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.

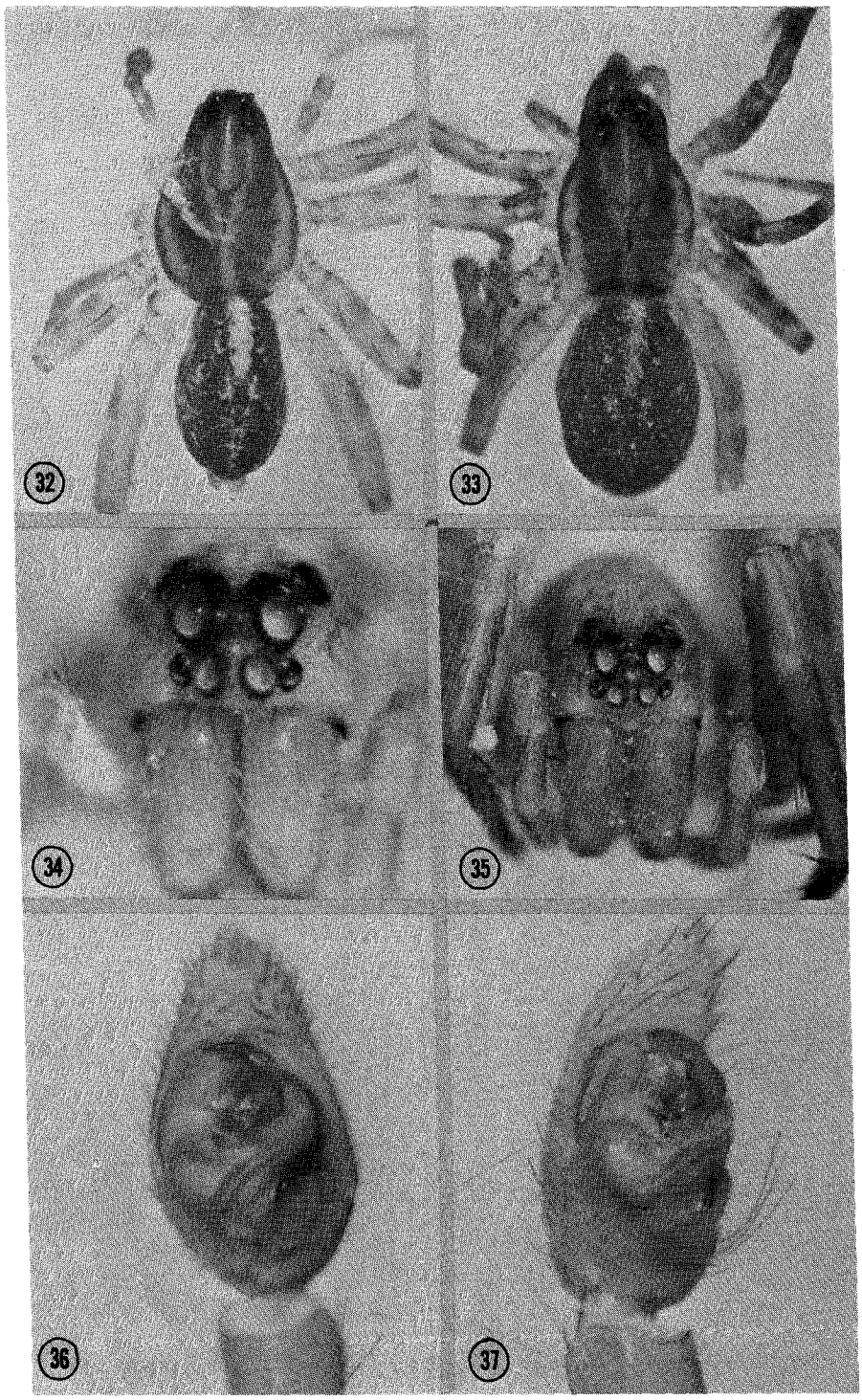
The median apophysis of *P. seminola* lacks the proximal process of *P. nanatus* and *P. welakae*, n. sp.

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.

