

NEARCTIC SPECIES OF THE WOLF SPIDER GENUS *RABIDOSA* (ARANEAE: LYCOSIDAE)

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ABSTRACT. The previously monotypic North American spider genus *Rabidosa* Roewer is characterized and expanded to include five species: *Rabidosa rabida*, *R. santrita*, *R. punctulata*, *R. carrana* and *R. hentzi*, all originally described under *Lycosa*. Descriptions, diagnoses, illustrations, distribution maps, natural history notes (where known), a provisional phylogeny, and an identification key are provided for these five species.

This investigation is part of a study of the systematics of the Nearctic Lycosidae, focused primarily upon those wolf spiders described in the genus *Lycosa*. Well over 50 species of medium-to-large size wolf spiders from the Nearctic Region have been described in this genus. Studies of *Lycosa* by the senior author over the past 15 years have disclosed considerable heterogeneity in taxonomic characters such as color patterns, eye arrangement, and genitalic features of males and females. Comparison of *Lycosa tarentula* Linnaeus, the type species of the genus *Lycosa*, with North American species of *Lycosa* discloses few similarities in these characters. Because of this, Dondale & Redner (1990) have transferred many of the large species of North American wolf spiders formerly placed in *Lycosa* to the genus *Hogna*. The generic name *Hogna* was first used by Simon (1885) for the species known as *Lycosa radiata* Latreille, which is apparently related to North American species in genitalic characteristics.

In preliminary studies, certain shared characteristics (color pattern, genitalic characters, leg length relative to body dimensions, and eye-row relationships) were used to distinguish distinct groups of species placed in *Lycosa*. *Trochosa* as defined by Brady (1979), *Varacosa* separated from *Trochosa* by Jiménez & Dondale (1987), *Gladicosa* established by Brady (1986), and *Rabidosa*, described here, contain species formerly placed in *Lycosa*. The scrutiny and definition of these four genera should prove useful in determining the evolutionary relationships of the remaining

North American species described under *Lycosa*. With these genera as yardsticks, an attempt will be made to establish synapomorphies at the species group or generic level.

This study is centered upon a group of species formerly described as *Lycosa rabida*, *L. punctulata*, *L. santrita*, *L. carrana* and *L. hentzi*, and treated as the genus *Rabidosa*. These species were closely examined to determine their relationships to one another. Similarities in dorsal color pattern, structure of the male and female genitalia, behavioral features, habitat preferences, and geographic distribution were considered in the attempt to evaluate their evolutionary relationships.

Genus *Rabidosa* Roewer

Lycosa (part). Walckenaer 1837: 320. Hentz 1844: 390; 1875: 31, 32. Marx 1883: 25; 1890: 563; 1892: 160. Emerton 1885: 490, 491; 1902: 76; 1909: 206; 1914: 149, 150, 157. Stone 1890: 422, 427. Banks 1892: 66; 1895a: 91; 1895b: 205; 1898: 268; 1899: 189; 1900: 538; 1901a: 183; 1901b: 587; 1904: 134, 135; 1907: 744; 1910: 56, 57; 1911: 454; 1916: 81. Simon 1898: 329, 330, 346. Tullgren 1901: 21. Montgomery 1902: 537, 552, 553; 1903a: 72, 77; 1903b: 647; 1904: 277, 288, 289. Scheffer 1905a: 119; 1905b: 190; 1906: 126. Bryant 1908: 85, 86; 1934: 38. Chamberlin 1908: 224, 253, 256. Petrunkevitch 1911: 561, 565, 566. Bilsing 1913: 215. Comstock 1913: 628, 637; 1940: 643, 648. Barrows 1918: 314. Bishop 1924: 11. Bishop & Crosby 1926: 208. Crosby & Bishop 1928: 1067. Ewing 1933: 173, 193. Worley & Pickwell 1931: 91, 95. Banks et al. 1932: 32. Newport 1932: 46. Chickering 1935: 584. Gertsch & Wallace 1935: 18. Jones 1936: 69. Kaston 1938: 184; 1948: 321, 322, 324, 325; 1953: 150, 151; 1972: 204; 1978: 194, 195; 1981: 321, 322, 324, 325, 932. Wallace 1937: 108. Chamberlin & Ivie 1942: 37; 1944: 145, 146. Gertsch 1949: 200; 1979: 187.

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Roewer 1954: 263, 278, 290, 305; 1958: 581. Bonnet 1957: 2617, 2637, 2644. Kuenzler 1958: 494. Fitch 1963: 102, 111. Eason 1964: 13. Whitcomb & Bell 1964: 45. Eason & Whitcomb 1965: 11. Whitcomb 1967: 1. Gaddy & Morse 1985: 67, 92, 133. Dondale & Redner 1990: 35, 38, 41.

Dolomedes (part). Walckenaer 1837: 347.

Isohogna (part). Roewer 1954: 263.

Megarctosa (part). Roewer 1954: 278.

Rabidosa Roewer 1954: 290; 1959: 581.

Varacosa (part). Roewer 1954: 305.

Hogna (part) Dondale & Redner 1990: 35, 38, 41.

Type species.—*Lycosa rabida* Walckenaer by original designation.

Etymology.—The generic name is derived from the Latin *rabidus* (to rave) and the Greek *osa* (full of, like). Freely translated this would be “fierce.”

Diagnosis.—*Rabidosa* may be distinguished from other lycosid genera by the following combination of characters: 1. Carapace with pale background color (pale yellow to brownish yellow), and with pair of dark brown to black, relatively broad longitudinal stripes from clypeus to posterior declivity (except *R. hentzi*); 2. Dorsum of abdomen with dark brown median stripe flanked by lighter yellowish color (except *R. hentzi*); 3. Legs relatively long when compared to body (i. e., longer than in *Trochosa*, *Varacosa*, *Gladicosa*, and most species now in *Hogna*); 4. Legs without distinct annulations; 5. Palpus with two terminal apophyses which are slender, sickle-shaped; 6. Median apophysis with spur near base; 7. Spider non-burrowing; and, 8. Spider preferring grassy vegetation and/or small shrubs for substrate rather than bare ground or leaf litter.

Description.—Total length 8.1–27.0 mm. Carapace length 4.1 to 12.4 mm; width 3.2–9.1 mm. See Tables 1–5 for further dimensions. Carapace viewed dorsally, narrowing at level of PLE row; smoothly convex along lateral margins with posterior margin concave; viewed laterally essentially the same height from eye region to posterior declivity (highest point is posterior cephalic region in front of dorsal groove with the carapace sloping slightly anteriorly). Dorsal groove long, distinct. Cephalothorax (Figs. 1–4, 6–9) ground color cream or pale yellow to brownish yellow with a pair of conspicuous longitudinal dark brown to black stripes, except *R. hentzi* (Figs. 5, 10). Abdomen (Figs. 1–4, 6–9) with a median dorsal dark stripe surrounded by paler yellowish on each side, except *R. hentzi* (Figs. 5, 10).

Anterior median eyes (AME) slightly larger than anterior lateral eyes (ALE). Anterior eye row much narrower than posterior median eye row (PME) with dorsal tangent slightly procurved. Posterior lateral eye row (PLE) much the widest (see Tables 1–5).

Chelicerae dark reddish brown to black; anterior and posterior margins each with three teeth; the anterior teeth more closely spaced.

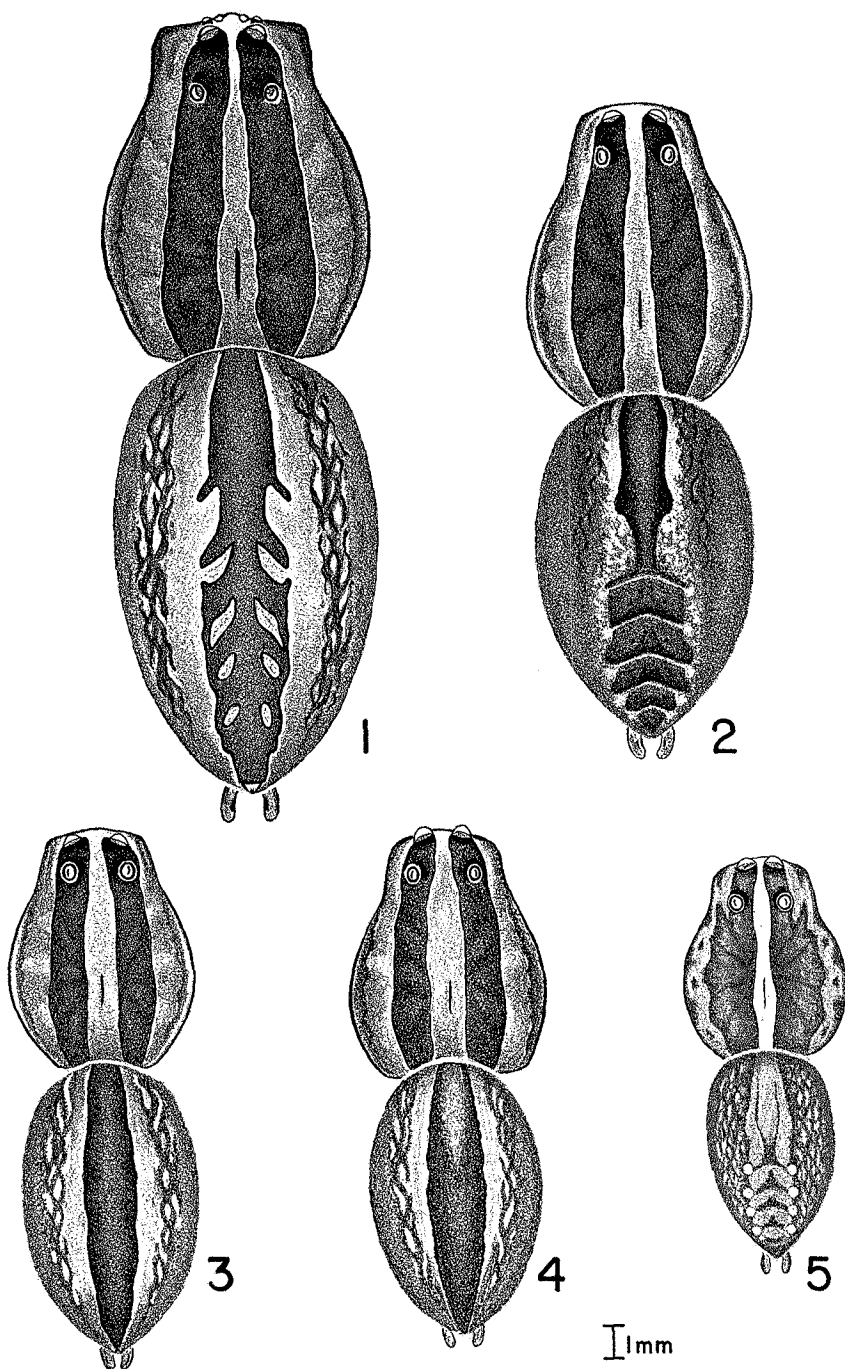
Legs when compared to body dimensions relatively longer than in *Trochosa*, *Varacosa*, and *Gladicosa*, without distinct annulations; yellow, yellow-orange to golden brown, becoming darker distally. In the male of *R. rabida* most of leg I is dark brown to black. Order of leg length IV–I–II–III.

Tibial macrosetation from basal to apical region. *Female*: leg I, 2-2-2 ventral, 1-1 prolateral; leg II, 2-2-2 ventral, 1-1 prolateral; leg III, 2-2-2 ventral, 1-1 prolateral, 1-1 retrolateral, 1-1 dorsal; leg IV, 2-2-2 ventral, 1-1 prolateral, 1-1 retrolateral, 1-1 dorsal. *Male*: Tibial macrosetation of male is the same with the addition of: leg I, 1-1 retrolateral, 0-1 dorsal; leg II, 1-1 retrolateral, 0-1 dorsal.

