

A REVIEW OF THE SPIDER GENERA *PARDOSA* AND *ACANTHOLYCOSA* (ARANEAE, LYCOSIDAE) OF THE 48 CONTIGUOUS UNITED STATES

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ABSTRACT. In the 48 contiguous United States, the wolf spider subfamily Pardosinae is represented by 65 species of *Pardosa* and 1 species of *Acantholycosa*. This study provides a comprehensive account of all species of Pardosinae in the USA including keys, some of which are new, for their identification. Based on genital morphology, the species of *Pardosa* in the USA can be divided into 14 species groups containing from one to 17 species. The male of *P. ourayensis* Gertsch 1933 is illustrated for the first time. Difficulties arise in the identification of some sister species which are both morphologically and geographically close; and also many of the species in the sternalis group which can be identified only by their distribution.

Keywords: Pardosinae, wolf spiders, keys, genitalia, taxonomy, species groups, range

The lycosid genus *Pardosa* C.L. Koch 1847 is among the five largest spider genera in the world, trailing *Araneus* Clerck 1757 and *Theridion* Walckenaer 1805 in number of species. The World Spider Catalog (Platnick 2003) lists over 530 species world-wide, occurring on all continents. Seventy-five currently recognized *Pardosa* species occur in North America, 65 of these south of Canada. The 45 species in Canada and Alaska, including 35 shared with the United States, have received excellent treatment (Dondale & Redner 1990), but it requires at least 13 papers (Barnes 1959; Dondale 1999; Dondale & Redner 1984, 1986, 1987, 1990; Jimenez 1986; Kronstedt 1975, 1981, 1988, 1993; Lowrie & Dondale 1981; Vogel 1964, 1970a) to identify *Pardosa* species in the contiguous United States.

In addition to scattered published information, some of the difficulty in identifying spiders arises from a lack of knowledge of the morphological variation in a species, and the lack of knowledge of the geographical range of a species. For example, such difficulty exists between *P. lapidicina* and *P. mercurialis*. *Pardosa lapidicina* Emerton 1885 was described from Salem, Massachusetts and Meriden, Connecticut and it ranges to the Midwest. *Pardosa mercurialis* Montgomery 1904 was described from Austin, Texas. There are no published records of these species occurring in Colorado but these spiders are collect-

ed there. Barnes (1959:7) was unable to distinguish the females of these two species, but the males may be separated by the shape of the terminal apophysis of the palp (Barnes' median accessory process). In *P. lapidicina* it is a blunt lobe and in *P. mercurialis* a pointed tooth. However it is reasonable that a blunt lobe may grade into a pointed tooth across a geographical range. In any case, one must bear in mind that within given species there is variation in genital morphology, especially the epigynum, and that that variation may exceed the variation between sister species. A study of intra-population variation would be particularly useful in these species.

Until recently, *Pardosa* was the only genus in the subfamily Pardosinae Simon 1898 in North America. However, for some years, arachnologists have recognized that *Pardosa solitudo* Levi & Levi 1951 may belong in *Acantholycosa* Dahl 1908 (Lowrie 1973: 12). Kronstedt & Marusik (2002) have now formally placed that species in *Acantholycosa*, which adds *Acantholycosa* to the list of genera, and to Pardosinae in North America.

Subfamily Pardosinae Simon 1898

Remarks.—The Pardosinae is characterized by the cephalic region of the cephalothorax which is relatively higher than in other lycosid genera and the sides of the face are

nearly vertical. In most species the legs are slender. The median apophysis is thick and well sclerotized; the embolus is a long curved spine; and the epigynum usually has a median

inverted T-shaped structure (Zyuzin 1993: 696). The terminal apophysis is tooth-like, situated retrolaterally on the palea (Dondale 1986:331).

KEY TO THE GENERA OF PARDOSINAE

1. Tibia I with 3 pairs of spines ventrally, of which the apical pair may be short *Pardosa*
 Tibia I with 5–7 pairs of spines ventrally *Acantholycosa*

Genus *Pardosa* C.L. Koch 1847

Remarks.—Members of the *Pardosa* are one of the smaller wolf spiders in North America. They range in size, measured as total body length, from about 3.0 mm in *P. parvula* Banks 1904 males, to greater than 12 mm in *P. groenlandica* (Thorell 1872) females. Most of the species are clothed with fine hair, brown or gray in color, with mottled black markings. The dorsum of the cephalothorax bears a more or less distinct lighter median band. The thoracic region may have additional pale lateral bands making five bands altogether on the prosoma. The dorsum of the abdomen usually has an anterior diamond shape (also referred to as “heart mark” (Dondale & Redner 1990)) followed by paired eyespots (Fig. 1). A few species have unique color patterns. Genital morphology is usually used to identify species but is not definitive in all cases. In a few species a single male or female cannot be identified unless it is collected together with a specimen of the other sex. Some of the smaller species, when the specimen is fresh, can be easily identified by color pattern, but red and yellow colors fade in alcohol.

There are 14 *Pardosa* species groups represented in this region: four containing only one species and ten containing from two to 17 species. The key to species groups is new as is the key to the lapidicina group. Barnes (1959) did not publish a key in his revision of the group. The distincta group key published in Vogel (1964) is revised. The modica group key includes several recently described species not included in the key in Dondale & Redner (1990) as well as species not occurring in Canada. The milvina group key is tailored from Dondale & Redner (1984) for species only in the 48 United States. Finally, most of the key to the nigra group is from Lowrie and Dondale (1981). Note that there may be other species in these species groups that are Hol-

arctic, or from Canada or Mexico and the Caribbean, but they are not considered here. Refer to the literature cited for such species. For the most part, except for recent synonymies, literature citations for individual species are not included. These can be found in the World Spider Catalog (Platnick 2003). Many of the older original descriptions do not include enough information to be useful in identifying specimens. Abbreviated synonymies for some species are included, especially for names that have been used recently. The range maps show only state records, not collection localities.

METHODS

To simplify identifying a specimen, the keys are constructed in two steps. Step one keys to a species group, and step two keys to species within the group. “Species group” is an informal group similar to subgenus, used by authors for convenience and consists of species with similar genital morphology; however, species group is not a taxon recognized by the International Commission on Zoological Nomenclature. A species group may be based on either the epigynum, or on the male palp. The genital morphology of the respective other sex may show greater variation. Within a species group some of the species are morphologically very similar, separated by subtle characters or only by range.

The sexes are keyed separately, but in neither species groups nor species (except for four small groups) do both sexes key in the same order. For this reason the species groups and the brief species descriptions are presented in alphabetical order. If one uses this paper repeatedly, species group recognition will occur, and the first step in the keys may be bypassed.

All genital drawings, except for Figs. 2 & 3, are made to the same scale so comparisons

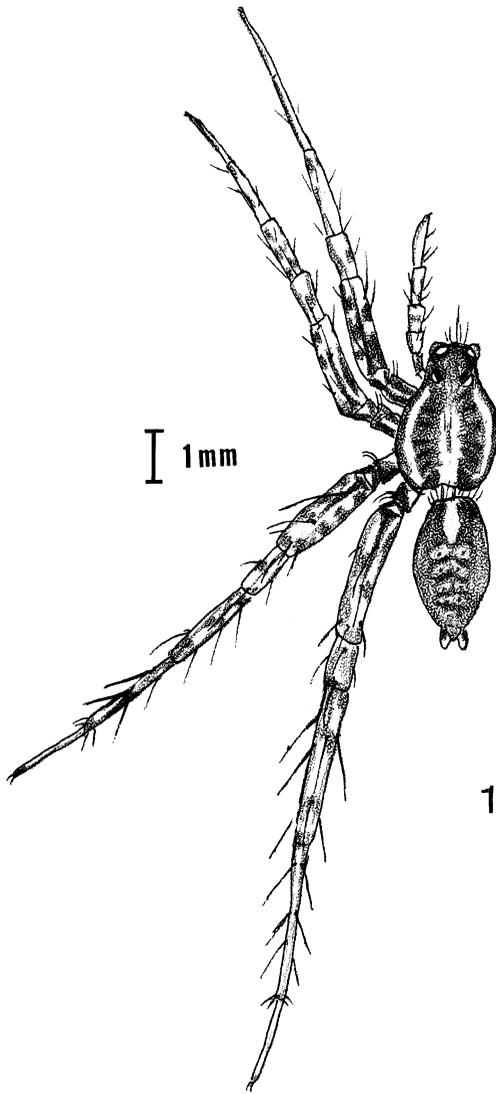


Figure 1.—Habitus of *Pardosa sternalis*.

may be made between related species. The drawings were made at a magnification of 60 X using an ocular grid in a Unitron binocular microscope and transferred to a 1 cm grid on paper. The drawings are reproduced here at 80%. The epigyna were drawn on the intact abdomen but some of the protective hairs were scraped off one side. Internal (dorsal) views are not used. Minor dissection may be required in some of the species in the nigra group to examine the structures in posterior view. For males, the spider's left palp is used in all illustrations. Drawings of the palp are made with the bulb intact. Setae and spines on the cymbium and the tibia of the pedipalp are not included except when they are diagnostic. There is no specifically accepted standard for genital terminology in Lycosidae. Terms used here (Figs. 2 & 3) follow various authors' usages (Dondale & Redner 1984:108; Dondale & Redner 1990:125, 131; Kronstedt 1975: 218; Lowrie & Dondale 1981:128; Vogel 1970a, 77, 78), however some clarification may be helpful.

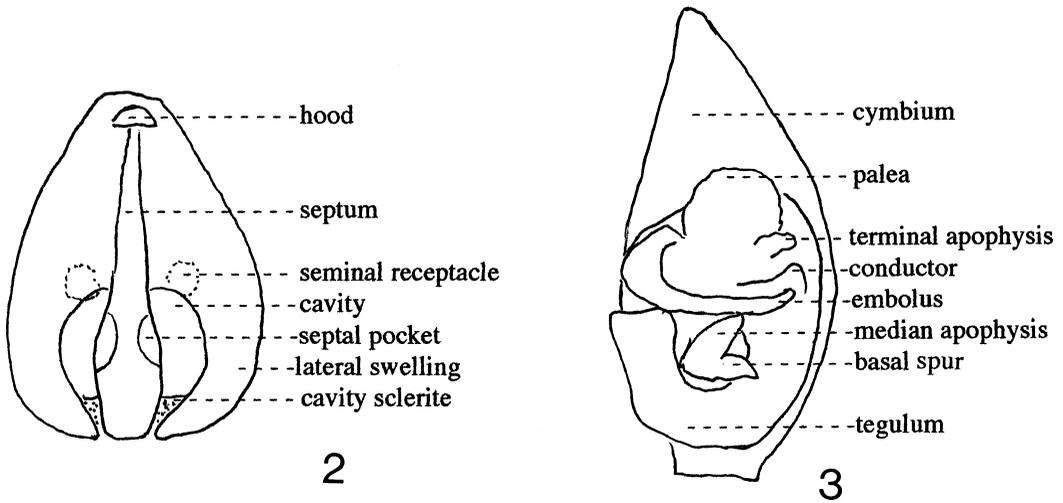
The epigynal hood is a pocket-like structure at the apical end of the septum on the rim of the epigynum. It may be formed by the thickened rim of the cavity or a separate cap-like structure or both. The lateral swellings are slightly mounded portions of the epigynal plate, curving around the cavities and may be enlarged basally. They may extend apically along the septum. Lateral wings (Fig. 7, not shown in Fig. 2) are lightly sclerotized, triangular or lobed projections of the epigynal plate.

The term tegular lobe (Figs. 27, 118–119) refers to an apical bulge on the rim of the tegulum. Terminal apophysis may not be homologous among the species groups when there is more than one paleal process (Zyuzin 1993:699). This is the case in the nigra group, but the authors' usage (Lowrie & Dondale 1981: fig. 10) is followed here.

KEYS TO *PARDOSA* SPECIES GROUPS IN THE USA

Females

- 1. Epigynum without hood; apical end of epigynum smoothly domed (Figs. 6–8, 138) 2
- Epigynum with hood, may be pointed, narrow or nearly the width of epigynum or paired (Figs. 4, 75, 116) 3
- 2. Cavities very narrow, reduced or indistinct: 3 species (Figs. 6–8) coloradensis group
- Cavities large, oval, diverging apically, covering more than 1/2 of epigynum: 1 species (*P. xerampelina*) (Fig. 138) xerampelina group



Figures 2-3.—Diagrams of genitalia with terminology used in this paper. 2, epigynum. 3, palP.

- 3. Single hood formed by apical extension of joined cavities, surrounding septum; apical end of septum may not extend to margin of epigynum (Figs. 29, 30-35, 94) 4
 Hood single or paired; septum longer than cavity or cavity extension 6
- 4. Basal portion of cavities concealed by expanded base of septum; apical end of cavity extension expanded laterally forming a wide hood: 1 species (*P. moesta*) (Fig. 94)
 *moesta* group
- Apical cavity extension approximately the same width throughout 5
- 5. Cavity widest basally; lateral swellings skimpy; septum with wide, short, transverse base and narrow ridge apical to base; lateral wings lacking: 6 species (Figs. 30-35)
 *lapidicina* group
- Cavity widest apical to bulbous base of lateral swellings; septum of moderate width for 2/3 of length, apical 1/3 slim; small lateral wings: 1 species (*P. concinna*) (Fig. 29)
 *lapponica* group
- 6. Paired hoods, flanking apical end of septum (Figs. 60-67, 134-145) 7
 Single hood at apical end of septum; or if apparently paired, hoods widely separated 8
- 7. Cavities reduced or nearly covered by septal expansions, cavities without apical extensions; epigynum longer than wide: 2 species (Figs. 134-135) *tesquorum* group
- Cavities conspicuous, oval or semicircular, with apical extensions (arms) to hoods, flanking septum (except *wyuta*, which has shallow depressions flanking septum); epigynum as wide or wider than long: 17 species (Figs. 60-76) *modica* group
- 8. Cavities very large, circular; hood a point directed basally: 1 species (*P. fuscula*) (Fig. 4)
 *atrata* group
- Cavities reduced, concealed or indistinct 9
- 9. Epigynum as wide as long; septum broad, covering most of epigynum; hood as broad as apical end of epigynum, may appear as paired hoods; cavities without lateral rim: 2 species (Figs. 116-117) *saltuaria* group
- Epigynum various shapes; septum, if broad basally, is narrow apically; hood not as broad as apical end of epigynum unless apical end is very narrow 10
- 10. Cavities not apparent; base of septum somewhat rectangular with transverse wrinkles; septum apical to base a trough extending to hood: 8 species (Figs. 96-106) *nigra* group
- Cavities small to indistinct; base of septum variable but without transverse wrinkles; septum apical to base raised 11
- 11. Cavities oval or semi-circular with distinct rim; lateral swellings encircling cavities ... 12
 Cavities without distinct rim and may be mostly covered by septal expansions 13

- 12. Cavities without sclerites; septum without pockets: 6 species (Figs. 120–125) sternalis group
 Cavities with sclerites arising from septum, filling half of cavity; septum with longitudinal pockets: 2 species (Figs. 24, 25) falcifera group
- 13. Epigynum longer than wide; margin of epigynum usually distinct; apical rim of epigynum and hood thickened, hood a curved pocket: 9 species (Figs. 42–50) milvina group
 Epigynum as wide as long or wider; margin of epigynum often indistinct; apical rim not thickened, hood various shapes: 6 species (Figs. 12–17) distincta group

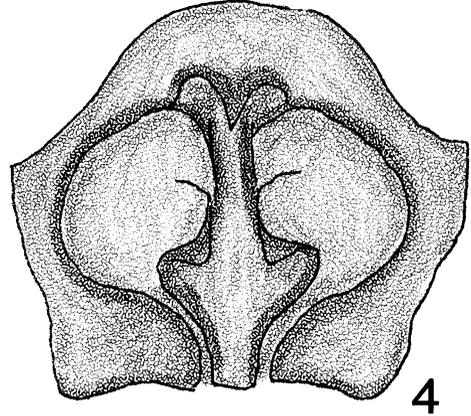
Males

- 1. Median apophysis extending to edge of cymbium and beyond (Figs. 18–23, 26–28, 51–53, 128–133) 2
 Median apophysis may extend partway across bulb, but not to edge of cymbium; median apophysis lump-like, knob-like, flattish or hooked 6
- 2. Embolus traverses bulb arching apically in a large semicircle (Figs. 26–27, 128–133) . . . 3
 Embolus traverses bulb without semicircular arch (Figs. 18–23, 25, 51–53) 4
- 3. Median apophysis with conspicuous bulge mid-length: 2 species (Figs. 26–27) falcifera group
 Median apophysis without a conspicuous mid-length bulge: 6 species (Figs. 128–133) sternalis group
- 4. Median apophysis extending beyond edge of cymbium, tip visible in dorsal view; basal spur small, thin, and pointed: 6 species (Figs. 18–23) distincta group
 Median apophysis not extending beyond edge of cymbium, basal spur short and stubby . . . 5
- 5. Median apophysis broad and very slightly curved, basal spur with truncate tip: 1 species (*P. concinna*) (Fig. 28) lapponica group
 Median apophysis strongly curved in distal half; basal spur with blunt point: 9 species (Figs. 51–53) milvina group (in part)
- 6. Tegulum widely projecting from palp in lateral view (Fig. 107): median apophysis strap-like, basal spur curved, tapered, nearly half as long as median apophysis: 8 species (Figs. 107–115) nigra group
 Tegulum more vertical and bowl-like; median apophysis and basal spur variable 7
- 7. Median apophysis stout, curved, tip pointed, various lengths (Figs. 9–11, 53–59, 136–137) . . . 8
 Median apophysis short, lumpish, pyramidal, or rounded distally (Figs. 36–41, 77–93, 95, 118–119, 139) 11
- 8. Bulb very wide; lobe on apical rim of tegulum low; embolus whip-like; median apophysis stout, with single or double curve, tip pointed; basal spur about half the size of median apophysis: 3 species (Figs. 9–11) coloradensis group
 Palp without this combination of characters 9
- 9. Body length 6.5–7.5 mm; median apophysis stout, bent nearly at a right angle; stout process traversing bulb behind median apophysis: 1 species (*P. fuscula*) (Fig. 5) atrata group
 Body length less than 5.5 mm; or if greater than 6 mm, without stout sclerotized process near base of embolus 10
- 10. Basal spur short, slender, directed laterally; occurs in the northern Great Plains and Rocky Mountains: 2 species (Figs. 136–137) tesquorum group
 Basal spur short, stout, curved, tip pointing basally; if basal spur slender, occurs in southern California: 6 species (Figs. 54–59) milvina group (in part)
- 11. Median apophysis lumpish, barely extending beyond tegulum, tip with blunt lateral protuberance, basal spur absent: 6 species (Figs. 36–41) lapidicina group
 Median apophysis short with basal spur directed basally or laterally; spur may arise apically . . 12
- 12. Median apophysis pyramidal, truncate or roundish apically; basal spur long, directed laterally; tip may be bent basally: 17 species (Figs. 77–93) modica group
 Median apophysis rounded apically, basal spur directed basally 13
- 13. Palea with apical triangular process pointing basally; tibia of the pedipalp swollen: 1 species (*P. moesta*) (Fig. 95) moesta group

- Palea without sclerotized triangular process; tibia of the pedipalp not swollen 14
14. Median apophysis with large spur arising apically, but directed basally; terminal apophysis small and squarish: 1 species (*P. xerampelina*) (Fig. 139) xerampelina group
- Median apophysis with small basal spur, arising medially and directed basally; terminal apophysis not small and squarish: 2 species (Figs. 118–119) saltuaria group

Atrata Group

Remarks.—The atrata group consists of one species in North America, and two Palearctic species. The epigynum has large roundish cavities that nearly cover the entire epigynal plate and are without arms extending apically. The median septum has a pair of lateral lobes basally, and the hood has a pointed lobe directed basally. The male palp is large, with a stout, curved median apophysis extending halfway across the bulb. The basal spur is a stout pointed triangle. The palea bears a large sclerotized structure curving behind the median apophysis.



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Pardosa fuscula (Thorell 1877)

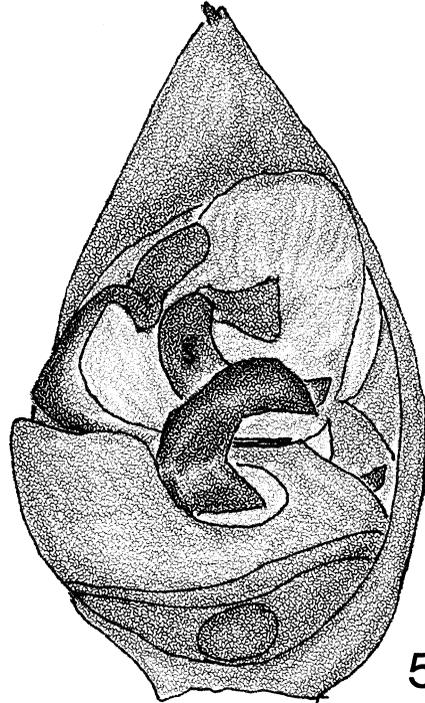
Figs. 4, 5; Map 1

Diagnosis.—Females and males are nearly the same size. Body length of females ranges from 6.7–7.8 mm; that of males 6.6–7.7 mm. The spiders are a reddish brown with a narrow yellow median stripe on the carapace and unbroken yellow lateral bands. The abdominal markings are of low contrast, displaying a diamond mark apically and paired lighter patches behind. The diamond mark covers nearly half the length of the abdomen. The legs are reddish, slightly marked with longitudinal dark lines. The genital characters described above distinguish this species.

Distribution.—Rocky Mountain states to Great Lakes and New England; Canada, Alaska (Dondale & Redner 1987: map 1).

Coloradensis Group

Remarks.—The coloradensis group consists of three Nearctic species. The color pattern is typical of the genus. The cephalothorax usually has five longitudinal bands except in dark spiders. The abdomen may have five pairs of light spots basal to the diamond mark. The epigynum is slightly wider than long, broadly rounded apically, without a hood. The septum and cavities are no more than 1/2 the length of the epigynum. The cavities are very narrow and mostly concealed by either the septum or lateral swellings. The bulb of the male palp is round and



5

Figures 4–5.—Genitalia of *Pardosa*, atrata group, *P. fuscula*. 4. Epigynum. 5. Palp, s, sclerite.

wide. The median apophysis is short, stout, with one or two curves, ending in a sharp point. The triangular basal spur is also pointed. The tip of the embolus is slender. The terminal apophysis is a thin finger directed basally.

KEYS TO SPECIES OF THE COLORADENSIS GROUP

Females

- 1. Cavities very narrow, about 1/2 length of epigynum; septum broad basally, tapering to apical end of cavities (Fig. 6) *Pardosa metlakatla*
Cavities greatly reduced, less than 1/4 the length of epigynum; base of septum with a short basal ridge or spine, which may be tucked into genital furrow 2
- 2. Septum with truncated base and basal spine; cavities curving apically around corners of septum base (Fig. 7) *Pardosa coloradensis*
Base of septum with a double arch, divided by the spine; cavities lying within the double arch (Fig. 8) *Pardosa ontariensis*

Males

- 1. Median apophysis with a single curve, tip pointing laterally; embolus slender, arching across bulb apical to the median apophysis, entirely exposed (Fig. 9) *Pardosa metlakatla*
Median apophysis with a double curve, tip directed apically; embolus partly concealed crossing bulb 2
- 2. Bulb, in ventral view, wider than long; terminal apophysis a long slender hook with tip bent basally (Fig. 10) *Pardosa coloradensis*
Bulb, in ventral view, not wider than long; terminal apophysis directed basally, bent mid-length (Fig. 11) *Pardosa ontariensis*

Pardosa coloradensis Banks 1894
Figs. 7, 10; Map 1

Diagnosis.—Females can be recognized by the short narrow cavities curving around the base of the septum. The wide bulb of the palp and stout median apophysis with a double curve characterize the male.

