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

BY ALLEN R. BRADY
Department of Biology, Hope College
Holland, Michigan 49423

This is the second paper in a projected series of systematic studies of the Nearctic Lycosidae described primarily in the genus Lycosa. Over 50 species of medium to large size wolf spiders from the Nearctic Region have been placed in this genus. However, recent studies indicate that several distinct genera are included under Lycosa. Matters have been complicated at the generic level by C. F. Roewer (1954) who listed 44 new genera of Lycosinae in the Katalog der Araneae. They are nomina nuda, lacking descriptions. Later Roewer (1959, 1960) defined these 44 genera, thus validating the names, and added seven more new ones to the Lycosinae as well. These genera were established primarily on the basis of differences in the number of posterior cheliceral teeth and eye arrangement (particularly eyes of the anterior row). Investigations of North American Lycosidae (Brady 1962, 1972, 1979) indicate that the number of posterior cheliceral teeth is an unreliable character in delimiting genera. Recent studies indicate that color patterns on the dorsal surface of the carapace, length of legs relative to body size, and particularly the structure of the male and female genitalia are most reliable in determining generic relationships. Certain features of the eye arrangement, as well as information about habitat, behavior, and life history are also useful. In the final analysis, it is the unique combination of all these features that should be employed to distinguish genera.

Gladicosa gen. nov.


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Leimonia (part) Simon 1864: 352.
Avicosa (part) Roever 1954: 236.
Hogna (part) Roever 1954: 258.
Scaptocosa (part) Roever 1954: 293.

Type species. Gladicosa gulosa (Walckenaer)

Etymology. The generic name is a combination of gladius (Latin for sword) referring to the unique sword-shaped embolus of the male palpus, and cosa derived from the generic name Lycosa. It is considered feminine.

Diagnosis. Gladicosa may be distinguished from other lycosid genera by the following combination of characters: (1) the swordlike or bladelike form of the embolus (em) and its clockwise orientation in ventral view of the left palpus of the male (Fig. 33), (2) the modification of the terminal apophysis (ta), which is also broadly flattened and parallels (and partly supports) the embolus (Figs. 33, 34), (3) the rectangular or wedge shape of the transverse piece (tp) of the scape of the epigynum, together with its white pearlescent appearance, in whole or part (Fig. 10) and (4) the dorsal color pattern illustrated in Figures 1–5 and described below.

Description. Total length 7.8 to 18.8 mm. Carapace length 4.2 to 8.3 mm; width 3.1 to 6.4 mm. 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 very slightly anteriorly). Dorsal groove long and distinct. Dorsal color pattern with light uneven submarginal stripes and wide median light colored stripe, narrow between ALE, widening until just anterior to dorsal groove (where it is usually constricted), becoming wider again parallel to groove, and then narrowing as it
follows thoracic declivity to posterior edge of carapace. Black markings framing median stripe at posterior declivity. Dark areas of carapace brown to dark brown and black. Light stripes pale yellow to yellow-orange (Figs. 1-5).

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 1-6).

Chelicerae dark reddish brown to black; anterior and posterior margin each with three teeth, the anterior triad crowded more closely together.

Legs when compared to body dimensions relatively longer than in *Trochosa*; without distinct annulations; yellow, yellow-orange to golden brown in color. Order of leg length IV-I-II-III. Tibial spination in female: leg I, 2-2-2 ventral, 1-0 or 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. Tibial spination in the male is the same with the addition on leg I of 1-1 retrolateral and leg II 1-1 retrolateral.

Dorsal abdominal pattern variable according to size and hirsuteness, but generally with anterio-lateral black markings aligned with those on carapace, cardiac area well marked, and often with pattern of chevrons as indicated in Figures 1-5. Dark colors on dorsum of abdomen brown to black, lighter colors cream to tan or beige. Vent of abdomen cream to light brown in *gulosa, huberti*, and *euepigynata*; dark brown to black in *pulchra* and *bellamyi*. Region anterior to epigastric furrow of contrasting darker or lighter color respectively.

Male palpus with stridulatory file situated retrolaterally at tip of tibia. Cymbium with cluster of macrosetae at tip, and with stridulatory scraper retrolaterally at base. Male palpal sclerites as seen in ventral view: Palea (pa) concave, largely hidden by embolus, visible along retrolateral margin. Embolus (em) blade-like, tapering to a point, with clockwise orientation (from left to right) in left palpus, which is opposite to that of most Lycosinae. Conductor (co) concave, with cuplike portion containing tips of the terminal apophysis (ta) and the embolus. Terminal apophysis large, flattened and parallel embolus, with its tip serving partly as a conductor. Median apophysis (ma) with a flattened ridge extending retrolaterally and
coming to a point near margin of cymbium (cy); heavily sclerotized spur directed medially (Figs. 30, 33, 34).

Epigynum of female with scape shovel-shaped with elongate longitudinal piece (lp) (handle) and rectangular or trapezoidal transverse piece (tp) (blade). The transverse piece is unusual in being wholly or partly translucent white or pearlescent in appearance (Fig. 10). Spermathecae (s) smooth and round to ovoid (Fig. 7), rarely elongate ovoid (Fig. 15); usually their diameter apart.

METHODS

The techniques and methods employed in the study of Gladicosa were essentially the same as for Trochosa (Brady 1979) and are described there. Color descriptions are based upon appearance of specimens in alcohol illuminated by microscope lamp. Measurements are listed in millimeters, but for Gladicosa the mean and standard error (SEM) are listed instead of the mean and range as in the previous paper. Methods and techniques of measurement are described in the paper on Trochosa (Brady 1979). Under Records specific localities are given for uncommon species and the peripheral range for common species, otherwise localities of specimens examined are indicated by counties.