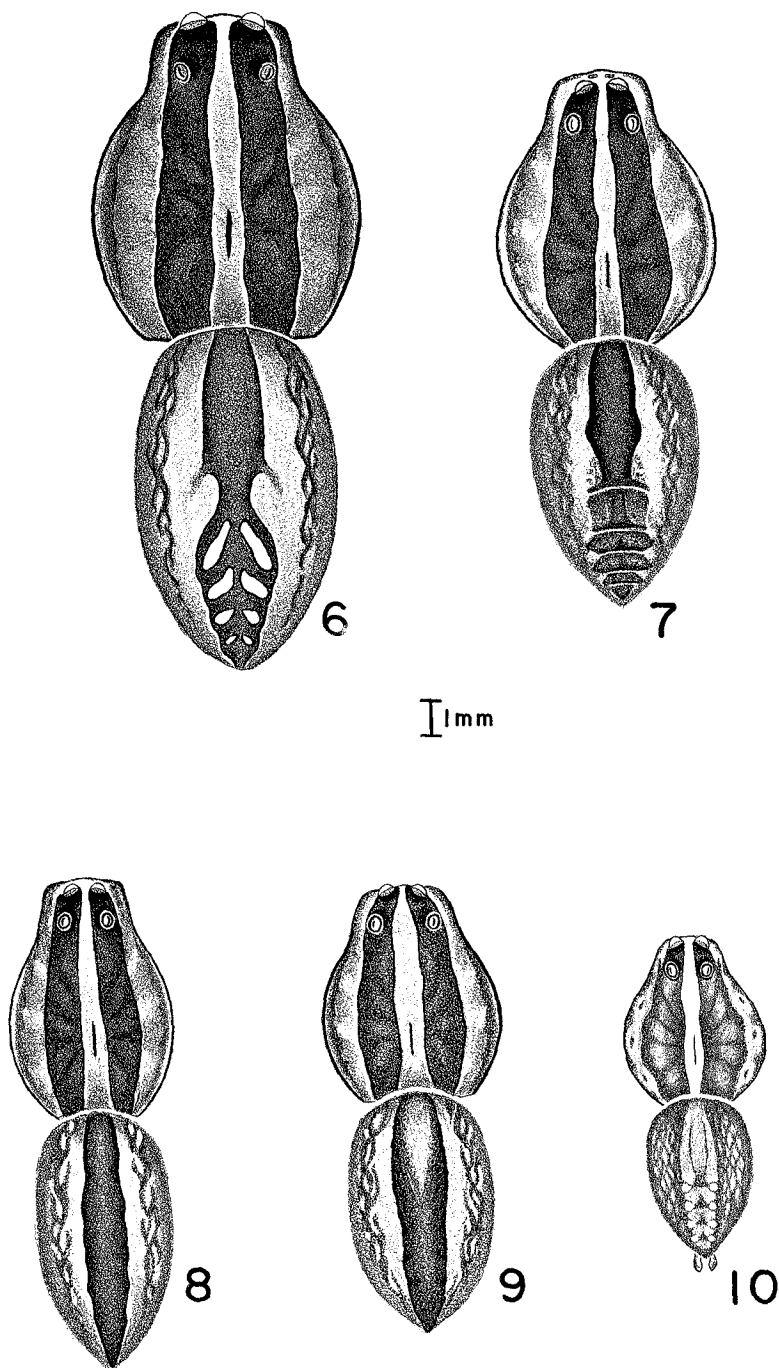
Dorsal abdominal pattern with a broad median longitudinal dark stripe; either solid dark brown or black in *R. punctulata* and *R. carrana* (Figs. 3, 4, 8, 9) or the posterior half with white spots in *R. rabida* (Figs. 1, 6) or chevrons in *R. santrita* (Figs. 2, 7); or light with dark chevrons in *R. hentzi* (Figs. 5, 10). Venter of abdomen with median area cream to light beige; lateral areas often marked with spots of darker hair in *R. rabida*, *R. santrita*, and *R. hentzi*. Sternum cream to light tan. Venter with large black spots (*R. punctulata*), or black with six white spots (*R. carrana*).

Epigynum (Figs. 13, 14) with median septum in shape of inverted “T” lying in deep atrium (*at*). Longitudinal piece (*lp*) longer than width of transverse piece (*tp*). Distinct hood (*hd*), with deep, paired openings, situated at anterior end of septum. Spermathecae (*sp*) round to ovoid; distinctly different in each species.

Male palp with stridulatory file at retrolateral apex of tibia. Cymbium with cluster of macrosetae at tip, with stridulatory scraper at retrolateral base. Male palpal sclerites as seen in ventral and retrolateral view (Figs. 11, 12): palea (*pa*) rounded with sclerotized knob at base, traversed by sclerotized ridges or anelli (*an*); embolus (*em*) curving counter clockwise and drawn into a fine, hair-like structure, except in *R. punctulata* where



Figures 1-5.—Dorsal views of female *Rabidosa*: 1. *R. rabida* (Walckenaer), Sherman, Grayson Co., Texas, 25 July 1963; 2. *R. sanrita* (Chamberlin and Ivie), Madera Canyon, Santa Rita Mtns., Santa Cruz Co., Arizona, 9 Sept. 1941; 3. *R. punctulata* (Hentz), New Canaan, Fairfield Co., Connecticut, Sept. 1955; 4. *R. carrana*, Tybee Island, Chatham Co., Georgia, 5 Dec. 1962; 5. *R. hentzi* (Banks), Gainesville, Alachua Co., Florida, 14 June 1935.



Figures 6–10.—Dorsal views of *Rabidosa* males: 6. *R. rabida* (Walckenaer), Sherman, Grayson Co., Texas; 25 July 1963; 7. *R. sanrita* (Chamberlin and Ivie), Madera Canyon, Santa Rita Mtns., Santa Cruz Co., Arizona, 9 Sept. 1941; 8. *R. punctulata* (Hentz), New Canaan, Fairfield Co., Connecticut, Sept. 1955; 9. *R. carrana* (Bryant), Tybee Island, Chatham Co., Georgia, 5 Dec. 1962; 10. *R. hentzi* (Banks), Umatilla, Lake Co., Florida, 14 June 1935.

it is flattened and blade-like (Fig. 19). The embolus is supported by two sickle-shaped terminal apophyses, the first (*sta*) partly hidden by the tegulum (*tg*) and supporting the tip of the embolus subterminally, the second (*ta*) paralleling the tip of the embolus. Both the first apophysis and the tip of the embolus rest within the cup-like tegular lobe, considered to be the conductor (*cd*). Median apophysis (*ma*) with a flattened ridge extending retrolaterally and coming to a point near the margin of the cymbium (*cy*), and with heavily sclerotized spur directed medially.

METHODS

Methods and techniques of measurement are as described for *Trochosa* (Brady 1979). Measurements of 10 males and 10 females of each species are listed in mm and the mean and standard error (SEM) are given.

Color descriptions are based upon appearance of most specimens illuminated by microscope lamp and observed under low power of the dissecting microscope. Under "Records" specific localities are given for uncommon species and for the peripheral localities of common species; otherwise localities of specimens examined are indicated by counties.

Key To Species of *Rabidosa*

- 1a. Abdomen without median dorsal longitudinal dark stripe. Central area of abdomen lighter in color than lateral areas (Figs. 5, 10). Male and female genitalia as in Figures 27–30 *hentzi*
- 1b. Abdomen with median dorsal longitudinal dark stripe, flanked by lighter color (Figs. 1–4, 6–9) 2
- 2a. Dorsal longitudinal dark stripe on abdomen enclosing four pairs of white spots posteriorly (Figs. 1, 6). Male and female genitalia as in Figs. 11–14 *rabida*
- 2b. Dorsal longitudinal dark stripe on abdomen traversed by white chevrons (Figs. 2, 7), or solidly dark (Figs. 3, 4, 8, 9) 3
- 3a. Dorsal longitudinal dark stripe interrupted by white chevrons (Figs. 2, 7). Male and female genitalia as in Figs. 15–18. Restricted to Arizona *santrita*
- 3b. Dorsal longitudinal dark stripe solid in color (Figs. 3, 4, 8, 9), eastern United States 4
- 4a. Venter of abdomen posterior to epigastric furrow pale brownish yellow with irregular pattern of large black spots. Male and female genitalia as in Figs. 19–22 *punctulata*
- 4b. Venter of abdomen posterior to epigastric

furrow black with three pairs of white spots.

Male and female genitalia as in Figs. 23–26

..... *carrana*

Rabidosa rabida (Walckenaer)

Figs. 1, 6, 11–14. Map 1

Lycosa rabida Walckenaer 1837: 320. Female holotype from New York State, destroyed. Banks 1901b: 183; 1904: 135; 1910: 57; 1911: 454. Petrunkevitch 1911: 565. Bishop & Crosby 1926: 208. Crosby & Bishop 1928: 1067. Worley & Pickwell 1931: 95. Banks et al. 1932: 32. Newport 1932: 46. Kaston 1938: 184; 1948: 321, 322, 324, pl. 40, figs. 1077–1079, pl. 58, fig. 2006 ♂; 1953: 151, fig. 381; 1972: 204, fig. 465; 1978: 195, fig. 498; 1981: 321, 322, 324, 932, pl. 40, figs. 1077–1079, pl. 58, fig. 2006, ♂. Wallace 1937: 108. Comstock 1940: 643, 648, fig. 723, ♀. Chamberlin & Ivie 1944: 146. Gertsch 1949: 200, 1979: 187. Bonnet 1957: 2617. Fitch 1963: 111, fig. 49, ♀. Eason 1964: 13. Whitcomb & Bell 1964: 45. Eason & Whitcomb 1965: 11. Gaddy & Morse 1985: 67, 92, 133.

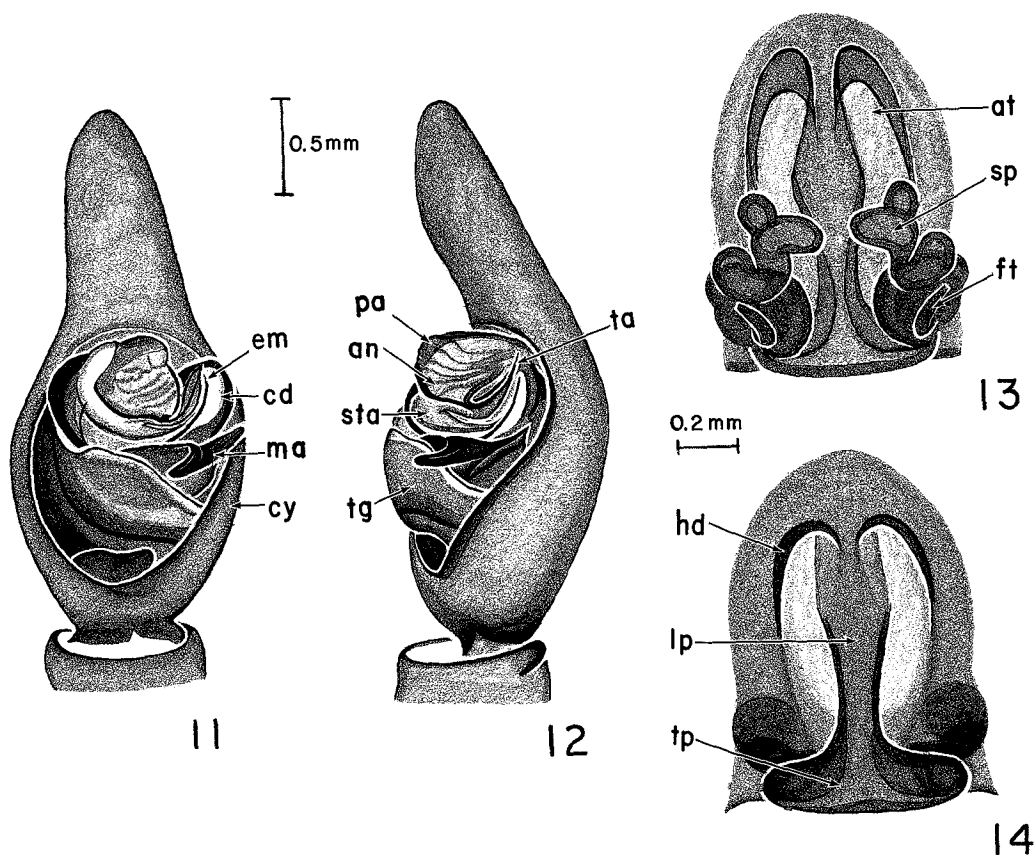
Lycosa scutulata Hentz 1844: 390, pl. 18, figs. 1, 2, ♂. Male and female syntypes from Alabama, destroyed. Hentz 1875: 32, pl. 4, figs. 1, 2, ♂. Marx 1883: 25; 1890: 563; 1892: 160. Emerton 1885: 491, pl. 48, fig. 2, ♀; 1902: 76, fig. 183, ♀; 1914: 149, 150, 157. Stone 1890: 422, 427. Banks 1892: 66; 1895a: 91; 1895b: 205; 1899: 268; 1900: 538; 1901a: 183; 1904: 135; 1907: 744; 1910: 57; 1911: 454; 1916: 81. Simon 1898: 329, 330, 346. Tullgren 1901: 21. Montgomery 1902: 537, 553, pl. 29, figs. 15, 16, ♂; 1903a: 72; 1903b: 647; 1904: 277, 289. Scheffer 1905a: 119; 1905b: 190. Bryant 1908: 86. Chamberlin 1908: 224, 253, pl. 17, fig. 9; pl. 18, fig. 1, ♂. Bilsing 1913: 215. Comstock 1913: 628, 637, fig. 723, ♀. Barrows 1918: 314. Jones 1936: 69.