Remarks.—Fittingly, *P. coloradensis* is one of the most commonly collected *Pardosa* on the east side of the Rocky Mountains in Colorado.

Distribution.—Washington, Oregon, Montana, Wyoming, Utah, Colorado, Arizona, New Mexico; Canada, Alaska (Dondale & Redner 1986: map 2; pers. obs.).

Pardosa metlakatla Emerton 1904
Figs. 6, 9; Map 1

Diagnosis.—The narrow finger-like cavities 1/2 the length are uniquely identify *P. metlakatla* females. Unlike the other two species in this group, the median apophysis of the male palp has only a single curve.

Distribution.—Washington, Oregon; coastal British Columbia (Dondale & Redner 1986: map 3).

Pardosa ontariensis Gertsch 1934
Figs. 8, 11; Map 1

Diagnosis.—The genitalia of both sexes are very similar to *P. coloradensis*. Females can

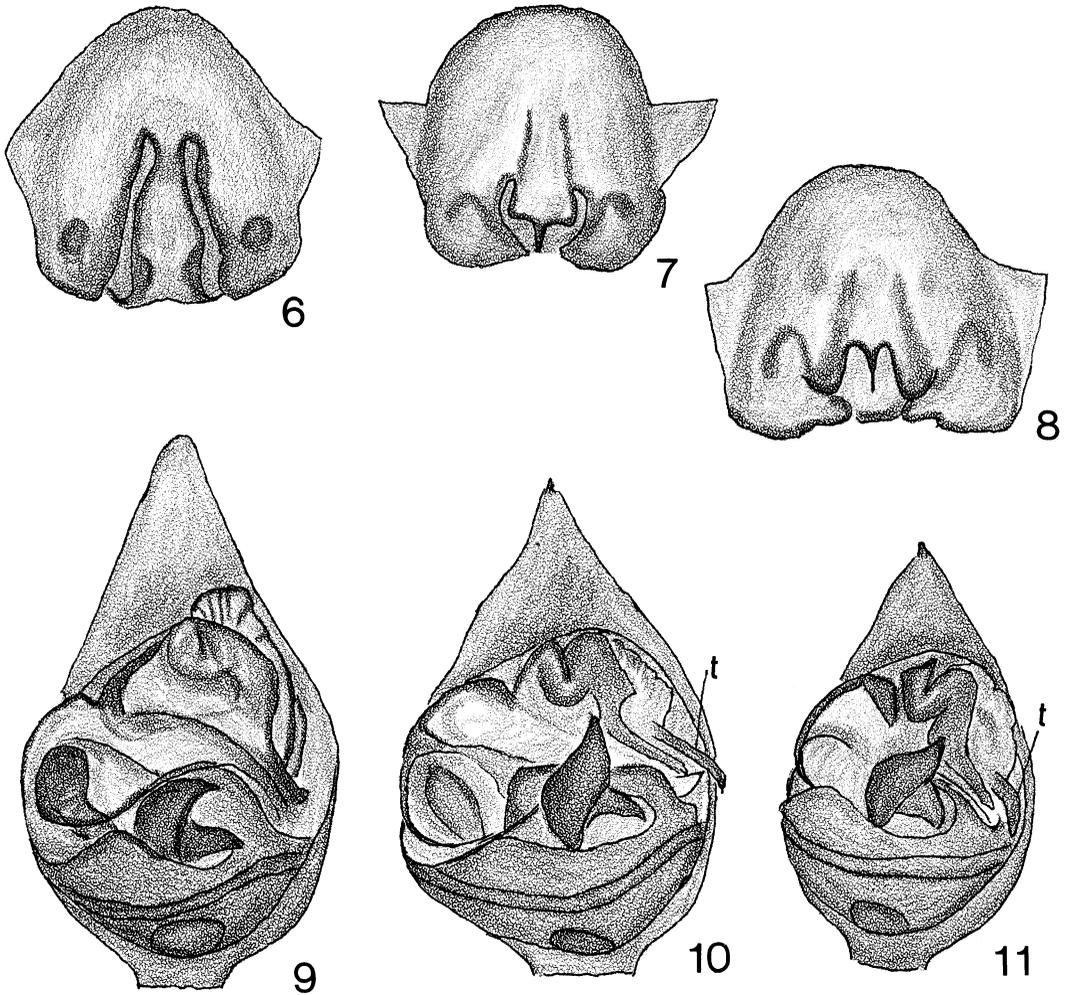
be distinguished by the small double arch at the basal margin of the septum. Males are distinguished by the bend mid-length in the terminal apophysis.

Remarks.—Range of *P. ontariensis* is about the same as that of *P. coloradensis*, but *P. ontariensis* is not common.

Distribution.—Oregon, Montana, Wyoming, Colorado; Canada (Dondale & Redner 1986, map 3).

Distincta Group

Remarks.—The distincta group consists of six species, which occur in Rocky Mountain states and three species known only from Mexico. These are among the smaller of *Pardosa* species, from 4–7 mm in length, and live spiders have noticeable and characteristic color patterns. The cephalothorax is marked with five longitudinal bands. The median and outer lateral bands are a light color ranging from yellow to light brown. The inner lateral bands are darker, light brown to dark brown. The abdomen also bears a median light band, often mottled pale yellow like curdled milk, which contrasts highly with the lateral dark areas. The apical end of the median band is the diamond heart mark, with dark outline, sometimes more than 1/2 the length of the abdomen. Males are darker than females, sometimes dark enough that the light bands



Figures 6-11.—Genitalia of *Pardosa*, coloradensis group. Figs. 6-8. Epigyna. 6. *P. metlakatla*. 7. *P. coloradensis*. 8. *P. ontariensis*. Figs. 9-11. Palpi. 9. *P. metlakatla*. 10. *P. coloradensis*. 11. *P. ontariensis*. s, sclerite. t, terminal apophysis.

are indistinct. The epigynum is small, septum more or less flask-shaped, with expanded base. A small hood is situated at the apical end of the septum. The cavities are either lacking or small and entirely covered by the septum. The palp of males is characterized by a long, slightly curved median apophysis reaching the edge of cymbium and slightly beyond. The embolus is not conspicuous and does not form a semicircular arch as in the falcifera and sternalis groups. These genital characteristics and conspicuous abdominal

markings distinguish species in this group from all other *Pardosa*.

Members of the distincta group are often found syntopically. *Pardosa distincta* is an extremely common and wide-spread species and is often found alone, but it also occurs with *P. yavapa*, which is also quite common, or with *P. utahensis*, and sometimes both. *Pardosa orophila* occurs with *P. yavapa* on the foothills of the Rocky Mountains west of Denver, Colorado, more often than by itself.



Map 1.—State records for *P. fuscula* (*), *P. coloradensis* (★), *P. metlakatla* (☆), *P. ontariensis* (◆).

KEYS TO USA SPECIES OF THE DISTINCTA GROUP

Females

1. Carapace with a thin “mustache” of white hair below eye rows; septum with small bilobed base and expanded apically to a heart shape; hood with a long basally pointing finger (Fig. 12) *Pardosa orophila*
 Median septum without small bilobed base, not heart-shaped apically 2
2. Spider 5–7 mm in length, pale color; epigynal plate minimal, epigynum reduced to septum and hood; base of septum apple-shaped, 1/2 the length of septum; apical end about 1/3 width of base, hood small (Fig. 13) *Pardosa distincta*
 Size and color of spider variable; epigynal plate apparent; apical end of septum slender .. 3
3. Spider 5–7 mm in length; expanded base of septum pear-shaped, nearly the length of septum, apical end of septum very thin; hood somewhat rectangular (Fig. 14) *Pardosa utahensis*
 Expanded base of septum flask-shaped, not more than half length of septum 4
4. Median band on carapace tapers nearly to a point at pedicel; spider quite dark; septum hourglass shaped, with expanded base and an arched structure trailing basally at apical end just before a small hood (Fig. 15) *Pardosa yavapa*
 Median band not tapering to pedicel, or not tapering to a point; median septum apically slender without an arched structure 5
5. Epigynal plate with long wings directed laterally (Fig. 16) *Pardosa montgomeryi*
 Epigynal plate with indistinct border, without long laterally directed wings (Fig. 17)
 *Pardosa xerophila*

Males

1. Slender brush of longer dark hair on median side of palp; tibia of pedipalp with distal dark band and brush of hair (Fig. 18) *Pardosa xerophila*
 Palp may be clothed with black hair but without a conspicuous brush 2
2. Median apophysis somewhat thick, bending apically, with longitudinal wrinkles, extending

- noticeably beyond edge of cymbium; spider may be yellow ochre or nearly black (Fig. 19) *Pardosa distincta*
- Median apophysis without longitudinal wrinkles, extending to edge of cymbium but scarcely beyond 3
3. Median apophysis with a strong bend apically in mid-length, giving it a "sway-back" look (Fig. 20) *Pardosa montgomeryi*
- Median apophysis without a strong bend apically 4
4. Median apophysis very slightly curved at tip, but with a bulge on the basal edge, like a pot belly (Fig. 21) *Pardosa orophila*
- Median apophysis gently curved, edges either relatively smooth or bulged on both edges 5
5. Small spider (4–5 mm), carapace glabrous, very dark brown; median band on carapace tapering to a point at waist; median apophysis nearly same width throughout length (Fig. 22) *Pardosa yavapa*
- Larger spider (5–7 mm), medium brown color, carapace not glabrous; median band on carapace not tapered; median apophysis with a constriction near base and slight bulge mid-way to tip (Fig. 23) *Pardosa utahensis*

Pardosa distincta (Blackwall 1846)

Figs. 13, 19; Map 2

Diagnosis.—Length 5–7 mm. Females of *P. distincta* are light colored, sometimes seeming to have five longitudinal bands on the entire body, not just the prosoma. The legs are pale without distinct markings. The epigynum, reduced to the septum and hood, is uniquely recognizable. Males east of the Rocky Mountains are colored like the females, only slightly darker. Males in the Rocky Mountain region are more likely to be nearly black, both dorsally and ventrally, with an iridescent blue sheen of the anterior side of femora. This character is shared by males of *P. sternalis*, but the two species can readily be distinguished by the palp. The median apophysis of *P. distincta* has longitudinal wrinkles and extends beyond the edge of the cymbium with the tip showing in dorsal view.

Remarks.—*Pardosa distincta* is among the two or three most common spiders in the lower elevations of the central Rockies. *Pardosa distincta* prefers mesic habitats and is often found with *Pardosa* species in other species groups. While *P. distincta* is also collected by itself, it may be collected with *P. utahensis* or *P. yavapa* or both.

Distribution.—Rocky Mountains from Alberta to Arizona, across northern United States to New England. (Dondale & Redner 1990: map 32; Vogel 1964:13; pers. obs.).

Pardosa montgomeryi Gertsch 1934

Figs. 16, 20; Map 2

Diagnosis.—Females are 4–5 mm in length. The color pattern is typical for the

group with five longitudinal bands on the cephalothorax, and the abdomen bears a light median band. The legs are yellow ochre mottled with gray or brown. The epigynal plate with its long wings pointing laterally, characterize these females. Males of *P. montgomeryi* are among the smallest *Pardosa*, 3–4 mm in length. The carapace is glabrous and dark brown. The lighter bands may not be distinct except near the pedicel. These males are distinguished by the bend in the median apophysis of the palp, giving a "sway-back" look.

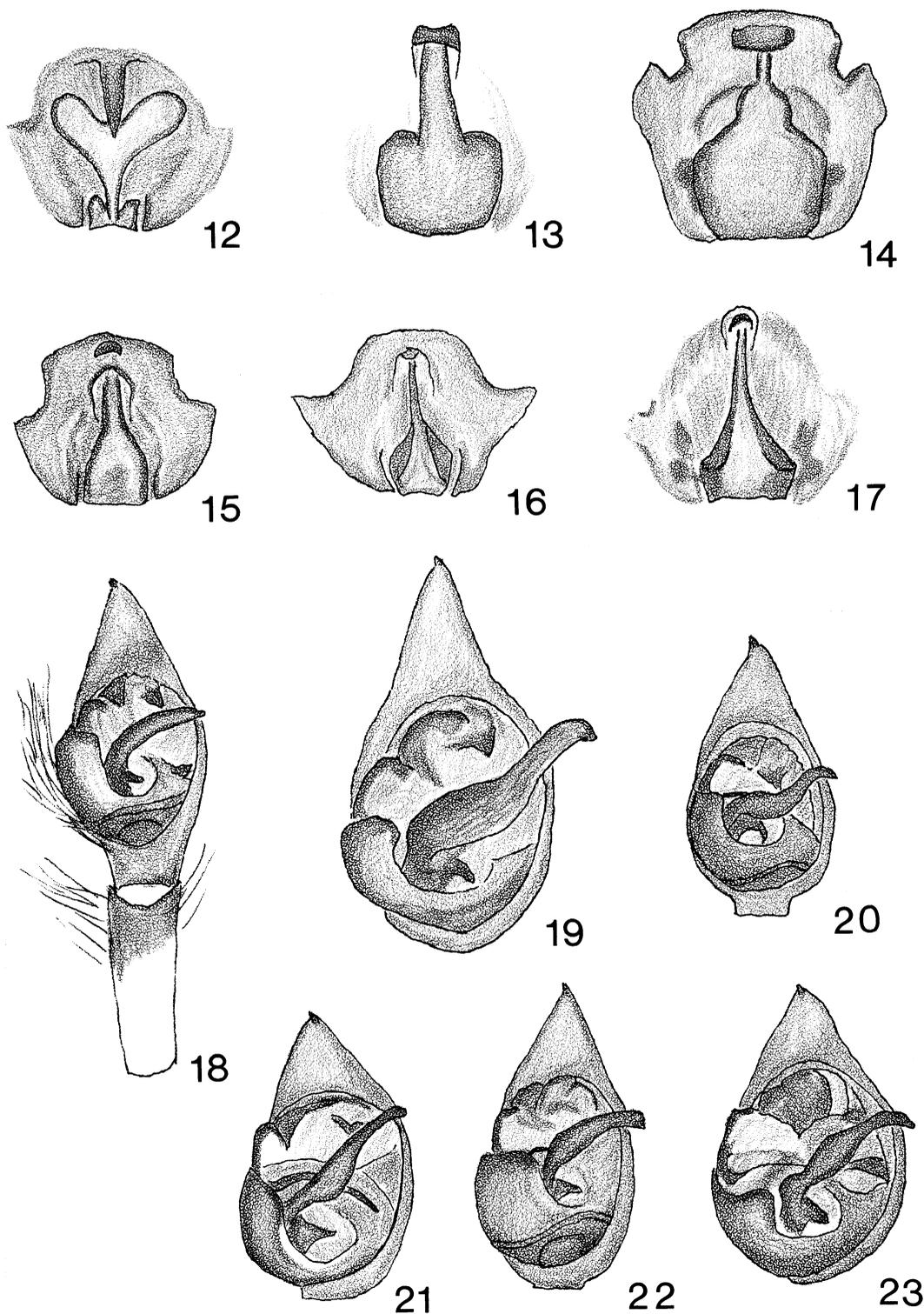
Distribution.—Arizona, Colorado, New Mexico; Mexico (Vogel 1964:15).

Pardosa orophila Gertsch 1933

Figs. 12, 21; Map 2

Diagnosis.—Fresh specimens have a cherry red spot basal to the eyes. Females and some males and juveniles have a "mustache" of white hair below the basal eye rows. This is difficult to see in preserved males. The median band on the abdomen of females consists of paired yellow patches instead of a continuous band of color. The carapace of males is glabrous and dark reddish brown. The median band is brown, and the outer lateral bands very narrow. The median band of the abdomen is composed of paired lighter patches like the female. The apical lobes of the epigynal septum characterize females of *P. orophila*. The "pot-bellied" look of the median apophysis in the male palp sets *P. orophila* off from other species in this group.

Remarks.—On the foothills of the Rocky



Figures 12-23.—Genitalia of *Pardosa*, *distincta* group. Figs. 12-17. Epigyna. 12. *P. orophila*. 13. *P. distincta*. 14. *P. utahensis*. 15. *P. yavapa*. 16. *P. montgomeryi*. 17. *P. xerophila*. Figs. 18-23. Palpi. 18. *P. xerophila*. 19. *P. distincta*. 20. *P. montgomeryi*. 21. *P. orophila*. 22. *P. yavapa*. 23. *P. utahensis*.



Map 2.—State records for *P. distincta* (*), *P. montgomeryi* (★), *P. orophila* (☆), *P. utahensis* (◇), *P. xerophila* (%), *P. yavapa* (%).

Mountains west of Denver, Colorado, *P. orophila* occurs syntopically with *P. yavapa* more frequently than by itself.

Distribution.—Colorado, Arizona, New Mexico; central Mexico (Vogel 1964:18).

Pardosa utahensis Chamberlin 1919
Figs. 14, 23; Map 2

Diagnosis.—Length 5–7 mm. Males and females both have the color pattern typical of the group. The median band on the cephalothorax is yellow to yellow ochre. The median band on the abdomen is pale yellow contrasting sharply with the dark abdomen. The legs are yellow ochre with darker mottled markings. Females of *P. utahensis* can be recognized by the pear-shaped basal expanded portion of the epigynal septum. Males can be recognized by their size and color and by the slight constriction at the base of the median apophysis.

Remarks.—Of all the species in this group, *P. utahensis* is found in the driest habitats, even plowed fields. They have also been collected sympatrically with *P. yavapa* and *P. distincta*.

Distribution.—Montana, Wyoming, Colorado, Utah (Vogel 1964:21, fig. 3; pers. obs.).

Pardosa xerophila Vogel 1964
Figs. 17, 18; Map 2

Pardosa xerophila Vogel 1964:21, figs. 13–14 (female holotype); Jiménez 1986: 27, figs. 5–6 (male).

Diagnosis.—Length 5–7 mm. Females are yellow and brown, and similar in size to *P. distincta*. The legs have brown longitudinal markings dorsally, especially on the patellae. The expanded base of the septum tapers apically with concave margins and septal pockets are present. Males are colored similarly to females, except for the legs. The legs are yellow, entirely without markings except for a dark ring on the distal ends of tarsus and metatarsus I, and the dark ring on the distal end of the tibia of the pedipalp. The palp is uniquely adorned with a brush of long black setae on the medio-lateral side of the cymbium.

Remarks.—The male described as *P. xerophila* (Vogel 1964) was collected with the female holotype. Later collections produced different males, described by Jemenez (1986), who speculated that the original male was a variant of *P. montgomeryi*.

Distribution.—New Mexico, Arizona; Mexico (Vogel, 1964: fig. 4).

Pardosa yavapa Chamberlin 1925

Figs. 15, 22; Map 2

Diagnosis.—Both male and female of *P. yavapa* are small, female body length is 4.8–5.2 mm, male body length 4.0–4.5 mm. The median band on the cephalothorax is dark and tapers to a point at the pedicel. The outer lateral bands are reduced to a few paler spots on the female and obscured on the male. The carapace of the male is glabrous and mahogany colored. On the female, the median band of the abdomen, hardly a band, is patterned with paired brown patches, scarcely lighter than the rest of the abdomen. This is usually obscured on the male. In addition to size and color, the hourglass appearance of the epigynal septum identifies the female. The slender median apophysis of the male palp, lacking sways or bulges and the absence of a brush of dark setae separate *P. yavapa* from the rest of the species group.

Remarks.—*Pardosa yavapa* is fairly common and is found with other species in the distincta group.

Distribution.—Utah, Colorado, Arizona, New Mexico (Vogel 1964: fig. 4).

Falcifera Group

Remarks.—The falcifera group consists of two species throughout the Southwest to Cen-

tral America. Their body length is 5–8 mm. The color pattern is typical of the genus. The cephalothorax usually has five longitudinal bands, except in dark spiders. The abdomen may have five pairs of light spots basal to the diamond mark. This group is very closely related to the sternalis group. The epigynum is small with small lateral wings. Paired semicircular cavities are about 1/2 the length of the plate. The lateral swellings surrounding the cavities extend apically to the hood. The cavities are nearly filled with cavity sclerites extending laterally from the septum. The male palp separates the falcifera group from all other *Pardosa*. The embolus curves in a low semicircular arch behind the median apophysis. The median apophysis is long, with a mid-section bulge and reaches to the edge of the cymbium. The basal spur is short, wide, and curved basally. The median apophysis is stouter than that of sternalis group males and the arch of the embolus is lower. The males of falcifera group are distinguished from all other *Pardosa* by the feathery brush of hair on tarsus and metatarsus I. In alcohol these hairs may appear colorless but in life they are black and erectile when displayed in courtship (Vogel 1970b).

KEYS TO SPECIES OF THE FALCIFERA GROUP

Females

- 1. Median septum wider at base; apical end of cavity forming acute angle with septum; cavity sclerites a D-shaped lobe without basal or apical extensions parallel to septum (Fig. 24) *Pardosa falcifera*
- Median septum rectangular through cavities; apical end of cavity forming nearly a right angle with septum; cavity sclerites smallish lobes with basal and apical extensions along the septum (Fig. 25) *Pardosa zionis*

Males

- 1. Median apophysis tapers distal to bulge, ending in a point; tip of terminal apophysis bilobed (Fig. 26) *Pardosa falcifera*
- Median apophysis not tapering distal to bulge, tip somewhat truncate; terminal apophysis not bilobed (Fig. 27) *Pardosa zionis*

Pardosa falcifera F. Pickard-Cambridge 1902
Figs. 24, 26; Map 3

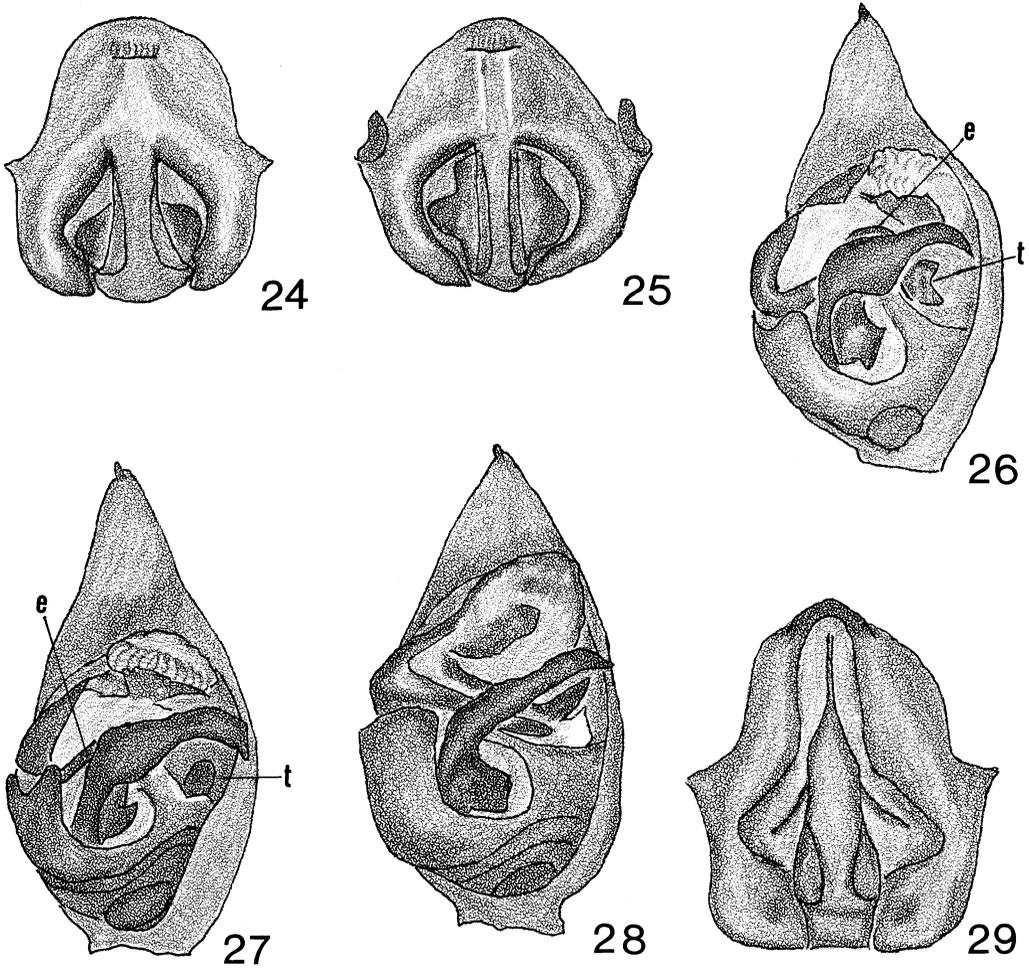
Pardosa falcifera F. Pickard-Cambridge 1902:318,
plate 30, figs. 23, 24.

