

Bulletin OF THE
Museum of
Comparative
Zoology

S-NA-C [Cambridge]

MUS. COMP. ZOOL.
LIBRARY

FEB 25 1966

HARVARD
UNIVERSITY,

Italian Wolf Spiders of the Genus *Pardosa*
(Araneae: Lycosidae)

by PAOLO TONGIORGI

Museum of Comparative Zoology, Cambridge, Massachusetts
Istituto di Biologia Generale, Università di Pisa, Italy

HARVARD UNIVERSITY
CAMBRIDGE, MASSACHUSETTS, U.S.A.

VOLUME 134, NUMBER 8
FEBRUARY 25, 1966

S - NA = C [unclear]

MUS. COMP. Zool.
LIBRARY

FEB 25 1966

HARVARD
UNIVERSITY.

ITALIAN WOLF SPIDERS OF THE GENUS *PARDOSA* (ARANEAE: LYCOSIDAE)

PAOLO TONGIORGI

We owe to Giovanni Canestrini and Pietro Pavesi the first accurate work on Italian spiders. Their memoir was presented at the Congresso dei Naturalisti Italiani in Vicenza in 1868, and was published in *Atti della Società italiana di Scienze naturali* in Milan under the title "Araneidi Italiani." This work records 404 species, 38 of which belong to the family Lycosidae. Among these are only 12 species of *Pardosa*, just one-third of the *Pardosa* species known at present for the Italian spider fauna. During the ensuing years, the largest harvest of information on the Italian spider fauna has been gathered by L. Di Caporiacco (1922-1953) and some recent foreign authors who have made further contributions. These authors have very often limited themselves to compilation of faunal lists concerning more or less limited areas of the peninsula. There are hardly any works on single taxonomic groups. My attempt to satisfy the need for work on the spiders of the genus *Pardosa* has not been easy and is still far from furnishing a true picture of Italian species. In particular, the data on the geographical distribution of different species are scanty and doubtful. Often we have little or no information about the species of certain regions that are of interest because of their geographical position and past geological events—Sicily for example. One of the greatest difficulties in attempting to reconstruct a reliable picture of Italian distribution of *Pardosa* results from the inability to

check the numerous records. Most of the collections are lost or their present locations are unknown. Other collections, such as the spiders of Carnia collected and identified by Di Caporiacco (1922, 1927), revealed a very high number of errors or identifications based on juvenile specimens. The same specific name was sometimes used for different species so it is impossible to know which species the older authors intended. Among the Italian species of the genus *Pardosa* I have included those found near the political boundaries of Italy, where there are no ecological or geographical reasons that would exclude them. That these species are not found in Italy probably can be ascribed to lack of collecting rather than to their real absence.

As a general rule the descriptions and drawings were made from specimens collected in Italy. When that was impossible, I used specimens from the localities nearest to Italy; in all cases I have indicated where the specimens were collected. In this way I was able to examine and make original drawings of specimens of all the species. The present study used mainly specimens I collected myself and material coming from the collections of Museo Civico di Storia Naturale, Genova (MSNG), Museum of Comparative Zoology, Cambridge (MCZ), and Museo di Storia Naturale, Firenze (MSNF). Other specimens were borrowed from the following collections: Istituto di Zoologia dell'Università, Padova (Collection

Canestrini) (IZUP); Muséum d'Histoire Naturelle, Genève (MHNG); Muséum National d'Histoire Naturelle, Paris (MNHN); Museo di Storia Naturale, Verona (MSNV); Naturhistoriska Riksmuseet, Stockholm (RMS); Senckenberg Museum, Frankfurt (SMF); and Professor P. Zangheri's Romagna arachnids (Forlì) (CZ). When necessary the types of the species were examined.

I want to express my thanks to the following for having made specimens available: Prof. V. Baldasseroni, Florence; Dr. L. Brundin, Stockholm; Dr. H. Gisin, Geneva; Dr. A. Holm, Uppsala; J. H. Jézéquel, Paris; Dr. O. Kraus, Frankfurt; Prof. G. Marcuzzi, Padua; Prof. S. Ruffo, Verona; Prof. E. Tortonese, Genoa; Prof. M. Vachon, Paris; Prof. P. Zangheri, Forlì. Also I want to express my thanks to Dr. G. Lugetti (Pisa) whose help was very useful for the bibliographic researches and the discussion of some problems. I want particularly to thank Dr. H. W. Levi and Mrs. L. Levi for the really valuable encouragement, advice and help they constantly gave me in the preparation of the present paper. A Fulbright travel grant and a grant by the Evolutionary Biology Committee of the Biology Department of Harvard University supported this research. National Institutes of Health grant AI-01944 to Dr. H. W. Levi helped defray some expenses involved in this study. I would like to express my gratitude also to the Consiglio Nazionale delle Ricerche (CNR) for support of my studies.