Dolomedes lineatus Walckenaer 1837: 347 (part). First synonymized by Chamberlin & Ivie 1944: 146.

Rabidosa rabida: Roewer 1954: 290; 1959: 581.

Hogna rabida: Dondale & Redner 1990: 35, 38, 41, figs. 25–28, ♂.

Discussion. — Walckenaer (1837) first described this species from specimens collected in New York State. The description of the color pattern fits that of *R. rabida*, but there are no illustrations. John Abbot's drawing #51 (in manuscript) was labelled *Dolomedes lineatus* by Walckenaer (1837), but appears to be *R. rabida*. Many early publications from 1844 to 1936 used Hentz's name, *Lycosa scutulata*. Banks (1901a) was the first to recognize *L. scutulata* as a junior synonym of *L. rabida*, and many other authors adopted that name beginning with the catalogue



Figures 11–14.—*Rabidosa rabida* (Walckenaer), Sherman, Grayson Co., Texas, 25 July 1963. 11. left palp, ventral view; 12. same, retrolateral view; 13. internal genitalia, dorsal view; 14. epigynum, ventral view. Abbreviations: an = annuli, at = atrium, cd = conductor, cy = cymbium, em = embolus, ft = fertilization tube, hd = hood, lp = longitudinal piece of median septum, ma = median apophysis, pa = palea, sp = spermatheca, sta = subterminal apophysis, ta = terminal apophysis, tg = tegulum, tp = transverse piece of median septum.

of Petrunkevitch (1911). Roewer (1954) erected *Rabidosa* without explanation or characters to define the genus. Later Roewer (1959) characterized the new genus.

Diagnosis.—*Rabidosa rabida* is most closely related to *R. santrita* based upon similarities in size, dorsal color pattern, and male and female genitalic structure. *Rabidosa santrita* has a less prominent notch in the median longitudinal abdominal stripe and does not have paired spots in the posterior portion of the stripe (compare Figs. 1, 6 with 2, 7). Very thin transverse lines pass through the posterior portion of the median abdominal stripe in *R. santrita* and the abdominal coloration is darker. *Rabidosa rabida* is larger and longer-legged (compare Table 1 to Table 2). The male of *R. santrita* does not exhibit the

dark coloration of the first pair of legs seen in *R. rabida*. Although the epigyna of *R. rabida* and *R. santrita* are similar (compare Fig. 14 with Fig. 18), the spermathecae of *R. rabida* have anterio-lateral subchambers or bulbs that are not seen in *R. santrita* (compare Fig. 13 with Fig. 17). The species are also widely separated geographically (Map 1).

Color.—*Females*: Chelicerae dark rust brown. Face brownish yellow to pale orange-brown with dark stripes on carapace extending through anterior eye row. Eye region (nacles) black. Stripe of white hairs beginning dorsal to the anterior eye row and continuing between the PME and halfway to the PLE. Carapace (Fig. 1) brownish yellow to pale orange-brown with two broad dark brown stripes, one on either side of the mid-line,

Table 1.—Measurements of ten females and ten males of *Rabidosia rabida* from Texas.

| | Mean \pm SEM | | Mean \pm SEM |
|--------------------|------------------|------------------|------------------|
| Females | | | |
| Anterior eye row | 1.75 \pm 0.07 | Femur I | 8.88 \pm 0.41 |
| PME width | 2.36 \pm 0.08 | Patella-tibia I | 11.67 \pm 0.57 |
| PLE width | 2.73 \pm 0.12 | Metatarsus I | 7.28 \pm 0.44 |
| POQ length | 2.10 \pm 0.07 | Tarsus I | 3.45 \pm 0.14 |
| Carapace width-PLE | 4.42 \pm 0.27 | Femur IV | 10.09 \pm 0.41 |
| Carapace width | 7.34 \pm 0.42 | Total I | 31.28 \pm 1.46 |
| Carapace length | 10.08 \pm 0.58 | Patella-tibia IV | 12.55 \pm 0.54 |
| Body length | 21.22 \pm 1.24 | Metatarsus IV | 12.07 \pm 0.53 |
| Patella-tibia II | 10.59 \pm 0.55 | Tarsus IV | 4.21 \pm 0.23 |
| Patella-tibia III | 9.02 \pm 0.40 | Total IV | 38.92 \pm 1.68 |
| Males | | | |
| Anterior eye row | 1.50 \pm 0.04 | Femur I | 8.27 \pm 0.35 |
| PME width | 2.05 \pm 0.06 | Patella-tibia I | 11.06 \pm 0.44 |
| PLE width | 2.48 \pm 0.07 | Metatarsus I | 7.87 \pm 0.31 |
| POQ length | 1.82 \pm 0.05 | Tarsus I | 3.86 \pm 0.14 |
| Carapace width-PLE | 3.47 \pm 0.14 | Total I | 31.05 \pm 1.19 |
| Carapace width | 6.50 \pm 0.27 | Femur IV | 9.10 \pm 0.32 |
| Carapace length | 8.53 \pm 0.36 | Patella-tibia IV | 11.14 \pm 0.44 |
| Body length | 16.98 \pm 0.78 | Metatarsus IV | 11.20 \pm 0.45 |
| Patella-tibia II | 9.44 \pm 0.35 | Tarsus IV | 4.18 \pm 0.10 |
| Patella-tibia III | 8.09 \pm 0.33 | Total IV | 35.63 \pm 1.27 |

running longitudinally from PME to posterior declivity. Carapace bounded marginally by similar, but much thinner, dark brown stripes. Dorsum of abdomen (Fig. 1) pale brownish yellow with a wide dark brown median stripe running its full length. Stripe is notched anteriorly and encloses four pairs of cream to pale brownish yellow spots posteriorly. Area on either side of the dark median stripe is pale brownish yellow, bounded by brown speckling along sides. Venter of abdomen cream colored; median area flanked by pale brownish yellow laterally, interspersed with scattered tufts of black hair. Legs uniformly pale brownish yellow to medium brownish orange, appearing grayish distally due to thick clothing of hair on metatarsus and tarsus. Dark spot on ventral surface at distal end of tibia IV. Labium, endites, and sternum pale brownish yellow to light orange-brown.

Males: Color pattern in *R. rabida* does not differ significantly between male and female specimens, except for the dark coloration of the first pair of legs in the male. In the male the first pair of legs are dark brown to black beginning at the distal ends of the femora and extending to the distal ends of the tarsi. Carapace and dorsal abdominal pattern as in Fig. 6.

Measurements.—Ten females and ten males from Texas. See Table 1.

Natural history.—Newport (1932) reported *R. rabida* running swiftly in the upper part of grass and commonly ascending foliage of tall herbs and shrubs at night in Oklahoma. This preference for tall grass and the habit of ascending vegetation in the evening has been observed consistently by the senior author and numerous other investigators (pers. comm.). Fitch (1963) reported *R. rabida* characteristic of grassland habitats on the University of Kansas Natural History Reservation, but also indicated its presence in low herbaceous vegetation in open woodlands as well. It was most abundant in tall-grass prairie and pasture. Kuenzler (1958) noted that *R. rabida* is an active climber and abundant in the forbs and grasses of old-field ecosystems in Aiken County, South Carolina. In his study of niche relations between *Lycosa lenta*, *L. carolinensis*, and *R. rabida* occurring in the same habitat, Kuenzler (1958) noted that the primary factor separating *R. rabida* from the other two species seemed to be vertical stratification. *Rabidosia rabida* was observed above ground level in the grasses, forbs, and shrubs, while the other two species remained on or below the ground level.

Despite its large size, *R. rabida* is capable of rapid locomotion (Newport 1932; Kuenzler 1958; Fitch 1963; Brady pers. obs.). This species is not known to burrow but does build a silken retreat for egg case construction in shallow holes (Kaston 1948) and under logs. In central Texas during July 1990, Brady (pers. obs.) discovered a large hollowed-out, rotten log containing seven females with newly constructed egg sacs. Each spider had an oval nest lined thickly with silk. All egg sacs had a definite bluish cast indicating recent construction.

Jerry Rovner, who has probably observed more intently and recorded for a longer period the behavior of *R. rabida* than any other single investigator, reported courtship behavior without prior sperm induction (Rovner 1966), and the communicatory function of sound during courtship and agonistic displays in male *R. rabida* (Rovner 1967). Rovner (1968a) described the visual and chemical communication involved in pre-copulatory behavior of *R. rabida*. Pre-copulatory behavior involved reciprocal display in males and females. A pheromone released by the female elicited courtship display in the male. Later, Rovner (1968b, 1971) elucidated the mechanisms controlling copulatory behavior in *R. rabida*. Subsequently, he undertook the first quantitative study of mechanisms controlling copulatory behavior by using an event recorder to determine temporal patterning of palpal insertions and palpal moistening during copulation (Rover 1972).

Rovner et al. (1973) reported that, for newly emerged spiderlings of *R. rabida*, "spiny, knobbed hairs located dorsally on the abdomen and peculiar to adult female lycosids, apparently provided the stimulus and means for attachment by the inner layer of spiderlings." Higashi & Rovner (1975) described dismounting, drinking, and remounting behavior of recently emerged spiderlings, interactions between spiderlings and substitute parents, and the survival of young without parents.

A new type of spider stridulating organ (now known to occur widely in Lycosidae) was located by Rovner (1975) at the hidden surface of the male pedipalpal tibio-tarsal joint. In a landmark paper he demonstrated that the males stridulate by rapid oscillation at the tibio-tarsal joints. Previously it had been assumed that the sound was produced by a rapid drumming of the palps upon the substrate as in *Gladicosa gulosa* (see Brady

1986). Macrosetae at the distal tip of the palp helped to anchor this appendage and increase its "communicatory effectiveness."

Rovner & Knost (1974) proposed that post-immobilization silk wrapping by *R. rabida* is "a behavioral adaptation for life in the herbaceous stratum" and served to prevent prey from dropping downward from an elevated position when it was released by the spider during feeding, grooming, or additional efforts at prey capture.

Rovner (1980) summarized morphological and behavioral adaptations for prey capture by *R. rabida* and showed that flexor musculature for grasping strength, rapid leg extension through hydraulic mechanisms, long legs, and especially adhesive scopular hairs and erectile spines on the legs play an important role in subduing large prey. Lizotte & Rovner (1988) suggested that most nocturnal predation by *R. rabida* upon fireflies involved vibratory rather than visual stimulus.

Distribution.—Massachusetts south to Florida in the eastern USA. Southern Ontario, Michigan and Minnesota in the north central USA, south to the tip of Texas and the northern Gulf Coast of Tamaulipas, Mexico. *Rabidosa rabida* reported from other parts of Mexico and Central America probably represent closely related, but different species (Map 1).