ACKNOWLEDGMENTS

This study was made possible by the loan of large numbers of specimens from the Museum of Comparative Zoology, Cambridge, Massachusetts, the American Museum of Natural History, New York City, and the Canadian National Collection, Ottawa, Canada. I wish to thank sincerely the curators of those collections, Dr. H. W. Levi, Dr. N. J. Platnick, and Dr. C. D. Dondale respectively for the use of these materials. The loan of type specimens from the Museum of Comparative Zoology, the American Museum and the Philadelphia Academy of Natural History is gratefully acknowledged. Thanks are offered to Mr. Donald Azum for loan of the latter.

I am indebted to the following individuals and institutions for making available regional collections that provided a much better picture of geographical distribution and clarified the relationships of certain populations: Dr. Richard Brown and Ms. Pat Miller of the Entomological Museum, Mississippi State University; Mr. Tim
Lockley, Delta State Research Center, USDA, Stoneville, Mississippi; Dr. G. B. Edwards and Dr. H. K. Wallace of the University of Florida, Gainesville; and Dr. Andrew Penniman, Defiance College, Defiance, Ohio.

Special thanks are extended to Dr. C. D. Dondale and Dr. H. W. Levi who consented to review the manuscript and offered constructive criticism and friendly advice. I am also grateful to Mr. F. R. Wanless for sending specimens of *Lycosa pulchra* Keyserling from the L. Koch collection maintained in the British Museum (Natural History). A note of special appreciation to Ms. Amy Youatt, who helped with general sorting, compilation of locality data, and preparation of distribution maps.

National Science Foundation grant DEB-7803561 assisted in defraying expenses of the investigation. A summer grant from the faculty development program at Hope College (1980) helped to initiate this project.

**KEY TO FEMALES**

1a Transverse piece (tp) of scape of epigynum rectangular, about equal in length and width (Figs. 6–14) ................. 2

1b Transverse piece (tp) of scape of epigynum irregular in shape (Figs. 15–17) or, if rectangular, much wider than long (Figs. 18–26) ......................... 3

2a Transverse piece entirely pearlescent in appearance. Longitudinal piece (lp) lacking indentations where it joins transverse piece (Figs. 6–9) .................... *gulosa*

2b Transverse piece only partly pearlescent white. Longitudinal piece (lp) with indentations at posterior end where it joins transverse piece (Figs. 10–14) ................ *pulchra*

3a Transverse piece irregular in shape and broadly joined by longitudinal piece (Figs. 15–17) ................. *euepigynata*

3b Transverse piece somewhat rectangular, much wider than long and narrowly joined by longitudinal piece ............ 4

4a Width of transverse piece greater than length of longitudinal piece. Longitudinal piece about the same width throughout its length (Figs. 18–20) .................... *huberti*

4b Width of transverse piece equal to or less than length of transverse piece. Longitudinal piece wider anteriorly, narrowing posteriorly (Figs. 21–26) ............... *bellamyi*
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KEY TO MALES

1a Both embolus (em) and terminal apophysis (ta) bladelike, paralleling one another with each separate and drawn out to a point (Figs. 27, 28, 35–42) 3

1b Embolus bladelike, but terminal apophysis not resembling it; the two not as distinctly separated as above (Figs. 29–34, 43–46). 2

2a Relatively small species. Total length 7.8 to 11.0 mm (Figs. 29–34). Not reported from central Texas. bellamyi

2b Relatively large species. Total length 10.4 to 13.9 mm (Figs. 43–46). Distribution central Texas. euepigynata

3a Embolus with relatively short, pointed tip (Figs. 27, 28) huberti

3b Embolus with longer drawn out tip that is curved at end. 4

4a Tip of embolus pointed; median apophysis (ma) with large retrolateral spur (Figs. 35–36) pulchra

4b Tip of embolus flattened; median apophysis (ma) with small retrolateral spur (Figs. 37–42) gulososa

Gladicosa gulososa (Walckenaer), comb. nov.

Figures 5, 6–9, 35, 36. Map 1.


Leimonia gulososa: Simon 1864: 352.


Lycosa helluo: Banks 1901: 184 (part).


*Trochosa purcelli*, Montgomery, 1904: 301, 305.

*Lycosa pulchra*: Chamberlin 1904: 147 (part); Banks 1910: 57 (part).


**Discussion.** The nomenclatural history of *G. gulosa* is complex. Walckenaer's (1837) seven-line description without figures is not diagnostic for this species. The locality given is North America, and that doesn't help. To complicate matters, Emerton (1885) misidentified this species as *Tarentula kochi* Keyserling and transferred it to the genus *Lycosa*. Gertsch and Wallace (1935) discussed the systematic and nomenclatural problems associated with *G. gulosa* and suggested using the name *Lycosa kochi* Emerton for this species since Emerton (1885) had placed the species in a different genus. However, according to Article 49 of the International Code of Zoological Nomenclature (1985): "A previously established species-group name wrongly used to denote a species-group taxon because of misidentification cannot be used for that taxon even if it and the taxon to which the name correctly applies are in, or are later assigned to, different genera, except when a previous misidentification is deliberately used in fixing the type species of a new nominal genus." Bonnet (1955) points out that the name *nigraurata* or *purcelli* of Montgomery should have been used for the species. Montgomery (1904) himself synonymized *nigraurata* with *purcelli* and the name *purcelli* has been used only by Montgomery (1902, 1904). The name *gulosa*, on the other hand, has been employed numerous times since Gertsch and Wallace's (1935) invocation of *kochi*, and even by Gertsch (1949) in his book *American Spiders*. It therefore seems best to retain the name *gulosa* for this species to promote stability of nomenclature by preserving a long accepted name in its accustomed meaning.

**Color. Females.** Face yellow or yellow-orange, to pale golden brown. Eye region darker with nacelles black. Chelicerae yellowish brown to dark reddish brown, almost black at distal ends. Condyles yellow or orange, to golden brown.