Routinely, the drawings of the left male palpus illustrate the ventral and ventrolateral views. In the ventrolateral view the palpus is rotated about 60°, a position that shows the terminal apophysis equally well in all species. The terms tegular and terminal apophysis are used according to Holm (1947). While the tegular apophysis is homologous in all species, the terminal apophysis does not originate always from the same piece (Fig. 1). The different parts of the epigynum are illustrated on Figure 2. Only the external view of the

male genitalia was drawn. Since the body pattern may be a helpful and distinctive character for the females, this was illustrated for some species. For each group of species that has a similar body pattern it was illustrated only once. The descriptions of the patterns are mainly based on female specimens as the patterns of the males are similar but often darker and less distinct; when the male differs in some character, it is pointed out. When possible, specimens were selected to represent the mean of the specific variability. When considerable variability occurred I provided more than one drawing. All drawings were made with the specimens submerged in 80 per cent alcohol under a dissecting microscope provided with a reticule grid in the ocular.

Generally, the Italian species of the genus *Pardosa* are not difficult to identify, except those of the *P. monticola* group. More information about this group and its relationships with the species not belonging to the Italian fauna will be published in a separate paper (Tongiorgi, 1965). For each species I listed the original reference. Only when I changed the synonymy were other references listed. For additional sources consult the bibliographic works of Bonnet (1958), and Roewer (1954). In the descriptions of species only characters useful for identification are discussed. I could not check most of the records because, as I mentioned above, the animals were often not preserved, or were lost, or for the greater part of Di Caporiacco's collections, labels in the vials were not clear. Concerning the Italian distribution of each species, I have deliberately omitted all data that I have been unable to check personally. The distribution that could be constructed from this group of data must be considered only a tentative one. In fact, many records, in particular those of Di Caporiacco, are scarcely reliable. For example, among the *Pardosa* from Romagna of Zangheri's collection, determined by Di Caporiacco, only the specimens of three vials were correctly identified. Thus the list of localities gives only those from which

I could examine specimens, the name of the collectors, and where the specimens are now deposited. If there are no such indications, the specimens are collected by me and kept in my own collection. I have indicated for each species where the type is preserved. The geographical distributions outside Italy are taken from the compilations of Bonnet (1958) and Roewer (1954) and may not be accurate.

Key to Italian species of genus PARDOSA

1. Males	2
- Females	41
2. Tegular apophysis as in Figures 100-118, terminal apophysis variable. (The species belonging to <i>P. monticola</i> group constitute a homogeneous group) (<i>P. monticola</i> group)	3
- Tegular apophysis different	12
3. Tarsi, metatarsi and part of tibiae of first pair of legs covered with long hairs (Fig. 106), much longer than on the corresponding segment of other legs. Terminal apophysis beak-like (Figs. 104-105)	
..... <i>P. mixta</i>	
- Tarsi, metatarsi and tibiae of first pair of legs with hairs as long as those on other legs	4
4. Terminal apophysis large, well developed, more or less pointed, and jagged at the apical end (Figs. 102, 103)	<i>P. palustris</i>
- Terminal apophysis small and different ...	5
5. Terminal apophysis with two small blunt teeth (Figs. 107, 108), median light band of carapace dilated in front	<i>P. agricola</i>
- Terminal apophysis with one tooth only or without teeth	6
6. Median light band of carapace dilated in front, lateral band broken	7
- Median light band dilated or pointed, lateral bands continuous	8
7. Terminal apophysis pointed, with a stout tooth (Figs. 109, 110)	<i>P. torrentum</i>
- Terminal apophysis without tooth (Figs. 100-101)	<i>P. agrestis</i> (part.)
8. Median light band of carapace dilated anteriorly (Fig. 95), terminal apophysis without tooth	<i>P. agrestis</i> (part.)
- Median light band pointed anteriorly (Fig. 96)	9
9. Terminal apophysis without tooth	
..... <i>P. agrestis</i> (part.)	

- Terminal apophysis stout, more or less tooth-shaped	10
10. Segments of male palpus without white hairs, terminal apophysis small and slender, tegular apophysis generally long and rather pointed (Figs. 111, 112) ..	<i>P. monticola</i>
- Segments of male palpus more or less covered with white hairs	11
11. Femur, patella, tibia and part of tarsus with white hairs; palpus as in Figures 117, 118	<i>P. albata</i>
- Femur and patella only with white hairs; palpus as in Figures 115, 116	<i>P. blanda</i>
12. Anterior tibia with four pairs of spines on ventral sides as well as a pair of little apical ones. Palpus as in Figures 123, 124. (The species of genus <i>Acantholycosa</i> generally have five or more pairs of spines on ventral sides of first tibia and genitalia very different.)	<i>P. nigra</i>
- Anterior tibia with two pairs of spines as well as apical pair (in some cases the anterior lateral pair of spines almost fall into line with the ventral pairs and it may appear that there are three pairs of ventral spines)	13
13. Tegular part of bulb very protuberant. From the shield protrudes a slender and pointed process bent towards the external side	14
- Tegular part of bulb otherwise	15
14. Embolus long and distally pointed (Figs. 15, 16, 17)	<i>P. giebeli</i>
- Embolus flattened, making an angle at level of process of shield, then ending with a flattened and expanded lamina, anteriorly pointed and forwardly directed (Figs. 19, 20, 22)	<i>P. eiseni luciae</i>
15. Some spinnerets black	16
- Spinnerets yellow or brown, sometimes very dark but never black	19
16. All spinnerets black. Palpus as in Figures 67, 68	<i>P. saltuaria</i>
- Anterior spinnerets black, other spinnerets more or less dark	17
17. Tegular apophysis a robust lamina, C-shaped. Terminal apophysis a big tooth (Figs. 30, 31). Lateral bands of carapace narrow. Abdomen with reddish pattern	<i>P. lapponica</i>
- Tegular apophysis differently formed. Terminal apophysis otherwise. Lateral bands of carapace rather wide. Abdomen with very clear yellow pattern (Figs. 3,	