Pardosa hopi Chamberlin & Ivie 1942:34, fig. 66;
Vogel 1970a:15 (= *Pardosa falcifera*)

Diagnosis.—The distinguishing feature of

P. falcifera females is the D-shaped cavity sclerite within a semicircular cavity. The feathery brushes of hair on tarsus and metatarsus I and the bilobed terminal apophysis are the distinguishing features of *P. falcifera* males.

Remarks.—Both *P. falcifera* and *P. zionis*



Figures 24–29.—Genitalia of *Pardosa* species groups. Figs. 24–27. Falcifera group. Figs. 24–25. Epigyna. 24. *P. falcifera*. 25. *P. zionis*. Figs. 26–27. Palpi. 26. *P. falcifera*. 27. *P. zionis*. Figs. 28–29. Laponica group, *P. concinna*. 28. Palp. 29. Epigynum. e, embolus. t, terminal apophysis.

are found in wet meadows, streambanks, and lawns, but never together.

Distribution.—California, Utah, Colorado, Kansas, Arizona, New Mexico, Texas; south to Costa Rica (Vogel 1970a:20–21; pers. obs.).

Pardosa zionis Chamberlin & Ivie 1942
Figs. 25, 27; Map 3

Diagnosis.—*Pardosa zionis* is closely related to *P. falcifera*. The cavity sclerites in females differ by having basal and apical extensions along the septum. Males of *P. zionis* are differentiated by the terminal apophysis which is not bilobed.

Remarks.—This species is not common in the United States.

Distribution.—Utah, Arizona, New Mexico, Texas; Mexico (Vogel 1970a:22; pers. obs.).

Lapidicina Group

Remarks.—The lapidicina group consists of six species in the United States and two in Mexico. The color pattern is typical of *Pardosa* but the legs bear annular markings. Body length of females ranges 6.2–10.4 mm and the males are slightly smaller. The cavity is conspicuous, featuring a wide basal expansion and a single broad extension apically to the



Map 3.—State records for *P. concinna* (*), *P. falcifera* (★), *P. zionis* (☆), *P. moesta* (◆).

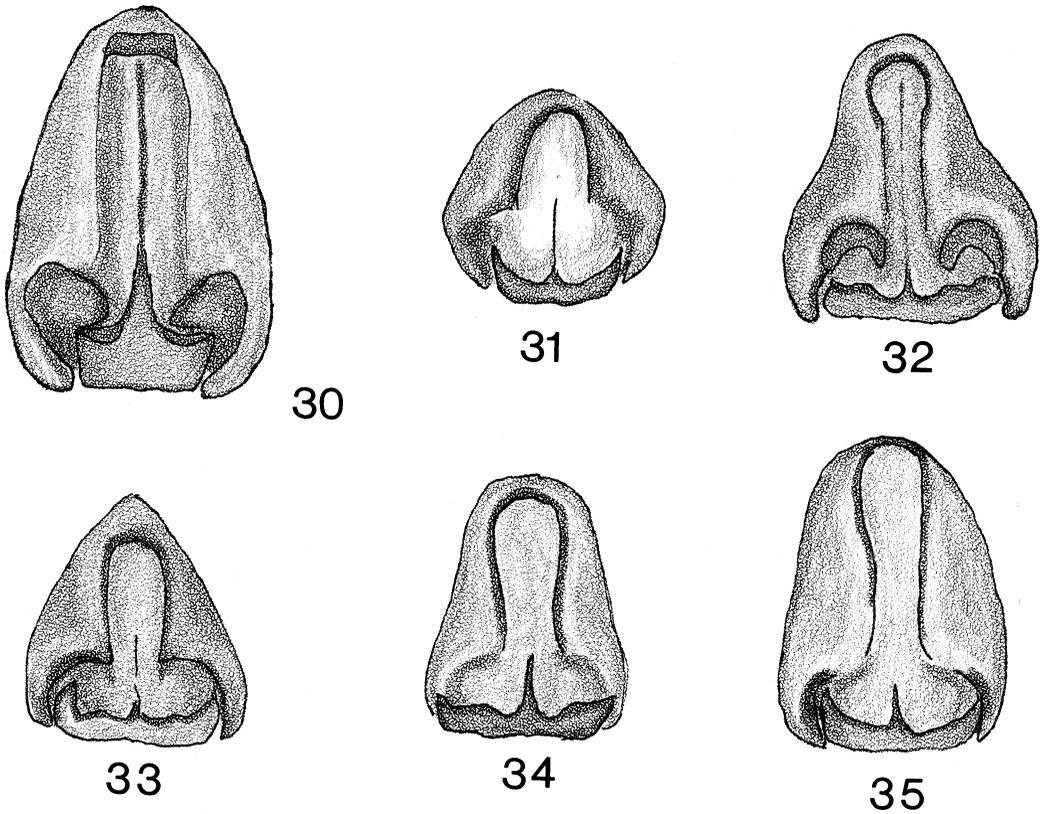
end of the epigynum. The apical cavity rim forms the hood. The transverse base of the septum is short, but nearly as wide as the epigynum. The septum apical to the base is reduced to a thin ridge which may be quite short or extend nearly to the hood. The median

apophysis of the palp is short, lumpish, barely extending beyond the encircling tegulum. The median apophysis lacks a basal spur, but the apical end has a blunt lateral protuberance. The embolus is slender and traverses the bulb apically to the median apophysis.

KEYS TO USA SPECIES OF THE LAPIDICINA GROUP

Females

1. Transverse base of septum rectangular; septal ridge four times longer than base, extending to hood (Fig. 30) *Pardosa valens*
 Transverse base of septum somewhat canoe-shaped; septal ridge usually not extending to hood 2
2. Basal expansion of cavity 1/2 the total length of cavity; spider pale, tan or yellow (Fig. 31) *Pardosa vadosa*
 Basal expansion of cavity less than 1/2 the total length of cavity 3
3. Basal expansion of cavity deeply excavated with sclerotized crescents apically (Fig. 32) ..
 *Pardosa sierra*
 Basal expansion of cavity without sclerotized crescents apically 4
4. Apical rim of basal expansion of cavity distinct, forming a sharp point medially with longitudinal rim of apical portion of cavity (Fig. 33) *Pardosa steva*
 Apical rim of basal expansion of cavity indistinct, forming a rounded corner medially with longitudinal rim of apical portion of cavity 5
5. Apical rim of transverse base of septum with shallow notches flanking septal ridge (Fig. 34) *Pardosa lapidicina*
 Apical rim of transverse base of septum without shallow notches flanking septal ridge; ends of base turned slightly apically (Fig. 35) *Pardosa mercurialis*



Figures 30–35.—Epigyna of *Pardosa*, *lapidicina* group. 30. *P. valens*. 31. *P. vadosa*. 32. *P. sierra*. 33. *P. steva*. 34. *P. lapidicina*. 35. *P. mercurialis*.

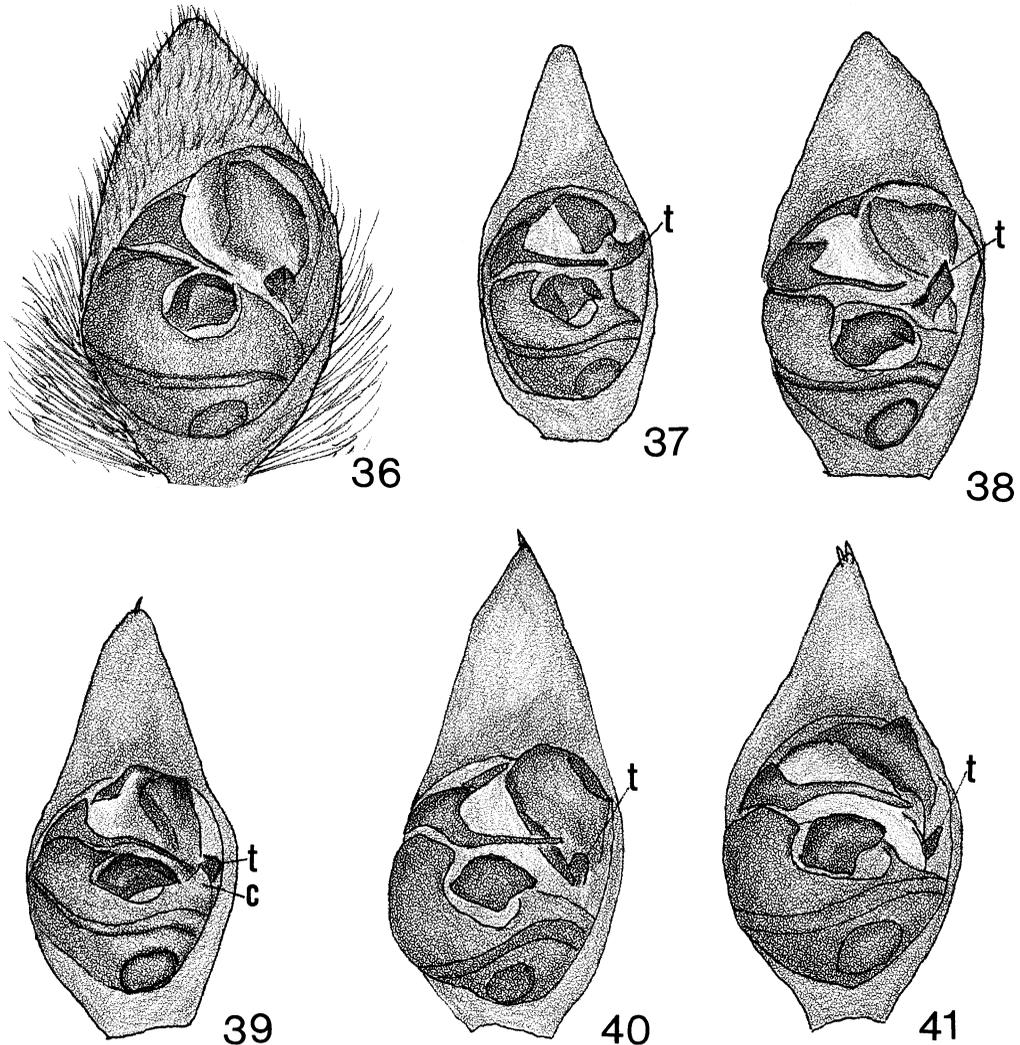
Males

1. Cymbium and tibia of the pedipalp heavily clothed with thick black hair (Fig. 36)..... *Pardosa valens*
 Cymbium and tibia of the pedipalp clothed but without thick black hair 2
2. Cymbium very slender; terminal apophysis a stout curved hook arising apical to tip of embolus (Fig. 37) *Pardosa vadosa*
 Cymbium not especially slender; terminal apophysis not a stout curved hook 3
3. Terminal apophysis straight and thumb-like, nearly equal in length to median apophysis; tip of embolus curves apically (Fig. 38) *Pardosa sierra*
 Terminal apophysis short, a small knob or thorn; tip of embolus pointing laterally or basally 4
4. Embolus extending all the way across bulb, tip bent basally and ending behind hyaline conductor; terminal apophysis a small knob next to conductor (Fig. 39) *Pardosa steva*
 Embolus extending only slightly beyond median apophysis; tip of embolus plainly visible . . . 5
5. Terminal apophysis a rounded knob (Fig. 40) *Pardosa lapidicina*
 Terminal apophysis a pointed thorn (Fig. 41) *Pardosa mercurialis*

Pardosa lapidicina Emerson 1885
 Figs. 34, 40; Map 4

Diagnosis.—*Pardosa lapidicina* may be a dark chocolate brown without markings or lighter brown with typical markings. The lat-

eral bands on the carapace are represented by three or four pale blotches. The abdomen is also marked with blotches, not bands. The femora bear dark annulations. The epigynum of *P. lapidicina* features a broad apical exten-



Figures 36–41.—Palpi of *Pardosa*, lapidicina group. 36. *P. valens*. 37. *P. vadosa*. 38. *P. sierra*. 39. *P. steva*. 40. *P. lapidicina*. 41. *P. mercurialis*. c, conductor. t, terminal apophysis.

sion of the cavity. The transverse base of the septum is a short broad canoe shape with a short ridge directed apically and shallow notches flanking the ridge. The palp of males of *P. lapidicina* differs from other males in the lapidicina group by the terminal apophysis, which is a rounded knob, and by the embolus, which is directed laterally.

Remarks.—Females of *P. lapidicina* are very difficult to separate from *P. mercurialis* by genital morphology. Currently location is more reliable because there is no known overlap in range.

Distribution.—Montana, Wyoming, Colorado, Nebraska, Arkansas, Minnesota, Wis-

consin, Pennsylvania, New York, Maine, Massachusetts, Rhode Island, Connecticut, New Jersey, West Virginia, Virginia, North Carolina; Ontario to Nova Scotia (Barnes 1959: fig. 1; Dondale & Redner 1990: map 55; pers. obs.).

Pardosa mercurialis Montgomery 1904

Figs. 35, 41; Map 4

Diagnosis.—The lateral band on the carapace of females of *P. mercurialis* consists of four wide yellow blotches. The median band is orangish. The abdomen is marked with yellow blotches, and the basal half is a single wide yellow blotch. The legs are annulate.

Males are dark brown with lighter brown markings. The transverse base of the septum in *P. mercurialis* is short, broad and without shallow notches flanking the short septal ridge. The ends of the transverse base turn slightly apically. The basal expanded portion of the cavity is about 1/4 the total length of the cavity. Males of *P. mercurialis* are characterized by the terminal apophysis in the form of a sharp tooth pointing apically, and the tip of the embolus which is turned basally.

Distribution.—Oklahoma, Texas (Barnes 1959: fig. 1).

Pardosa sierra Banks 1898

Figs. 32, 38; Map 4

Diagnosis.—Females of *P. sierra* have a body length of 9.0–9.5 mm. The carapace is a reddish brown with the median band orangish. The abdomen is pale with the yellow areas larger than the dark areas. The carapace and legs of males are brown and orange brown, and the abdomen is yellow and brown. The epigynum of *P. sierra* is unique in the lapidicina group. Crescent-shaped sclerites lie at the apical edge of the lateral expansions of the cavity. The thin septal ridge extends apically to the hood. The palp of the male features an embolus which extends only part way across the bulb with the tip curving apically. The terminal apophysis is nearly as long as the median apophysis. It is thumb-like and straight.

Distribution.—Oregon, California, Idaho, Wyoming west of the Continental Divide, Colorado, Arizona, New Mexico, Texas; Mexico (Barnes 1959: fig. 5; pers. obs.).

Pardosa steva Lowrie & Gertsch 1955

Figs. 33, 39; Map 4

Diagnosis.—Females of *P. steva* are dark, pattern with low contrast. The legs are annulate with dark gray and chestnut brown; the diamond on the abdomen is outlined in black, lateral blotches are chestnut. Males similarly marked. The epigynum is differentiated from other females in this group by the apical rim of basal expansions of the cavity. The rim is crisply defined, not softly rounded, and meets the rim of the apical extension in a sharp point. Males of *P. steva* can be identified by the embolus, which extends all the way across the bulb. The tip of the embolus is bent ba-

sally and ends behind a hyaline conductor. The terminal apophysis is a small knob.

Distribution.—California, Oregon, Idaho, Montana, Wyoming, Utah, Colorado, Arizona, New Mexico; Canada, Mexico (Barnes 1959: fig. 4; Dondale & Redner 1990: map 55).

Pardosa vadosa Barnes 1960

Figs. 31, 37; Map 4

Diagnosis.—Spiders are of a very light color, yellow to yellow ochre, and marked with light brown. The legs bear light brown annulations. The abdomen is marked with chalky yellow blotches. The distinguishing character of *P. vadosa* is the cavity of the epigynum. The basal expansion of the cavity is about 1/2 the length of the epigynum, longer than any other species in the lapidicina group. The cymbium of the male palp *P. vadosa* is very slender. The terminal apophysis is a stout hook arising apical to the tip of embolus. The tip of the terminal apophysis is turned apically.

Distribution.—California, Utah, Colorado, Arizona, Texas; Mexico (Barnes 1959: fig. 2; pers. obs.).

Pardosa valens Barnes 1960

Figs. 30, 36; Map 4

Diagnosis.—*Pardosa valens* is a dark-colored spider. Its carapace is mahogany. The body length of females is 7.0–9.3 mm. Males range in size from 6.8–8.0 mm. The transverse base of the septum differs from the other females in this group. It is rectangular and about 2/3 as long as wide. Additionally, the hood is a rectangular pocket. The septal ridge extends to the hood. Males can be recognized by the heavy black hair on the palp and the tibia of the pedipalp. The tegulum nearly surrounds the lumpish median apophysis.

Distribution.—Colorado, Arizona, New Mexico; Mexico (Barnes 1959: fig. 3; pers. obs.).

Laponica Group

Remarks.—The laponica group consists of one species in North America, one Holarctic species and several Palearctic species. The epigynum of this group, along with the lapidicina and moesta group, has a cavity that is wide basally and has a single apical extension surrounding the septum. The apical end of the cavity extension reaches the end of the epi-



Map 4.—State records for *P. lapidicina* (*), *P. mercurialis* (*), *P. sierra* (★), *P. steva* (☆), *P. vadosa* (◆), *P. valens* (⊗).

gynum and forms a sclerotized hood. The tegulum of the male palp is a robust, rounded bowl. The median apophysis is thick, long, and reaches the edge of the cymbium without curves. The basal spur is short and truncated. The embolus is moderately wide in the distal portion and nearly straight. The terminal apophysis is situated basally to the tip of the median apophysis.

Pardosa concinna (Thorell 1877)
Figs. 28, 29; Map 3

Diagnosis.—The spiders are brown with a yellow median and unbroken lateral bands on the carapace. The abdomen is mottled brown with a diamond mark apically and paired lighter patches basally. The abdominal markings are of low contrast. The legs are brown and the sternum is nearly black. The cavity of *P. concinna* is as described above. The septum is moderately wide for 2/3 to 3/4 of its length, narrowing to a spine apically. Drop-shaped septal pockets lie near the base of the septum. The palp of *P. concinna* conforms to the diagnosis of the lapponica group, above.

Distribution.—Washington, Oregon, Montana, Wyoming, Utah, Colorado, New Mexico, New York, Vermont, New Hampshire,

Maine; Alaska, Canada (Dondale & Redner 1986: map 7).

Milvina Group

Remarks.—The milvina group consists of nine species in the United States and at least eight more in Mexico, and Central and South America. The cephalothorax usually has five longitudinal bands except in dark spiders. The median band bulges posteriorly of the eye area, is constricted, then bulges again and ends as a slender band at the pedicel. The median band of the abdomen is usually ragged or poorly defined aside from the diamond mark. Males are darker than females and usually with a glabrous carapace. The spiders range in size from 3.5–7.5 mm, but the majority are small. The genitalia of the milvina group is more variable than any other group considered here, except perhaps, for the modica group. The epigynum is longer than wide; in some species, twice as long as wide. The apical rim of the epigynum is broad, rounded and thickened. The thickened rim also forms the hood and may bear an additional structure. The expanded base of the septum is generally triangular, but appears anchor shaped because of the septal pockets. The

septum apical to the expanded base may be a furrow flanked by ridges, although five species have raised septa extending to the hood. The cavities have no distinct rim and are mostly concealed by the expanded base of the septum, except for *P. milvina*. Females of the milvina group strongly resemble those of the distincta group, but the thickened apical rim of the epigynum will distinguish milvina

group from distincta group females. There is considerable variation in the male palp, especially in the median apophysis. In three species the median apophysis is long, curved, slender, and extends to the edge of the cymbium, with a small basal spur. In the other species the median apophysis is a short, stout, curved hook with a short, stout, strongly curved basal spur.

