curved; of *insularis* type, without lateral process, with small proximal process; carapace 2.9 mm long or longer *giganteus*
- 45b. Distal process not robust, forms an angle with body of median apophysis . . 46
- 46a(45b). Distal process long, drawn out into a slender, recurved tip (Fig. 5) . . . *pagicola*
- 46b. Distal process not recurved 52
- 47a(44b). Median apophysis with a long evenly curved distal process which bears a dorsal process near its tip 51
- 47b. Distal process forms almost a right angle with body of median apophysis and lacks a dorsal process 48
- 48a(47b). Distal process long, drawn out into a slender, recurved tip (Figs. 5, 102, 104) *pagicola*
- 48b. Distal process short, not recurved, with an egg-tooth-like process on tip (Figs. 1, 159-160) *sedentarius*
- 49a(24b). Distal process in ventral view evenly curved; a straight shelf-like structure just proximal of base of median apophysis (Fig. 235) *sylvanus*
- 49b. Distal process slightly angled, its tip rather short, round, and usually lighter in color than rest of median apophysis *apalacheus*
- 50a(9b). Distal process long, attenuated, forming less than a right angle with body of median apophysis *montanoides*
- 50b. Distal process short, wide, forming almost a right angle with body of median apophysis *turrialbicus*, n. sp.
- 51a(47a). Median apophysis with a proximal process, distal process not spatulate in lateral view, bearing a pointed distal process (Figs. 2, 84, 88) *insularis*
- 51b. Median apophysis without a proximal process; distal process spatulate in lateral view, dorsal process not pointed—shelf-like *seminola*
- 52a(46b). Distal process forms almost a right angle with body of median apophysis; is short and may have an egg-tooth-like process at tip (Figs. 1, 159-160) *sedentarius*

- 52b. Distal process more elongate; does not form a right angle with body of median apophysis; most significant feature is a straight, shelf-like structure proximal to and ventral to body of median apophysis (Fig. 235) *sylvanus*
- 53a(28a). Median apophysis with a large, plate-like circular distal process that is continuous with a short lateral process *iviei*, n. sp.
- 53b. Distal process at median apophysis as long as lateral process, not circular and plate-like *aspirans*
- 54a(26b). Anterior edge of distal process of median apophysis slightly arched; tip ending in egg-tooth-like process *sedentarius*
- 54b. Anterior edge of distal process straight, sharply angled to form tip *turrialbicus*, n. sp.

KEY TO FEMALE *PIRATA*

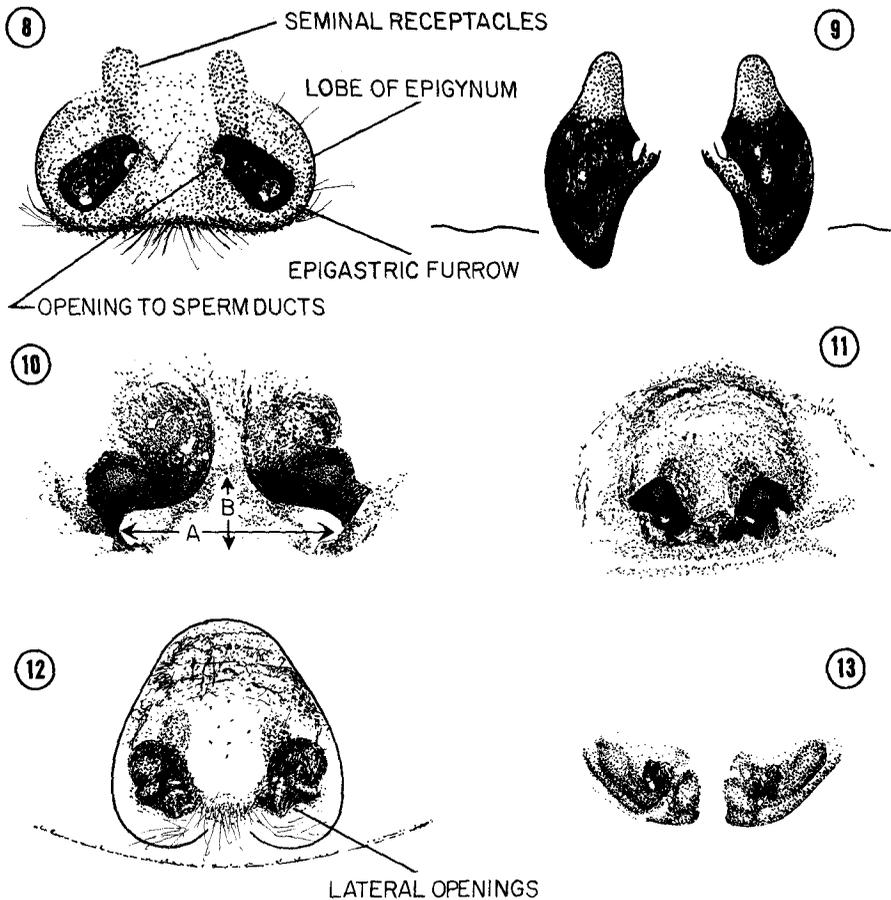
- 1a. Tibia I with eight or fewer long overlapping ventral spines 2
- 1b. Tibia I with more than eight long overlapping ventral spines *spiniger*
- 2a(1a). Carapace dark, heavily pigmented, without tuning-fork mark or lateral light stripes *bryantae*
- 2b. Carapace with tuning-fork pattern or head region unpigmented 3
- 3a(2b). Sides of carapace dark, without a marginal or submarginal light area 4
- 3b. With a marginal or submarginal light band on both sides of carapace 5
- 4a(3a). Retromargin or furrow of chelicerae with three teeth; carapace 2.0 mm long or longer 36
- 4b. Retromargin with two teeth; carapace less than 2.0 mm long *minutus*
- 5a(3b). Retromargin of chelicerae with two teeth 6
- 5b. Retromargin with three teeth (tooth next to base of fang may be so small it is difficult to see) 7
- 6a(5a). Carapace 3.0 mm long or longer *marxi*
- 6b. Carapace less than 3.0 mm long *pagicola*
- 7a(5b). Carapace with a wide marginal light band with or without pigmented rim 8
- 7b. Carapace with a submarginal light area, separated from rim by a distinct band of pigment which may or may not be continuous 26
- 8a(7a). Epigynum has two lobes which extend posteriorly beyond epigastric furrow. . 9
- 8b. Epigynal lobes do not extend posteriorly beyond epigastric furrow 20

- 9a(8a). Epigynal lobes somewhat pointed posteriorly (Fig. 9) 10
 9b. Epigynal lobes rounded posteriorly (Fig. 8) 16
- 10a(9a). Epigynal lobes concave on postmedial surface 11
 10b. Not so 15
- 11a(10a). Epigynal lobes contiguous 12
 11b. Not so 13
- 12a(11a). Carapace less than 2.0 mm long; legs without annulae; seminal receptacles converge anteriorly; anterior median eye diameter double that of anterior lateral eye diameter *allapahae*
 12b. Carapace 2.0 mm long or longer; legs with annulae; seminal receptacles parallel or diverge anteriorly; anterior median eyes less than twice diameter of anterior lateral eyes *aspirans*
- 13a(11b). Carapace more than 2.5 mm long; dorsum with prominent white paired spots; seminal receptacle openings on ventral surface, middle of lobes halfway back *piraticus*
 13b. Carapace less than 2.5 mm long 14
- 14a(13a). Epigynum of *aspirans* type (Fig. 10) with ventral overhang forming a kind of cave-like entrance posteriorly; carapace less than 2.0 mm long *iviei*, n. sp.
 14b. Epigynum consists of two prominent lobes projecting posteriorly without ventral overhang characteristic of *aspirans* group 32
- 15a(10b). Lobes of epigynum almost contiguous, separated by less than width of a lobe (U.S.A.) (Figs. 197-198) *hiteorum*, n. sp.
 15b. Lobes of epigynum well separated, by at least width of a lobe (Costa Rica) (Figs. 109, 118) 34
- 16a(9b). Carapace more than 2.0 mm long *sedentarius*
 16b. Carapace less than 2.0 mm long 17
- 17a(16b). Lobes of epigynum concave on posteromedial surface 19
 17b. Not so 18
- 18a(17b). Lobes of epigynum contiguous posteriorly 36
 18b. Lobes of epigynum separated by almost width of a lobe *welakae*, n. sp.
- 19a(17a). Seminal receptacles diverge anteriorly at an angle of about 90 degrees *nanatus*
 19b. Seminal receptacles almost parallel to each other or converge anteriorly . . . 37
- 20a(8b). Carapace more than 2.4 mm long; epigynum consists of two large, almost circular, heavily pigmented contiguous plates *giganteus*
 20b. Carapace less than 2.4 mm long 21

- 21a(20b). Epigynal lobes of *aspirans* type (concave on posteromedial surface) 22
- 21b. Epigynal lobes not concave on posteromedial surface 24

- 22a(21a). Carapace less than 2.0 mm long 38
- 22b. Carapace 2.0 mm or more long (Great Lakes region) 23

- 23a(22b). Anterior median eyes twice as large as anterior laterals; epigynal opening (Fig. 10) A/B=4/1 *indigenus*, n. sp.
- 23b. Anterior median eyes less than twice as large as laterals; epigynal opening (Fig. 10) A/B=2/1 *triens*, n. sp.



Figs. 8-13.—Explanation of key to the females. Epigynum: 8, *P. alachuus*. Seminal receptacles parallel, lobes do not extend posterior to epigastric furrow, lobes rounded posteriorly, openings to sperm ducts on posteroventromedial surface of lobes of the epigynum, lobes of epigynum contiguous; 9, *suwaneus* type. Lobes extend posterior to epigastric furrow, lobes pointed posteriorly, lobes concave on posteromedial surface; 10, *aspirans* type. A, width of epigynal opening, B, length of epigynal opening; 11, *P. montanoides*. Epigynum not divided into right and left lobes. Pigmented areas look like clipped ears of a dog; 12, *P. sylvanus*. Epigynal openings lateral in position; 13, *P. zelotes*, n. sp. Epigynal lobes shaped like human ears.

- 24a(21b). Epigynal openings on posterior edge of lobes facing posterolaterally (Figs. 11-12) 25
- 24b. Epigynal openings on ventral surface of lobes and central located . . . *alachuus*
- 25a(24a). Heavily sclerotized portions of epigynum doughnut-shaped with light center (Fig. 12) *sylvanus*
- 25b. Heavily sclerotized portions of epigynum shaped like trimmed ears of a dog (Fig. 11) *montanoides*
- 26a(7b). Carapace 3.0 mm long or longer; epigynal lobes shaped somewhat like human ears (Fig. 13) *zelotes*, n. sp.
- 26b. Carapace less than 2.0 mm long 27
- 27a(26b). Epigynal lobes rounded posteriorly 28
- 27b. Epigynal lobes pointed posteriorly 30
- 28a(27a). Epigynal lobes concave on posteromedial surface 29
- 28b. Epigynal lobes not concave 31
- 29a(28a). Epigynal lobes contiguous; anterior median eyes double that of anterior lateral eyes; seminal receptacle openings on inner edge of lobes halfway back. *mayaca*
- 29b. Epigynal lobes not contiguous; anterior median eyes less than double that of anterior lateral eyes; seminal receptacle openings ventral surface middle of lobe, halfway back 33
- 30a(27b). Carapace less than 2.0 mm long 39
- 30b. Carapace 2.0 mm long or longer *pagicola*, *mayaca*
- 31a(28b). Carapace less than 2.2 mm long *seminola*
- 31b. Carapace 2.2 mm long or longer *insularis*, *cantralli*, n. sp.
- 32a(14b). Seminal receptacles converge anteriorly (Florida) *allapahae*
- 32b. Seminal receptacles parallel or diverge anteriorly (Central America) 34
- 33a(29b). Carapace less than 2.5 mm long; seminal receptacle openings on ventral surface in middle of lobe, halfway back *seminola*
- 33b. Carapace usually more than 2.2 mm long; seminal receptacle openings on posteromedial surface of lobe of epigynum *sedentarius*
- 34a(15b,32b). Apex of lobes of epigynum pointed; carapace 1.7 mm long
. *turrialbicus*, n. sp.
- 34b. Apex of lobes curved rather than pointed; carapace 1.9-2.1 mm long . . . *felix*
- 35a(4a). With *aspirans* type epigynum, i.e., lobes extending posterior to epigastric furrow, somewhat pointed, concave on posteromedial aspect (Figs. 98-99, 103) *pagicola*
- 35b. Epigynum without posteriorly projecting lobes (Fig. 229) *montanus*

- 36a(18a). Lobes of epigynum large, round, heavily sclerotized; may look like two round black plates *apalacheus*
 36b. Not so 40
- 37a(19b). Anterior eye row almost straight; anterior median eyes twice as large as laterals *allapahae*
 37b. Anterior eye row distinctly procurved; anterior median eyes not much larger than anterior laterals *welakae*, n. sp.
- 38a(22a). Epigynal opening three times as wide as long (Fig. 10-A/B) (Georgia, North Carolina) *iviei*, n. sp.
 38b. Epigynal opening four times as wide as long (Fig. 10-A/B) (Texas, Mexico) *davisi*
- 39a(30a). Epigynum of *aspirans* type (Fig. 10) with deep concavities on posteromedial aspect of each lobe *iviei*, n. sp., *pagicola*, *mayaca*
 39b. Epigynum of *suwaneus* type (Fig. 9), somewhat concave on posteromedial aspect of each lobe, but not excavated as in *aspirans* type . . *suwaneus*, *browni*
- 40a(36b). Lobes of epigynum round posteriorly, weakly developed *alachuus*
 40b. Lobes of epigynum pointed posteriorly, concave on posteromedial aspect (*aspirans* type) *pagicola*

SPECIES GROUPS

In the descriptions species that appear to be most closely related are arranged in groups. In the last group species whose relationships are uncertain are treated in alphabetical order. The following is a list of the groups and their included species.

- (1) *nanatus* group: *P. allapahae* Gertsch, *P. apalacheus* Gertsch, *P. nanatus* Gertsch, *P. seminola* Gertsch and Wallace, *P. welakae*, n. sp.
- (2) *aspirans* group: *P. aspirans* Chamberlin, *P. indigenus*, n. sp., *P. iviei*, n. sp., *P. triens*, n. sp.
- (3) *insularis* group: *P. insularis* Emerton, *P. cantralli*, n. sp.
- (4) *mayaca* group: *P. mayaca* Gertsch, *P. pagicola* Chamberlin.
- (5) *felix* group: *P. felix* Pickard-Cambridge, *P. browni* Gertsch and Davis, *P. suwaneus* Gertsch, *P. turrialbicus*, n. sp., *P. veracruzae* Gertsch and Davis.
- (6) *piraticus* group: *P. piraticus* (Clerck), *P. zelotes*, n. sp.
- (7) *sedentarius* group: *P. sedentarius* Montgomery, *P. spiniger* (Simon).
- (8) Species of uncertain relationship: *P. alachuus* Gertsch and Wallace, *P. bryantae* Kurata, *P. davisi*, n. sp., *P. giganteus* Gertsch, *P. hiteorum*, n. sp., *P. marxi* Stone, *P. minutus* Emerton, *P. montanoides* Banks, *P. montanus* Emerton, *P. sylvanus* Chamberlin and Ivie.

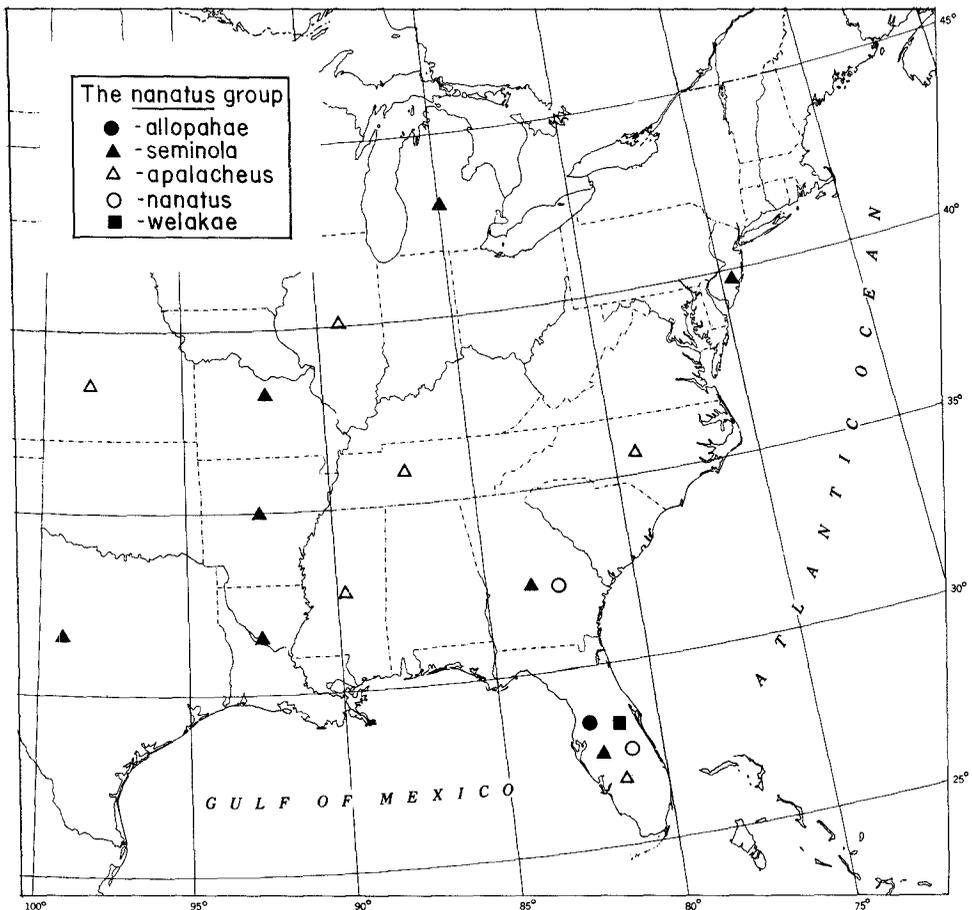
In listing the specimens examined locality, date, collector, etc., usually are given for species known from only a few localities. In cases where the species is represented by numerous collections only state and county are given. The abbreviations in parentheses following the number of specimens indicates the collection in which the vial is deposited.

Dates are given as listed on labels to avoid the possibility of error in conversion to some standard form.

THE *NANATUS* GROUP

The following five species in the southeastern United States, *P. apalacheus*, *P. nanatus*, *P. seminola*, *P. allapahae*, and *P. walakae*, n. sp., may easily be confused, although they differ in character combinations of size, pattern, spination and structure of the genitalia. *P. nanatus*, *P. apalacheus*, and *P. walakae*, have marginal light areas on the carapace while the other two have submarginal light bands (*P. seminola* has marginal banding in Arkansas). *P. nanatus* and *P. allapahae* epigyna are very similar, but may be distinguished by the position of the seminal receptacles; in the latter they are parallel, in the former they diverge from one another anteriorly. The seminal receptacles also diverge in *P. walakae*, n. sp. The epigynum of *P. nanatus*, *P. allapahae*, and *P. walakae*, n. sp., resemble *P. sedentarius* somewhat, while that of *P. seminola* is very similar in appearance to that of *P. insularis*; and *P. apalacheus* is unique.

The palp of *P. nanatus* is smaller than that of *P. allapahae* (cymbium 0.45 mm versus 0.55 mm) and their median apophyses differ in shape; the median apophysis of *P. nanatus*



is larger in proportion to the size of the cymbium than it is in *P. allapahae*. In *P. nanatus* the median apophysis extends anteriorly beyond the excavation of the cymbium about one-third the distance to its tip. In *P. allapahae* it barely extends beyond the rim of the excavation. In ventrolateral view the anterior process of the median apophysis of *P. nanatus* is wider and more spatulate than in *P. allapahae*, and in *P. allapahae* it is more rounded and less angular than in *P. nanatus*. The palpal tibia is relatively shorter in *P. nanatus* than in *P. allapahae* and *P. seminola*.

The anterior process of the median apophysis in *P. seminola* is spatulate somewhat like that in *P. nanatus* in ventrolateral view, but the median apophysis lacks the distinct medial process of the base like in *P. nanatus*. The median apophysis of *P. seminola* has a dorsally extending shelf that extends to its tip (Fig. 39).

In *P. welakae*, n. sp., the median apophysis is stout and resembles that of *P. sedentarius* somewhat, lacking the basal median process of *P. nanatus* and *P. allapahae*. It is about the same size as these two, but is smaller than in *P. sedentarius*. The median apophysis of *P. apalacheus* has a characteristic light colored, flattened anterior tip.

Pirata allapahae Gertsch

Figs. 14-19

Pirata allapahae Gertsch, 1940, Florida Entomol., 23(2):23, fig. 9 (male, female, Alachua Co., Fla., A.M.N.H., examined).

Etymology.—This species was named after the Allapaha Indian tribe which lived in Florida.

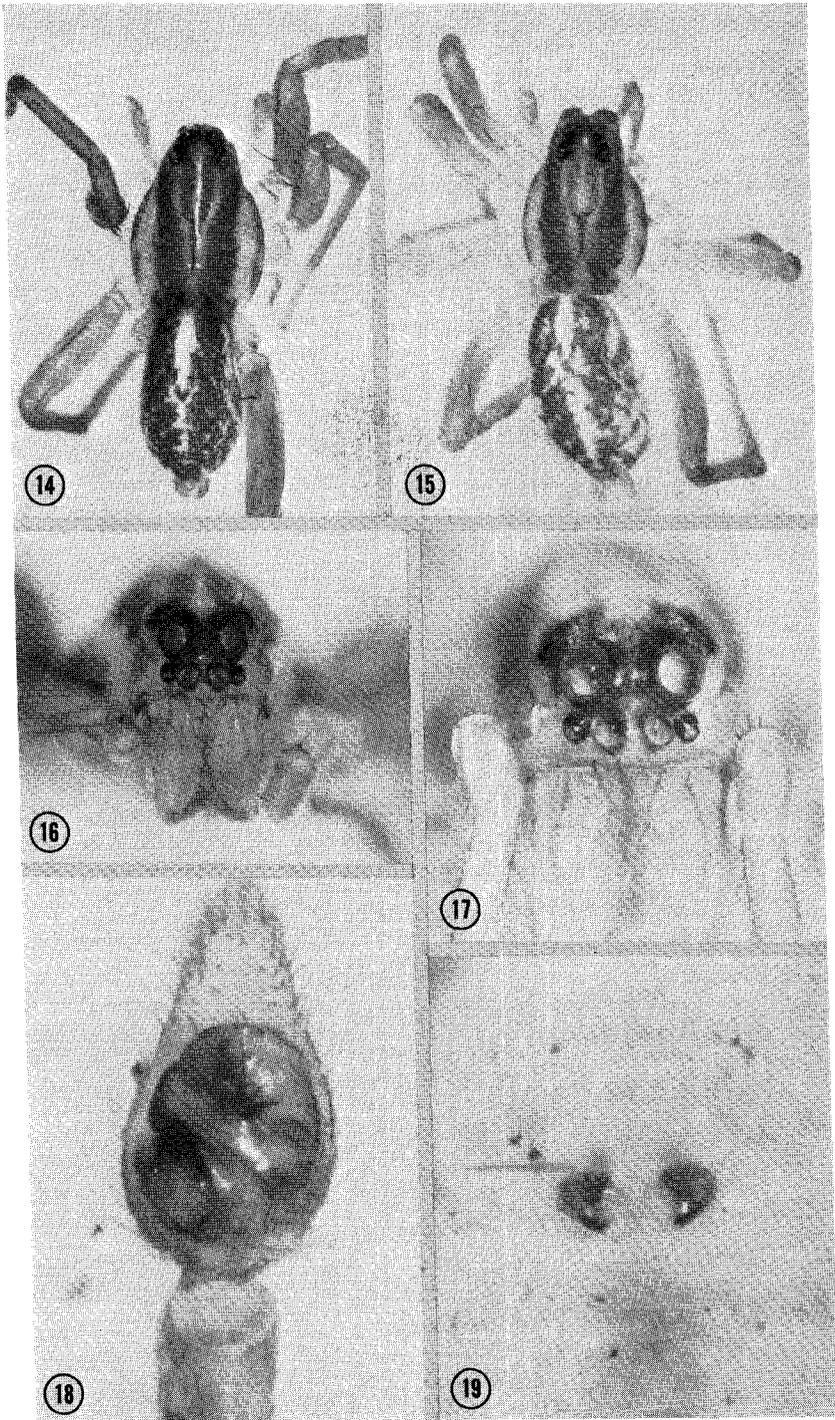
Description of holotype.—A male with carapace 1.75 mm long, 1.25 mm wide. Carapace with a wide submarginal band and typical tuning-fork pattern. Legs dusky, a suggestion of annulae on some femora (Fig. 14). Anterior eye row almost straight, slightly narrower than posterior median eye row; anterior median eyes about twice the size of anterior lateral eyes, anterior eyes evenly spaced. Palpal tibia 0.37 mm, cymbium 0.55 mm long. Median apophysis of palp with a pointed proximal process (Fig. 18).

Description of allotype.—A female with carapace 1.87 mm long, 1.37 mm wide. Carapace with a wide submarginal band, and typical tuning fork pattern. Legs dusky (Fig. 15). Anterior eye row slightly procurved, narrower than posterior median eye row; anterior median eyes are twice as large as the anterior lateral eyes. Epigynum (Fig. 19) with lobes about a diameter apart, concave on medial surface. The seminal receptacles are visible through the body wall; are rather short and inclined towards each other anteriorly. Note: Gertsch did not describe or list a female, but the type vial contains a female labeled as allotype.

Variations and observations.—Gertsch described the pattern of the carapace as having a "broad marginal band and a black edge" which is another way of describing, in our words, "a wide submarginal band." Sometimes the black edge is missing, as in a female from Pasco County, Florida.

In examining the collections we were impressed from time to time with the fact that *P. allapahae* resembled *P. sedentarius* both in pattern and genitalia, although considerably smaller in size.

There is some variation in size. Males range from 1.55 to 1.80 mm in carapace length and females from 1.72 to 2.0 mm.



Figs. 14-19.—*P. allapahae*: 14, holotype male, Florida, Alachua Co.; 15, allotype female, Florida, Alachua Co.; 16, paratype male, eyes, Florida, Alachua Co.; 17, paratype female, eyes, Florida, Alachua Co.; 18, holotype, palpus; 19, allotype, epigynum.

Distribution.—Known only from Florida: Alachua, Lake, Marion, Pasco, and Putnam Counties.

Specimens examined.—*Florida*: Alachua Co.: HKW Sta 7B, Feb. 7, 1937, male holotype, female allotype and male and female paratypes; HKW Cat. No. 1016, Feb. 13, 1938, 1 male; Marion Co.: 9.1 mi. E. Fla. 318 at Citra, N. of Fla. 318, in bog, 13 Apr., 1950, H.G.P. No. 3, male, 6 females, egg sacs (D.P.I.); Pasco Co.: 1.0 mi. S. U.S. 41 x Fla. 52 on U.S. 41, edge cypress bay, March 21, 1947, HKW Cat. No. 1242, female, egg sac (A.M.N.H.); Putnam Co.: U.F.C.R., Mud Springs, K 62, May 3, 1947, HKW Cat. No. 1257, male, female (D.P.I.); U.F.C.R., Margin sawmill pond, G-58, VI.1.47, HKW Cat. No. 1264, 2 males, female (D.P.I.).

Life history.—We have examined males and females collected from February through June; egg sacs from March and April.

Ecology.—This species is apparently not restricted to the edge of water. It has been collected from sphagnum moss around cypress ponds, near a spring on a mesic slope, and under pine needle litter in a flatwoods.

Remarks.—There is some evidence that this species occurs in company with or near to *P. sedentarius* in Florida. *P. allapahae* has paired white spots on the abdomen.

Pirata apalacheus Gertsch

Figs. 20-25

Pirata apalacheus Gertsch, 1940, Florida Entomol., 23(2):17-19, figs. 3, 4 (male, female, Alachua Co., Fla., A.M.N.H., examined); Barnes, 1953, Amer. Mus. Nov., 1632:11.

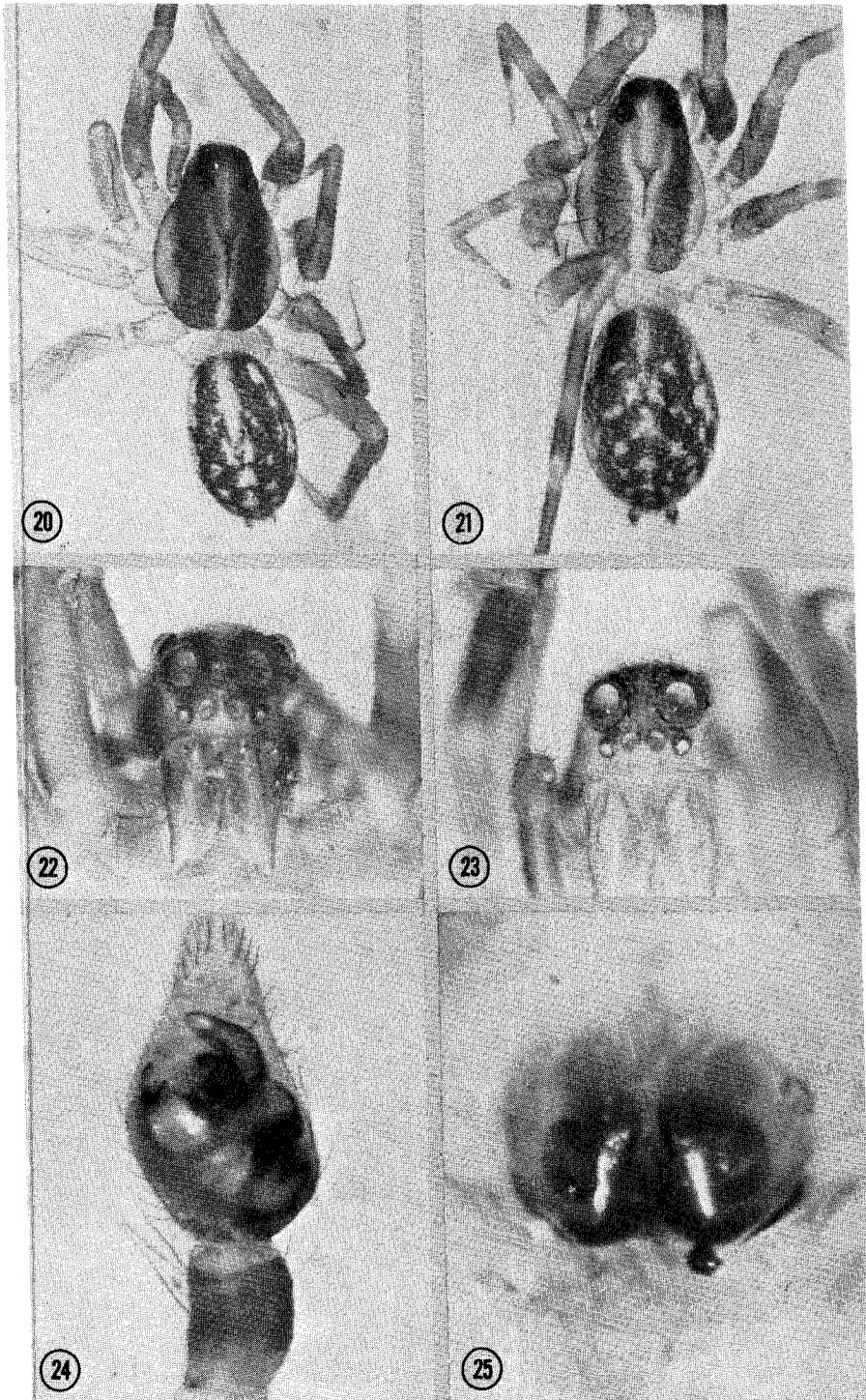
Description of holotype.—Carapace 1.67 mm long, 1.20 mm wide, with a wide marginal light area, narrowly and unevenly pigmented along the edges, the usual tuning-fork mark fading out between the eyes (Fig. 20). Anterior eye row distinctly procurved, much narrower than posterior median eye row, anterior eyes evenly spaced, anterior median eyes about half again as large as anterior lateral eyes (Fig. 22). Height of clypeus is equal to the diameter of an anterior median eye, slanted posteriorly. Legs with indistinct annulae. The median apophysis of palp is quite characteristic in shape with a light-colored tip (Fig. 24).

Description of allotype.—Carapace 1.77 mm long, 1.22 mm wide. Resembles the male except: the tuning-fork mark is quite distinct (Fig. 21); there is very little pigment along edge of carapace, and the clypeus is not slanted as much. The epigynum is quite characteristic in appearance; when heavily pigmented it looks like two black contiguous disks (Fig. 25). Tibia I and II with three pairs of ventral spines, none apical.

Variations and observations.—This species resembles *P. minutus* in appearance and size, but its genitalia are quite different and the front legs are not dark as in the former species. It also resembles *P. welakae* in appearance and size. There is some variation in size, the carapace in males varying in length between 1.5 and 1.7 mm and in females between 1.5 and 1.8 mm.

Distribution.—Southeastern United States, Illinois and Kansas.

Specimens examined.—*Alabama*: Baldwin, Madison, Marshall, Tuscaloosa Counties and Chatahoochie State Park; *Florida*: Alachua, Columbia, Dade, Duval, Jefferson, Highlands, Hillsborough, Indian River, Leon, Liberty, Monroe, Nassau, Polk, Putnam Counties; *Georgia*: Daugherty County; *Illinois*: Madison County, Bell Smith Springs,



Figs. 20-25.—*P. apalacheus*: 20, holotype male, Florida, Alachua Co.; 21, allotype female, Florida, Alachua Co.; 22, holotype male, eyes; 23, allotype female, eyes; 24, holotype, palpus; 25, allotype, epigynum.

Bedford; *Kansas*: Douglas County; *Mississippi*: Jackson, Wilkinson Counties; *North Carolina*: Alamance, Carteret, Durham, Orange Counties; *Tennessee*: Roane County.

Life history.—This is evidently a summer species. In Florida males have been taken from April through August and females from March through October with a preponderance in June and July; females with egg sacs have been collected from May through August. From the western and northeastern United States adults have been taken only in July and August. This may be a reflection of collecting activities.

Ecology.—*P. apalacheus* differs from most other species of *Pirata* in its occurrence away from water. The type locality was a rotten log in a mesic hammock far from the nearest pond or stream. H. W. Weems, Jr., collected it in pine needle litter in June in Alachua Co., Florida. H. G. Parrish collected it in leaf litter in a mesic hammock in Alchua Co., Florida. Alan Brady collected it under leaves and logs in Highland Hammock State Park, Florida. At Tall Timbers Research Station in Leon Co., Florida, many collections were made in pitfalls in various types of terrestrial situations away from water, annually burned pine woods, broom sedge-pine, woodyard hammock, beech woods, spruce pine, hickory-sweet gum association, etc. In Everglades Park, Florida, it has been collected in pitfalls in hardwood hammock. It appears to be a humus-loving form.

Pirata nanatus Gertsch

Figs. 26-31

Pirata nanatus Gertsch, 1940, Florida Entomol., 23(2):19-20, fig. 7, 8 (male, female, Turner Co., Ga., A.M.N.H., examined).

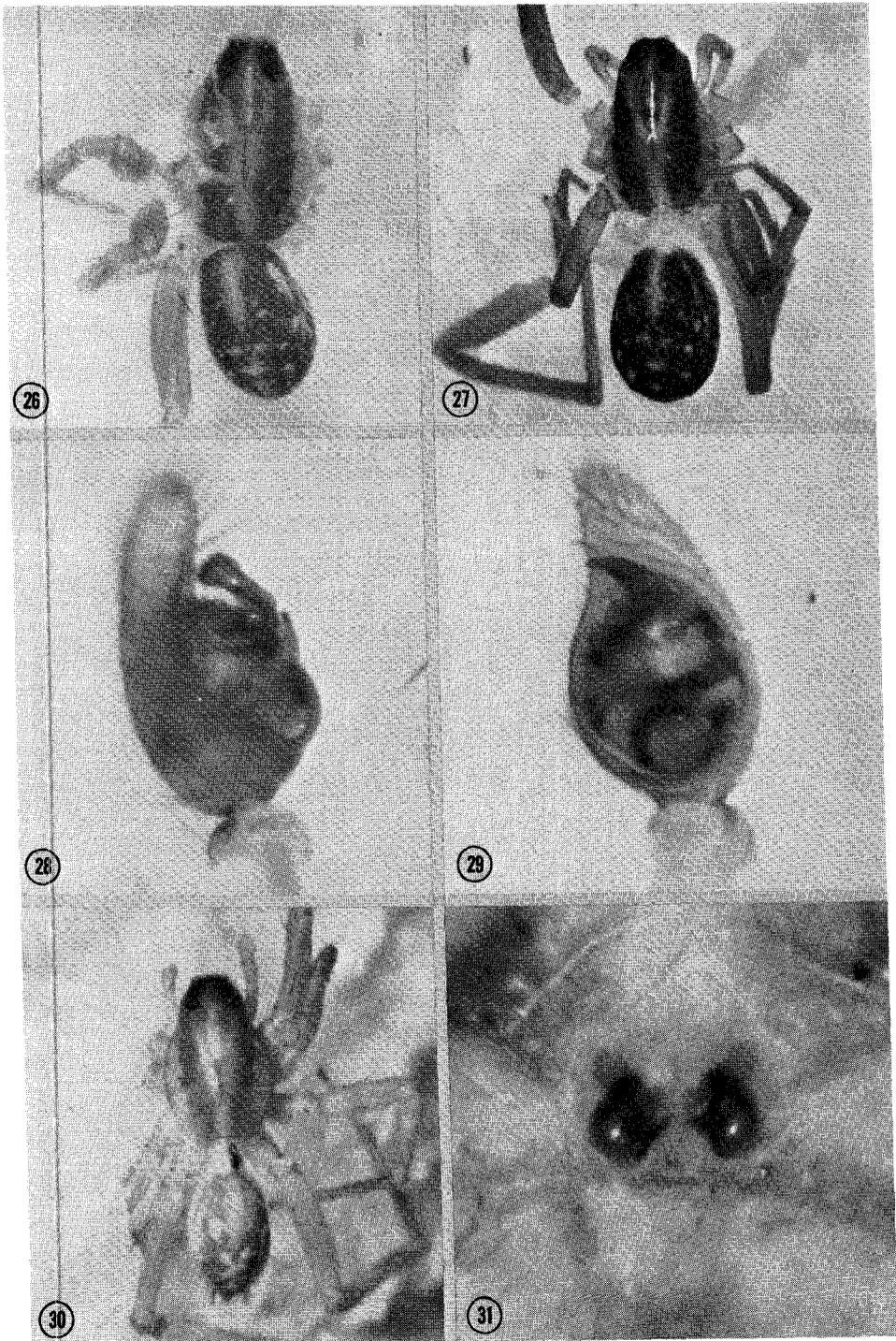
Diagnosis.—*Pirata nanatus* is one of the smallest, if not the smallest *Pirata* in North America. It may easily be confused with *P. seminola*, *P. allapahae* and *P. welakae*, n. sp., all of which occur in the same geographic region. *P. nanatus* has a wide marginal light band on the carapace; in females the epigynum resembles that of *P. sedentarius* and the seminal receptacles diverge anteriorly; the median apophysis of the palp in males extends anteriorly beyond the excavation of the cymbium and has a pointed tooth at its base (Fig. 29).

Descriptive notes on male holotype.—The cephalothorax (Fig. 26) is smashed and five legs and palps are disarticulated. Carapace 1.37 mm long, 1.05 mm wide, with wide marginal light area. Anterior eye row narrower than posterior median eye row, procurved; anterior median eyes larger than anterior lateral eyes, closer to each other than to the laterals. Palpal cymbium 0.45 mm long, palpal tibia 0.25 mm long.

Descriptive notes on female allotype.—Carapace 1.37 mm long, 0.95 mm wide, shiny, with a wide marginal light area (Fig. 27), the "black" edge rather obscure. Eye arrangement similar to that described above for the male.

Descriptive notes on five paratypes.—Two females from Columbia Co., Florida, HKW 402, IV.27.35. These two small females are dark and their patterns are obscure, but appear to have wide marginal light areas; carapaces 1.3 mm long, 0.9 mm wide; most legs disarticulated.

Three females from same collection as holotype, Georgia, Turner Co., 9 mi. S.E. Sycamore, V.6.37, HKW 606 (HKW). Amount of pigment varies somewhat. All three with wide marginal light areas on carapace, carapace shiny, sternum and venter light, legs not banded but are lightly pigmented.



Figs. 26-31.—*P. nanatus*: 26, holotype male, Georgia, Turner Co.; 27, allotype female, Georgia, Turner Co.; 28-29, holotype, palp; 30, male, Georgia, Baker County, Springfield Rd.; 31, allotype, epigynum.

Female No. 1: Carapace 1.30 mm long, 0.95 mm wide. Legs 4123.

Female No. 2: Carapace 1.55 mm long, 1.07 mm wide. Lower margin of furrow of chelicerae with three teeth, middle tooth the largest, tooth next to fang the smallest. Anterior eye row narrower than posterior median eye row, procurved, about equally spaced. Anterior median eyes are one and one-half times as large as the anterior lateral eyes. Legs 4123.

Female No. 3: Carapace 1.25 mm long, 0.88 mm wide. Lower margin of furrow of chelicerae with three teeth, middle tooth the largest, tooth next to the fang the smallest. Eyes like female no. 2. Legs 4123.

Four females from Alachua Co., Florida, have the following dimensions of the carapace: 1.18 mm long, 0.87 wide; 1.27 mm long, 0.95 mm wide; 1.30 mm long, 0.97 mm wide; 1.27 mm long, 0.95 mm wide.

Variation.—*P. nanatus* usually has a wide marginal light area on the carapace; the male from Baker Co., Georgia, has a little pigment along the edge of the carapace. The males we have examined are quite small: carapaces 1.35 mm long, 0.93 mm wide and 1.37 mm long, 1.05 mm wide. The carapace of females varies from 1.18 mm to 1.45 mm in length, with most being less than 1.40 mm.

The spines on tibia I and II are quite long (Fig. 61).

Distribution.—Known only from Florida and Georgia.

Specimens examined.—*Florida*: Alachua Co.: Sta 1 VIC, I.30.37, female paratype (A.M.N.H.); Sta. 1 VIC., IV.19.37, 3 female paratypes (H.K.W.); Columbia Co.: IV.27.35, H.K.W. 402, 2 female paratypes (H.K.W.); Leon Co.: Tall Timbers Research Station, VI.8-14.68, W. H. Whitcomb, male, 3 females (J.A.B.); *Georgia*: Baker Co.: Springfield Pond, 5 July 60, male (H.K.W.); Charlton Co.: Billy's Island, Okefinokee Swamp, W 82° 15': N 30° 45', June, 1912, C. R. Crosby, 7 females (Utah); Turner Co.: 9 mi. S.E. Sycamore, V.6.37, H.K.W. 606, 1 male, 10 females (Holotype, allotype, paratypes, A.M.N.H. and H.K.W.).

Life History.—*P. nanatus* appears to be a spring form judging from the scanty material available. We have examined one male each from May, June and July; one female from January, six from April, ten from May, 16 from June, and one from August. The only egg cases are from May. The scarcity of specimens in collections probably results from their small size and the difficulty of collecting the species.

Ecology.—This species has been collected in flatwoods, sphagnum in flatwoods, near water in a grassy pine woods, on the surface of water in a pond, and from a woodyard hammock (Berlese).

Pirata seminola Gertsch and Wallace

Figs. 32-43

Pirata seminola Gertsch and Wallace, 1935, Amer. Mus. Nov., 794:7-8, figs. 33, 35 (male, female, Levy Lake, Florida, A.M.N.H., examined).

Remarks on types.—We measured the carapace of the male holotype as 1.87 mm long, 1.32 mm wide (vs. 1.80 mm long, 1.25 mm wide in original description) and that of female allotype as 1.87 mm long, 1.27 mm wide (vs. 1.75 mm long, 1.20 mm wide in original description). Both types have submarginal light band on the carapace (Figs. 32-33). We also found the anterior eye row of the allotype to be narrower than the posterior median row as described.

Diagnosis.—*Pirata seminola*, in Florida, with submarginal light band and banded legs resembled *P. insularis* in appearance, but is smaller and differs in genitalia. The epigynum resembles that of *P. insularis*, but the palpi are quite different. The distal process of the median apophyses of these two species are quite different in structure; the differences in the genitalia can best be determined by studying Figs. 38, 84.