Records.—CANADA. Ontario: Windsor, 18 May–6 July 1976, 2♂; 8 July–27 Aug. 1976, 2♂ (C. D. Dondale & J. H. Redner). UNITED STATES. Massachusetts: Barnstable Co.: Wood's Hole, 1 Sept. 1883, 3♀ (J. H. Emerton); Dukes Co.: Martha's Vineyard, Sept. 1925, 2♀; Middlesex Co.: Cambridge, 31 Aug. 1946, 1♀ with egg sac. Connecticut: Fairfield; New Haven; New London. New York: Kings; Nassau; Orange; Suffolk; Queens. New Jersey: Bergen; Mercer; Middlesex; Morris; Passaic. Pennsylvania: Adams; Chester; Mifflin; Northampton; Wabash; Westmoreland. Ohio: Champaign; Fairfield; Hocking; Mercer; Muskingum; Perry. Maryland: Montgomery. Dist. of Columbia. West Virginia: Mineral. Virginia: Alexandria (city); Fairfax; Falls Church (city); Fredericksburg (city); Giles; Lee; Lynchburg (city); Petersburg (city); Pittsylvania; Powhatan; Radford (city); Surry; Smyth. Kentucky: Bell; Christian; Harlan; Hart. Tennessee: Benton; Davidson; Knox; Loudon; Roane; Sevier; Shelby; Sullivan; Van Buren; White. North Carolina: Alamance; Buncombe; Carteret; Durham; Haywood; Henderson; Jackson; Madison; Mecklenburg; Moore; Orange; Union; Wake; Wilkes. South Carolina: Pickens; Spartanburg. Georgia: Clarke; Floyd; Macon; Mitchell; Towns. Florida: Alachua; Gadsden; Indian River; Lake; Levy; Monroe; Orange; Pinellas; Putnam; St. John's; Walton. Alabama: Dallas;

Etowah; Lee; Tuscaloosa. *Mississippi*: Hinds; Jackson; Lafayette; Rankin; Washington. *Louisiana*: Assumption; Caddo; East Baton Rouge; Lincoln; Madison; Orleans. *Michigan*: Livingston Co., E. S. George Reserve, 8 July 1951, 1♀ (H. K. Wallace). *Indiana*: Henry; Porter. *Illinois*: Henderson; Macoupin. *Minnesota*: Hennepin Co., Minneapolis, 1907, 2♀. *Missouri*: Atchison; Boone; Butler; Callaway; Cole; Jackson; Lincoln; St. Charles; St. Louis; Stoddard; Vernon. *Arkansas*: Faulkner; Hempstead; Lawrence; Madison; Washington. *Kansas*: Cowley Co., Winfield, 26 Oct. 1907, 1♀ (Hayhurst); Douglas Co., Univ. of Kansas Nat. Hist. Rsvn., 19–26 Aug. 1961, 2♂1♀ (A. R. Brady); Riley Co., Manhattan, 29 Oct., 1♀ (N. Banks). *Oklahoma*: Mayes Co., Chouteau, 1 Aug. 1965, 1♂ (D. C. Arnold). Payne Co., Stillwater, 10 Oct. 1967, 1♀ (R. A. Adams); 29 July–5 Aug. 1968, 2♂1♀; Rogers Co., Claremore, 27 Aug. 1948, 1♂ (C. P. Vaurie). *Texas*: Atascosa; Bandera; Bastrop; Bexar; Brazos; Cameron Co.: 25 mi. SE of Harlingen, 18 July–21 Sept. 1945, 2♀1♂ (D. E. Hardy, V. L. Woolley); 5 mi. SE of Brownsville, 26 Sept. 1937, 1♀ (L. I. Davis); Clay; Crockett Co.: Ozona, 30 Sept. 1950, 1♀ (W. J. Gertsch); Comanche; Dallas; Denton; Galveston; Grayson; Harris; Harrison; Hidalgo Co., Edinburg, 16–18 Sept. 1935, 1♂1♀2♂; Jefferson; Kendall; Kerr; Kimble; Llano; Lubbock Co., Yellowhouse Canyon, 5 mi. NE of Slaton, 5 May 1981, 1♂ (J. C. Cokendolpher); Milan; Montague; Montgomery; Refugio; San Patricio; Tarrant; Taylor; Travis; Walker; Waller; Webb; Williamson; Wilson; Wichita; Zavala. **MEXICO**. *Tamaulipas*: Tamaulipeca, July 1930, 1♂ (H. H. Bartlett, L. R. Dice).

Rabidosia punctulata (Hentz) new combination
Figs. 3, 8, 19–22; Map 2

Lycosa punctulata Hentz, 1844: 390, pl. 17, figs. 16, 17, 1♂. Male holotype from Pennsylvania, lost. Hentz 1875: 31, pl. 3, figs. 16, 17, 1♂. Emerton 1885: 490, pl. 48, fig. 1, 1♀; 1909: 206, pl. 7, figs. 4, 4a, 1♂1♀; 1914: 149, 150, 157. Stone 1890: 422, 427. Marx 1883: 25; 1890: 563; 1892: 160. Banks 1895a: 91; 1900: 538; 1904: 134; 1907: 744; 1910: 57; 1911: 454. Montgomery 1902: 537, 552, pl. 29, fig. 14, 1♀; 1903a: 77; 1904: 277, 288. Scheffer 1906: 126. Bryant 1908: 85. Chamberlin 1908: 224, 256, pl. 18, figs. 2, 3, 1♂1♀. Petrunkevitch 1911: 565. Comstock 1913: 628, 637; 1940: 643, 648. Barrows 1918: 314. Bishop 1924: 11. Bishop & Crosby 1926: 208. Crosby & Bishop 1928: 1067. Ewing 1933: 193, pl. 7. Worley & Pickwell 1931: 91, 95. Banks et al. 1932: 32. Chickering 1935: 584. Kaston 1938: 184; 1948: 325, pl. 55, figs. 1080–1084, 1♂1♀; 1953: 150, fig. 380; 1978: 194, fig. 497; 1981: 321, 322, 325, 932, pl. 40, figs. 1080–1084, 1♂1♀. Chamberlin & Ivie 1944: 145. Bonnet 1957: 2617. Fitch 1963: 102, 110, fig. 47, 1♀. Gaddy & Morse 1985: 133.

Isohogna punctulata: Roewer 1954: 263.

Hogna punctulata: Dondale & Redner 1990: 35, 38, figs. 21–24, 1♂1♀.

Discussion.—Hentz (1844) first described *Lycosa punctulata*, and subsequent authors have used that name. Roewer (1954) placed *R. punctulata* in the new genus *Isohogna* without explanation. In 1959 Roewer established *Lycosa maderiana* from the Madeira Islands, off the northwest coast of Africa, as the type species of his new genus. A strange amalgamation of *Lycosa punctulata*, *L. lenta*, *L. tigana*, *L. timuqua*, and *Schizocosa salsa* was included from the Nearctic Region.

Diagnosis.—*Rabidosia punctulata* is closest to *R. carrana* in size and dorsal color pattern (compare Fig. 3 with Fig. 4). It can be easily distinguished from *R. carrana* by the ventral color pattern of the abdomen (see Key to Species) and the structure of epigynum. In *R. punctulata* the median septum is very wide anteriorly and tapers narrowly before joining the transverse piece, and the ends of the transverse piece curve anteriorly (Fig. 22). In *R. carrana* the median septum tapers more gradually before joining the transverse piece, and the arms of the transverse piece parallel the epigastric furrow (Fig. 26). The embolus of *R. punctulata* is flared at the end (Figs. 19, 20), while in *R. carrana* the embolus tapers to a fine point at the end (Figs. 23, 24). *Rabidosia punctulata* is often confused with *R. rabida* because of the similarity of the dorsal color pattern (compare Fig. 1 with Fig. 3) and the fact that they often occur in the same grassy habitats. Close scrutiny will reveal the differences in size (compare Table 1 with Table 2) and color pattern (see Key to Species) that can be used to separate these two species.

Color.—*Female*: Chelicerae dark brown. Face pale brownish yellow with two broad dark brown longitudinal stripes passing through eye rows to lower edge of clypeus. White hairs located dorsomedial to the anterior eye row. Eye nacelles black. Carapace (Fig. 3) pale brownish yellow with two broad dark brown stripes on either side of the median line. Dark stripes beginning at PME and continuing to posterior edge of carapace. Marginal areas of carapace bounded by dark thin longitudinal stripes. White hair along extreme margin. Dorsum of abdomen (Fig. 3) with wide dark brown median stripe. Stripe with smooth edges, not interrupted by indentations or lighter spots. Pale brownish areas on each side of median stripe. Laterally the abdomen becoming heavily speckled with dark brown color that almost forms longitudinal lines. Outside of this, the abdomen is covered with fine pale hairs in-

terspersed with darker coarse hairs. Venter of abdomen very pale brownish yellow (beige) with few-to-many scattered, variably-sized dark spots. Occasionally the venter is all dark brown or black. Legs pale brownish yellow with darker fine hair covering all segments. Coxae and trochanters variably pale to dark brown and usually matching variable color of sternum. Labium and endites pale brownish yellow. Sternum pale brownish yellow, light brown, to almost black.

Male: Males are very similar to females in overall coloration. Carapace and abdominal pattern as in Fig. 8.

Measurements.—Ten females and ten males. See Table 3.

Natural history.—Stone (1890) found *R. punctulata* in grass. Montgomery (1903a) described the construction and cannibalism of an egg sac. Fitch (1963) reported that little was known of the habits of *R. punctulata* in Kansas (because it was long confused with *rabida*) but that it was primarily found in more open or barren situations than in the tall-grass habitat preferred by *R. rabida*.

Kaston (1948) indicated that in Connecticut *R. punctulata* has the same habits as *R. rabida* (but is much less common). Females mature from late June through October, and males appear in early September (but he believed they also matured in June). Eason (1964) observed egg sac construction and maternal care by *R. punctulata*. Eason & Whitcomb (1965) showed that in Arkansas, *R. punctulata* and *R. rabidosa* are reproductively isolated by distinct differences in time of maturity. There *R. rabida* matures, mates, and constructs egg sacs in midsummer and early fall, while *R. punctulata* matures and mates in late fall and constructs egg sacs early the following spring. Thus, the absence of mature males in June reported by Kaston (1948) is explained, and the life cycle of *R. punctulata* in Arkansas agrees closely with that of *R. punctulata* in Connecticut.

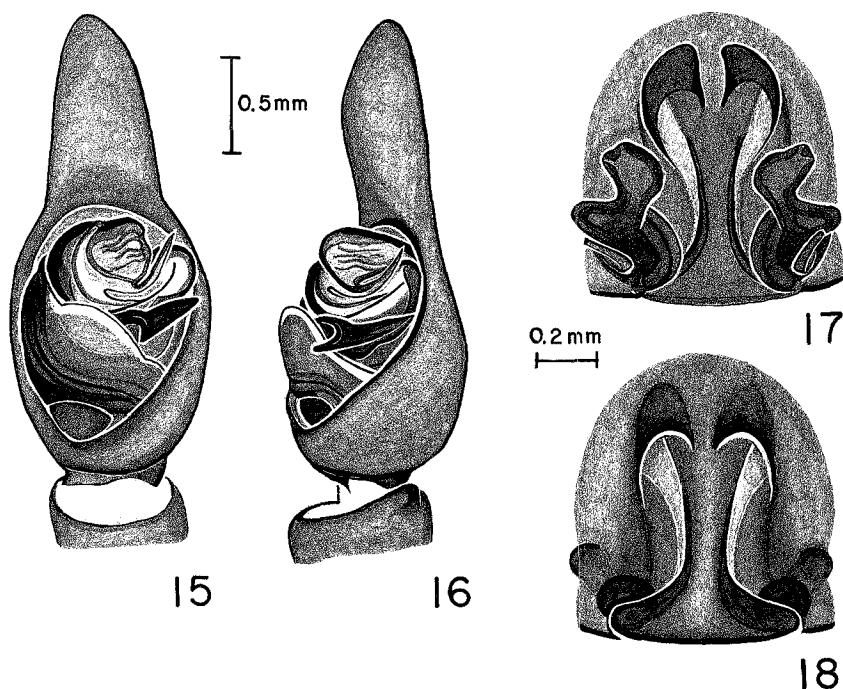
Rovner et al. (1973) determined that the spiny knobbed hairs found on the abdomen of *R. punctulata* apparently provide the stimulus and means for attachment of the newly emerged spiderlings to their mother. Long smooth, innervated setae on the abdomen are mechanoreceptors that may serve in other aspects of brood care. Rovner & Knost (1974) found that (as in *R. rabida*), *R. punctulata* may employ post-immobilization prey wrapping behavior to prevent prey from dropping to the ground as the spider rests on vegetation. Knost & Rovner (1975) demonstrated that

R. punctulata will feed upon dead arthropods in the laboratory, and perhaps scavenges in the field. Rovner et al. (1973) attempted to use *R. punctulata* as surrogate mothers for young of *R. rabida*. The young were eaten or not allowed to mount the abdomen. This may have been due to an intolerance by young female *R. punctulata* that were not advanced enough physiologically for brood carrying behavior. Rovner (1978), using a high speed camera, was able to show that the adhesive leg scopula of *R. punctulata* assists in prey capture.