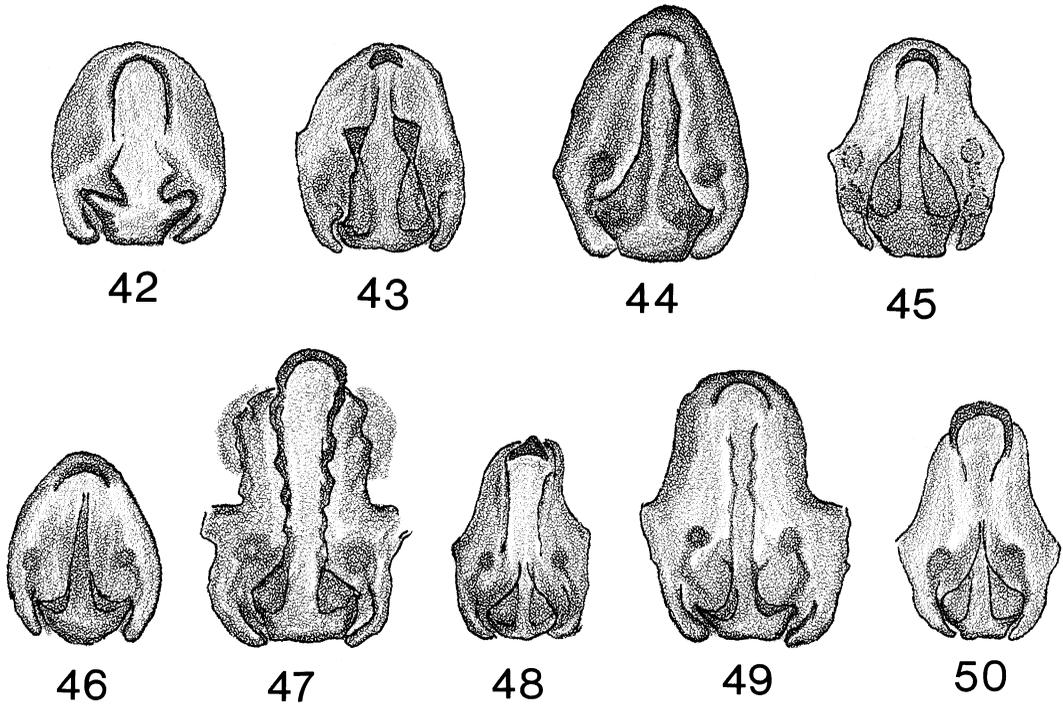
KEYS TO USA SPECIES OF THE MILVINA GROUP

Females

1. Expanded base of septum nearly 1/2 the length of epigynum or longer (Figs. 42–45) 2
Expanded base of septum 1/3 the length of epigynum or less (Figs. 46–50) 5
2. Expanded base of septum with a pair of deep lateral notches (Fig. 42) *Pardosa saltonia*
Expanded base of septum without notches 3
3. Expanded base of septum rectangular, with triangular sclerotized structures apical to cavities (Fig. 43) *Pardosa bellona*
Expanded base of septum triangular, without sclerotized structures 4
4. Sides of expanded base of septum concave, apical portion of septum tapering slightly (Fig. 44) *Pardosa littoralis*
Sides of expanded base of septum convex, apical portion of septum not tapering (Fig. 45) *Pardosa delicatula*
5. Septum apical to base is a raised structure extending to hood (Fig. 46) *Pardosa pauxilla*
Septum apical to base a furrow 6
6. Hood with ridges trailing basally along septal furrow to, or nearly to, expanded base of septum 7
Hood without ridges trailing nearly to expanded base of septum 8
7. Spider nearly 6 mm; trailing ridges of hood thick and very wrinkled (Fig. 47)
. *Pardosa saxatilis*
Spider not more than 4 mm; trailing ridges of hood narrow and straight (Fig. 48)
. *Pardosa parvula*
8. Spider 6.0–6.5 mm; hood narrow; septal pockets shallow with concave rim (Fig. 49)
. *Pardosa milvina*
Spider 4.0–4.5 mm; hood broad; septal pockets deep with convex rim (Fig. 50)
. *Pardosa atlantica*

Males

1. Median apophysis slender, extending nearly to edge of cymbium, base wide; basal spur short and truncate (Fig. 51–53) 2
Median apophysis more stout, short, not reaching cymbium; basal spur a curved hook . . . 4
2. Dorsum of cymbium, tibia, and patella of pedipalp completely clothed with stiff shiny white hair; palp as in Fig. 51 *Pardosa parvula*
Not all three segments so clothed 3
3. Dorsum of patella, and tibia of the pedipalp, and only narrow basal portion of cymbium clothed with stiff shiny white hair; palp as in Fig. 52 *Pardosa atlantica*
Only patella of the pedipalp clothed with stiff shiny white hair; cymbium dark basally, with tip paler; palp as in Fig. 53 *Pardosa saxatilis*
4. Cymbium very narrow and long, tegulum flattish; bulb embedded deeply in cymbium (Fig. 54) *Pardosa saltonia*
Cymbium not unusually narrow and long; tegulum protruding from cymbium 5
5. Median apophysis medium long, base wide; basal spur short and pointed and slightly curved (Figs. 55, 56) 6



Figures 42–50.—Epigyna of *Pardosa*, milvina group. 42. *P. saltonia*. 43. *P. bellona*. 44. *P. littoralis*. 45. *P. delicatula*. 46. *P. pauxilla*. 47. *P. saxatilis*. 48. *P. parvula*. 49. *P. milvina*. 50. *P. atlantica*.

- Median apophysis short and thick, basal spur a stout curved hook 7
- 6. Palea with a long, slender, tapered process extending behind median apophysis (Fig. 55) *Pardosa littoralis*
- Palea without such a process (Fig. 56) *Pardosa milvina*
- 7. Median apophysis very short, basal spur strongly curved and much larger than median apophysis (Fig. 57) *Pardosa bellona*
- Basal spur not larger than median apophysis 8
- 8. Tip of median apophysis a curved pointed hook, basal spur a small hook; palea membranous (Fig. 58) *Pardosa pauxilla*
- Tip of median apophysis curved and blunt, basal spur a wide hook; palea sclerotized (Fig. 59) *Pardosa delicatula*

Pardosa atlantica Emerton 1913
Figs. 50, 52; Map 5

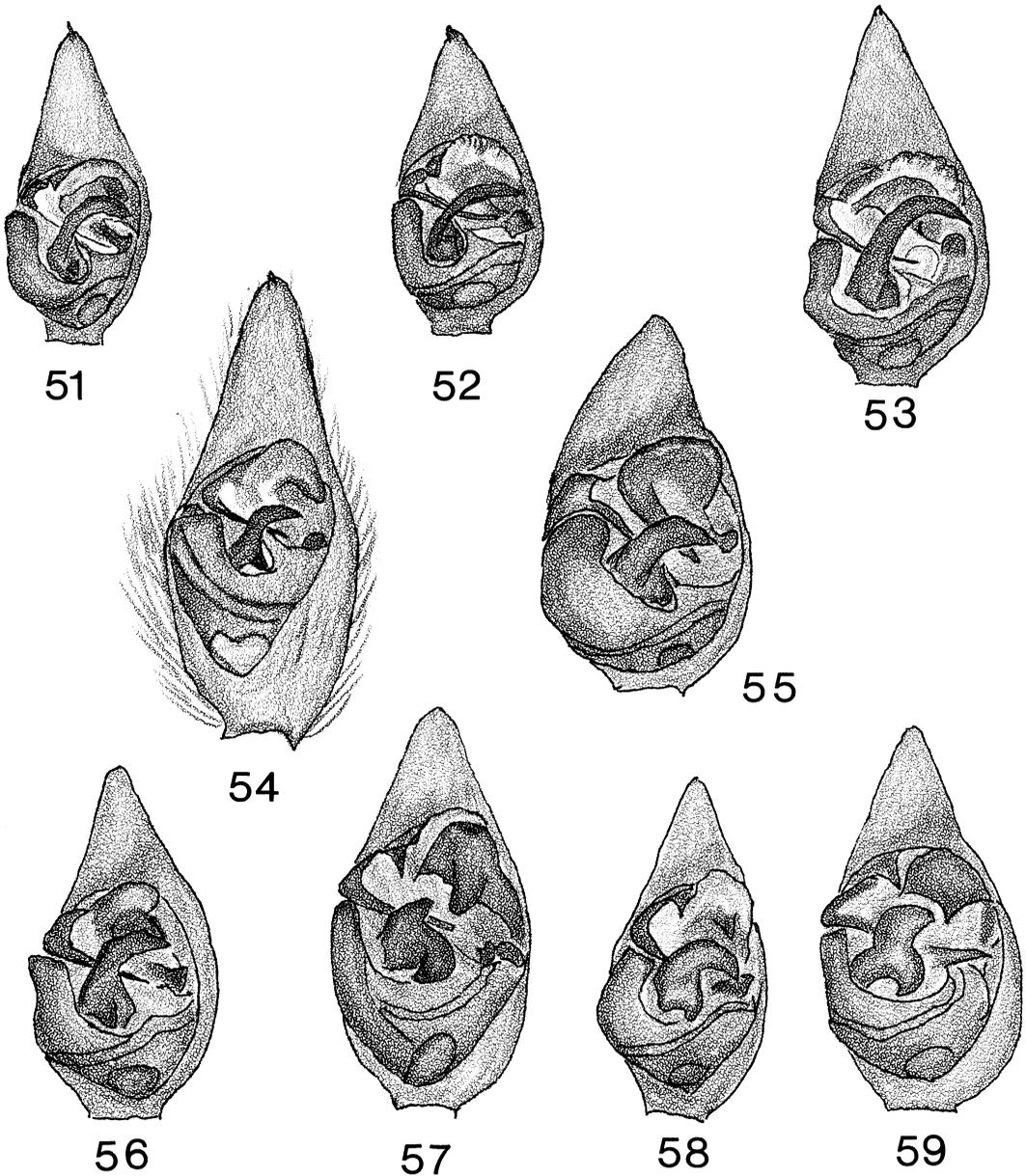
Diagnosis.—The abdomen of the female is characterized by four pairs of eye spots basal to diamond mark. The septal pockets of the epigynum are deep with convex apical margins. Males of *P. atlantica* have a long slender median apophysis that nearly reaches the cymbium, and a small truncated basal spur. Males of *P. atlantica* cannot be separated by palpal morphology from *P. parvula* and *P. saxatilis*. The distribution of white, shiny hair on the pedipalp distinguish these three spe-

cies. In *P. atlantica* they occur only on the tibia and patella of the pedipalp and a very narrow band on the base of the cymbium.

Distribution.—Nebraska, Oklahoma, Texas, Arkansas, Mississippi, Kentucky, New Jersey, Maryland, West Virginia, Virginia, Georgia (Dondale & Redner 1984: map 3).

Pardosa bellona Banks 1898
Figs. 43, 57; Map 5

Diagnosis.—Females of *P. bellona* can be identified by the expanded base of the septum, which is more than half the length of the epigynum, and bears triangular sclerotized struc-



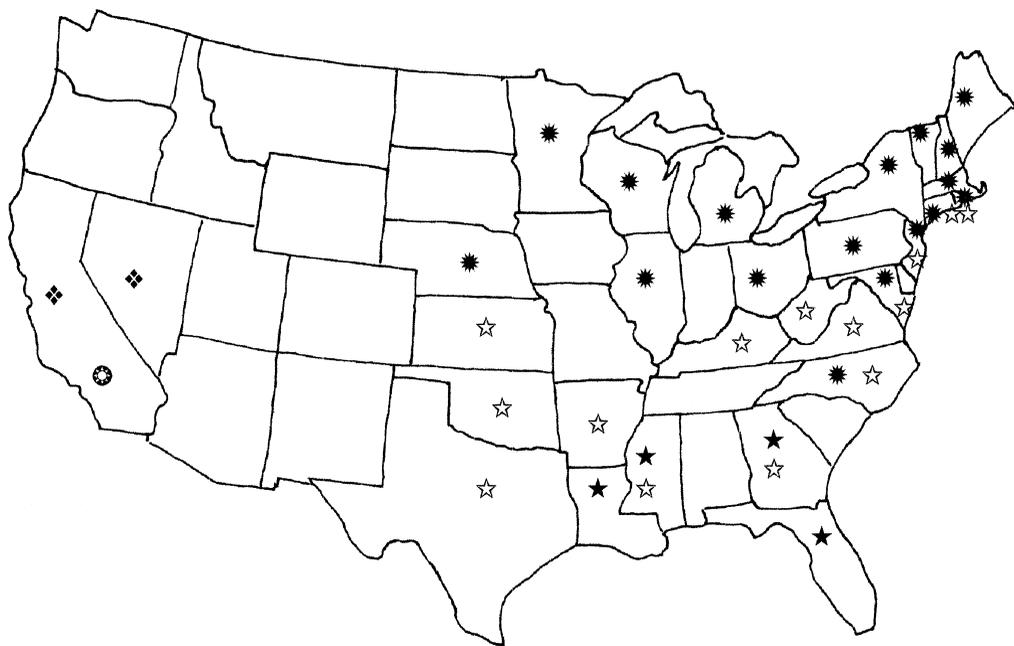
Figures 51–59.—Palpi of *Pardosa*, milvina group. 51. *P. parvula*. 52. *P. atlantica*. 53. *P. saxatilis*. 54. *P. saltonia*. 55. *P. littoralis*. 56. *P. milvina*. 57. *P. bellona*. 58. *P. pauxilla*. 59. *P. delicatula*.

tures apical to the cavities. Males of *P. bellona* can be identified by the short stout median apophysis with a blunt tip, a strongly curved, pointed basal spur, which is much larger than the median apophysis, and a tongue-shaped structure on the palea extending toward the median apophysis.

Distribution.—California, Nevada; Mexico (Dondale & Redner 1984:77, map 1).

Pardosa delicatula Gertsch & Wallace 1935
Figs. 45, 59; Map 6

Diagnosis.—The carapace of the females is pale, yellow marked with brown. The median band of the abdomen is a pale yellow, and the diamond is tan. Males are darker and the median band of the abdomen is about the same color as the diamond mark. The expanded



Map 5.—State records for *P. atlantica* (☆), *P. parvula* (★), *P. saxatilis* (*), *P. bellona* (◇), *P. saltonia* (*).

base of the septum is more than half as long as the epigynum, with convex sides. The apical portion extends to the hood as a ridge, not a furrow. The palp of the male has a short stout median apophysis with a blunt curved tip. The basal spur is a stout curved hook. The palp of *P. delicatula* is similar to the palp of *P. pauxilla*, but the palea of *P. delicatula* is sclerotized and the palea of *P. pauxilla* is membranous.

Distribution.—Nebraska, Oklahoma, Texas, Mississippi, Louisiana; Mexico (Dondale & Redner 1984: map 1).

Pardosa littoralis Banks 1896
Figs. 44, 55; Map 6

Pardosa littoralis Banks, 1896:192.

Pardosa longispinata Tullgren 1901:23; Dondale & Redner 1984:91 (= *Pardosa littoralis*)

Pardosa floridana Banks 1904:136; Dondale & Redner 1984:91 (= *Pardosa littoralis*)

Pardosa banksi Chamberlin 1904:175; Dondale & Redner 1984:91 (= *Pardosa littoralis*)

Pardosa ocala Bryant 1935:81; Dondale & Redner 1984:91 (= *Pardosa littoralis*)

Diagnosis.—The epigynal septum characterizes females of *P. littoralis*. The expanded base is about half the length of the epigynum

with concave sides. The apical portion of septum is a ridge, not a furrow. The median apophysis of the male palp is medium long with a wide base and a short broad basal spur. The palea bears a long tapered process that crosses the bulb behind the median apophysis.

Distribution.—Texas, Louisiana, Mississippi, Alabama, New York, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, Maryland, Virginia, North Carolina, South Carolina, Georgia, Florida; Canada (Dondale & Redner 1984: map 1).

Pardosa milvina (Hentz 1844)
Figs. 49, 56; Map 6

Diagnosis.—The epigynum of *P. milvina* is longer than wide. The expanded base of the septum is very short, about 1/5 the length of the septum, and does not conceal the cavities. The septum apical to the base is a furrow. The male palp features a somewhat stout median apophysis, with a broad base and a small, hooked basal spur. The palea bears a sclerotized structure, but it is not long, tapered, and crossing behind the median apophysis.

Distribution.—Nebraska, Kansas, Oklahoma, Texas, Iowa, Missouri, Arkansas, Lou-

isiana, all states east of the Mississippi River; Canada (Dondale & Redner 1984: map 5).

Pardosa parvula Banks 1904
Figs. 48, 51; Map 5

Diagnosis.—*Pardosa parvula* is the smallest *Pardosa* in the United States. The female body length is 3.4–4.2 mm and the male's is 3.1–3.5 mm. The cephalothorax is very high and the median pale band is wide. Males have pale legs, but femur I is brown. The expanded base of the septum is less than a third of the length of the epigynum. The apical half of the septum is a furrow flanked by straight ridges trailing basally from a triangular hood. *Pardosa parvula* males cannot be distinguished from *P. atlantica* and *P. saxatilis* palpal morphology, but is unique in the distribution of shiny white hair on the dorsum of the pedipalp. All three segments, of the pedipalp, patella, tibia and cymbium, are clothed by these hairs.

Distribution.—Louisiana, Mississippi, Georgia, Florida (Dondale & Redner 1984: map 3).

Pardosa pauxilla Montgomery 1904
Figs. 46, 58; Map 6

Pardosa georgiae Chamberlin and Ivie; 1944 Dondale & Render 1984:94 (= *pauxilla*)

Diagnosis.—These spiders are small, only slightly larger than *P. parvula*. The females are 4.5–5.5 mm in length, males are 4.0–4.4 mm. The abdomen of females is marked with a pale yellow median band, tan diamond and gray sides. The expanded base of the epigynal septum is less than a third the length of the epigynum. The apical portion of the septum is a ridge extending to the hood. The epigynum lacks lateral wings. The male palp of *P. pauxilla* bears a short, stout median apophysis with a curved pointed tip. The basal spur is a wide curved hook. The palea is membranous.

Distribution.—New Mexico, Kansas, Oklahoma, Texas, Louisiana, Mississippi, New Jersey, Maryland, Virginia, Georgia, Florida (Dondale & Redner 1984: map 5).

Pardosa saltonia Dondale & Redner 1984
Figs. 42, 54; Map 5

Diagnosis.—This species is the largest of the group. Female body size ranges from 6.5–8.5 mm and male body size ranges from 6.0–6.8 mm. The females are pale, mostly yellow

ochre marked with tan. The median band on the abdomen is a chalky pale yellow, and the diamond is tan. The median on the abdomen of the male is yellow ochre and the diamond is brown. The expanded base of the epigynal septum is about half the length of the epigynum with a pair of deep notches on its sides. The septum apical to the base is a wide furrow and flanked by trailing ridges of the wide hood. The epigynum lacks lateral wings. The male of *P. saltonia* has a long narrow cymbium heavily clothed with long hair. The tegulum is flat and the bulb seems to be embedded in the cymbium.

Distribution.—Salton Sea, California; Mexico (Dondale & Redner 1984: map 5).

Pardosa saxatilis (Hentz 1844)
Figs. 47, 53; Map 5

Pardosa platta Chamberlin and Ivie 1942:31; Dondale & Redner 1984:87 (= *saxatilis*)

Diagnosis.—Females of *P. saxatilis* are characterized by an epigynum about twice as long as wide. The expanded base of septum is less than a third the length of epigynum. The septum apical to base is a furrow flanked by thick wrinkled ridges trailing from the hood. Males of *P. saxatilis* are distinguished from all other *Pardosa* by the slender curved median apophysis that nearly reaches the cymbium, and small truncate basal spur. *Pardosa saxatilis* is distinguished from *P. atlantica* and *P. parvula*, not by palpal morphology, but rather by the distribution of white shiny hair on the pedipalp, that occurs only on the dorsum of the patella.

Distribution.—Nebraska, Minnesota, Wisconsin, Illinois, Michigan, Ohio, Maine, New Hampshire, Vermont, New York, Massachusetts, Rhode Island, Connecticut, New Jersey, Pennsylvania, Maryland, Virginia; Canada (Dondale & Redner 1984: map 3).

Modica Group

Remarks.—The modica group is represented by 23 recognized species in North America; 17 in the lower United States, 17 in Canada, with 11 in common between these two regions. Alaska has eight species, three of which occur in the lower 48 states. The modica group is by far the richest group and it is suspected that there are still more to be named. A few species have sister species, which are not only close morphologically but



Map 6.—State records for *P. milvina* (*), *P. delicatula* (☆), *P. littoralis* (★), *P. pauxilla* (◇).

geographically as well. Many of the species are large, up to 13 mm long. Even the smallest species exceed 6 mm in total body length. The spiders are dark. The median pale band on the carapace has sinuous margins and the lateral pale bands may be entire, broken into three or four large pieces, three or four small spots, or obscure. The femora of females are mottled, and in most males are marked with longitudinal dark bands.

The epigynum is characterized by large oval cavities, covering about half the epigynal area in the majority of species. The septum

extends the entire length as a sclerotized structure or raised ridge to paired hoods at the apical rim of the epigynum. The septum may be narrow and fairly straight, or have lateral expansions, chiefly in the cavity portion.

The male palp is large, with a short lumpish median apophysis scarcely extending apical to the tegulum. The basal spur is as large or larger than the apophysis. The palea is large and usually has a sclerotized area. The embolus in some species has a wide basal portion and the tip may be whip-like or somewhat broad.

KEYS TO USA SPECIES OF THE MODICA GROUP

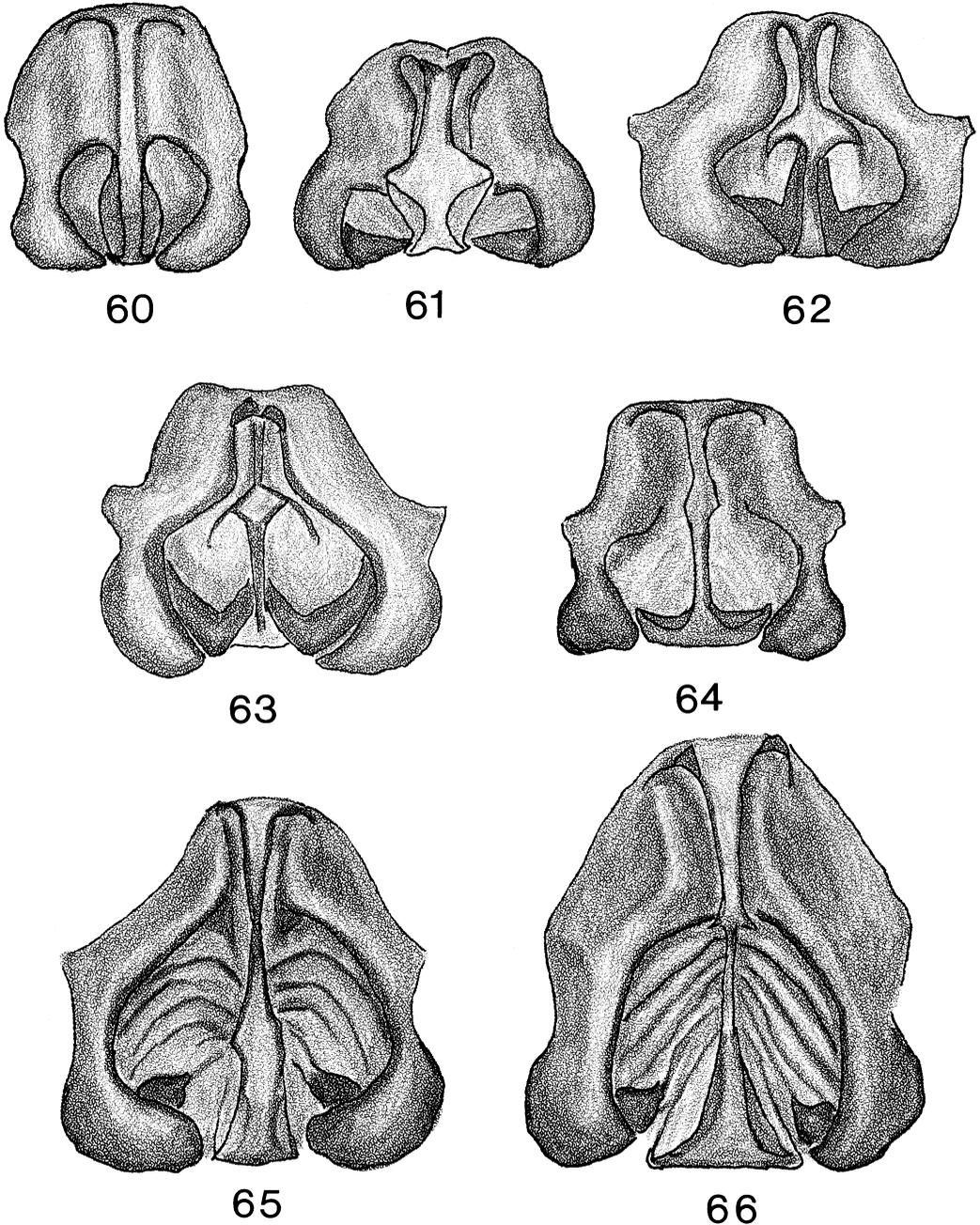
Females

1. Oval cavities not more than 1/2 the length of epigynal plate; cavity without arms extending apically; septum apical to cavities a slightly raised ridge flanked by shallow furrows (Fig. 60) *Pardosa wyuta*
 Septum extending length of epigynum from base to hoods, cavities with arms extending to hoods (Figs. 61–76) 2
2. Cavities not more than 1/3 the length of epigynal plate, with large triangular sclerites basally; septum flaring from base to apical rim of cavity concealing basal part of cavity arms; arms diverging apically (Fig. 61) *Pardosa labradorensis*
 Widest part of septum not concealing basal part of cavity arms 3
3. Septum slender at both ends, expanded at apical end of cavities to a diamond shape with lateral ridges trailing basally on cavity floor; cavity sclerites a large V-shape situated basally 4