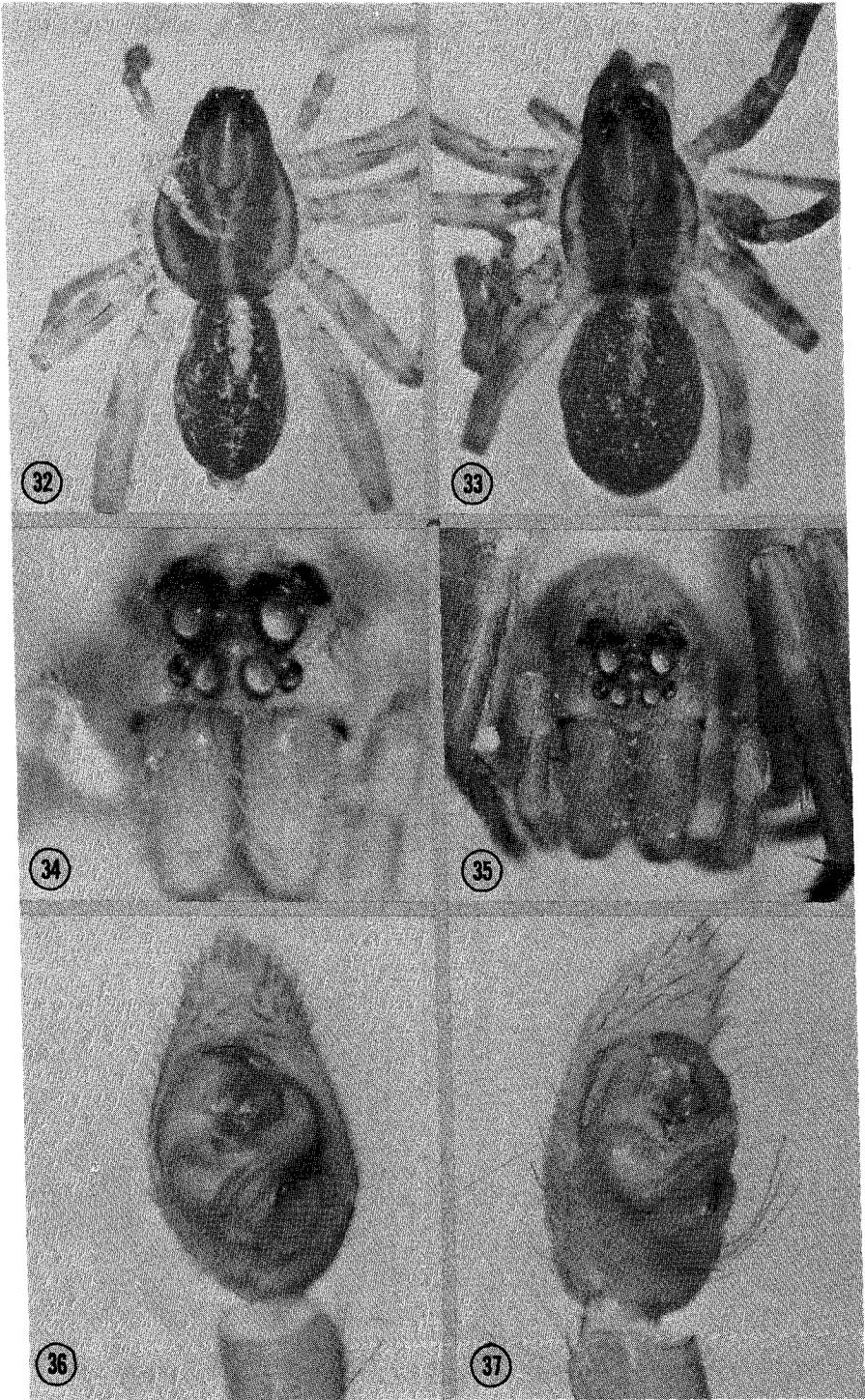
The median apophysis of *P. seminola* lacks the proximal process of *P. nanatus* and *P. welakae*, n. sp.

Variation.—*P. seminola* varies both in size and appearance. Males vary in carapace length from 1.5 mm to 2.2 mm, females from 1.5 mm to 2.3 mm. In Florida *P. seminola* has a distinct submarginal light band on the carapace and annulae on the legs. In Arkansas this species has a marginal light band on the carapace and no annulae, although sometimes there is a dark rim on the carapace. In a collection of twelve males from Hamburg, Louisiana, the pattern on the carapace varies from a wide marginal light area to a distinct submarginal stripe or band. The wide band forms are identical in appearance to Arkansas specimens. In Arkansas and Missouri there is much variation in size.

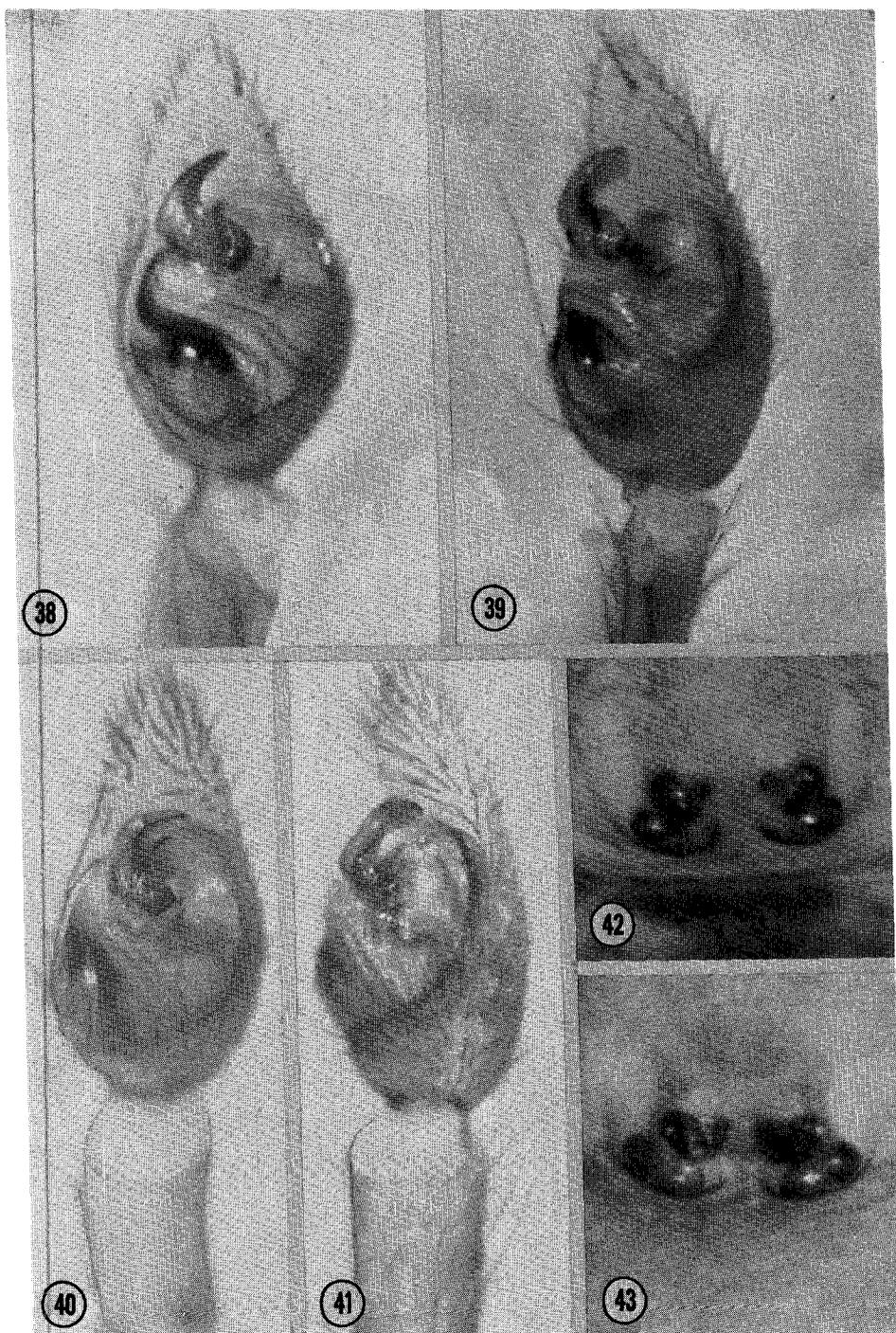
The angle which the distal process makes with the body of the median apophysis appears to vary in Arkansas males. In some it is almost 90 degrees and the tip does not extend much beyond the rim of the excavation of the cymbium. In others (Fig. 38) the median apophysis is rotated so that the angle appears smaller and the tip extends well beyond the rim as in *P. nanatus*.

Distribution.—The distribution of *P. seminola* is spotty and raises questions. Why, for example, the blanks from Georgia to New Jersey, Michigan and Louisiana? There is no pattern that we can detect. Perhaps more than one species is involved!

Specimens examined.—*Arkansas*: Bradley Co.: 8-VI-63, Crim 20, female (H.E.), 25-V-63, Crim 22, 2 females (H.E.); Conway Co.: 19-VI-63, Comp 8, male (H.E.), 22-VIII-61, W2-183W, female (H.E.), II-VII-63, Comp. 16, Traford, pitfall trap, male, female (H.E.), VIII-5-60, W-76, fall trap, female (H.E.), July, 60, no. 21, Gertsch, 2 males (H.E.), VIII.18.61, W2-164, 2 females (H.E.), VIII.7.61, M-44, male (H.E.), July 60, 21, female (H.E.), 12 Aug 61, Mori-13, male (H.E.), 14-21-VII.65, pitfall trap, Morrilton Lab, male (H.E.), 7 Aug 61, Morrilton, 2 males, 1 female (H.E.), 28 July 61, CF-39, Morrilton, Gertsch, 2 males (H.E.), 23 Aug 61, CF-34, Morrilton, female (H.E.), VI.7-61, L-141, Morrilton, female (H.E.), VIII.7.61, M-44, male (H.E.), VI.7-61, VI.9-1961, L-130, Plummerville, male (H.E.); *Washington Co.*: Cove Creek, 26-v-62, HL-306, Hite, 3 females (H.E.), III.6.62, CL-197; O + M Hite, female and egg sac (H.E.), V-26-62, CL-170, O + M Hite, male (H.E.), 7 July 62, C. G 148, Hite, female (H.E.), VII-15-1961, HL-72, male (H.E.), 2-VI-62, CL-184, HiteHite, female (H.E.), 7-VII-65, B. A. Dumas, male (H.E.); *Florida*: Alachua Co.: Mar 25, 1934, McClanahan, female (A.M.N.H.), Levy Lake, III.14.34, H.K.W. 264, males, females (holotype, allotype, paratypes A.M.N.H., paratypes H.K.W.), Station 6-C, II.3-37, H.K.W., males, females (H.K.W. and A.M.N.H.), Station 7B, II.7.37, H.K.W., males, females (H.K.W.), Station 7B, IV.28.37, H.K.W., 2 females (H.K.W.), Station 6-C, 3-III.37, H.K.W., male, female (M.C.Z.); *Hernando Co.*: 1.3 mi. W of U.S. 19 on Fla. 50, pond margin in scrub, III.23-47, H.K.W. 1248, male (H.K.W.); *Highlands Co.*: Archbold Biol. Sta., II.3.43, M. Cazier 80, female (A.M.N.H.); *Jackson Co.*: 3 Apr 1953, HKW 1655, male, female (H.K.W.); *Louisiana*: Hamburg: 29-IV-63, R. T. Allen, 12 males (H.E.), 29 Apr 63, L.A.-1, 5 males, 1 female (H.E.), 29 Apr 63, LA-2, 10 males, 5 females (H.E.), 13-V-63, L.A.-18, T. Allen, 6 males, 4 females (H.E.), 13 May 63, LA-40, 4 males, 1 female (H.E.), 18 May 63, LA-18, 3 males, 1 female (H.E.); *New Jersey*: Burlington Co.: New Gretna, May 13, 49, male (A.M.N.H.); *Michigan*: Kalamazoo



Figs. 32-37.—*P. seminola*: 32, holotype male, Florida, Alachua Co.; 33, allotype female, Florida, Alachua Co.; 34, male, eyes, Florida, Alachua Co., Sta 6C, II-3-37; 35, female, eyes, Florida, Alachua Co., Sta 6C, II-3-37, holotype, palp.



Figs. 38-43.—*P. seminola*: 38-39, palp, Arkansas, Conway Co., 14-21-VII-65; 40-41, palp, Michigan, Kalamazoo Co., Gull Lake, 1-7 July 65; 42, allotype, epigynum; 43, epigynum, Florida, Levy Co., H.K.W. 264.

Co.: Gull Lake Biol Sta.: 15-22 July 65, T. F. Hlavac, female (D.E.B.), 5-11 July 65, T. F. Hlavac; pitfall trap, *Typha* marsh, male (D.E.B.); *Missouri*: Newton Co.: Newtonia, 28 Aug 61, Peck, 1 female (H.E.); Dent Co.: Hobson Hts, May 2, 69, H.E.F., male, female, egg sac (H.E.); *Texas*: Henderson Co.: Swamp 9 mi. W of Athens, May 24, 1942, O. Saunders, female (H.E.); Travis Co.: Austin, July 7, 46, D. L. and H. Frizzell, male (H.E.).

Life history.—*P. seminola* is a spring form in Florida. We have males and females from February and March, and several females from April. The other months are blank. North of Florida we have males and females from April through August, one female with egg sac in March and two females in October from Arkansas. The only other egg sac is from Missouri in May.

Ecology.—In Florida *P. seminola* appears to be a flatwoods form and to occur around the margins of ponds and lakes, or swamps. In Arkansas and Missouri it has been collected in pitfall traps in open fields and near water in various types of situations. In Michigan it was taken in a pitfall in a *Typha* marsh; in Texas in a swamp.

Pirata welakae, n. sp.

Figs. 44-50

Holotype.—Male, Florida, Putnam Co., University of Florida Conservation Reserve, May 20, 1972, H. K. Wallace and Charles Harper, H.K.W. 1981 (A.M.N.H.).

Allotype.—Female with same data (A.M.N.H.).

Diagnosis.—At the U. of F. Conservation Reserve in Welaka, Florida, Wallace collected *P. welakae*, n. sp., and *P. apalacheus* Gertsch together by sifting thick layers of pine needles in situations where the ground was moist. The females of both species are about the same size and look alike, but the epigyna are quite different. The males are also similar in size and appearance, so much so that the palpi have to be examined to tell them apart. The median apophysis of *P. apalacheus* has a characteristic light spot at the tip of the distal process and the distal process is inclined laterally at less of an angle than in *P. welakae*. The distal process of *P. welakae* is somewhat shorter than that of *P. apalacheus*. The median apophysis of *P. welakae* lacks the basal process of *P. allapahae*; otherwise their palps look much alike. The palpal tibia of *P. allapahae* is relatively longer than that of *P. welakae* or *P. apalacheus*.

The genitalia of *P. welakae* most closely approach those of *P. sedentarius* in appearance, but the former is smaller than the latter and differs in pattern.

Description of holotype.—Carapace 1.55 mm long, 1.05 mm wide, glabrous, with numerous long hair-like bristles in head region and a wide marginal light area with dark pigmented rim. General body color, in alcohol, greenish yellow, black in eye region, the pigment on carapace rather diffuse, the tuning-fork pattern indistinct. Dorsum of abdomen with a distinct pattern (see Fig. 44). Coxae and femora greenish yellow above and below; tibiae and metarsi indistinctly banded. Labium, endites, coxae, sternum and venter yellow, immaculate. Anterior eye row much narrower than posterior median eye row (Fig. 46), procurved; anterior median eyes closer to each other than to anterior lateral eyes; anterior median eyes only slightly larger than anterior lateral eyes; clypeus is about equal to the diameter of anterior lateral eyes. Lower margin of furrow of chelicerae with three teeth, the middle tooth the largest, the lateral tooth the smallest. Legs 4123. Spines on tibia I long and overlapping. The palpus is very similar to that of *P. sedentarius* (Figs. 48-49).

	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
Palp	0.48	0.22	0.25		0.52	1.47
Leg I	1.12	0.50	0.93	0.93	0.52	4.00
Leg II	0.95	0.50	0.78	0.83	0.50	3.56
Leg III	0.95	0.40	0.70	0.93	0.47	3.45
Leg IV	1.30	0.50	1.13	1.45	0.70	5.08

Description of allotype.—Carapace 1.70 mm long, 1.13 mm wide. Pattern similar to male (Fig. 45), but legs more distinctly banded. Carapace glabrous like in some species of *Arctosa*. Anterior eye row narrower than posterior median eye row (Fig. 47), procurved; anterior median eyes closer to each other than to laterals, slightly larger than laterals. Clypeus about equal to the diameter of anterior lateral eyes. Legs 4123. Openings to sperm canals on ventral surface in center of lobes. Epigynum (Fig. 50).

	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
Palpus	0.50	0.27	0.37		0.50	1.64
Leg I	1.25	0.55	1.00	0.98	0.50	4.28
Leg II	1.18	0.52	0.92	0.92	0.50	4.04
Leg III	1.08	0.47	0.80	0.95	0.48	3.78
Leg IV	1.50	0.55	1.33	1.70	0.70	5.78

Descriptive notes on females.—From Putnam Co., Florida, VI.3.47, HKW 1267. Carapace of female no. 1, 1.6 mm long, 1.1 mm wide. Pattern on carapace indistinct, but appears to have a wide marginal light area. The anterior eye row is shorter than the posterior median eye row, procurved; anterior median eyes are closer to each other than the laterals; anterior median eyes one and one-fourth times as large as anterior lateral eyes. Clypeus equals diameter of anterior median eyes. Legs unbanded. Tibia I with long, overlapping spines. Legs 4132.

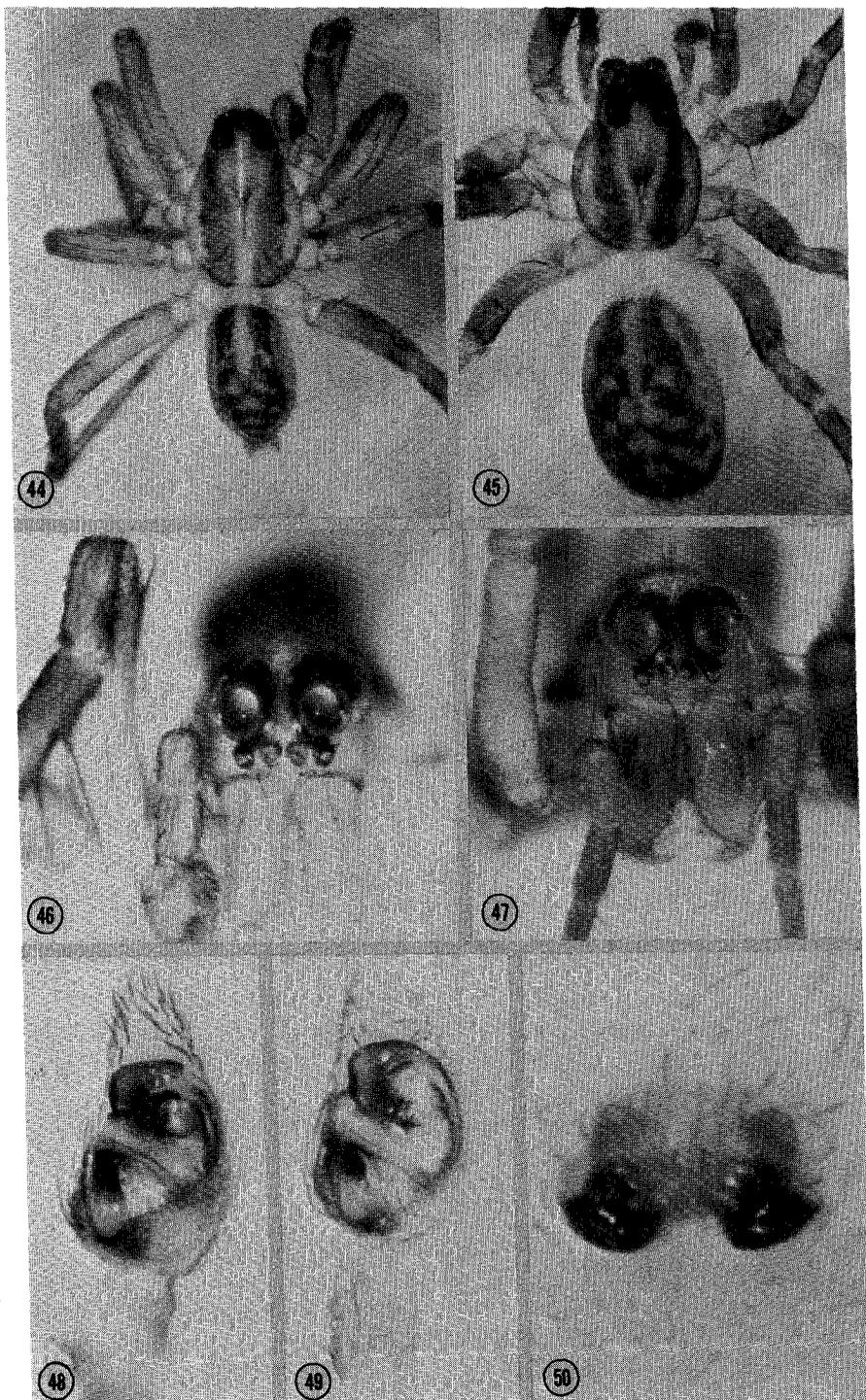
Distribution.—Columbia and Putnam Counties, Florida.

Specimens examined.—*Florida*: Columbia County: 12 mi. north Lake City, Dec. 22, 1962, W. Ivie, female (A.M.N.H.); Putnam County: U of F Conservation Reserve, VI.3.47, P-7, HKW 1267, 2 males, 4 females (D.P.I.), VI.6.47, 0-67, H.K.W. 1273A, 5 males, 11 females, egg sacs (D.P.I.); VI.7.47, P-70, H.K.W. 1275A, female (D.P.I.), V.20.72, G-56, H.K.W.1981, 5 males, 4 females (holotype and allotype, A.M.N.H.; paratypes, D.P.I.), V.26.72, G-56, H.K.W. 1984, 24 males, 27 females (D.P.I.).

Life history.—We have males and females from May and June from Putnam County and we think we collected females with egg sacs in May. The record from Columbia County in December may be due to misidentification; this locality record needs to be confirmed by additional collections.

Ecology.—*P. welakae* appears not to be confined to the margins of standing water. On the Reserve at Welaka where fire has been kept out for many years the leaf litter becomes eight to ten inches deep with the top layers forming a dry roof above the damp, dark rotting layers beneath. In pine flatwoods the pine needles form a thick carpet supported by clumps of the grass *Aristida stricta* and providing a moist dark habitat where Wallace has collected *P. welakae*, *P. apalacheus*, *Trabea aurantiaca*, *P. (Sosilaus) spiniger*, *P. insularis* and *Arctosa furtiva*.

The sawmill pond on the Reserve has a border of long-leaf pines above the high water zone. Sifting the pine needles from under these trees yields *P. welakae*, *P. apalacheus*, *P. insularis* and *Trabea aurantiaca*. Headlight collecting between the pines and the water on



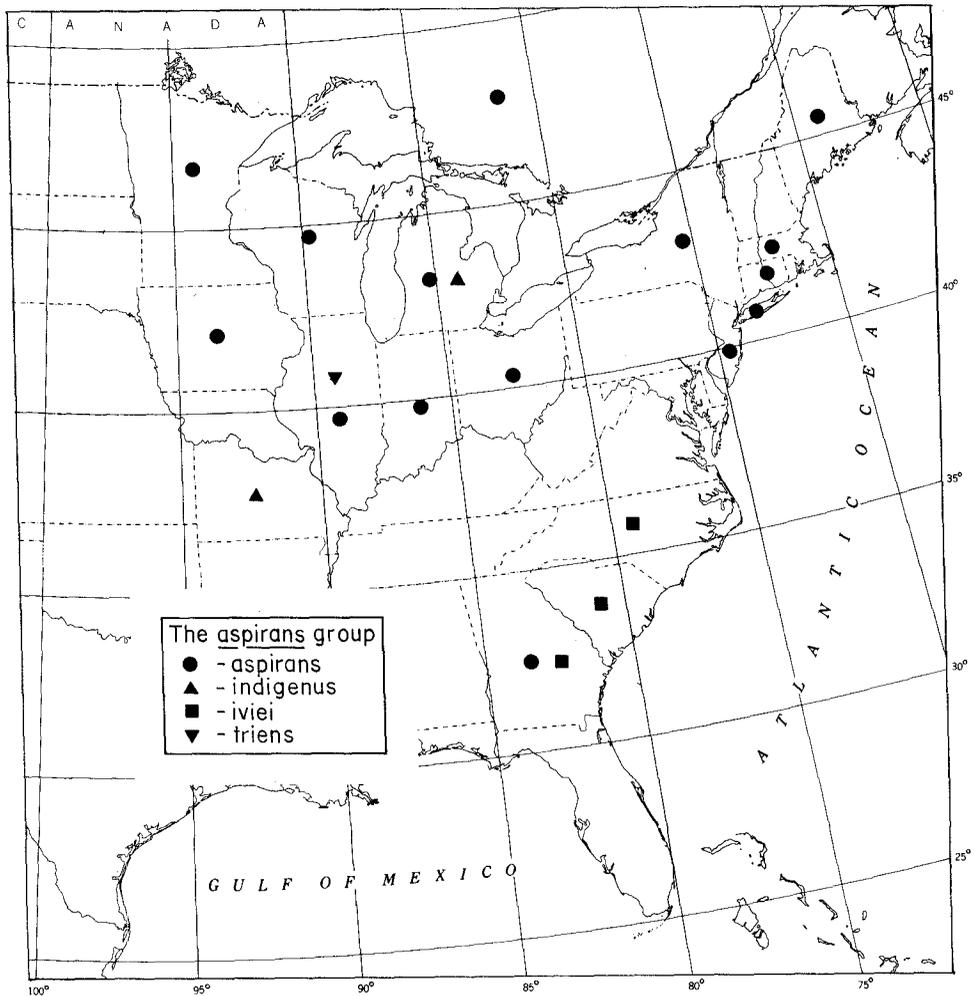
Figs. 44-50.—*P. welakae*, n. sp.: 44, holotype male, Florida, Putnam Co.; 45, allotype female, Florida, Putnam Co.; 46, holotype, eyes; 47, allotype, eyes; 48-49, holotype, palp; 50, allotype, epigynum.

black mud flats or by examining sphagnum moss yields *P. allapahae*, *P. insularis*, *P. suwaneus*, *P. mayaca* and *Arctosa furtiva*.

P. welakae and *P. apalacheus* have also been collected in the leaf litter of mesic hammock on the Reserve.

THE *ASPIRANS* GROUP

P. aspirans, *P. triens*, n. sp., *P. indigenus*, n. sp. and *P. iviei*, n. sp., are a related group having similar patterns and genitalia that appear to have diverged from the same source (Figs. 51-76). *P. mayaca*, *P. pagicola*, and *P. davisii*, n. sp., have epigyna that are somewhat similar to the *aspirans* group, but their palps are different unless the median apophysis of *P. pagicola*, *P. mayaca*, and *P. davisii*, n. sp., represent an extreme of the type of modification from that of *P. aspirans* seen in *P. triens*, n. sp., in which the apex of the median apophysis is drawn out laterally to form a finger-like process and medially is reduced to nothing.



P. aspirans Chamberlin

Figs. 51-60

Pirata aspirans Chamberlin, 1904, Canadian Entomol., 36(10):286-287 (male, female, Virginia, North Carolina; the types are not in M.C.Z. and were not examined; are presumably lost; see remarks); Chamberlin, 1908, Proc. Acad. Nat. Sci. Philadelphia, 60:303-305, pl. XXII, fig. 4, 5 (male, female figures, but mislabeled; see remarks).

Pirata arenicola Emerton, 1909, Trans. Connecticut Acad. Arts and Sci., 14:208-209, pl. VI, figs. 9-9C (male, female, Ipswich, Mass., M.C.Z., examined). Female = *piraticus*; male = *aspirans*. NEW SYNONYMY.

Description of male.—From the E. S. George Reserve, Livingston Co., Michigan, VIII-3-51, H.K.W. 1448. Carapace 2.07 mm long, 1.55 mm wide, with a wide marginal light area and the usual tuning-fork pattern. Dorsum heavily pigmented, with narrow light colored area over the heart and four pairs of patches of white scales. Coxae and endites light, without pigment, sternum and labium lightly pigmented; venter with irregular patches of pigment.

Anterior eye row narrower than median row, slightly procurved; the anterior median eyes twice as large as laterals, closer to laterals than to each other. Clypeus height equal to diameter of anterior lateral eye. Lower margin of furrow of chelicerae armed with three unequal teeth, the middle tooth the largest, the lateral the smallest, the middle tooth closer to the lateral than to the median.

Legs 4123, banded. Tibia I with seven ventral and lateral spines. Tibia II with eight ventral and lateral spines. For palpus see Fig. 58.

Description of female.—Same data as male. Carapace 2.20 mm long, 1.58 mm wide, with a wide marginal light area and tuning fork pattern; color and pattern as in the male (Figs. 56-57). Eye arrangement and dentition of chelicerae as in the male. Epigynum (Fig. 60).

Legs 4123, faintly banded. Tibia I with six ventral and lateral spines. Tibia II with five ventral and lateral spines.

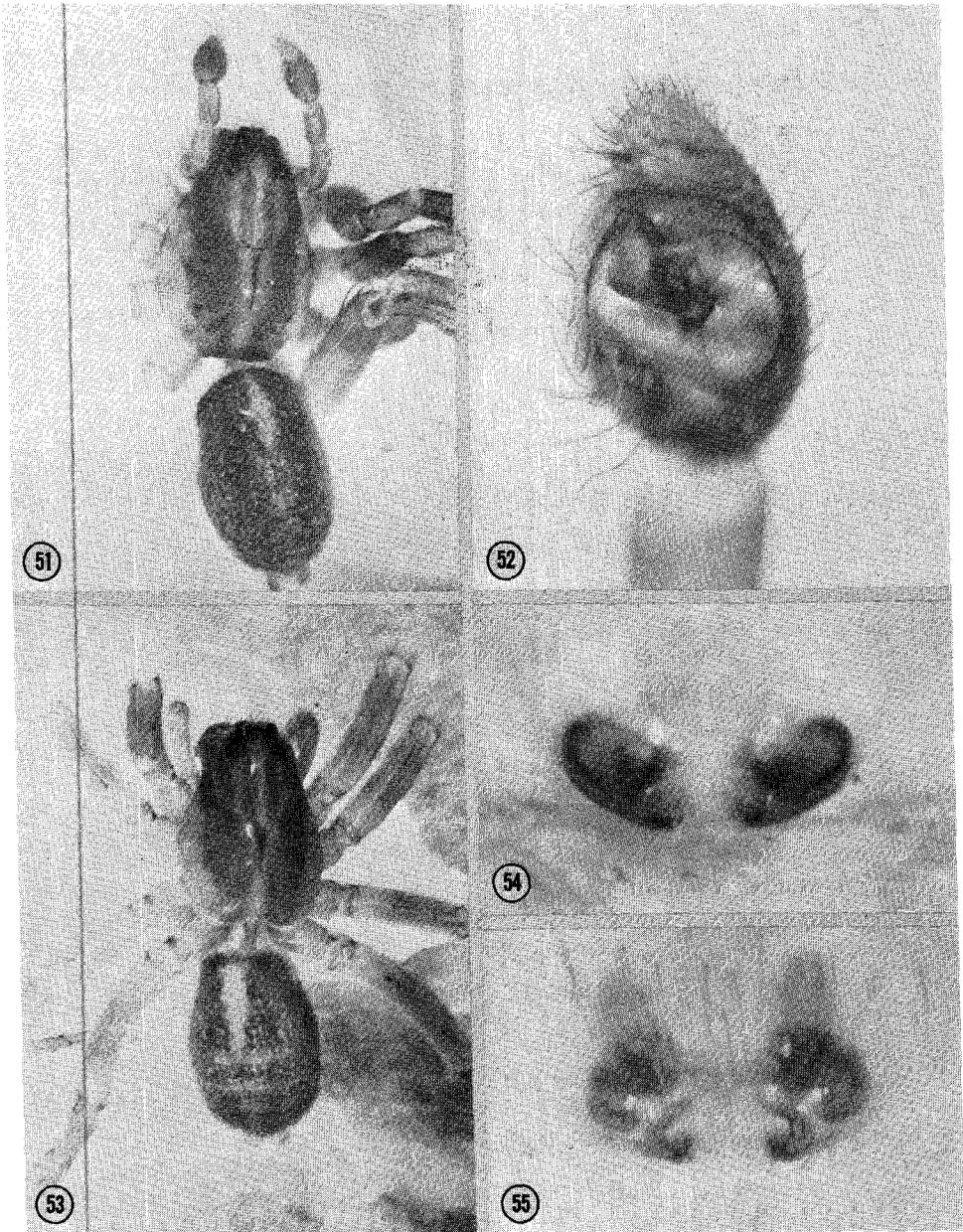
Variations and observations.—This species resembles *P. piraticus* in appearance with its wide marginal light area, although sometimes it appears to have a submarginal light area. Michigan specimens have distinctly banded legs. Five females from Crosswick, New Jersey, have an epigynum that looks different; we need males. In fact any record based on a female in this group should be considered tentative until backed up by the capture of a male in the same locality.

Epigynum of *P. aspirans* is very similar in appearance to that of *P. mayaca* and *P. pagicola*, but the median apophysis of the palps are quite different; also *P. mayaca* in Florida has a submarginal band on the carapace while *P. aspirans* has a wide marginal light area. The pattern of *P. pagicola* is more like that of *P. aspirans*.

Distribution.—Northeastern United States and Canada, east of the Dakotas. One male known from Georgia; others have been reported from North Carolina, Virginia and Washington, D.C.

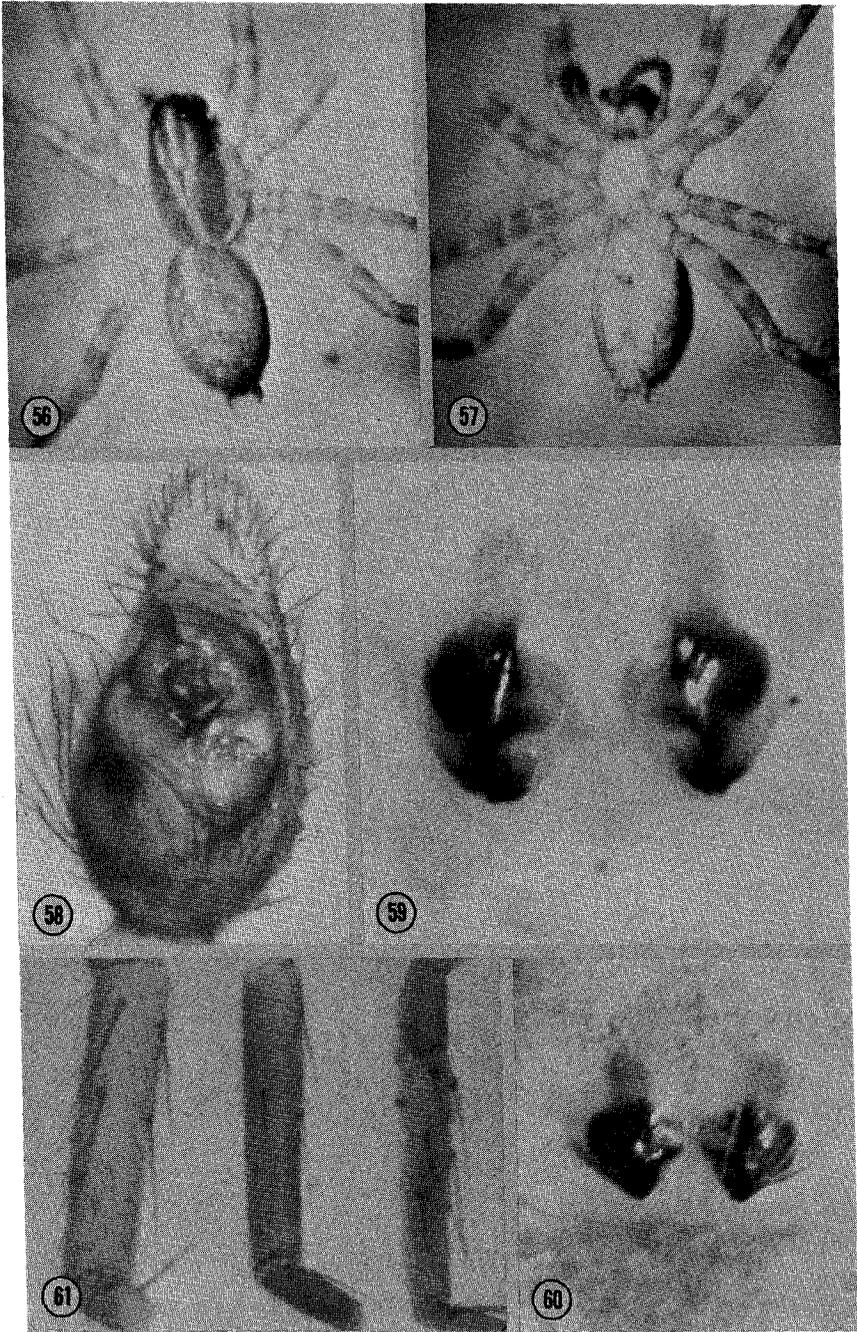
Specimens examined.—Canada: *Ontario*; *Quebec*. United States: *Connecticut*: Fairfield, Litchfield, New Haven Counties; *Georgia*: Floyd County; *Illinois*: Adams, Cook, Lake, Lee Counties, Volo; *Indiana*: Porter County; *Iowa*: Cerro Gordo and Dickinson Counties; *Maine*: Knox County, Isle au Haut; *Massachusetts*: Essex, Middlesex Counties; *Michigan*: Arenac, Calhoun, Cheboygan, Ingham, Kalamazoo, Livingston, Macomb,

Mecosta, Midland, Oakland, Washtenau Counties, Selridge Field; *Minnesota*: Freeborn County, Albert Lea; *New Jersey*: Burlington County, Crosswicks; *New York*: Rensselaer, Schenectady, Suffolk, Tompkins Counties, Enfield Glen, Orient, Long Island, Rensselaerville; *Ohio*: Erie, Wayne Counties; *Wisconsin*: Iron, Marienette, Rock Counties, Hurley.



Figs. 51-54.—*P. arenicola*: 51, male type (= *P. aspirans*), Massachusetts, Ipswich, June 6, 1903; 52, male type (= *P. aspirans*), palp; 53, female type (= *P. piraticus*), Massachusetts, Ipswich, June 6, 1903; 54, female type (= *P. piraticus*), epigynum.

Fig. 55.—*P. aspirans*: Epigynum, Connecticut, New Haven.



Figs. 56-60.—*P. aspirans*: 56, female, dorsal surface, Michigan, Livingston Co., E.S.G.R., H.K.W. 1448; 57, female, ventral surface, Michigan, Livingston Co., E.S.G.R., HKW 1448; 58, palp, Michigan, Livingston Co., E.S.G.R., H.K.W. 1410; 59, epigynum, New Jersey, Crosswicks; 60, epigynum, Michigan, Livingston Co., HKW. 1448.

Fig. 61.—Tibia I. Left: *P. seminola*, Florida, Alachua Co., Sta. 6C; Middle: *P. allapahae*, Florida, Pasco Co., H.K.W. 1242; Right: *P. nanatus*, Florida, Turner Co., II-5-37.

Life history.—*Pirata aspirans* appears to be a summer form. Males have been taken from May into August but most from June and July. The earliest record of a female is from April, none in May and three from September. Most of the records are from June, July and August. Females with egg sacs have been taken in June, July and August. Kaston (1948) writes that, in Connecticut, "individuals mature in late May and early June."

Ecology.—In Michigan this species occurs along with *P. piraticus* and *P. insularis* in wet areas in swamps and bogs, around woods ponds with *P. piraticus*, and in marshes. *P. minutus* and *P. aspirans* are found in the same vial in collections by R. V. Chamberlin from Wisconsin and Michigan.

Remarks.—In 1904 Chamberlin described *Pirata aspirans* from three specimens, including a female and a male, from Virginia and North Carolina. He did not describe the male, nor did he illustrate the genitalia of either sex, but he did indicate the presence of a marginal light area on the carapace and compare the epigynum to that of *P. humicolus* (*minutus*) in such a way as to suggest he had before him what subsequent authors have been naming *P. arenicola* Emerton. In 1908 Chamberlin redescribed and figured *P. aspirans*, but unfortunately reversed the numbers on the figures of the epigyna of *P. aspirans* and *P. insularis* (as pointed out by Kaston in 1948). The figure of the male palp is quite characteristic of *P. arenicola* although the figure of the epigynum is dubious. However, he only gives Washington, D.C., for locality. Unfortunately the types are missing.

What did Chamberlin have before him when he described *P. aspirans* in 1904? There are no specimens that fit his 1908 description from North Carolina or Virginia in any collections that we have examined. We have found one male from Chapel Hill, North Carolina which is closely related, but which is a member of the new species we are describing from Georgia as *P. iviei*.

The absence of specimens in collections from North Carolina, Virginia and Washington, D.C., is disturbing, but in view of the small amount of collecting which apparently has been done in those areas we believe we can not rule out the possibility that *P. aspirans* does occur there. In any case it is quite clear what Chamberlin had before him in 1908 when he redescribed *P. aspirans*. Kaston (1948) recognized *P. aspirans* when he synonymized it with *P. arenicola* Emerton, and Bonnet (1958) lists both *P. aspirans* and *P. arenicola* as good species. It is our opinion that subsequent authors, confused by the mix-up in figure numbers in Chamberlin's 1908 paper, assumed that *P. aspirans* and *P. arenicola* were different species. Since we now know that this is not the case *P. aspirans* must replace *P. arenicola*.

Although it has no bearing on the priority of these two names it is interesting that the female type of *P. arenicola*, which Emerton cites first in his description, is *P. piraticus* (Cl).

Description of Emerton's types.—Male: carapace 2.1 mm long, 1.5 mm wide, with a wide marginal light band and typical tuning-fork pattern (Fig. 51). Anterior eye row slightly narrower than the posterior median row, almost straight. The anterior median eyes are twice as large as the laterals and are closer to the laterals than to each other. Emerton figured the palpus accurately (9b) (Fig. 52).

Female: This is *P. piraticus* Clerck. Emerton's figures of the epigynum (9c) and carapace (9a) match these structures (Figs. 53-54). The carapace is 3.0 mm long, 2.1 mm wide. The pattern on the carapace is typical of *P. piraticus* with wide marginal light band, resembling the male type above very closely, accounting no doubt for Emerton's confusion.

Pirata indigenus, n. sp.

Figs. 62-65, 72

Holotype.—Female from Meramec River, Crawford Co., Missouri, 14-18 July, 1966, HEF & DLF (Exline), A.M.N.H.

Diagnosis.—This species appears to be a member of the *aspirans* complex. The epigynum (Figs. 63, 65) is wider and shorter than *P. aspirans*, *P. davisii*, n. sp., or *P. triens*, n. sp. It differs from *P. davisii* in the spination of tibia I. They all resemble one another in appearance, and are characterized by the wide marginal light band on the carapace.

Description of holotype.—Carapace 1.95 mm long, 1.67 mm wide with a wide marginal light band a little pigment visible faintly through the edge; the tuning-fork pattern on the head is not very distinct (Fig. 62). Basic color yellow. Pattern on dorsum nondescript with dim traces of what must have been white spots in life. Lower margin of furrow of chelicerae with three teeth, middle the largest, the one next to the fang very small. Anterior eye row narrower than posterior median eye row; distinctly procurved; anterior median eyes almost twice as large as anterior lateral eyes; anterior median eyes closer to anterior lateral eyes than to each other.

Coxae, sternum, endites yellow, immaculate; labium a little darker; venter pigmented with patchy spots in middle and laterally. Legs 4132, yellow, unbanded except for faint traces of two annulae on femora III. Tibia I with five ventral overlapping spines, two retrolateral, three prolateral.

	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
Palp	0.77	0.37	0.55		0.65	2.34
Leg I	1.77	0.82	1.47	1.42	0.62	6.10
Leg II	1.50	0.65	1.20	1.25	0.57	5.17
Leg III	1.62	0.70	1.17	1.50	0.65	5.64
Leg IV	2.20	0.80	2.02	2.50	0.87	8.39

Distribution.—Michigan and Missouri.

Specimens examined.—*Missouri*: Crawford Co., Meramec River 14-18 July, 1966, HEF & DLF, 5 females (Exline); *Michigan*: Midland Co., A. M. Chickering, one female (M.C.Z.).

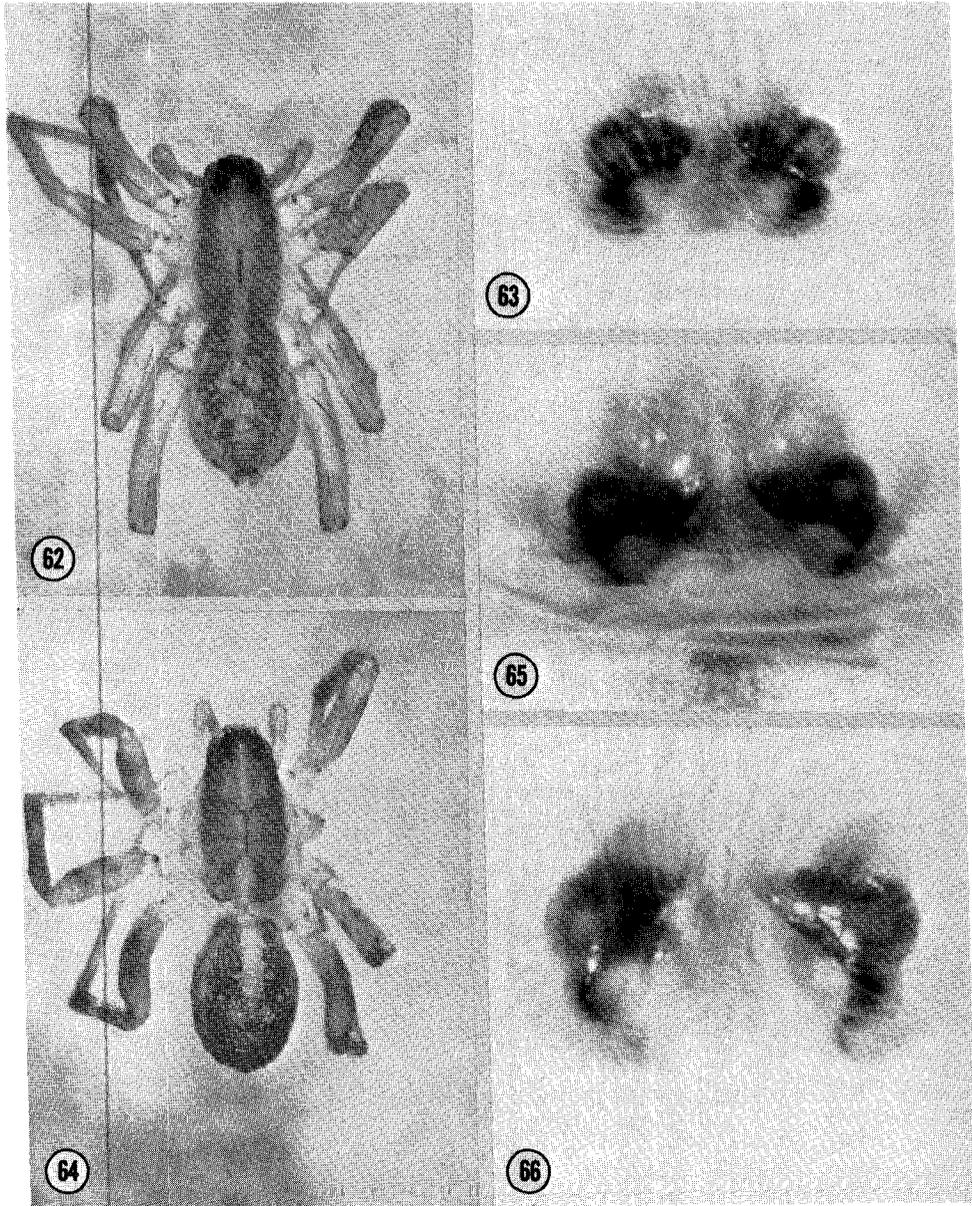
Life history.—We have examined a female with egg sac in July from Missouri and in August from Michigan. The male is unknown.