Carapace light brown to brown, with broad yellow to yellow-orange median stripe. Narrow irregular submarginal yellow stripes suffused with brown. Posterior declivity with black patches as in Figure 3.
Fig. 1. *Gladicosa huberti* (Chamberlin), female from Bar M Ranch near Boston, Thomas Co., Georgia, 2 Mar. 1973. Fig. 2. *Gladicosa bellamyi* (Gertsch and Wallace), female from 2 mi. N of Stoneville, Washington Co., Mississippi, 9–11 May 1983. Fig. 3. *Gladicosa pulchra* (Keyserling), female from Gainesville, Alachua Co., Florida, 14 June 1935. Fig. 4. *Gladicosa gulosa* (Walckenaer), female from 4 mi. S of New Richmond, Allegan Co., Michigan, 16 Sept. 1974. Fig. 5. *Gladicosa euepigynata* (Montgomery), Camp Verde, Kerr Co., Texas, Dec. 1939.
Dorsum of abdomen light brown to brown with pair of black anterior-lateral patches as in Figure 5. Anterior cream to yellow spots mark depressions of internal muscle attachments. Cardiac area faintly indicated. Venter of abdomen cream or light beige to pale yellowish brown. Few scattered darker spots. Overlaid with fine coat of white hair.

Legs yellow or pale yellow-orange to yellowish brown, darker distally. Femora with dusky bands on dorsal and lateral surfaces. Ventral surface lighter yellow.

Labium and endites brownish orange to brown with distal ends yellow to cream. Sternum yellow to light golden brown.

**Color. Males.** Face yellow to yellow-orange, darker brownish in eye region. Chelicerae with basal areas yellow to orange-yellow, darker brown to reddish brown distally. Condyles orange-yellow to orange. Cymbia of palpi dark brown.

Carapace brown with a broad median yellow stripe and irregular yellowish submarginal stripes obscured by thicker clothing of white hair.

Dorsum of abdomen beige to light brown with black markings along sides beginning anteriorly and continuing posteriorly. Black markings often more prominent than in female. Posterior of dorsum without distinct chevrons as in other species. Venter of abdomen pale yellow to beige, clothed with white hair which is more abundant laterally.

Legs yellow to brownish yellow. Darker dorsally without dusky markings on femora as in female.

Labium and endites orange-yellow to orange-brown with distal ends lighter yellow to beige. Sternum orange to orange-brown.

**Measurements.** Ten females and ten males from Allegan Co., Michigan. See Table 1.

**Diagnosis.** *Gladicosa gulosa* is closest to *G. pulchra* in size and coloration. The markings of *pulchra* offer greater contrast, and chevrons are usually visible on the dorsum of the female abdomen (compare Fig. 5 with Fig. 4). The epigyna of the females and the palpi of the males also resemble one another in appearance, but are distinctly different when compared in detail. The epigynum of *gulosa* has the transverse piece entirely pearlescent white, whereas *pulchra* has some white, but nearly always shows darker brown sclerotized areas on the transverse piece (compare Figs. 6, 8, 9 with Figs. 10, 11, 13, 14). In *gulosa* the embolus is pointed at the end, whereas that of *pulchra* is somewhat spatulate in shape (compare Figs. 35, 36 with Figs. 37, 38).
Table 1. Measurements of ten females and ten males of *Gladicosa gulosa* from Allegan Co., Michigan.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Females: Mean SEM</th>
<th>Males: Mean SEM</th>
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<tbody>
<tr>
<td>Ant. Eye Row</td>
<td>0.985 ± 0.023</td>
<td>0.900 ± 0.025</td>
</tr>
<tr>
<td>PME</td>
<td>1.218 ± 0.016</td>
<td>1.141 ± 0.021</td>
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<tr>
<td>PLE</td>
<td>1.623 ± 0.020</td>
<td>1.503 ± 0.028</td>
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<tr>
<td>POQ</td>
<td>1.138 ± 0.015</td>
<td>1.049 ± 0.018</td>
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<tr>
<td>Car. Width</td>
<td>4.36 ± 0.08</td>
<td>4.14 ± 0.06</td>
</tr>
<tr>
<td>Car. Length</td>
<td>5.88 ± 0.09</td>
<td>5.09 ± 0.12</td>
</tr>
<tr>
<td>Body Length</td>
<td>13.18 ± 0.49</td>
<td>11.46 ± 0.30</td>
</tr>
<tr>
<td>Pat.-Tibia II</td>
<td>4.96 ± 0.09</td>
<td>4.70 ± 0.08</td>
</tr>
<tr>
<td>Pat.-Tibia III</td>
<td>4.37 ± 0.08</td>
<td>4.18 ± 0.07</td>
</tr>
</tbody>
</table>

**Natural History.** Kaston (1948) reports *gulosa* running over dead leaves on forest floors in Connecticut. I have found it in leaf litter of deciduous woods in Michigan. Here it is found in more open Oak woodlands as opposed to the shaded floor of Beech-Maple forests. In Michigan and New England *gulosa* usually matures late in the fall, overwinters as an adult, and mates in early spring. Kaston (1936) made the following observations of courtship behavior in the species:

Immediately upon coming in contact with the female, or within 3 minutes thereof, the male begins to drum his palps rapidly against the floor of the cage. These drumming movements are made so rapidly that a distinct purring or humming sound can be heard. The palps are used alternately and are raised only a very short distance during the process. The body is held at an angle so that the posterior end of the abdomen almost touches the floor. As a consequence when the male begins to twitch his abdomen in a vertical plane the tip strikes...
the floor. However, I could not detect any sounds made by this part of the body. It is highly probable that the vibrations set up in the substratum by the tapping movements of the palps and abdomen are perceived by the female. This may exert an exciting influence on her in a manner analogous to that which occurs in web-building species, where the male tweaks the threads of the female's snare.