- 11) 18
- 18. Looking at the palpus in ventral position, the tegular apophysis seems a more or less circular lamina with a sharp tooth on the middle. The tooth is more evident as seen from the side (Figs. 12, 13) *P. schenkeli*
 - In ventral position, the tegular apophysis has a hooked laminal process on the external side (Figs. 8, 9) *P. bifasciata*
- 19. Metatarsi of the second pair of legs ventrally with long hairs, much longer than on other legs (Fig. 6). Palpus as in Figures 4, 5 *P. vittata*
 - Metatarsi of the second pair covered with hairs of the same length as on other pairs 20
- 20. Tegular apophysis long, extending beyond the edge of alveolus or close to it. The upper branch of the apophysis is directed anteriorly and laterally, sometimes pointed, sometimes apically blunted 21
 - Tegular apophysis short, variously formed. If the apophysis has an upper branch, it is far from the alveolar edge 29
- 21. Terminal apophysis long and narrow, finger-shaped (Figs. 39, 40) *P. nigriceps*
 - Terminal apophysis absent (or at least not visible) or a thin lamina (*P. lugubris*) 22
- 22. Tegular apophysis robust and apically blunted and does not reach the edge of alveolus. The shield has a robust and laterally directed process 23
 - Tegular apophysis pointed or blunted but always close to the edge of the alveolus as observed from the ventral side 24
- 23. Palpus as in Figures 36, 37 *P. ferruginea*
 - Palpus as in Figures 34, 35 *P. cavannae*
- 24. Median light band of carapace wide, covered with white hairs, lateral bands not very distinct. Tarsal article of palpus narrow and long, covered with short hairs. Terminal apophysis a thin lamina (Figs. 56, 57) *P. lugubris*
 - Median light band of carapace more or less distinct, generally more evident on the thoracic region, spindle-shaped or more or less branched. Tarsal article of palpus not as narrow as in *P. lugubris* 25
- 25. Median light band slightly branched on the thoracic region; lateral bands clearly broken or absent. Tibial and tarsal segments of palpus black, thickly covered with black hairs. Palpus as in Figures 60, 61 *P. amentata*
 - Median light band of carapace as in Figure 44, generally reddish and not distinct; lateral bands continuous or a little broken with two or three lines. Segments of palpus reddish. Tegular apophysis, as seen from the ventral side, seems to have two independent pieces. The one directed anteriorly and laterally is more or less pointed distally; the other is directed laterally and has the point bent as a hook (Figs. 42, 43) (*P. riparia* group) 26
- 26. Tegular apophysis very long and distally blunt, extending beyond the edge of alveolus (Figs. 42, 43) *P. riparia*
 - Tegular apophysis long, more or less pointed, reaching scarcely to the edge of alveolus or extending beyond it only a little 27
- 27. Tegular apophysis pointed, scarcely reaching the edge of alveolus if the palpus is observed from the ventral side. If the palpus is observed from the lateral side the point of tegular apophysis is far from the edge of alveolus (Figs. 49, 50) *P. pullata*
 - Tegular apophysis apically blunt, reaching to the edge of alveolus (observed either ventrally or laterally) 28
- 28. The distal point of tegular apophysis extends beyond the edge of alveolus. Ectal corner of tegulum pointed and strongly sclerotized (Figs. 46, 47) *P. femoralis*
 - The distal point of apophysis scarcely reaches edge of alveolus. Ectal corner of tegulum slightly pointed, visible and not sclerotized (Figs. 53, 54) *P. prativaga*
- 29. Tegular apophysis with upper branch always clear, more or less bent as a hook. Point of the lower branch of apophysis directed toward the median side of the palpus. (Left side if the left palpus has been observed from ventral side) 30
 - Tegular apophysis squat. There is not an upper branch, or if present it is not bent laterally. Sometimes the apophysis has a laminar shape (*P. nebulosa*) 35
- 30. Upper branch of tegular apophysis ending with a sharp point. Lateral bands of carapace continuous or hardly broken with two or three lines, sometimes absent 31
 - Upper branch of the tegular apophysis distally blunt. Lateral bands clearly broken or continuous but not very clear 32
- 31. Palpus as in Figures 26, 27. Upper branch of tegular apophysis short. The shield, as