Variations.—In the vial from Meramec River there were seven females, one of which is in poor condition, and an egg sac. The six good specimens, including the holotype, are quite uniform in appearance, but vary somewhat in the size and shape of the carapace. The epigyna of all seven specimens are quite similar in structure. Measurements of the six carapaces: Holotype, 1.96 mm long, 1.67 mm wide; Specimen 2, 1.95 mm long, 1.30 mm wide; Specimen 3, 2.05 mm long, 1.40 mm wide; Specimen 4, 2.07 mm long, 1.50 mm wide; Specimen 5, 2.22 mm long, 1.55 mm wide; Specimen 6, 2.25 mm long, 1.57 mm wide.

Description of female from Michigan.—Carapace 2.4 mm long, 1.72 mm wide. In alcohol the basic color pattern is amber. Carapace with a wide marginal light band interrupted by several faint pigmented spots along the margins (Fig. 64). Central part of carapace rather heavily pigmented, the tuning fork pattern almost completely obliterated; eye region darker.

Sternum, coxae, endites light amber, immaculate, labium darker. Dorsum of abdomen with hastate mark, heavily pigmented; venter pigmented somewhat like *P. sedentarius*.

Lower margin of furrow of chelicerae with three teeth; middle tooth the largest, tooth nearest base of fang very much reduced.



Figs. 62-65.—*P. indigenus*, n. sp.: 62, holotype female, Missouri, Crawford Co.; 63, holotype, epigynum; 64, female, Michigan, Midland Co.; 65, epigynum, Michigan, Midland Co.

Fig. 66.—*P. triens*, n. sp. Epigynum, Illinois, Adams Co., Quincy, VI-10-58.

Anterior eye row narrower than posterior median eye row, slightly procurved; anterior median eyes about half again as large as anterior eye row; anterior median eyes closer to anterior lateral eyes than to each other. Clypeus equal to the diameter of an anterior median eye, receding.

Legs 4132, banded. Tibia I with long, overlapping ventrolateral spines; three prolateral, two retrolateral.

	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
Palp	0.80	0.43	0.53		0.67	2.43
Leg I	1.75	0.80	1.48	1.37	0.58	5.98
Leg II	1.67	0.75	1.25	1.30	0.57	5.54
Leg III	1.62	0.70	1.20	1.50	0.62	5.64
Leg IV	2.20	0.80	2.00	2.55	0.88	8.43

Remarks.—The female paratype from Michigan is larger than the Missouri specimens, but otherwise resembles them in appearance. The epigynum of the paratype from Michigan is a little different in shape from the Missouri specimens and femur II is longer than femur III and just the reverse in the holotype; when males are known we may find these two are separate species.

***Pirata iviei*, n. sp.**

Figs. 67-71

Holotype.—Male, Lyons, Georgia, June 11, 1935, W. Ivie, W 82° 17': N 32° 9' (A.M.N.H.).

Allotype.—Female, with same data (A.M.N.H.).

Etymology.—This species is named for Mr. Wilton Ivie, lifelong student and collector of spiders.

Diagnosis.—*P. iviei* differs from *P. aspirans* in having a distinct submarginal band on carapace, in having a larger epigynum, and in the shape of the median apophysis of the palp, which has a round distal flange instead of a more or less rectangular flange as in *P. aspirans*.

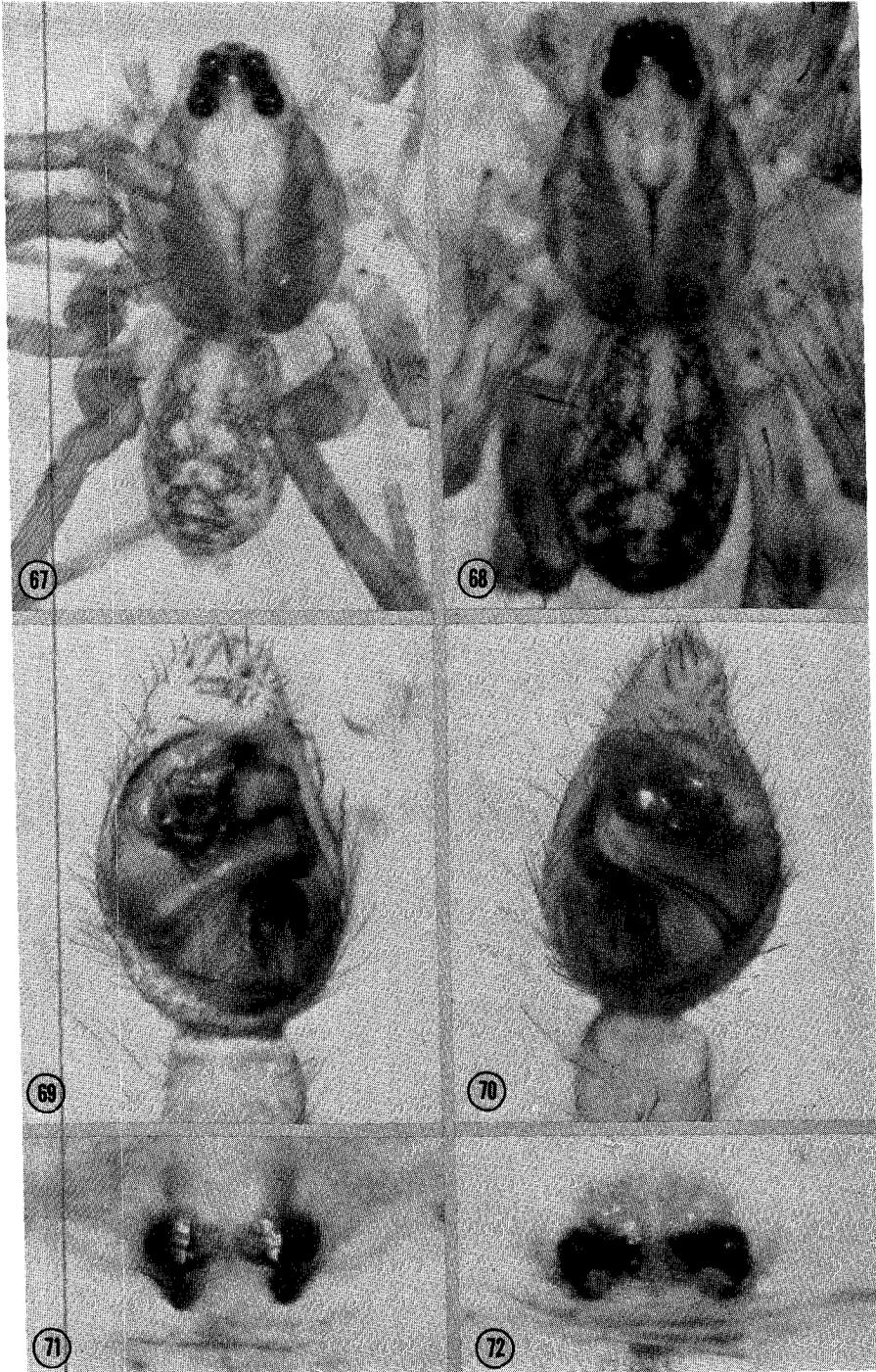
Description of male holotype.—Carapace 1.8 mm long, 1.32 mm wide, with the usual tuning-fork pattern and a submarginal light band but the marginal pigment is very scanty and discontinuous. (Fig. 67). Ventral surface of coxae, sternum, etc. light, unpigmented except for a patch of pigment in the center of the venter. Lower margin of the furrow of the chelicerae with three unequal teeth, the middle tooth the largest, the lateral tooth the smallest; middle tooth closer to the lateral than to the median.

Anterior eye row narrower than the median row, procurved. The anterior median eyes are closer to the laterals than to each other and are twice as large. Clypeus height slightly less than the diameter of an anterior median eye.

The median apophysis of the palp is basically similar to that of *P. aspirans* but the distal flange (Fig. 69) is much larger and is round where that of *P. aspirans* is rectangular.

Legs 4123, lightly banded.

	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
Palpus	0.60	0.25	0.33		0.56	1.74
Leg I	1.23	0.58	1.00	1.13	0.56	4.50
Leg II	1.15	0.57	0.93	1.03	0.53	4.21
Leg III	1.12	0.53	0.80	1.03	0.52	4.00
Leg IV	1.56	0.63	1.32	1.63	0.70	5.84



Figs. 67-71.—*P. iviei*, n. sp.: 67, holotype male, Georgia, Lyons; 68, allotype female, Georgia, Lyons; 69, holotype, palp; 70, palp, North Carolina, Durham Co., New Hope Creek; 71, allotype, epigynum.

Fig. 72.—*P. indigenus*, n. sp.: Epigynum, Michigan, Midland Co.

Description of female allotype.—Carapace 2.0 mm long, 1.45 mm wide with sub-marginal light band and tuning-fork pattern (Fig. 68). Anterior eye row narrower than median row, procurved; anterior median eyes closer to laterals than to each other and twice as large. Lower margin of the furrow of the chelicerae with three unequal teeth, the middle tooth the largest and slightly closer to the lateral than the median; median and lateral teeth about the same size. Clypeus height about equal to the diameter of an anterior median eye.

The epigynum of *P. iviei* resembles that of *P. aspirans*.

Legs 4123, distinctly banded.

	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
Palpus	0.64	0.32	0.43		0.56	1.95
Leg I	1.45	0.70	1.22	1.20	0.58	5.15
Leg II	1.35	0.67	1.05	1.18	0.55	4.80
Leg III	1.30	0.55	0.98	1.25	0.55	4.63
Leg IV	1.75	0.62	1.56	1.95	0.77	6.65

There were four additional females in the vial with the holotype and allotype. All females were uniform in size but two of these paratypes were so lightly pigmented along the edges of the carapace as to appear to have a broad marginal light band.

Distribution.—Southeastern United States.

Specimens examined.—*Georgia*: Lyons, June 11, 1935, W 82° 17' N 32° 9', W. Ivie, 1 male, 5 females (male holotype, female allotype, A.M.N.H.); *North Carolina*: Durham County, Chapel Hill Blvd. (US 15-501), at New Hope Creek (S of road) pitfall, J. W. Berry, male (A.M.N.H.); *South Carolina*: Aiken County, 5 mi N Aiken, VI-30-39, H.K.W. 1089A, 2 females (H.K.W.).

Life History.—All the specimens we have examined are from June and July with one egg sac from June.

Ecology.—The male from North Carolina was collected in a pitfall in "hardwood bottom land." The two females from South Carolina were collected in a wet hammock. We have no habitat information for the Georgia specimens.

Remarks.—The epigynum of *P. iviei* is very close to that of *P. aspirans* and *P. davisi* but the median apophysis of the palpi differ considerably.

Whether this species has a submarginal or marginal light band on the carapace depends upon how heavily the animal is pigmented.

***Pirata triens*, n. sp.**

Figs. 73-76

Holotype.—Male from Quincy, Adams Co., Illinois, 10 June 1958, moist woods, J.L.K. (A.M.N.H.).

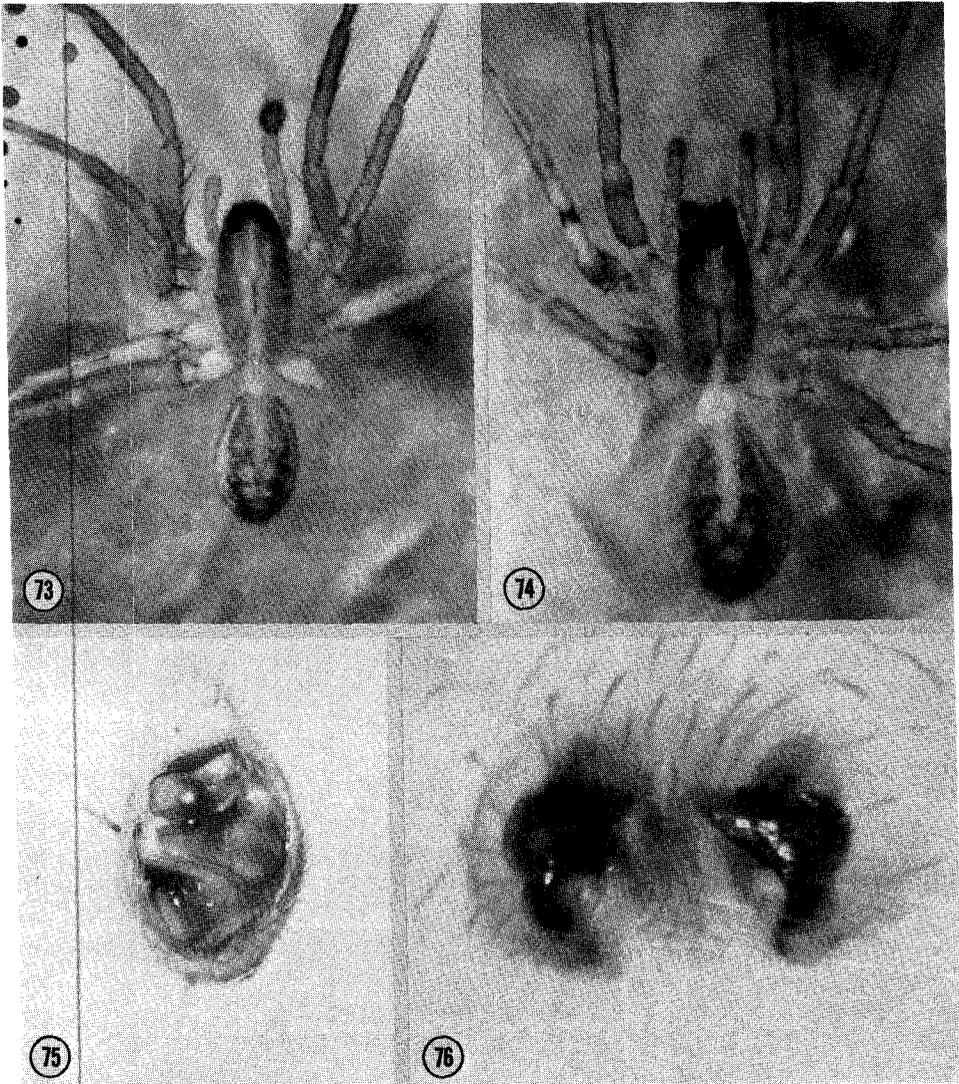
Allotype.—Female with same data (A.M.N.H.).

Etymology.—This species is named *triens* (a third part) because it was the third new species we found in the *aspirans* group.

Diagnosis.—*P. triens* is a member of the *aspirans* group (*P. iviei*, n. sp., and *P. indigenus*, n. sp.). It has the wide marginal light band on the carapace but lacks the annulations on the legs of *P. aspirans*. The types are very light in color (Figs. 73-74); more heavily pigmented specimens might have banded legs. The palpus and epigynum of *P.*

triens are quite distinct (Figs. 75-76); the lateral process of the median apophysis is a long spatulate appendage, much longer than in *P. aspirans*, and the distal process is reduced to nothing. The epigynum is narrower and longer than in *P. aspirans* or *P. indigenus*.

Description of holotype.—Total length 4.0 mm. Carapace 2.00 mm long, 1.48 mm wide. Basic color light yellow with unbanded legs. Carapace with distinct tuning-fork pattern and wide marginal light band. Dorsum with hastate mark followed by a pair of light circular areas containing a central dark spot, these followed by a rectangular light area with a dark central spot, this followed by indistinct chevrons. Lateral edges of dorsum with a longitudinal light band that extends forward almost to the front margin of the abdomen.



Figs. 73-76.—*P. triens*, n. sp.: 73, holotype male, Illinois, Adams Co., Quincy; 74, allotype female, Illinois, Adams Co., Quincy; 75, holotype, palp; 76, allotype, epigynum.

Coxae, labium, endites, and sternum light yellow, immaculate; venter with just a few faint pigment spots laterally. Lower margin of furrow of chelicerae with three teeth, the middle one the largest, the one nearest the fang the smallest.

Anterior eye row narrower than the posterior median row, slightly procurved. The anterior median eyes are half again as large as the laterals, and are closer to the laterals than to each other. The clypeus height is slightly less than the diameter of an anterior median eye. For palpus see Fig. 75.

Legs 4123, without annulae.

	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
Palpus	0.80	0.40	0.48		0.70	2.38
Leg I	1.55	0.70	1.20	1.23	0.63	5.31
Leg II	1.45	0.65	1.07	1.20	0.60	4.97
Leg III	1.38	0.56	0.97	1.23	0.60	4.74
Leg IV	1.90	0.72	1.67	2.05	0.79	7.13

Description of female allotype.—Total length 5.0 mm, carapace 2.12 mm long, 1.55 mm wide. Color pattern essentially as in the male. Dentition of chelicerae, height of clypeus, and eye arrangement as in the male. The epigynum is of the *P. aspirans* type (Fig. 76).

Legs 4123, without annulae.

	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
Palpus	0.77	0.39	0.52		0.65	2.33
Leg I	1.73	0.75	1.45	1.35	0.62	5.90
Leg II	1.65	0.75	1.25	1.27	0.58	5.50
Leg III	1.52	0.65	1.17	1.45	0.65	5.44
Leg IV	2.20	0.82	2.03	2.58	0.62	8.25

Distribution.—Known only from the type specimens, which are from Illinois.

Ecology.—The types were collected in a "moist woods."

Remarks.—As indicated in the diagnosis *P. triens* is a member of the *aspirans* group. All have rather similar epigyna, but the median apophyses of the palpi differ conspicuously. The distribution of the members of this group suggests that speciation was brought about by isolation during periods of glaciation.

THE *INSULARIS* GROUP

Pirata insularis Emerton

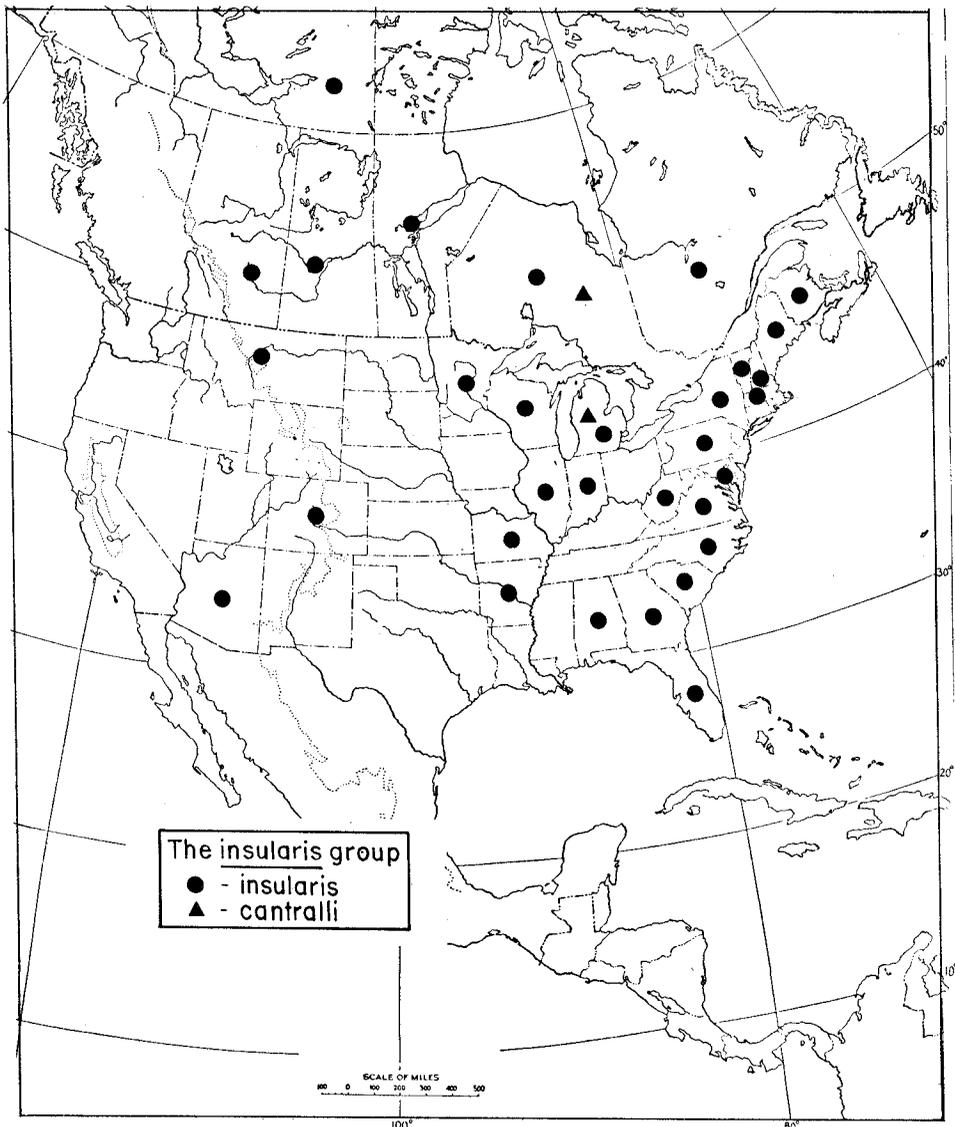
Figs. 77-80, 83-86

- Pirata insularis* Emerton, 1885, Trans. Connecticut Acad. Sci., 6:492-493, pl. 48, figs. 8, 8a (3 females, Long Lake, New York; M.C.Z., examined; one selected here as LECTOTYPE; Note: Fig. 8a is upside down); Chamberlin, 1908, Proc. Acad. Nat. Sci. Philadelphia, 59:309-311, pl. 22, figs. 3, 6 (Note: Plate mislabeled); Kaston, 1938, Canad. Entomol., 70:16, fig. 10; Kaston, 1948, Bull. Connecticut Ecol. Nat. Hist. Survey, 70:310-311, pl. 49, figs. 987-988, pl. 50, fig. 1005, pl. 51, fig. 1011.
- Pardosa bilobata* Tullgren, 1901, Bih. Svenska Vet.-Akad. Handl., 27 (4,1):22, fig. 12 (2 females, Lake Leonore, Florida; Zool. Inst., Uppsala, examined); Chamberlin, 1908, *Ibid.*, 315.

Pirata liber Montgomery, 1902, Proc. Acad. Nat. Sci. Philadelphia, 54:578-579, pl. 30, figs. 42-43 (male, female, Philadelphia, Pennsylvania; A.M.N.H., examined).

Pirata sylvestris Emerton, 1909, Trans. Connecticut Acad. Arts and Sci., 14:209, pl. 6, figs. 8, 8a (male, not the female, Lynn Woods, (?) Massachusetts; M.C.Z., examined).
See remarks under *P. piraticus*.

Description of lectotype.—A somewhat faded female with submarginal light band and the usual tuning-fork pattern on the carapace which is 3.3 mm long and 2.5 mm wide (Fig. 77). Dorsum with distinct hastate mark and no indication of white patches of scales as in *P. piraticus*. Basic color of body and legs amber; legs not banded. Venter much lighter than sides of abdomen with longitudinal streaks of pigment. Sternum with a median longitudinal light area. Epigynum (Fig. 78).



Variation.—*P. insularis* is a variable species both in size and pigmentation; usually, however, the submarginal light band pattern on the carapace is discernable. Males range in length of carapace from 1.7 to 2.7 mm; females from 1.9 to 2.8 mm. Sometimes the hairs on tibia and metatarsus I of the male are long and dense and could be mistaken for the brush in *P. cantralli*; however, the tibia is not swollen like in *P. cantralli*.

A small (carapace 1.7 mm long, 1.2 mm wide) amber-colored male, with no pattern, from Temiskaming, Quebec, may be new. The palp is very similar to *P. insularis* and leg I is not swollen like in *P. cantralli*.

Eight females from Holliston, Massachusetts, 17-30 June, J.H.E. and N.B., coll., identified as *P. sylvestris* are in two sizes. The large ones, carapace 2.4 mm long, are heavily sclerotized. The small ones, carapace 1.9 mm long, are lightly sclerotized.

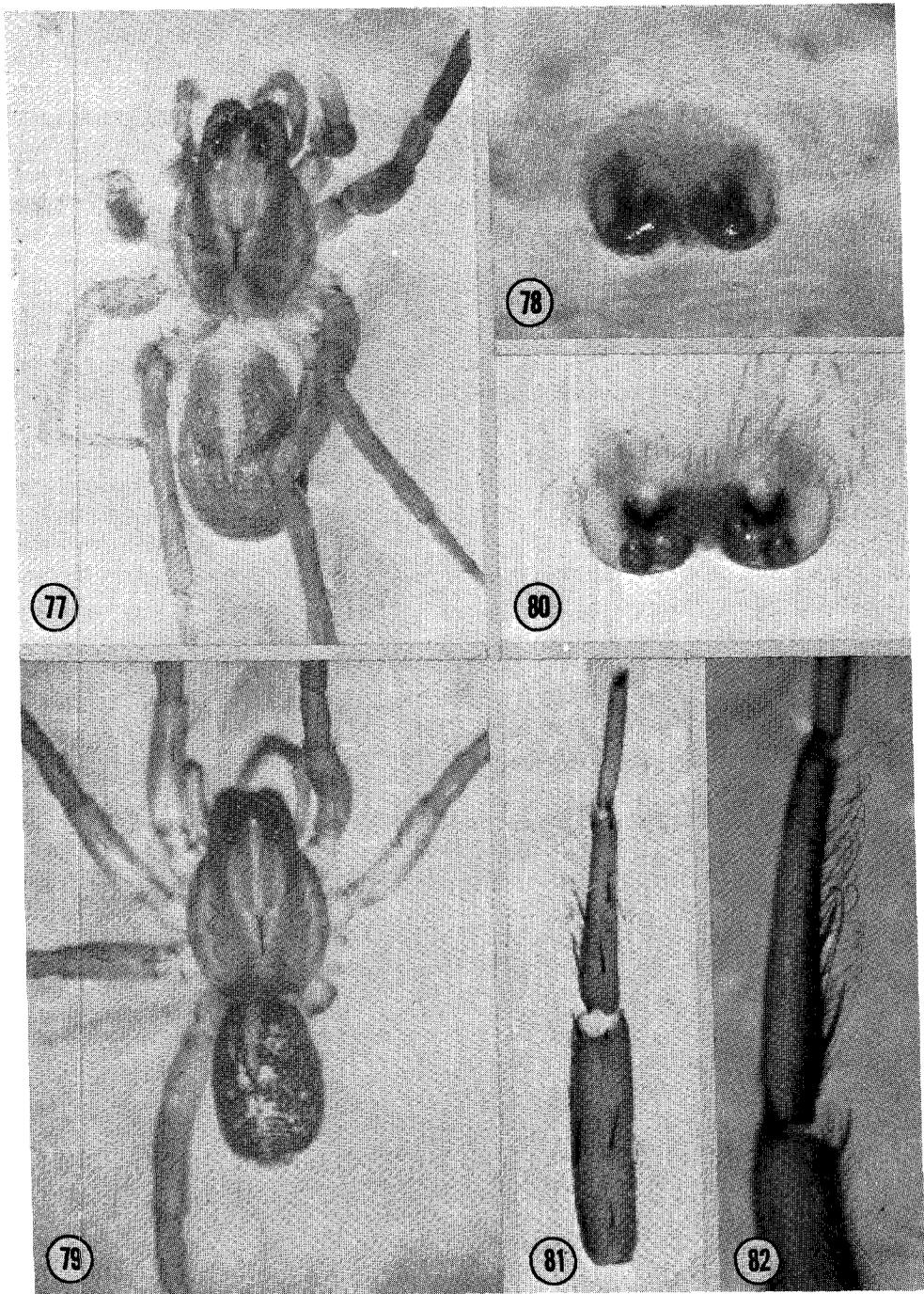
Distribution.—Southern Canada and the U.S. east of the Rocky Mountains.

Specimens examined.—Canada: *Alberta*: George Lake; *Manitoba*: Darwin; New Brunswick; *Northwest Territory*: Gt. Slave Lake; *Ontario*: 26 localities; *Quebec*: E. shore of James Bay; Temiskaming; *Saskatchewan*: Lady Lake, Besnard Lake, Lac La Rouge.

United States: *Alabama*: Jackson, Mobile Counties; *Arizona*: White Mt. Res. E. of McNary; *Arkansas*: Mississippi County; *Colorado*: Larimer County; *Connecticut*: Fairfield County; *Florida*: Alachua, Collier, Dade, Escambia, Gadsden, Hernando, Highlands, Jackson, Jefferson, Lake, Lee, Levy, Liberty, Marion, Nassau, Orange, Pasco, Pinellas, Polk, Putnam, Sarasota, St. Johns Counties; *Georgia*: Burke, Rabun, Screven, Thomas Counties, Okefinokee Swamp; *Illinois*: Lake, McHenry, Sangamon Counties; *Indiana*: LaPorte, Potter, Smith Counties; *Iowa*: Clinton County; *Maine*: Penobscot, York Counties; *Maryland*: Baltimore, Montgomery Counties; *Massachusetts*: Barnstable, Middlesex Counties; *Michigan*: Arenac, Barrien, Calhoun, Cheboygan, Clinton, Douglas, Emmet, Gogebic, Ingham, Johnson, Kalamazoo, Keeweenaw, Livingston, Macomb, Marquette, Menominee, Midland, Muskegan, Oakland, Ontagonagon Counties; *Minnesota*: Itaska Park; *Missouri*: Crawford, Johnson Counties; *Montana*: Carbon County; *New Hampshire*: Fitzwilliam; *New Jersey*: Bergen, Burlington Counties; *New York*: Albany, Cattaragus, Hamilton, Nassau, Queens, Rensselaer, Saratoga, Schuyler, Tompkins, Wayne Counties; *North Carolina*: Carteret, Durham, Swain Counties; *Ohio*: Fairfield, Fulton, Hocking, Knox, Ottawa Counties; *Pennsylvania*: Allegheny, Cambria, Franklin, Lancaster, Westmoreland Counties; *South Carolina*: Aiken County; *Tennessee*: Roane County; *Vermont*: Groat; *Virginia*: Arlington, Giles, Nansemond, Page, Surry Counties; *West Virginia*: Pocahontas County; *Wisconsin*: Ashland, Barron, Dane, Iron, Langlade, Taylor, Waukesha Counties.

Life history.—In the Gainesville, Florida, region this species matures in the spring (February, March, April, May). By June the species has dwindled to occasional individuals which may be found throughout the remainder of the year until the next spring. We have adults from every month but January, and no records of adult males after June. In the Gainesville region females with egg sacs have been taken during April, May and June. In south Florida females have been taken in March, April and December.

As we move northward from Florida our records indicate a progressively later season of maturity and breeding. We have no record of adult males from earlier than May from either the southeastern states (Arkansas, Louisiana, Mississippi, Alabama, Georgia, Kentucky, Tennessee, West Virginia, North Carolian, South Carolina, Maryland, Delaware) or northeastern states (Wisconsin, Illinois, Michigan, Indiana, Ohio, Pennsylvania, New Jersey, New York, Vermont, New Hampshire, Maine, Massachusetts, Connecticut). For both the southeast and northeast the majority of our records are from May, June and



Figs. 77-80.—*P. insularis*: 77, lectotype female, New York, Long Lake, 1884; 78, lectotype epigynum; 79, female, Michigan, Livingston Co., E.S.G.R., H.K.W. 1789H; 80, epigynum, Florida, Pinellas Co.

Figs. 81-82.—*P. cantralli*, n. sp.: 81, leg I, Michigan, Livingston Co., E.S.G.R.; 82, metatarsus I, Michigan, Livingston Co., E.S.G.R., H.K.W. 1796E.

July with the number of records falling off in the northeast as winter approaches while there are only a total of five records for the southeast after July: a male and female from August and a male and two females from December. Data from the western states indicate a seasonality similar to the northeastern states while the Canadian data indicate the attainment of maturity about a month later.

We have records of egg sacs from the southeast from April, May and June; for the northeast from June, July, August and September; for the west from July and September; and for Canada from July and September.

Looking at the country as a whole we have males from every month except November and January, females from every month, and egg sacs from every month except January, February and November.

Pirata insularis matures at different times in the spring in different localities in the Gainesville, Florida, region. Thus, *P. insularis* will be mature in one spot during February, and immature at the same time in various other localities in the region. It is the species of *Pirata* most commonly found in the Gainesville region.

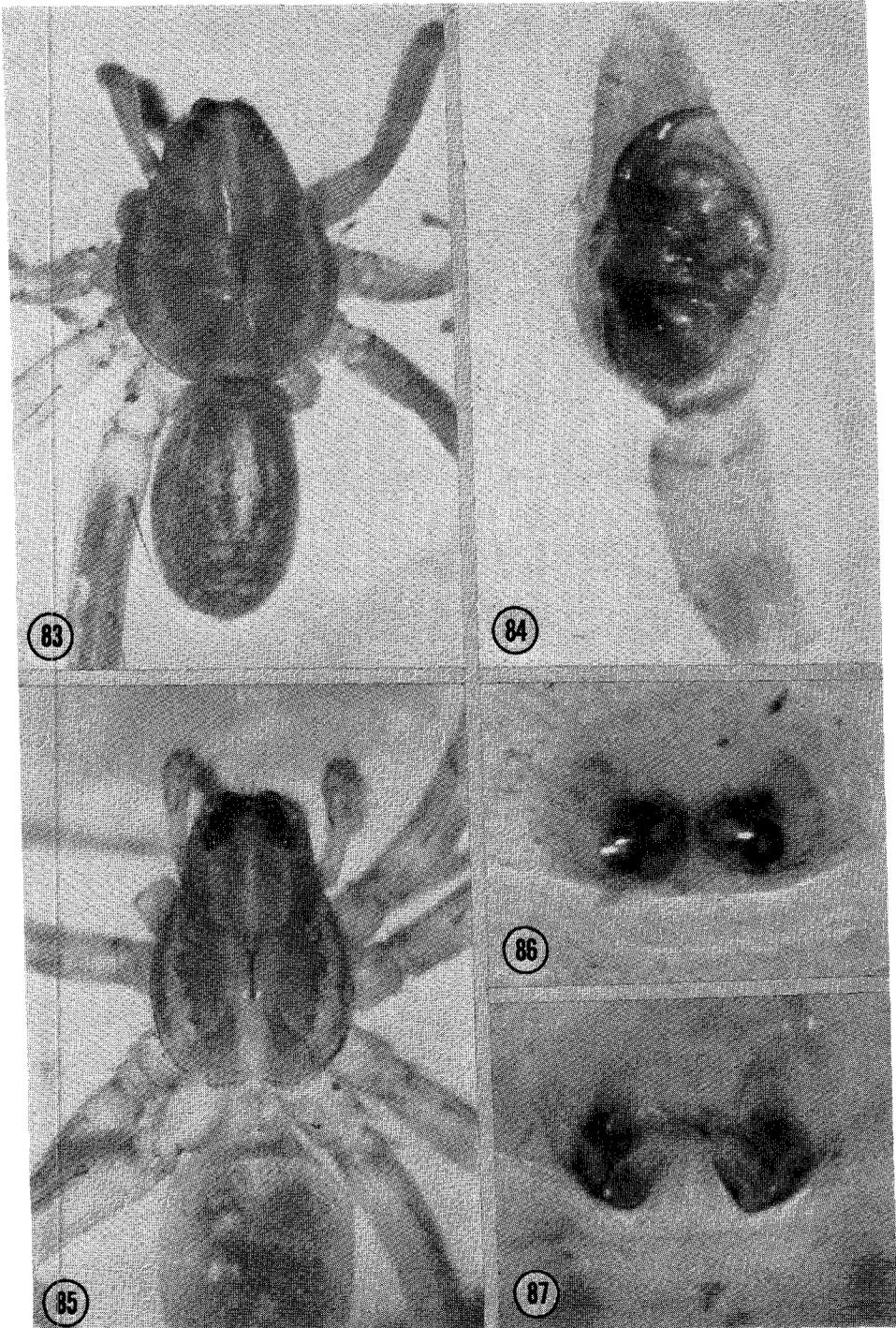
Ecology.—In the Gainesville, Florida, region this species apparently occurs in all kinds of moist situations except typical flatwoods. It occurs in wet situations in various types of hammocks, in swamps, and in the vegetational mattings of some of our marshes and all of our lakes. Records from other regions indicate that it is an inhabitant of marsh, and the edges of ponds and streams throughout its range. In Michigan it also occurs in bogs and swamps. It sometimes occurs in the same bog or marsh as *P. cantralli*, but our evidence indicates that these two species do not occupy the same niche. For example, in the "Big Cassandra" on the George Reserve in Michigan *P. insularis* was collected from sphagnum moss out in the leatherleaf bog proper while *P. cantralli* was taken around the edge of the Cassandra on mud flats covered with a dense growth of tiny moss plants.

In Stone-Ring Marsh on the Reserve *P. cantralli* appeared to be most numerous in zones of emergent vegetation while *P. insularis* was taken in wet zones where there was no standing water. *P. insularis* occurs in sphagnum whether it be in marsh or swamp.

Remarks.—Montgomery's types of *P. liber* are now in the American Museum of Natural History and the male is labeled holotype and the female allotype. The carapace of the male is 2.20 mm long, 1.80 mm wide; of the female is 2.35 mm long, 1.67 mm wide (Figs. 83, 85). His figures of the genitalia are recognizable and he considers his specimens to be distinct from *P. insularis* (Figs. 84, 86).

Six males and 24 females of *P. insularis* were checked for the number of apical spines on the ventral surface of tibia I and II. All the males had pairs on tibia I and II. The data for females follows:

Combination	Tibia I		Tibia II		Number Cases
	Right	Left	Right	Left	
1	0	0	1	1	5
2	1	1	2	2	4
3	2	2	2	2	2
4	0	1	1	1	1
5	0	0	0	1	1
6	1	1	1	1	2
7	1	1	1	2	2
8	1	1	2	1	1
9	0	0	0	0	1
10	1	2	2	2	1
11	1	1	1	0	1
12	0	1	2	2	1
13	1	0	1	1	1



Figs. 83-86.—*P. liber* Montgomery (= *P. insularis*): 83, male type, Pennsylvania, Philadelphia; 84, male type, palp; 85, female type, Pennsylvania, Philadelphia; 86, female type, epigynum.
 Fig. 87.—*P. mayaca*: Allotype, epigynum, Florida, Port Mayaca.

In Michigan *P. insularis* and *P. piraticus* were collected together in a cat-tail marsh on muddy ground; they were collected together on numerous occasions in marshy situations. On the other hand, sometimes *P. insularis* was the only *Pirata* collected.

In 1954 Wallace, while working on the Edwin S. George Reserve near Pinckney, Michigan, collected a marsh by vegetational zones and found that *P. insularis* and a very similar species, here described as *P. cantralli*, appeared to occupy different, but contiguous zones. Females are indistinguishable as are the palpi and epigyna, but the male of *P. cantralli* has swollen legs I and II and a conspicuous brush of hair-like structures on metatarsus I. Males with swollen front legs and brushes on the metatarsi have been collected in three other counties in Michigan, in Wisconsin, and in Ontario.

***Pirata cantralli*, n. sp.**

Figs. 81-82, 88-89

Holotype.—Male, Michigan, Livingston Co., E. S. George Reserve, M-28, VII.15.54, HKW 1789E (M.C.Z.).

Allotype.—Female with same data (M.C.Z.).

Etymology.—Named after Irving J. Cantrall, who was resident naturalist on the Edwin S. George Reserve and who accompanied Wallace on many collecting trips and helped the spider work in many ways.

Diagnosis.—*P. cantralli* is very similar to *P. insularis* except for swollen legs I and II and the brush on metatarsus I of *P. cantralli*. Their genitalia, size, and appearance, except for legs I and II in the male, appear to be identical.

Description of holotype.—Carapace 2.4 mm long, 1.75 mm wide, with a distinct submarginal light band and distinct tuning-fork mark on the head. The submarginal band is slightly wavy laterally and has three distinct indentations medially. Basic color of body a light amber in alcohol. Dorsum with the usual hastate pattern and faint indications of paired small round white spots produced by scales. Coxae, labium and endites light yellow, covered with numerous short hair-like structures. Sternum slightly dusky with a median light area and covered with longer hair-like structures. Epigastric region light, venter a little darker. Lower margin of the furrow of the chelicerae with three evenly spaced teeth, the middle tooth the largest. Anterior eye row slightly procurved, narrower than posterior median eye row; anterior median eyes equal one and one-half times anterior lateral eyes; anterior eyes about equally spaced. Clypeus equals diameter of anterior median eyes.

Legs 4132, without annulae. Legs I and II swollen and heavily sclerotized; metatarsus I with a ventral brush of hair-like structures which are curled at their tips (Figs. 81-82). A few of these curled hairs also occur on the tarsus. Tibiae I and II with three pairs of non-overlapping ventrolateral spines, the distal pair apical; most of these spines, stout, but the proximal prolateral spine on tibia II is reduced to less than half the size of the retrolateral; a prolateral spine is present on tibia I between the middle and apical spines.

	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
Palpus	0.83	0.43	0.43		0.78	2.47
Leg I	1.80	0.78	1.45	1.32	0.80	6.15
Leg II	1.65	0.70	1.25	1.28	0.72	5.60
Leg III	1.62	0.70	1.18	1.50	0.70	5.70
Leg IV	2.22	0.78	1.93	2.50	1.03	8.46

Metatarsi I and II with three pairs of stout, non-overlapping ventrolateral spines plus a third distal spine on the midline between the distal pair; none of the distal spines are apical in position. For palpus see Figs. 88 and 89.

Description of allotype.—Carapace 2.5 mm long, 1.77 mm wide; color and pattern similar to the male except for venter which is more heavily pigmented and punctate. Eye arrangement similar to male. Lower margin of furrow of chelicerae with three unevenly spaced teeth, the middle tooth the largest.

Legs 4132, without annulae. Tibia I with two pairs of ventrolateral spines, the proximal pair overlapping base of middle pair; and two prolateral spines, one apical, one between middle pair and the apical spine. Metatarsus I with three pairs of ventrolateral

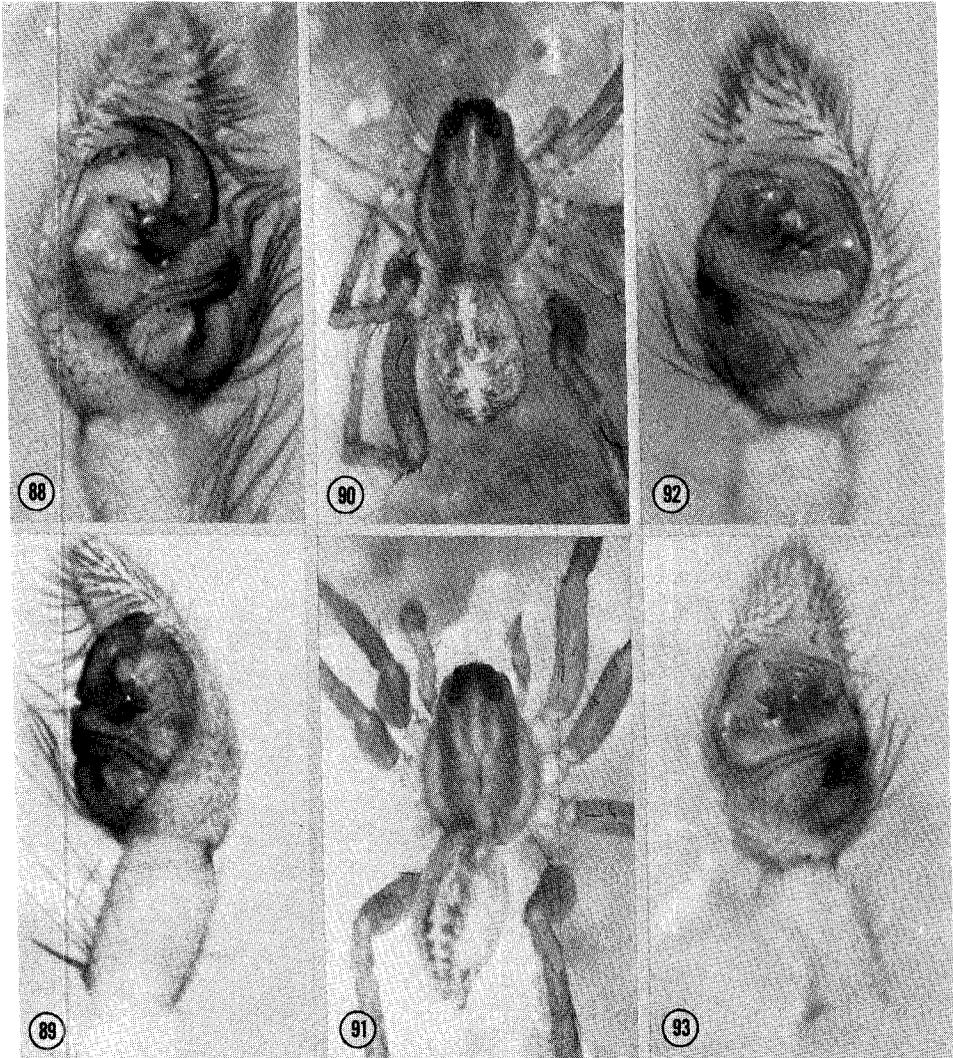


Fig. 88.—*P. cantralli*, n. sp.: Palp, Michigan, E.S.G.R., H.K.W. 1789E.