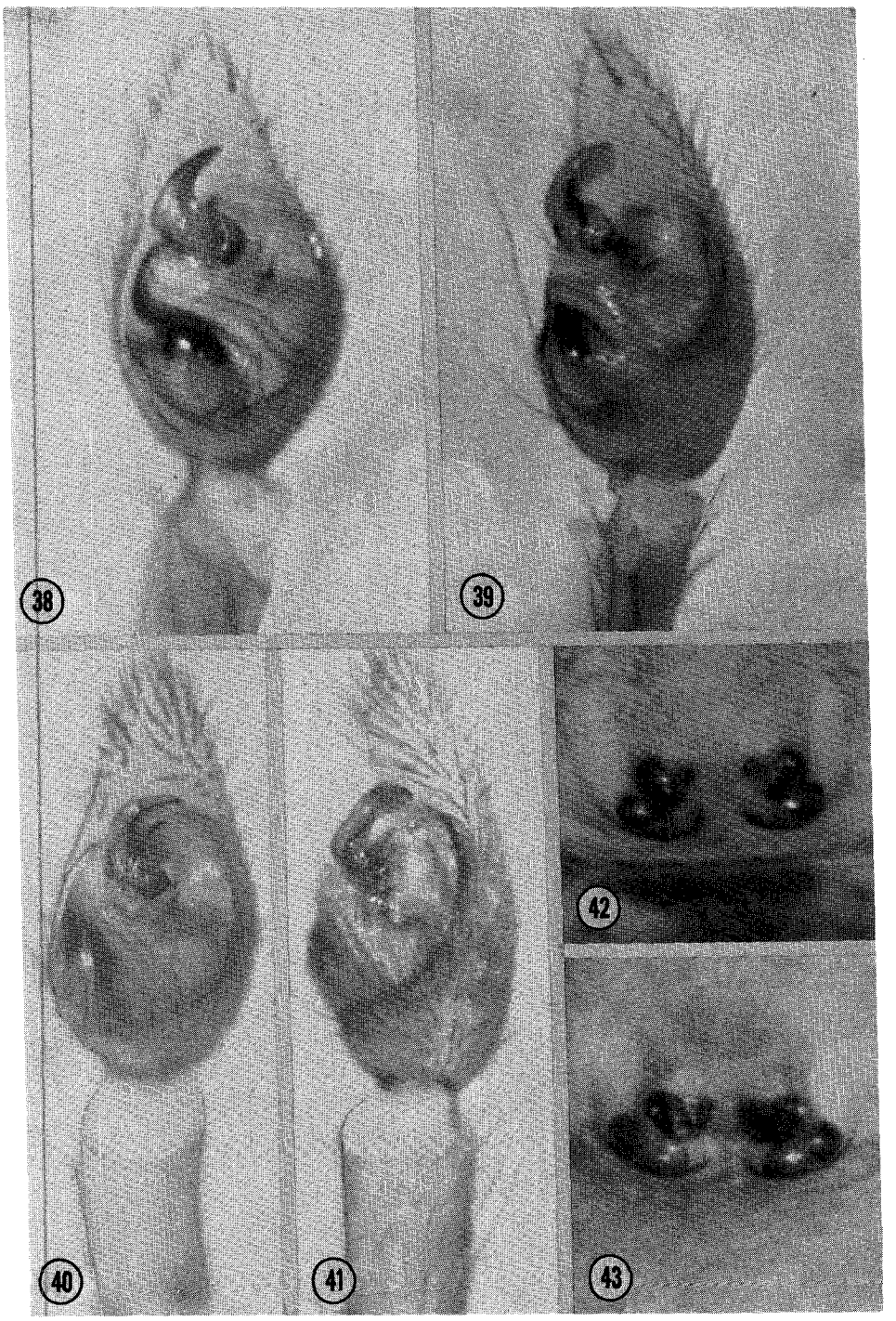
The angle which the distal process makes with the body of the median apophysis appears to vary in Arkansas males. In some it is almost 90 degrees and the tip does not extend much beyond the rim of the