- seen from the side, has an anteriorly bent lamina as in Figure 27 *P. sordidata*
- Palpus as in Figures 23, 24. Upper branch of tegular apophysis long. The shield is differently formed *P. paludicola*
32. Segments of palpus dark brown 33
- Segments otherwise, distal part of femora, patella and tibia of the palpus yellow on upper side, black ventrally. Lateral bands continuous. Palpus as in Figures 139, 140. This species lives only on salt marshes *P. luctinosa*
33. Tegular apophysis strongly C-shaped 34
- Tegular apophysis as in Figures 135, 136. Lateral bands clearly broken *P. italica*
34. Found in plains to 1400 m along the edges of rivers and streams with preference for pebbly banks. Body pubescence gray. Length of tarsal segment of palpus 1 mm. Total length of body 5 to 6 mm. Palpus as in Figures 128, 129 *P. wagleri*
- Found on high mountains, along the edges of streams, on moraines, and often under stones that cover the glaciers. Bigger than the preceding species. Body color generally dark, almost black. Length of tarsal segment of palpus 1.5 mm. Length of body 7–8 mm. Palpus as in Figures 132, 133 *P. saturation*
35. Tegular apophysis as a lamina slightly slanted towards the external side. Palpus as in Figures 119, 120. Species large. Total body length 8.25 mm (only 1 male examined) *P. nebulosa*
- Tegular apophysis different. It generally has a tooth, the point of which is sometimes bent towards the lateral side, sometimes towards the median one 36
36. Shield with a laminar process 37
- Shield without laminar process 40
37. Laminar process of the palpal shield, as seen from ventral side, appears strongly lengthened and pointed 38
- Laminar process of the shield short 39
38. Tegular apophysis thumb-shaped (Figs. 158, 159) *P. strigillata*
- Tegular apophysis as in Figures 160, 161 *P. pseudostrigillata*
39. Tooth of tegular apophysis directed towards the ectal side (Figs. 154, 155), very common *P. hortensis*
- Tooth of tegular apophysis directed towards the mesal side of the palpus (Figs. 64, 65) *P. morosa*
40. Lateral bands of carapace continuous, though not very distinct. Tegular apophysis broader than long. Terminal apophysis as in Figures 152, 153 *P. cribrata*
- Lateral bands of carapace broken. Tegular apophysis longer than broad. Terminal apophysis as in Figures 156, 157, very common *P. proxima*
41. Septum of epigynum shaped as a trapezoidal plate of reddish color covering the genital depression. (*Pardosa monticola* group and *P. saltuaria*) 42
- Septum of epigynum rather reduced and different. If it occupies the genital depression it is triangular 52
42. Anterior spinnerets dark brown or black. Septum with edges of the posterior half strongly rounded (Fig. 69) *P. saltuaria*
- Spinnerets yellow 43
43. Median light band of carapace tapering, pointed in front or ending with a small diamond-shaped spot 44
- Median band clearly dilated behind the posterior eyes and at level of thoracic furrow 49
44. Lateral bands of carapace broken by two or three lines (Fig. 90). Edge of the anterior pockets as in Figures 88, 89 *P. blanda* (part.)
- Lateral bands of carapace continuous 45
45. Genital septum longer than broad. Edge of the septum almost parallel or slightly enlarged posteriorly. Edge of the anterior pockets as in Figure 83. Legs light, more or less annulated *P. monticola*
- Genital septum broader than long 46
46. Septum clearly much broader than long. Edge of the anterior pockets regularly curved as in Figures 84, 85, 88, 89 47
- Septum becoming large posteriorly with more or less sinuous sides. Edges of the anterior pockets never regularly curved as in *P. blanda* and *P. palustris* 48
47. Posterior angles of septum obtuse, often wrinkled and prominent. Septum with a longitudinal deep groove, about two-thirds its length (Figs. 84, 85). Legs generally light *P. palustris*
- Posterior lateral extensions of the septum sometimes extending laterally, sometimes pointed anteriorly, never wrinkled (Figs. 88, 89). Legs, especially femora, dark *P. blanda* (? *P. albata*)