Fig. 89.—*P. cantralli*, n. sp.: Palp, Michigan, E.S.G.R., H.K.W. 1448.

Figs. 90-93.—*P. mayaca*: 90, allotype female, Florida, Port Mayaca; 91, holotype male, Florida, Port Mayaca; 92, palp, Florida, 50 mi. west of Miami; 93, holotype, palp.

spines, the proximal pair overlapping base of middle pair, the distal pair subapical in position. Tibia II with five ventral spines, the distal one apical, the medial of each pair much reduced, the proximal much more so than the middle. Metatarsus II with three pairs of spines and a seventh spine between the subapical distal pair.

	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
Palpus	0.87	0.42	0.50		0.75	2.54
Leg I	1.87	0.80	1.45	1.42	0.75	6.29
Leg II	1.70	0.75	1.30	1.32	0.70	5.77
Leg III	1.65	0.70	1.22	1.57	0.68	5.82
Leg IV	2.24	0.87	1.93	2.50	0.97	8.51

Variation.—*P. cantralli* appears to be a rather uniform species; lightly sclerotized specimens are paler in color than heavily sclerotized ones, but this is true of all arthropods. The male from Ontario has swollen front legs, but the brush on metatarsus I is not as conspicuous as in Michigan specimens.

Distribution.—Ontario and Michigan.

Specimens examined.—Canada: *Ontario*: Sproule Bay, Lake Opeonga, Alg. Pl., June 26-July 7, 45, W 78° 22', N 45° 38', male, four females (R.O.M. 7817); United States: *Michigan*: Calhoun County: Tekonsha, 30.V.42, A.M.C., male (M.C.Z.); Clinton County: Bath, 14-24, July 66, DEB 59, male, female (D.E.B.); Kalamazoo County: Gull Lake, 1-7 July 1965, D.E.B., male (D.E.B.); Gull Lake Biol. Sta., 22 June-9 July 65, T.F.H., pitfall trap, *Typha* marsh, male, 2 females (D.E.B.); Gull Lake Biol. Sta., 15-22 July 65, female (T.F.H.); Gull Lake Biol. Sta., 29 July-4 Aug 65, male, 2 females (D.E.B.); Gull Lake Biol. Sta., 4-11 Aug 65, male (D.E.B.); Livingston County: E.S. George Reserve, D6-8, VI.19.51, HKW 1410, 2 males, 2 females (HKW); M-28, VII.3.51, HKW 1448, 3 males, 7 females with egg sacs (HKW); P-18, VII.4.51, F.N. Young, male (HKW); M-28, VII.14.54, HKW 1788, 1 male, 9 females (HKW); M-28, VII.14.54, HKW 1788A, male, four females (HKW); R-6, VII.30.54, HKW 1819, male, 6 females (HKW); M-28, VII.19.54, HKW 1796E, 3 males, 9 females, imms., egg sac (HKW); M-28, VII.19.54, HKW 1796H, male, 5 females, egg sac (HKW).

Life history.—We have examined males from May, June, July and August, females from June, July and August, and egg sacs from July. Wallace's records from Michigan were limited to the three months (June, July, August) he spent on the Reserve each of three summers. Adults probably are present over a longer period than that indicated above.

Ecology.—As stated in the discussion under *P. insularis*, *P. cantralli* appears to occur in emergent vegetational zones in marshy and in other situations in bogs, but not in the same niches as *P. insularis*. These conclusions are tentative and need careful checking.

THE MAYACA GROUP

Pirata mayaca Gertsch

Figs. 87, 90-96

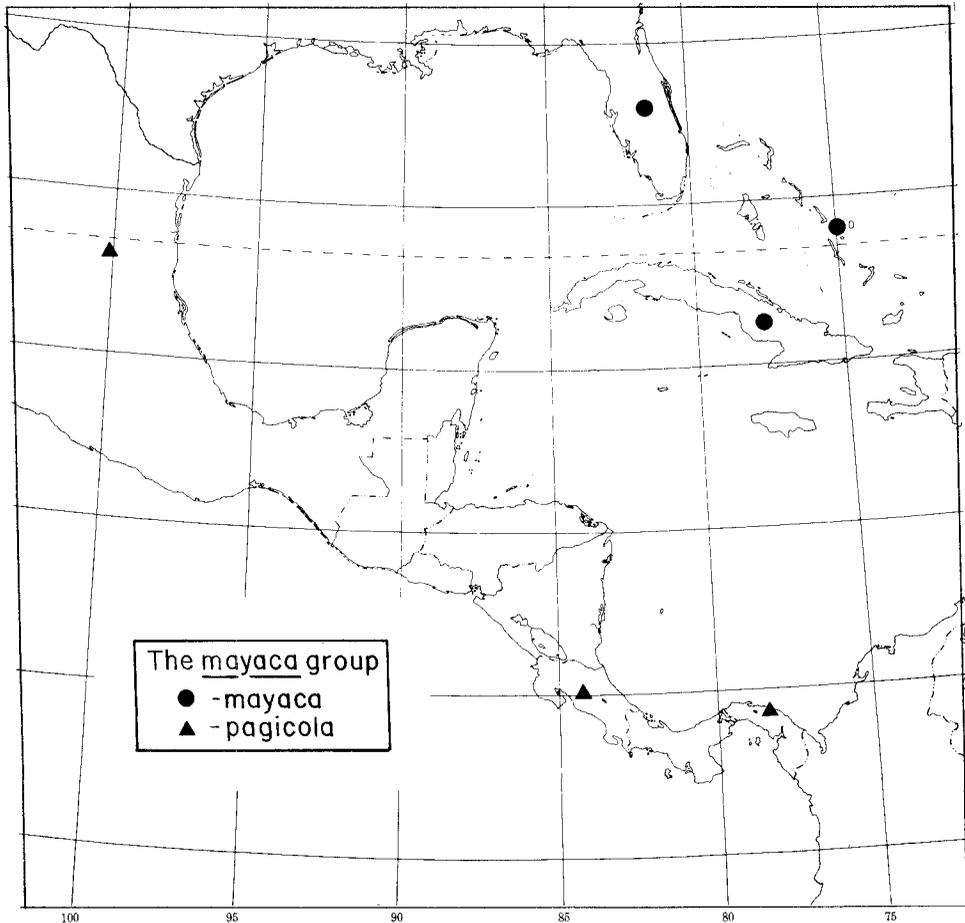
Pirata mayaca Gertsch, 1940, Florida Entomol., 23(2):21-22, figs. 5-6 (male, female, Port Mayaca, Florida, A.M.N.H., examined).

Pirata gertschi Chamberlin and Ivie, 1944, Bull. Univ. Utah, 35(9):149-150, figs. 190-191 (male, female, 3 mi SE Savannah, Georgia, not examined. See remarks). NEW SYNONYMY.

Description of holotype.—A male with carapace 1.8 mm long, 1.3 mm wide, with a wide submarginal light band (Fig. 91). Legs not banded. Dorsum with a distinct pattern of four triangular white markings on the midline with their apices pointing anteriorly. Anterior eye row narrower than the posterior median row, almost straight; anterior median eyes twice as large as anterior lateral eyes, closer to anterior lateral eyes than to each other. Clypeus equals $\frac{4}{5}$ the diameter of anterior lateral eyes. Tibiae I and II with three pairs of spines, the distal pair apical in position. The distal process of the median apophysis of the male palp is long and recurved (Fig. 93).

Description of allotype.—Carapace with a submarginal light band not as wide as in the holotype and a distinct tuning-fork pattern (Fig. 90). Legs unbanded. Eye arrangement similar to male. Tibiae I and II with two pairs of ventral spines. Epigynum (Fig. 87) somewhat similar to that of *P. aspirans*.

Description of male from Palm Beach Co., Florida.—U.S. Sugar Corp., Sand Cut, Pitfall, 31-VII.70, Carapace 1.62 mm long, 1.28 mm wide, with a submarginal light band with very irregular borders and a distinct tuning-fork pattern on the head. Dorsum with large light hastate mark and irregular pattern posteriorly. Sternum, coxae, venter yellow, immaculate. Lower margin of the furrow of chelicerae with three teeth, middle tooth the largest, lateral tooth the smallest. Anterior eye row narrower than the posterior median



row, procurved; anterior median eyes are twice as large as the anterior lateral eyes, closer to anterior lateral eyes than to each other. Clypeus height somewhat less than the diameter of an anterior median eye. Tibia I with three pairs of ventral spines, the distal pair apical in position. Tibia II with three pairs of ventral spines, the distal pair apical in position; the prolateral spines much reduced in size. Legs 4123, unbanded.

Description of a female paratype.—Port Mayaca, Fla., March 28, 1938., W. J. Gertsch, coll. Carapace 2.00 mm long, 1.50 mm wide, with a submarginal light band with irregular borders and a distinct tuning-fork pattern on the head. Dorsum with a light hastate mark and irregular dark, crease-like pattern behind. Sternum, coxae, venter yellow, immaculate. Lower margin of furrow of chelicerae with three teeth, evenly spaced, the middle tooth the largest. Anterior eye row slightly narrower than the posterior median row, almost straight, eyes about equally spaced, anterior median eyes twice as large as the anterior laterals. Clypeus receding, equal in height to the diameter of an anterior lateral eye. Tibia I with two pairs of long ventral spines and one prolateral apical spine. Tibia II with two pairs of ventral and one prolateral apical spine; the prolateral spines much reduced in size.

Legs 4123, unbanded.

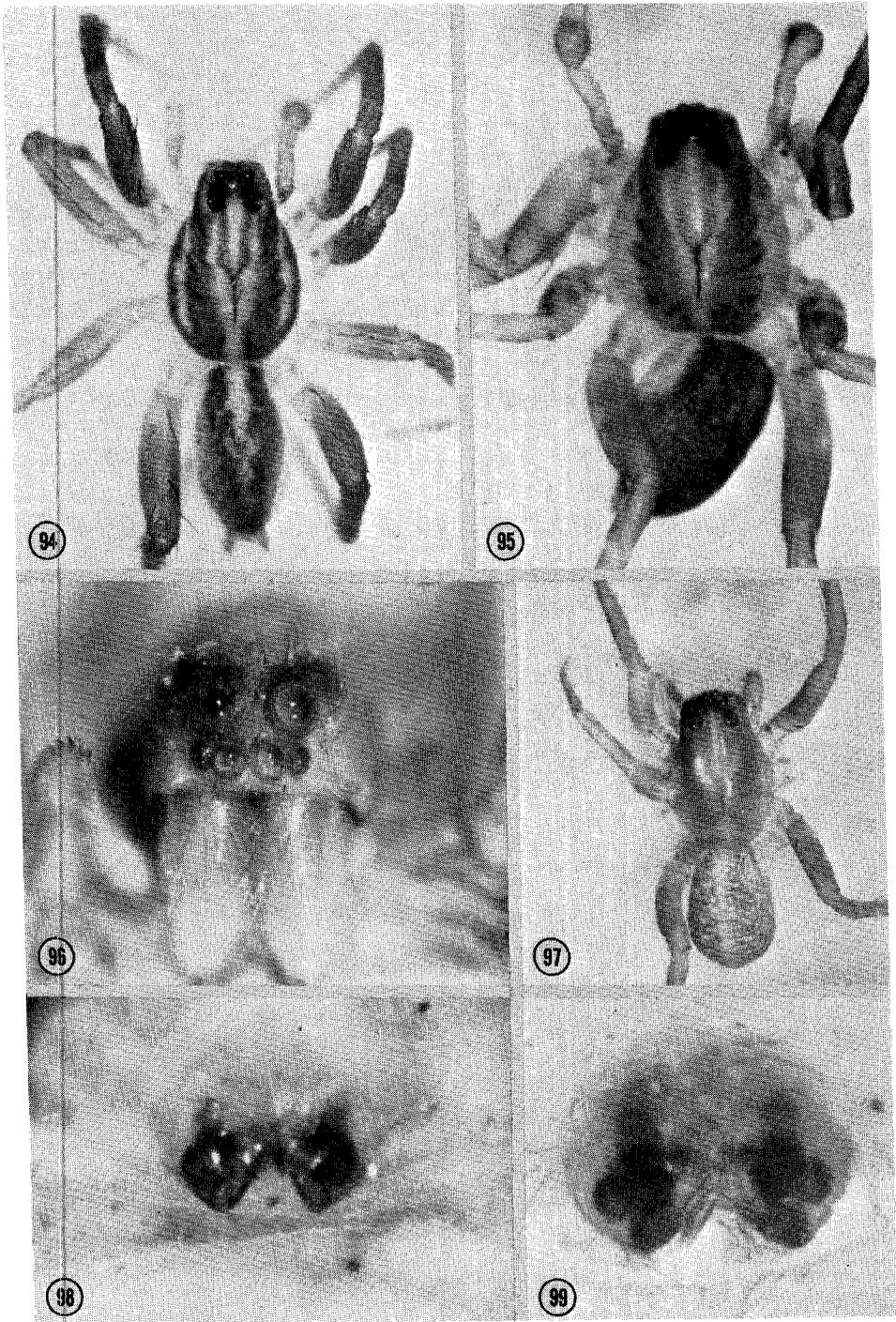
Distribution.—Florida, British West Indies, Cuba. Females from North Carolina and Cuba resemble *P. mayaca*, but males are needed to verify these records.

Specimens examined.—*British West Indies*: Crooked Island, S.E. of Gordon Bluff, Sept. 58, A. W. Scott, Jr., 1 male (M.C.Z.); *Cuba*: Trinidad Mts., Buenos Aires, 9 May 36, P. J. Darlington, 3 females (M.C.Z.); Soledad, Mar 1925, Salt and Mayers, female (M.C.Z.); United States: *Florida*: Royal Palm Park, 15-24 Mar 1930, Blatchley, male (M.C.Z.); Alachua County: II-2-37, HKW Sta 6c, male (H.K.W.), IV-19-37, HKW Sta 1, female (H.K.W.), VI-14-37, HKW 15, male (H.K.W.); Dade County: 2-5 mi. S. Florida City, April 1, 1957, Forester and Gertsch, female (A.M.N.H.), 50 mi. W. Miami, March 31, 1957, Forester and Gertsch, male (A.M.N.H.); Flagler County: 14.8 mi. S.E. County Line on Fla 28, IV-1-39, HKW 1073, male, 2 females (H.K.W.); (?) Franklin County: nr. Sebring, Highlands Hammock, Mar 24, 1938, Gertsch, female (A.M.N.H.), Archbold Bio. Sta., Feb., Neofiber burrows, female (A.M.N.H.); Indian River County: Sebastian, II-44, Nelson, female (M.C.Z.); Lee County: 6.3 mi. S. Ft. Myers on U.S. 41, 15 Apr 49, HKW 1306, male, 2 females (H.K.W.); Levy County: 6 mi. E. of Cedar Keys, IV-9-37, HKW 593, 1 male, 1 female (H.K.W.); Martin County: Port Mayaca, Lake Okechobee, May 29, 1938, 3 males, 14 females (Holotype, allotype, paratypes, A.M.N.H.; 1 male, 3 female paratypes, H.K.W.); Palm Beach County: Canal Point, 8-V-70, pitfall, male (D.P.I.); Putnam County: U.F.C.R., VI-1-47, H.K.W. 1264, male, female (H.K.W.).

Life history.—All of the records for *P. mayaca* but one are from spring and early summer; males from February through June, females February through May. The exception is the male from Crooked Island in September.

Ecology.—The information available indicates that this species always occurs near water.

Variation.—Males vary in carapace size from 1.5 mm long, 1.0 mm wide to 1.8 mm long, 1.3 mm wide; females from 1.4 mm long, 1.0 mm wide to 2.2 mm long, 1.6 mm wide. In Florida this species has a submarginal band on the carapace, but in the three females from the Trinidad Mountains in Cuba the pattern varies from light to medium dark with a wide marginal light band on the carapace and faint annulae on the legs; one of these has indications of marginal pigment. The carapaces of these three females measure 2.05 mm long, 1.55 mm wide; 2.0 mm long, 1.45 mm wide; 2.0 mm long, 1.50 mm wide.



Figs. 94-96.—*P. mayaca*: 94, male, Florida, Palm Beach Co.; 95, male, British West Indies, Crooked Island; 96, male, eyes, Florida, Putnam Co.

Figs. 97-99.—*P. pagicola*: 97, holotype female, Barro Colorado Island; 98, holotype, epigynum; 99, epigynum, Mexico, Tamaulipas, Rancho del Cielo.

The male from Crooked Island, British West Indies, has a carapace measuring 1.7 mm long, 1.3 mm wide. Wallace noted that it had a submarginal band on the carapace and distinct annulations on the legs, but a photograph of the specimen makes it appear to have a wide marginal light band and indistinct annulae.

Remarks.—The median apophysis of *P. mayaca* is quite distinctive and males can be identified with certainty. Females, on the other hand, are hard to identify and any locality record based on females should be considered tentative until confirmed by collection of males.

Remarks.—Dr. Cooke wrote that he was unable to locate the types of *P. gertschi* in the A.M.N.H. so they may be lost. The figure of the epigynum of *P. gertschi* does not represent anything we have seen, but the figure of the palp is that of *P. mayaca*; only *P. mayaca* in Georgia has the recurved distal arm of the median apophysis.

This species has been identified as *P. felix* by various authors. The type of *P. felix* is a smaller spider with a much different epigynum (Fig. 109).

P. pagicola and *P. mayaca* have very similar genitalia, but differ in size and pattern. *P. mayaca* has a submarginal band on the carapace, but in *P. pagicola* it is marginal. *P. mayaca* is much smaller than *P. pagicola*.

The specimens listed as *P. mayaca* from Cuba and the British West Indies have the pattern of *P. pagicola* and size of *P. mayaca*.

Pirata pagicola Chamberlin

Figs. 97-104

Pirata pagicola Chamberlin, 1925, Bull. Mus. Comp. Zool., 67(4):225 (female, M.C.Z., 1,292, Barro Colorado Island, examined).

Pirata felix Gertsch and Davis, 1940, Amer. Mus. Nov., 1059:9-10, examined. NEW SYNONYMY.

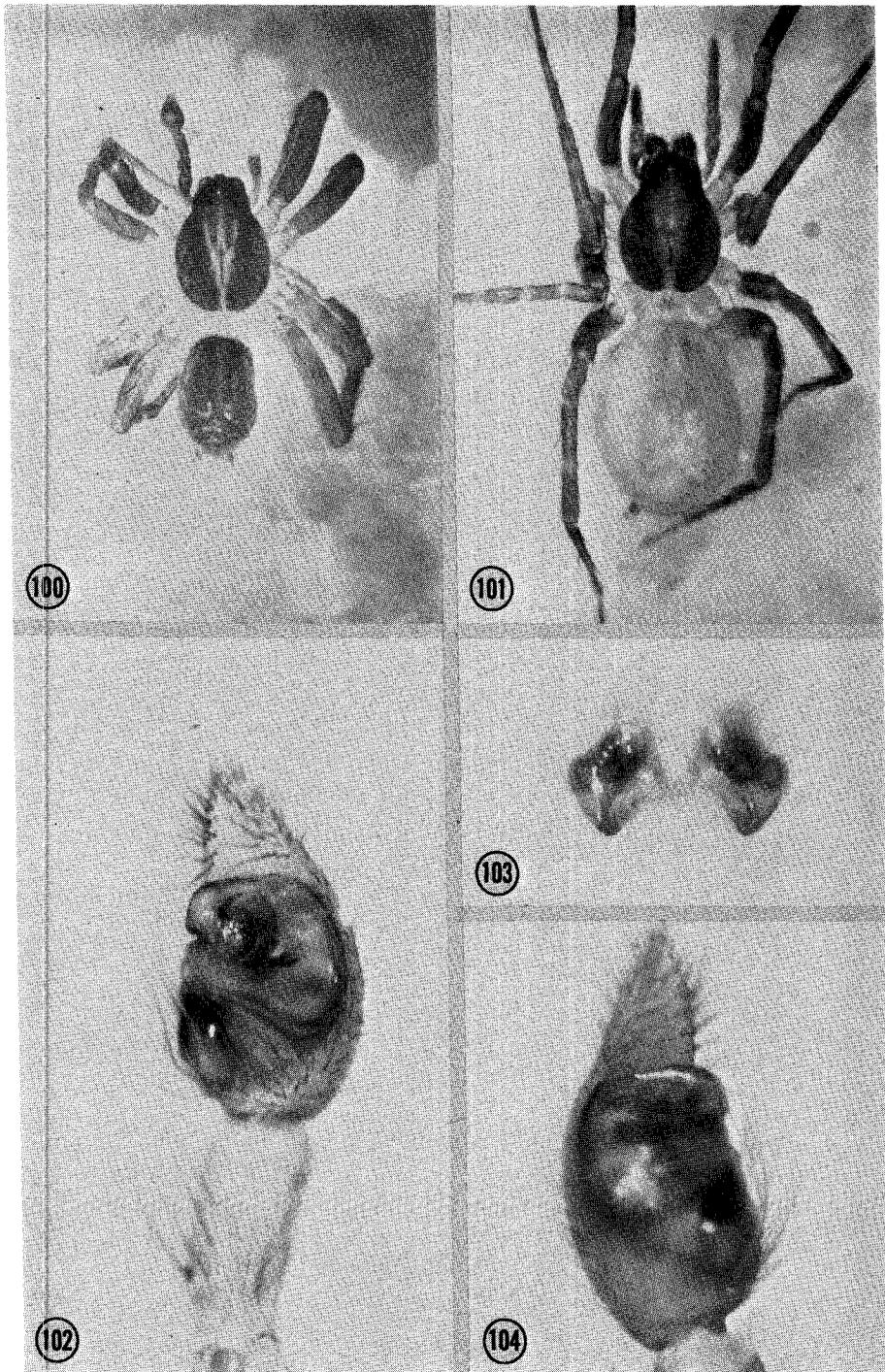
Remarks on the holotype.—Chamberlin's description still fits the specimen. Carapace 1.9 mm long, 1.3 mm wide, with a wide marginal light band, but it looks like it might be interpreted as a submarginal band. The anterior eye row is slightly narrower than the posterior row, almost straight; anterior eyes evenly spaced, anterior median eyes are twice as large as the anterior laterals.

	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
Leg I	1.40	0.63	1.17	1.17	0.55	4.92
Leg IV	1.75	0.70	1.75	1.90	0.90	7.00

Chamberlin did not figure the epigynum (Fig. 98) which resembles *P. aspirans* and *P. mayaca*. The palpi of *P. mayaca* and *P. pagicola* are very similar and differ from *P. aspirans*.

Distribution.—Panama: Barro Colorado Island; México: Tamaulipas, Veracruz, and San Luis Potosí; Costa Rica.

Specimens examined.—*Costa Rica*: Turrialba, I.I.C.A., 13 Mar 67, W. Peck, ground, opening in jungle, female (Exline). *México*: *San Luis Potosí*: 5 mi. N. Tamazunchale, July 2, 1936, L. I. Davis, female (A.M.N.H.); *San Luis Potosí*, Picolo, May 21, 1952, W. J. G., 4 males, 10 females (A.M.N.H.); *Tamaulipas*: Rancho del Cielo, 6 mi. N.W. Gómez Farías, 9 Mar 1969, J. Reddell etc., male, female (A.M.N.H.), Mar 24, 1967. R. W. Mitchell. 3



Figs. 100-104.—*P. pagicola*: 100, male, Mexico, Tamaulipas, Rancho del Cielo; 101, female, Mexico, Tamaulipas, Rancho del Cielo; 102, palp, Mexico, San Luis Potosi, May 21, 1952, W.J.G.; 103, epigynum, Mexico, San Luis Potosi, May 21, 1952, W.J.G.; 104, palp, Mexico, Tamaulipas, Rancho del Cielo.

females and egg sac (A.M.N.H.); Rancho del Cielo, 4200 ft., 5 females (A.M.N.H.); *Veracruz*: nr. Jalapa, Aug 1948, C. Goodnight, female (A.M.N.H.).

Life history.—We have examined males from March and May, females from March, May and July.

Ecology.—The only information we have is from a label, “ground-opening in jungle.”

Variation.—Five females from Tamaulipas have dark carapaces like *P. montanus*. A male has a carapace 2.3 mm long, 1.7 mm wide, a female 2.5 mm long, 1.8 mm wide. The male also has a carapace like *P. montanus*.

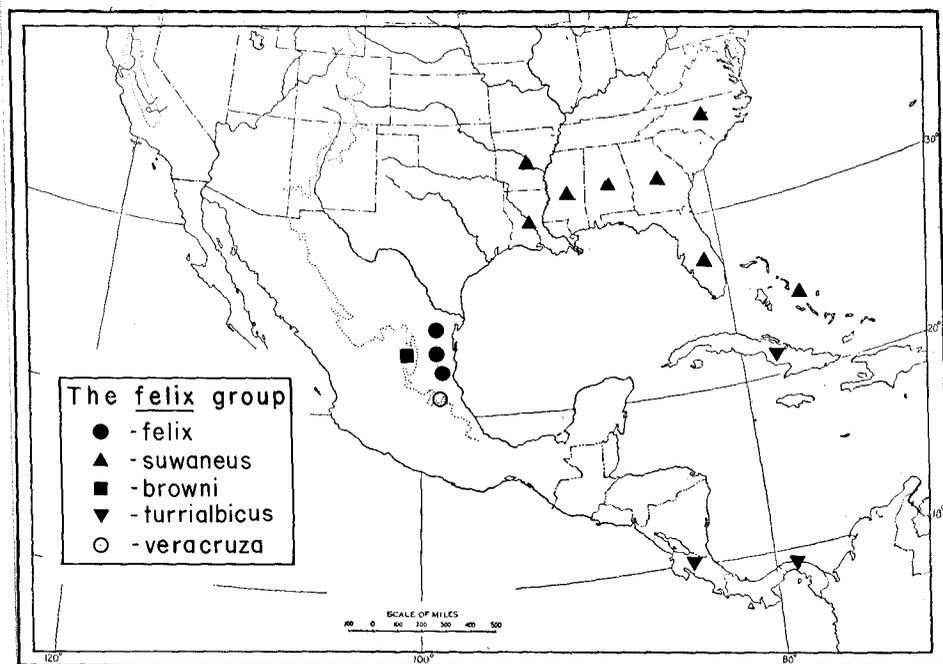
The spinning on tibia I and II in *P. pagicola* and *P. mayaca* is similar.

THE *FELIX* GROUP

The following species are very similar in appearance, genitalia and size and as a result are very difficult to separate: *P. felix*, *P. suwaneus*, *P. browni*, *P. veracruzae*, and *P. turrialbicus*, n. sp. *P. browni* and *P. suwaneus* have a submarginal light band on the carapace; the other three have wide marginal light areas. Unfortunately, the amount of pigment and the transparency of the carapace varies so that, for instance, specimens of *P. turrialbicus* from the same locality vary from very light ones with no annulae on the legs to pigmented individuals with carapace pattern that suggests the presence of a submarginal light area and legs with distinct annulae. So pattern is not always reliable.

Perhaps it is significant that no specimens identified as *P. browni* (Fig. 113) and *P. veracruzae* (Figs. 122-124) have turned up in the collections we have examined. For these two species only the holotypes are known. Both may be heavily pigmented *P. felix*. We propose to let these two species stand pending more thorough collecting in Mexico.

The epigynum of the type of *P. felix* (Fig. 109) appears to us to be identical with that of the allotype of *P. gratus* Gertsch and Davis and the two specimens agree in appearance,



size and morphology. In our opinion they are the same species. *P. turrialbicus* resembles *P. felix* in appearance and morphology, but their genitalia are different (Figs. 105-106, 117-118) and *P. turrialbicus* is a somewhat smaller species than *P. felix*. The palps of *P. felix*, *P. veracruzae* and *P. turrialbicus* are very similar; the palp of *P. felix* is slightly larger than that of *P. turrialbicus* (Figs. 111-112, 120, 123-124). *P. felix* and *P. turrialbicus* have wide marginal light bands or areas, but the lobes of the epigynum are more pointed in *P. turrialbicus*. *P. veracruzae* appears to have a submarginal light band, but the female is unknown.

The type of *P. felix* resembles the allotype of *P. suwaneus* in appearance (Figs. 105, 131) and the epigyna are very similar (Figs. 109, 132). However, we have found no males from Mexico with palpi like Florida *P. suwaneus* and therefore conclude that *P. suwaneus* and *P. felix* are distinct species.

Pirata felix Pickard-Cambridge

Figs. 105-106, 109

Pirata felix Pickard-Cambridge, O., 1898, Biol. Centr.-Amer., Arachn., Aran., 1:243; p. 33, figs. 6, 6a-d (female, Mexico, Atoyac, Vera Cruz, B.M.N.H., examined); Pickard-Cambridge, F., 1902, Biol. Centr.-Amer., Arachn., Aran., 2:330, pl. 31, fig. 23 (female, Guatemala).

Pirata gratus Gertsch and Davis, 1940, Amer. Mus. Nov., 1059:10, figs. 19, 21 (male, female, San Fernando, Tamaulipas, Mexico, A.M.N.H., examined). NEW SYNONYMY

Description of type.—In alcohol the basic color is amber with dark pigmentation producing a pattern on carapace and abdomen and annulae on all legs. Carapace with the usual tuning-fork pattern extending forward between the eyes and a ragged wide marginal light area each side which is invaded medially and laterally by irregular spikes of dark pigment. Dorsum dusky with a light hastate area over the heart, three light chevrons behind the heart region, and a light streak extending posterolaterally on each side from the anterior end of the abdomen. Sternum and coxae light amber colored, venter light with dark pigmentation medially on the posterior half.

Carapace 1.7 mm long, 1.2 mm wide; width of head opposite posterior median eyes 0.7 mm. Posterior ocular quadrangle 0.55 mm wide, 0.32 mm long. Anterior eye row slightly procurved, narrower than posterior median eye row; anterior eyes about equally spaced, anterior median eyes larger than anterior lateral eyes. Clypeus narrow, less than the diameter of an anterior median eye in height.

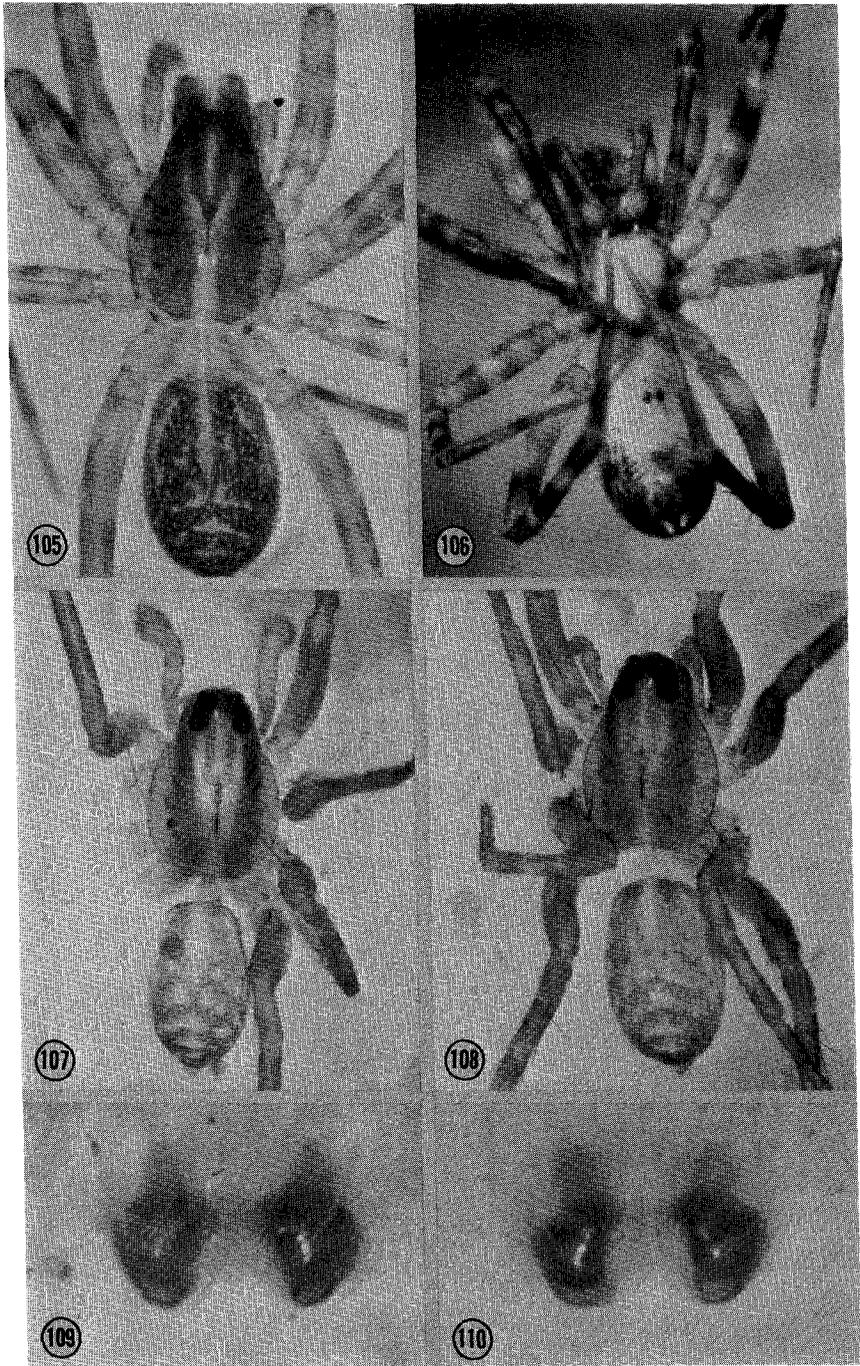
Lower margin of the furrow of chelicerae with three teeth, the one nearest the base of the fang quite small, transparent and inconspicuous; upper margin with three teeth, middle tooth much the largest.

Tibia I with five long overlapping ventral spines, three prolateral, two retrolateral.

Distribution.—México: Tamaulipas, San Luis Potosí, Veracruz.

Specimens examined.—México: *Veracruz*: Atoyac 573, H. H. Smith, female type (B.M.N.H.); *San Luis Potosí*: Apr. 16, 1965, J. Reddell, male (A.M.N.H.); *Tamaulipas*: San Fernando, Mar. 28, 1937, L. I. Davis, male (holotype of *P. gratus* Gertsch and Davis, A.M.N.H.) and male and 5 females (A.M.N.H.); 1 mi. S.W. Villa Juárez, Apr. 17, 1938, L. I. Davis, female (allotype of *P. gratus* Gertsch and Davis, A.M.N.H.).

Ecology.—Nothing has been recorded.



Figs. 105-106.—*P. felix*: 105, female type, Mexico, Vera Cruz; 106, female type, ventral surface.

Figs. 107-108.—*P. gratus* (= *P. felix*): 107, holotype male, Mexico, Tamaulipas, San Fernando; 108, allotype female, Mexico, Tamaulipas, San Fernando.

Fig. 109.—*P. felix*: Female type, epigynum.

Fig. 110.—*P. gratus* (= *P. felix*): allotype epigynum.

Remarks.—The figures given by the Cambridges for the epigynum of *P. felix* are quite different. The figure in volume I is poor and does not resemble anything we have seen from Mexico or Central America. The figure of the epigynum in volume II resembles that of specimens from Turrialba and of the allotype of *Pirata gratus* Gertsch and Davis from Veracruz. If the type of *P. felix* was not available one could not be certain of the relationship of these two populations to *P. felix*.

Pirata browni Gertsch and Davis

Figs. 113-114

Pirata browni Gertsch and Davis, 1940, Amer. Mus. Nov., 1059:9, fig. 18 (female, Rio Gualolejo, Tamaulipas, Mexico, A.M.N.H., examined).

Remarks.—The holotype is a well pigmented female with a distinct submarginal light band on the carapace and annulae on the legs (Fig. 113) and a carapace that measures 1.7 mm long, 1.2 mm wide, putting it in the size range of *P. turrialbicus* and *P. felix*. It differs from these two in pattern and from the former in shape of the epigynum (Fig. 114). The epigynum is also different from that of *P. felix* in that the lobes do not project as far posteriorly; it has some resemblance to that of *P. sedentarius* and *P. suwaneus*.

We have found no specimens which we could place in this species, but believe the species should stand pending additional collecting in the Tamaulipas and Veracruz areas.

Pirata turrialbicus, n. sp.

Figs. 115-121

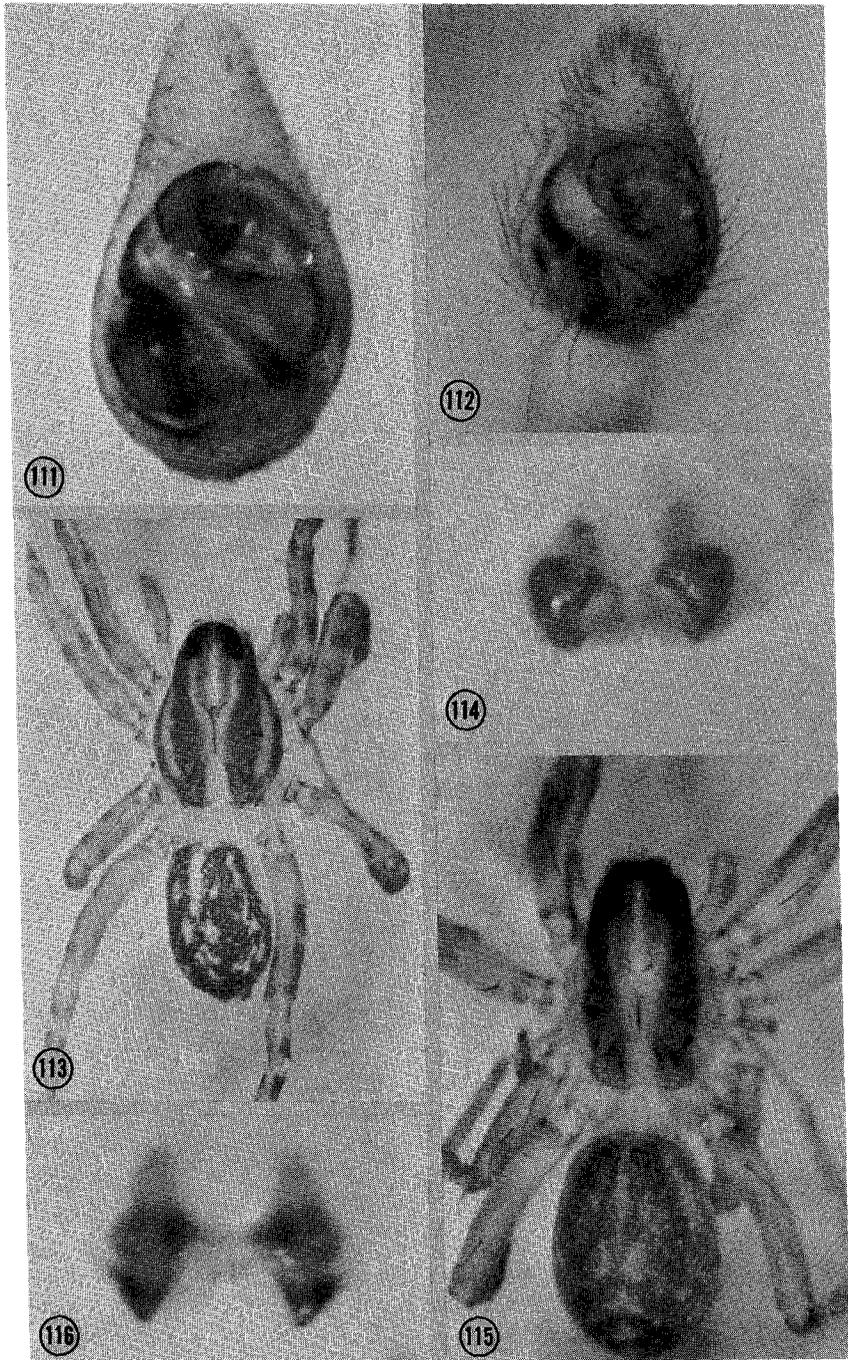
Holotype.—Female, from Turrialba, Costa Rica, 25 July-15 Aug. 1965, A. M. Chickering (M.C.Z.).

Allotype.—Male, with same data (M.C.Z.).

Diagnosis.—This species is close to *P. felix* Cambridge, *P. suwaneus* Gertsch, *P. veracruzae* Gertsch and Davis, and *P. browni* Gertsch and Davis. The latter two are known only from the holotypes and may be examples of *P. felix*. *P. suwaneus* differs from *P. felix* and *P. turrialbicus* in having a submarginal light band on carapace and resembles *P. browni* and *P. veracruzae* in this respect. The epigyna of these species are very similar, but the range of variation in the series, while small, is sufficient to cause confusion. A typical *P. turrialbicus* epigynum from Costa Rica is different from a typical *P. suwaneus* epigynum from Florida or a *P. felix* epigynum from Mexico. In the former the lobes are rather sharply pointed posteriorly, heavily pigmented at the tips and straight or concave laterally while in the latter two the lobes are not as pointed, are not pigmented at the tips, and are convex laterally (Figs. 109, 116, 118, 132).

P. browni resembles *P. suwaneus* from Florida in pattern, but the lobes of the epigynum do not possess the posterior projections of the others.

The median apophysis (Figs. 129-130, 133) of *P. suwaneus* is quite different from that of *P. felix*, *P. turrialbicus*, and *P. veracruzae* in that the distal and proximal teeth are about the same size, while in the others the distal is larger than the proximal. The palpi of the "other" three are very similar (Figs. 111-112, 120, 123-124).



Figs. 111-112.—*P. gratus* (= *P. felix*): 111, paratype, palp, Mexico, Tamaulipas, San Fernando; 112, holotype, palp, Mexico, Tamaulipas, San Fernando.

Figs. 113-114.—*P. browni*: 113, holotype female, Mexico, Tamaulipas, Rio Gualolejo; 114, holotype, epigynum.

Figs. 115-116.—*P. turrialbicus*, n. sp.: 115, female, Cuba, Soledad; 116, epigynum, Cuba, Soledad.

Description of holotype.—Total length 3.0 mm. Carapace 1.55 mm long, 1.17 mm wide with the usual tuning-fork pattern. Basic color pattern amber, carapace with a wide marginal light band. Sternum immaculate, venter faintly dusky medially. Anterior eye row narrower than the posterior median row, slightly procurved, anterior median eyes slightly closer to anterior lateral eyes than to each other, diameter of anterior median eyes almost twice that of anterior lateral eyes; clypeus equal to diameter of anterior median eyes. Lower margin of chelicerae with three teeth, median the largest.

Legs 4123, very faintly annulate. Tibia I with long overlapping ventrolateral spines, three prolateral, two retrolateral. Metatarsus I with three pairs of long spines.

	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
Palpus	0.52	0.30	0.37		0.47	1.66
Leg I	1.20	0.52	0.97	0.97	0.45	4.11
Leg II	1.10	0.50	0.80	0.82	0.45	3.67
Leg III	1.00	0.45	0.72	0.95	0.47	3.59
Leg IV	1.45	0.53	1.23	1.48	0.57	5.26

Description of allotype.—Total length 1.5 mm. Carapace 0.78 mm long, 0.58 mm wide with the usual tuning-fork pattern. Color and pattern similar to holotype. Anterior eye row narrower than the posterior median row, procurved, anterior median eyes about half again as large as anterior lateral eyes, anterior eyes almost evenly spaced. Clypeus equal to the diameter of an anterior median eye (Fig. 121). Lower margin of the furrow of chelicerae with three teeth, the median largest, the lateral quite small.

Legs 4123, faintly annulate. Tibia I with five overlapping ventral spines, three prolateral and two retrolateral, and one small prolateral apical spine. Metatarsus I with three pairs of long spines.

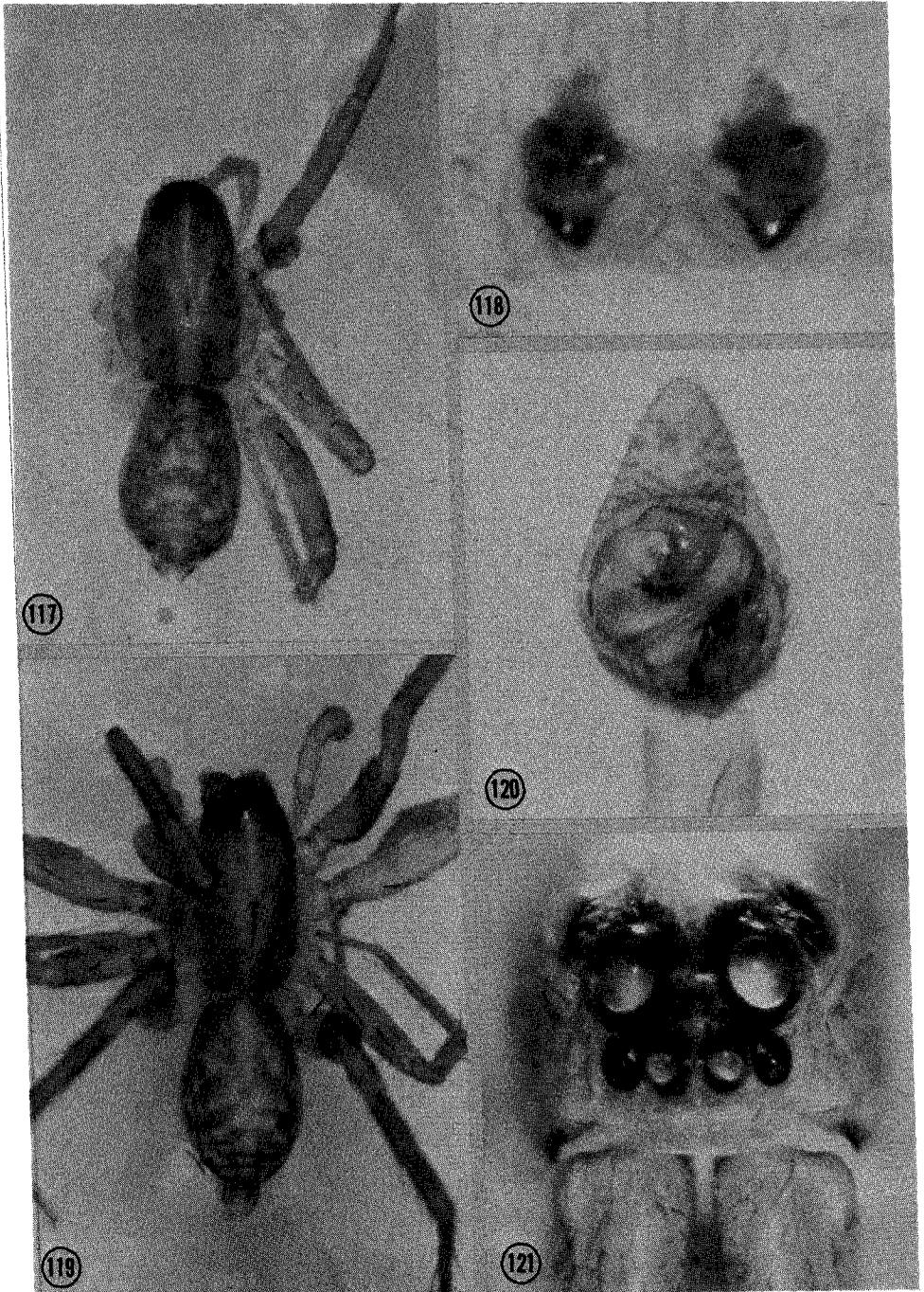
	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
Palpus	0.55	0.25	0.30		0.52	1.62
Leg I	1.22	0.52	1.05	1.10	0.55	4.44
Leg II	1.12	0.50	0.87	1.00	0.52	4.01
Leg III	1.13	0.47	0.77	1.00	0.47	3.84
Leg IV	1.50	0.53	1.52	1.55	0.60	5.70

Distribution.—Cuba, Costa Rica, Panama.