excavation of the cymbium. In others (Fig. 38) the median apophysis is rotated so that the angle appears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

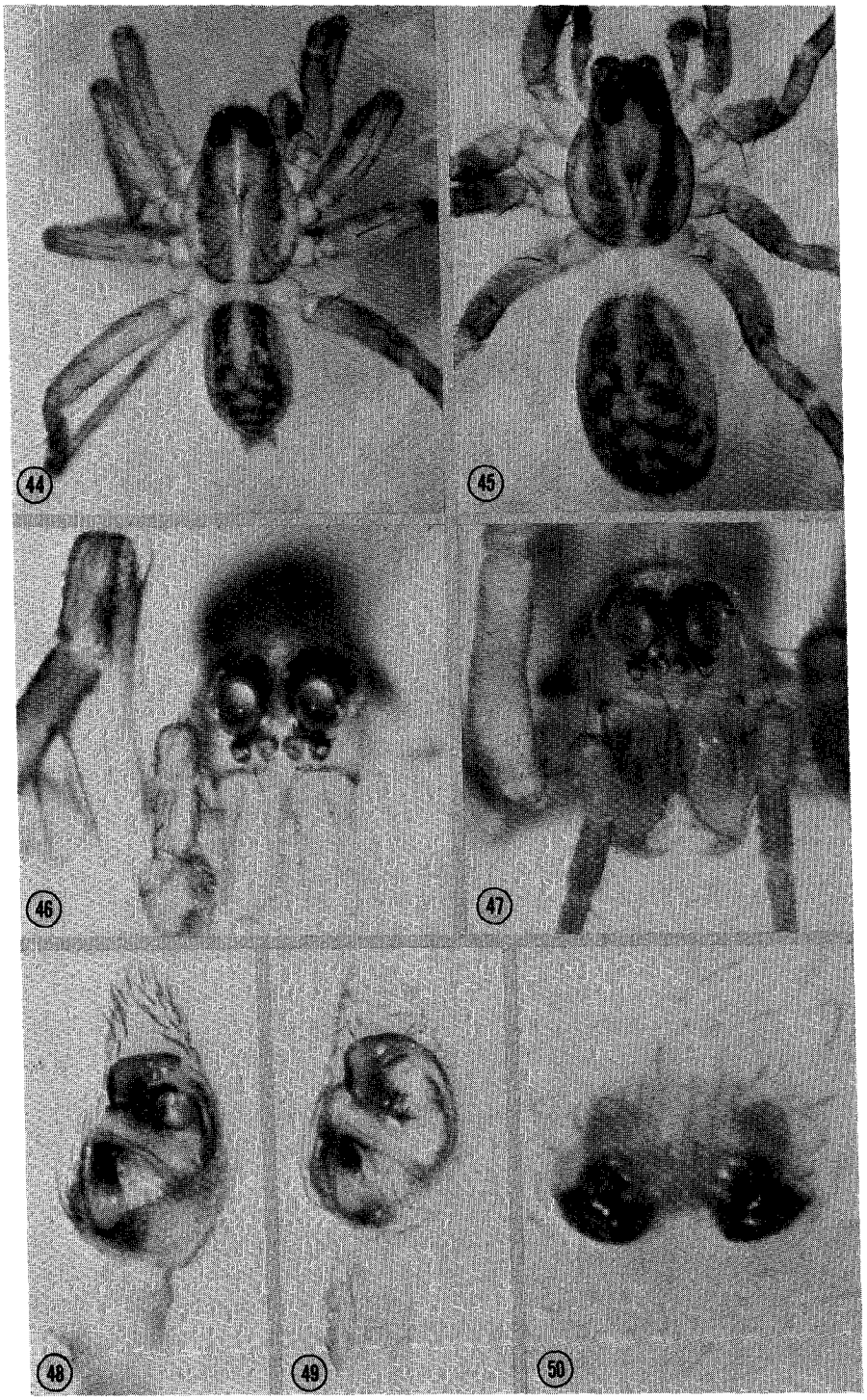
Distribution.—Columbia and Putnam Counties, Florida.