48. Sides of septum almost parallel, with posterior angles more or less blunted and often a little wrinkled. Carapace pattern as in *P. blanda*, but the lateral bands are always continuous, and near the edges of the carapace there is another thin light band (Figs. 80, 81, 93) *P. mixta*
- Sides of the septum rather sinuous, with the posterior angles generally beak-shaped. Legs more or less annulated (Figs. 72-74) *P. agrestis* (part.)
49. Lateral light bands of carapace broken 50
- Lateral bands continuous (Fig. 95). Epigynum as in Figures 72-74 *P. agrestis*
50. Septum about as broad as long, sides S-shaped. Edges of the anterior pockets as in Figures 77-79. Legs clearly annulated *P. agricola*
- Septum broader than long. Legs annulated or not 51
51. Legs annulated. Edge of the anterior pockets as in Figures 86, 87. Abdominal pattern yellow reddish, rather pronounced (Fig. 99) *P. torrentum*
- Legs scarcely annulated. Sides of septum regularly enlarged, only a little sinuous. Edge of the anterior pockets as in Figures 72-74 *P. agrestis* (part.)
52. Anterior tibia with four pairs of spines on ventral side. Epigynum as in Figure 125. Body color very dark *P. nigra*
- Anterior tibia with two pairs of spines on ventral side (occasionally three pairs) ... 53
53. Lateral bands of carapace continuous, broad, often as broad as the dark bands. They are marginal. A dark band more or less distinct is included on the light ones. Median light band broad. On the abdomen, as well as on the anterior lanceolate stripe, a yellow pattern is very distinct (compare Figs. 3, 11). Carapace rather long and narrow 54
- Lateral bands continuous or broken, always narrower than the dark ones and divided from the edges of carapace by a narrow dark band. Carapace not particularly lengthened (except *P. nigriceps*) 56
54. Spinnerets yellow. Anterior portion of the genital depression long and narrow. The two lips rather undulating. Posterior portion trapezoidal in shape. Epigynum as in Figure 7 *P. vittata*
- Anterior spinnerets black or at least darker, especially at the base. Epigynum very small, yellowish. The seminal receptacles can be seen through the cuticle 55
55. Only one anterior pocket with rounded edge under which median septum of epigynum is tucked. The connecting canals of the seminal receptacles coil once (Fig. 10) *P. bifasciata*
- Two anterior pockets. Median septum long and undulating. The connecting canals of the seminal receptacles coil at least twice (Fig. 14) *P. schenkeli*
56. Carapace rather lengthened (about as in *P. vittata*, etc.). Median light band broad with edges narrowing posteriorly. Lateral bands continuously broad; separated from the edge of carapace by a narrow dark band. Anterior pockets of epigynum as in Figure 41. The epigynum is reddish yellow made up of thin cuticle that easily yields under slight pressure *P. nigriceps*
- Carapace not particularly long. Lateral light bands always narrower than the dark ones 57
57. The anterior pockets are far apart and placed on the anterior external corner of epigynum. Median septum more or less dilated posteriorly. Genital depressions ear-shaped or somewhat triangular (*P. riparia* group) 58
- Anterior pockets always close to each other, sometimes touching, sometimes separated by the median septum 61
58. Genital depressions ear-shaped. Septum dilated posteriorly (Fig. 45) *P. riparia*
- Genital depressions triangular. Septum posteriorly rounded 59
59. A straight line across the center of the anterior pockets would intersect the median septum at about its middle point (Fig. 51) *P. pullata*
- A straight line across the center of the anterior pockets would intersect the septum much more anteriorly or would not touch it at all 60
60. If the septum is so intersected, it is at the level of the anterior quarter. Septum rather broad (Fig. 48) *P. femoralis*
- If the line crosses the septum it does so just at the septum's anterior edge or does not cross it at all (Fig. 55) *P. prativaga*
61. Median light band of carapace not distinct, dilated behind the posterior eyes and at

- level of the median furrow. Generally it is made up of two oval spots divided by a thin line, followed by a dark rhomboidal spot, and then in the thoracic region a more or less distinct light band, never branched. Lateral bands evident or not, sometimes continuous, sometimes broken. Spinnerets dark brown, at least the lower pair. Edge of the anterior pockets united, more or less bent 62
- Median light band of carapace almost always distinct, and at least in the thoracic region, dilated, branched or spindle shaped. If not very clear, then the lateral bands are clear and evident and clearly broken. Spinnerets light. Edge of the anterior pockets different 66
62. Lips of the epigynum parallel, more than half the length of epigynum, then diverging posteriorly (compare Figs. 18, 25, 28) 63
- Lips of epigynum immediately diverging or subparallel on the anterior fifth of the length of epigynum 65
63. The septum starts under the anterior pockets and is enlarged twice, as in Figure 28 *P. sordidata*
- The septum does not start under the anterior pocket and is enlarged posteriorly only once 64
64. The anterior portion of the epigynal depression, containing the pedunculus of the septum, is much longer than the second portion containing the transverse portion of septum (Fig. 25). Lateral bands of carapace distinct *P. paludicola*
- Anterior portion of the epigynal depression not longer, or barely longer, than the second portion (Fig. 18). Lateral bands of carapace very obscure *P. giebeli*
(and *P. eiseni luciae*?)
65. Lateral bands of carapace distinct, continuous (Fig. 33). Anterior pocket of epigynum wide; lips of genital depression diverging at once (Fig. 32) *P. lapponica*
- Lateral bands of carapace obscure. Anterior pocket of epigynum narrow. Lips of genital depression subparallel at least for a short distance (Fig. 38) *P. ferruginca*
66. Median light band of carapace wide with more or less parallel edges, or spindle-shaped, sometimes anteriorly ending as a diamond shape, but never dilated anteriorly and on the thoracic region. Median band generally clear-cut 67
- Median light band more or less clear-cut, dilated behind the posterior eyes and at level of the thoracic furrow; sometimes clear only on the thoracic region, sometimes rather obscure 70
67. Median light band of carapace wide with subparallel edges, covered with white pubescence. Lateral bands narrow, rather obscure (Fig. 59). Epigynum as in Figure 58, anchor-shaped. Species rather common, easily seen running on dried leaves in woods *P. lugubris*
- Median light band spindle-shaped, or ending with a little diamond-shaped enlargement 68
68. Lateral bands of carapace broken 69
- Lateral bands of carapace continuous though not very clear (Fig. 148). Body color brown or greenish brown. Abdominal pattern yellow, distinct. Epigynum as in Figure 149. Lips of the anterior part of genital depression not parallel *P. cribrata*
69. Body color reddish. Carapace as in Figure 146. Abdominal pattern reddish brown. Epigynum as in Figure 147. Lips of the anterior part of genital depression parallel. Very common species *P. proxima*
- Body color red brown. Median band of carapace not particularly evident. Epigynum as in Figure 127 *P. aenigmatica*
70. Lateral bands of carapace continuous, sometimes deeply serrated 71
- Lateral bands broken 73
71. Median band of carapace greatly branched in the thoracic region. Lateral bands clear but deeply serrated on the external edges 72
- Median band obscure, sometimes distinct only posteriorly (Fig. 141). Lateral bands yellow, covered with black hairs and spots. Epigynum as in Figure 142. Species inhabits only the border of salt-marshes *P. luctinosa*
72. Epigynum as in Figure 122. Species of eastern Alps and eastern Europe through Caucasus *P. nebulosa*
- Epigynum as in Figure 126. Occurs in Sardinia and Abyssinia *P. naevia*
73. Anterior pockets single. Anterior portion of septum dilated as a yellow semilunar piece, then constricted (pedunculus) and then again dilated on the transverse por-