Specimens examined.—*Cuba*: Soledad, 31-VII-33, N. A. Weler, 1 female (M.C.Z.); Soledad, 1-11 Aug 1934, P. J. Darlington, 6 females (M.C.Z.); Soledad, Apr. 36, Darlington, male, female (M.C.Z.). *Costa Rica*: Turrialba, 23 July-15 Aug. 1965, A. M. Chickering, several hundred males and females (M.C.Z.); Turrialba I.I.C.A., 8 Mar. 67, W. Peck, 3 females (Exline); 1 Mar. 67, W. Peck, male, female (Exline); San Jose, Ciudad Universitaria, CEV 72, 4 females (U.C.R. 103). *Panama*: Boquete, Aug. 1-8, 1950, A.M.C., female (M.C.Z.); Chanquinola, July 65, J. P. Harrison, 3 females (Exline); Canal Zone, Forest Preserve, XII-24-57, A.M.C., 2 males (M.C.Z.); Canal Zone, Summit Gardens, May 64, A.M.C., male, female (M.C.Z.), XII-20-57, A.M.C., 5 females (M.C.Z.), July 26, 1954, A.M.C., female (M.C.Z.), Aug. 17, 1954, A.M.C., 2 males, female (M.C.Z.); Canal Zone, 3 miles N. Pedro Miguel, Aug. 23, 1954, 2 females (M.C.Z.); El Valle, July 36, A.M.C., 4 females (M.C.Z.); Canal Zone, Aug. 28, 1950, A.M.C., 5 females (M.C.Z.); Canal Zone, Ft. Clayton, Jan. 31, 58, A.M.C., female (M.C.Z.); Canal Zone, Gatun, Feb. 58, A.M.C., 2 males, 8 females (M.C.Z.).

Life history.—*P. turrialbicus* adults probably occur throughout the year. Gaps in the records are probably a reflection of collecting activities rather than an indication of seasonal occurrence. We have a male from Cuba in April and females in April, July and

August, and egg sacs in July and August; from Panama males in February, May, August and December, females in January, February, May, July, August and December, egg sacs in February and August.



Figs. 117-121.—*P. turrialbicus*, n. sp., Costa Rica, Turrialba: 117, holotype female; 118, holotype, epigynum; 119, allotype male; 120, allotype, palp; 121, allotype, eyes.

Ecology.—The only information available comes from labels in vials: "Pasture-Berlese;" "night-open lawn-pond margin;" "under trash, cleared forest;" "banana grove."

Variations.—This small species is characterized by a wide marginal light area on carapace and faint annulae on the legs. Light specimens lack annulae and heavily pigmented specimens look like they have a submarginal band and distinct annulae on the legs. In a vial containing several hundred males and females from Turrialba lightly pigmented specimens are yellowish in color with a wide marginal light area and faint annulae on their legs. Heavily pigmented specimens have distinct annulae and pigment invading the marginal light area; these are similar to the type of *P. felix*. In this same vial one female with the marking of *P. felix* stood out because of its size: carapace 2.0 mm long by 1.5 mm wide, while typical *P. turrialbicus* measure 1.7 mm long by 1.2 mm wide. The epigynum of this specimen also resembles *P. turrialbicus*, the lobes being a little farther apart than in smaller specimens. This female is described separately below. We believe it may possibly represent a new species, but we prefer not to name it until it is verified by additional representatives including a male.

There is some variation in size. Males usually have a carapace length of less than 1.5 mm (range 1.3-1.6) and females less than 1.7 mm (range 1.4-2.0). There is also some variation in the appearance of the genitalia. The typical epigynum has a black tip on the lobes and appears to be concave in front of the tip; frequently this is true of one lobe, but not the other, sometimes depending upon the orientation of the specimen with reference to the optical path. In such cases the epigynum is very similar to that of *P. suwaneus*. The distal tooth or ramus of the median apophysis also appears to vary slightly in the length and shape, approaching *P. suwaneus* in bluntness on one extreme and *P. felix* in size and shape on the other.

Description of large female.—From Turrialba, 25 July-15 August. General body color dusky amber. Total length 5.0 mm. Some segments of legs faintly annulate. Carapace 2.0 mm long, 1.5 mm wide, with a wide marginal light area, medial edges of which are almost straight. The tuning-fork pattern is incomplete, the handle missing in front of the cervical groove. Dorsum with the usual hastate mark over the heart and several triangular shaped light areas on the midline posterior to the hastate pattern. Sides of abdomen with irregular blotches. Sternum, venter and coxae without markings.

Dorsal ocular quadrangle wider than long (0.67×0.50). Anterior eye row very slightly procurved, narrower than the posterior median row, anterior eyes evenly spaced; anterior median eyes larger than the anterior laterals. Height of clypeus slightly less than the diameter of an anterior median eye. Both tibiae I with three prolateral and two retrolateral long, overlapping ventral spines. Both tibiae II with three prolateral and two retrolateral spines ventrally, the latter long, overlapping, the prolateral about half as long as the retrolaterals. The distal prolateral spine is subapical. Legs 4123.

	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
Palpus	0.67	0.37	0.45		0.67	2.16
Leg I	1.50	0.70	1.25	1.25	0.70	5.40
Leg II	1.45	0.67	1.10	1.17	0.67	5.06
Leg III	1.42	0.60	1.00	1.25	0.70	4.97
Leg IV	1.80	0.75	1.60	1.92	0.85	6.92

Pirata veracruzae Gertsch and Davis
Figs. 122-124

Pirata veracruzae Gertsch and Davis, 1940, Amer. Mus. Nov., 1059:8-9, fig. 23 (male, Potrero, Vera Cruz, Mexico, A.M.N.H., examined).

Remarks.—The holotype is a dark specimen with a carapace pigmented somewhat like *P. montanus* (Fig. 122). However, a submarginal light band is faintly visible and in this respect it does not resemble *P. felix*, although photographs of the palp resemble that of *P. felix*. At the time the holotype was examined it was noted that the palpus resembled that of *P. sedentarius* (Figs. 123-124).

The carapace of the holotype measures 1.8 mm long, 1.3 mm wide, and the eyes are typical for *Pirata*, i.e., the anterior eye row is narrower than the posterior median row and slightly procurved; the anterior median eyes are larger than the laterals.

We have found no other specimens which we could classify as this species, but neither have we been able to place it with certainty as one of the described species. In view of the small amount of collecting done in the Veracruz area we believe it best to let this species stand.

Pirata suwaneus Gertsch
Figs. 125-133

Pirata suwaneus Gertsch, 1940, Florida Entomol., 23(2):20-21, figs. 1-2 (male, female, Port Mayaca, Florida, A.M.N.H., examined); Barnes, 1953, Ecol. Monogr., 23:315-337, figs. 1-17; Barnes, 1953a, Amer. Mus. Nov., 1632:1-21, figs. 1-19.

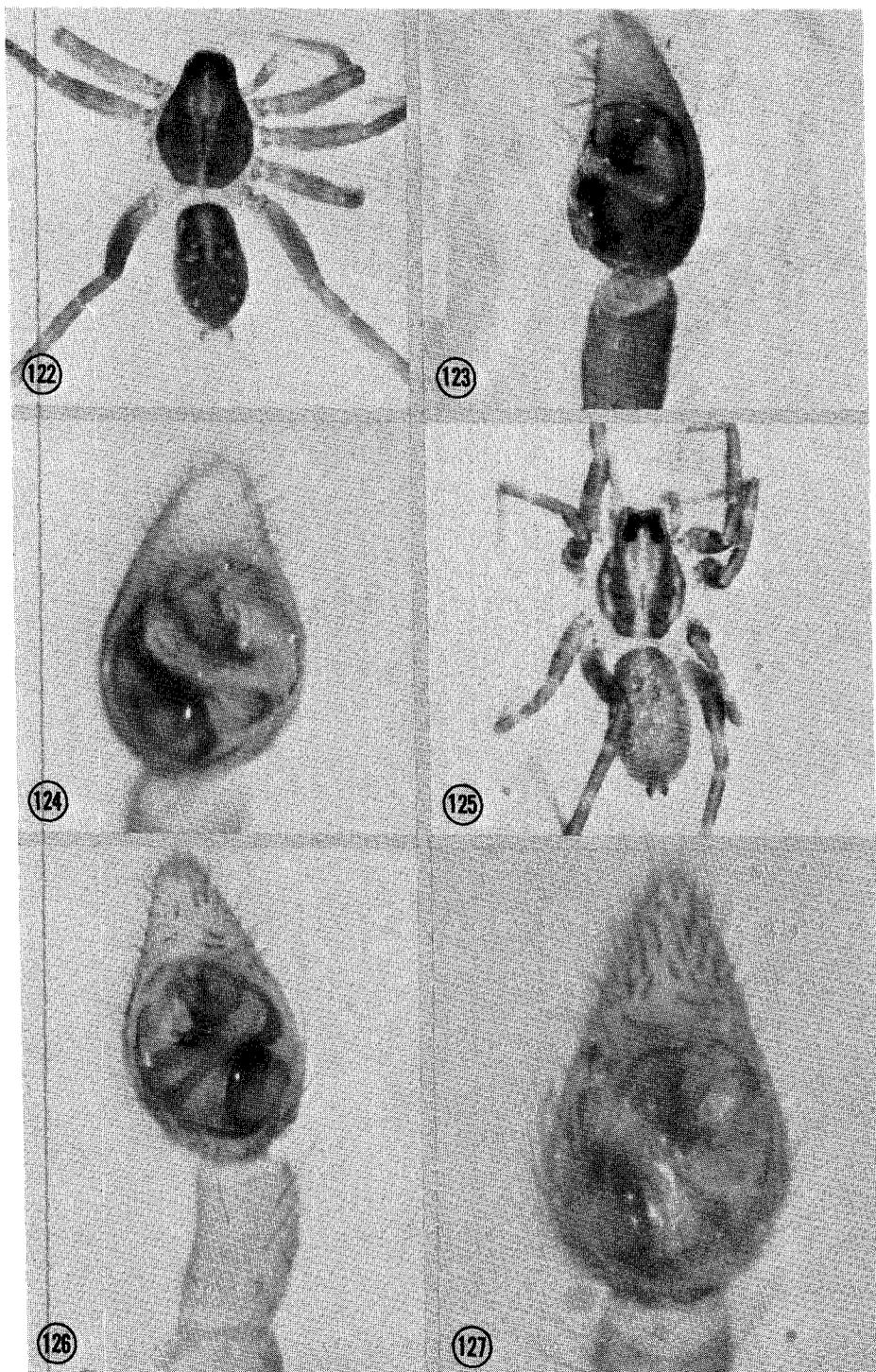
Observations on types.—Both sexes have a submarginal light band on the carapace, but the marginal pigment is not well developed, especially in the male (Figs. 128, 131). The carapace of the male holotype is 1.70 mm long, 1.07 mm wide. The anterior eye row is narrower than the median row, procurved; the anterior median eyes are twice as large as the laterals and closer to each other than to the laterals. The median apophysis of the palpus is small and chelate (Fig. 129).

The carapace of the allotype is 1.87 mm long, 1.30 mm wide. The eye arrangement is similar to that of the male. The epigynum has conical shaped structures projecting posteriorly beyond the epigastric furrow (Fig. 132).

Description of male.—From Palm Beach County, Florida, Canal Point, U. S. Sugar Corp., VIII-31-70, pitfall. Carapace 1.65 mm long, 1.22 mm wide, with a submarginal light band and the usual tuning-fork pattern. Dorsum heavily pigmented, with a light hastate mark over the heart. Sternum, coxae, labium and endites light amber colored without markings; venter similarly colored, but with pigment along the mid-line about one-third the width of the venter.

Anterior eye row distinctly procurved, distinctly narrower than the median row; anterior median eyes twice the size of the laterals, closer to the laterals than to each other. Clypeus height equal to the diameter of an anterior median eye. Lower margin of the furrow of the chelicerae with three teeth, the middle tooth the largest and closer to the lateral than to the median tooth.

Legs 4123, banded. Tibia I with seven ventral and lateral spines. The four ventral spines are long, overlapping the spines distal to them; one spine is apical in position. Tibia



Figs. 122-124.—*P. veracruzae*: 122, holotype male, Mexico, Potrero; 123-124, palp.

Figs. 125-127.—*P. suwaneus*: 125, Male, British West Indies, Crooked Island, Sept. 58; 126, palp, British West Indies, Crooked Island, Sept. 58; 127, Palp, Florida, Palm Beach Co.

II with seven ventral and lateral spines; the proximal ventroretrolateral spine overlaps the spine distal to it; the proximal ventroprolateral spine is reduced to not much more than a bristle. One spine is apical in position.

A male from the same collection is smaller than the above. Its carapace measured 1.40 mm long, 1.02 mm wide.

Description of female.—With same data. Carapace 1.67 mm long, 1.12 mm wide, with a submarginal light band and tuning-fork pattern as in the male. Dorsum with paired white spots; ventral surface yellow, immaculate except for light pigment in center of venter. Eye arrangement and toothing of chelicerae similar to male.

Legs 4123, banded. Tibia I with five ventral and lateral spines, none apical in position. Tibia II with six ventral and two lateral spines.

Variations.—There is some variation in size in this species but they are all small spiders. Male carapaces vary in length from 1.4 mm to 1.8 mm and female carapaces from 1.55 mm to 1.8 mm.

Distribution.—*P. suwaneus* probably is limited in its distribution to the southeastern United States and the West Indies. It ranges from North Carolina westward to Louisiana and Arkansas and southward throughout Florida and into the British West Indies. It does not appear to occur as far north as Tennessee; it has not been found in northwestern Arkansas where much collecting has been done, nor in Missouri.

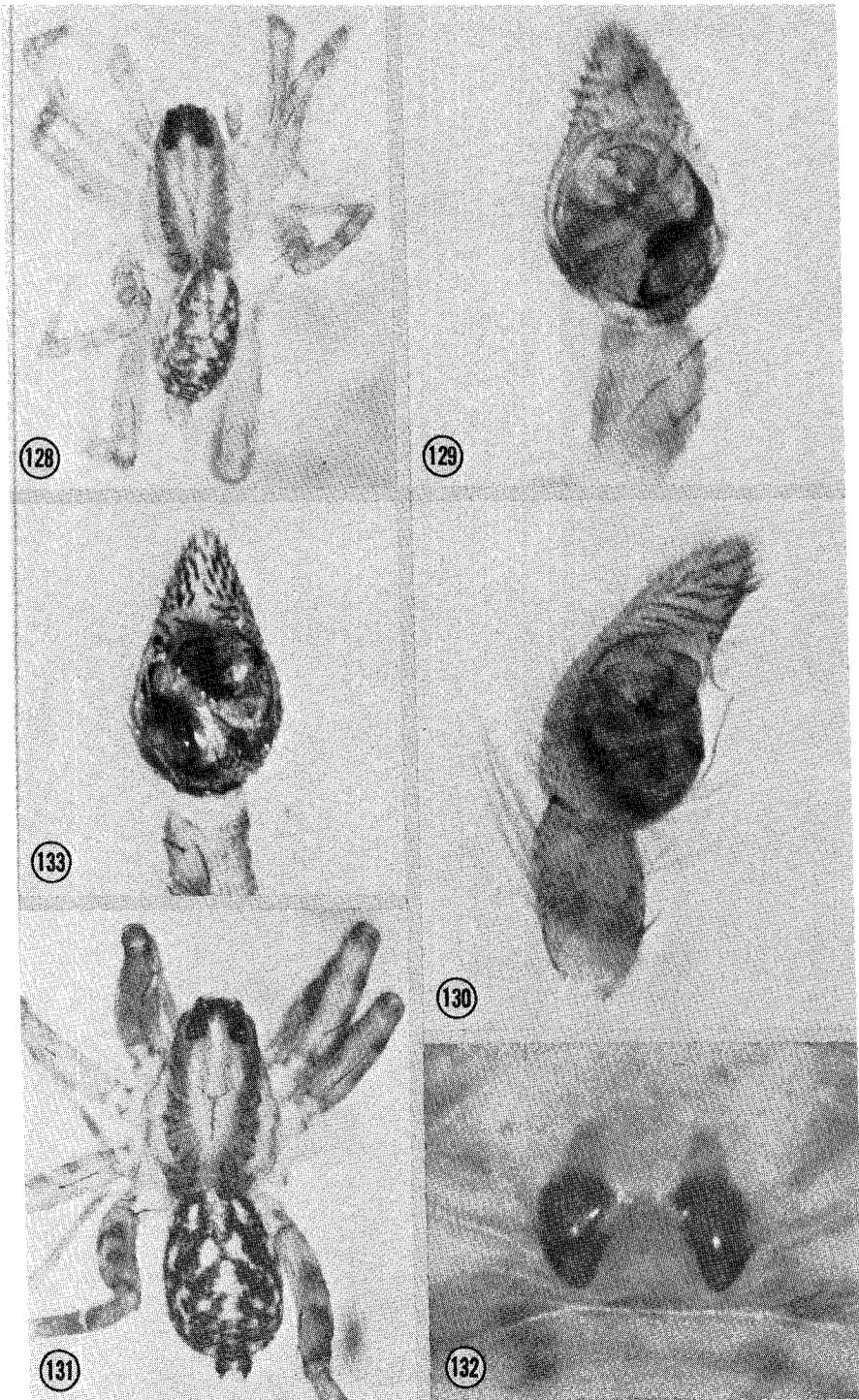
Specimens examined.—*British West Indies*: Crooked Island: Major Cay Settlement, Sept 58, A. W. Scott, Jr., male (M.C.Z.), SE of Gordon's Bluff, Sept. 58, A. W. Scott, Jr., female (M.C.Z.). *United States*: *Alabama*: Mobile County; *Arkansas*: Bradley, Conway Counties; *Florida*: Alachua, Bay, Brevard, Charlotte, Collier, Columbia, Dade, Highlands, Jefferson, Lake, Lee, Leon, Levy, Martin, Orange, Palm Beach, Putnam, Sarasota, St. Johns, Taylor Counties; *Louisiana*: St. Mary Parish; *Mississippi*: Camp Shelby; *North Carolina*: Carteret, Durham, Franklin, Orange Counties.

Life history.—In Florida adult females have been collected in every month of the year and adult males in every month from January through July. Egg sacs have been collected in all months except March, May, June and December.

Almost all records from north of Florida are from June, July and August. We have seen one male collected in Louisiana in April and one in Arkansas in September; two females in North Carolina in September and one female with egg sac in North Carolina in November. The only other egg sac from north of Florida is one collected in North Carolina in August. The male and female from the West Indies were collected in September.

Ecology.—In Florida *P. suwaneus* has been collected in a variety of wet situations: in pine flatwoods, pond margins, edge of lake, canal bank, Panama City beach, in low hammocks, cypress swamp bayheads. In Arkansas it was taken in pitfall traps in cotton fields and pastures. In North Carolina it was collected in pitfall traps in a variety of situations. Barnes (1953) demonstrated a definite habitat distribution for *P. suwaneus* in non-forest maritime communities at Beaufort, North Carolina, using pitfall traps. Barnes (1953a) listed this species as the most abundant *Pirata* in the coastal area of North Carolina.

Remarks.—The high proportion of specimens in the various collections that came from pitfall traps probably results from the small size of this species. It is easily overlooked during daylight hours and although the headlight facilitates locating them at night one might pass them by as immatures.



Figs. 128-133.—*P. suwaneus*: 128, holotype male, Florida, Port Mayaca; 129-130, holotype, palp; 131, allotype female, Florida, Port Mayaca; 132, allotype, epigynum; 133, palp, Florida, Palm Beach Co.

We have found *P. suwaneus* identified as *P. sedentarius*, *P. minutus*, *P. aspirans* and *P. insularis*, but one should be able to distinguish this small species by comparing the genitalia with the illustrations (Figs. 126-127, 129-130, 132-133). The median apophysis of *P. suwaneus* is chelate and the epigynum is characterized by the conical shaped lobes that project posteriorly beyond the epigastric furrow.

THE *PIRATICUS* GROUP

Pirata piraticus (Clerck)

Figs. 134-139

Araneus piraticus Clerck, 1757, Svenska Spindlar, p. 102, pl. 5, tab. 4 (female, type not examined).

Aranea piratica Olivier, 1789, Encycl. Method., 4:218.

Pirata prodigiosa Keyserling, 1876, Verh. Zool.-Bot., Gesell. Wien, 26:669, pl. 2, fig. 2 (Bonnet, 1945, gives date 1877; Chamberlin, 1908, lists pl. 8, fig. 44; Petrunkevitch, 1911, lists pl. 2, fig. 44); Chamberlin, 1908, Proc. Acad. Nat. Sci. Philadelphia, 60:313.

Lycosa febriculosa Becker, 1881, Ann. Soc. Entomol. Belg., p. 45, pl. 2, figs. 2, 2a (female, New Orleans, Louisiana).

Pirata febriculosa, Chamberlin, 1908, idem, p. 311-313, pl. 22, figs. 1-2.

Pirata piratica (Clerck) var. *utahensis* Chamberlin, 1908, idem, p. 313 (male, Utah).

Pirata arenicola Emerton, 1909, Trans. Connecticut Acad. Arts. and Sci., 14:208-209, pl. 6, figs. 9-9c (female, not the male, Ipswich, Massachusetts; type examined).

Pirata sylvestris Emerton, 1909, Trans. Connecticut Acad. Arts. and Sci., 14:209, pl. 6, figs. 8b, 8c (female, not the male, see remarks).

Pirata piratica, Kaston, 1938, Canadian Entomol., 70:16, fig. 1; Kaston, 1948, Bull. Connecticut Geol. and Nat. Hist. Survey, 70:309, pl. 50, fig. 1003, pl. 51, fig. 1010.

Description of male.—From the E. S. George Reserve, Livingston Co., Michigan, VII-3-1951, HKW 1448. Carapace 2.8 mm long, 2.1 mm wide with a wide marginal light area and distinct tuning-fork mark (Fig. 134). Edge of carapace with a narrow band of short white hair-like structures. Dorsum with a distinct hastate mark, three pairs of spots covered with short white hairs and distinct lateral stripes of white hairs. Sternum yellow, coxae, labium, endites and venter a little darker in color, immaculate.

Anterior eye row slightly narrower than the posterior median row, slightly procurved, anterior median eyes about twice the size of the laterals, closer to laterals than to each other. Height of clypeus about three-fourths the diameter of an anterior median eye. Lower margin of furrow of chelicerae with three, almost evenly spaced teeth which are almost equal in size.

Legs 4123, unbanded. Tibia I with three pairs of ventral spines, the distal pair apical. The proximal ventroprolateral spine on tibia II is much reduced.

Description of female.—With same data as male. Carapace 3.0 mm long, 2.3 mm wide. Pattern similar to male except white markings from short hairs or scales are more conspicuous (Fig. 135). Legs unbanded, venter dusky. Eye arrangement similar to male. Lower margin of furrow of chelicerae with three teeth, evenly spaced, equal in size.

Legs 4132, unbanded. Tibia I with two pairs of long ventral spines. Tibia II with two pairs of ventral spines; the prolateral ones much reduced in size.



Distribution.—Europe and, roughly speaking, north of the 35th parallel in North America.

Specimens examined.—Canada: *Alberta*: Altabasca Delta, Vermillion Lakes nr Banff, Edmonton, George Lake, McMurray; *British Columbia*: Field, Ft. St. James, Vancouver Island; *Manitoba*: Cedar Lake, Kettle Rapids, the Pas; *New Brunswick*: St. Andrews; *Northwest Territory*: Ft. Resolution, Great Slave Lake; *Ontario*: Algoma, Carleton, Cochrane, Hastings, Kenora, Lennox and Addington, Nipissing, Prince Edward, Thunder, York County or District, L. Nimissire, New Sarum, Mac Bay L.N.P.S., Mere Bleu, Long Point, Wilcox Lake, Garret Island, Holst Pt., Fround Lake, MacLerian, Ft. Severn, St. Joseph's Island, Ompah; *Quebec*: Gatineau, Lac St. Jean-Quest Counties; *Saskatchewan*: Besnard Lake, Emma Lake, Indian Head, Lady Lake, Moose Mtn. Creek; *Yukon Territory*: Whitehorse. United States: *Alaska*: Kodiak, Haines, Homer, Matunuska, Rudyerd

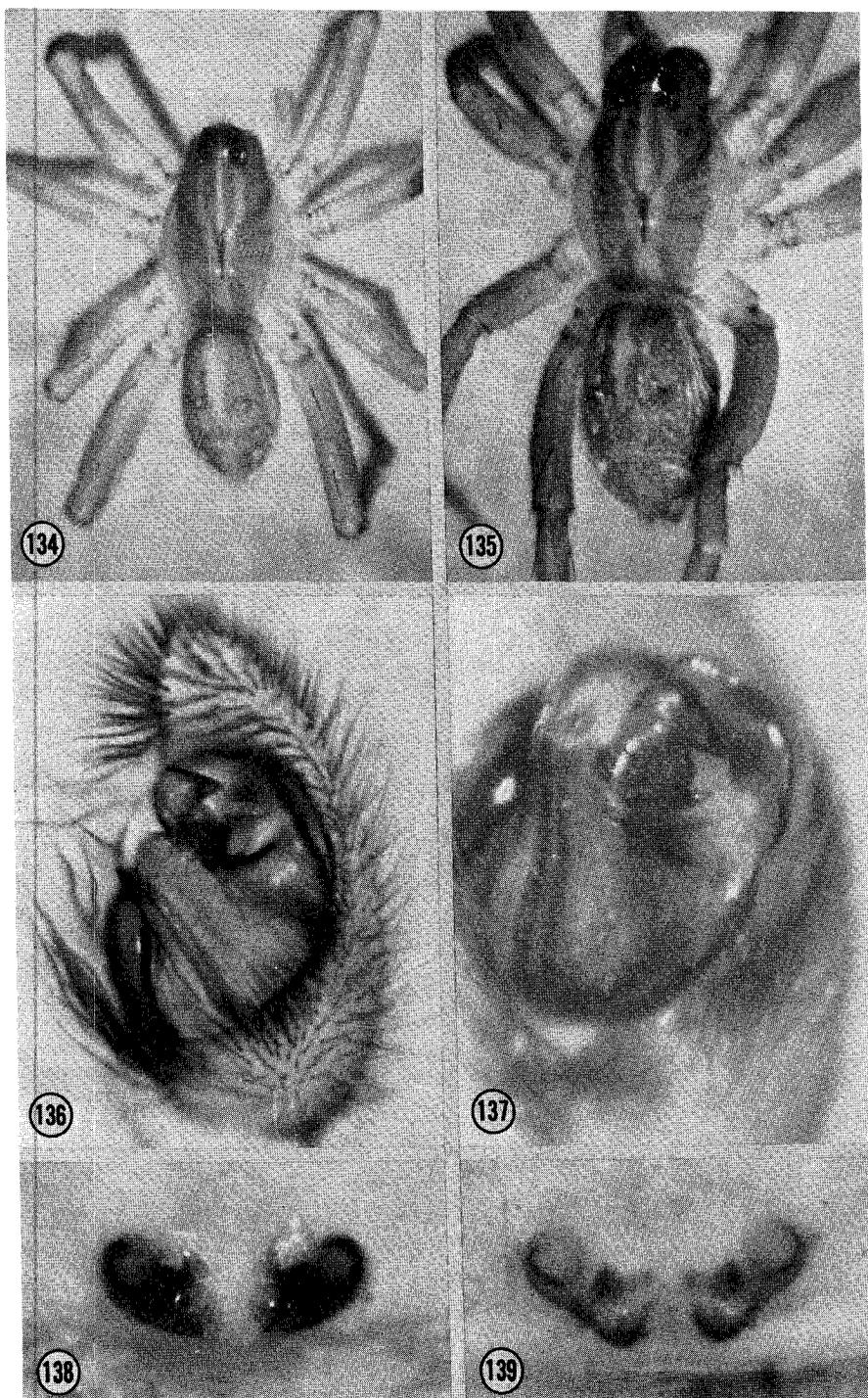
Bay Area; *California*: Alameda, Del Norte, Humboldt, Inyo, Los Angeles, Orange, Riverside, San Diego, Siskiyou, Shasta Counties; *Colorado*: Alamosa, Lake, Mesa, Larimer, Teller Counties; *Connecticut*: New Haven County; *Idaho*: Adams, Blaine, Franklin, Idaho, Latah, Oneida, Owyhee, Payette, Shoshone, Valley, Washington Counties; *Illinois*: Elkhart and La Porte Counties; *Iowa*: Cerro Gordo County; *Maine*: Washington County, Wals; *Massachusetts*: Hampden, Middlesex, Nantucket Counties; *Michigan*: Alger, Baraga, Berrien, Calhoun, Charlevoix, Cheboygan, Clare, Clinton, Delta, Emmet, Gogebic, Kalamazoo, Livingston, Luce, Macomb, Marguette, Menominee, Midland, Missaukee, Oakland, Ogemaw, Roscommon, Schoolcraft, Tuscola Counties; *Minnesota*: Crow Wing, Freeborn, Polk, Roseau, Stearns Counties; *Montana*: Carbon, Sanders Counties; *Nevada*: 20 mi W Elks, Wadsworth; *New York*: Columbia, Rensselaer, Schuylar, Tompkins, Wayne Counties; *Ohio*: Erie, Ottawa Counties; *Oregon*: Benton, Coos, Deschutes, Douglas, Harvey, Klamath, Lane, Linn, Multnomah, Umatilla Counties; *Pennsylvania*: Lancaster, Pike, Potter Counties; *South Dakota*: Grant County; *Utah*: Davis, Emery, Grand, Millard, Rich, Salt Lake, Utah Counties; *Washington*: Clark, Cowlitz, Grant, Jefferson, King, Lincoln, Okanogan, San Juan, Snohomish, Spokane Counties; *West Virginia*: Pocahontas County; *Wisconsin*: Dane, Dodge, Florence, Iron, Polk, Rock, Taylor, Waukesha Counties; *Wyoming*: Albany, Laramie, Platte, Teton Counties, Yellowstone National Park.

Life history.—In the United States 95 percent of the records are from May, June, July and August. We have two records of males and females from February, and several from October; none from November through January. We have records of males and females from California in March and one egg sac from March. Most records of egg sacs are from July, a few from June and August, and one from September. *P. piraticus* appears to mature about a month later in Canada; almost all of our Canadian records are from June, July, August and September.

Ecology.—The information available (mostly from labels) indicates that *P. piraticus* is usually found near water; in swamps, marshes, or on the shores of lakes, ponds and streams. One record by B. Malkin, June 21, 1951, from Hot Springs at the SE end of Harvey Lake has four males, four females, three immatures from "upper layer running on surface of hot water."

Wallace collected this species on numerous occasions on the E. S. George Reserve, Livingston Co., Michigan, from marsh, swamps, woods pond, and bog. *P. insularis* and *P. piraticus* were frequently taken together. On one occasion, collecting a marsh by separating plants along muskrat trails and by shining eyes, *P. aspirans*, *P. cantralli*, *P. minutus*, *P. piraticus* and *P. zelotes* were collected in the same part of the marsh.

Remarks.—We have found this species identified as follows: *P. aspirans*, *P. febriculosus*, *P. insularis*, *P. prodigiosus*, *P. sylvestris*, *P. utahensis*, *P. wacondana*. Chamberlin and Ivie (1944) listed two females from Georgia. The one from Marshallville, June-24-1910; R. V. Chamberlin, is *P. sedentarius*; the one from Gainesville we have not examined. Becker (1881) described *Lycosa febriculosa* from New Orleans, Oklahoma; various authors have since synonymized his species with *P. piraticus*. Although we have not seen the type we doubt that Becker's specimen was *P. piraticus* for two reasons: (1) we have examined no other *P. piraticus* from within hundreds of miles of New Orleans; (2) Becker illustrated the anterior row of eyes as wider than the posterior median row and this is not true of any *Pirata* that we have examined. Banks (1892) reported *P. piratica* as uncommon around Ithaca, New York; in 1895 he reported it as occurring on Long Island under leaves in swamps.



Figs. 134-139.—*P. piraticus*: 134, male, Michigan, Livingston Co., E. S. George Reserve; 135, female, Michigan, Livingston Co., E. S. George Reserve; 136, palp, Michigan, Livingston Co., E. S. George Reserve; 137, palp, Michigan, Gull Lake; 138, epigynum, Massachusetts, Ipswich (type of *P. arenicola*); 139, epigynum, Ontario, St. Josephs.

Emerton did not give a locality for *P. sylvestris*. We received a vial from the M.C.Z. labeled *Pirata sylvestris* Em., Lynn Woods, June 11, 1905, J. H. Emerton, coll., which contained a female *P. piratica* and a male *P. insularis*, evidently the same specimens he illustrated.

The number of ventral spines of tibia I and II have been used as a generic character. The following data from five male and 22 female *P. piraticus* indicates that this may be a consistent character in males, but not in females:

Apical-Tibia I		Apical-Tibia II		Number Cases	
Right	Left	Right	Left	Male	Female
0	0	0	1	0	4
0	0	1	0	0	2
0	0	1	1	0	10
0	0	0	0	0	3
1	1	0	1	0	2
1	0	1	1	0	1
2	2	2	2	5	0

***Pirata zelotes*, n. sp.**

Figs. 140-142, 145

Holotype.—Male, Michigan, Livingston Co., E. S. George Reserve, M-28 VII-15-54, H.K.W. 1789H (M.C.Z.).

Allotype.—Female, with same data (M.C.Z.).

Etymology.—The name of this species comes from the Greek word “zelotes” meaning “emulator,” selected because of its close resemblance to *P. piraticus*.

Diagnosis.—*Pirata zelotes* is most closely related to *P. piraticus* and in Michigan occurs in the same marsh or swamp with it, but they can be distinguished from each other by their patterns on the carapace and the structure of the genitalia. *P. zelotes* has a sub-marginal light band on the carapace, *P. piraticus* a wide marginal light band. The tip of the median apophysis is pointed in *P. piraticus* with the anterior border straight while in *P. zelotes* the tip is not so sharply pointed (Fig. 136) and the anterior border is rounded or convex (Fig. 142). The differences in epigyna can best be determined by studying the illustrations (Figs. 138-139, 145).

Description of holotype.—Carapace 2.8 mm long, 1.9 mm wide, with a distinct sub-marginal light band and the usual tuning-fork pattern. Dorsum of abdomen with light colored hastate mark and white scales forming four pairs of spots and lateral stripes. Ventral surface of body and coxae immaculate, sternum lighter in color than the rest, venter a little darker.

Anterior eye row narrower than median row, somewhat procurved. Anterior median eyes twice as large as laterals; closer to laterals than to each other. Clypeus height equals the diameter of an anterior median eye. Lower margin of the furrow of the chelicerae with three equally spaced teeth which are almost equal in size; the middle tooth is the largest, the median the smallest.

The palpus is similar in structure to that of *P. piraticus*, but differs in that the median apophysis is not as sharply pointed as it is in *P. piraticus*. Legs 4123, femora with faint annulae.

	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
Palpus	1.02	0.48	0.63		0.83	2.96
Leg I	2.13	0.97	1.62	2.10	0.90	7.72
Leg II	1.90	0.83	1.38	1.78	0.80	6.69
Leg III	1.75	0.75	1.20	1.75	0.75	6.20
Leg IV	2.45	0.93	2.05	2.80	1.05	9.28

Description of female allotype.—Carapace 3.3 mm long, 2.3 mm wide, with a distinct submarginal light band and the usual tuning-fork pattern. Dorsum with light hastate mark and white scales forming indistinct paired spots. Venter and epigastric region unmarked, lighter than the sides of the abdomen. Sternum with heavily sclerotized rim and lightly pigmented each side of the light colored center. Labium much darker than endites.

Eye arrangement similar to that of the male. Lower margin of the furrow of the left chelicera with three, almost equal teeth; right chelicera with four teeth.

Legs 4123, femora with faint annulae.

	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
Palpus	1.13	0.58	0.67		0.85	3.23
Leg I	2.30	1.07	1.67	1.80	0.80	7.64
Leg II	2.13	1.00	1.43	1.68	0.78	7.02
Leg III	2.05	0.95	1.38	1.75	0.80	6.93
Leg IV	2.75	1.10	2.30	3.10	1.10	10.35

Variation.—The number of cheliceral teeth varies from three on the left to four on the right in the allotype. This species is fairly uniform in size throughout its range. One female from Ontario has a very flat and wide carapace (2.50 mm long, 2.25 mm wide). We have also seen this characteristic in *P. piraticus* from the western United States.

Distribution.—We have examined specimens from Michigan, Illinois, Massachusetts and Ontario, Canada.

Specimens examined.—Canada: *Ontario*: Cordova Mines nr. Marmora, 12 July 62, J. H. Redner, female (A.M.N.H.). United States: *Illinois*: Lake Co., Volo, bog, June 8, 1941, D. C. Lowrie, female (D.C.L.); Volo bog, V-16-36, D. C. Lowrie, 1 male, 7 penultimate males, 3 penultimate females (D.C.L.); *Massachusetts*: Middlesex Co., Lexington, V-29-26, P.J.D., 1 male, 2 females (M.C.Z.); *Michigan*: Kalamazoo Co., Gull Lake Biol. Sta., 14-22 July 65, T. F. Hlavac, male (H.K.W.); Livingston Co., E. S. George Reserve, E-17, VI-26-51, H. K.W. 1430, female (H.K.W.); M-28, VII-14-54, H.K.W. 1788A, 1 female, 1 imm female (H.K.W.); M-28, VII-15-54, H.K.W. 1789 H, 4 males, 4 females (holotype and allotype, A.M.N.H.; paratypes, H.K.W.); M-28, VII-19-54, H.K.W. 1796 H, 2 females, 1 imm (H.K.W.); *Wisconsin*: Dane Co., Madison, 29 May 1957, Dunn's Marsh, J.L.K., female (H.K.W.).

Life history.—Very little is known about this species. One male was collected in Massachusetts on May 29, 1926, by P.J.D. (Darlington) and identified as *P. insularis* by Mr. Emerton or Miss Bryant, and as *P. piratica* by Miss Exline in 1965. D. C. Lowrie collected one male, seven penultimate males, and three penultimate females in Volo, Illinois, on May 16, 1936. They were in a vial with *P. piraticus*. Wallace collected the E. S. George Reserve in Michigan during June, July and August in 1951, 1954 and 1957. He got one female on June 26, 1951. All the other males and females and one sac were collected in July. It would appear to be a species that matures in mid-summer.

Ecology.—All of the specimens we have examined were collected in swamps or marshes. Wallace collected *P. zelotes*, *P. piraticus*, *P. insularis* and *P. aspirans* from Stone-

Ring Marsh on the E. S. George Reserve in a standing-water zone. This zone had clumps of willow (*Salix amygdaloides*), pure stands of spike rush (*Eleocharis obtusa*) and pure stands of *Dulichium arundinacium*. There were also present several species of *Carex*, *Scirpus*, and *Sagittaria latifolia*. Wallace also collected *P. minutus* along with *P. zelotes* and *P. piraticus* from the edge of a swamp on the Reserve.

Remarks.—The data on this and several other species of *Pirata* leads one to think that the surface has not been scratched very deeply in the collecting of members of the genus. Thorough collecting will probably extend the ranges of many of our species and turn up additional new ones.

THE *SEDENTARIUS* GROUP

Pirata sedentarius Montgomery

Figs. 143-144, 146-162

Pirata sedentarius Montgomery, 1904, Proc. Acad. Nat. Sci. Philadelphia, 56:312-313, pl. 19, figs. 28-29 (male, female, Austin, Texas; A.M.N.H., examined).

Pirata wacondana Scheffer, 1904, Entomol. News, 15(8):260, pl. 17, fig. 7 (female, Waconda, Kansas; M.C.Z., examined).

Pirata californica Banks, 1904, Proc. California Acad. Sci., 3(13):356, pl. 39, fig. 13 (female, Mariposa Co., California; type is said to have been destroyed in San Francisco earthquake).

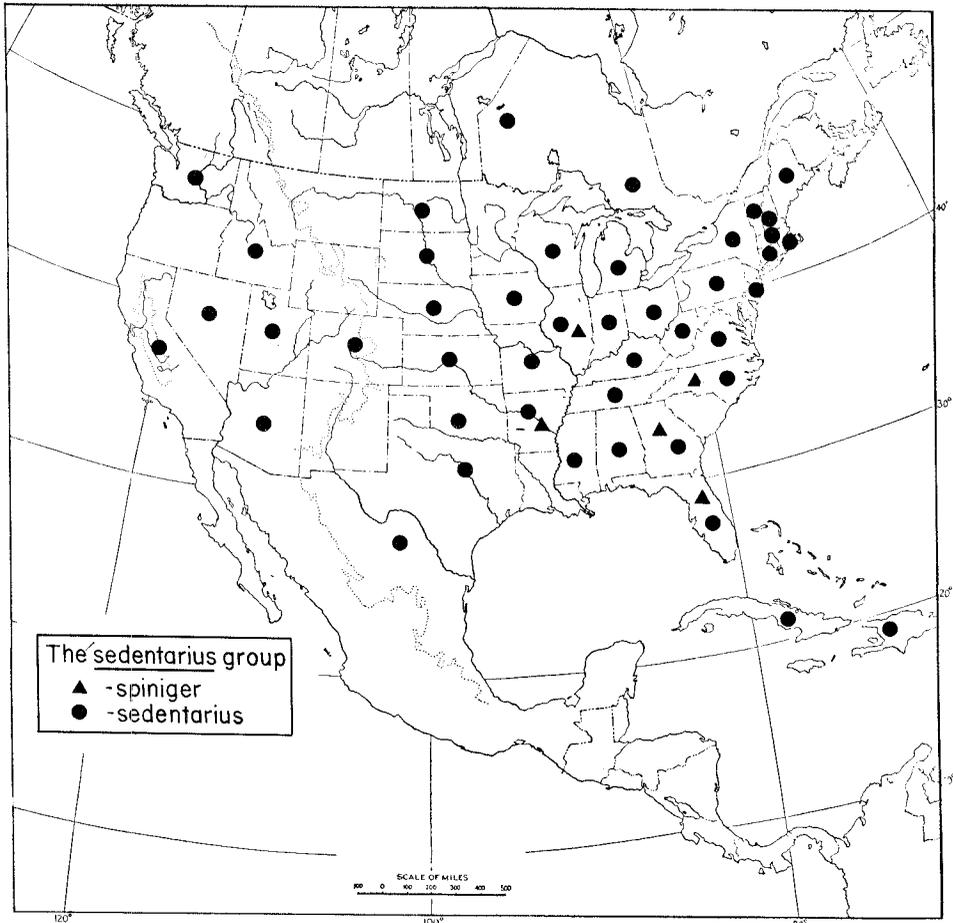
Pirata maculatus Emerton, 1909, Trans. Connecticut Acad. Arts and Sci., 14:209, pl. 6, figs. 10, 10a, 10b (female, Moosehead Lake, Maine; M.C.Z., examined); Kaston, 1938, Canadian Entomol., 70:16, fig. 3; Kaston, 1948, Bull. Connecticut Geol. and Nat. Hist. Survey, 70:311-312, pl. 49 (990-991), pl. 50 (fig. 1007), pl. 51 (fig. 1013). NEW SYNONYMY.

Remarks on types.—The “types” of *P. sedentarius* are in a vial bearing A.M.N.H. red holotype and allotype labels. Their carapace measurements are: male, 3.2 mm long, 2.4 mm wide; female, 3.0 mm long, 2.2 mm wide.

A female labeled *Pirata wacondana* Scheffer, Waconda, Kans., 23 Aug., N. Banks coll., received from M.C.Z., has a carapace 3.0 mm long by 2.1 mm wide. The ventral spines on tibia I are 2:2:0:0; on metatarsus I are 2:2:2. The anterior eye row is straight, about as wide as the median row; the anterior eyes are about evenly spaced, the anterior medians are about twice the size of the laterals. The posterior median eyes are separated by about one diameter; the clypeus height equals a diameter of an anterior median eye (Fig. 144).