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



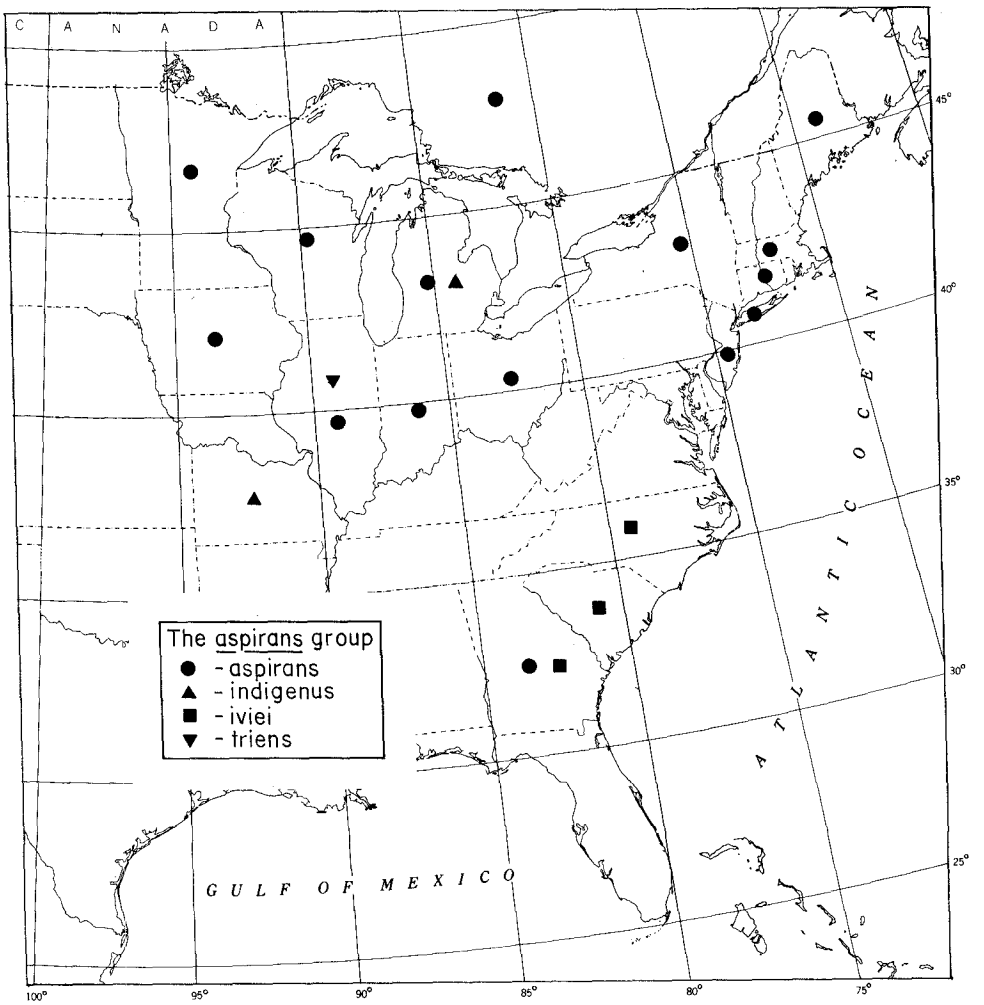
Figs. 44-50.–*P. welakae*, n. sp.: 44, holotype male, Florida, Putnam Co.; 45, allotype female, Florida, Putnam Co.; 46, holotype, eyes; 47, allotype, eyes; 48-49, holotype, palp; 50, allotype, epigynum.

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. davisi*, 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. davisi*, 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 checlicerae 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.