- Septum various shapes, without a diamond shape at apical end of cavities; cavity sclerites not V-shaped, or absent 5
4. The septal branch of the V extending nearly to the diamond expansion of septum (Fig. 62) *Pardosa ourayensis*
The septal branch of the V not extending to diamond expansion (Fig. 63) *Pardosa modica*
5. Septum except for base, quite slender throughout length (Figs 64–68) 6
Septum with basal part somewhat or greatly wider than apical part (Fig. 69–76) 10
6. Base of septum thin and wide like an inverted T, septal pockets on base; cavities wide and elongated without distinct apical rim; hoods wide, reaching to sides of epigynal plate (Fig. 64) *Pardosa wasatchensis*
Base of septum scarcely wider than septum or triangular in shape; cavity arms narrow and distinct 7
7. Floor of cavity with conspicuous serial ridges extending from septum to side of cavity . . 8
Floor of cavity may have small wrinkles lacking apparent pattern 9
8. Cavity ridges with apical arch near septum, then curving postero-laterally (Fig. 65) *Pardosa tristis*
Cavity ridges without apical arch near septum, extending postero-laterally more or less straight (Fig. 66) *Pardosa lowriei*
9. Base of septum scarcely wider than septum, septum evenly narrow from base to hood; cavity sclerites triangular (Fig. 67) *Pardosa bucklei*
Base of septum a narrow triangle with septal pockets along the sides; septum narrowing to a line between cavity arms, widening toward hoods; cavity sclerites oval (Fig. 68) *Pardosa albomaculata*
10. Basal expanded portion of septum a long rectangle, sides parallel or slightly concave, with long narrow septal pockets 11
Basal expanded portion of septum not a rectangle with rectangular septal pockets 14
11. Expanded portion of septum more than half the length of septum; hoods straight, perpendicular to septum (Fig. 69–70) 12
Expanded portion of septum less than half the length of septum; hoods curved (Figs. 72–73) 13
12. Rim of cavity and lateral rim of cavity arm crisply defined; cavity sclerites absent or at most a small knob (Fig. 69) *Pardosa confusa*
Rim of cavity and lateral rim of cavity arm gently rounded; cavity sclerites triangular at base of cavity (Fig. 70) *Pardosa tetonensis*
13. Cavity sclerites may not touch septum; total length of female 9–10 mm; higher elevations; montane, alpine (Fig. 71) *Pardosa groenlandica*
Cavity sclerites spanning base of cavity and abutting septum; total length of female < 9 mm; foothills and plains (Fig. 72) *Pardosa dromaea*
14. Base of septum 1/3 the width of epigynum, tapering from base to hood without an abrupt decrease; septal pockets bilobed (Fig. 73) *Pardosa sinistra*
Septum narrowing abruptly between cavity arms, septal pockets not bilobed (Figs. 74–76) . . 15
15. Cavities small, semicircular, placed somewhat apically, with heavily sclerotized rim; basal part of septum with parallel sides; hoods very narrow (Fig. 74) *Pardosa crassistyla*
Septum amphora shaped, bulging widely in cavity, with a narrow rounded base 16
16. Basal half of septum nearly covering cavities, large semicircular septal pockets; hoods reduced (Fig. 75) *Pardosa anomala*
Basal half of septum more evenly wide from base; entire septum with transverse wrinkles; hoods heavily sclerotized and contiguous (Fig. 76) *Pardosa vogelae*

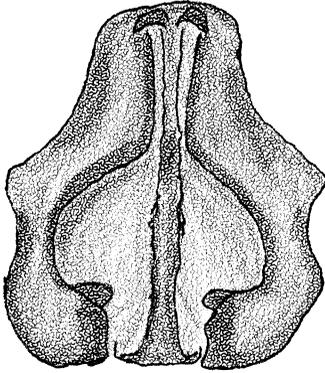
Males

1. Pale lateral bands on carapace unbroken or unmarked with darker spots 2
Lateral bands broken with darker marks or indistinct 8
2. Embolus with broad, heavily sclerotized base, tip broad or slender (Figs. 77–79) 3
Embolus slender, hair-like at tip 5

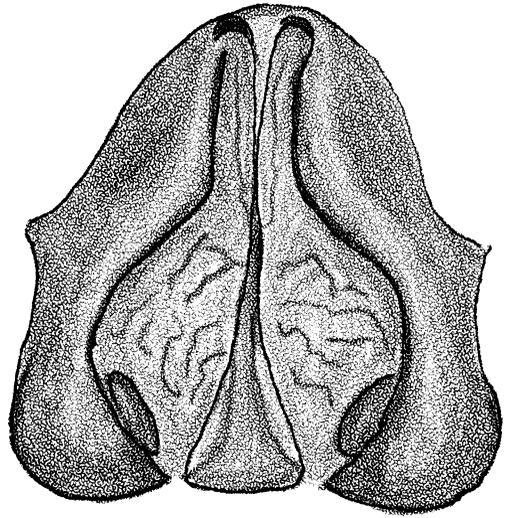


Figures 60–66.—Epigyna of *Pardosa*, modica group. 60. *P. wyuta*. 61. *P. labradorensis*. 62. *P. ourayensis*. 63. *P. modica*. 64. *P. wasatchensis*. 65. *P. tristis*. 66. *P. lowriei*.

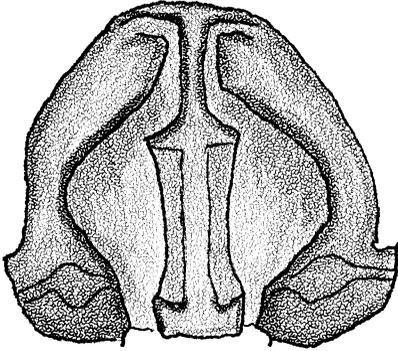
- 3. Median apophysis short, not extending apical to basal spur; large bulbous structure (B in Fig. 77) situated between median apophysis and base of median apophysis; terminal apophysis a large hook (Fig. 77) *Pardosa crassistyla*
 Median apophysis extending apical to basal spur, no bulbous structure between median apophysis and base of embolus 4
- 4. Base of embolus wide, apical portion thin and hair-like (Fig. 78) *Pardosa tetonensis*



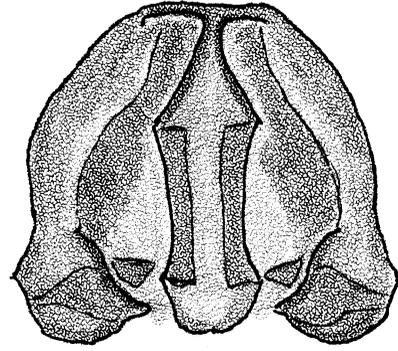
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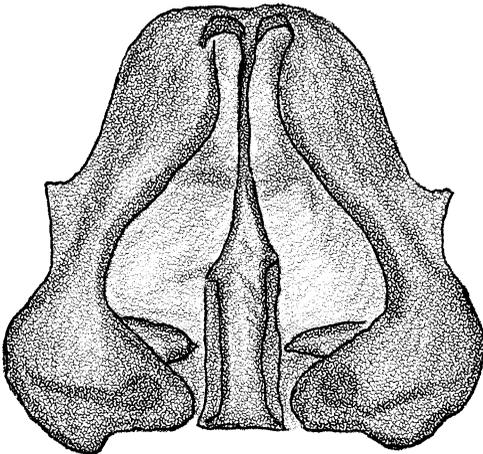
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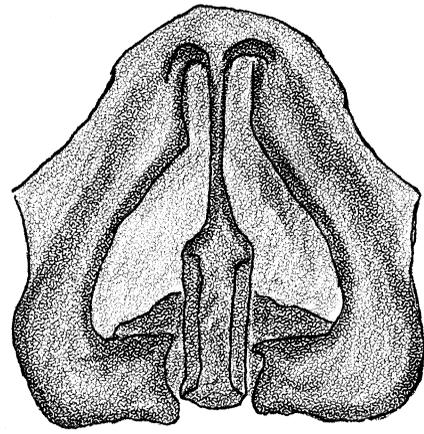
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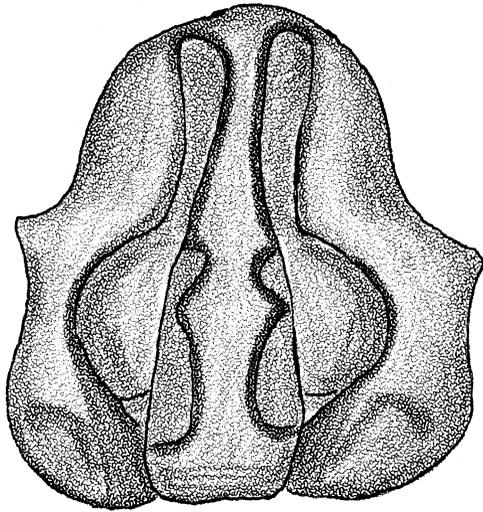


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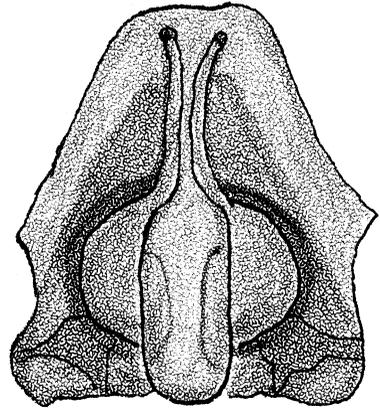


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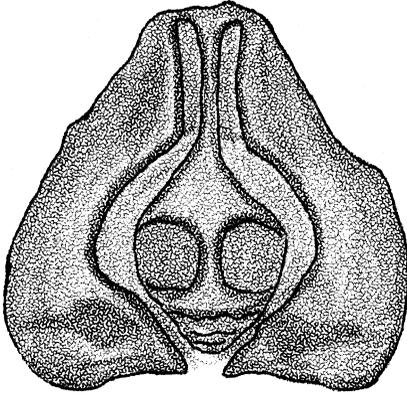
Figures 67-72.—Epigyna of *Pardosa*, modica group. 67. *P. bucklei*. 68. *P. albomaculata*. 69. *P. confusa*. 70. *P. tetonensis*. 71. *P. groenlandica*. 72. *P. dromaea*.



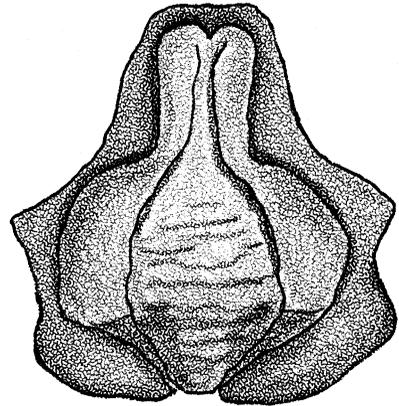
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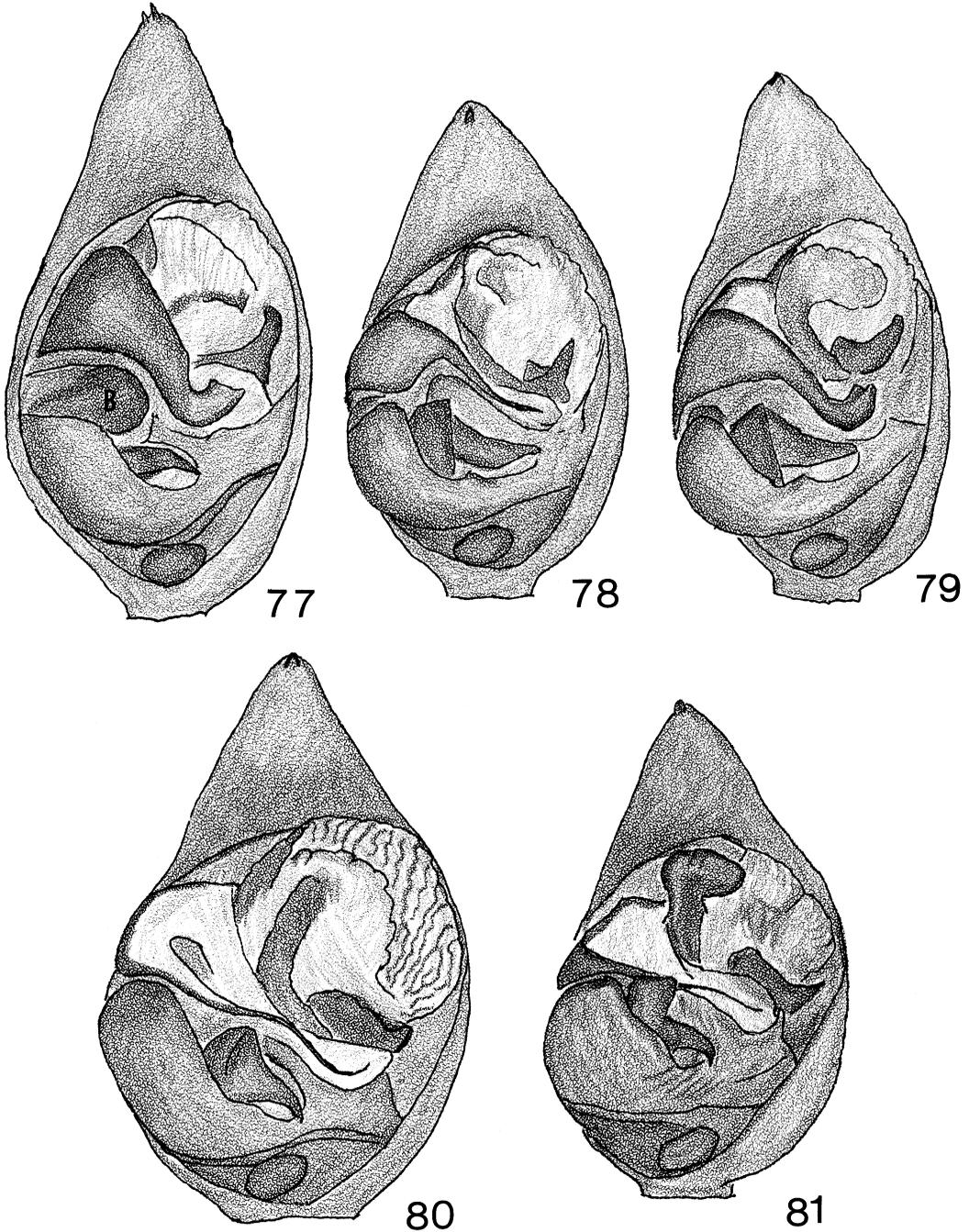
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Figures 73–76.—Epigyna of *Pardosa*, modica group. 73. *P. sinistra*. 74. *P. crassistyla*. 75. *P. anomala*. 76. *P. vogelae*.

- Base of embolus wide, apical portion broad and curved apically, tip broad and bifid (Fig. 79) *Pardosa confusa*
5. Palea with a large, strongly wrinkled pillow-like structure on most of its apical margin, and a somewhat L-shaped, sclerotized structure medially (Fig. 80) *Pardosa anomala*
- Pillow-like structure on margin of palea smaller and not strongly wrinkled, sclerotized structure on palea slender basally, expanding to a large oval apically (Figs. 81–83) 6
6. Median apophysis block-like, stocky, and truncate (Fig. 81) *Pardosa labradorensis*
- Median apophysis triangular or pyramidal 7
7. Terminal apophysis somewhat horizontal with basal hump and apical edge of lateral extension straight and ending in slight point (Fig. 82) *Pardosa modica*
- Terminal apophysis somewhat horizontal with basal hump and apical edge of lateral extension with 2 or 3 small bumps (Fig. 83) *Pardosa ourayensis*
8. Lateral bands of carapace indistinct or a series of small spots 9



Figures 77–81.—Palpi of *Pardosa*, modica group. 77. *P. crassistyla*. 78. *P. tetonensis*. 79. *P. confusa*. 80. *P. anomala*. 81. *P. labradorensis*. B, bulbous structure.

- Lateral bands of carapace as 3 or 4 tan or yellowish segments 13
- 9. Median apophysis rounded, basal spur curved apically, looks like a bird's head (Fig. 84)
 *Pardosa vogelae*
- Median apophysis does not look like a bird's head 10
- 10. Base of embolus not heavily sclerotized; distal portion slender, hair-like (Figs. 85–86) . . 11

- Base of embolus broadly sclerotized, distal portion slender but not hair-like (Figs. 87–88) . . . 12
- 11. Total length < 7 mm; tip of basal spur of median apophysis blunt, squarish (Fig. 85) . . .
 *Pardosa wyuta*
 Total length > 8 mm; tip of basal spur a sharp curved point (Fig. 86) *Pardosa sinistra*
- 12. Median apophysis rounded apically; occurs in Maine and New Hampshire (Fig. 87)
 *Pardosa albomaculata*
 Median apophysis triangular, tip pointing apically; occurs in Washington and Oregon (Fig. 88) *Pardosa lowriei*
- 13. Basal spur of median apophysis larger than median apophysis, arises from apical edge of apophysis, with a broad triangular tip; terminal apophysis a sharply pointed horn (Fig. 89) *Pardosa wasatchensis*
 Basal spur of median apophysis a longish slender hook arising below apical edge of apophysis (Figs. 90–93) 14
- 14. Distal part of embolus somewhat broad and truncate, tip slightly transparent; sclerotized oval structure on palea mostly concealing pillow-like structure (Fig. 90) . . . *Pardosa bucklei*
 Distal part of embolus slender; exposed, wrinkled pillow-like structure bordering edge of sclerotized oval structure on palea 15
- 15. Large sclerotized process on palea (P in Fig. 92) curving retrolaterally between embolus and terminal apophysis (t in Fig. 92) with an angular ridge throughout its length 16
 Large sclerotized process on palea curving retrolaterally between embolus and terminal apophysis with a smoothly rounded ridge (Fig. 91) *Pardosa tristis*
- 16. Spider 9 mm long or larger; higher elevations, alpine; palp as in Fig. 92
 *Pardosa groenlandica*
 Spider around 8 mm long; lower elevations, great plains, cobbly river sides; palp as in Fig. 93 *Pardosa dromaea*

Pardosa albomaculata Emerton 1885
 Figs. 68, 87; Map 7

Pardosa tristoides Chamberlin & Ivie 1947:22;
 Kronstedt 1975:218 (= *Pardosa albomaculata*)

Diagnosis.—The spiders are a reddish brown with a narrow yellow median stripe on the carapace. The epigynum of *P. albomaculata* is characterized by a slender septum with a triangular base. Small random wrinkles cover the floor of cavity. Oval cavity sclerites lie on the basal side of cavity. The lateral bands on the carapace of male *P. albomaculata* are reduced to three yellow spots. The base of embolus is heavily sclerotized and distal portion is slender but not hair-like. The median apophysis is pyramidal but rounded apically.

Remarks.—This spider is found in Maine and New Hampshire at higher elevations. The palpal morphology is very similar to *P. lowriei*, which occurs in the Pacific Northwest.

Distribution.—New Hampshire, Maine; Canada, Alaska (Dondale & Redner 1984: map 50; Kronstedt 1975: fig. 9).

Pardosa anomala Gertsch 1933
 Figs. 75, 80; Map 7

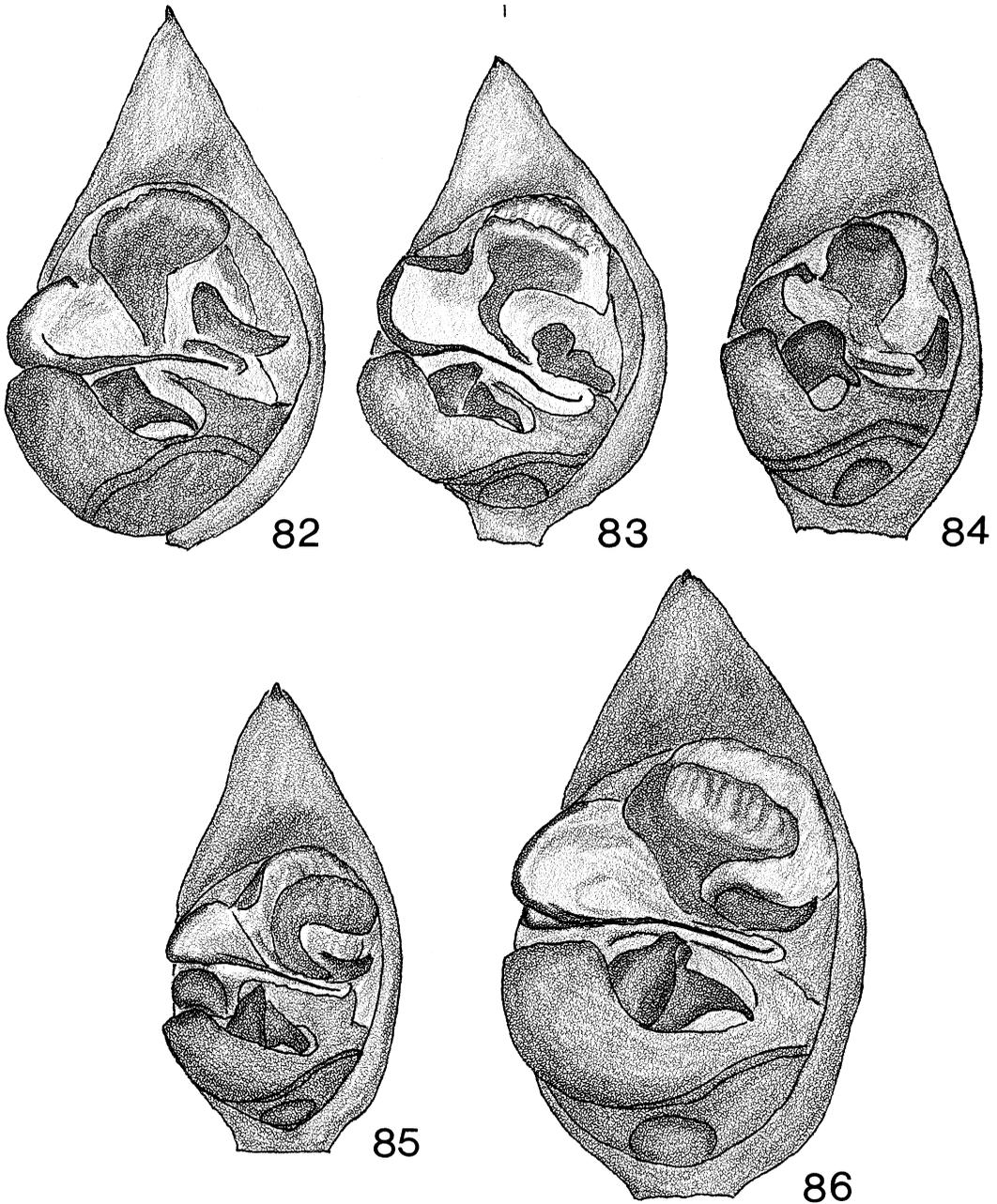
Diagnosis.—The pale lateral bands on the carapace are unbroken by darker color. The

basal half of the epigynal septum is a broad oval covering most of the cavities. Large semicircular septal pockets are inserted into the sides of the oval. The palea of the male palp is unique with a large, strongly wrinkled pillow-like structure in its apical margin. Males of *P. anomala* can be distinguished from all other *Pardosa* by lateral bands of the carapace unbroken, slender embolus with hair-like tip, palea with large strongly wrinkled pillow-like structure in apical margin.