A female labeled “*Pirata maculata* Em. Type. Me. Moosehead Lake, Aug. 7, 1904, J. H. Emerton. ‘Deer Is.’ Dried up, Relaced 1958” was received from the M.C.Z. This specimen matches Emerton’s figures. The carapace is 3.0 mm long, 2.2 mm wide. The anterior eye row is narrower than the median row, is almost straight; the anterior median eyes are larger than the laterals and closer to them than to each other.

Description of male.—From Austin, Texas, July 7, 1946, Don L. Frizzell. Carapace 2.80 mm long, 2.00 mm wide. The body and legs are very light amber color and the legs are conspicuously hirsute. Dorsally there is almost no pigment pattern and ventrally the animal is immaculate.



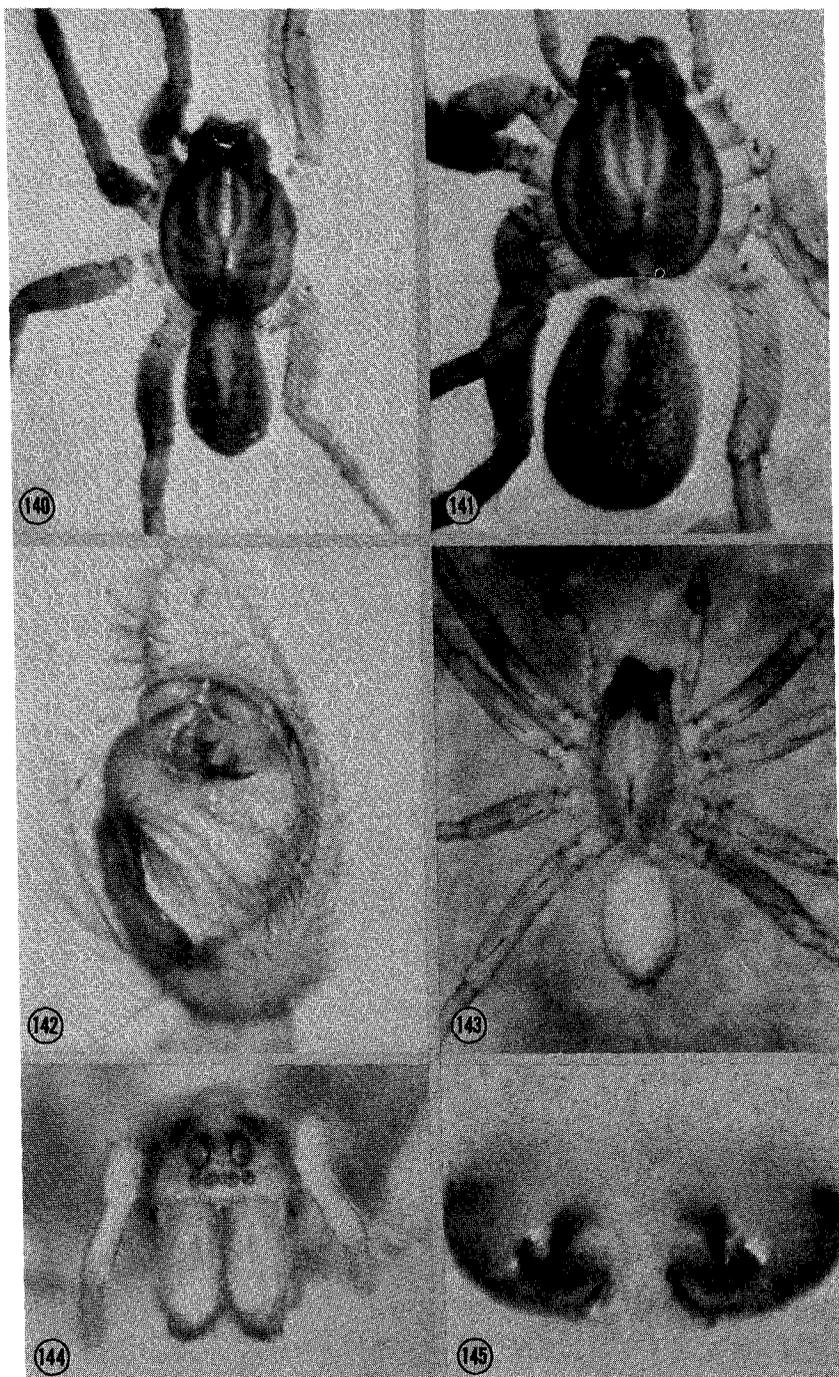
Anterior eye row narrower than the posterior median row, slightly procurved, the anterior median eyes about half again as large as the anterior laterals; these four eyes about evenly spaced. Clypeus height slightly greater than the diameter of an anterior median eye. Lower margin of the furrow of the chelicerae with three unequal teeth, the middle tooth the largest and closer to the lateral than to the median tooth.

Legs 4123, unbanded. Tibia I with four long overlapping, ventral, two lateral and one apical spines. Tibia II with four ventral, two lateral and one apical spines. The proximal ventro-prolateral spine is conspicuously reduced in size.

Description of female.—from Austin, Texas, July 7, 1946. Carapace 3.20 mm long, 2.37 mm wide, with a wide marginal light area and pigmented tuning-fork pattern. Dorsum with light hastate mark lightly bounded by scattered pigment; with four pairs of spots and the sides covered with white scales. Ventral surface immaculate.

Anterior eye row and clypeus similar to the male, lower margin of the furrow of the chelicerae armed as in the male.

Legs 4123, unbanded. Tibia I with two pairs of long, ventral, overlapping spines. Tibia II with four ventral, one prolateral, and one apical spines. The ventral prolateral spines are reduced to bristles.



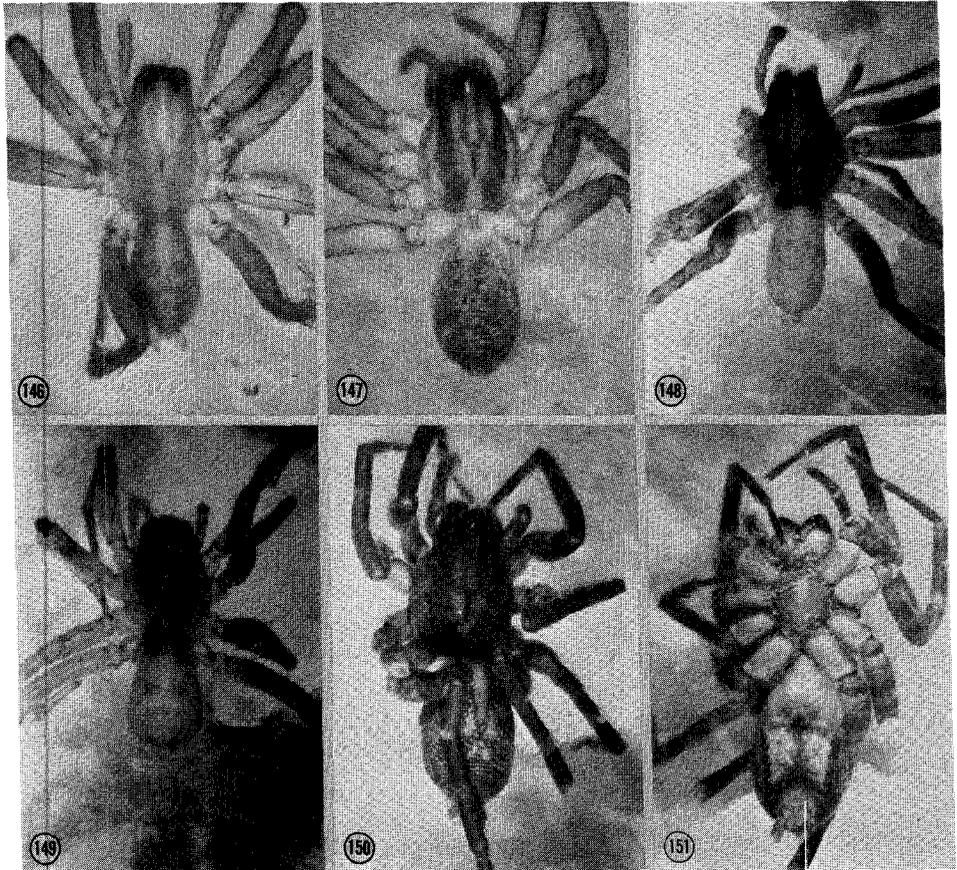
Figs. 140-142.—*P. zelotes*, n. sp.: 140, holotype male, Michigan, E. S. George Reserve; 141, allotype female, Michigan, E. S. George Reserve; 142, palp, Illinois, Volo, V-16-36.
 Fig. 143.—*P. sedentarius*: Male, Cuba, Trinidad Mts., Buenos Aires, 9 May 36.
 Fig. 144.—*P. wacondana*: Type female (= *P. sedentarius*), eyes, Kansas, Wacondana.
 Fig. 145.—*P. zelotes*, n. sp.: Epigynum, Illinois, Lake Co., V-8-41.

Variation.—*Pirata sedentarius* usually has a pattern which, although difficult to put into words, is characteristic for that species; it probably will take a lot of study before one can recognize it from that of other *Pirata*. In Texas this species sometimes has no pattern as a result of lack of pigment.

There is also considerable variation in size but this appears to be a local rather than regional phenomenon. The smallest male measured, from Arkansas, had a carapace 1.7 mm long, the largest from Texas, 3.2 mm long. Females from Arkansas varied in carapace length from 1.7 mm to 3.2 mm. The largest from Mexico, measured 3.3 mm. Females from Virginia ranged from 2.5 to 2.9 mm in carapace length.

Distribution.—Southern Canada, United States, Mexico, Cuba, Haiti.

Specimens examined.—Canada: *Manitoba*: Daphin, June 17, 1963, T.B.K., female (ROM); *Ontario*: York Co., Elmhurst Beach N9 W7, July 15, 1931, T.K., female (ROM); Aug. 15, 1931, T.K., female, egg sac (ROM 526); Toronto, June 4, 1934, E.O., female, egg sac (ROM 4529); *Saskatchewan*: nr. Val Marie, Bank Frenchman River, June 14, 1969, D.J.B., female (D.J.B.); Moose Mtn. Creek, 3W OXBOW, 4 July 1968, D.J.B., 3



Figs. 146-149.—*P. sedentarius*: 146, male, Texas, Austin, 30 July 68, B. Vogel; 147, female, Michigan, Kalamazoo Co., 11-18 Aug 65; 148, Type male, Texas, Austin; 149, Type female, Texas, Austin.

Fig. 150.—*P. maculatus*: Type female (= *P. sedentarius*), Maine, Moosehead Lake.

Fig. 151.—*P. maculatus*: Type female, ventral view.

females, egg sacs (D.J.B.). *Cuba*: Trinidad Mts., Buenos Aires, 9 May 36, 2500-3500 ft., P. J. Darlington, male (M.C.Z.); Soledad, June 29, P. J. Darlington, female (M.C.Z.). *Haiti*: Petion, Wm. M. Mann, female (M.C.Z.); Etangha Chaux, 27 Oct. 34, P. J. Darlington, female (M.C.Z.). *Mexico*: *Coahuila*: Arroya de la Cruz, 18 Dec. 41, H.K.W. 1147, 2 females (H.K.W.); *Nuevo León*: Horsetail Falls, 31 Aug. 68, J.E.C. 347, female (J.E.C.); *Tamaulipas*: Rancho Santa Ana, 24 Dec. 41, H.K.W. 1156, 2 males, 3 females (H.K.W.); *Hidalgo*: 10 mi NE Cardonal, Grutas de Tonoltongo, 1 Aug. 47, J. Reddell, J. Fish, 3 males, 13 females, imm. (A.M.N.H.). *United States*: *Alabama*: Clarke, Lowndes, Mobile, Russell, Tuscaloosa Counties; *Arizona*: Cochise County, White Mts., Virgin Narrows; *Arkansas*: Bradley, Carroll, Conway, Craighead, Franklin, Hempstead, Madison, Perry, Washington Counties; *California*: Inyo, San Bernardino, San Diego Counties; *Colorado*: Douglas, Larimer Counties; *Connecticut*: Fairfield, Litchfield, Middlesex Counties; *Florida*: Alachua, Dade, Henry, Highlands, Lake, Levy, Liberty, Marion, Pinellas, St. Johns Counties; *Georgia*: Baker, Macon, Thomas Counties; *Idaho*: 10 mi. S. Swan Valley, 7-6-35, W.I., female (A.M.N.H.); *Illinois*: Cook, Jackson, Jo Davies, Lee, Livingston, Macoupin, Morgan, Peoria, Pope, Union Counties; *Indiana*: Turkey Run, 28 May 32, D.C.L., male, female (D.C.L.); *Iowa*: Cerro Gordo, Washington Counties; De Witt, 26 June 10, R.V.C., 3 females (A.M.N.H.); *Kansas*: Riley County; *Kentucky*: Brewthitt, Edmonson, Powell Counties; *Maine*: Moosehead Lake, 7-VIII-1904, J.H.E., immatures (M.C.Z.); *Massachusetts*: Franklin, Middlesex, Nantucket Counties; *Michigan*: Genesee, Ingham, Kalamazoo Counties; *Mississippi*: Hinds County; *Missouri*: Boone, Crawford, Dent, Jefferson, Johnson, Osage, Phelps, Saint Genevieve, Saline Counties; *Nebraska*: Burwell, Cheyenne, Dawson, Hall Counties; *Nevada*: Clark County; *New Hampshire*: Francoria County; *New Jersey*: Burlington, Morris Counties; *New York*: Columbia, Delaware, Nassau, Ontario, Rensselaer, Tompkins Counties; *North Carolina*: Buncombe, Cartaret, Durham, Macon, Swain, Transylvania, Wake Counties; *North Dakota*: Divide County; *Ohio*: Erie, Wayne Counties; *Oklahoma*: Delaware, Marshall, Wayne Counties; *Oregon*: Baker County; *Pennsylvania*: Adams, Allegheny, Fayette, Potter Counties; *Rhode Island*: Washington County; *South Dakota*: Camp Judson; *Tennessee*: Roane, White Counties; *Texas*: Dallas, Hays, Hidalgo, Kerr, McClennan, Travis, Uvalde Counties; *Utah*: Cache, Grand, Millard, Salt Lake, Utah Counties; *Vermont*: Mt. Mansfield; *Virginia*: Giles, Powell, Rappahannock, Shenandoah, Smyth Counties; *Washington*: Pierce County; *West Virginia*: Ohio, Pocahontas, Summers Counties; *Wisconsin*: Eau Claire, Rock Counties.

Life history.—The data on the collection of adults appears to reflect the monthly activity of collectors rather than the life history of this species. We have recorded males and females from Mexico only in August and December. In Florida it looks like two broods a year. We have adult males and females from January through June with egg sacs in April and young in June. July, August and September are a blank. In October we have adult males and females with egg sacs.

Most of the collections in the southeastern United States are from June, July and August, but we have females from every month but November, December and February and males from February through September. We have examined egg sacs from April through August.

Maturity appears to occur a little later in the northeastern United States. We have one male from March, Males from May through August and one in November, females from May through November. We have egg cases from June through October.

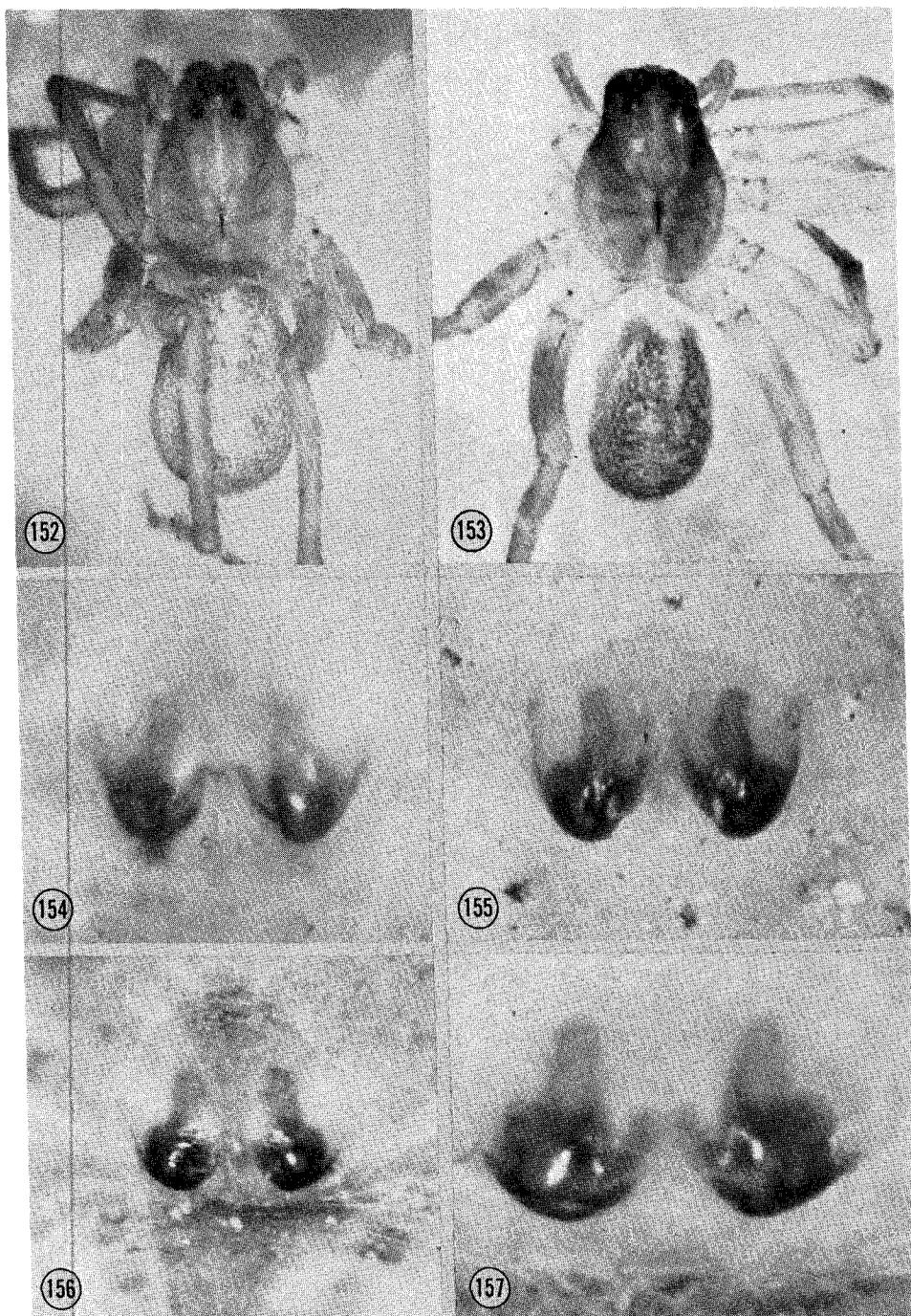


Fig. 152.—*P. wacondana*: Type female (= *P. sedentarius*).

Figs. 153-155.—*P. sedentarius*: 153, female, Hayti, Petion; 154, epigynum, Arkansas, Washington Co.; 155, type female, epigynum, Texas, Austin.

Fig. 156.—*P. maculatus*: Type female (= *P. sedentarius*), epigynum.

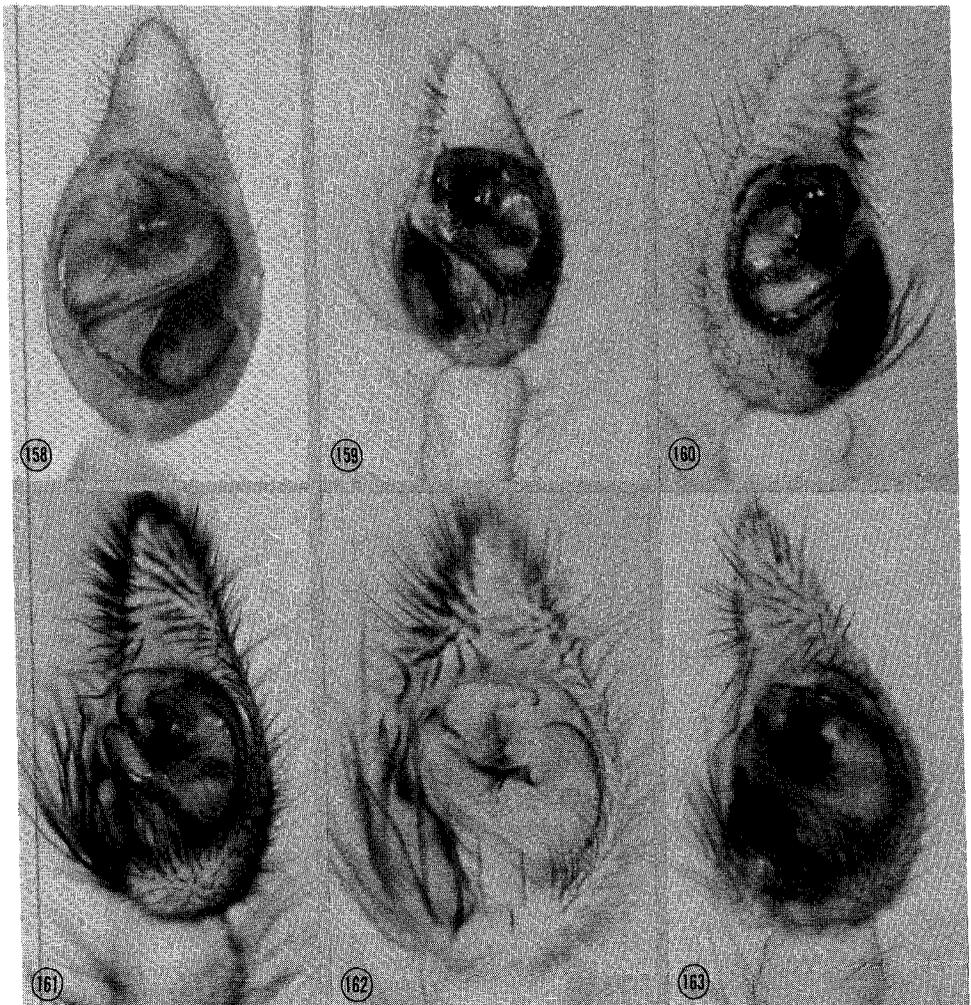
Fig. 157.—*P. wacondana*: Type female (= *P. sedentarius*), epigynum.

The data from the western United States are very similar to the southeast. Males are recorded from March through September and females from March through November and one in January. Egg cases occur from April through August.

The data from Canada are scanty. We have females with egg sacs from June, July and August, but no males.

Ecology.—*Pirata sedentarius* is collected usually in the vicinity of water. Wallace collected it in Mexico under rocks in a dry stream bed. Other collectors have also recorded it from similar situations. In Florida it is usually found in hyacinth mats, around cypress bays in flatwoods, and around ponds. It has also been recorded from *Neofiber* burrows.

In Arkansas it has been collected near a grassy lake, under rocks, near streams, and at night on Odell Mountain in an open oak-hickory woods. In Georgia it was collected on the surface film of a mossy pond; in Illinois from a rocky stream bank; from a salt marsh



Figs. 158-162.—*P. sedentarius*: 158, type male, palpus, Texas, Austin; 159, palp, Georgia, Baker Co.; 160, palpus, Cuba, Trinidad Mts.; 161, palpus, Arkansas, Washington Co.; 162, palpus, Tennessee, Kingston.

Fig. 163.—*P. spiniger*: Palpus, Florida, Alachua Co.

in Massachusetts; in the vicinity of a spring in Missouri; near a river in Nebraska; on the shore of Utah Lake.

Remarks.—The relative length of the palpal tibia has been cited as distinguishing *P. sedentarius* from *P. maculatus*, being twice as long as thick in the latter and only one and one-half times as long in the former. *P. maculatus* is usually considered to occur in the northeastern U.S. and *P. sedentarius* in the south. These two cannot be distinguished by this character in the specimens I have examined.

The palpal tibia is more than twice as long as thick in every female that I have measured from Vermont to Mexico and every male measured from Georgia, Florida, Alabama, Texas, Oklahoma and Mexico have palpal tibia at least twice as long as thick. Males from Arkansas vary in this character, most being slightly less than twice as long as thick. This condition also varies in males from Pennsylvania; in one vial I found two males with the proportions 31/19 and 40/20. Two other males from Pennsylvania had proportions of 32/19 and 35/22.

The only population we have found with palpal tibia consistently shorter than twice the thickness is from Giles Co., Virginia, where every male measured (9) had palpal tibiae less than twice as long as thick.

We have never found a male with palpal tibia as short as one and one-half times its thickness.

Preserved *P. sedentarius* that we have examined vary in coloration from lightly pigmented specimens with no pattern and unbanded legs through specimens with a typical *Pirata* pattern and banded legs to specimens with a black carapace. Also, the marginal pigment is not continuous so that the animal appears to have a wide marginal light band with flecks of pigment near the rim of the carapace.

Pirata spiniger (Simon)

Figs. 163-168

Sosilaus spiniger Simon, 1898, Histoire naturelle des Araignees, 2(2):350, fig. 340; Chamberlin, 1908, Proc. Acad. Nat. Sci. Philadelphia, 60:298, pl. 12, figs. 5-6; Comstock, 1912, The spider book, New York, p. 649; Hubbell and Goff, 1939, Proc. Florida Acad. Sci., 4:152.

Description of male.—From Melbourne, Florida, 1/9/55. Einem: Carapace 2.20 mm long, 1.57 mm wide, without markings. Legs and carapace from above amber in color, dorsum of abdomen light yellow, almost white in color. Ventrally there is no pattern, the sternum and venter slightly lighter in color than the legs. The muscles in the cephalothorax are faintly visible from above giving the carapace a faint striated appearance.

The anterior eye row is wider than the posterior median row, and is straight. The anterior median eyes are twice as large as the anterior laterals and the same size as the posterior laterals; and are closer to each other than to the laterals. The clypeus height equals the diameter of an anterior median eye. Lower margin of the furrow of the chelicerae with three, almost equally spaced teeth, the median tooth the largest, the other two similar in size.

Legs 4123, unbanded. Tibia I with twelve long, overlapping ventrolateral, two prolateral, and retrolateral spines. Metatarsus I with nine ventrolateral and lateral spines, the distal pair far removed from the apical position. Tibia II with 12 long overlapping,

ventrolateral, two prolateral, and two retrolateral spines. Metatarsus II with nine ventrolateral and lateral spines. Palpus very similar to that of *P. sedentarius*.

Description of female.—With same data as male. Carapace 2.25 mm long, 1.68 mm wide, immaculate. Female resembles the male in lacking pigmented pattern, in coloration, in eye arrangement, and cheliceral dentition. The epigynum appears to be identical with that of *P. sedentarius* (Fig. 168).

Legs 4123. Tibia I with 11 ventrolateral, three prolateral, one retrolateral, and one dorsal spine. The ventrolateral spines are long and overlapping. Tibia II with ten long, overlapping ventrolateral spines; and two prolateral, two retrolateral and one dorsal spine.

Variation.—*P. spiniger* does not vary much in size and usually is quite light in color with no pigment. However, freshly collected specimens may show traces of pigmentation.

C. C. Goff near Dade City, Florida, collected four adult specimens from the same *Geomys* tunnel in which all of the eyes were the same size as the anterior laterals.

Distribution.—Southeastern United States.

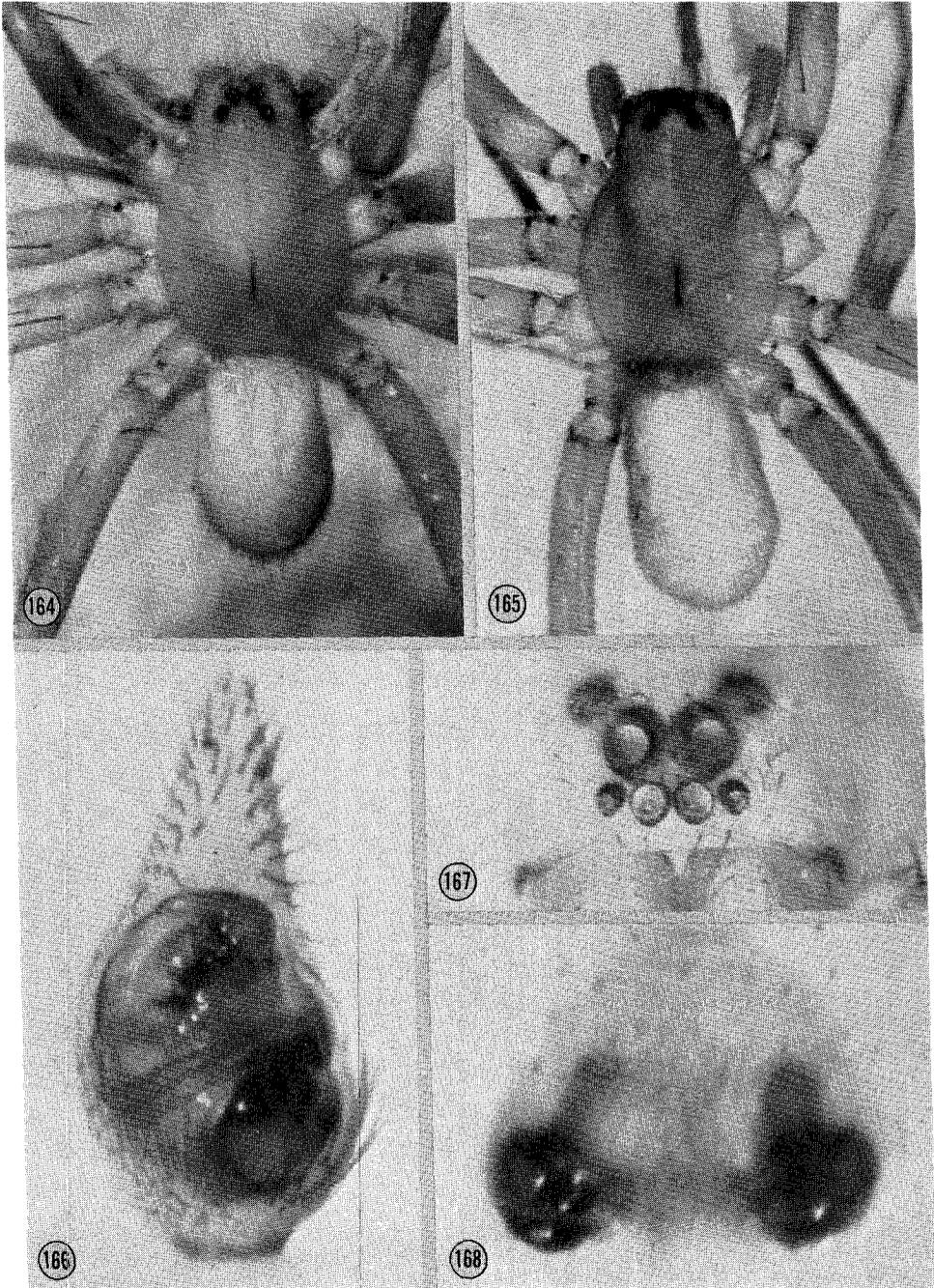
Specimens examined.—*Arkansas*: Craighead Co., Jonesboro, XI.10.66, pitfall, oak woods, Exline, female (Exline); *Florida*: Alachua, Brevard, Hillsborough, Lake, Leon, Nassau, Putnam Counties; *Illinois*: Jackson Co., S. of Carbondale, X.20.68, Union Hills, Adams, male, 2 imms. (J.A.B.); *North Carolina*: Durham Co., VII.16.63, Gate 3 Duke Forest, N. from 751, mixed pine and hardwood, pitfall, Berry, male (J.A.B.); VII.1.63, Chapel Hill Blvd. E. of county line, Russel Farm, broomsedge field, pitfall, Berry, male (J.A.B.).

Life history.—In Florida and Georgia adults of *P. spiniger* will probably be found throughout the year. Most of our records of adults in Florida are from May, June, July and August, but we have both sexes from January and females from September. From Georgia we have records of both sexes from February and April and a female with egg sac from May. All of this data reflects the activity of collectors. John Anderson at the University of Florida had a female that made an egg sac on 21 July, five days after mating. He also had young emerge from an egg sac on 8 August. Data from the other states are too meager to be meaningful.

Ecology.—*P. spiniger* was a very rare spider in collections until C. C. Goff demonstrated that it inhabits pocket gopher tunnels (*Geomys*). It had been taken once or twice in gopher turtle burrows. In recent years it has been collected in pitfalls in various types of plant associations; by sifting leaf litter in high pine turkey oak by W. M. Barrows at Gainesville, Florida, and on the University of Florida Conservation Reserve, Welaka, Florida; by Wallace in pine flatwoods by raking pine needle litter and shining the exposed areas with a head light. The pine needles were interlaced between the blades of wiregrass clumps so thickly that they formed a sort of roof an inch or two above the ground and it appeared to Wallace that this formed a dark, damp environment not unlike that of a pocket gopher tunnel. From the evidence at hand one is encouraged to think that this is a species that evolved from *P. sedentarius* in a cave environment, that the usual habitat is still cave-like, i.e., *Geomys* tunnels or tortoise borrows, but that it occasionally wanders into dark damp situations such as leaf litter, or under stones or boards.

Remarks.—On the basis of the structure of the genitalia *P. spiniger* is more closely related to *P. sedentarius* than *P. sedentarius* is to any other *Pirata* known to us. These two species are very similar in size and when pigment is present in *P. spiniger* its pattern is like that of *P. sedentarius*. The anterior eye row is wider than the posterior median row in *P. spiniger* (narrower in *P. sedentarius*) and the spining of the legs is unique, but to us this species is very closely related to *P. sedentarius*. It appears to be a species developed in

cavernicolous isolation, perhaps during periods of glaciation, where it acquired some of the modifications, i.e., reduced eyes, reduced pigment, spine and sense organ modifications, not unusual in cave-dwelling species.



Figs. 164-168.—*P. spiniger*: 164, male, Florida, Melbourne; 165, female, Florida, Melbourne; 166, palpus, Florida, Leon Co.; 167, male, eyes, Florida, Melbourne; 168, epigynum, Florida, Alachua Co.

SPECIES OF UNCERTAIN RELATIONSHIP

Pirata alachuus Gertsch and Wallace

Figs. 169-174

Pirata alachua Gertsch and Wallace, 1935, Amer. Mus. Nov., 794:9, figs. 34, 36 (types: male, female, Alachua Co., Florida, A.M.N.H., examined).

Etymology.—This species was named for the county in which the type specimens were found.

Description.—A small spider, the carapace usually less than 2.0 mm long in males and less than 2.4 mm in females, with a wide marginal light band on the carapace, otherwise resembling *P. sedentarius* in pattern, and indistinct annulae on legs. Anterior eye row slightly procurved, slightly narrower than posterior median eye row. Epigynum with posteriorly rounded lobes about one-half diameter apart. Median apophysis of palp unique, truncated anteriorly so that it has somewhat the shape of a tomahawk or hatchet. The distal (anterior) end of the median apophysis is sometimes transparent and difficult to see.

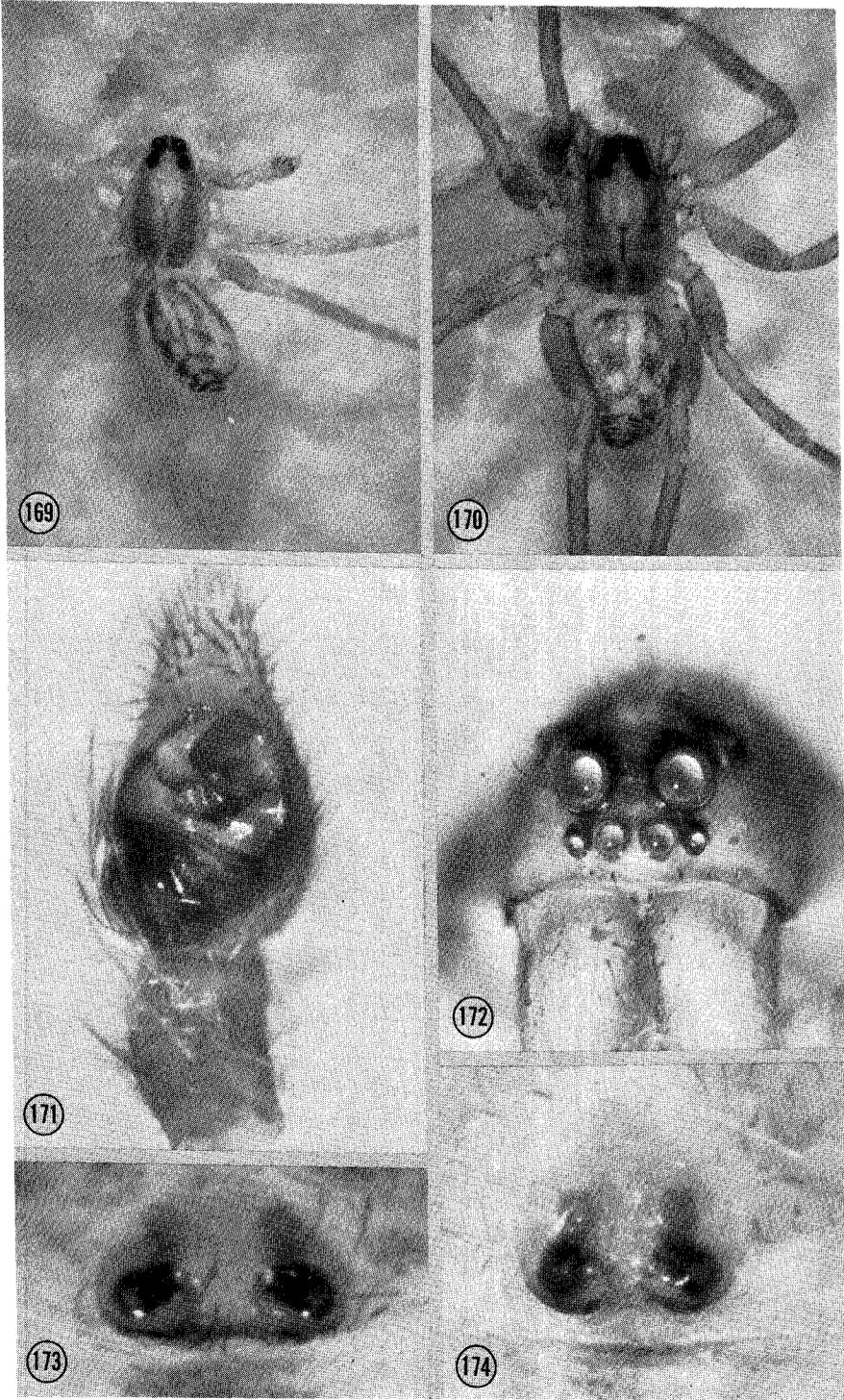
Distribution.—*Alabama*: Blount, Houston, Macon Counties; *Arkansas*: Bradley, Conway, Craighead, Hempstead, Mississippi Counties; *Florida*: Alachua, Columbia, Gadsden, Highland, Jackson, Lake, Leon, Liberty, Marion, Nassau, Orange, Pasco, Putnam, Sumter Counties; *Georgia*: Baker, Burke, Walker, Ware Counties; *Illinois*: Jackson, Pope, Union Counties; *Indiana*: La Porte County, Williamsburg; *Maryland*: Montgomery County; *Mississippi*: Wilkinson County, Camp Shelby; *Missouri*: Crawford, Johnson, Phelps, Ripley, Stoddard Counties; *North Carolina*: Durham, Lincoln Counties; *Ohio*: Warren County; *South Carolina*: Aiken County; *Virginia*: Albermarle, Nasomond, Norfolk Counties.

In addition we have examined females from New Jersey, Tennessee and Texas which resemble *P. alachuus*, but males are needed from these states to confirm them as state records. The female from New Jersey resembles *P. sedentarius* in size and appearance, but the epigynum is very similar to *P. alachuus* from Florida.

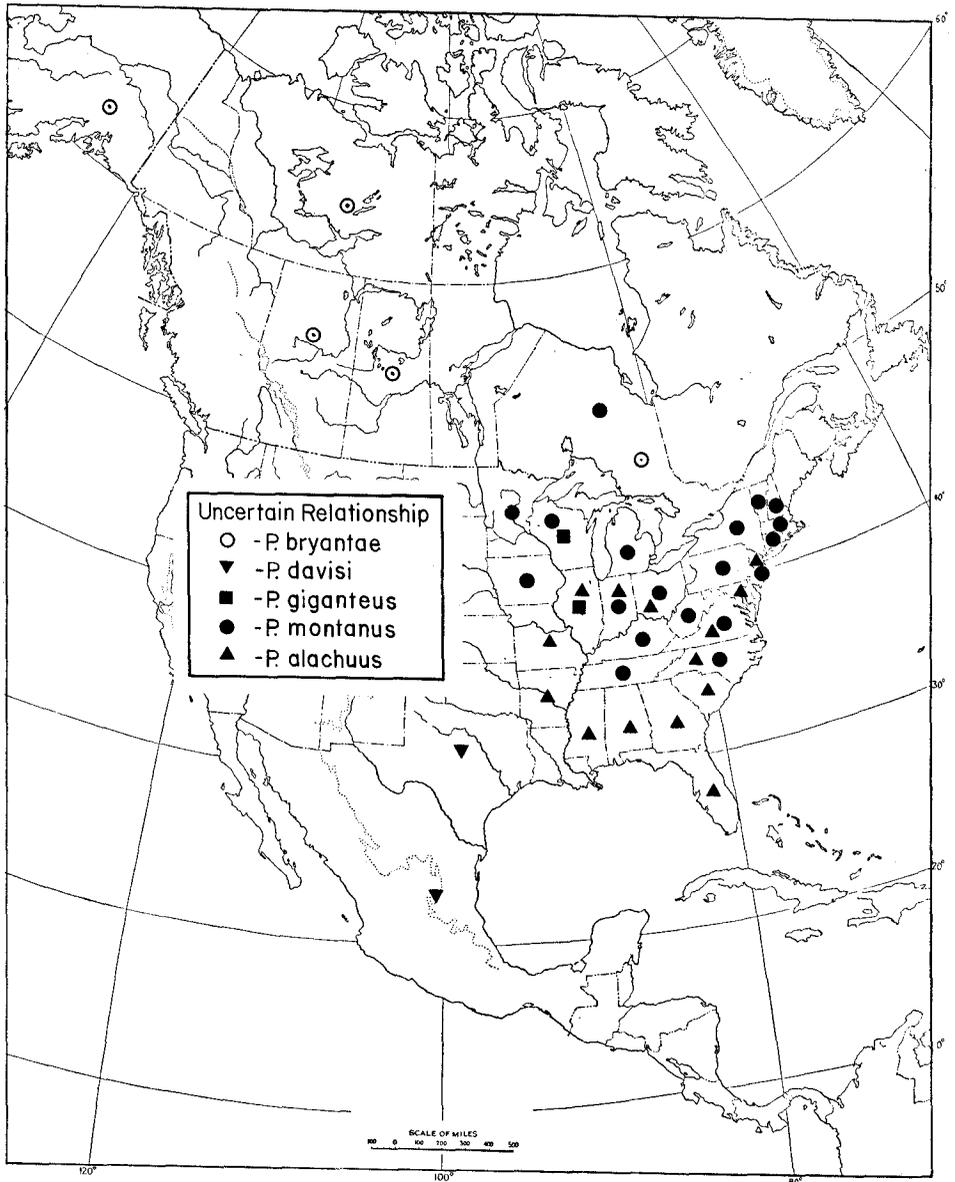
Life history.—*P. alachuus* is a summer spider; 95 percent of all specimens collected come from April, May, June and July. In the northeastern part of the U.S. males have not been taken earlier than May or later than July with 90 percent from May and June. In Florida adult males begin to appear in March with the season of maturity moving northward, gradually, with the isotherm. In the southern states males may be taken in August and we have a record of one male from Florida in December. No other adults are known from Florida during September, October, November and January. Three females have been taken in February.

Records of egg sacs.—Florida: April, May, June; United States: May through September with one record in January from the west. Egg sacs measure from 2.0 to 2.8 mm in diameter, and are slightly flattened dorsoventrally when first made, becoming round as the young hatch.

Ecology.—*P. alachuus* is not as riparious as most *Pirata*. It is not confined to the margins of ponds and streams and throughout its range may be found in leaf litter of mesic woods, in cultivated fields or sometimes in exposed areas. In Arkansas it has been taken in pitfall traps in pine-oak woods; in Missouri from traps in open woods, ground litter and along streams and ponds (H. Peck). Specimens from Highlands State Park,



Figs. 169-174.—*P. alachuus*: 169, holotype male, Florida, Alachua Co.; 170, allotype female, Florida, Alachua Co.; 171, palp, Florida, Pasco Co.; 172, eyes, Florida, Jackson Co.; 173, epigynum, North Carolina, Durham Co.; 174, epigynum, Florida, Alachua Co.



Florida, were collected by A. R. Brady from under leaves and logs, and by sifting leaf litter. The following statements by collectors will give some idea of the variety of situations in which this species occurs. Arkansas: cotton field pitfall trap, Grassy Lake; Florida: under leaves and logs, wet area, edge of pond, pitfall under magnolia, woodyard hammock, pitfall under live oak in lawn, pitfall in hickory sweetgum hammock, berlese funnel, magnolia litter, leaf mould in dried up cypress-hardwood, leaf mould in creek floodplain, cypress bay-pine flatwoods margin, wet sandy banks of stream, black mucky lake shore; Illinois: leaf mould, woods, spring area, pitfall, wooded lowland, floodplain; Missouri: moist shady leaf mould, lake margin, trap-open woods, on face of sandstone cliff; North Carolina: bottomland pine with hardwood-pitfall; Virginia: Dismal swamp, reservoir; Maryland: swampy area.

Pirata bryantae Kurata

Figs. 175-180

Pirata bryantae Kurata, 1944, Occ. Pap. Roy. Ontario Mus. Zool., 8:3-4, pl. 2, figs. 1-4 (female, Favourable Lake, Ontario, R.O.M.Z. 7073, examined).

Diagnosis.—*Pirata bryantae* is a small, dark spider that looks more like a dark *Arctosa* than a *Pirata*. The carapace is dark in both sexes and lacks the tuning-fork pattern. The epigynum (Fig. 180) also resembles that of some *Arctosa*, but the palpus (Fig. 177) has a median apophysis that is somewhat like those of *P. minutus* or *P. sedentarius*.