Tietjen (1979, 1980) found that males of *R. punctulata* did not react to a hidden conspecific female. Tietjen & Rovner (1980) reported that males of *R. punctulata* rely more upon chemical cues in trail-following behavior (in response to draglines of females) than *R. rabida*. Rovner (1980) employed high-speed cinematography and experimentally modified morphological features to study the adaptations of lycosid spiders for capturing large, dangerous prey. Nossek & Rovner (1984) observed and recorded intraspecific agonistic behavior in *R. punctulata*. Aggressive interactions between *R. punctulata* and *R. rabida* were also reported. Lizotte & Rovner (1988) found that lab-reared *R. punctulata* were as responsive to visually simulated firefly signals as *R. rabida*, even though adult *R. punctulata* do not usually encounter fireflies in the field because of their early fall maturation.

Distribution.—From Massachusetts in the northeast to southern Michigan in the central United States, southwestward to east Texas (Map 2).

Records.—*Massachusetts:* Barnstable Co., Woods Hole, 6 July 1932, 1♀ (R. Lewis). Middlesex Co., Framingham, 29 Sept. 1906, 2♂ (J. H. Emerton); Pepperell, Oct. 1969, 1♀ (H. W. Levi); Sherborn, 1♀ (A. L. Babcock). *Rhode Island:* Providence. *Connecticut:* Fairfield; New Haven; New London; Windham. *New York:* Dutchess; Putnam; Richmond; Rockland; Suffolk; Tompkins. *New Jersey:* Bergen; Hunterdon. *Pennsylvania:* Allegheny; Bucks. *Ohio:* Champaign; Knox. *Maryland:* Baltimore City; Harford; Prince Georges; Washington. *District of Columbia:* Virginia: Falls Church (city); Fairfax; James City; Montgomery. *Tennessee:* Blount; Cheatham; Davidson; Franklin; Knox; Roane. *North Carolina:* Durham; Mecklenburg; Orange; Raleigh. *South Carolina:* Harry. *Georgia:* Charlton; Franklin; Hall; McDuffie; Thomas; Ware. *Florida:* Alachua; Calhoun; Escambia; Lake; Leon. *Alabama:* Lee; Madison. *Mississippi:* Coahoma; Forrest; George; Hancock; Hinds; Newton; Oktibbeha; Pearl River; Rankin. *Louisiana:* Avoyelles; East Baton Rouge; Grant;



Figures 15-18.—*Ravidosa santrita* (Chamberlin and Ivie), Madera Canyon, Santa Rita Mtns., Santa Cruz Co., Arizona, 9 Sept. 1941. 15. left palp, ventral view; 16. same, retrolateral view; 17. internal genitalia, dorsal view; 18. epigynum, ventral view.

Jefferson Davis; Orleans. *Michigan*: Eaton Co., Olivet, 15 Sept. 1933, 1♂ (A. M. Chickering); Livingston Co., E. S. George Reserve, 14 Sept. 1936, 1♀ (A. M. Chickering). *Indiana*: Jennings; Lawrence; Parke. *Illinois*: Randolph; Will. *Missouri*: Boone; Cole; Greene; St. Louis City; St. Louis; Vernon. *Arkansas*: Lawrence; Washington. *Kansas*: Bourbon Co., Redfield, 23 Apr. 1962, 1♀, 14 Oct. 1963, 3♂3♀ (W. Ivie); Cowley Co., Winfield, 1♀. *Oklahoma*: Carter Co., Arbuckle Mtns., 15 Nov. 1970, 1♂ (C. Young); Kay Co., New Kirk, 8 Oct. 1907, 1♂ (P. Hayhurst); Pottawatomie Co., Shawnee, 1971 (D. Lane). *Texas*: Brazos; Burnet Co., Tiger Mills, Mar. 1885, 1♀ with egg sac (Schauff); Coryell; Dallas; Jasper; San Patricio Co., 8 mi NE of Sinton, Nov. 1959, 1♂ (H. E. Laughlin); Travis Co., Austin, 25 Sept. 1947, 1♂ (H. Exline); Walker.

Ravidosa santrita (Chamberlin & Ivie)
new combination

Figs. 2, 7, 15-18, Map 1

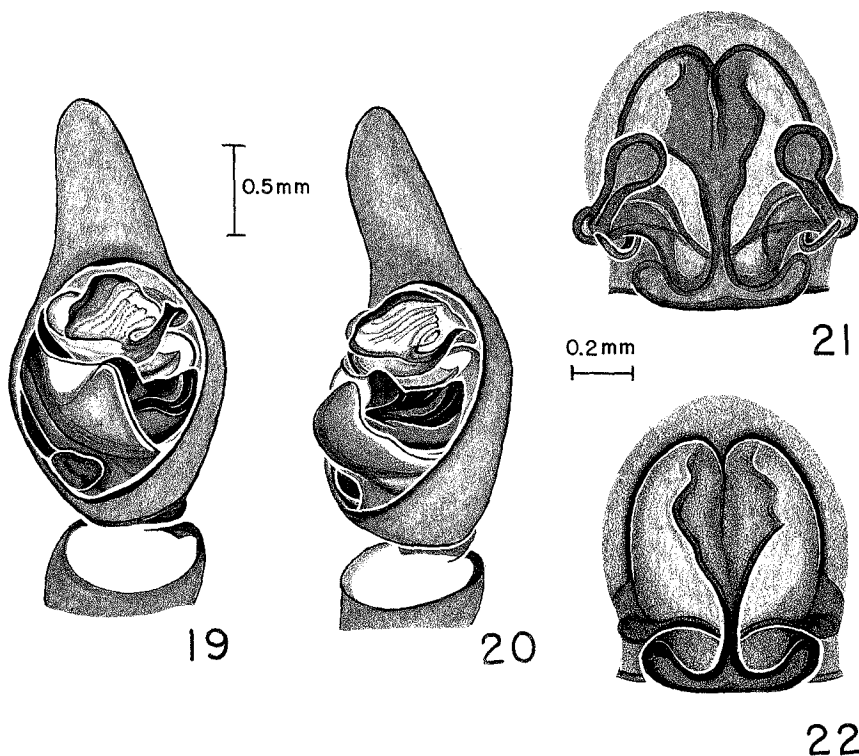
Lycosa santrita Chamberlin & Ivie 1942: 37, figs. 81, 82, 1♂1♀. Female holotype from Madera Canyon, Santa Rita Mtns., Santa Cruz Co., Arizona, in the AMNH, examined. Kronk & Riechert 1979: 155.
Lycosa scutulata: Banks 1901b: 587. NEW SYNONYMY.

Discussion.—The range of this species is yet to be determined. *Lycosa scutulata* reported from

the Santa Rita Mountains by Banks (1901b) is certainly this species. Other reports of *L. scutulata* from various parts of Mexico and Central America (Banks 1898; F. O. Pickard-Cambridge 1902) may be *R. santrita* but these are based almost entirely upon immature specimens. Adults are needed.

Diagnosis.—*Ravidosa santrita* is closest to *R. rabida* in size and dorsal color pattern. The males can be distinguished by the black color on leg I of *R. rabida*, which extends from distal end of the femur to the tip of the tarsus. Females are readily separated by comparing the internal genitalia. The spermathecae of *R. rabida* have anterior lateral subchambers or bulbs that are not found in *R. santrita* (compare Fig. 13 with Fig. 17). Other differences are noted under the diagnosis of *R. rabida*. These two sister species are widely separated geographically, *R. santrita* having been reported only from certain regions of Arizona (see Map 1).

Color.—*Female*: Chelicerae dark brown. Face pale brownish yellow with two broad dark brown stripes enclosing the PME, PLE, and lateral pair of the anterior eye row. Stripes extending to PME. White hair located dorsomedial to anterior eye



Figures 19–22.—*Rabidosa punctulata* (Hentz), New Canaan, Fairfield Co., Connecticut, Sept. 1955. 19. left palp, ventral view; 20. same, retrolateral view; 21. internal genitalia, dorsal view; 22. epigynum, ventral view.

row, extending dorsally between PME and half-way to PLE. Eye nacles black. Carapace (Fig. 2) brownish yellow with two broad dark brown longitudinal stripes on either side of the median line. Stripes continuous from distal end of clypeus to posterior part of carapace. Marginal areas of carapace bounded by dark, thin longitudinal stripes. Marginal white hair present. Dorsum of abdomen (Fig. 2) light brown with dark broad median stripe running length of abdomen. The stripe is solid dark in color anteriorly, narrows one-third of the way posteriorly, where it is traversed by a series of five light chevrons along the posterior half. Stripe darkest at edges, accented laterally by light yellow. Dorsum light brown lateral to accented stripe. Venter of abdomen light pale yellow to cream with few scattered dark hairs. Legs brownish yellow with fine darker hairs, without darker bands. Labium, endites, and sternum brownish yellow.

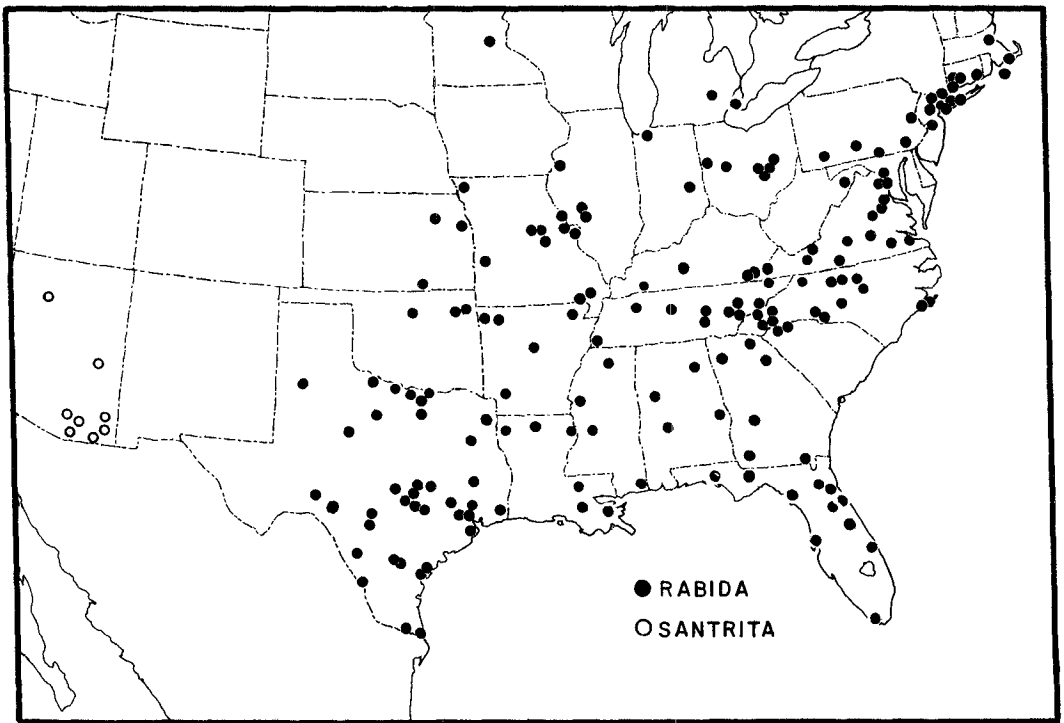
Males: Males are very similar to females in overall coloration, except that the first pair of legs is somewhat darker than others (but not nearly as black, as in *R. rabida*). Carapace and dorsal abdominal pattern as in Fig. 7.

Measurements.—Ten females and ten males from Madera Canyon, Santa Rita Mountains, Santa Cruz Co., Arizona. See Table 2.