The male now moves slowly toward the female without courting. When near her he reaches over to touch her. At first she may jump at him and chase him away. Later, if she is receptive she allows him to stroke her legs or abdomen. After this contact with the female the male resumes his courtship movements. Later on, if the male gets more excited he begins to raise his forelegs off the floor about 1 or 2 mm, and lower them quickly. During this process the legs quiver violently.

After 13 minutes of this courting one male began to mount the female, but before he could get into the final copulatory position, she ran away from him. Another male had courted only seven minutes when the female allowed him to mount. The position is the usual one for Lycosids, the male using his palps
alternately during the 10 minutes the act lasted. This duration time may not be the usual one for the species, however, for one pair were observed in the field, when collected, which were already *in copula* and remained so for about another half hour. The sound produced during courtship was also reported by Allard (1936). Observations were made on a collecting trip in the Bull Run Mountains of Virginia during late April. He described the sound as a distinct purring produced by drumming rapidly upon dry leaf surfaces. He reports:

The creatures were very wary, but with care I was able to examine their movements critically from a distance of only a few inches. When the spider moved and made its sounds, the fore part of the body quivered perceptibly and the palpi, too, executed gentle up and down movements. The quivering movements brought the chelicerae directly in contact with the dry leaf surface, and the latter alone appeared to be responsible for the rather loud sounds I had heard. According to Allard these tapping sounds could be heard a distance of 10 feet or more.

Rovner (1975) investigated sound production in three species of *Schizocosa* and six species of *Lycosa*, including *gulosa*. Previous investigators, as with *gulosa* above, had regarded such sounds as being solely percussive, generally produced by a tapping or scraping of the palps or the chelicerae against the substratum. High-speed
film analysis by Rovner (1975) revealed the presence of a stridulatory organ at the tibio-tarsal joint. This apparatus consists of a file on the distal end of the tibia and a scraper at the base of the palpal cymbium. Further examination revealed a group of stout spines or macrosetae at the tip of the palpal tarsus. These spines apparently aid in coupling the tarsus to the substratum. Thus, the sound produced by *gulosa* and other lycosids is not generated simply by drumming, but involves a rapid oscillation at the tibio-tarsal joint facilitated by macrosetae that anchor the palpus to the substratum.

Kaston (1948) reports seeing mature females of *gulosa* from September, through winter, to June suggesting that some may live for two years. Egg sacs appear in early April and are produced until late May. Egg sacs vary from 6–10 mm in diameter and egg counts range from 118–274, each egg about 1 mm in diameter.

**Distribution.** From southern Canada in the northeast to eastern Texas in the southwest. Not recorded from Florida and a single specimen from Colorado (Map 1).

**Records.** CANADA. *Nova Scotia*. Bridgewater; Kentville. *Quebec*. Ft. Coulouge; King Mtn., Gatineau National Park; Ste. Rose. *Ontario*. Arnprior; Belleville; Chatterton; Haliburton; Marmora; Mazinaw Lake; Ottawa; Pelee Island; Port Credit; Rondeau Provincial Park; Simcoe; Toronto.

UNITED STATES. *Maine*. Androscoggin Co.: Poland Spring, 15 June 1904, ♂ (J. H. Emerton); York Co.: Wells, 12 Aug. 1933 (W. Ivie). *New Hampshire*. Belknap; Carroll; Cheshire; Hillsboro; Sullivan. *Vermont*. Caledonia; Windham; Windsor. *Massachusetts*. Barnstable; Berkshire; Essex; Franklin; Hampden; Middlesex; Norfolk; Worcester. *Connecticut*. Providence; Fairfield; Litchfield; Middlesex; New Haven; Windham. *New York*. Allegany; Cattaraugus; Courtland; Essex; Fulton; Monroe; Nassau; Oneida; Onondaga; Queens; Richmond; Rockland; Steuben; Suffolk; Sullivan; Tompkins; Westchester; Wyoming. *New Jersey*. Bergen; Burlington; Camden; Mercer; Ocean; Union. *Pennsylvania*. Butler; Cambria; Carbon; Mifflin; Philadelphia; Pike; Venango; Westmoreland. *Ohio*. Champaign; Columbiana; Hocking; Knox; Ottawa; Washington. *Maryland*. Anne Arundel; Baltimore City; Montgomery. *District of Columbia*. Washington. *West Virginia*. Pocahontas. *Virginia*. Fairfax; Falls Church (Indep. City); King William;

Gladicosa pulchra (Keyserling), comb. nov.

Figures 4, 10–14, 37–42. Map 2.

Tarentula pulchra Keyserling, 1877: 628, pl. 7, figs. 13, 14, ♂♀. Syntypes (♂♀) from “North America,” L. Koch collection, deposited in the British Museum (Natural History), examined. Banks 1893: 124.

Lycosa gulosa: Chamberlin 1908: 265 (part).
Scaptocosa pulchra: Roewer 1954: 293.

Discussion. Montgomery (1904) described this species under Lycosa insopita. He apparently did not have the Keyserling syntypes for comparison. Gertsch (1934) was the first to recognize the synonymy.

Color. The range of color in G. pulchra is greater than that of G. gulosa. I have noted light forms and dark forms of pulchra. These do not represent a genetic polymorphism but are the extremes in a color continuum. There is no discernible correlation between geographic locality and color pattern among the specimens examined. The darker forms are much more numerous than the light colored ones. The range of color is indicated in the following descriptions.

Color. Female. Face orange-brown to dark reddish brown. Chelicerae dark reddish brown to black with condyles lighter orange-brown.

Carapace dark brown to a dark reddish brown with a broad median yellow stripe suffused with white hair. Irregular lighter submarginal yellow stripes similarly clothed with white hair. Pattern as in Figure 4.

Dorsum of abdomen brown to brown mottled with black. Anterio-lateral areas black, blending with similar black areas on cephalothorax. Five pairs of white spots (in well-marked specimens) beginning in cardiac area and continuing posteriad. White spots connected by dark brown chevrons as in Figure 4. Cardiac area darker brown, outlined by lighter brown or yellowish.