- tion of septum (Fig. 62) *P. amantata*
- Anterior pockets single or double. Septum triangular in shape, more or less long, pedunculate anteriorly 74
74. Anterior pockets clearly divided by pedunculus of septum; the edges of the septum continue as edges of the anterior pockets. Septum long, pedunculate, plain or depressed on the median portion 75
- Anterior pockets more or less close. The edges of the pedunculus of septum do not continue as edges of the pockets 77
75. Septum flat. Median light band of carapace not very clear 76
- Septum medially depressed. Posteriorly and laterally to the septum are very distinct posterior pockets, subcircular and dark brown. Median light band of carapace limited to two little spots on the cephalic region and to a branched band on the thoracic one (Fig. 137). Lateral bands clearly broken. [Epigynum (Fig. 138) like that of *P. luctinosa*] *P. italica*
76. Color dark brown, but all body covered with gray hairs. Leg annulations pale. Total length of body, 6-7.5 mm. Length of septum, 0.5 mm. Lives on plains to 1400 m (Figs. 130, 131) *P. wagleri*
- Color of carapace chocolate brown, with sparse gray pubescence. Legs reddish yellow, clearly annulated. Total body length, 7.8-9.5 mm. Length of septum, 0.75 mm. Lives on the mountains above 1400 m height (Fig. 134) *P. saturator*
77. The septum does not entirely fill genital depression which is divided into anterior and posterior, the anterior light and flat, the posterior half-filled. (The shape of septum is rather variable.) Very common species (Fig. 151) *P. hortensis*
- The septum nearly fills the entire genital depression and has the appearance of a triangular plate 78
78. Median light band strongly dilated behind posterior eyes, yellow and very distinct. Lateral bands evident. Body color yellow-brown to greenish 73
- Median and lateral bands reddish, not distinct. Median band often only in the thoracic region. General body color dark chocolate brown. Epigynum as in Figure 66 *P. morosa*
79. The points of basal spines of anterior metatarsus hardly reach, or extend only a little beyond the base of median pair. Epigynum as in Figure 144 *P. strigillata*
- The points of the basal spines of anterior metatarsus extend beyond the basal half of the median pair. Epigynum as in Figure 145 *P. pseudostrigillata*
- Pardosa mixta* (Kulczynski)**
- Figures 80-81, 93, 104-106
- Lycosa mixta* Kulczynski, 1887, Rozpr. spraw. wudz. mat. przyrod. Akad. Umiej. 16: 299, pl. 5, figs. 11, 12, ♂ ♀. Male and female syntypes from southern Tyrol, "Schlern Mountain," probably in Budapest Museum.
- Pardosa mixta*,—Roewer, 1954, Katalog der Araneae, 2a: 167. Bonnet, 1958, Bibliographia Araneorum, 2: 3388.
- **Description.** Carapace brown. Median band pointed in front, in the male often faint anteriorly. Lateral bands continuous, about as broad as the median one; separated from the carapace margins by a narrow dark band, then by another thin light band (Fig. 93). Legs yellow-brown. Femora with dorsal longitudinal dark marks; the other segments with indistinct rings, clearer on posterior legs. Tarsus, metatarsus and part of tibia of male with very long laterally and forwardly directed hairs (Fig. 106). Abdomen brown-red. Male palpus as in Figures 104, 105. Epigynum as in Figures 80, 81. Septum a little broader than long. Posterior angles more or less blunt, wrinkled, and sometimes prominent.
- Remarks.** The male cannot be mistaken for any other species because of the long hairs on the three first segments of the first leg. The females are distinct from *P. blanda* (and *albata*?) and *P. palustris* by the shape of the epigynum and particularly by the different shape of the edge of the anterior pockets. The females of *P. mixta*, *P. agricola* and *P. torrentum* differ in the carapace pattern; *P. mixta* differs from *P. monticola* by having the septum broader than long (in *P. monticola* it is longer than broad or as long as broad). The lateral light bands are generally a little broader than the median bands in *P. agrestis* (*pseudomonticola*

Simon) while they are about equal in *P. mixta*.