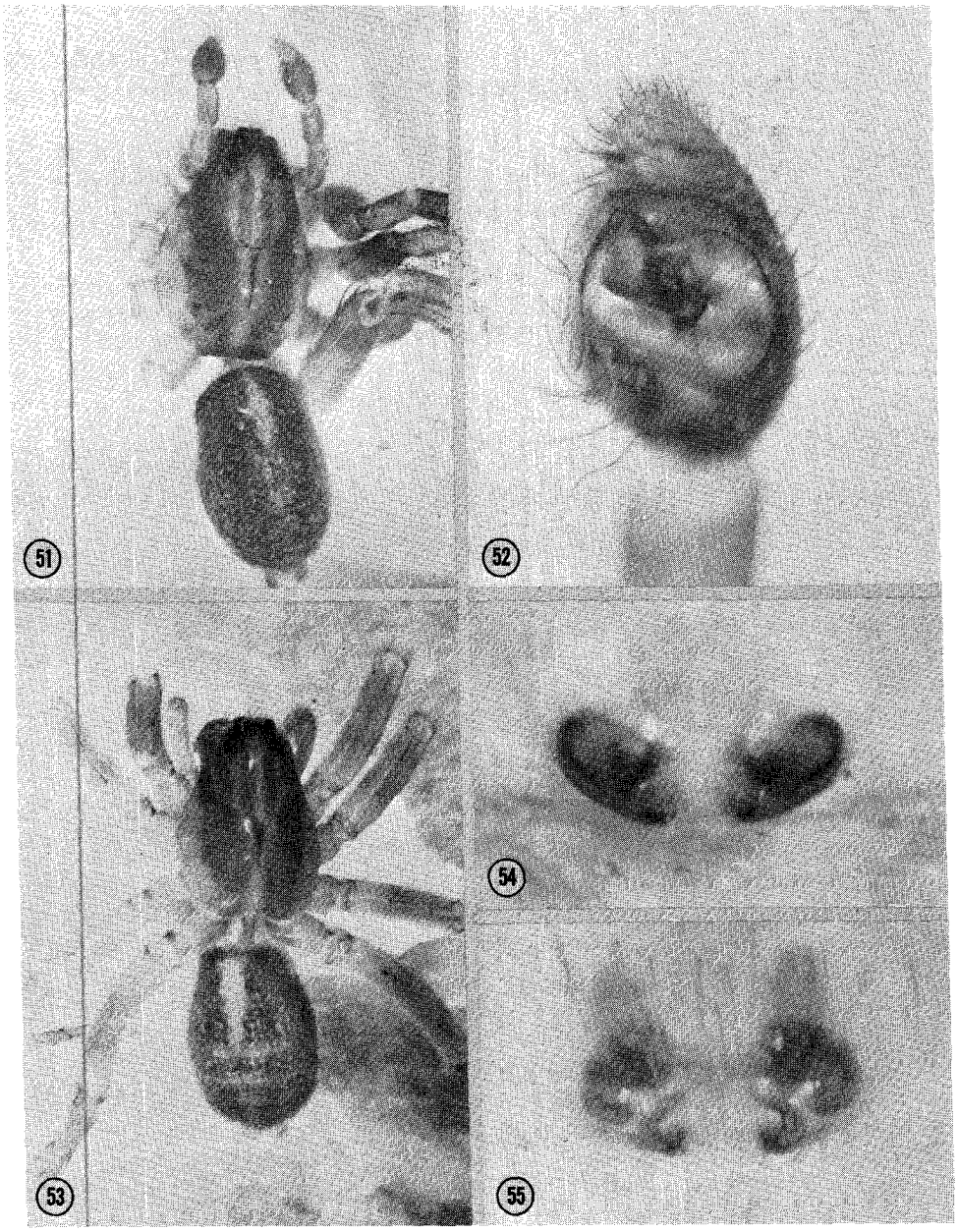
Variations and observations.—This species resembles *P. piraticus* in appearance with its wide marginal light area, although sometimes it appears to have a submarginal light area. Michigan specimens have distinctly banded legs. Five females from Crosswick, New Jersey, have an epigynum that looks different; 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.