Venter of abdomen dark brown to almost black posterior to epigastric furrow. Yellowish anterior to furrow.

Legs light brown with darker black annulations on femora to dark reddish brown without distinct annulations.

Labium and endites light brown to black with pale yellowish distal ends. Sternum yellow brown (golden), dark reddish brown to black.


Carapace orange-brown to dark orange-brown with broad yellow to pale orange median stripe overlaid with white hair. Irregular submarginal stripes of same color, sometimes indistinct.

Dorsum of abdomen with median area light to medium brown, bordered by black. Five pairs of white spots beginning in cardiac area and continuing posteriad. Spots joined by black chevrons. Cardiac area brown, enclosed by lighter pale brown to yellow-brown. Pattern similar to female. Venter of abdomen brown to black posterior to epigastric furrow. Light brown to pale yellow or cream anterior to furrow.

Labium and endites yellow-orange to orange with distal ends cream. Sternum yellow-orange to orange.

**Measurements.** Ten females and ten males from Florida. See Table 2.

**Diagnosis.** *Gladicosa pulchra* is closest to *G. gulosa* in size, coloration, and genitalic structure. *Gladicosa pulchra* is a larger species
than \textit{gulosa} (compare Table 1 with Table 2) and is usually darker in color with a more distinct pattern (compare Fig. 4 with Fig. 3). In most specimens of \textit{pulchra} the venter of the abdomen is dark brown to black behind the epigastric furrow, while that of \textit{gulosa} is yellowish to light brown. Differences between female and male genitalia of these two species are noted under \textit{gulosa} and in the keys.

\textbf{Natural History.} Little is known of the habitat or behavior of \textit{pulchra}. I've collected this species in Florida from the trunks of deciduous trees where their color blends well with the bark substrate. G. B. Edwards (personal communication) has collected specimens from similar microhabitats in Florida. Pat Miller (personal communication) reported collecting both male and female \textit{pulchra} from the trunks of pine trees at night in Perry, Florida, on December 5, 1982. Montgomery (1904) reported finding \textit{pulchra} near Austin, Texas, in drier habitats than \textit{gulosa} and less abundantly. He noted that the females live under stones where they make a shallow horizontal burrow lined with silk. Whether this behavior is consistent throughout the life cycle or represents a temporary adjustment to molting or egg laying is a question to be answered. \textit{Gladicosa pulchra} is not the abundant inhabitant of deciduous leaf litter, as are \textit{gulosa} and \textit{huberti}. Of the species investigated \textit{pulchra} is the most variable in coloration of the body and structure of the epigynum. It is possible that more than one species is represented in this complex.

Roble (1986) reported rearing \textit{Mantispa viridis} from a \textit{Gladicosa pulchra} egg sac. It is the first record of a lycosid spider serving as a host of \textit{M. viridis}. When the spider died, its egg sac was opened and a mantispid cocoon and 95 surviving spiderlings were found. This corroborates an earlier observation of high spiderling survival within a mantispid-infested egg sac of \textit{Lycosa rabida}.

\textbf{Distribution.} From Long Island, New York, along the East Coast to Texas in the southwest. Limited in its northern range inland to the southern parts of Kansas and Missouri and northern Kentucky. More abundant in the southeastern United States (Map 2).

Table 2. Measurements of ten females and ten males of *Gladicosa pulchra* from Florida.

<table>
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<th>Females:</th>
<th>Mean</th>
<th>SEM</th>
<th>Mean</th>
<th>SEM</th>
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<tr>
<td>Ant. Eye Row</td>
<td>1.304 ± .028</td>
<td>Femur I</td>
<td>5.46 ± .12</td>
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<tr>
<td>PME</td>
<td>1.734 ± .040</td>
<td>Pat.-Tibia I</td>
<td>7.23 ± .16</td>
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<td>PLE</td>
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<td>Meta. I</td>
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<tr>
<td>Body Length</td>
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<td>Meta. IV</td>
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<td>Pat.-Tibia III</td>
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<td>Tarsus IV</td>
<td>2.70 ± .07</td>
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</tr>
<tr>
<td>Total IV</td>
<td>22.73 ± .51</td>
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<tr>
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<th>Mean</th>
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<tr>
<td>Ant. Eye Row</td>
<td>1.176 ± .022</td>
<td>Femur I</td>
<td>5.79 ± .11</td>
<td></td>
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<tr>
<td>PME</td>
<td>1.604 ± .032</td>
<td>Pat.-Tibia I</td>
<td>7.88 ± .19</td>
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<td>PLE</td>
<td>2.044 ± .050</td>
<td>Meta. I</td>
<td>5.46 ± .15</td>
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<td>POQ</td>
<td>1.514 ± .032</td>
<td>Tarsus I</td>
<td>2.47 ± .06</td>
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<td>Car. Width</td>
<td>4.94 ± .14</td>
<td>Total I</td>
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<td>Femur IV</td>
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<td>Body Length</td>
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<td>12.02 ± .17</td>
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<td>7.83 ± .18</td>
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<tr>
<td>Pat.-Tibia III</td>
<td>6.09 ± .16</td>
<td>Tarsus IV</td>
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<tr>
<td>Total IV</td>
<td>24.69 ± .51</td>
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</tbody>
</table>

Gladicosa huberti, comb. nov.
Figures 1, 18–20, 27, 28. Map 3.


Scaptocosa huberti: Roewer 1954: 293.

Discussion. Gladicosa huberti together with G. pulchra were placed in the genus Scaptocosa by Roewer (1954) with Lycosa missouriensis (Banks) [= Geolycosa] as the type species. Five other North American species now considered to be in Geolycosa and one species of Schizocosa were included in Scaptocosa as well. It is not clear what distinguishes this odd assemblage.