Ecology. *Pardosa mixta* is mentioned mostly from Alps at high altitudes (about 2000–2500 m). It seems to like open wet meadows. The record from the Apennines (Monte Cimone, 2163 m) is not surprising in view of the glacial history.

Specimens examined from Italy. *Piemonte.* Alpi Pennine: Colle d'Olen, 2865 m (Gnecco, MSNG). *Valle d'Aosta.* Valsavaranche (Festa, MSNF); Gressoney la Trinité: Lake Gabiet, 2339 m, 22.VIII.1958. *Trentino.* Dolomiti (SMF). *Friuli-Venezia Giulia.* Carnia (Di Caporiacco, MSNF). *Toscana.* Appennino Tosco Emiliano: Mt. Cimone (MSNF).

Specimens examined from outside Italy. *Switzerland.* Canton Ticino (Pavesi, MSNG). *Austria.* Tyrol: Ober-Gurgl im Ötztal, 2000 m, June 1958 (Levi, MCZ).

General distribution. Switzerland, Italy, Austria, Carpathians, Yugoslavia.

Pardosa palustris (Linnaeus)

Figures 84–85, 91, 102–103

Araneae palustris Linnaeus, 1758, Systema Naturae, 10 ed., p. 623. Holotype from Sweden lost.

Lycosa herbigrada Blackwall, 1857, Ann. Mag. Nat. Hist., (2)20: 285. Female syntypes from Isle of Portland, Dorset, England, in British Museum, London.

Pardosa herbigrada,—Roewer, 1954, Katalog der Araneae, 2a: 163. Bonnet, 1958, Bibliographia Araneorum, 2: 3373.

Pardosa palustris,—Roewer, 1954, *op. cit.*, 2a: 177. Bonnet, 1958, *op. cit.*, 2: 3402.

Description. The carapace patterns are not very different from those of *P. monticola*. In several specimens the light lateral bands are separated from the carapace margins by a continuous dark band, but specimens can be found in which the outer dark bands are reduced (Fig. 91). Some specimens have different carapace patterns and often have been regarded as belonging to a different species, e.g. *P. herbigrada* (Blackwall). Such specimens have never been recorded in Italy (compare Tongiorgi, 1965). Legs yellow with more or less distinct

annulations. Femora with dark blotches dorsally. Terminal apophysis of the male palpus is a broad, slightly curved, more or less sharp and jagged lamina. It is very characteristic and unique to this species (Figs. 102, 103). Epigynum as in Figures 84, 85. Septum much broader than long, posterior angles obtuse, often prominent and wrinkled. A deep groove extends about two-thirds of the septum's length. Edge of the anterior pockets very characteristic. Color rather variable: posterior angles generally dark brown-red, but plate usually evenly colored, or only one side darkened. Because of the great variability of the epigynum, I have drawn only two examples.

Remarks. The peculiar structure of the terminal apophysis of the palpus distinguishes the males of *P. palustris* from those of the other species. The females cannot be mistaken for any other species, as the shape of the epigynum is very characteristic, and though it may vary greatly, it always permits reliable diagnosis. The edge of the anterior pockets has the same structure only in *P. blanda* (and *P. albata*?). The only closely related species is *P. mixta*, which often has posterior angles of the septum similarly wrinkled and prominent, but is distinguished from *P. palustris* by the edges of the anterior pockets and by having the sides of the septum generally more parallel.

Ecology. The species is widespread, especially in cold climates. It lives on mountains mostly in open and rather dry places, i.e., meadows, pastures, heaths.

Specimens examined from Italy. *Piemonte.* Alpi Pennine: Colle d'Olen, 2865 m (Gnecco, MSNG); Macugnaga, 1600 m, Val Anzasca, 30.VII.1961. *Torino.* Pratiiglione Ivrea, (MSNF). *Valle d'Aosta.* Gressoney la Trinité, 1627 m, 20.VIII.1958; Capanna Morgenrot, 1800 m, 20.VIII.1958; Capanna S. Anna, 2170 m, 27.VIII.1958. Gressoney St. Jean, 1385 m, 23.VIII.1958. *Emilia-Romagna.* Forlì: Campigna, 20. VII.1942 (Zangheri, CZ). *Toscana.* Lucca: Orecchiella, S. Romano, 1220 m, 4.VIII. 1965.

General distribution. Palearctic, Alaska.