Description of holotype.—The holotype, a female, has a carapace 2.25 mm long and 1.55 mm wide. It is now dark and faded, almost black, so it no longer fits Kurata's description (Fig. 175). A hastate mark is visible on the abdomen and the legs show some signs of banding.

Description of female.—From Spring Creek Basin, Alberta. Carapace 2.30 mm long, 1.50 mm wide; color and markings of body and legs similar to the male. Anterior eye row much narrower than the posterior median row, strongly procurved, anterior median eyes larger than the anterior laterals, closer to the anterior laterals than to each other. Lower margin of the furrow of the chelicerae armed with three teeth, middle tooth the largest, the tooth nearest the base of the fang the smallest.

Legs 4123.

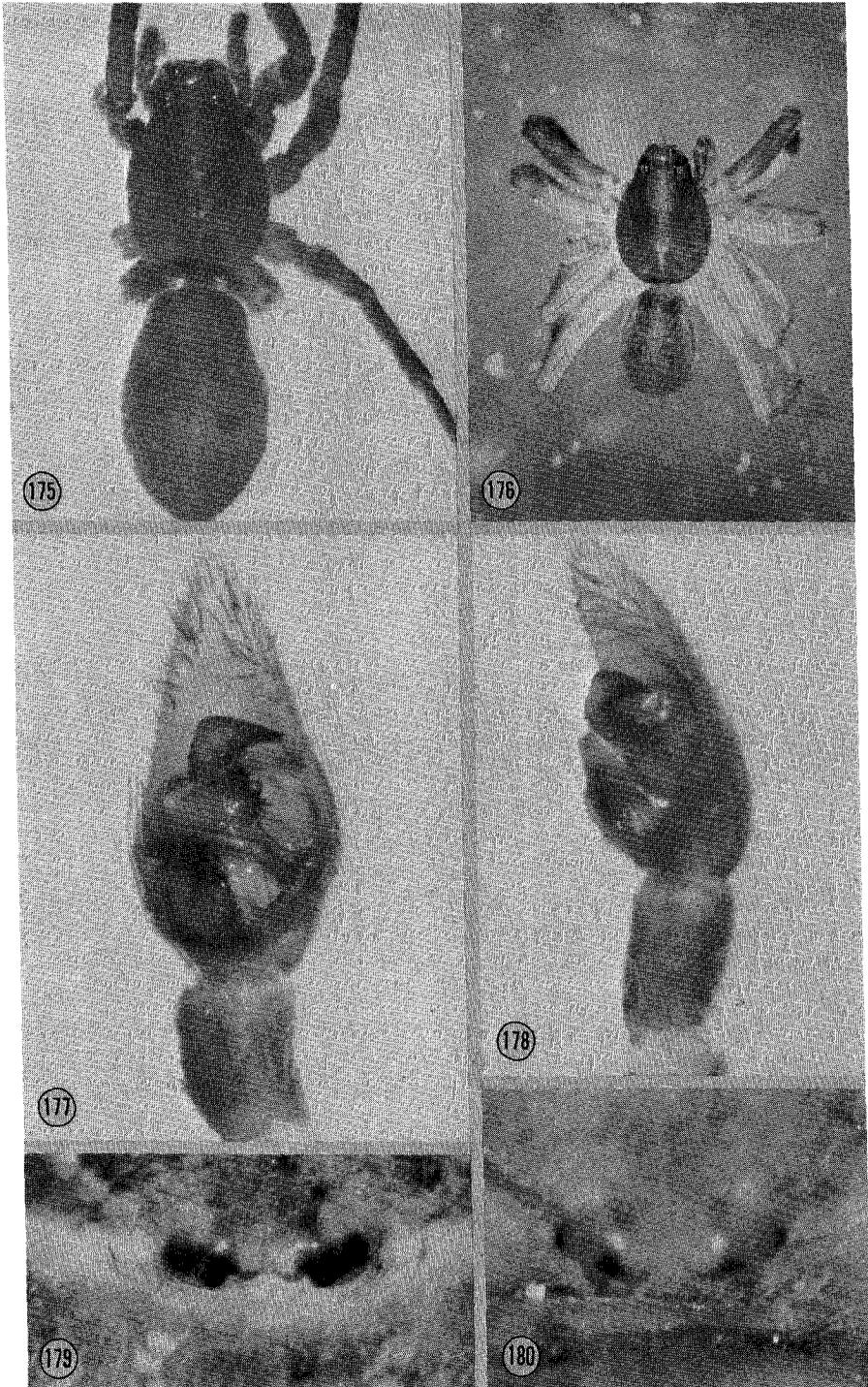
Description of male.—From Spring Creek Basin, Alberta, ca. 53° 30' N, 117° 40' W, 12-VI-1969. Carapace 2.20 mm long, 1.65 mm wide, almost black, shining with a sparse covering of white 'hairs' over the head region and around the lateral edge. Dorsum also almost black, with a sparse covering of short white 'hairs' which appear to be denser over the brown hastate mark; a pair of light colored spots behind the middle of the hastate mark and two pairs posterior to them. Sternum, epigastric region and venter almost black; anterior and posterior spinnerets almost black, posteriors twice as long as the anteriors. Labium and endites dark proximally, becoming yellow distally; coxae I dusky beneath, coxae II, III and IV yellow. Lower margin of the furrow of the chelicerae with three equally spaced teeth, middle tooth slightly larger than the medial, the tooth next to the base of the fang the smallest. Anterior eye row considerably narrower than the posterior median row, distinctly procurved; the anterior median eyes are larger than the anterior laterals and are nearer to them than to each other.

All palpal segments, except the tip of the cymbium, and femora, patellae and tibiae I and II dark like the carapace; femora I and II with a blue iridescence; all other leg segments lighter, basically yellow with dusky annulae.

Legs 4123.

	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
Palpus	0.65	0.34	0.32		0.72	2.03
Leg I	1.38	0.68	1.13	1.20	0.80	5.19
Leg II	1.35	0.62	1.00	1.12	0.75	4.84
Leg III	1.33	0.55	0.93	1.25	0.70	4.76
Leg IV	1.85	0.70	1.53	2.03	0.97	7.08

Description of two males.—From Lady Lake, Saskatchewan. Carapace and dorsum black; dorsal head region with grey 'hairs.' Carapaces 2.05 mm long, 1.35 mm wide and 2.05 mm long, 1.55 mm wide. Anterior eye row narrower than the posterior median row, procurved. Sternum and venter black. All coxae and trochanters yellow ventrally; palpal



Figs. 175-180.—*P. bryantae*: 175, holotype female, Ontario; 176, male, Saskatchewan, Lady Lake; 177-178, palpus, Saskatchewan, Lady Lake; 179, epigynum, Canada, Alta; 180, holotype, epigynum, Ontario.

segments black, tip of cymbium light; femur I black beneath; femur II splotchy, femora III and IV yellow; patellae and tibia I and II black beneath, all other segments light; femur II dark distally, otherwise leg pattern is the same above and below.

Distribution.—Known only from Alaska and Canada.

Specimens examined.—*Alaska*: Fairbanks, July 68, John V. Mathews, female (R.E.L.). *Canada: Alberta*: ca 53° 30' N, 117° 40' W, D. W. Chomyn, VI-12-69, site I quad 1-6, male (R.E.L.), VI-12-69, site I, quad 1-2, female (R.E.L.), VI-5-69, site I quad 2-1, female (R.E.L.), VI-12-69, site 1 quad 2-2, 2 females (H.K.W.), VI-5-69, site 1 quad 1-6, male, 2 females (R.E.L.), VI-12-69, site 20 quad 20, male (R.E.L.), VI-5-69, site 1 quad 1-3, female (R.E.L.), VI-5-69, site 1 quad 2-10, female (R.E.L.), VI-12-69, site 1 quad 2-4, 2 males (H.K.W.); *Northwest Territory*: Wrigley Pan Trap no. 6, VI-6-12-69, G. E. Shewell, male female (R.E.L.), VI-12-15-69, male (R.E.L.); *Ontario*: Favourable Lake Mine, Lat. 53° N 94° W, June 1938, Morley Neal, female Holotype (R.O.M.Z. 7073); *Saskatchewan*: Lady Lake, June 9, 1969, D. J. Buckle, 2 males (D.J.B.).

Life history.—All the males and females from Canada were collected in June; the single female from Alaska in July.

Ecology.—The only information we have is the following from D. J. Buckle: "Logging trail through black spruce forest, Lady Lake, Saskatchewan, 9 June 1969."

Pirata davis, n. sp.

Figs. 181-186

Holotype.—Male, San Fernando, Tamaulipas, Mexico, Mar. 28, 1936, L. I. Davis (A.M.N.H.).

Allotype.—Female, with same data as holotype (A.M.N.H.).

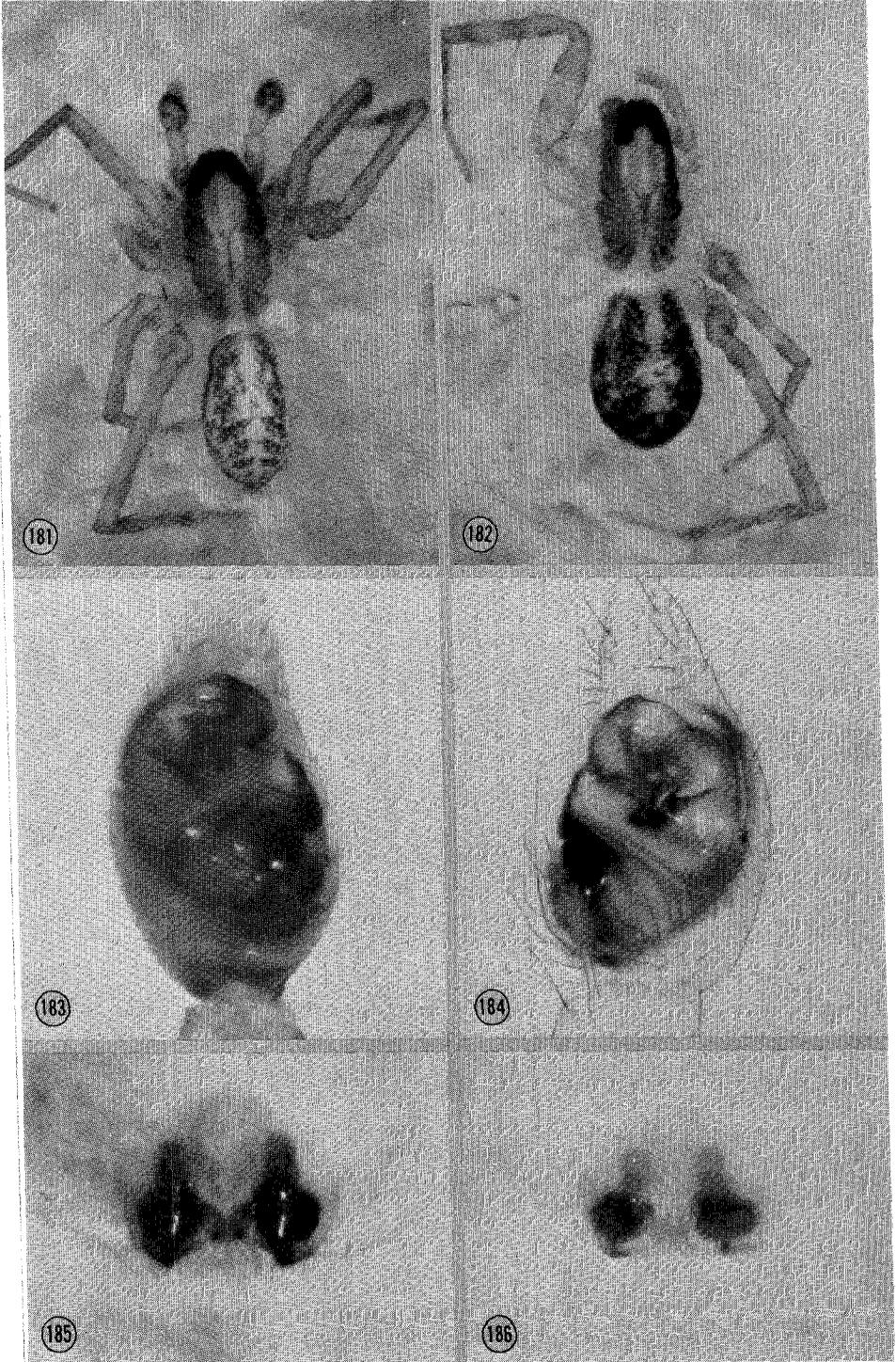
Diagnosis.—*Pirata davis*, n. sp., is very similar in appearance to *P. turrialbicus*, n. sp., and is about the same in size. The epigynum, however, is more on the order of *P. aspirans*. The palpus resembles *P. turrialbicus* somewhat, but the median apophysis is relatively bulkier and the lateral process has a different shape (Figs. 183-184).

Description of holotype.—Carapace 1.72 mm long, 1.22 mm wide with a wide marginal light band and the typical tuning-fork pattern on the head (Fig. 181). Basic color light yellow, lateral margins of carapace without pigmented edge. Ventral surface of body yellow, unpigmented except for a small area in the middle of the venter. Lower margin of the furrow of the chelicerae with three teeth, the middle tooth the largest. Anterior eye row narrower than the posterior median row, procurved; the anterior median eyes are twice as large as the laterals; the anterior eyes are about evenly spaced.

Legs 4123, light yellow in color, without annulae. Tibia I with five long overlapping spines, three prolateral, two retrolateral.

	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
Palpus	0.50	0.25	0.30		0.57	1.62
Leg I	1.25	0.55	1.07	1.17	0.60	4.64
Leg II	1.20	0.55	0.92	1.00	0.55	4.22
Leg III	1.10	0.50	0.80	1.07	0.50	3.97
Leg IV	1.60	0.57	1.37	1.97	0.70	6.21

Description of allotype.—Carapace 1.70 mm long, 1.22 mm wide, with a distinct tuning-fork pattern on the head and a wide marginal light area unmarked with pigment along the lateral edge. Basic color light yellow (Fig. 182). Sternum, labium and coxae



Figs. 181-186.—*P. davisii*, n. sp.: 181, holotype male, Mexico, Tamaulipas; 182, allotype female, Mexico, Tamaulipas; 183, palpus, Texas, Edinburg; 184, holotype, palpus; 185, epigynum, Texas, Edinburg; 186, epigynum, Texas, Bexar Co.

yellow, sternum with faint pigmented spots along lateral edges; venter a little darker with faint pigment in the middle.

Lower margin of the furrow of the chelicerae with 3 teeth, the middle tooth the largest. Anterior eye row narrower than the posterior median row, slightly procurved; anterior median eyes almost twice as large as the anterior laterals; anterior eyes about equally spaced.

Legs 4123, with faint annulae. Tibia I with 4 ventral spines; the two retrolateral spines long, overlapping, the two prolateral much reduced, the proximal one reduced to a bristle.

	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
Palpus	0.55	0.32	0.37		0.50	1.74
Leg I	1.25	0.60	0.92	0.97	0.51	4.25
Leg II						
Leg III	1.20	0.52	0.82	1.02	0.52	4.08
Leg IV	1.62	0.62	1.45	1.77	0.67	6.13

Distribution.—Mexico, Texas.

Additional records.—*Texas*: Edinburg, May 1, 1936, S. Muliak, 1 male, 2 females (A.M.N.H.); Bexar Co., Bullis Hole, female Travis Co., Austin, R.V.C., female (M.C.Z.).

Life history.—Adult males and females have been collected on March 28 and May 1.

Pirata giganteus Gertsch

Figs. 187-191

Pirata giganteus Gertsch, 1934, Amer. Mus. Nov., 693:12-13. (female, Chicago, Illinois, A.M.N.H., examined).

Description of holotype.—A female with the typical tuning-fork mark on the head (Fig. 187). Carapace 3.2 mm long, 2.3 mm wide, sides “with a broad, irregular, marginal light band.” Anterior eye row narrower than the posterior median row, slightly procurved; anterior median eyes closer to the anterior laterals than to each other, less than one diameter apart. Epigynum (Fig. 188).

Distribution.—Illinois, Wisconsin.

Specimens examined.—*Illinois*: nr Chicago, June 13, 1933, W.J.G., 2 female paratypes (A.M.N.H.); Princeton, June 12, 1933, T. H. Hubbell, male (A.M.N.H.); *Wisconsin*: Richland Co., Rt. 60 W of Gotham, June 17, 1949, H. Levi, female (M.C.Z.).

Life history.—All known specimens are from June.

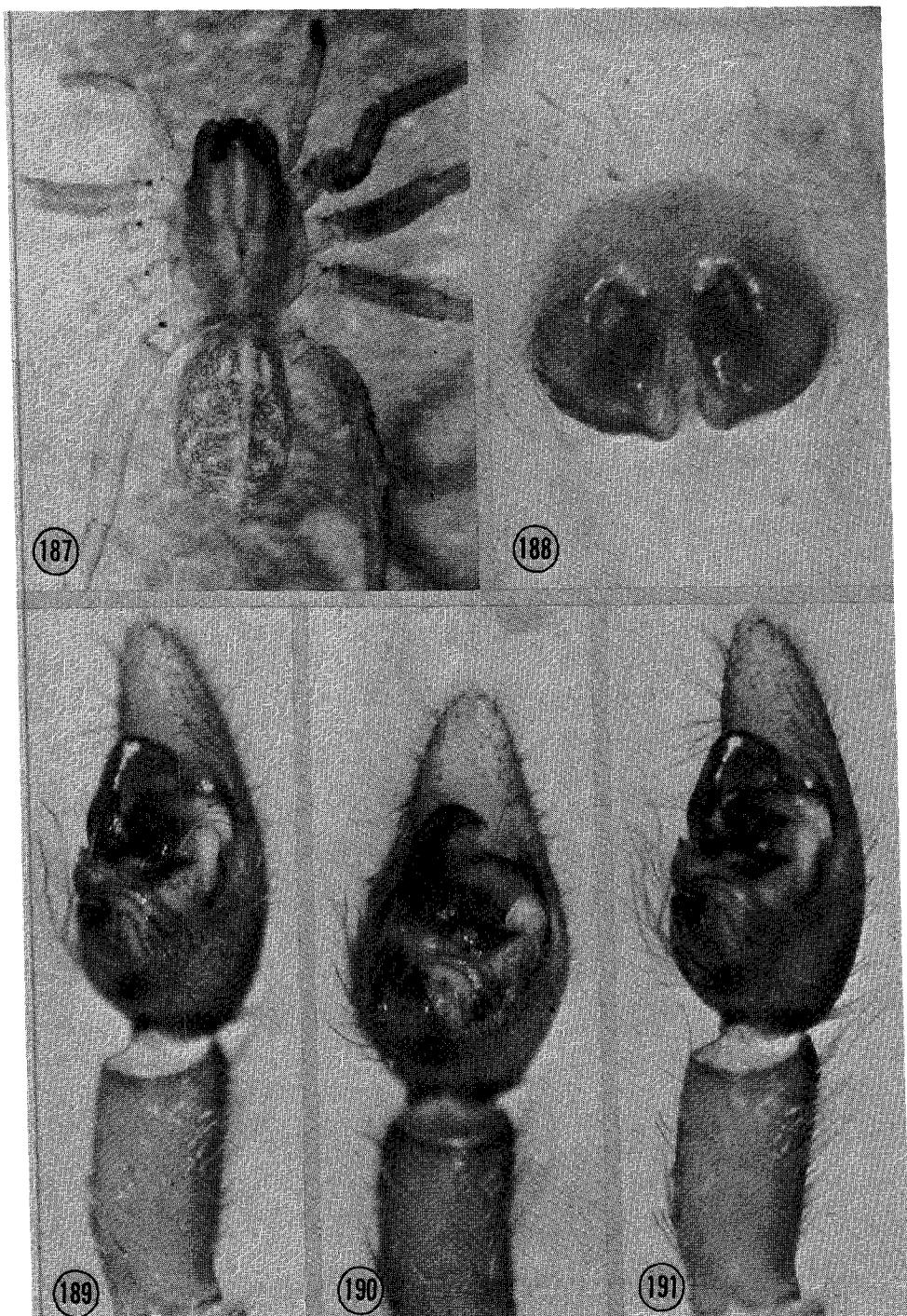
Remarks.—The carapace pattern of the Wisconsin female and the holotype are much like that of *P. sedentarius*. The epigynum resembles to some extent that of *P. hygrophilus* of Europe. The legs of the Wisconsin female show signs of annulae. Our measurements of the carapace of the holotype differ somewhat from Gertsch's; his are 3.0 mm long by 2.12 mm wide. He also describes the anterior eye row as straight, but it looks slightly procurved to us.

Pirata hiteorum, n. sp.

Figs. 192-198

Holotype.—Male, Cove Creek, Washington Co., Arkansas, June 2, 1963, Otis and Maxine Hite (A.M.N.H.).

Allotype.—Female with same data (A.M.N.H.).



Figs. 187-191.—*P. giganteus*: 187, holotype female, Illinois, Chicago; 188, holotype, epigynum; 189-191, palpus, Illinois, Princeton.

Etymology.—Named after the collectors, O. and M. Hite.

Diagnosis.—This small spider somewhat resembles *P. minutus* in appearance; however, the front legs are not dark in the male as they are in *P. minutus*. At first glance the epigynum looks like that of *P. minutus*, but close examination leaves no doubt as to their distinctness; the concave depressions in front of the tips of the lobes of the epigynum of *P. hiteorum* are unique. The palp resembles that of *P. aspirans* most closely, but the anteromedial truncation of the median apophysis (Figs. 194-195) is unique also. However, positioning of the palpus determines the shape of the median apophysis from the viewer's point of view and this palpus must be moved around carefully in order to obtain a satisfactory impression of its structure.

Description of holotype.—A male with basic color yellow or amber with dark pigment producing the typical tuning-fork pattern on the head and a distinct pattern on the dorsum (Fig. 192). Carapace 1.50 mm long, 1.03 mm wide, with a wide marginal light area and pigmented lateral edge. Eye region black. Legs yellow, lightly pigmented; femur I dusky above, palpal segments darker. Face, chelicerae, sternum, epigastric region, and venter all pigmented; venter splotchy. Anterior eye row distinctly narrower than the posterior median row, strongly procurved (Fig. 196). Anterior eyes about equally spaced, anterior median eyes approximately one and one-half times larger than the anterior lateral eyes. Clypeus height equals a diameter of an anterior median eye, slanted posteriorly (receding). Tibia and metatarsus I with three pairs of overlapping ventrolateral spines.

The legs from a male paratype from Cove Creek measure as follows:

	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
Palpus	0.43	0.20	0.24		0.47	1.34
Leg I	1.00	0.50	0.77	0.85	0.48	3.60
Leg II	0.93	0.43	0.70	0.75	0.45	3.26
Leg III	0.82	0.37	0.60	0.80	0.43	3.02
Leg IV	1.23	0.48	1.05	1.30	0.63	4.69

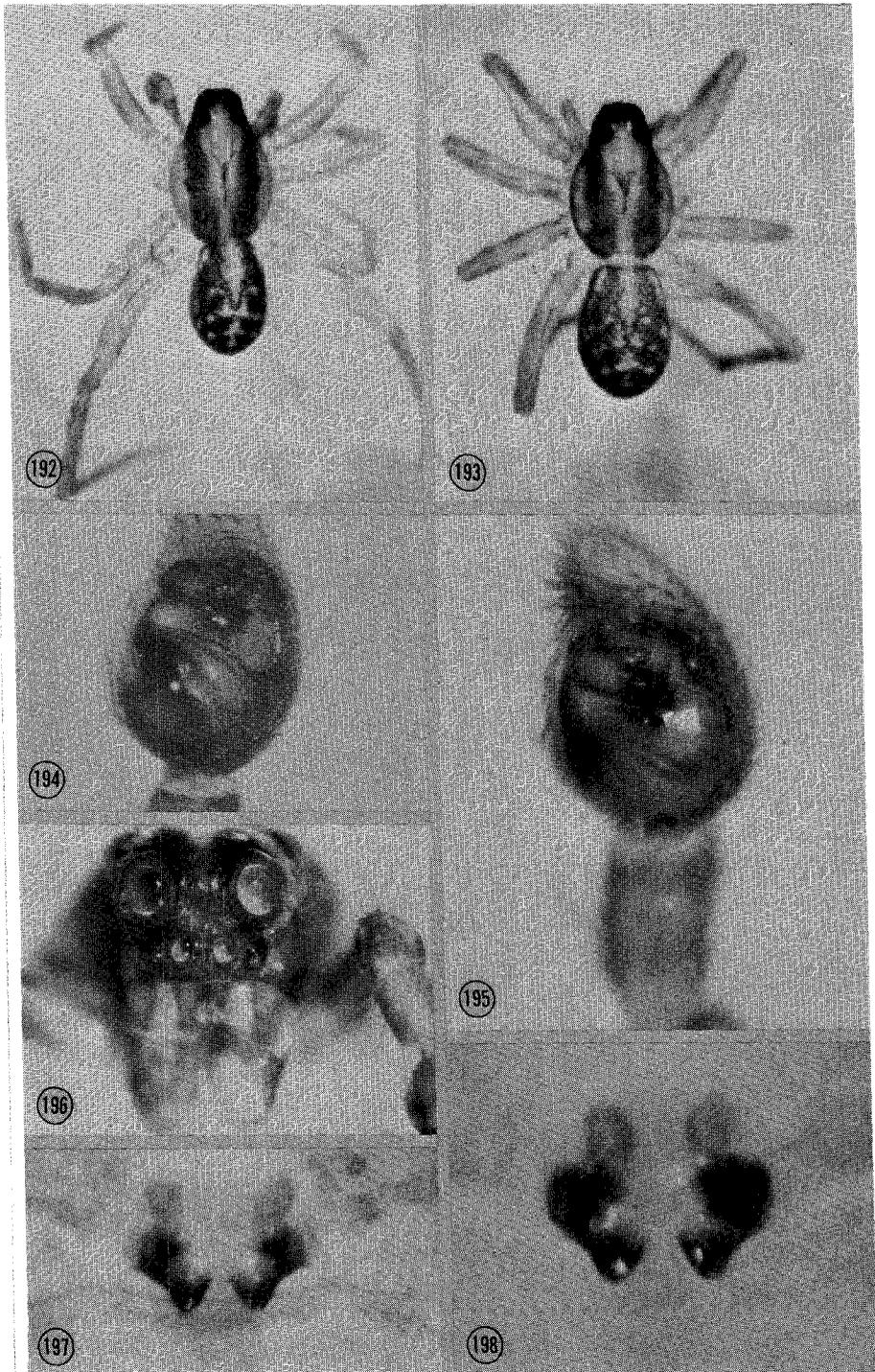
The lower margin of the furrow of the chelicerae of the paratype has three teeth, the middle tooth the largest, the one next to the fang inconspicuous.

Description of allotype.—The female is a little more heavily pigmented than the holotype (Fig. 193) and there is a distinct triangular dark spot that looks like a widening of the dorsal groove anteriorly; in front of this spot the two prongs of the tuning-fork pattern are lightly pigmented. The carapace is 1.50 mm long, 1.03 mm wide, and the pigment along the lateral edge is wider than in the holotype, so much so in fact, that one might describe the sides of the carapace as having a submarginal light area. In both sexes the carapace is shiny, somewhat as in *Trabea* and some *Arctosa*. The legs show faint traces of annulae. The eye arrangement (Fig. 196) and spining of tibia and metatarsus I are similar to the holotype.

Measurements of leg segments of a paratype from Cove Creek:

	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
Palpus	0.50	0.25	0.33		0.47	1.55
Leg I	1.20	0.53	1.00	0.93	0.48	4.14
Leg II	1.10	0.50	0.83	0.85	0.47	3.75
Leg III	1.03	0.45	0.75	0.95	0.47	3.65
Leg IV	1.50	0.57	1.38	1.68	0.68	5.81

Lower margin of the furrow of the chelicerae with three teeth, the middle tooth the largest, the other two about equal in size; almost evenly spaced.



Figs. 192-198.—*P. hiteorum*, n. sp., Arkansas, Washington Co.: 192, holotype male; 193, allotype female; 194-195, palpus; 196, holotype, eyes; 197, allotype, epigynum; 198, epigynum.

Variation.—This species varies somewhat in the amount of pigmentation, in size, and in the structure of the genitalia. Sometimes leg I is slightly swollen and sclerotized in the male. Males vary in carapace length from 1.4 mm to 1.5 mm, females from 1.5 mm to 1.7 mm. The legs are lightly banded in dark specimens. The epigynum is characterized by the concavity in front of the tips of the lobes. The median apophysis varies somewhat in the shape of the median and lateral extensions or arms. The palpus is small and difficult to observe clearly, but it can be positioned so that the median apophysis appears squarely truncate laterally.

Distribution.—Southeastern United States, north to Virginia, west to Texas and north to Kansas.

Specimens examined.—*Alabama*: Madison Co., Monte Sano, Dec. 1940, A. F. Archer, female (A.M.N.H.); *Arkansas*: Benton Co., Beaver Lake, 7-VIII-65, Peck, female (Exline); V-21-65, male (Exline); Bradley Co., VI-1-63, female (Exline); Conway Co., V-30-64, MOR II, male (Exline); Crawford Co., Natural Dome, V-31-61, L-1-5, female and egg sac (Exline); Washington Co., Cove Creek, many records (Exline); *Florida*: Leon Co., Tall Timbers, male in May, female in June, pitfall (D.P.I.); *Kansas*: Riley Co., Manhattan, IX-5-63, female (Exline); *Missouri*: Dent Co., Dry Fork, VIII-22-62, HEF, 2 females (Exline); Phelps Co., Dry Forks Cr., VII-2-49, HEF, female (Exline); *North Carolina*: Orange Co., 7-VI-63, Beatty, male (Beatty); *Virginia*: Giles Co., Mountain Lake, July-August, males, females, egg sacs (D.P.I.); Albemarle Co., VIII-27-48, HKW, 3 females, egg sacs (H.K.W.); *Texas*: Dallas Co., Dallas, 11 May, 40, Knutsen, female (M.C.Z.).

Life history.—*P. hiteorum* is a summer species. Males have been collected from May to August with the majority from May and June. Most of the records of females are from August, but May, June and July are well represented. We have studied two females from March, three from September, and one from December. Egg sacs have been collected from May through August.

Ecology.—It is interesting that we have no record of *P. hiteorum* being taken near water. Most of the records are from pitfall traps or from under rocks. We have 14 records from pitfall traps in meadows, five from pitfall traps in old fields (most of these from Arkansas), one from a lawn at night, one from a hillside during the day, and the Texas record is from under a rock. Wallace collected this species at 4,000 feet at Mountain Lake, Virginia, at least a dozen times, almost always by turning rocks in fields or by scraping leaf litter and shining the area with a headlight in wooded situations, never close to water. This appears to be a mesic form.

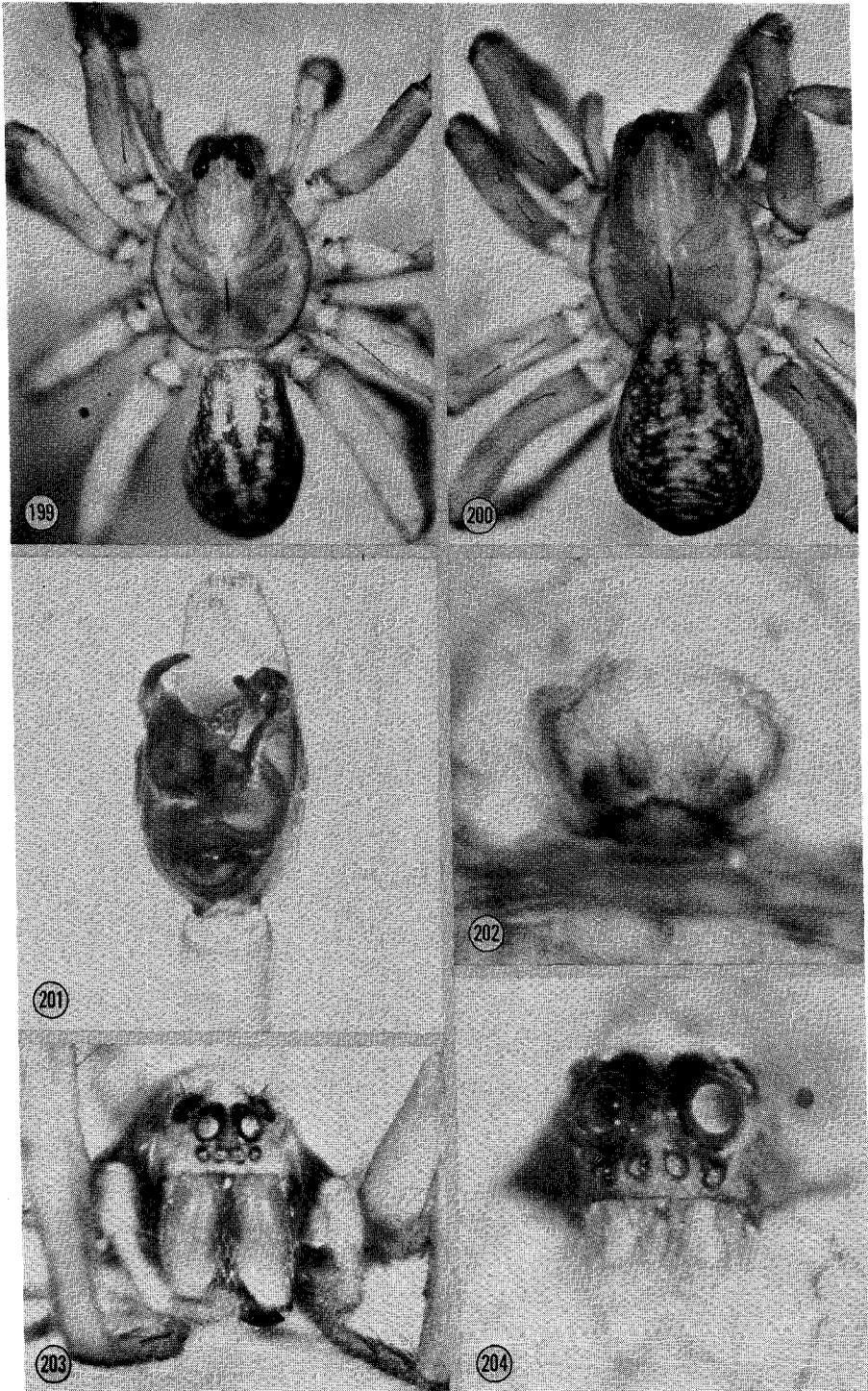
Remarks.—In publications on Arkansas spiders this species has been listed as *Pirata* sp. A., aff *minutus* Em).

Pirata marxi Stone

Figs. 199-203

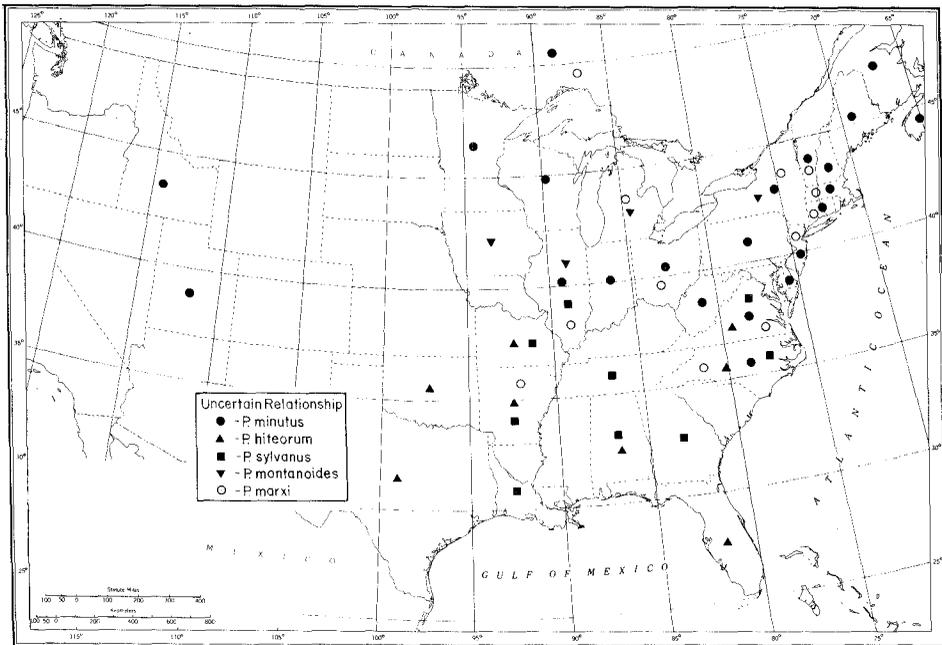
Pirata piraticus, Emerton, 1885, Trans. Connecticut Acad. Sci., 6:492, pl. 48, figs. 7-7d.

Pirata marxi Stone, 1890, Proc. Acad. Nat. Sci. Philadelphia, 42:429-430, pl. 15, figs. 1, 1a (female, York Co., Pennsylvania); Chamberlin, 1908, Proc. Acad. Nat. Sci. Philadelphia, 60:307-309, pl. 21, fig. 8, pl. 22, fig. 8; Kaston, 1938, Canadian Entomol., 70:16, fig. 5; Kaston, 1948, Bull. Connecticut Geol. Nat. Hist. Survey, 70:309, pl. 49, figs. 985-986, pl. 50, fig. 1006.



Figs. 199-203.—*P. marxi*, New Jersey, Ramsey, VI-1-10-44: 199, male; 200, female; 201, palpus; 202, epigynum; 203, female, eyes.

Fig. 204.—*P. hiteorum*, n. sp.: Allotype female, eyes.



Description of male.—From Ramsey, New Jersey, June 1-10, 1944, W.J.G. (A.M.N.H.). Carapace 3.2 mm long, 2.4 mm wide, with indistinct, wide submarginal light band and tuning-fork mark that is broken up into paired segments (Fig. 199). General body color in alcohol amber. Dorsum with distinct light-colored hastate mark bordered by black V-shaped mark which is bordered by light-colored converging stripes. Coxae, labium, sternum and endites without markings, venter with a little scattered pigment.

Anterior eye row narrower than the posterior median row slightly procurved; anterior median eyes a little larger than the anterior laterals, closer to each other than to the laterals. Height of the clypeus twice the diameter of an anterior median eye. Lower margin of the furrow of the chelicerae with two teeth.

Legs 4123, without annulae. Tibiae I and II with three pairs of ventrolateral spines, the distal pair apical in position, each with an additional prolateral spine about halfway between the middle and apical pairs. The prolateral spine of the proximal pair on tibia I barely overlaps the middle spine. The prolateral spines of the proximal and middle pairs on tibia II are reduced to about half the size of their mates.

Description of female.—From Ramsey, New Jersey, July 11, 1948, W. Ivie (A.M.N.H.). Carapace 3.5 mm long, 2.7 mm wide, with a rather indistinct submarginal light band and a narrow, light streak extending forward from the cervical groove to between the posterior lateral eyes (Fig. 200). For dorsum see the figure. Coxae, labium, endites and sternum without pigment.

Anterior eye row narrower than the posterior median row, slightly procurved; anterior median eyes about half again as large as the anterior laterals; anterior median eyes closer to each other than to the laterals. Height of the clypeus equal to the diameter of an anterior median eye. Lower margin of the furrow of the chelicerae with two teeth, the largest near the base of the fang.

Legs 4123, without annulae. Tibia I and II with two pairs of non-overlapping ventrolateral spines, one apical ventroprolateral spine, and one prolateral spine distal to the

middle pair; the prolateral spine of the proximal pair reduced to a bristle. Metatarsus I and II with 3 pairs of ventrolateral spines, the distal pair subapical; metatarsus II also bears a spine on the midline between the distal pair; this spine is almost apical in position.

Distribution.—Eastern half of the United States and Canada; south into Florida.

Specimens examined.—Canada: *Ontario*; United States: *Arkansas*: Garland County; *Connecticut*: Fairfield, New Haven Counties; *Florida*: Alachua, Lake, Leon Counties; *Illinois*: Lake County; *Maine*: Swan Island; *Massachusetts*: Essex, Hampden, Middlesex, Nantucket Counties; *Michigan*: Calhoun, Clinton, Ingham, Livingston Counties; *New Jersey*: Bergen County; *New York*: Rensselaer, Saratoga, Schuylcr, Nassau, Wayne Counties, Long Island; *North Carolina*: Durham County; *Ohio*: Hocking County; *Virginia*: Fairfax, Lancaster Counties; *Vermont*.

Life history.—This is evidently a rare species in the southern states. The only known males and females from Florida were collected in April. The other southern records are too few to warrant any conclusions. In the northern states there appears to be two broods per year. We have no records of adults from January, February or March; then both sexes for the next four months; no adults in August or September; males are present in October, and both sexes in November and December. The only egg sacs seen by us are from July.

Ecology.—In Florida this species is apparently confined to the leaf litter of wet, swampy, densely shaded areas, usually in a hammock along a stream. In Michigan *P. marxi* is found in swamps and bogs. In the New England and Middle Atlantic states this species inhabits similar situations and is also found in "wet" and "damp" fields. Emerton observed that it passed the winter in leaf litter in Massachusetts and Connecticut.

Remarks.—The pattern and size of *P. marxi* may vary somewhat. A male from Alachua Co., Florida, is larger than the male from New Jersey described above (carapace 3.6 mm long, 2.7 mm wide). Two females from Ramsey, New Jersey vary considerably in size (carapace no. 1, 3.5 mm long, 2.7 mm wide; carapace no. 2, 2.9 mm long, 2.1 mm wide) and somewhat in pattern, the markings on the larger specimen being less distinct than in the smaller. In old alcoholic specimens the pattern is sometimes obscure.

Pirata minutus Emerton

Figs. 208-216

Pirata minutus Emerton, 1885, Trans. Connecticut Acad. Sci., 6:493-494, pl. 48, figs. 10a-c (two males, West Roxbury, Massachusetts, June 2, 1872, J. H. Emerton, coll., M.C.Z., examined); Chamberlin, 1908, Proc. Acad. Nat. Sci. Philadelphia, 60:301-303, pl. 21, fig. 9, pl. 22, fig. 7; Kaston, 1938, Canadian Entomol., 70:16, fig. 9; Kaston, 1948, Bull. Connecticut Geol. Nat. Hist. Survey, 70:307, pl. 50, fig. 1001, pl. 51, fig. 1008.

Pirata exigua Banks, 1892, Proc. Acad. Nat. Sci. Philadelphia, 44:72-73, pl. 1, fig. 48 (female, Ithaca, New York, M.C.Z., examined).

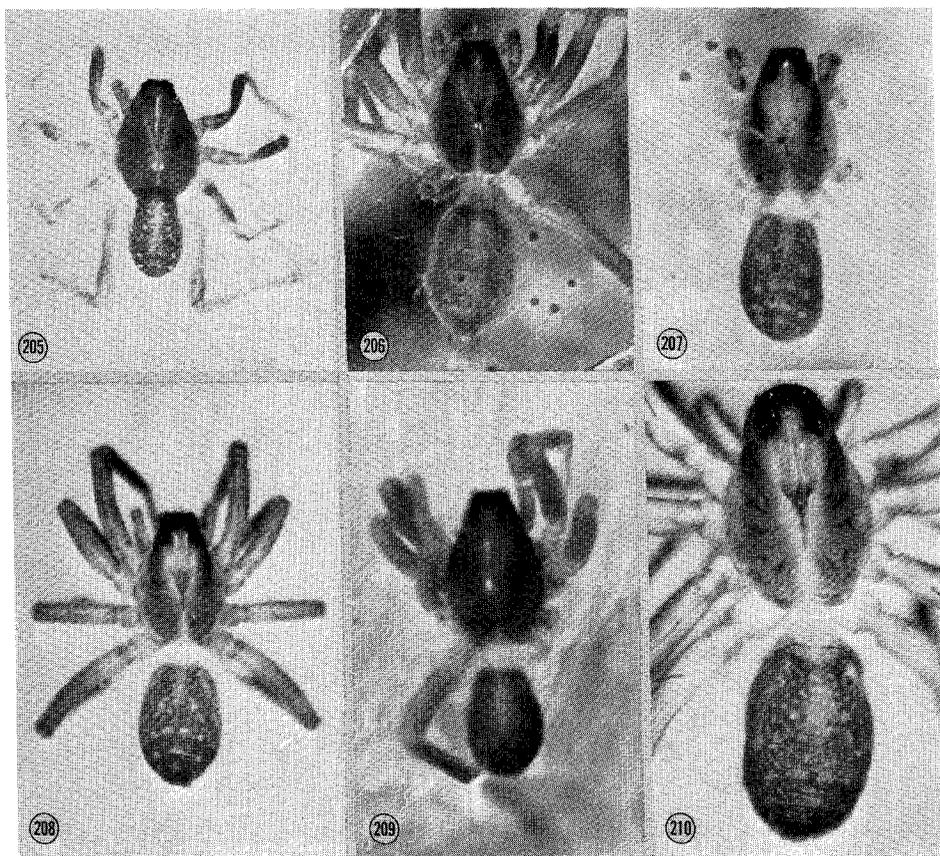
Pirata humicolus Montgomery, 1902, Proc. Acad. Nat. Sci. Philadelphia, 54:575-578, pl. 30, figs. 40-41 (male, female, Philadelphia, Pennsylvania, A.M.N.H., examined).

Remarks on synonyms and types.—Emerton (1885) gave Salem and Roxbury, Massachusetts, and Meriden, Connecticut, as the type localities for *P. minutus*. In May 1971 Dr. H. W. Levi sent to us as types two males, both faded, from West Roxbury, June

2, 1872, J. H. Emerton, collector. The label is underlined in red. In 1937 Wallace made these notes at the M.C.Z.: "*P. minutus* Em., Mass., Salem, June 25, 1877, J. H. Emerton, coll. female - Type is same as *P. exigua* Bks. male, 2 females in Type Bottle—same as *minuta* I have in my collection." The Salem specimens were not included in the M.C.Z. *Pirata* sent to us for examination. In any event, every specimen in the type series examined by us is *P. minutus* (Fig. 209).