Color. Females. Face orange-brown to reddish brown with eye nacelles black. Chelicerae dark reddish brown (mahogany) to black. Condyles orange-brown.

Carapace orange-brown to reddish brown with broad median pale orange stripe from PME to posterior edge. Lighter irregular submarginal stripes less distinct than median. Pattern as in Figure 1.

Dorsum of abdomen brown to dark brown with cardiac area outlined in black. Chevrons faintly indicated along posterior half with white spots marking their lateral edges. Anterior lateral edges of dorsum darker as in Figure 1. Venter pale yellow-orange to darker brown. Lateral areas darker in pale-colored individuals, con-colorous brown in others.

Legs yellow-orange to orange-brown, without darker annulations.

Labium and endites orange-brown to dark reddish brown, with distal ends yellowish to cream. Sternum yellow-orange to light orange-brown.


Carapace orange-brown to darker reddish brown with light orange broad median stripe from eye region to posterior edge. Lighter, irregular submarginal stripes, not so distinct as median one.

Dorsum of abdomen medium to dark brown with cardiac area lighter, outlined by black line which is enclosed in turn with lighter color extending laterally. Anterior lateral areas marked by black color, which extends more posteriad than in female. Venter of
abdomen orange-brown to dark brown. Central area somewhat lighter.

Legs yellow-orange to orange-brown, somewhat lighter ventrally, without darker bands.

Labium and endites yellow-orange to dark reddish brown, with distal ends pale yellow to cream. Sternum yellow to reddish orange-brown.

**Measurements.** Ten females and ten males from Georgia and Florida.

**Diagnosis.** *Gladicosa huberti* is closest to *G. bellamyi* in body size and shape of the epigynum, but resembles *G. gulosa* in coloration and structure of the male palpus. *Gladicosa huberti* is lighter in color than *bellamyi* and smaller in size than *gulosa*. It may be distinguished from either of these species by comparing the epigynum (Figs. 19, 20) to *bellamyi* (Figs. 22, 23, 25, 26) or *gulosa* (Figs. 6, 8, 9) and the palpus (Figs. 27, 28) to *bellamyi* (Figs. 29–34) or *gulosa* (Figs. 35, 36).

**Natural History.** Nothing concerning the natural history of this species is reported in the literature. I have collected it in leaf litter near the edge of woods in Georgia and in a marshy area near the edge of a pond beneath a pine tree canopy in Florida. The great majority of the adult specimens were collected from February through April (see **Records** below).

**Distribution.** Southeastern United States (Map 3).


Figs. 37–38. *Gladicosa pulchra* (Keyserling), left palpus of male syntype of *Lycosa pulchra* Keyserling from North America. 37. Ventral view. 38. Retrolateral view. co, conductor; cy, cymbium; em, embolus; ma, median apophysis; pa, palea; ta, terminal apophysis.


_Gladicosa bellamyi_ (Gertsch and Wallace) comb. nov.


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*Trochosa cherokee* Chamberlin and Ivie, 1942: 35, fig. 76, ♀. Female holotype from Fort Gibson, Muskogee Co., Oklahoma, 21 July 1937 (Standish-Kaiser) deposited in the American Museum of Natural History, examined. NEW SYNONYM.


**Discussion.** *Gladicosa bellamyi* was placed in the new genus *Avicosa* by Roewer (1954) with *Avicosa avida* (Walckenaer) [= *Schizocosa*] as the type species. Two other North American species now placed in *Schizocosa* (*minnesotensis* and *wasatchensis* = *mccooki*) as well as *Lycosa ceratiola* and *Tarentula pictilis* (now *Alopecosa pictilis*) were also included in this new genus. *Avicosa* is certainly an artificial conglomeration without systematic foundation.

**Table 3.** Measurements of ten females and ten males of *Gladicosa huberti* from Georgia and Florida.

<table>
<thead>
<tr>
<th>Females:</th>
<th>Mean</th>
<th>SEM</th>
<th>Mean</th>
<th>SEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ant. Eye Row</td>
<td>.959 ± .013</td>
<td>Femur I</td>
<td>3.63 ± .09</td>
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</tr>
<tr>
<td>PME</td>
<td>1.138 ± .018</td>
<td>Pat.-Tibia I</td>
<td>4.68 ± .11</td>
<td></td>
</tr>
<tr>
<td>PLE</td>
<td>1.478 ± .025</td>
<td>Meta. I</td>
<td>2.56 ± .09</td>
<td></td>
</tr>
<tr>
<td>POQ</td>
<td>1.048 ± .019</td>
<td>Tarsus I</td>
<td>1.57 ± .03</td>
<td></td>
</tr>
<tr>
<td>Car. Width</td>
<td>3.84 ± .12</td>
<td>Total</td>
<td>12.48 ± .32</td>
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</tr>
<tr>
<td>Car. Length</td>
<td>5.09 ± .11</td>
<td>Femur IV</td>
<td>4.12 ± .09</td>
<td></td>
</tr>
<tr>
<td>Body Length</td>
<td>11.18 ± .46</td>
<td>Pat.-Tibia IV</td>
<td>5.03 ± .10</td>
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</tr>
<tr>
<td>Pat.-Tibia II</td>
<td>4.27 ± .11</td>
<td>Meta. IV</td>
<td>4.53 ± .09</td>
<td></td>
</tr>
<tr>
<td>Pat.-Tibia III</td>
<td>3.68 ± .08</td>
<td>Tarsus IV</td>
<td>2.03 ± .03</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Total IV</td>
<td>15.70 ± .31</td>
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<table>
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<th>SEM</th>
<th>Mean</th>
<th>SEM</th>
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<td>Tarsus I</td>
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<tr>
<td>Car. Width</td>
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<td>Total</td>
<td>13.30 ± .17</td>
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<tr>
<td>Car. Length</td>
<td>4.81 ± .07</td>
<td>Femur IV</td>
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<tr>
<td>Body Length</td>
<td>8.98 ± .17</td>
<td>Pat.-Tibia IV</td>
<td>4.96 ± .07</td>
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<td>Pat.-Tibia II</td>
<td>4.32 ± .06</td>
<td>Meta. IV</td>
<td>4.61 ± .07</td>
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<td>Pat.-Tibia III</td>
<td>3.67 ± .05</td>
<td>Tarsus IV</td>
<td>2.03 ± .03</td>
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<td></td>
<td></td>
<td>Total IV</td>
<td>15.73 ± .22</td>
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</tr>
</tbody>
</table>

**Color.** *Females.* Face orange-brown to dark reddish brown. Chelicerae dark reddish brown to black. Condyles lighter yellowish.