Natural history.—*Rabidosa sanrita* occurs in desert riparian habitats. Kronk & Riechert (1979) showed that *R. sanrita* prefers grass in these habitats, but that mature females tend to move from grass to patches of bare ground or rock where prey is more abundant. Males apparently move to the same areas to increase their opportunities for mating. *Rabidosa sanrita* is considered to be a sit-and-wait or ambush type of predator.

Distribution.—Arizona (Map 1).

Records.—**USA.** *Arizona:* Cochise Co., Huachuca Mtns., 18–21 July 1950, 1♀1♂ (W. S. Creighton); Garden Canyon, Huachuca Mtns., 8–12 July 1950, 1♀1♂ (C. M. Bogart); Carr Canyon, Huachuca Mtns., 16 Sept. 1952, 1♀ (B. Malkin); Chiricahua Mtns., Painted Canyon Ranch, W of Portal, 20 June 1954, 4♂4♀6♂ (M. A. Cazier), 4 July 1954, 1♀1♂ (W. J. Gertsch); Paradise, 3 July 1954, 1♀ (W. J. Gertsch); 3 mi. W of Paradise, 9 Sept. 1950, 1♂1♀ (W. J. Gertsch); Portal, 1 June 1952, 2♂5♀1♂; 12 Oct. 1953, 3♂1♀ (M. A. Cazier); 1 mi. W of Portal, 10 Sept. 1950, 10♂5♀3♂ (W. J. Gertsch); 3



Map 1.—Distribution of *Rabidosa rabida* (Walckenaer) and *R. santrita* (Chamberlin and Ivie).

mi. W of Portal, July 1963, 1♀ with egg sac (J. Woods); 4 mi. SW of Portal, 7 Apr. 1966, 1♀ (B. Vogel); South Fork of Cave Creek, 11 Sept. 1950, 29♂19♀13o (W. J. Gertsch); 6–13 May 1956, 1♂2♀1o, (M. Statham); Southwestern Research Station, 5 mi. W of Portal, 15–26 June 1955, 2♂3♀2o (M. Statham); 6–20 July 1955, 8♀4o (W. J. Gertsch); Nov. 1955, 1♀ (E. Ordway); 2–19 May 1956, 4♂2♀1o (M. Statham); 4 July 1956, 1♀ (E. Ordway); 10 Oct. 1956, 1♀ carried by wasp (M. Pugsly); 20 June 1957, 2♀ (M. Statham); 21 Mar. 1960, 3♂2♀3o (W. J. Gertsch, W. Ivie, R. Schrammel); 19 Apr. 1961, 1♀ (J. Rozen, R. Schrammel); 10 May 1961, 2♀ (W. J. Gertsch); 3 Oct. 1961, 1♀ (W. J. Gertsch); 21 April 1962, 1♀ (W. J. Gertsch); May 1962, 1♀ (W. J. Gertsch); July 1962, 2♂3♀2o (W. J. Gertsch); Nov. 1962, 1♀ (V. Roth); Apr. 1963, 1♀ (V. Roth); 17 July 1964, 1♀ (J. A. Woods); 13–22 Aug. 1972, 1♀ (N. Platnick); Turkey Creek, 31 May 1952, 2♀ with egg sacs (M. Cazier, W. Gertsch, R. Schrammel); Coconino Co., Sedona, 5 June 1956, 1♀ (E. I. Davis); Navajo Co., White Mtns., 10 mi. NE of Whiteriver, 8–11 July 1940, 2♀9o (W. J. Gertsch, Hook); Pima Co., Tucson, 1♀ (R. V. Chamberlin & W. Ivie); Santa Cruz Co., Santa Rita Mtns., 5 Oct. 1936, 2♂ (O. Bryant); Madera Canyon, 8–9 Sept. 1941, 31♂30♀ (W. Ivie); 10 Dec. 1941, 1♂ (W. Ivie); 7 June 1952, 4♀ with two egg sacs (M. Cazier, W. Gertsch, R. Schrammel); Patagonia, 17 Sept. 1952, 1♂1o (B. Malkin); 5 mi. SW of Patagonia, 25 Aug. 1950, 3♀7o (M. A. Cazier).

Rabidosa carrana (Bryant) new combination
Figs. 4, 9, 23–26, Map 2

Lycosa carrana Bryant 1934: 38, fig. 1, 1♂. Male holotype from Big Pine Key, Monroe Co., Florida, 20 December 1933 (A. F. Carr), in MCZ, examined. Gertsch & Wallace 1935: 18, fig. 37, 1♀. Wallace 1937: 108. Bonnet 1957: 2637.

Varacosa (part). Roewer 1954: 305.

Discussion.—Roewer (1954) placed 10 species in the genus *Varacosa* of Chamberlin & Ivie (1942). Of these, five species have been retained in *Varacosa* (*apothetica*, *avara*, *gosiuta*, *parthenus*, *shenandoa*) by Jiménez & Dondale (1987). Two species were placed in *Schizocosa* (*floridana*, *segregata*) by Dondale & Redner (1978), one in *Gladicosa* by Brady (1986), and one is problematical (*Lycosa acompa* Chamberlin). The species *carrana* is combined here with the other species of *Rabidosa* where it obviously belongs.

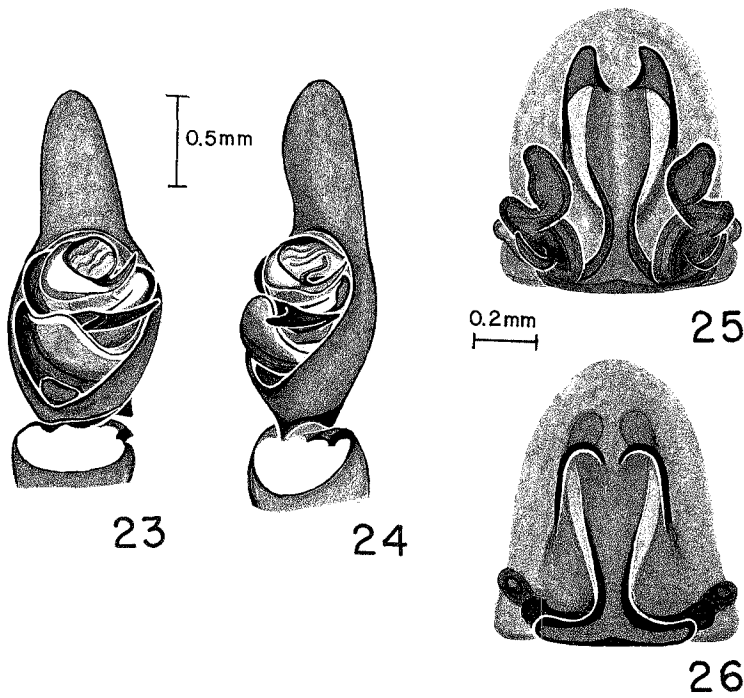
Diagnosis.—*Rabidosa carrana* is very similar to *R. punctulata* in size and dorsal color pattern (compare Figs. 4, 9 with Figs. 3, 8). Gertsch & Wallace (1935) reported that “From the dorsal aspect this species looks almost exactly like *Lycosa punctulata*”, differing only in details of coloration. In *R. punctulata* the median septum is

Table 2.—Measurements of ten females and ten males of *Rabidosa santrita*.

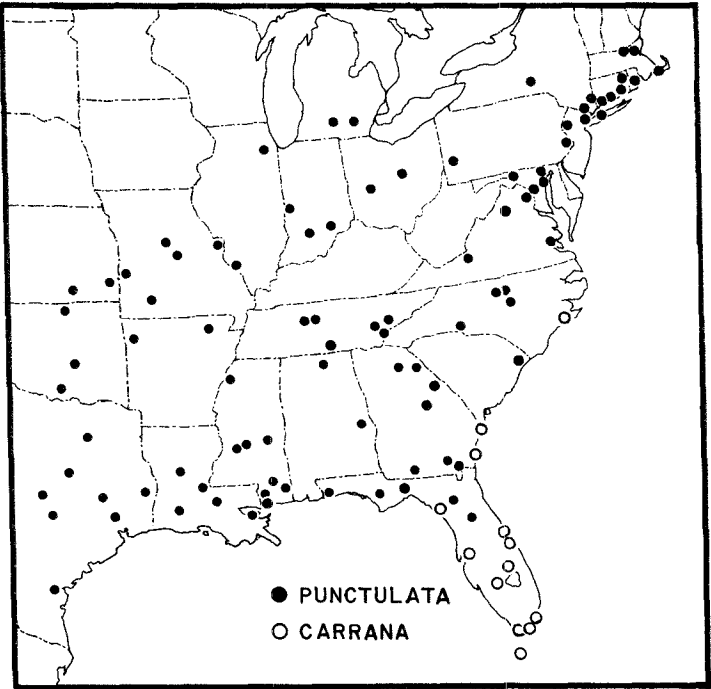
| | Mean ± SEM | | Mean ± SEM |
|--------------------|--------------|------------------|--------------|
| Females | | | |
| Anterior eye row | 1.45 ± 0.03 | Femur I | 6.39 ± 0.11 |
| PME width | 1.74 ± 0.03 | Patella–tibia I | 8.17 ± 0.14 |
| PLE width | 2.20 ± 0.03 | Metatarsus I | 4.77 ± 0.09 |
| POQ length | 1.50 ± 0.03 | Tarsus I | 2.82 ± 0.08 |
| Carapace width–PLE | 3.89 ± 0.11 | Total I | 22.15 ± 0.35 |
| Carapace width | 6.63 ± 0.12 | Femur IV | 7.30 ± 0.09 |
| Carapace length | 8.65 ± 0.18 | Patella–tibia IV | 8.72 ± 0.10 |
| Body length | 18.91 ± 0.43 | Metatarsus IV | 7.85 ± 0.12 |
| Patella–tibia II | 7.56 ± 0.11 | Tarsus IV | 3.07 ± 0.06 |
| Patella–tibia III | 6.75 ± 0.11 | Total IV | 26.94 ± 0.30 |
| Males | | | |
| Anterior eye row | 1.28 ± 0.02 | Femur I | 6.25 ± 0.13 |
| PME width | 1.54 ± 0.03 | Patella–tibia I | 8.35 ± 0.08 |
| PLE width | 1.87 ± 0.04 | Metatarsus I | 5.28 ± 0.11 |
| POQ length | 1.24 ± 0.03 | Tarsus I | 2.96 ± 0.05 |
| Carapace width–PLE | 3.14 ± 0.06 | Total I | 22.85 ± 0.30 |
| Carapace width | 5.77 ± 0.12 | Femur IV | 6.98 ± 0.07 |
| Carapace length | 7.42 ± 0.14 | Patella–tibia IV | 8.39 ± 0.20 |
| Body length | 14.25 ± 0.23 | Metatarsus IV | 7.78 ± 0.27 |
| Patella–tibia II | 7.43 ± 0.12 | Tarsus IV | 3.20 ± 0.07 |
| Patella–tibia III | 6.46 ± 0.12 | Total IV | 26.35 ± 0.45 |

Table 3.—Measurements of ten females and ten males of *Rabidosa punctulata*.

| | Mean ± SEM | | Mean ± SEM |
|--------------------|--------------|------------------|--------------|
| Females | | | |
| Anterior eye row | 1.23 ± 0.06 | Femur I | 5.28 ± 0.21 |
| PME width | 1.56 ± 0.07 | Patella–tibia I | 6.75 ± 0.34 |
| PLE width | 2.00 ± 0.07 | Metatarsus I | 3.70 ± 0.21 |
| POQ length | 1.32 ± 0.03 | Tarsus I | 2.08 ± 0.10 |
| Carapace width–PLE | 3.24 ± 0.14 | Total I | 17.81 ± 0.83 |
| Carapace width | 4.99 ± 0.24 | Femur IV | 5.79 ± 0.31 |
| Carapace length | 6.58 ± 0.31 | Patella–tibia IV | 6.79 ± 0.31 |
| Body length | 15.17 ± 0.63 | Metatarsus III | 5.98 ± 0.30 |
| Patella–tibia II | 6.12 ± 0.32 | Tarsus IV | 2.56 ± 0.11 |
| Patella–tibia III | 5.06 ± 0.33 | Total IV | 21.11 ± 0.98 |
| Males | | | |
| Anterior eye row | 1.10 ± 0.03 | Femur I | 5.70 ± 0.17 |
| PME width | 1.45 ± 0.04 | Patella–tibia I | 7.50 ± 0.22 |
| PLE width | 1.85 ± 0.05 | Metatarsus I | 4.61 ± 0.16 |
| POQ length | 1.18 ± 0.04 | Tarsus I | 2.21 ± 0.06 |
| Carapace width–PLE | 2.77 ± 0.06 | Total I | 20.02 ± 0.51 |
| Carapace width | 4.60 ± 0.12 | Femur IV | 6.23 ± 0.20 |
| Carapace length | 6.27 ± 0.17 | Patella–tibia IV | 7.45 ± 0.21 |
| Body length | 12.80 ± 0.33 | Metatarsus IV | 6.97 ± 0.21 |
| Patella–tibia II | 6.52 ± 0.18 | Tarsus IV | 2.87 ± 0.10 |
| Patella–tibia III | 5.26 ± 0.17 | Total IV | 23.53 ± 0.59 |



Figures 23–26.—*Rabidosa carrana* (Bryant), Tybee Island, Chatham Co., Georgia, 5 Dec. 1962. 23. left palp, ventral view; 24. same, retrolateral view; 25. internal genitalia, dorsal view; 26. epigynum, ventral view.