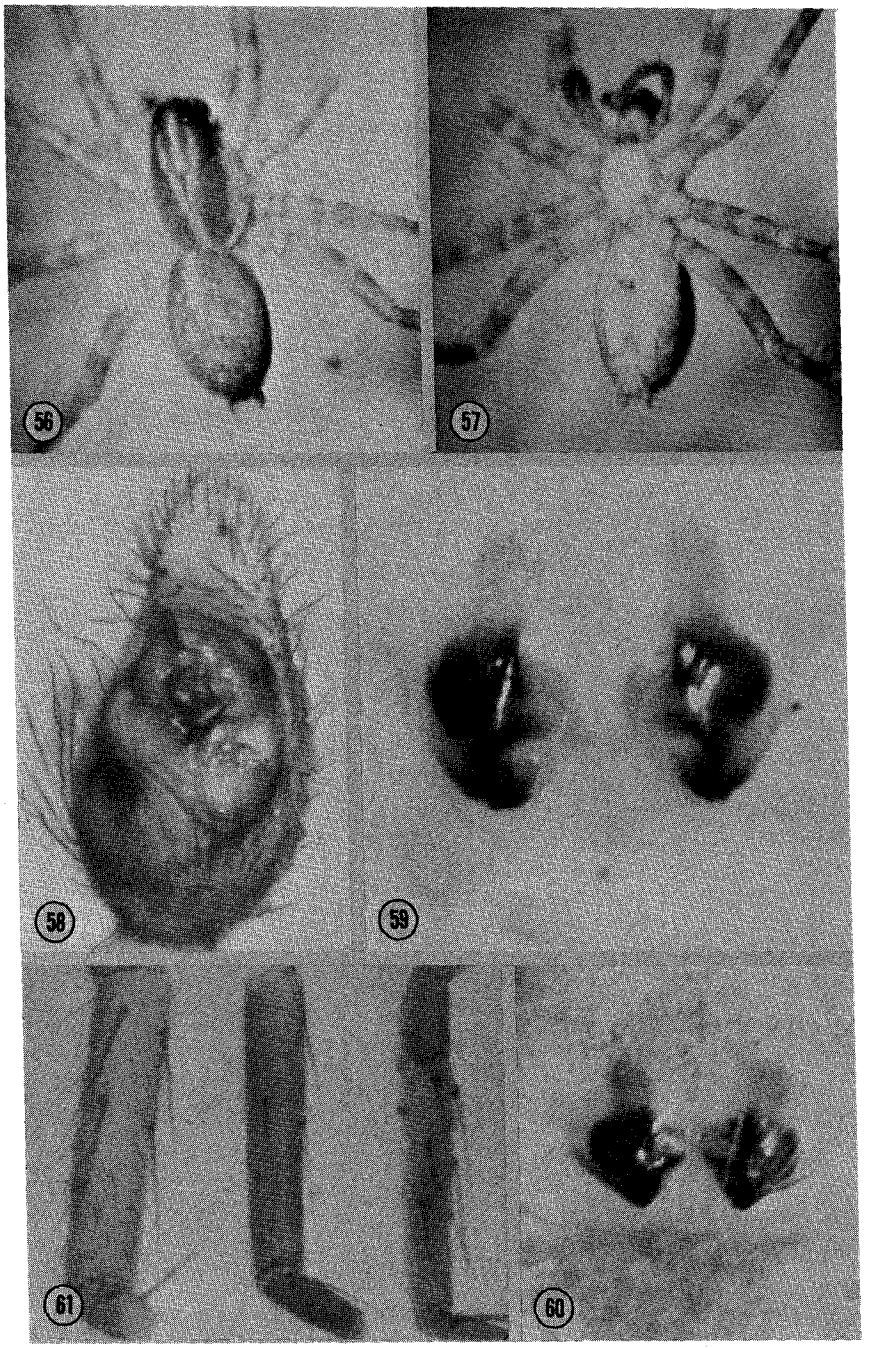
Specimens examined.—Canada: *Ontario*; *Quebec*. United States: *Connecticut*: Fairfield, Litchfield, New Haven Counties; *Georgia*: Floyd County; *Illinois*: Adams, Cook, Lake, Lee Counties, Volo; *Indiana*: Porter County; *Iowa*: Cerro Gordo and Dickinson Counties; *Maine*: Knox County, Isle au Haut; *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 1. 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 dubius. 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. arencola* 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.