Carapace dark brown to dark reddish brown with broad median yellow-orange to pale brownish orange stripe from PME to posterior declivity as in Figure 2. Indistinct submarginal stripes of same color.
Dorsum of abdomen pale yellow-brown to medium brown, often with darker brown cardiac mark and darker chevrons posteriorly as in Figure 2. Slight indication of black counter-shading anterio-laterally. Venter of abdomen dark brown posterior to epigastric furrow; median area sometimes mottled with light orange-brown. Lighter yellowish anterior to furrow.

Legs brown to dark brown dorsally. Pale yellowish brown to golden brown ventrally. Legs without distinct bands.

Labium and endites dark reddish brown to orange-brown with distal ends lighter golden to yellow.


Carapace dark reddish brown overlaid with fine black hair. Broad median pale yellow-orange to orange-brown stripe from PME to posterior edge.

Dorsum of abdomen beige to light brown. Black countershading in antero-lateral areas, extending posteriorly farther than in female. Indistinct chevrons posteriorly. In some specimens the median longitudinal area of the dorsum is pale yellow to cream with darker brown at edges and along sides. Venter of abdomen dark brown to black posterior to epigastric furrow, lighter yellowish brown anteriorly. Lateral areas often somewhat lighter in color.

Legs orange-brown to dark brown dorsally, paler golden to yellowish brown ventrally. Without darker bands. Tibia and metatarsus I black, tarsus yellow.

Table 4. Measurements of ten females and ten males of *Gladicosa bellamyi* from Ohio.

<table>
<thead>
<tr>
<th>Females:</th>
<th>Mean</th>
<th>SEM</th>
<th>Females:</th>
<th>Mean</th>
<th>SEM</th>
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<tr>
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<tr>
<td>PME</td>
<td>1.135 ± .018</td>
<td>Pat.-Tibia I</td>
<td>4.46 ± .11</td>
<td></td>
<td></td>
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<tr>
<td>PLE</td>
<td>1.478 ± .024</td>
<td>Meta. I</td>
<td>2.47 ± .05</td>
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<td></td>
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<tr>
<td>POQ</td>
<td>1.065 ± .015</td>
<td>Tarsus I</td>
<td>1.53 ± .03</td>
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<td>Car. Width</td>
<td>3.66 ± .08</td>
<td>Total I</td>
<td>11.85 ± .26</td>
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<td>Car. Length</td>
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<td>Femur IV</td>
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<td>Body Length</td>
<td>10.43 ± .27</td>
<td>Pat.-Tibia IV</td>
<td>4.86 ± .11</td>
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<td>Meta. IV</td>
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<td>Pat.-Tibia III</td>
<td>3.49 ± .08</td>
<td>Tarsus IV</td>
<td>1.96 ± .04</td>
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<td>Total IV</td>
<td>15.28 ± .33</td>
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1986]  

**Brady—Nearctic Gladicosa**  

<table>
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<tr>
<th>Males:</th>
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<th>Mean</th>
<th>SEM</th>
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<tbody>
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<td>.014</td>
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<td>.013</td>
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<td>.14</td>
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<td>.05</td>
<td>Meta. IV</td>
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<td>.04</td>
<td>Tarsus IV</td>
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<td>Total IV</td>
<td></td>
<td></td>
<td>Total IV</td>
<td>14.68</td>
</tr>
</tbody>
</table>

Labium and endites orange-brown to dark brown with distal ends lighter yellow to golden. Sternum light orange-brown to darker reddish brown.

**Measurements.** Ten females and ten males from Ohio, and ten females from Mississippi. See Tables 4 and 5.

Table 5. Measurements of ten females of *Gladicosa bellamyi* from Mississippi.

<table>
<thead>
<tr>
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<th>SEM</th>
<th>Mean</th>
<th>SEM</th>
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<td>5.32</td>
<td>.09</td>
<td>Femur IV</td>
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<td>Body Length</td>
<td>9.94</td>
<td>.19</td>
<td>Pat.-Tibia IV</td>
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<td>.07</td>
<td>Meta. IV</td>
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<td>.07</td>
<td>Tarsus IV</td>
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<td>Total IV</td>
<td></td>
<td></td>
<td>Total IV</td>
<td>18.75</td>
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**Diagnosis.** *Gladicosa bellamyi* is closest to *G. huberti* in body size and in shape of the epigynum (compare Figs. 22, 23, 25, 26 with Figs. 19, 20). It is more darkly colored than *huberti* and the light submarginal stripes on the carapace are narrower. *Gladicosa bellamyi* can be easily distinguished from *huberti* by the structure of the male palpi (compare Figs. 29–34 with Figs. 27, 28). Other than the type specimens of *Lycosa bellamyi* and *Trochosa cherokee*, this species is represented by specimens taken in pitfall traps near Stoneville, Mississippi and Columbus, Ohio. The males from Mississippi, which
are the predominant sex in these collections, are distinctly larger than the Ohio males as indicated by the Measurements, but the similarity of coloration, genitalic structure, and anatomical proportions led me to think that only one species is represented. The southern populations are simply larger in size.