Map 2.—Distribution of *Rabidosa punctulata* (Hentz) and *R. carrana* (Bryant).

Table 4.—Measurements of ten females and ten males of *Rabidosa carrana* from Georgia and Florida.

| | Mean ± SEM | | Mean ± SEM |
|--------------------|--------------|------------------|--------------|
| Females | | | |
| Anterior eye row | 1.34 ± 0.03 | Femur I | 5.14 ± 0.21 |
| PME width | 1.80 ± 0.04 | Patella-tibia I | 6.77 ± 0.24 |
| PLE width | 2.27 ± 0.10 | Metatarsus I | 3.52 ± 0.18 |
| POQ length | 1.46 ± 0.07 | Tarsus I | 2.08 ± 0.08 |
| Carapace width-PLE | 3.32 ± 0.11 | Total I | 17.51 ± 0.65 |
| Carapace width | 5.27 ± 0.15 | Femur IV | 5.69 ± 0.21 |
| Carapace length | 7.25 ± 0.22 | Patella-tibia IV | 7.23 ± 0.27 |
| Body length | 14.07 ± 0.44 | Metatarsus IV | 5.85 ± 0.21 |
| Patella-tibia II | 6.04 ± 0.25 | Tarsus IV | 2.44 ± 0.09 |
| Patella-tibia III | 5.15 ± 0.20 | Total IV | 21.21 ± 0.73 |
| Males | | | |
| Anterior eye row | 1.05 ± 0.04 | Femur I | 4.34 ± 0.18 |
| PME width | 1.46 ± 0.04 | Patella-tibia I | 5.92 ± 0.26 |
| PLE width | 1.78 ± 0.06 | Metatarsus I | 3.19 ± 0.15 |
| POQ length | 1.04 ± 0.04 | Tarsus I | 2.05 ± 0.10 |
| Carapace width-PLE | 2.40 ± 0.12 | Total I | 15.50 ± 0.66 |
| Carapace width | 4.43 ± 0.30 | Femur IV | 4.84 ± 0.28 |
| Carapace length | 5.66 ± 0.27 | Patella-tibia IV | 6.15 ± 0.36 |
| Body length | 11.25 ± 0.56 | Metatarsus IV | 4.95 ± 0.34 |
| Patella-tibia II | 5.19 ± 0.24 | Tarsus IV | 2.23 ± 0.14 |
| Patella-tibia III | 4.81 ± 0.29 | Total IV | 18.37 ± 1.09 |

very wide anteriorly and narrows considerably before joining the transverse piece, and the lateral arms of the transverse piece curve anteriorly (Fig. 22). In *R. carrana* the median septum tapers more gradually before joining the transverse piece, and the lateral arms of the transverse piece run straight across (Fig. 26). The embolus of *R. punctulata* is spatulate at the end (Figs. 19, 20), while in *R. carrana* it terminates in a fine point (Figs. 23, 24). In addition, nearly all specimens of *R. carrana* have a black venter with three pairs of white spots. This particular characteristic led H. K. Wallace (pers. comm.) to refer to his nameless specimens as “*Lycosa domino*” because the six white spots reminded him of the six spot in dominoes. Although *R. carrana* is most like *R. punctulata* in size and coloration, it resembles *R. rabida* and *R. santrita* in structural details of the male palpus (compare Figs. 23, 24 with Figs. 11, 12 and 15, 16) and female genitalia (compare Figs. 25, 26 with 13, 14 and 17, 18). We think this makes a stronger case for including *R. punctulata* in the genus *Rabidosa*.

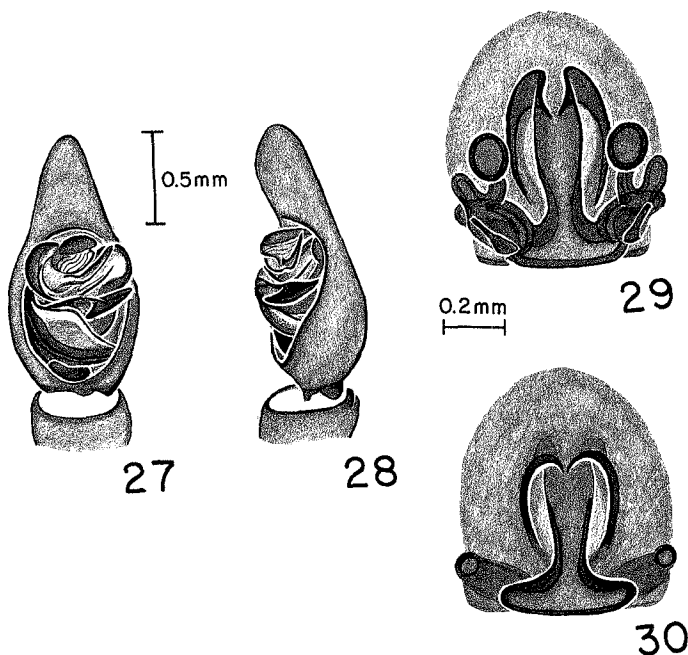
Color.—*Females*: Face brownish yellow as in other species of *Rabidosa*; dark brown stripes on dorsal surface continue down face to lower edge of clypeus. Chelicerae uniform reddish brown with covering of light brown hair. White hairs

forming a thin line beginning between AME and continuing to PME row. Eye nacelles black. Carapace (Fig. 4) brownish yellow with two broad dark brown stripes on either side of mid-line, continuing from clypeus to posterior declivity. Carapace bounded marginally by similar, but thinner stripes. Dorsum of abdomen (Fig. 4) with a wide dark brown median stripe ($\frac{1}{3}$ the width of the abdomen). Stripe often with variably irregular edges. Light brownish yellow diamond shaped mark is within the stripe over the cardiac area. Stripe laterally bounded by lightly speckled yellow brown, and medium brown areas respectively. Venter of abdomen variably black, but *nearly always* with central black area containing three pairs of spots distinctly marked with white hair. Legs brownish yellow and covered with fine brown hair. Labium, endites, and sternum variable; totally black to only sparsely black or sometimes yellow brown.

Males: Carapace and dorsal abdominal pattern as in Fig. 9. Color pattern does not differ significantly between male and female specimens, although males tend to show less speckling on the venter.

Measurements.—Ten females and ten males from Georgia and Florida. See Table 4.

Natural history.—Gertsch & Wallace (1935)



Figures 27-30.—*Rhabdosa hentzi* (Banks), Gainesville, Alachua Co., Florida, 14 June 1935. 27. left palp, ventral view; 28. same, retrolateral view; 29. internal genitalia; 30. epigynum, ventral view.

reported capturing this species at night with a headlight in reeds above the high tide mark on an island about five miles from Cedar Key, Florida. This species, at that time, was reported as one of the most common species in southern Florida. Adult males and females were taken in February in Monroe and Dade Counties.

Distribution.—Atlantic coastal plain of North Carolina and Georgia, south to the Florida Keys (Map 2).

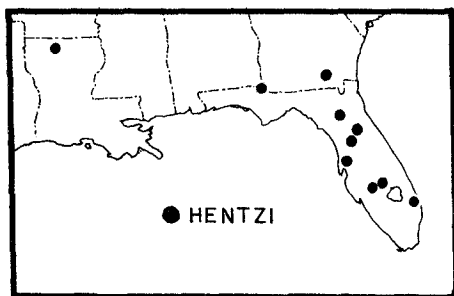
Records.—*North Carolina*: Carteret Co., Beaufort, 31 July 1951, 1♂1♀2o (R. D. Barnes). *Georgia*: Brunswick Co., 2 mi. W of Jekyll Island, 7 Dec. 1962, 9♂10♀1o (W. Ivie); Chatham Co., N. shore Tybee Island, 5 Dec. 1962, 9♂13♀5o (W. Ivie). *Florida*: Brevard Co., Eau

Galle, Feb. 1936, 1♀; Cocoa, 23 Feb. 1926, 1♀; Dade Co., 7-9 Feb. 1935, 3♂3♀ (J. Kilby, H. K. Wallace); Glades Co., Archbold Biol. Sta., 19 Dec. 1962, 4♀ (W. Ivie); Hillsborough Co., Tampa, 3-5 Mar. 1943, 1♀; Levy Co., 28 Apr. 1934, 1♂2♀ (H. K. Wallace); Monroe Co., Flamingo, Everglades Natl. Pk., 17 Dec. 1962, 8♂6♀15o; 2 mi. SE of Marathon, 15 Dec. 1962, 1♂1o (W. Ivie); Okeechobee Co., Okeechobee, 28 Mar. 1938, 4♂4♀2o (W. J. Gertsch); Port Mayaca, 29 Mar. 1938, 1♂1♀ (W. J. Gertsch).

Rhabdosa hentzi (Banks) new combination
Figs. 5, 10, 27-30, Map 3

Lycosa hentzi Banks 1904: 135, pl. 8, figs. 16, 17. Male and female syntypes from Altoona, Lake Co., Florida, July (A. Dobbin), in the MCZ, examined. Banks 1910: 56. Petrunkevitch 1911: 561. Chamberlin & Ivie 1944: 144. Wallace 1950: 77, pl. 1, fig. 5, 1♀. Bonnet 1957: 2644. Miller et al. 1988: 213.
Megarctosa hentzi: Roewer 1954: 278.

Discussion.—*Lycosa hentzi* was placed in the genus *Megarctosa* by Roewer (1954) with *Megarctosa naccai* Caporiacco from the Island of Rhodes as the type species. Three other species from the Palearctic Region were placed in the genus, and, in addition, one from Africa, one from Argentina, and *Lycosa hentzi* from Florida. This strange zoogeographic assortment raises serious questions about the genus *Megarctosa*.



Map 3.—Distribution of *Rhabdosa hentzi* (Banks).