Distribution.—Montana, Wyoming, Utah, Colorado; Canada (Dondale & Redner 1990: map 41; pers. obs.).

Pardosa bucklei Kronstedt 1975
 Figs. 67, 90; Map 7

Diagnosis.—*Pardosa bucklei* is one of the smaller species in the modica group. The body length of females is 7–9 mm, that of males is 6–7.5 mm. Lateral bands of the carapace are represented by three or four tan patches. The septum of the epigynum is slender except for triangular base. The floor of cavity has faint random wrinkles and small cavity sclerites situated laterally and pointing toward the septum. The base of the embolus is broad and sclerotized. The distal portion of embolus somewhat



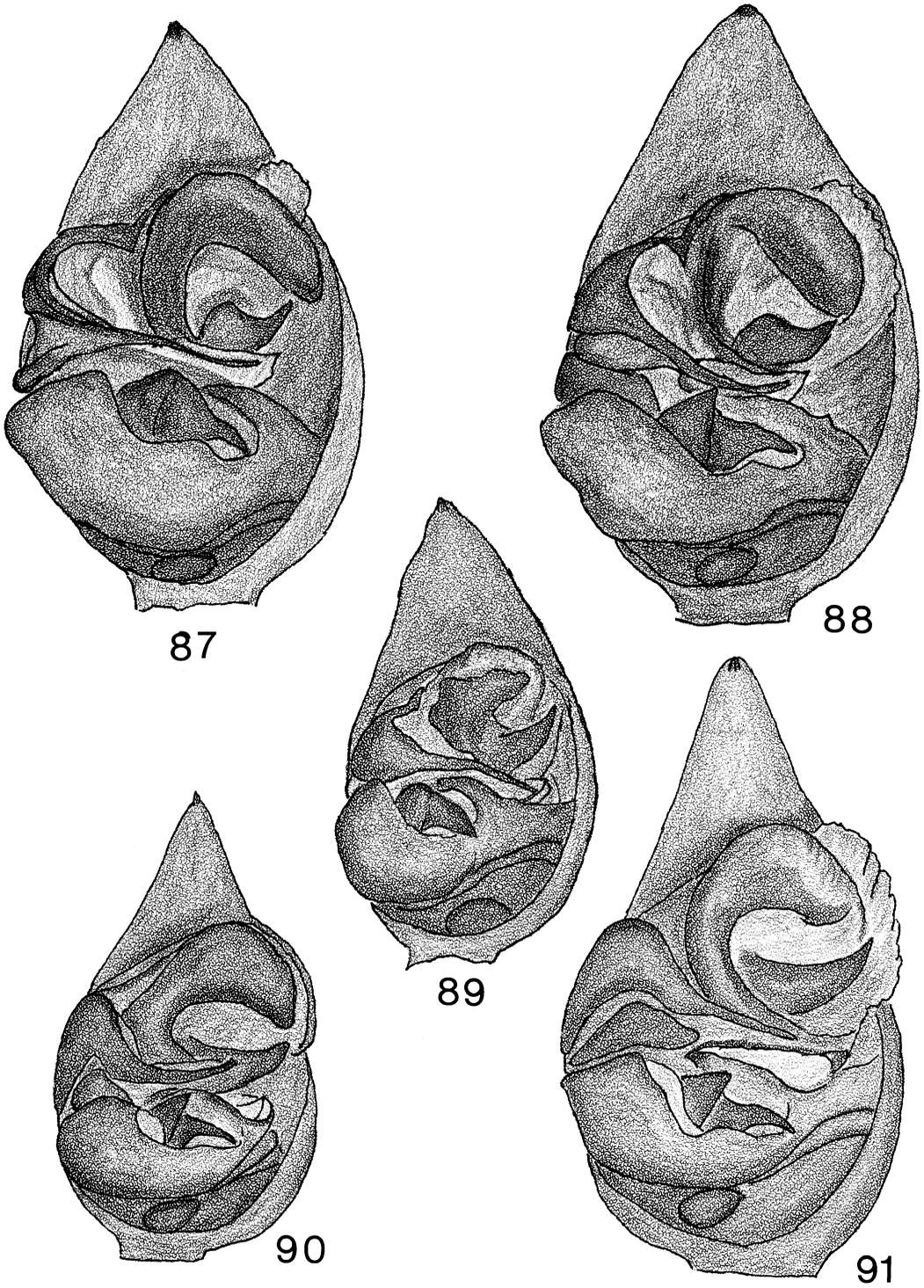
Figures 82–86.—Palpi of *Pardosa*, modica group. 82. *P. modica*. 83. *P. ourayensis*. 84. *P. vogelae*. 85. *P. wyuta*. 86. *P. sinistra*.

broad and truncate. The tip slightly transparent. The pillow-like structure of the palea is mostly concealed by a sclerotized structure.

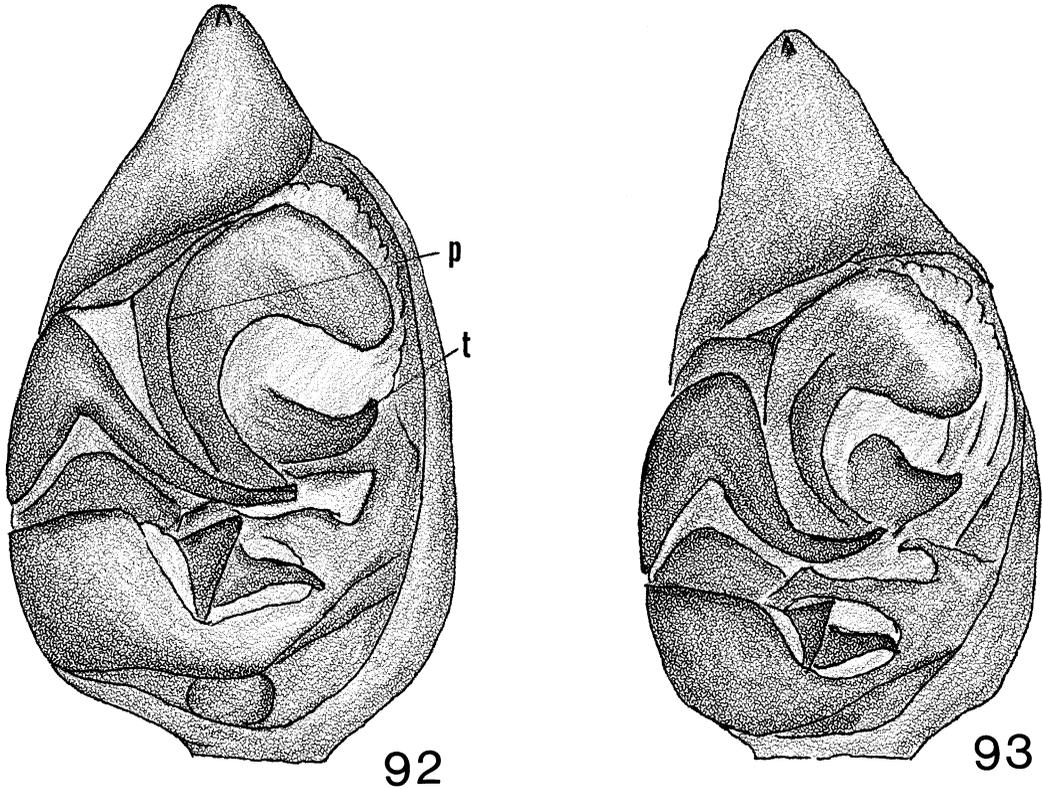
Distribution.—Oregon, California, Idaho, Montana, Wyoming, Utah, Colorado, Arizona, New Mexico, Nebraska; Canada (Dondale 1999: fig. 17).

Pardosa confusa Kronstedt 1988
Figs. 69, 79; Map 7

Diagnosis.—The average body length of females is 6.5 mm, the average length of males is 6.2 mm. The pale lateral bands of carapace are unbroken by darker color. The



Figures 87–91.—Palpi of *Pardosa*, modica group. 87. *P. albomaculata*. 88. *P. lowriei*. 89. *P. wasatchensis*. 90. *P. bucklei*. 91. *P. tristis*.



Figures 92–93.—Palpi of *Pardosa*, modica group. 92. *P. groenlandica*. 93. *P. dromaea*. p, paleal process. t, terminal apophysis.

basal expanded portion of the epigynum is $2/3$ the length of the of septum. It is a narrow rectangle with rectangular septal pockets. Cavity sclerites are very small or absent. *Pardosa confusa* and *P. tetonensis* are sister species. The cavity rim is crisply defined in *P. confusa* and softly rounded in *P. tetonensis*. The base of the embolus of the palp of *P. confusa* is broad and sclerotized. The distal portion is broad, and the tip is bifid and curved apically. In *P. tetonensis* the distal portion of the embolus of is very slender and the tip is not turned apically.

Distribution.—Oregon, Utah, Colorado (Kronstedt 1988: 419–420).

Pardosa crassistyla Kronstedt 1988
Figs. 74, 77; Map 8

Diagnosis.—Pale lateral bands of carapace unbroken by darker color. The epigynal cavities of *P. crassistyla* large and semicircular with heavily sclerotized rims. The base of the septum is rounded. The cavity arms and

paired hoods are very narrow. The most conspicuous feature of the male palp is a bulbous structure between base of embolus and the median apophysis. The base of the embolus is broad and sclerotized. The short median apophysis does not extend apical to the basal spur.

Distribution.—Oregon, California, Idaho, Montana, Wyoming, Utah, Colorado (Kronstedt 1988: fig. 10; pers. obs.).

Pardosa dromaea (Thorell 1878)
Figs. 72, 93; Map 8

Pardosa nebraska Chamberlin & Ivie 1942:30;
Dondale & Redner 1990:209 (= *Pardosa dromaea*)

Diagnosis.—Lateral band of carapace consists of a series of pale blotches. *Pardosa dromaea* is a sister species of *Pardosa groenlandica*. The basal half of the epigynal septum is a long rectangle with rectangular septal pockets. *Pardosa dromaea* may differ from *P. groenlandica* by the position cavity sclerites,



Map 7.—State records for *P. albomaculata* (*), *P. anomala* (★), *P. bucklei* (☆), *P. confusa* (★), *P. tetonensis* (◆).

which abut the septum, but may not in *P. groenlandica*. Males of *P. dromaea* can be distinguished by the pyramidal median apophysis and the basal spur shaped like a long slender hook. The large sclerotized structure of the palea has an angular ridge.

Remarks.—Genital morphology is not useful in separating *P. dromaea* from *P. groenlandica*. *Pardosa dromaea* is smaller than *P. groenlandica*. The body length of females of *P. dromaea* is 7.6–9.7 mm; length of males 7.2–8.8 mm. The body length of *P. groenlandica* females is 8.2–10.6 mm and the length of males is 8.1–9.4 mm. *Pardosa dromaea* lives at lower elevations, foothills and plains. The species is regarded as a member of the Great Plains fauna (Dondale 1999:444).

Distribution.—Montana, Wyoming, Colorado, New Mexico, North Dakota, Nebraska, Iowa, Minnesota, Wisconsin; Canada (Dondale 1999: fig. 16).

Pardosa groenlandica (Thorell 1872)
Figs. 71, 92; Map 8

Lycosa iracunda Thorell 1877:514; Dondale 1999: 439 (= *Pardosa groenlandica*)

Diagnosis.—*Pardosa groenlandica* is a sis-

ter species of *Pardosa dromaea*. See “Diagnosis” and “Remarks” above in *P. dromaea*.

Remarks.—*Pardosa groenlandica* lives at higher elevations, forest to tundra.

Distribution.—Idaho, Montana, Wyoming, Utah, Colorado, Minnesota, Wisconsin, Michigan, Maine; Canada, Alaska (Dondale & Redner 1990: fig. 16).

Pardosa labradorensis (Thorell 1875)
Figs. 61, 81; Map 8

Pardosa lenghi Gertsch 1933:23, figs. 24, 34; Kronstedt 1981:119 (= *Pardosa labradorensis*)

Diagnosis.—Spider is lightly colored with wide yellow lateral bands on the carapace unbroken by darker color. The epigynum is wider than long. The cavities have large, triangular cavity sclerites that lie on the basal ends of the cavities. A transverse diamond-shaped expansion of the septum at the apical end of the cavities conceals the basal end of the cavity arms. This feature is unique in the modica group. The median apophysis of the male palp is block-like, stocky, and truncated. The basal spur is long and stout with the tip bent basally. The palea bears large sclerotized oval.

Distribution.—New Hampshire; Canada



Map 8.—State records for *P. crassistyla* (◇), *P. dromaea* (☆), *P. groenlandica* (*), *P. labradorensis* (*), *P. lowriei* (⊗), *P. tristis* (★).

(Dondale & Redner 1990: map 44; Kronestedt 1981: map 1).

Pardosa lowriei Kronestedt 1975
Figs. 66, 88; Map 8

Diagnosis.—Spiders are dark brown, lateral bands on carapace represented by three or four paler spots. The floor of the epigynal cavity features serial ridges or wrinkles. These ridges extend postero-laterally from the septum without an apical arch. The base of the septum is a long thin triangle with septal pockets. The epigynum is very similar to *P. tristis*, but in *P. tristis* the wrinkles have an apical arch. The median apophysis of the male palp is pyramidal with an acute tip. The basal spur is long and slender with the tip turned basally.

Remarks.—Palpal morphology is very like that of *P. albomaculata*, which occurs in Maine and New Hampshire. *Pardosa lowriei* occurs in the Pacific Northwest.

Distribution.—Oregon, Washington; Canada, Alaska (Dondale & Redner 1990: map 52; Kronestedt 1975: fig. 9; pers. obs.).

Pardosa modica (Blackwall 1846)
Figs. 63, 82; Map 9

Diagnosis.—The lateral band on the carapace is entire, unmarked by darker lines. *Par-*

dosa modica and *P. ourayensis* are sister species. The epigynum is wider than long. The septum is slender with a transverse diamond-shaped expansion at the apical end of the cavities with lateral ridges that trail basally across the cavity floor. V-shaped cavity sclerites lie on the basal end of the cavity. In *P. modica*, one branch of the V does not extend to the diamond-shaped expansion along the septum as it does in *P. ourayensis*. Males of *P. modica* have an embolus which is slender and hair-like. The palea has a pillow-like structure apically which is not strongly wrinkled, but with a large sclerotized oval basally. The median apophysis is pyramidal. The terminal apophysis points laterally. In *P. modica* it has a basal hump and a straight margin on the distal part. In *P. ourayensis* it has a basal hump and a bumpy margin on the distal part.

Distribution.—Idaho, Montana, Wyoming, Colorado, Michigan, New York, Connecticut; Canada (Dondale 1999: map 44; Kronestedt 1981:119; pers. obs.).

Pardosa ourayensis Gertsch 1933
Figs. 62, 83; Map 9

Diagnosis.—*Pardosa ourayensis* and *P. modica* are sister species Refer to “Diagnosis” in *P. modica*.

Distribution.—Colorado, Montana (pers. obs.)

Pardosa sinistra (Thorell 1877)

Figs. 73, 86; Map 9

Pardosa cascadae Schenkel 1951:25; Kronstedt 1981:121 (= *Pardosa sinistra*)

Diagnosis.—The shape of the septum distinguishes females of *P. sinistra*. The base is about 1/3 the width of the basal end of the epigynum. It tapers apically to the hoods smoothly ending in a short neck. The septal pocket is bilobed, with the basal lobe about three times as long as the apical lobe. The lateral bands of the carapace of *P. sinistra* males are indistinct or absent. The base of embolus is sclerotized but the tip is slender and hair-like. The median apophysis is pyramidal with a basal spur wide basally and tip pointed. The body length is greater than 8 mm. The palp of *P. sinistra* is very like that of *P. wyuta*, but the tip of the basal spur is pointed not truncate.

Distribution.—Washington, Montana, Colorado; western Canada (Kronstedt 1981:123).

Pardosa tetonensis Gertsch 1933

Figs. 70, 78; Map 7

Diagnosis.—The pale lateral bands of the carapace are entire. Females average 7.2 mm, males 6.3 mm. *Pardosa tetonensis* and *P. confusa* are sister species. The basal expanded portion of the epigynum is 2/3 the length of the septum. It is a narrow rectangle with rectangular septal pockets. The cavity rim is softly rounded in *P. tetonensis* and crisply defined in *P. confusa*. Small cavity sclerites lie near the basal end of the cavity. The base of the embolus of the palp of *P. tetonensis* is broad and sclerotized. The distal portion is very slender and the tip is not turned apically. The distal portion of the embolus of *P. confusa* is broad, and the tip is bifid and curved apically.

Distribution.—Montana, Wyoming, Colorado (Kronstedt 1988: 412–413; pers. obs.).

Pardosa tristis (Thorell 1877)

Figs. 65, 91; Map 8

Diagnosis.—Lateral bands on the carapace are represented by three paler segments. The body length of females is 8.2–10.6 mm, that of males is 8.0–9.3 mm. The epigynum of *P. tristis* is very similar to the epigynum of *P.*

lowriei. The septum is slender with a long triangular base. The septal pockets are also long and slender. The floor of the cavity features serial ridges or wrinkles, which extend laterally with a conspicuous apical arch near the septum. The ridges in the epigynum of *P. lowriei* are straight. The male palp of *P. tristis* is morphologically close to the palps of *P. dromaea* and *P. groenlandica*. The median apophysis is pyramidal with a long basal spur. The tip of the spur is pointed basally. The terminal is a curved horn with the tip pointing apically. *Pardosa tristis* differs from *P. dromaea* and *P. groenlandica* by the large sclerotized structure on the palea that curves laterally between the embolus and the terminal apophysis. It is smoothly rounded in *P. tristis*, but angular in *P. dromaea* and *P. groenlandica*.

Distribution.—Washington, Oregon, California, Idaho, Nevada, Montana, Wyoming, Utah, Colorado, Arizona, New Mexico; Canada (Dondale 1999: fig. 17).

Pardosa vogelae Kronstedt 1993

Figs. 76, 84; Map 9

Diagnosis.—Pale lateral band on the carapace is entire. The genitalia of this species are very distinctive. The basal expanded portion of the epigynal septum is an oval as long as the cavities, with a narrow rounded base, sides strongly convex, narrowing between the cavity arms. The oval is covered with transverse wrinkles. The short, rounded median apophysis of the male palp looks like a bird's head.

Distribution.—Utah (Kronstedt 1993: fig. 22).

Pardosa wasatchensis Gertsch 1933

Figs. 64, 89; Map 9

Diagnosis.—The pale lateral band of the carapace is crossed by two dark streaks. The epigynal septum is slender for most of its length with a slight expansion at the apical end of the cavities. The base is short and wide, like an inverted T, with transverse septal pockets. The hoods are wide and flat, not arched. The short median apophysis of the male palp is shorter than the wide basal spur, which arises from the apical edge of the median apophysis. The tip is a broad triangle pointing basally. The terminal apophysis is a sharply pointed horn directed apically.

Distribution.—Washington, Oregon, Ida-



Map 9.—State records for *P. modica* (*), *P. ourayensis* (*), *P. sinistra* (◇), *P. vogelae* (⊗), *P. wasatchensis* (★), *P. wyuta* (☆).

ho, Montana, Wyoming, Utah, Colorado (Kronstedt 1993: fig. 22).

Pardosa wyuta Gertsch 1933
Figs. 60, 85; Map 9

Diagnosis.—The pale lateral band of the carapace is represented by several blotches. The epigynum of *P. wyuta* is atypical for the modica group in lacking distinct cavity arms. The septum apical to paired oval cavities is represented by a ridge flanked by a pair of furrows, instead of the characteristic troughs, which extend to the paired hoods. The hoods are flat and wide, not arched. The median apophysis is pyramidal with the basal spur somewhat stout and its tip is truncated. The base of the embolus not heavily sclerotized and tip hair-like. The palp of *P. wyuta* is very like that of *P. sinistra* but the tip of the basal spur in *P. wyuta* is truncate not pointed.

Distribution.—Washington, Idaho, Montana, Wyoming, Utah, Colorado; western Canada (Dondale & Redner 1990: map 49; pers. obs.).

Moesta Group

Remarks.—The moesta group consists of one species in North America. The group is

characterized by the genitalia. The epigynum (Fig. 94) features an apical extension of the cavity to the edge of the epigynum where it widens to a transverse oval. The cavity surrounds the narrowed apical portion of the septum. The base of the septum is a trapezoidal shape with transverse cavity sclerites on the apical edge. The basal portion of the cavity has an indistinct rim and is mostly covered by the expanded base of the septum. The male palp (Fig. 95) is small and compact. The median apophysis is blunt and rounded apically. The basal spur, a fairly large triangular shape, arises medially and is directed basally. The palea has a prominent sclerotized hook directed basally.

Pardosa moesta Banks 1892
Figs. 94, 95; Map 3

Diagnosis.—The spiders are small, the body length 4–6 mm. The female carapace is brown with lighter median area that is not a well-defined band. The abdomen is marked with a diamond apically and lighter paired marks posteriorly. The epigynum and palp are as described above. The male carapace is glabrous and shiny chestnut brown color which makes this spider instantly recognizable. The



Map 10.—State records for *P. dorsalis* (★), *P. dorsuncata* (☆), *P. uncata* (◆), *P. gothicana* (*).

tibia of the male pedipalp is barrel-shaped and nearly as wide as the palp.

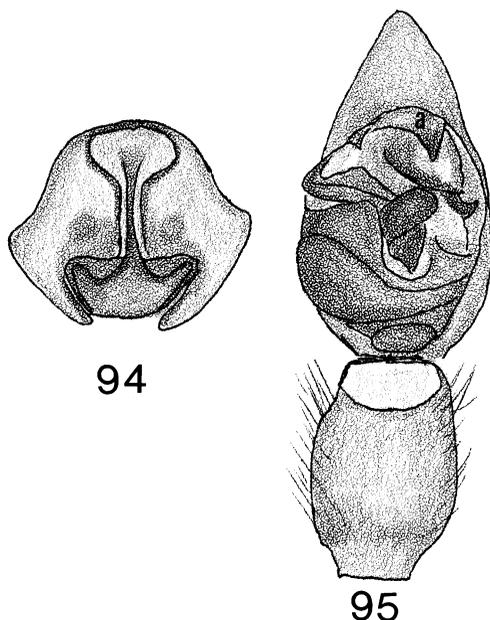
Remarks.—*Pardosa moesta* is widely distributed and relatively common at lower elevations.

Distribution.—Washington to New England, West Virginia, Tennessee; Canada, Alaska (Dondale & Redner 1987: map 4).

Nigra Group

Remarks.—The nigra group consists of eight species in the contiguous United States, five of these also occur in Canada, and six Palearctic species. The group is characterized by the genitalia. Cavities are not apparent on the epigynum. The base of the septum is expanded, rectangular or somewhat triangular, with transverse wrinkles. The apical portion of the septum is a narrow trough flanked by ridges, extending to the end of the epigynum, where it forms the hood. Conspicuous lateral swellings flank the expanded base of the septum.

The male palp is immediately recognizable by the jutting tegulum that extends from the cymbium almost horizontally. The bulb is very open, and the median apophysis somewhat strap-like and also leaning away from



Figures 94–95.—Genitalia of *Pardosa*, moesta group, *P. moesta*. 94. Epigynum. 95. Palp. a, apical process.

bulb. The basal spur is curved basally and generally about half the length of the median apophysis. The terminal apophysis is a twig-like process arising from the medial end of the palea and traversing to the edge of the cymbium (Fig. 108).