**Natural History.** Andrew Penniman (personal communication) collected this species in some abundance by using pitfall traps in a wooded area in central Ohio. The collecting period extended from 24 April to 28 August 1973 and the relative abundance of the sexes taken in these traps is indicated in the records below. Four females with egg cases were collected from 29 May–12 June. The egg cases contained 53, 56, 91, and 106 eggs. Tim Lockley (personal communication) also captured this species in pitfall traps placed at the edge of a deciduous woods in Mississippi. Most of these specimens were males as indicated in the records below. A single female with egg case was collected between 3–6 June 1983.

**Distribution.** Ohio southeastward to western Florida and southwestward to Oklahoma (Map 3).


**Gladicosa euepigynata** (Montgomery) comb. nov.


Not Lycosa gulosa (Walckenaer).
Hogna euepigynata: Roewer 1954: 258.

Discussion. Chamberlin (1908) synonymized G. euepigynata with G. gulosa commenting upon the variation in size and color of gulosa. Montgomery (1909) rightfully defended his designation of euepigynata as a distinct species.

Carapace brown with broad, irregular median stripe of orange-yellow to yellow. Irregular submarginal stripes of orange-yellow, intersected by black lines radiating from thoracic area. Pattern illustrated in Figure 3.
Dorsum of abdomen mottled with beige, spots of white, and dark brown along the edges. Faint indications of chevron markings posteriorly as in Figure 3. A series of five white spots marking edges of chevrons. Venter of abdomen pale cream to yellow.
Legs yellow-gold to brownish orange. Pale ventrally with dorsal surfaces of femora marked by three irregular dark brown bands.
Labium reddish brown with distal end yellow. Endites orange-brown to reddish brown with distal ends yellow. Sternum orange-brown to reddish brown.

Color. Males. Face yellow to brownish yellow, eye region brown. Cymbia of palpi brown.
Carapace brown with broad median yellow stripe and irregular submarginal stripes of same color, producing a pattern very similar to that of female (Fig. 3).
Dorsum of abdomen with mottled pattern of light and dark brown overlaid with white hair. White hairs forming five paired spots beginning in cardiac area and continuing posteriad. Cardiac area outlined with dark brown. Overall pattern as in female (Fig. 3). Venter of abdomen cream to pale brown or beige.
Legs yellow to golden brown, darker on dorsal surface. Each femur with three dark brown irregular bands that are more distinct on dorsal surfaces.
Labium yellow to gold. Endites brown, with distal ends yellow. Sternum golden yellow.

Measurements. Ten females and ten males from Texas. See Table 6.

Table 6. Measurements of ten females and ten males of *Gladicosa euepigynata* from Texas.

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th><strong>Males:</strong></th>
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<tr>
<td></td>
<td>Mean</td>
<td>SEM</td>
<td>Mean</td>
<td>SEM</td>
</tr>
<tr>
<td>Ant. Eye Row</td>
<td>1.268 ± .016</td>
<td></td>
<td>1.152 ± .018</td>
<td></td>
</tr>
<tr>
<td>PME</td>
<td>1.692 ± .016</td>
<td>Femur I</td>
<td>5.39 ± .06</td>
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</tr>
<tr>
<td>PLE</td>
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<td>POQ</td>
<td>1.610 ± .014</td>
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<td>Car. Width</td>
<td>5.32 ± .08</td>
<td>Tarsus I</td>
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<td>Car. Length</td>
<td>7.21 ± .12</td>
<td>Total I</td>
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<td>Body Length</td>
<td>16.88 ± .35</td>
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<td>6.54 ± .09</td>
<td>Meta. IV</td>
<td>7.51 ± .08</td>
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</tr>
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<td>Pat.-Tibia III</td>
<td>5.76 ± .07</td>
<td>Tarsus IV</td>
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<td></td>
<td></td>
<td>Total IV</td>
<td>23.48 ± .22</td>
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<td>Ant. Eye Row</td>
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<tr>
<td>PME</td>
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<td>Pat.-Tibia</td>
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</tr>
<tr>
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<td>1.964 ± .028</td>
<td>Meta. I</td>
<td>6.87 ± .07</td>
<td></td>
</tr>
<tr>
<td>POQ</td>
<td>1.466 ± .016</td>
<td>Tarsus I</td>
<td>4.54 ± .07</td>
<td></td>
</tr>
<tr>
<td>Car. Width</td>
<td>4.84 ± .11</td>
<td>Total I</td>
<td>2.44 ± .04</td>
<td></td>
</tr>
<tr>
<td>Car. Length</td>
<td>6.60 ± .17</td>
<td>Femur IV</td>
<td>18.97 ± .25</td>
<td></td>
</tr>
<tr>
<td>Body Length</td>
<td>11.91 ± .28</td>
<td>Pat.-Tibia IV</td>
<td>5.91 ± .09</td>
<td></td>
</tr>
<tr>
<td>Pat.-Tibia II</td>
<td>6.24 ± .08</td>
<td>Meta. IV</td>
<td>7.20 ± .10</td>
<td></td>
</tr>
<tr>
<td>Pat.-Tibia III</td>
<td>5.59 ± .08</td>
<td>Tarsus IV</td>
<td>6.82 ± .07</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total IV</td>
<td>22.76 ± .29</td>
<td></td>
</tr>
</tbody>
</table>

**Diagnosis.** *Gladicosa euepigynata* is closest to *G. pulchra* in size and coloration (compare Fig. 3 with Fig. 4). The epigynum of *euepigynata* (Figs. 15–17) and the palpus (Figs. 43–46) distinguish it from *pulchra* and all other species of *Gladicosa.*

**Natural History.** Montgomery (1904) reported this species as being abundant near Austin, Texas. There he found it under stones near water. Males were most numerous in January.

**Distribution.** South central Texas (Map 3).

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