Table 5.—Measurements of ten females and ten males of *Rabidosa hentzi*.

| | Mean \pm SEM | | Mean \pm SEM |
|--------------------|------------------|------------------|------------------|
| Females | | | |
| Anterior eye row | 1.10 \pm 0.04 | Femur I | 4.54 \pm 0.25 |
| PME width | 1.53 \pm 0.04 | Patella-tibia I | 6.18 \pm 0.36 |
| PLE width | 1.78 \pm 0.06 | Metatarsus I | 3.53 \pm 0.19 |
| POQ length | 1.08 \pm 0.04 | Tarsus I | 1.84 \pm 0.19 |
| Carapace width-PLE | 1.06 \pm 0.04 | Total I | 16.09 \pm 0.92 |
| Carapace width | 4.31 \pm 0.16 | Femur IV | 5.17 \pm 0.31 |
| Carapace length | 5.54 \pm 0.22 | Patella-tibia IV | 6.57 \pm 0.33 |
| Body length | 11.33 \pm 0.58 | Metatarsus IV | 5.73 \pm 0.25 |
| Patella-tibia II | 5.64 \pm 0.35 | Tarsus IV | 2.12 \pm 0.13 |
| Patella-tibia III | 4.94 \pm 0.25 | Total IV | 19.59 \pm 0.98 |
| Males | | | |
| Anterior eye row | 0.92 \pm 0.03 | Femur I | 3.97 \pm 0.19 |
| PME width | 1.31 \pm 0.04 | Patella-tibia I | 5.40 \pm 0.26 |
| PLE width | 1.54 \pm 0.04 | Metatarsus I | 3.51 \pm 0.22 |
| POQ length | 0.89 \pm 0.04 | Tarsus I | 1.71 \pm 0.11 |
| Carapace width-PLE | 2.12 \pm 0.08 | Total I | 14.59 \pm 0.74 |
| Carapace width | 3.52 \pm 0.11 | Femur IV | 4.66 \pm 0.20 |
| Carapace length | 4.56 \pm 0.16 | Patella-tibia IV | 5.86 \pm 0.27 |
| Body length | 9.53 \pm 0.47 | Metatarsus IV | 5.40 \pm 0.23 |
| Patella-tibia II | 4.90 \pm 0.24 | Tarsus IV | 2.02 \pm 0.13 |
| Patella-tibia III | 4.33 \pm 0.19 | Total IV | 17.94 \pm 0.79 |

Diagnosis.—*Rabidosa hentzi* is distinguished from other *Rabidosa* by its distinct dorsal pattern and paler color. It is closest to *R. carrana* or *R. rabida* in coloration and to *R. carrana* in size. The genitalia of *R. hentzi* and *R. carrana* are very similar, but the spermathecae of *R. hentzi* are spherical (Fig. 29), while those of *R. carrana* are elongate, ovoid (Fig. 25). The palpa of the palpus in *R. hentzi* has a heavily sclerotized cap (Figs. 27, 28), while sclerotization of the palpa in *R. carrana* is greatly reduced (Figs. 23, 24). In the field *R. hentzi* is distinguished by microhabitat (see below) and the distinctive relatively narrow median yellow stripe on the carapace (Figs. 5, 10). The resemblance of *R. hentzi* to other *Rabidosa* in coloration, genitalic structure, and its habitat preference (forbs and shrubs) indicate to us that this species belongs here.

Color.—*Female*: Face light brownish yellow with a pair of black stripes extending through anterior eye row and continuing down chelicerae. Chelicerae light brownish yellow to yellow-brown. Stripe of white hairs beginning in anterior eye row and running dorsally between PME, continuing to PLE. Eye nacles black. Carapace (Fig. 5) pale brownish yellow to light yellow-brown. Narrow light yellow stripe extending from anterior region of carapace to posterior declivity.

Light stripe laterally bounded by brownish yellow to yellow brown region. Marginal areas with three or four evenly spaced dark spots. Dorsum of abdomen (Fig. 5) with light brownish yellow median stripe running its full length. Series of five or six dark brown chevrons, posteriorly. Each chevron accented by pair of dots (composed of white hairs) laterally. Five to seven pairs of white dots usually present. Median stripe bounded by darker brownish coloration covering dorsum laterally. Venter light brownish yellow with brown specks laterally. Legs light brownish yellow to light yellow-brown. Alternating light and dark hair in some, others appear speckled. Labium, endites, and sternum light brownish yellow.

Male: Face and chelicerae same as in female but a shade lighter brownish in color. Dorsum of carapace (Fig. 10) a shade lighter brown in color. Dorsum of abdomen (Fig. 10) very similar in color. Venter of abdomen brownish yellow with fewer brown specks laterally than female. Legs light brownish yellow to light yellow-brown, with colors alternating. Labium, endites, and sternum light brownish yellow.

Measurements.—Ten females and ten males from Florida. See Table 5.

Natural history.—Using a headlamp at night the senior author has collected many specimens

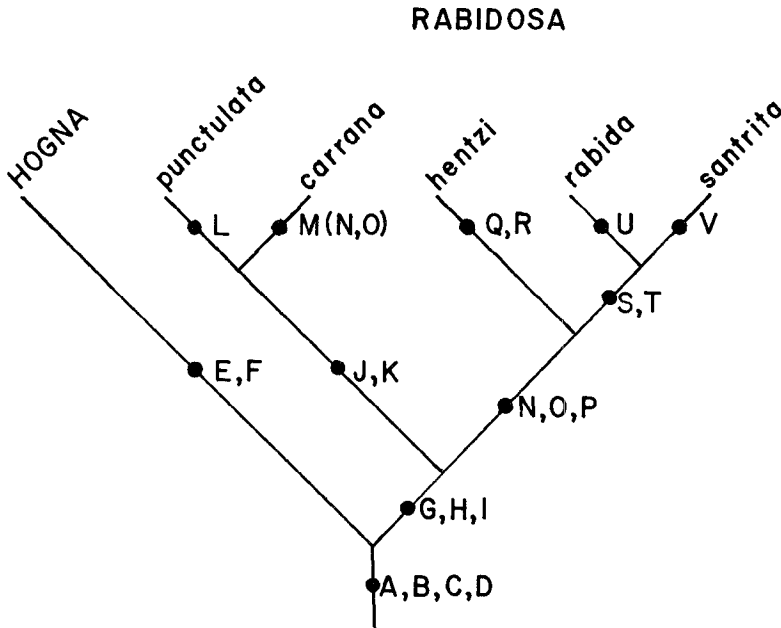


Figure 31.—Phylogenetic diagram of *Rabidosa*. Explanation of letters can be found under “Evolutionary Relationships” in text.

of *R. hentzi* throughout Florida. *Rabidosa hentzi* can often be identified from a distance because of its preferred microhabitat. Any lycosid eye shine more than 60–100 cm above the ground in a shrub is very likely to be *R. hentzi*. Many specimens were noticed feeding on various kinds of insects in these situations. This microhabitat is unexplored by other lycosids, and it serves as a safe haven from the larger, less agile wolf spiders that patrol the forest floor. *Rabidosa hentzi* is the only large wolf spider that can negotiate vertical glass surfaces (pers. obs.). This ability is due to scopula hairs on the metatarsi and tarsi (Miller et al. 1988). Claw tufts on the tarsi of *R. hentzi*, together with its body size smaller than *R. rabidosa* (compare Table 5 with Table 1), appear to aid this species’ movement through high herbaceous vegetation and shrubs in open woodland.

Distribution.—Georgia and Florida to Louisiana (Map 3).

Records.—*Georgia*: Ware Co., 15 mi. W of Waycross, 22 Dec. 1962, 3♂ (W. Ivie). *Florida*: Alachua Co., Gainesville, 14 June 1935, 5♂♀2♂ (W. Gertsch, W. Ivie); Desoto Co., Arcadia, 31 Mar. 1938, 1♂2♀6♂ (W. J. Gertsch); Highlands Co., Lake Placid, 8 Feb. 1943, 2♂ (M. Cazier); Sebring, 24 Mar. 1938, 1♀ (W. J. Gertsch); Jackson Co., 25 Apr.–1 May 1935, 2♂1♀ (O. C. Van Hyning); Lake Co., Lake Harris, 14 July

1935, 2♂1♀1♂, Leesburg; 1–11 Mar. 1954, 24♂ (M. Statham); Umatilla, 14 June 1935, 5♂7♀2♂ (W. Ivie); Pasco Co., Dade City, 7 Apr. 1938, 1♀ (W. J. Gertsch). *Louisiana*: Lincoln Par., Ruston, 10 July 1950, 1♀ (M. Cazier).

EVOLUTIONARY RELATIONSHIPS

This section provides a preliminary view of the evolutionary or phylogenetic relationships of the five species described under the genus *Rabidosa* (Fig. 31). It is not intended to be a cladistic analysis, but represents the views of the authors based upon morphological features, microhabitat data, and geographical distribution. This method was employed because of the difficulty in identifying synapomorphies for species groups within the genus *Lycosa*. This is true because of the great variety of lycosid species throughout the world described under *Lycosa*, representing diverse morphological, ecological and behavioral types. We hope that this analysis may serve as a beginning.

Species of the genus *Rabidosa* are recognized by the dorsal color pattern on the cephalothorax, consisting of two longitudinal dark stripes originating in the eye region and continuing to the posterior edge of the carapace, and a single median dark stripe on the dorsum of the abdomen (Figs. 1–4, 6–9). The pattern in *R. hentzi* is mod-

ified, but considered to be derived from this basic pattern (Figs. 5, 10). The general pattern described and illustrated is considered to be a synapomorphic feature of *Rabidosa*. The species included in this genus also have similar microhabitat preferences. *Rabidosa rabida*, *R. santrita*, *R. punctulata*, and *R. carrana* are found primarily in herbaceous vegetation, and occasionally in more woody small shrubs. *Rabidosa hentzi* is usually found higher from ground level in forbs and small shrubs. Although several of these species excavate chambers for egg case construction, none is known to burrow. Both above ground microhabitats (grass, forbs, shrubs) and the absence of burrowing behavior are considered to be traits of *Rabidosa*.

The genus *Hogna* is considered to be the sister group to *Rabidosa*. Representatives of the *Hogna-Rabidosa* group possess in common the characteristics: carapace uniform in height [A]; embolus with broad arch at base [B]; terminal apophyses sickle-shaped [C]; and median apophysis transverse with ventral directed spur [D] (Dondale & Redner 1990). *Hogna*, as viewed by Dondale & Redner (1990), includes many North American species formerly described under *Lycosa* that are strictly ground dwellers, preferring leaf litter or sparsely vegetated areas, rather than grassy areas [E]. In addition, they construct burrows for retreats and possibly egg case construction [F]. Species of the genus *Rabidosa* possess in common the characteristic dorsal pattern on the cephalothorax and abdomen described above [G], a herb or shrub microhabitat preference [H], and do not construct burrows for daily retreats [I].

Rabidosa punctulata and *R. carrana* share similarities in dorsal abdominal pattern (Figs. 8, 9) [J], and a venter splotched with black or black with white spots [K]. The distinct epigynum and palpus of *Rabidosa punctulata* (Figs. 19–22) separate it from other species in this group with regard to genitalic features [L]. Because of its distinct genitalic characters Dondale and Redner (pers. comm.) feel that the color pattern of this species has evolved convergently as a response to a similar habitat, rather than as a synapomorphy. On the other hand, *R. rabida* and *R. punctulata* are largely sympatric and syntopic throughout their ranges (compare Maps 1 and 2). The dramatic difference seen in the genitalia of *R. punctulata* and *R. rabida* may have resulted from initial encounters of these two species after allopatric speciation. *Rabidosa carrana* is distin-

guished from *R. punctulata* by the black venter with six white dots [M]. These two species are largely allopatric in distribution (Map 2), indicating a relatively recent divergence.

Rabidosa carrana, *R. hentzi*, *R. rabida* and *R. santrita* are related by similarities in the structure of the median septa of the epigyna (Figs. 14, 18, 26, 30) [N] and the structure of the palpal elements [O]. In Figs. 11, 15, 23, and 27 compare the paleae, emboli, conductors, subterminal and terminal apophyses, and median apophyses. All are based upon the same essential format. *Rabidosa carrana* has been grouped with *R. punctulata* based upon characteristics previously cited. *Rabidosa hentzi*, *R. rabida* and *R. santrita* all have a pale venter with a few dark spots [P], in contrast to the dark venters of *R. punctulata* and *R. carrana* [K]. The development of claw tufts [Q] in *R. hentzi* (Miller et al. 1988) concomitant with its preference for shrubby vegetation [R] readily separate this species from *R. rabida* and *R. santrita*.

Rabidosa rabida and *R. santrita* are considered sister species based upon strong similarities in the structure of the median septa of their epigyna (Figs. 14, 18) [S] and the structure of their palpal sclerites. Compare the paleae, emboli, conductors, subterminal and terminal apophyses, and median apophyses (Figs. 11, 12, 15, 16) [T]. In addition the dorsal abdominal stripes in these two species are interrupted by spots (*R. rabida*) or chevrons (*R. santrita*), not solid as in *R. punctulata* and *R. carrana*. A distinctive feature of *R. rabida* is the presence of anterior-lateral subchambers or bulbs on the spermathecae (Fig. 13) [U]. In *R. santrita* these bulbs are absent, but two ducts extending from a truncated anterior-lateral area of the spermathecae are unique to this species [V]. The close morphological, ecological, and behavioral resemblance of *R. rabida* and *R. santrita* together with their strongly allopatric distribution (Map 1) suggests a recent divergence of these two species, due perhaps to Pleistocene glaciation.

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