The general color pattern is low contrast between dark and lighter colors. The median band of the carapace, when present, has undulating edges; lateral pale bands usually not apparent. The abdomen has a broad median pale area.

KEYS TO USA SPECIES OF THE NIGRA GROUP

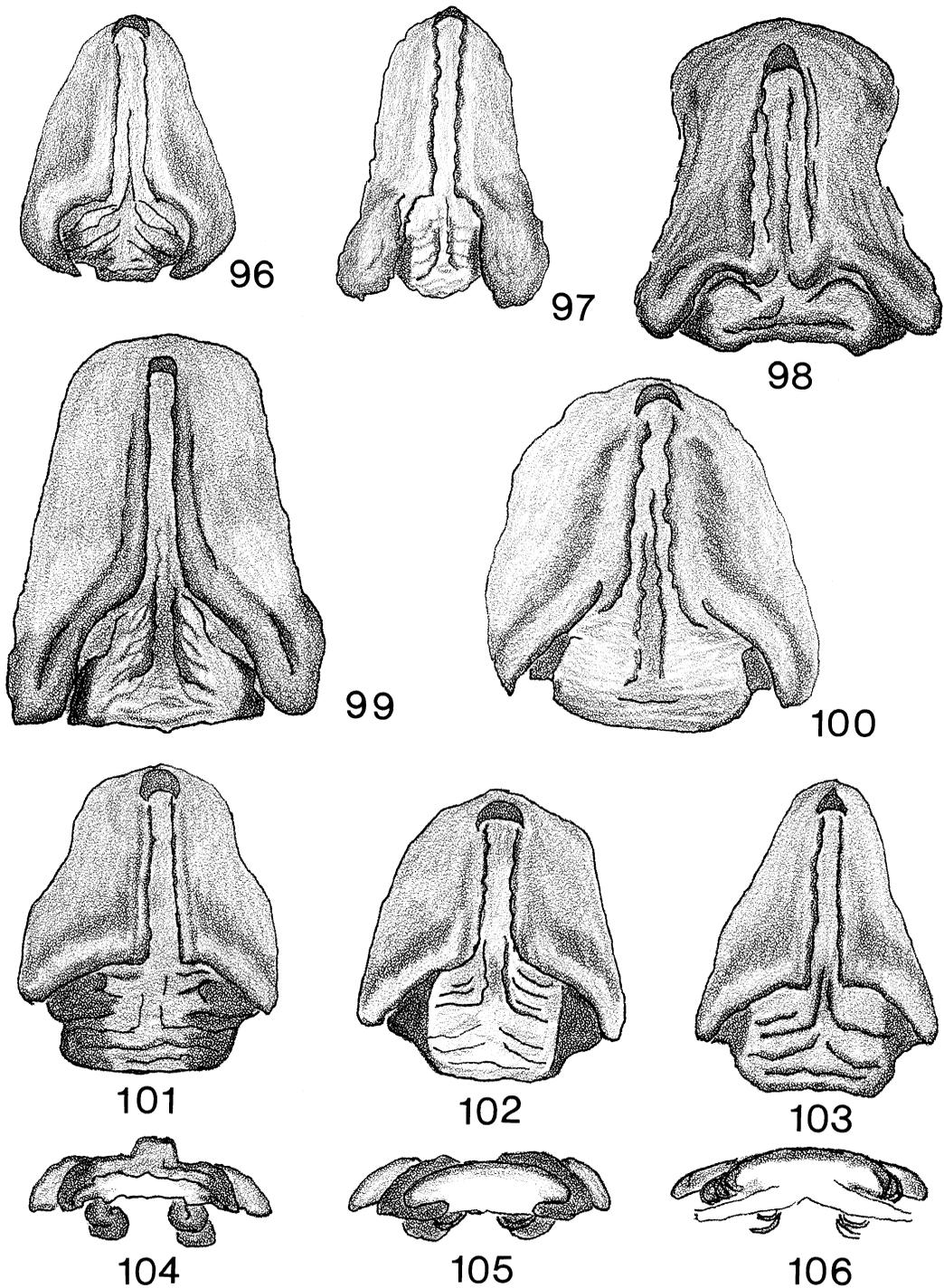
Females

1. Lateral swellings of the epigynum converging basally (Fig. 96) *Pardosa uintana*
Lateral swellings parallel or diverging basally 2
2. Lateral swellings parallel, extending slightly basal to expanded base of septum (Fig. 97)
. *Pardosa gothicana*
Lateral swellings diverging basally (Figs. 98–103) 3
3. Lateral swellings extending basally nearly as far as base of septum (Figs. 98–100) 4
Expanded base of septum extending basally much further than lateral swellings (Figs. 101–103) 6
4. Expanded base of septum with lateral lobes (Fig. 98) *Pardosa hetchi*
Expanded base of septum without lateral lobes 5
5. Epigynum much longer than wide (Fig. 99) *Pardosa rainieriana*
Epigynum nearly as wide as long (Fig. 100) *Pardosa mackenziana*
6. Copulatory tubes broad, not looped (in posterior view) (Figs. 101, 104)
. *Pardosa dorsuncata*
Copulatory tubes coiled (in posterior view) (Figs. 102, 103, 105, 106)
. *Pardosa dorsalis* and *Pardosa uncata*

Note.—Females of *P. dorsalis* and *P. uncata* cannot be identified unless collected with males. In fact, it is difficult to separate females of *P. dorsalis*, *P. dorsuncata*, and *P. uncata* because the copulatory tubes are difficult to see without dissection. Furthermore, the range of *P. dorsuncata* and *P. dorsalis* are almost completely congruent, and both share much of the range of *P. uncata*. Individual variation in epigynal structure within a species probably exceeds variation between these species.

Males

1. Carapace dark without discrete median pale area 2
Carapace with tan median band or at least a defined pale area 3
2. Body length < 5 mm; spider collected in Colorado; palp as in Fig. 108
. *Pardosa gothicana*
Body length > 6 mm; spider collected in the Pacific Northwest; palp is in Fig. 109
. *Pardosa rainieriana*
3. Median apophysis spatulate, tip rounded, wider than base; spider collected in interior California (Fig. 110) *Pardosa hetchi*
Tip of median apophysis truncate, with blunt point, not wider than base 4
4. Distal half of embolus thin, hair-like (Figs. 111–113) 5
Distal half of embolus flattened, tapering but not hair-like (Figs. 114–15) 7
5. Tip of median apophysis truncate, erose (Fig. 111) *Pardosa mackenziana*
Tip of median apophysis pointed or blunt with off-center point 6
6. Median apophysis 3 to 4 times as long as basal spur (Fig. 112) *Pardosa dorsalis*
Median apophysis not more than twice as long as basal spur (Fig. 113) *Pardosa uncata*
7. Tip of embolus flat and curved 360 degrees like a corkscrew (Fig. 114) *Pardosa uintana*
Tip of embolus flat and only slightly curved (Fig. 115) *Pardosa dorsuncata*



Figures 96–106.—Epigyna of *Pardosa*, nigra group. 96. *P. uintana*. 97. *P. gothicana*. 98. *P. hetchi*. 99. *P. rainieriana*. 100. *P. mackenziana*. 101. *P. dorsuncata*. 102. *P. dorsalis*. 103. *P. uncata*.
 Figures 104–106.—Epigyna, posterior view. 104. *P. dorsuncata*. 105. *P. dorsalis*. 106. *P. uncata*.

Pardosa dorsalis Banks 1894

Figs. 102, 105, 112; Map 10

Diagnosis.—The lateral swellings of the epigynal plate do not extend basal of the expanded base of the septum. The expanded base is somewhat rectangular and covered with transverse wrinkles. In posterior view, the copulatory tubes are coiled but *P. dorsalis* cannot be distinguished from *P. uncata*. The embolus of the male palp is whip-like in distal half. The median apophysis is three to four times longer than basal spur. The long slender terminal apophysis is untoothed.

Distribution.—Washington, Oregon, Idaho, Montana, Wyoming, Utah, Colorado, Arizona; Canada (Lowrie & Dondale 1981: map 5).

Pardosa dorsuncata Lowrie & Dondale

1981

Figs. 101, 104, 115; Map 10

Diagnosis.—Spiders are light reddish-brown, and the median area on the abdomen is yellow ochre. The lateral swellings of the epigynal plate do not extend basal of the expanded base of the septum. The expanded base is somewhat rectangular and covered with transverse wrinkle. In posterior view the copulatory tubes are broad and not looped. The embolus of the male palp is flattened and its tip is curved only slightly. The median apophysis is blunt and the tip slightly widened. The terminal apophysis is very slender and minutely toothed.

Distribution.—Arizona, California, Colorado, Montana, Oregon, Utah, Washington, Wyoming; Canada, Alaska (Lowrie & Dondale 1981: map 2; pers. obs.).

Pardosa gothicana Lowrie & Dondale 1981

Figs. 97, 108; Map 10

Diagnosis.—The body length of females is 4.5–5.5 mm, and the body length of males 3.5–4.5 mm. The body is dark brown. The carapace and abdomen are without pale median areas. The epigynum is narrow. The lateral swellings are approximately parallel and bulbous. They extends basally slightly more than the expanded base of the septum. The embolus of the male palp is flattened and not whip-like. The tip of the median apophysis is somewhat blunt and erose. The palpal mor-

phology is very similar to that of *P. rainieriana*.

Remarks.—*Pardosa gothicana* is smaller than *P. rainieriana*, and the two species are geographically separated. *Pardosa gothicana* has been collected only in Colorado and *P. rainieriana* is found in the Pacific Northwest.

Distribution.—Colorado (Lowrie & Dondale 1981: map 3).

Pardosa hetchi Chamberlin and Ivie 1942

Figs. 98, 110; Map 11

Diagnosis.—The spider is brown to reddish brown. The median band on the carapace is somewhat hourglass shaped, and the lateral pale bands are broken. The abdomen is brown marked with black. Males are darker than females. The transverse base of the epigynal septum is not strongly wrinkled and is lobed laterally. The diverging lateral swellings droop around these lobes. The median apophysis of the male palp is spatulate, wider at the tip than at the base. The embolus is flattened, but narrowed at the tip. The terminal apophysis is also widened at the tip and toothed.

Distribution.—California (Lowrie & Dondale 1981: map 3).

Pardosa mackenziana (Keyserling 1877)

Figs. 100, 111; Map 11

Diagnosis.—These spiders are large, the female body length is 7.4–8.6 mm, the male's is 6.0–7.1 mm. The epigynum is as wide as long. The lateral swellings diverge basally and extend to the basal edge of the septum. Additionally, the lateral swellings extend apically along the septum. The expanded base is more or less rectangular. The median apophysis of the male palp tapers slightly to the tip, which is blunt, and erose with irregular teeth. The distal half of the embolus is whip-like. The terminal apophysis has minute teeth.

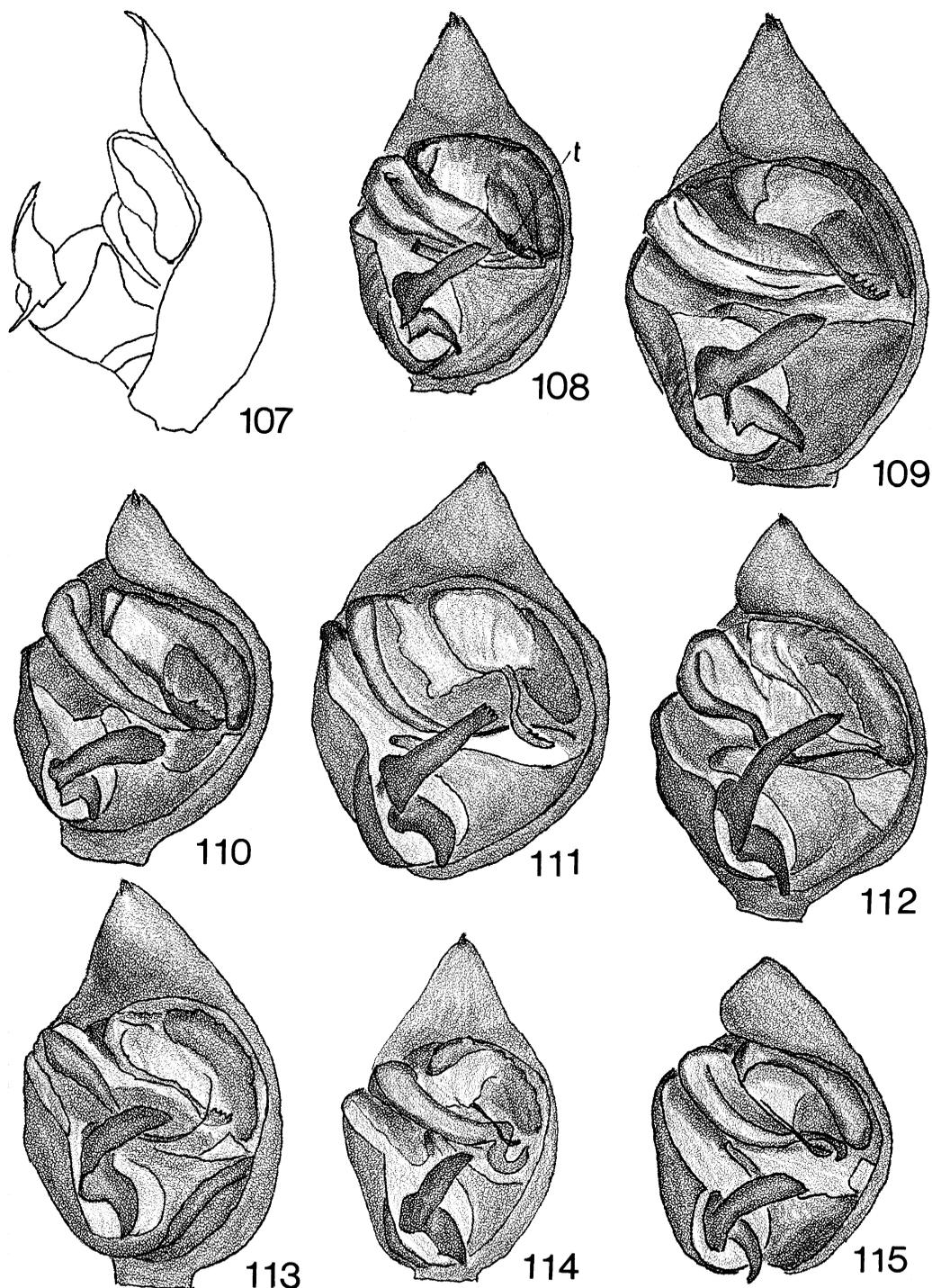
Remarks.—This species is common in dryish forests and is widely distributed.

Distribution.—Washington, Oregon, California, Idaho, Montana, Wyoming, Colorado, south Dakota, Minnesota, Wisconsin, Michigan, Connecticut, Rhode Island, Massachusetts, Maine; Canada, Alaska (Lowrie & Dondale 1981: map 4).

Pardosa rainieriana Lowrie & Dondale

1981 Figs. 99, 109; Map 11

Diagnosis.—The color of *P. rainieriana* ranges from dark brown to light brown. Fe-



Figures 107–115.—Palpi of *Pardosa*, nigra group. 107. *P. uncata*, lateral view. Figs. 108–115. Distroventral view. 108. *P. gothicana*. 109. *P. rainieriana*. 110. *P. hetchi*. 111. *P. mackenziana*. 112. *P. dorsalis*. 113. *P. uncata*. 114. *P. uintana*. 115. *P. dorsuncata*. t, terminal apophysis.



Map 11.—State records for *P. hetchi* (*), *P. mackenziana* (☼), *P. rainieriana* (◊), *P. uintana* (★).

male body length is 8–9 mm, male body length is 7–8 mm. The epigynum is longer than wide. The lateral swellings diverge basally. They extend to the edge of the expanded base of the septum, and at the lateral margin of the epigynum turn abruptly and extend apically for a short distance. The median apophysis of the male palp is broad with a somewhat blunt tip. The basal spur is broad and only slightly curved. The embolus is broad and flat. The terminal apophysis is slender with a toothed tip.

Remarks.—This species is the largest in the nigra group. The palpal morphology of *P. rainieriana* is very similar to *P. gothicana* but size and geography separate them.

Distribution.—Oregon, Washington; Canada (Lowrie & Dondale 1981: map 3).

Pardosa uintana Gertsch 1933
Figs. 96, 114; Map 11

Diagnosis.—Some of the darker brown spiders have conspicuous annulations on the femora. Females of *P. uintana* are the only species in the group in which the lateral swellings of the epigynum converge basally. The male palp is also unique in the group. The tip of the embolus has a 360 degree curve like a corkscrew.

Distribution.—Washington, Oregon, Wyoming, Utah, Colorado, Vermont, New Hampshire, Maine; Canada, Alaska (Lowrie & Dondale 1981: map 1).

Pardosa uncata (Thorell 1877)
Figs. 103, 106, 107, 113; Map 10

Diagnosis.—This species is a brown spider with a median pale area on carapace and the lateral bands are represented by yellow ochre blotches. The lateral swellings of the epigynum of *P. uncata* diverge basally but do not extend as far as the basal edge of the expanded base of the septum. The expanded base is rectangular and strongly wrinkled. In posterior view the copulatory tubes are slender and coiled, as in *P. dorsalis*. The median apophysis of the male palp is short, not more than two times the length of the stout basal spur. The distal half of the embolus is whip-like. The tip of the terminal apophysis is toothed.

Remarks.—Females of *P. uncata* and *P. dorsalis* are not distinguishable. They are also very similar to *P. dorsuncata*, but differ in the copulatory tubes, which are not looped in the latter species.

Distribution.—Montana, Utah, Colorado, Arizona, New Mexico (Lowrie & Dondale 1981: map 6; pers. obs.).

Saltuaria Group

Remarks.—The saltuaria group consists two species in the United States, one of which is Holarctic, and four Palearctic species. The septum and hood are nearly as wide as the

epigynum. The cavities open laterally. The median apophysis of the male palp is short, lumpish, and rounded apically. The short straight basal spur arises ventrally and is directed basally. The palea is mostly sclerotized.

KEYS TO USA SPECIES OF THE SALTUARIA GROUP

Females

- 1. Hood broadly rounded, with center apical to ends, rim continuous; median rim of cavities C-shaped; basal corners of septum curve apically into cavities; cavity sclerites lacking (Fig. 116) *Pardosa californica*
 Apical rim faint in mid portion giving appearance of paired hoods; basal corners of septum not curving into cavities; small triangular cavity sclerites situated on lateral edges of septum (Fig. 117) *Pardosa hyperborea*

Males

- 1. Median apophysis wider than long, short basal spur directed basally; tegular lobe is situated laterally (Fig. 118) *Pardosa californica*
 Median apophysis is longer than wide, short basal spur directed basally; tegular lobe is situated medially (Fig. 119) *Pardosa hyperborea*

Pardosa californica Keyserling 1887
 Figs. 116, 118; Map 12

Diagnosis.—The colors are strongly contrasting, brown and yellow. The median band on the carapace is somewhat hourglass shaped and the lateral bands are conspicuous. The femora are reddish brown and yellow. The cavities of the epigynum open laterally with no thickened lateral rim, but with a C-shaped median rim. The lateral corners of the expanded base of septum curve into cavities. The median apophysis of the male palp is wider than long and the tegular lobe is situated laterally.

Distribution.—Oregon, California, Idaho, Nevada, Utah; Mexico (Dondale & Redner 1987: map 7).

Pardosa hyperborea (Thorell 1872)
 Figs. 117, 119; Map 12

Diagnosis.—Female *P. hyperborea* is a yellowish spider with tan darker markings. The median band on the carapace is very narrow. The abdomen is tan and the legs are yellow without distinct markings. Males are somewhat darker, tan with brown markings. The basal corners of the expanded base of the epigynal septum are rounded. Small triangular cavity sclerites project from the sides of the septum. The median apophysis of the male

palp is longer than wide and the tegular lobe is situated medially.

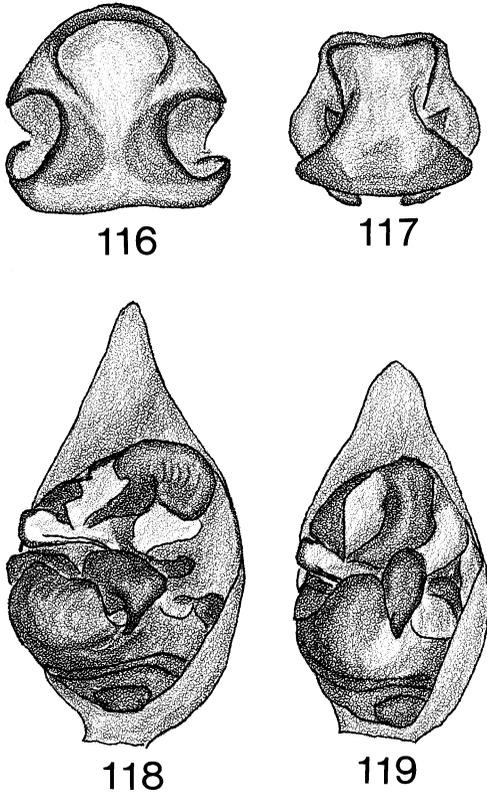
Distribution.—Wyoming, Michigan, New York, Vermont, New Hampshire, Maine; Canada, Palearctic (Dondale & Redner 1987: map 6).

Sternalis Group

Remarks.—The sternalis group consists of six species west of the Mississippi River, and one species south of the Tropic of Cancer. These are among the smaller of *Pardosa* species, with body length of 5–8 mm. The cephalothorax usually has five longitudinal bands unless the spider is dark. The abdomen may have five pairs of light spots posterior to the diamond mark.

The apical part of the septum is a raised ridge ending in a small hood at the margin of the epigynum. Paired oval cavities no greater than 1/3 the length of the plate occur in four of the six species. In these, the septum has an anchor-shaped base and is not wider than a cavity. In *P. orthodox* the cavity is longer and in *P. tuoba* the septum is wider. All six lack cavity sclerites.

The embolus of the male palp curves apically in a slender semicircular arch behind the median apophysis and ends in a thin tip. The median apophysis is long, and somewhat slen-



Figures 116–119.—Genitalia of *Pardosa*, saltatoria group. Figs. 116–117. Epigyna. 116. *P. californica*. 117. *P. hyperborea*. Figs. 118–119. Palpi. 118. *P. californica*. 119. *P. hyperborea*.

der. It gently curves to the edge of the cymbium or beyond. The basal spur is short, curved ventrally, the tip pointed or truncate. The terminal apophysis is a slender pointed finger or a knob near the end of the embolus. The palp is similar to the falcifera group palp. Males of the falcifera group bear feathery brushes of fine hair on tarsus and metatarsus I, which sternalis group males lack.

The similarity of epigynal and palpal morphology among the six species in the sternalis

group makes difficulties in identifying individuals using genital characters. For the most part, the species occupy different ranges, but there are overlap zones. It is in these zones that species may not be identified with certainty.

Pardosa altamontis ranges from the Pacific Northwest to the Rocky Mountain states. *Pardosa sternalis* is widespread and common in the Rocky Mountain states south into Mexico. *Pardosa vancouveri* occurs in the coastal Pacific Northwest. *Pardosa altamontis* overlaps with *P. sternalis* and may overlap with *P. vancouveri*. Tarsus I, which is swollen in *P. vancouveri* males, separates them from all the other males. The entire dorsum of the cymbium is dark or black in *P. altamontis*, but the tip is always light in *P. sternalis*. Females of these species in overlap zones cannot be identified unless they are collected with males.