The female type of *P. exigua* is labeled Ithaca, N.Y., and has all legs separated from the body. Banks' description and figure are not much help. His measurements of carapace differ from ours: 1.4 mm long by 0.9 mm wide, as opposed to ours of 1.75 mm long by 1.27 mm wide. The epigynum is *P. minutus* (Figs. 207, 215).

Montgomery recognized the similarity between his *P. humicolus* and *P. minutus* Emerton, but considered his species and *P. exiguus* Banks as distinct. He gives the length of the cephalothorax of the male as 1.7 mm, the female 1.8 mm. Wallace measured the types: male 1.5 mm, female 1.6 mm (Figs. 205-206). The male type has two teeth on the lower margin of the furrow of the chelicerae, the female type as three. Montgomery's figures of the genitalia are recognizable in both sexes.



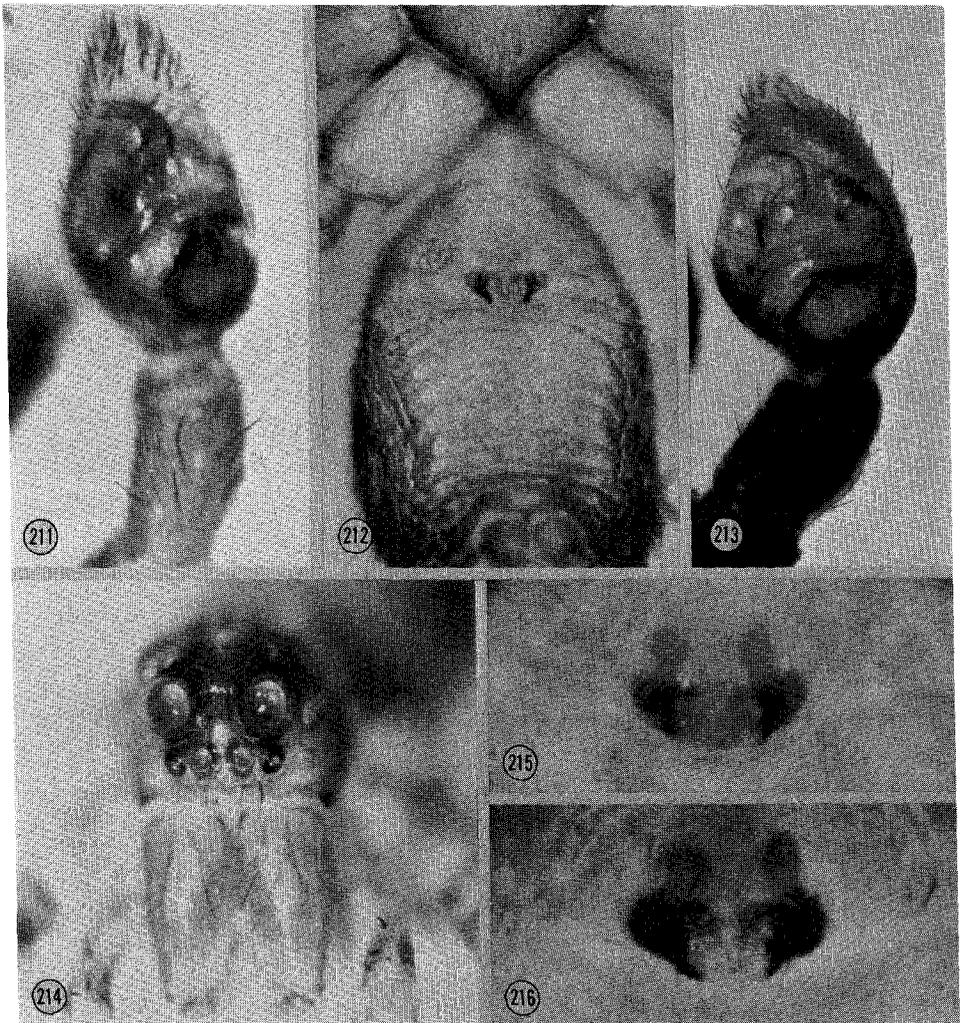
Figs. 205-206.—*P. humicolus*: 205, type male (= *P. minutus*), Pennsylvania, Philadelphia; 206, type female (= *P. minutus*), Pennsylvania, Philadelphia.

Fig. 207.—*P. exigua*: Type female (= *P. minutus*), New York, Ithaca.

Figs. 208-210.—*P. minutus*: 208, female, Michigan, Livingston Co.; 209, type female, West Roxbury; 210, female, Canada.

Data on type specimens.—From West Roxbury, Massachusetts. The large male has a carapace 1.5 mm long, 1.00 mm wide. The small male measures 1.37 mm long by 0.93 mm wide. The carapaces of both are dark and it looks like both had dark femora I. The anterior eye row is narrower than the posterior median row and is slightly procurved; the anterior median eyes are larger than the anterior laterals and are closer to the laterals than to each other.

Description of male.—From Livingston Co., Michigan. Carapace 1.45 mm long, 1.00 mm wide, dusky, with no tuning-fork pattern, lighter in front of cervical groove and along margins of carapace, but not presenting a distinct marginal light area sharply set off from the sides of the carapace. Dorsum dusky with pale hastate mark and indistinct paired



Figs. 211-212.—*P. minutus*: 211, palpus, Canada; 212, female, venter.

Fig. 213.—*P. humicolus*: Type male (= *P. minutus*), palpus.

Fig. 214.—*P. minutus*: Female, eyes, Michigan, Livingston Co.

Fig. 215.—*P. exigua*: Type female (= *P. minutus*), epigynum.

Fig. 216.—*P. minutus*: Epigynum, Michigan, Livingston Co.

spots posteriorly. Anterior eye row narrower than the posterior median row, procurved; anterior median eyes larger than anterior laterals, anterior eyes about equally spaced. Ventral surface unmarked except for medial longitudinal light stripe on sternum. Lower margin of furrow of chelicerae with three teeth; however, the tooth nearest the base of the fang is so small that under medium magnification only two teeth are visible.

Legs 4123, unbanded; femora I and II slightly darker than the other segments of the legs.

Description of female.—From Livingston Co., Michigan. Carapace 1.55 mm long, 1.07 mm wide; sides dusky with a narrow marginal light area, the tuning-fork pattern faint on head region; a triangular dark spot in front of cervical groove with its apex at the groove. Dorsum mottled with five pairs of white spots that look like they were covered with white scales in life. Venter, coxae, labium, endites yellow; sternum with a median longitudinal light stripe. Lower margin of furrow of chelicerae with three teeth; however, the tooth next to the base of the fang is so small that under medium magnification only two teeth are visible. Anterior eye row straight, narrower than the posterior median row; anterior median eyes are twice as large as the anterior laterals; the anterior eyes are equally spaced. Clypeus receding, equal in height to the diameter of an anterior median eye.

Legs 4123, dusky, without annulae. Femur I and II darker than the others, iridescent on prolateral surface.

Variation.—There is some variation in size and appearance. A male from Michigan has a carapace 1.52 mm long, 1.07 wide; its femora I and II and palpal segments are dark. The sides of the carapace are dark and there is no marginal band; the venter is dusky.

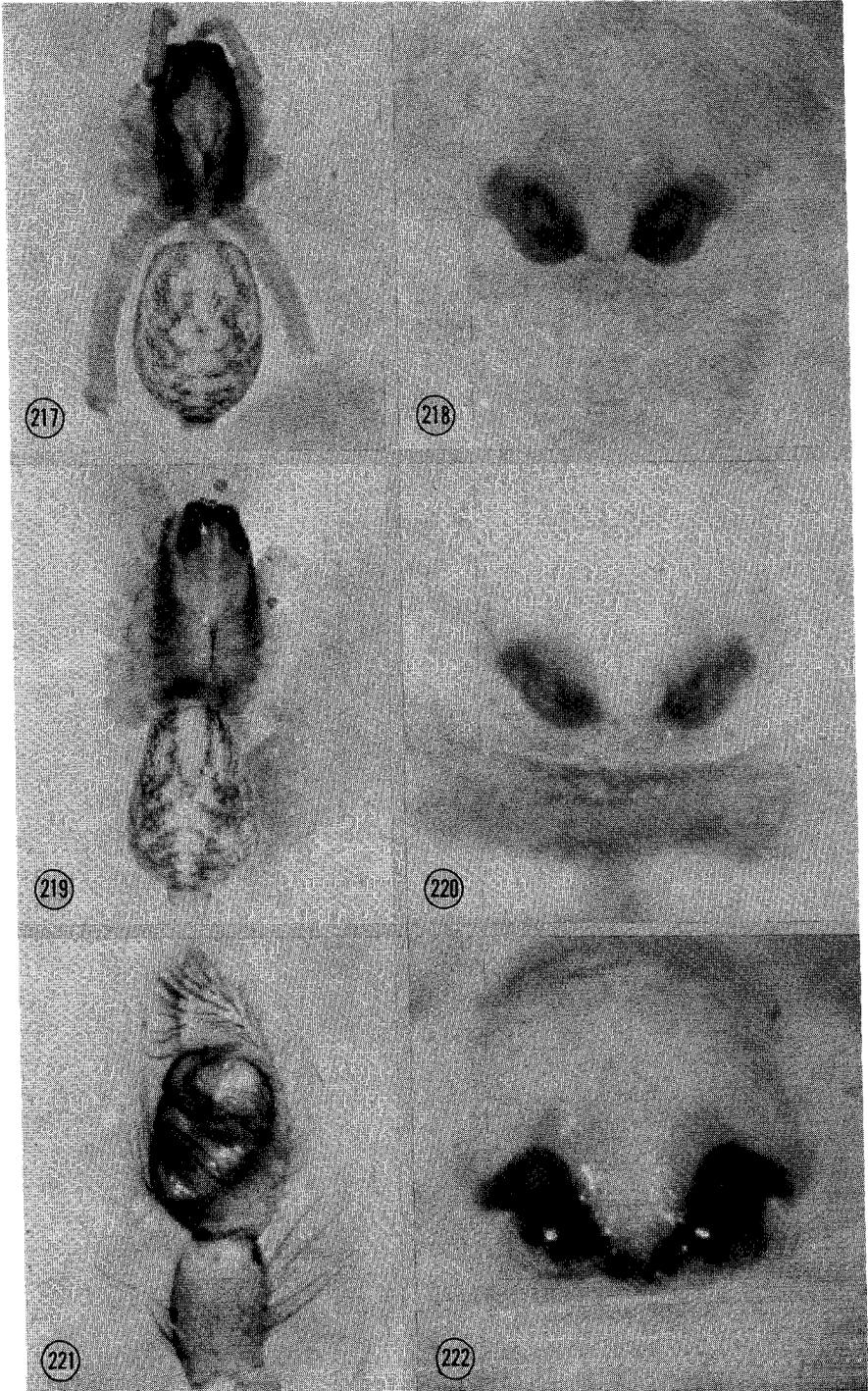
A male from Ontario is larger, carapace 1.62 mm long, 1.20 mm wide. The sides of its carapace are dark with a very thin marginal light area. Femora I and II and palpal segments are dark. There are three pairs of ventral spines on tibia I and the apical spines are reduced to minute hairs. The venter is dusky; the sternum is dusky with a median light streak. The anterior eye row is narrower than the posterior median row and slightly procurved.

A female from Ontario has a carapace 1.50 mm long, 1.05 mm wide. The carapace is dusky like *P. montanus* and has a narrow marginal light area. The anterior eye row is narrower than the posterior median row and is slightly procurved. There are three pairs of ventral spines on tibia I; the legs are yellow, without annulae; the venter is dusky, the sternum is dusky with a median light streak.

In dark females all legs may be dark distally with proximal ends of femora lighter.

Distribution.—Northeastern United States and Canada; south to North Carolina, west to Minnesota. Gertsch and Davis (1940) reported it from Mexico, but we have seen no specimens from south of North Carolina; since they were juveniles it is very likely that they were something else.

Specimens examined.—Canada: *New Brunswick*: June 17-24, 63, two males, July 10, 68, 2 females, egg sacs, T. R. Renault; *Nova Scotia*: Barrington, IX-23, Bryant, female (M.C.Z.), Canard, June 27, 56, C.D.D., 5 males (C.D.D.), Cow Bay, June 15, 1960, Fox and Sawler, 2 males, female (C.D.D.); *Ontario*: Bruce, Middlesex, Nippissing, Ontario, Prince Edward, York Counties, Elmhurst Beach, Rednersville, Chatterton, St. Joseph Island. United States: *Connecticut*: Fairfield, New Haven Counties, Brooksville; *Delaware*: Wilmington, A. Bacon, male (A.M.N.H.); *Idaho*: Adams Co., Mesa, July 2, 1943, W. Ivie, males, females (Utah); *Illinois*: Montgomery Co., Farmersville, 6-1-33, W.I., male (Utah), Arlington Heights, VI-36, F. Schubel, male (D.C.L.); *Indiana*: Lake Co., Gary,



Figs. 217-222.—*P. montanoides*: 217, female type no. 1, New York, Ithaca; 218, female type no. 1, epigynum; 219, female type no. 2, New York, Ithaca; 220, female type no. 2, epigynum; 221, palpus, Iowa, Cerro Gordo Co.; 222, epigynum, Michigan, Utica.

6-16-33, W.I., female (Utah); *Maine*: Cumberland, Hancock Counties; *Massachusetts*: Essex, Middlesex, Nantucket Counties, Allston; *Michigan*: Calhoun, Charlevoix, Clinton, Ingham, Kalamazoo, Livingston, Menominee, Midland, Washtenaw, Wayne Counties, Douglas Lake; *Minnesota*: Freeborn, Marshall, Ramsey, Sant Luis Counties; *New Hampshire*: Coos, Frafton Counties, Mt. Washington; *New Jersey*: Bergen County, Grosswicks; *New York*: Albany, Chautauqua, Columbia, Essex, Fulton, Monroe, Nassau, Rensselaer,

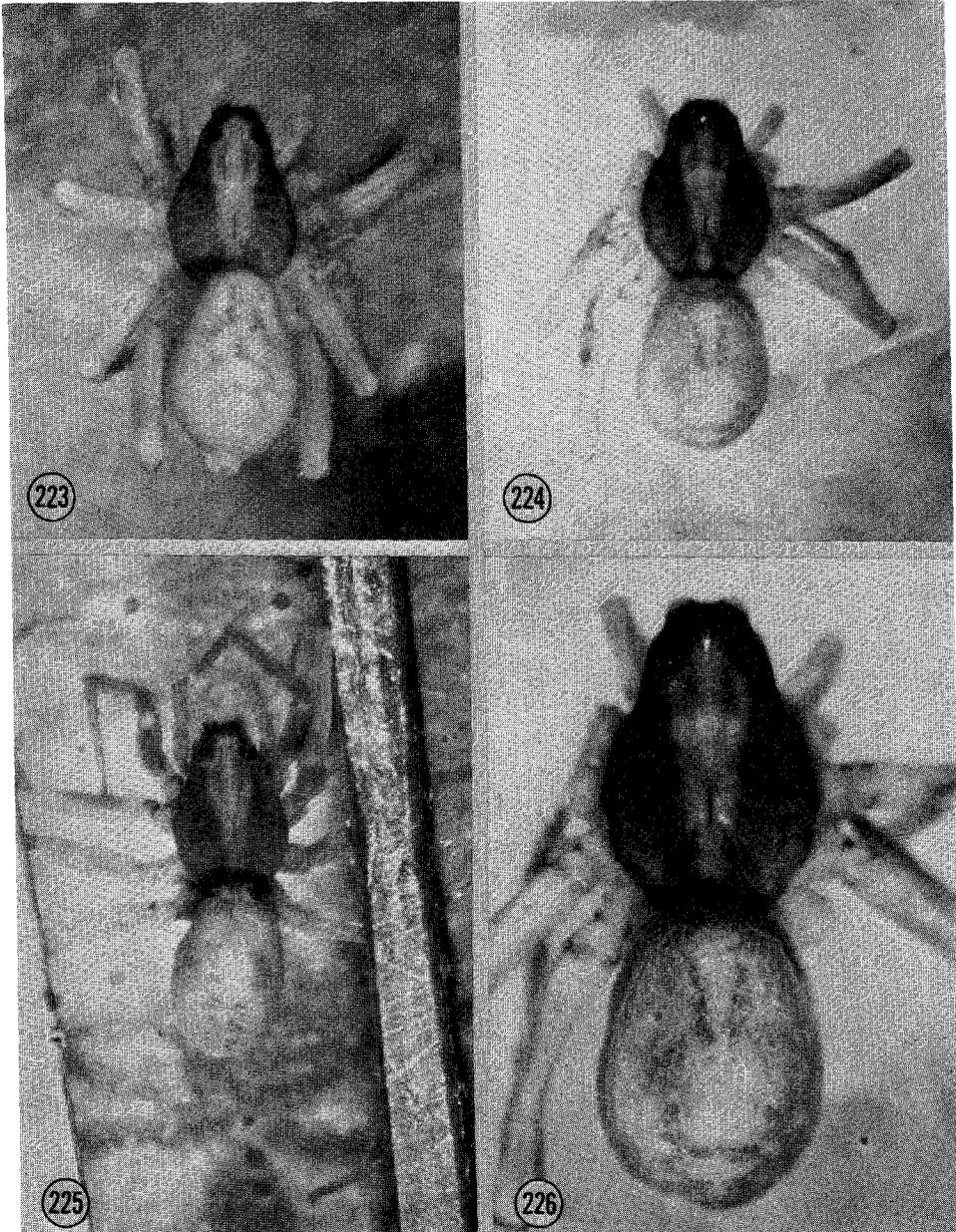


Fig. 223-224.—*P. agilis*: 223, juv. type male (= *P. montanus*), New York, Ithaca; 224, type female (= *P. montanus*), New York, Ithaca.

Figs. 225-226.—*P. elegans*, female co-type (= *P. montanus*), Pennsylvania, York.

Tompkins Counties, Wells, Dormansville, Enfield Glen, Cold Spring Harbor, Cross Lake; *North Carolina*: Avery Co., Pineola, N. Banks, VII-14-03, male (M.C.Z.); Watermount, 7-8-10, R.V.C., 77:34 NW, female (Utah); *Ohio*: Ashtabula, Guernsey, Wayne Counties; *Pennsylvania*: Cambria, Potter, Westmoreland Counties; *Tennessee*: Roane Co., 7-12-33, W.I., male, females (Utah); *Utah*: Cache Co., 1 mi. S. Logan, 7-1-27, R.V.C., female (Utah); Emery Co., Ferron, 6-23-34, W.I. and H.A.R., female (Utah); *Vermont*: Lamoille County; *Virginia*: Giles, Montgomery Counties; *West Virginia*: Mercer, Pocahontas Counties; *Wisconsin*: Eau Claire, Iron, LaCrosse, Marinette, Rock, Walworth, Winnebago Counties, Point Comfort.

Life history.—Adult males and females are present in the northeastern states from May through September; in Canada from June through September. Females with egg sacs are present from June through September. "This species apparently overwinters half-grown, and matures in late May and early June" (Kaston, 1948, p. 307).

Ecology.—*P. minutus* is not restricted to aquatic situations. In northwestern New Brunswick it was collected in pitfalls in a spruce-fir forest and under stones; in Nantucket, Massachusetts, in a salt marsh. In Michigan it has been taken in swamps, in *Typha* marsh, in a rotten log in upland field, and running on the steps of a house in upland field; in New York on the summit of Mt. Marcy. At Mountain Lake, Virginia, Wallace collected *P. minutus* on numerous occasions, and often in the company of *P. hiteorum*, n. sp., by turning rocks, logs, etc., in meadows and old fields; also on moist road banks and seepage areas. Levi and Field (1934) reported *P. minutus* as "fairly common" in Wisconsin, "usually in woods." Chamberlin (1908) said it occurred in "damp meadows, margin of ponds. Egg sacs late in summer."

Remarks.—This species has been misidentified frequently. We have found it labeled as *P. montanus*, *P. arenicola*, *P. montanoides*, *P. insularis*, *P. sylvestris*, *P. exiguus*, and *P. febriculosa*. *P. hiteorum* has been identified as *P. minutus* and at Mountain Lake, Virginia, they occur in the same field. Since they look very much alike, are of about the same size, and have epigyna that resemble each other somewhat, they can be confused easily. However, they differ in the following ways: *P. minutus* has a narrow marginal light area on the carapace and the front legs are dark, whereas *P. hiteorum*, n. sp., has a wide marginal light area on the carapace and the front legs are not dark; *P. minutus* usually has two teeth on the lower margin of the furrow of the chelicerae and *P. hiteorum*, n. sp., usually has three, but this is not a constant character. They differ in the structure of both palpus and epigynum; this can best be checked by referring to the illustrations (Figs. 194-195, 197-198, 211, 216). The *P. hiteorum* epigynum has a pair of posteriorly pointed projections somewhat like *P. suwaneus* and the palpus has a median apophysis of the *P. aspirans* type, while the *P. minutus* epigynum lacks posterior projections and the median apophysis is a curved tooth somewhat like that in *P. insularis*.

Pirata montanoides Banks

Figs. 217-222

Pirata montanoides Banks, 1892, Proc. Acad. Nat. Sci. Philadelphia, 44(1):71-72, pl. 1, fig. 46 (two females, Ithaca, New York, M.C.Z., examined).

Remarks.—The two type females from Ithaca, New York, differ in size: no. 1 carapace is 1.75 mm long, 1.27 mm wide; no. 2 carapace is 2.0 mm long, 1.5 mm wide.

Diagnosis.—A small, pale species with a wide marginal light area on the carapace, comparable to *P. minutus* in size, but differing in pattern and genitalia. The male has a long, tapering median apophysis bent at a 110 degree angle and extending beyond the alveolus (Fig. 221). The epigynum is quite distinct (Fig. 222) although it has a shape somewhat like that of *P. minutus*. The lower margin of the furrow of the chelicerae has two teeth and both sexes lack ventral distal spines on tibiae I.

Description of type female no. 1.—Carapace yellow with wide marginal light area, lateral edges clear yellow, without pigment. Tuning-fork mark indistinct and interrupted on head region. Dorsum yellow with grey markings (Fig. 217). Sternum yellow, immaculate. Legs (mostly disarticulated) yellow, indistinctly annulate. Venter yellowish with grayish markings behind the middle.

Anterior eye row narrower than the posterior median row, procurved, anterior eyes equally spaced, the medians a little larger than the laterals. Anterior lateral eyes a radius from the edge of the clypeus. Lower margin of the furrow of the chelicerae with two teeth, the one nearest the fang the largest. Tibiae I with three pairs of ventral spines, third pair nearly lateral, none distal. For epigynum see Fig. 218.

Description of male.—From Cerro Gordo Co., Iowa. Length 3.0 mm, carapace 1.6 mm long, 1.2 mm wide, with a wide marginal light area as in the female. Sternum and mouth parts clear yellow; legs with faint annulae. Venter dirty yellow with median pale gray streak. Lower margin of the furrow of the chelicerae with two teeth.

Legs 4123. Tibiae I with three pairs of long spines as in the female, without distal spines. Eyes as in the female except that the anterior lateral eyes are a little farther from the edge of the clypeus. Palpus short with patella and tibia about equal in length and not much longer than broad. Cymbium 0.52 mm long, 0.27 mm wide; palpal tibia 0.23 mm long, 0.21 mm wide.

Distribution.—Illinois, Iowa, Michigan, New York.

Specimens examined.—*Illinois*: nr Chicago, June 10, 1933, W.J.G., female, egg sac (H.K.W.); *Iowa*: Cerro Gordo Co., nr Clear Lake, 14 June 61, H. Levi, male (M.C.Z.); *Michigan*: Utica, VIII-3-36, M. N. Hatch, 4 females (Exline); *New York*: Ithaca, Banks, 2 females (M.C.Z., types).

Life history.—The only known male is from June; females are from June and August; the only egg sac is from June.

Ecology.—Nothing is known except that the male came from "McIntosh Woods" near Clear Lake, Iowa.

Remarks.—Every specimen examined had two teeth on the lower margin of the furrow of the chelicerae. The females from near Chicago are discolored and so dark that the pattern is not discernable.

Pirata montanus Emerton

Figs. 223-232

Pirata montanus Emerton, 1885, Trans. Connecticut Acad. Sci., 6:493, pl. 48, fig. 9 (three females, New York, M.C.Z., examined; see comments); Chamberlin, 1908, Proc. Acad. Nat. Sci. Philadelphia, 60:306-307, pl. 10, fig. 9, pl. 22, fig. 9; Kaston, 1938, Canadian Entomol., 70:16, fig. 6; Kaston, 1948, Bull. Connecticut Geol. Nat. Hist. Survey, 70:308, pl. 49, fig. 983, pl. 50, fig. 1004, pl. 51, fig. 1009.

Pirata elegans Stone, 1890, Proc. Acad. Nat. Sci. Philadelphia, 42:429, p. 15, figs. 5, 5a (female cotype, York Co., Pennsylvania, A.M.N.H., examined).

- Pirata agilis* Banks, 1892, Proc. Acad. Nat. Sci. Philadelphia, 44:72, pl. 1, fig. 47 (male, female, 2 juv., Ithaca, New York, M.C.Z., examined; see comments).
- Pirata nigromaculatus* Montgomery, 1902, Proc. Acad. Nat. Sci. Philadelphia, 54:579-581, pl. 30, figs. 44-45 (male, female, Luzerne Co., Pennsylvania, A.M.N.H., only female cotype examined; see comments).
- Pirata montana*, Emerton, 1911, Trans. Connecticut Acad. Arts, Sci., 16:401, 402, pl. 5, figs. 3, 3a.

Comments on synonyms and types.—The vial sent to us as containing the type of *P. montanus* contains two females labeled “Long Lake, Adirondacks, July 1884, J. H. Emerton, coll., dried up, relaxed 1958.” These are evidently the two females cited by Emerton from Long Lake and are what we recognize as *P. montanus*.

Banks described and gave measurements of a female *P. agilis*, n. sp. A vial sent to us from the M.C.Z. contains one male, one female, and two immature specimens labeled in longhand, “*Pirata agilis* Bks type,” Ithaca, New York. All four specimens are *P. montanus*.

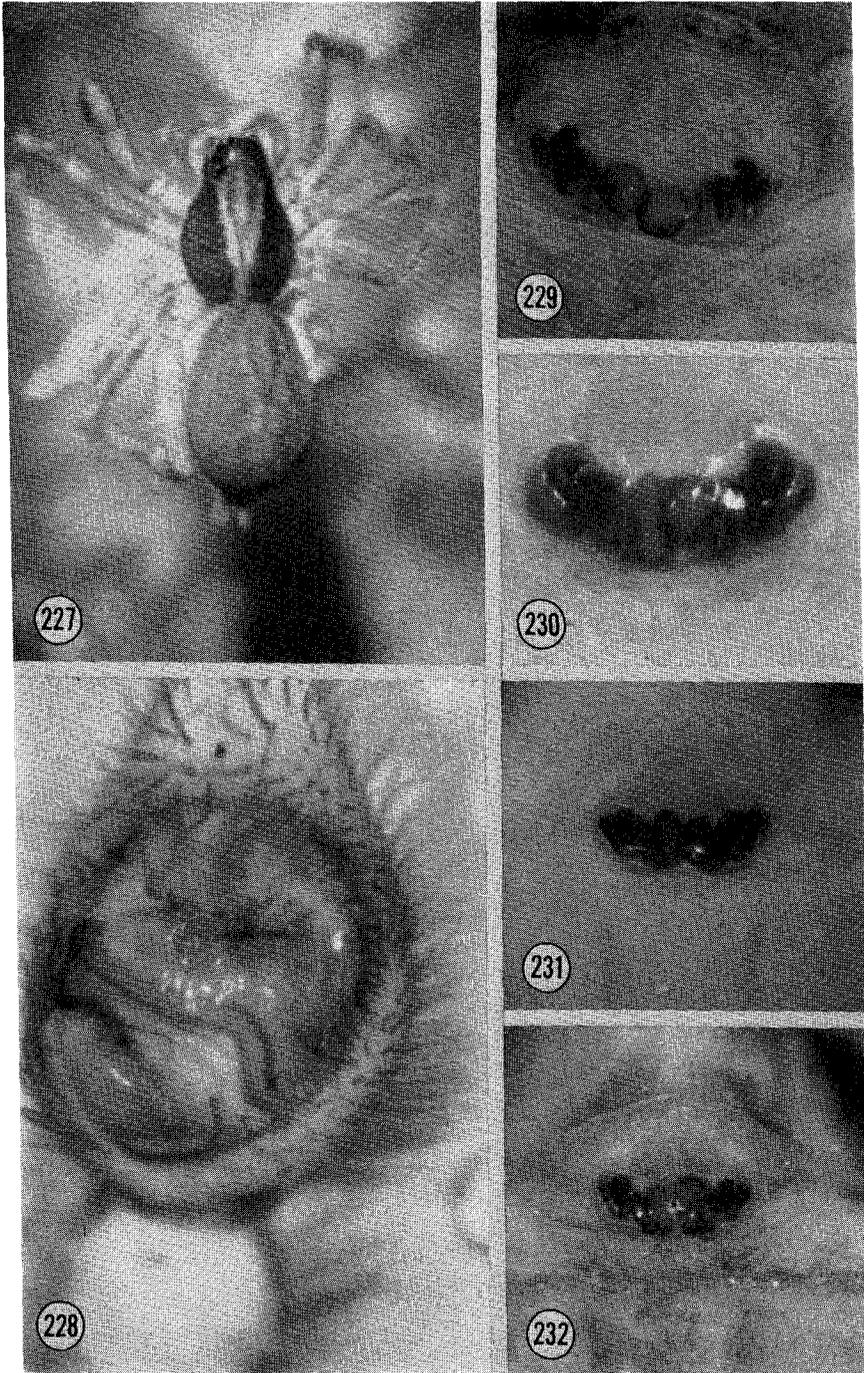
The types of *P. nigromaculatus* Montgomery were not received. However, in the shipment of types from the A.M.N.H. there was a female from Pennsylvania labeled “Cotype” with a carapace 2.7 mm long by 1.77 mm wide which is clearly *P. montanus*.

Description of female.—From Poverty Bay, Canada. Carapace 3.0 mm long, 2.1 mm wide, with a wide dorsal light colored band that extends from the posterior margin of carapace, becoming wider as it approaches the posterior lateral eyes and enclosing a tuning-fork mark which is incomplete, i.e., broken up into four patches of pigment; sides heavily pigmented with no trace of marginal or submarginal light areas. General body color amber in unpigmented areas; dorsum pigmented with indistinct hastate mark; legs unbanded. Ventral surfaces of body and legs unmarked. Lower margin of the furrow of the chelicerae with three stout teeth which are almost equal in size. Anterior row of eyes distinctly procurved, much narrower than the posterior median row; anterior eyes almost equal in size, equally spaced; clypeus height at anterior lateral eyes equal to the diameter of an anterior lateral eye.

Legs 4123.

Description of male.—From Raleigh Co. W. Va. Carapace 2.3 mm long, 1.7 mm wide; sides black; a wide mid-dorsal light stripe extends from the posterior margin to the posterior lateral eyes, widening to inclose the tuning-fork pattern in the head region; the head region bears a sparse covering of white hair-like structures which are longest between the posterior median eyes; the lateral edges of the carapace are adorned with closely set, short white hair-like bristles. The dorsum of the abdomen has an indistinct hastate mark, lateral rows of white scales, and four pairs of spots covered with white scales. Lower margin of the furrow of the chelicerae with three robust teeth which are almost equal in size. Anterior eye row distinctly procurved and considerably narrower than the posterior median row; anterior eyes almost equal in size and evenly spaced. Sternum, labium, endites and coxae I and II pigmented; sternum with a median longitudinal light stripe; distal end of endites light colored. Venter anteriorly, and epigastric region, darkly pigmented.

Legs 4123. The legs are yellow above except for coxae I and II and proximal five-sixths of femora I and II which are almost black, and femora III and IV which have a lightly pigmented band near the distal end. The leg pattern is the same below except that the pigment on femora I and II covers the whole surface.



Figs. 227-229.—*P. montanus*: 223, female, Virginia, Dickerson Breakes St. Pk.; 228, palp, Connecticut, E. Haddon; 229, epigynum, Connecticut, E. Haddon.

Fig. 230.—*P. agilis*: Type (= *P. montanus*), epigynum.

Fig. 231.—*P. nigromaculatus*: Cotype (= *P. montanus*), epigynum.

Fig. 232.—*P. elegans*: Cotype (= *P. montanus*), epigynum.

Distribution.—Northeastern United States and Canada; south into North Carolina; west into Iowa and Minnesota.

Specimens examined.—Canada: *Nova Scotia, Ontario*. United States: *Connecticut, Indiana, Kentucky, Massachusetts, Michigan, New Hampshire, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Vermont, Virginia, West Virginia, Wisconsin*.

Life history.—Ninety-two percent of the specimens we have examined are from May, June, July and August. It is striking that we have not seen a single specimen from December, January, February, March or April and only one collection each from October and November. We have males only from May, June and July and egg sacs from June, July, August and September.

Ecology.—The small amount of evidence available indicates that *P. montanus* occupies a variety of habitats from sphagnum moss in a bog to leaf litter on a mesic slope. Wallace collected it sifting leaf litter on a mesic slope in Magnetawan, Ontario. Levi and Field (1954) reported it in Wisconsin "in forests, frequently on hills. Fairly common." The following notes were extracted from labels in vials: Michigan: "sphagnum in bog," "leaf litter-wood lot." Pennsylvania: "can trap-woods." Virginia: "leaf mould of spruce, hemlock, oak mesic forest," "sphagnum moss-spruce swamp," "laurel thicket," "moss on rock at bank of stream." Wisconsin: "maple woods," "under rotten pine log." Stone (1890) wrote that *P. elegans* was "rather abundant in damp woods in York Co., Pennsylvania, in June."

Remarks.—*Pirata montanus* is one of the easiest *Pirata* to recognize due to the unique pattern on the carapace and the unique genitalia. It is one of the few *Pirata* that lack a light marginal or submarginal band on the carapace.

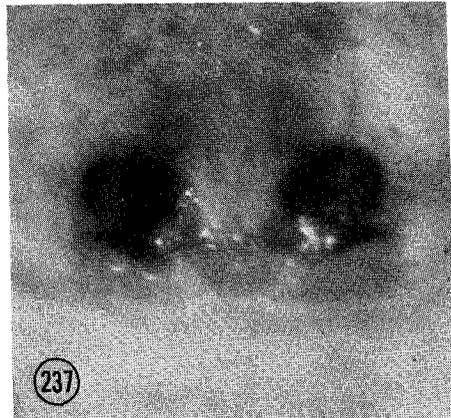
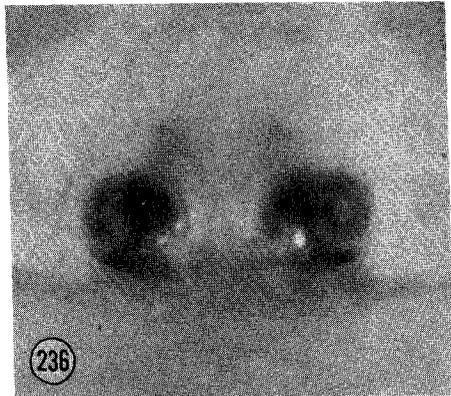
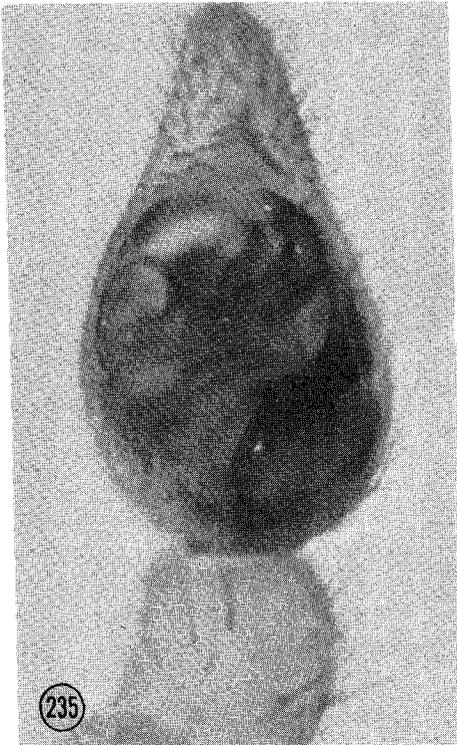
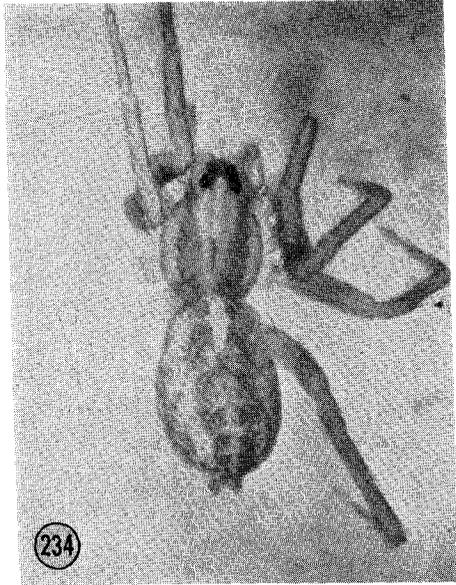
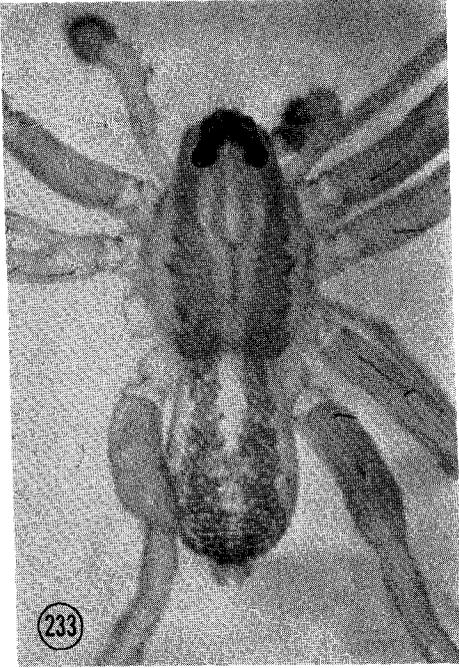
Pirata sylvanus Chamberlin and Ivie

Figs. 233-237

Pirata sylvanus Chamberlin and Ivie, 1944, Bull. Univ. Utah, 35(9):151-152, figs. 192, 193 (male, female, 2 mi. E. of Sylvania, Georgia, A.M.N.H., examined).

Remarks on types.—The male holotype has a carapace 1.90 mm long, 1.50 mm wide, with a submarginal light band (Fig. 233). The femora are faintly banded. The anterior eye is narrower than the posterior median row and is slightly procurved; the anterior median eyes are twice as large as the laterals and the eyes are almost equally spaced. The carapace of the female allotype is 2.37 mm long, 1.75 mm wide, with a submarginal light band. The eye arrangement is similar to that of the holotype except the anterior median eyes are closer to the laterals than to each other.

Description of male.—From Morrilton, Conway Co., Arkansas, 14 June 1961. Carapace 1.93 mm long, 1.35 mm wide, with a wide marginal light band and tuning-fork pattern. (Note: This male and one of the other two males in the same vial have a trace of marginal pigment and the male in the same vial with the female described below has a definite submarginal light band on the carapace.) Dorsum of abdomen heavily pigmented, with light hastate area and indications of paired light spots. Coxae and endites light amber, unpigmented; labium and venter lightly pigmented; sternum light with marginal blotches of pigment. Anterior eye row narrower than the posterior median row, almost straight; anterior median eyes twice as large as laterals, closer to laterals than to each other. Clypeus about as high as the diameter of an anterior median eye. Lower margin of the



Figs. 233-237.—*P. sylvanus*: 233, holotype male, Georgia, 2 mi. E. Sylvania; 234, allotype female, Georgia, 2 mi. E. Sylvania; 235, holotype, palpus, 236, allotype, epigynum; 237, epigynum, Arkansas, Conway.

furrow of the chelicerae with three unequal teeth, middle tooth the largest and closer to the lateral, which is the smallest, than to the median.

The median apophysis of the palpus of *P. sylvanus* somewhat resembles that of *P. apacheanus*, both in shape and in having a light-colored tip. The palpus of *P. sylvanus* is distinguished by the presence of a straight-edged shelf-like structure proximad of the base of the median apophysis (Fig. 235).

Legs 4123, femora faintly banded. Tibiae I with eight ventral and lateral spines, the four proximal spines long, overlapping and ventral in position; the distal pair is apical in position. Tibiae II with eight ventral and lateral spines; the ventral prolateral spines are reduced almost to bristles; the distal pair of spines are apical in position.

Description of female.—From Cove Creek, Washington Co., Arkansas, V-10-61, No. L-70. Carapace 2.60 mm long, 1.80 mm wide, with a distinct submarginal light band, and tuning-fork pattern. Dorsum heavily pigmented, with a narrow light hastate mark and four pairs of spots covered with white scales. Ventral surface yellowish amber except for scattered pigment in the center of the venter and narrow streaks of pigment along the edge of the sternum. Anterior eye row narrower than the median row, slightly procurved; anterior median eyes twice as large as laterals, somewhat closer to laterals than to each other. Clypeus height equals a diameter of an anterior median eye. Lower margin of the furrow of the chelicerae with three almost equally spaced teeth, the middle tooth the largest, the other two almost equal in size.

The epigynum of *P. sylvanus* is unlike that of any other *Pirata* that we have examined (Fig. 236-237). Legs 4123, very faintly pigmented; the femora have a suggestion of annulations. Tibiae I with five long overlapping ventrolateral spines; distal apical spines not developed. Tibiae II with four ventral spines and one spine lateral in position, the proximal retrolateral spines longer than the prolaterals; distal spines not developed.

Variation.—*P. sylvanus* specimens are usually lightly pigmented. They may appear to have a marginal or submarginal light band on the carapace depending upon the amount of pigmentation; the same holds true for the legs. The femora may be lightly banded; we recorded one male with banded legs. The size appears to be nearly uniform, male carapaces averaging around 1.9 mm by 1.4 mm and the females 2.3 mm by 1.7 mm. Arkansas specimens may be smaller: males with carapace 1.7 mm long, females 1.5 mm long.

The median apophysis of the male palpus usually has a light colored tip, but this is not true for some heavily sclerotized specimens.

Distribution.—Southeastern United States. The records from Missouri, Tennessee, and Virginia are based on females and should be considered tentative until confirmed by the collection of males. The only record from Georgia is that from the types.

Specimens examined.—*Arkansas*: Bradley, Conway, Washington Counties; *Georgia*: 2 mi. E. Sylvania, Screven Co., Apr 17, 43, W 81° 35', N 32° 43', W.I., male holotype, female allotype (A.M.N.H.); *Louisiana*: Hamburg, W.M.B., V-63, 4 males, 29-IV-63, 6 males, female; *Missouri*: Rolla, Phelps Co., X-48, H.E.F., female (H.E.); *North Carolina*: Weaverville, Buncombe Co., V-26-34, H.K.W. 332, male, female (H.K.W.); *Tennessee*: Kingston, Roane Co., 7-12-33, W.I., 16 females (Utah); *Virginia*: Amissville, Rappahannock Co., 8-18-39, R.V.C., female (Utah).

Life history.—Males have been collected from April into September and females from April into October. The only egg sac we have examined from a dated collection is from October.

Ecology.—Most of the specimens we have examined are from pitfall traps and most of those are from Arkansas: from traps in cotton, sorgham and alfalfa fields and in pastures. It also has been collected under stones near ponds and creeks.

Remarks.—*P. sylvanus* is larger than *P. apalacheus*; their palps are somewhat similar, but their epigyna are quite different. The anterior eye row in *P. apalacheus* is distinctly procurved while in *P. sylvanus* it is straight or only slightly procurved. The epigyna of *P. alachuus* and *P. sylvanus*, resemble each other superficially, but in the former there are openings on the ventral surface of the lobes of the epigynum (Figs. 8, 173-174), while in the latter the openings are on the posteromedial edge of the lobes (Figs. 12, 237).

ABBREVIATIONS

A.E., anterior eyes; A.L.E., anterior lateral eyes; A.M.C., A. M. Chickering; A.M.E., anterior median eyes; A.M.N.H., American Museum of Natural History; A.R.E., anterior row of eyes; B.J.K., B. J. Kaston; B.M.N.H., British Museum (Natural History); C.A.S., California Academy of Sciences; C.D.D., C. D. Dondale; C.G., Clarence Goodnight; D., diameter; D.C.L., Donald C. Lowrie; D.E.B., David E. Bixler; D.J.B., D. J. Buckle; D.P.I., Division of Plant Industry, University of Florida, Gainesville; E.S.G.R., E. S. George Reserve, Pickney, Michigan; H.E., Harriett Exline; H.E.F., Harriett Exline Frizell; H.G.P., Hillary G. Parrish; H.K.W., H. K. Wallace; J.A.B., J. A. Beatty; J.E.C., J. E. Carico; J.H.E., J. H. Emerton; K.P., Kenneth Prestwich; M.C.Z., Museum of Comparative Zoology; O.S.U., Oklahoma State University; P.L.E., posterior lateral eyes; P.M.E., posterior median eyes; P.M.R., posterior median row of eyes; P.R.E., posterior row of eyes; R.E.L., Robin E. Leech; R.I.B.O., Research Institute, Belleville, Ontario; R.O.M.Z., Royal Ontario Museum of Zoology; R.V.C., R. V. Chamberlin; S.C.B., Sherman C. Bishop; T.F.L., T. F. Hlavac; T.H.H., Theodore H. Hubbell; T.R.R., T. R. Renault; U.C.R., University of Costa Rica; U.F., University of Florida; U.F.C.R., University of Florida Conservation Reserve, Welaka; Utah, R. V. Chamberlin collection, now in the A.M.N.H.; W.B.P., William B. Peck; W.I., Wilton Ivie; W.J.G., Willis J. Gertsch; W.M.B., William Morton Barrows.

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