Pardosa orthodox occurs in Arizona but is not common. It may overlap with *P. sternalis* and *P. ramulosa*, but *P. orthodox* has distinctive genitalia. The epigynal septum nearly covers the cavities and the tip of the median apophysis is wide not pointed.

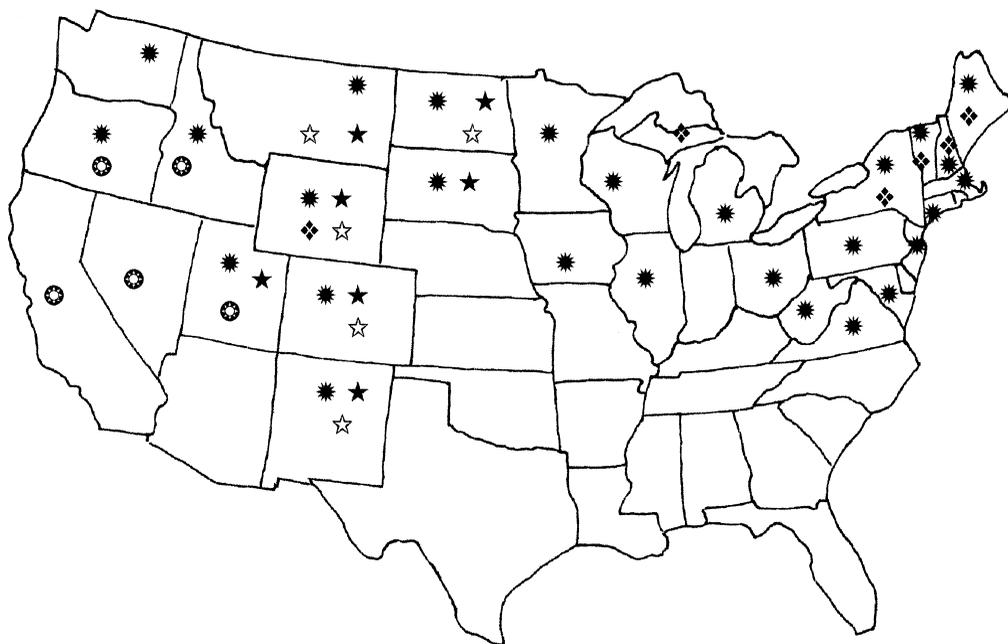
Pardosa tuoba is found in California at lower elevations and is almost entirely sympatric with *P. ramulosa*. The width of the epigynal septum distinguishes *P. tuoba*. The palpal structures do not separate the males, but the cymbium of *P. ramulosa* is narrow with a slender tip, while the cymbium of *P. tuoba* is quite wide.

Pardosa ramulosa occurs in California and Nevada and may overlap with *P. sternalis* in the Southwest. Neither palpal morphology nor external epigynal morphology can be used to separate these species, but internal epigynal morphology supports the validity of separate species. The seminal receptacle of females in southern California is bilobed, but in Colorado females the seminal receptor has a single lobe. Dissection is required to view this.

KEYS TO USA SPECIES OF THE STERNALIS GROUP

Females

1. Median septum with anchor-shaped base and not wider than a cavity (Figs. 121–125) 2
 Median septum rectangular and nearly covering cavities (Fig. 120) *Pardosa tuoba*
2. Cavities at least 1/2 the length of epigynal plate; apical end of cavity steeply slanting medially (Fig. 121) *Pardosa orthodox*
- Cavities roundish, less than 1/3 the length of epigynal plate (Figs. 122–125) 3

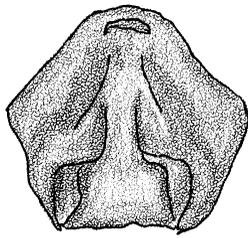


Map 12.—State records for *P. californica* (*), *P. hyperborea* (◆), *P. mulaiki* (☆), *P. tesquorum* (★), *P. xerampelina* (☼).

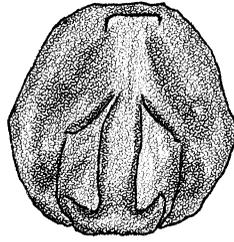
- 3. Spider collected in California, Nevada or Baja California; epigynum as in Fig. 122 *Pardosa ramulosa*
 Spider collected in other states (Figs 123–125) 4
- 4. Spider collected in coastal Oregon or Washington or with males of *P. vancouveri*; epigynum as in Fig. 123 *Pardosa vancouveri*
 Spider collected in the Cascade Mountains or anywhere east of the Cascades 5
- 5. Spiders collected in central Oregon or Washington, or west of the Continental Divide in Colorado, Idaho, Montana, Utah, or Wyoming; epigynum as in Fig. 124 *Pardosa altamontis*
 Note.—Females cannot be identified with certainty unless collected with males. Spiders collected in Arizona, Colorado, New Mexico, Utah, or east of the Continental Divide in Montana or Wyoming; epigynum as in Fig. 125 *Pardosa sternalis*

Males

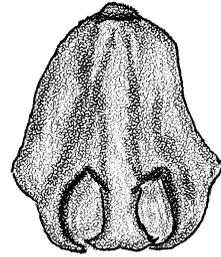
- 1. Tarsus I slender, no different than other tarsi (Fig. 126) 2
 Tarsus I swollen, thicker than tarsi of other legs (Fig. 127); palp as in Fig. 128 *Pardosa vancouveri*
- 2. Tip of median apophysis somewhat flared and truncate (Fig. 129) *Pardosa orthodox*
 Tip of median apophysis pointed (Figs. 130–133) 3
- 3. Tip of cymbium dorsally paler than base; palp as in Fig. 130 *Pardosa sternalis*
 Tip of cymbium dark throughout, may have brush of dark hair 4
- 4. Spider collected in Idaho, Utah or west of the Continental Divide in Colorado, Montana or Wyoming; palp as in Fig. 131 *Pardosa altamontis*
 Spider collected elsewhere 5
- 5. Tip of cymbium quite narrow; tibia of pedipalp unmarked or with 1 or 2 dark patches (Fig. 132) *Pardosa ramulosa*
 Tip of cymbium wide; tibia of pedipalp dark, clothed with dark hair (Fig. 133) *Pardosa tuoba*



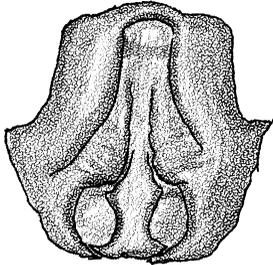
120



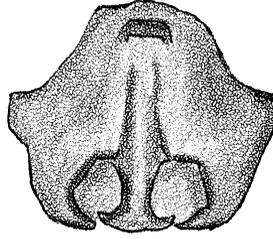
121



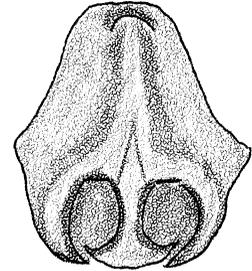
122



123



124



125

Figures 120–125.—Epigyna of *Pardosa*, sternalis group. 120. *P. tuoba*. 121. *P. orthodox*. 122. *P. ramulosa*. 123. *P. vancouveri*. 124. *P. altamontis*. 125. *P. sternalis*.

Pardosa altamontis Chamberlin & Ivie 1946
Figs. 124, 131; Map 13

Diagnosis.—Genitalia are not useful in identification. The cymbium is entirely dark dorsally.

Distribution.—Washington, Oregon, Idaho, Montana, Wyoming, Utah; Canada (Dondale & Redner 1990: map 42; Vogel 1970a: 18, fig. 89).

Pardosa orthodox Chamberlin 1924
Figs. 121, 129; Map 13

Diagnosis.—The epigynal cavities more than 1/2 the length of epigynum with the apical edge slanting basally from the septum. The median apophysis of the male palp is wide at the tip.

Remarks.—This species is not common.

Distribution.—Utah, Arizona; Mexico (Vogel 1970a:18, fig. 89).

Pardosa ramulosa (McCook 1884)
Figs. 122, 131; Map 13

Lycosa ramulosa McCook 1884: pl.30, figs. 5, 6 (no verbal description); Gertsch 1934:23 (= *Pardosa sternalis*)

Pardosa peninsulana Banks 1898:274; Gertsch

1934:23 (= *Pardosa sternalis*); Vogel 1970a:12 (= *Pardosa ramulosa*).

Pardosa ramulosa (McCook 1884): Vogel 1970a: 12.

Diagnosis.—Location is more useful for identification than genital morphology.

Distribution.—California, Nevada, Utah; Mexico (Vogel 1970a:12, fig. 89).

Pardosa sternalis (Thorell 1877)
Figs. 125, 127, 130; Map 13

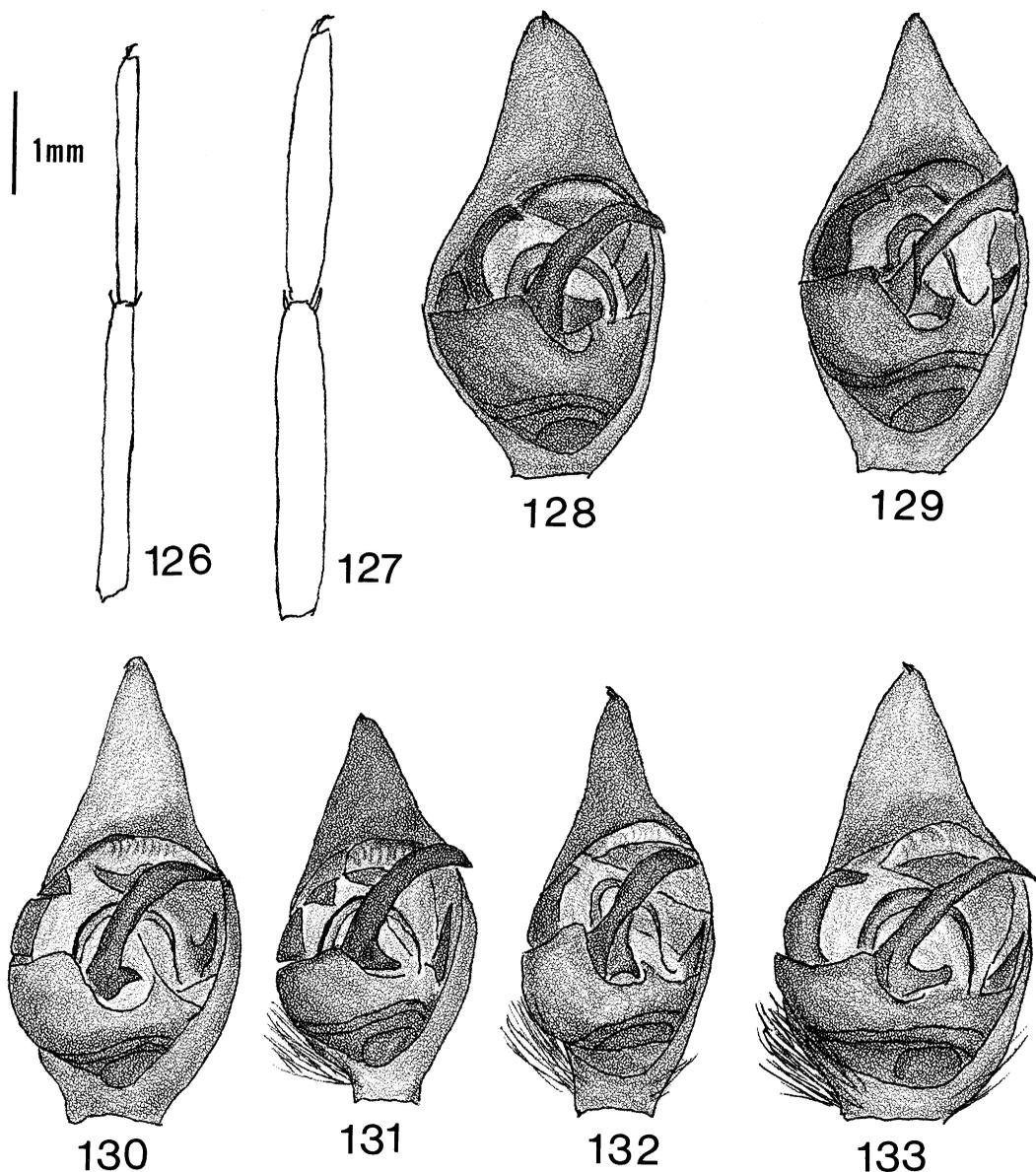
Diagnosis.—Location is more useful for identification than genital morphology.

Remarks.—This species is extremely common and abundant on wet meadows, stream sides, and lawns.

Distribution.—California, Idaho, Montana, Wyoming, Utah, Colorado, Arizona, New Mexico, Nebraska, Kansas, Texas; Alberta to Central Mexico (Dondale & Redner 1990: map 24; Vogel 1970a: 16, fig 89).

Pardosa tuoba Chamberlin 1919
Figs. 120, 133; Map 13

Diagnosis.—Females can be identified by the basal portion of the septum which is wide enough to nearly cover the cavities. The cym-



Figures 126–133.—Males of *Pardosa*, sternalis group. 126. *P. sternalis*, tarsus and metatarsus I. 127. *P. vancouveri*, tarsus and metatarsus I. Figs. 128–133. Palpi. 128. *P. vancouveri*. 129. *P. orthodox*. 130. *P. sternalis*. 131. *P. altamontis*. 132. *P. ramulosa*. 133. *P. tuoba*.

bium of the male palp is very wide and the tip is stout.

Remarks.—*Pardosa tuoba* occurs at low elevations, perhaps under 500'. They are almost entirely sympatric with *P. ramulosa*.

Distribution.—California (Vogel 1970a: 20, fig. 83).

Pardosa vancouveri Emerton 1917

Figs. 123, 127, 128; Map 13

Diagnosis.—The epigynum does not separate females from other species. Males of *P. vancouveri* can be distinguished by the thickened “club foot” of tarsus I.



Map 13.—State records for *P. altamontis* (★), *P. orthodox* (◆), *P. ramulosa* (☆), *P. sternalis* (*), *P. tuoba* (⊛), *P. vancouveri* (⊘).

Remarks.—This species is found in marshes, grasslands, and meadows at low elevations.

Distribution.—Oregon, Washington; British Columbia (Dondale & Redner 1990: map 24; Vogel 1970a:20, fig. 89).

Tesquorum Group

Remarks.—The tesquorum group consists of two species in the USA (one Nearctic and one Holarctic), and possibly two Palearctic species. The cephalothorax usually has five longitudinal bands except in dark spiders. The

abdomen may have five pairs of light spots posterior to the diamond mark. The epigynum is longer than wide. The cavities partially covered by lateral expansions of the septum. The apical part of the septum is slender and straight. A small pair of hoods flank the septum. The male palp is compact. The median apophysis is stout, curved and extends only halfway to the cymbium. The basal spur is short, narrow, and pointed. The tip of the embolus is slender. All segments of the pedipalp are dark except the patella which is a pale color.

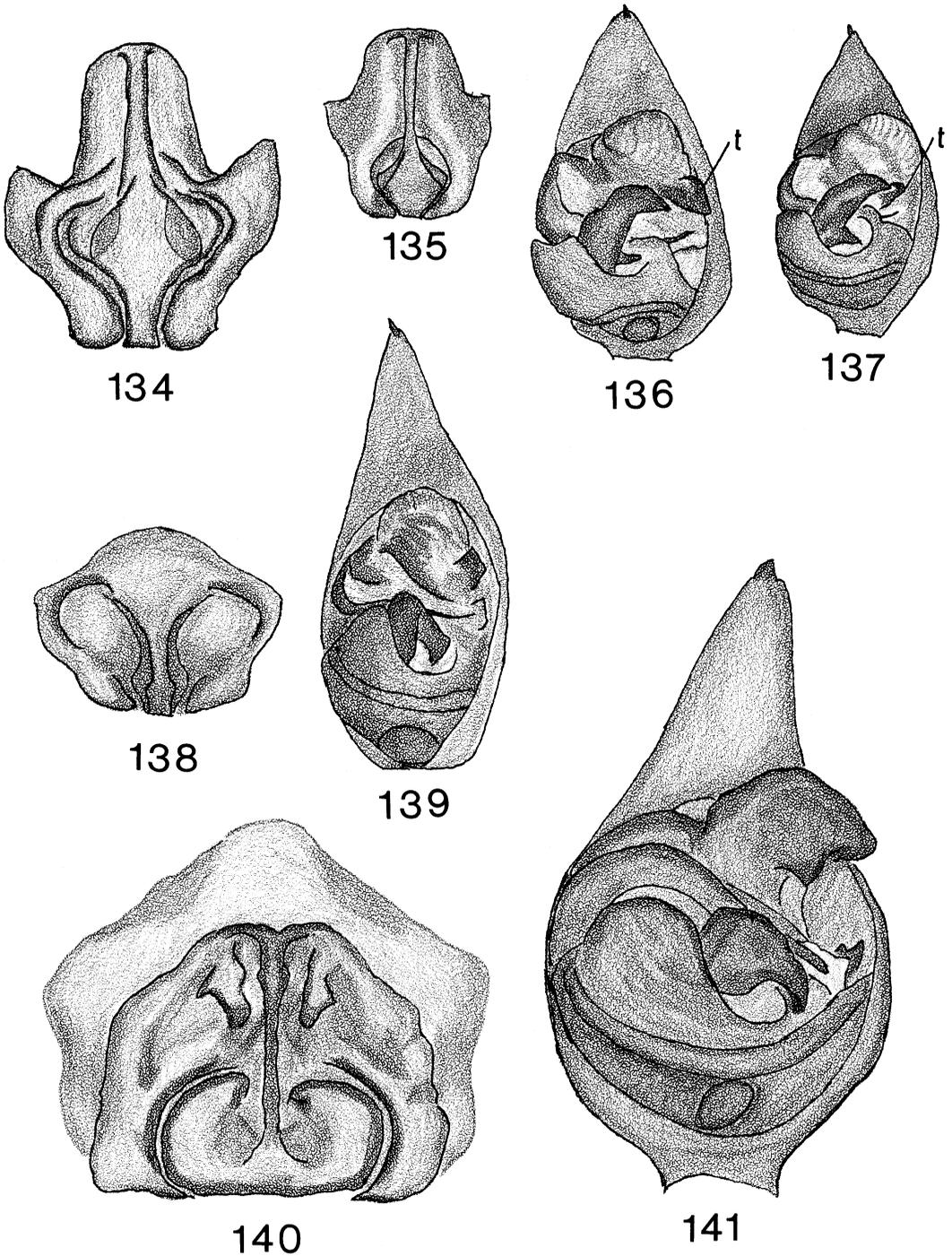
KEYS TO USA SPECIES OF THE TESQUORUM GROUP

Females

- 1. Epigynum with wide lateral wings; septum with a basal pedicel and lateral expansions nearly covering the cavities; septal pockets oval (Fig. 134) *Pardosa tesquorum*
- Epigynum with small lateral wings; septum lacks pedicel basal to expansions; septal pockets triangular (Fig. 135) *Pardosa mulaiki*

Males

- 1. Median apophysis stout with a right angle bend, ending in a point; terminal apophysis broad and flat (Fig. 136) *Pardosa tesquorum*
- Median apophysis stout and curved, but not a right angle bend; terminal apophysis small with a rounded tip (Fig. 137) *Pardosa mulaiki*



Figures 134–141.—Genitalia of *Pardosa*. Figs. 134–137. *Pardosa*, tesquorum group. 134. Epigynum of *P. tesquorum*. 135. Epigynum of *P. mulaiki*. 136. Palp of *P. tesquorum*. 137. Palp of *P. mulaiki*. t, terminal apophysis.

Figures 138–139.—*Pardosa*, xerampelina group, *P. xerampelina*. 138. Epigynum. 139. Palp.

Figures 140–141.—*Acantholycosa solituda*. 140. Epigynum. 141. Palp.

Pardosa mulaiki Gertsch 1934

Figs. 135, 137; Map 12

Diagnosis.—Lateral bands of the carapace on the female are wide, but mostly obscured on the male. The median band on the male is limited to the posterior half of the carapace. Females of *P. mulaiki* lack a pedicel on the septum basal to the expanded portion. Males of *P. mulaiki* differ from *P. tesquorum* by the short rounded terminal apophysis.

Distribution.—Montana, Wyoming, Colorado, New Mexico, North Dakota; Canada (Dondale & Redner 1986: map 9; pers. obs.).

Pardosa tesquorum (Odenwall 1901)

Figs. 134, 136; Map 12

Diagnosis.—*Pardosa tesquorum* is brown and light brown, with pale legs. The epigynum *P. tesquorum* differs from *P. mulaiki* by the basal pedicel of the septum. Males of *P. tesquorum* are distinguished by the broad flat terminal apophysis.

Distribution.—Montana, Wyoming, Utah, Colorado, New Mexico, South Dakota, North Dakota; Canada, Alaska, eastern Siberia (Dondale and Redner 1986: 827, map 8).

Xerampelina Group

Remarks.—The xerampelina group consists of one species in North America, two more in Canada and Alaska, and one Palearctic species. The apical end of the epigynum is smoothly domed, without a hood. The cavities are oval, diverging apically. The septum is somewhat narrow basally and widens apically to edge of epigynum. The male palp is long and slender with the apical portion of the cymbium more than 1/2 the length of the bulb. Median apophysis is short, stout and blunt. The spur arises apically rather than basally.

Pardosa xerampelina (Keyserling 1887)

Figs. 138, 139; Map 12

Diagnosis.—The genitalia are as described above.

Distribution.—Across the northern tier from the Pacific coast to New England; Canada, Alaska: (Dondale & Redner 1986: map 5).

Genus *Acantholycosa* Dahl 1908

Remarks.—The genus *Acantholycosa* consists of 13 species in Europe and Asia and one

in North America. The spiders in this genus closely resemble *Pardosa* in appearance, especially the shape of the cephalothorax and slenderness of the legs. The distinguishing feature is the number of spines, 5–7, on the ventral side of tibia I.

Solituda Group

Remarks.—The solituda group consists of one species in North America and a closely related Palearctic species. The central part of the epigynum is strongly sculptured. The base of the septum is about 1/4 the length of the septum. The apical 3/4 of the septum is slender, and flanked by a pair of hoods at the rim. The base of the septum is more than 1/2 the width of the epigynum with large bulbous lobes laterally, filling in the cavities. The lateral swellings are strongly sclerotized and closely apposed to the basal lobes of the septum. There is an apical pair of ridges flanking the septum. The strongly sculptured central part of the epigynum is surrounded laterally and apically by a lightly sclerotized plate. The part of the cymbium surrounding the bulb is nearly circular with the tip much narrower. The median apophysis is short, stout, and rounded apically. The spur arises apically and is directed basally. The palea bears a large sclerotized process, larger than the median apophysis. It protrudes from the cymbium and curves basally with a shallow notch in the wide end. The embolus is wide at the base tapering distally.

Acantholycosa solituda (Levi & Levi 1951)*Pardosa solituda* Levi & Levi 1951: 225–226, figs. 11, 16.*Acantholycosa solituda* (Levi & Levi): Kronstedt & Marusik 2002:63

Figs. 140, 141.

Diagnosis.—The carapace is brown, lateral bands are faint. The abdomen is dark gray with a brown diamond mark apically. The epigynum and palp are as described for the group.

Remarks.—Occurs at high elevations, above timberline, in talus.

Distribution.—Montana, Wyoming, Utah, Colorado; Canada [Kronstedt & Marusik 2002:65, 66]; pers. obs.].

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