***Pardosa agricola* (Thorell)**

Figures 77-79, 98, 107-108

Lycosa arenaria C. L. Koch, 1834, in Panzer, Faunae Insectorum Germaniae, Heft 123, pls. 15-16. Syntypes from the Danube bank near Regensburg, Germany, probably in the British Museum, London. Name preoccupied by *L. arenaria* Savigny and Audouin, 1825.

Lycosa agricola Thorell, 1856, Nova Acta Reg. Soc. Sci. Upsala, (3) 2 (1): 171. New name.

Pardosa agricola,—Roewer, 1954, Katalog der Araneae, 2a: 157. Bonnet, 1958, Bibliographia Araneorum, 2: 3348.

Description. Carapace dark brown. Light median band dilated anteriorly, sometimes branched on the thoracic region (Fig. 98). On several specimens the median band is not broader than the lateral ones, and on some the anterior enlargement is not very evident. Lateral bands very clearly broken. Occasionally the posterior spots merge. Abdomen very dark with brown-red pattern. Legs yellow, very distinctly annulated. Male palpus with two teeth on the terminal apophysis. Tegular apophysis long and blunt at the end (Figs. 107, 108). The female has the genital plate about as long as broad. Lateral sides very sinuous. Edge of the anterior pockets as in Figures 77-79. (Owing to the great variability, *P. agricola* can often be mistaken for *P. agrestis* and *P. torrentum*.)

Remarks. The male is easily distinguished from other species by the two-toothed terminal apophysis. The females can be confused with *P. torrentum*, *P. agrestis* (*pseudoagricola* Dahl); however, the carapace pattern distinguishes *P. agricola* from all others. *Pardosa agrestis* and *P. torrentum* have the genital plate broader than long, while *P. agricola* generally has it as long as broad. The lateral sides of the genital plate are very sinuous, and the edges of the anterior pockets are furthermore useful for distinguishing it from *P. agrestis*. The abdominal pattern seems useful for distinguishing between *P. agricola* and *P. torrentum*: *P. torrentum* generally has a yellow or yellow-red abdominal pattern, which is always lighter than that of *P. agricola*.

Ecology. According to Dahl and Dahl (1927, pp. 52, 53) and Locket and Millidge (1951, p. 255), *P. agricola* prefers open sandy or stone banks of lakes and water-courses. It does not seem to reach high altitudes.

Illustrations were made from Finnish specimens loaned by P. Palmgren and F. Papi.

Specimens examined from Italy. None, although there are numerous literature records.

General distribution. Europe, Iran, Asia, Siberia. It is probable that specimens of *P. torrentum* have sometimes been mistaken for *P. agricola*. At least *P. agricola* seems a more common species in northern than in southern Europe.

***Pardosa torrentum* Simon**

Figures 86-87, 99, 109-110

Pardosa torrentum Simon, 1876, Les Arachnides de France, 3: 313, pl. 13, fig. 26, ♀. Female and male syntypes from Lautaret, Briançon, in the Muséum National d'Histoire Naturelle, Paris. Roewer, 1954, Katalog der Araneae, 2a: 174. Bonnet, 1958, Bibliographia Araneorum, 2: 3426.

Description. Carapace dark brown. Some specimens collected on the plain near Pisa and near Barletta are lighter yellow-brown. Median band wide, dilated anteriorly, sometimes starred in the thoracic region (Fig. 99). Lateral bands broken into three or four spots, not always so light as the median band, and often very faint in the males. Legs yellow-brown. Femora with dorsal brown marks, the other segments (except tarsi) annulated. Annulations always distinct but less so than in *P. agricola*.

Abdomen dark brown, almost black. Anterior median stripe brownish, bordered with black anteriorly, flanked and followed by bright yellow-red pattern. The light spots generally flanked by a purplish or black area. Femur and patella of male palpus clothed with white hairs (Figs. 109, 110). Epigynum as in Figures 86, 87. Sep-

tum broader than long, rarely as broad as long.

Remarks. The male is distinguished from *P. agricola* and *P. agrestis* (*pseudoa-gricola* Dahl) by the different shape of the terminal apophysis, from all other species by the carapace markings. To separate the females of *P. torrentum* from those of *P. agricola* and *P. agrestis* is very difficult. It seems that the abdominal pattern is lighter in *P. torrentum*, while in both other species the abdomen is generally brown-red, the pattern not greatly contrasting against the background. The legs of *P. agricola* are clearly annulated, less so in *P. torrentum*, and often only scarcely annulated in *P. agrestis*. The genital plate is generally broader than long in *P. torrentum* and *P. agrestis*, while it is as long as broad in *P. agricola*. The carapace markings set this species apart from the remaining species of the *monticola* group.

Ecology. This species lives in the mountains as well as on the plains. I found some specimens (male and female) in countries near the sea. It seems to prefer open sandy places with scant vegetation, or meadows near streams and rivers.

In Italy this species seems more common than *P. agricola*, and many erroneous citations of this last species should probably be referred to *P. torrentum*.

Specimens examined from Italy. *Piemonte.* Alessandria: Casale Monferrato (MSNG) ♀ ♀ ♂ ♂. *Toscana.* Pisa: Caprona, 5.VI.1958, 1 ♀; IV.1962, 1 ♂ 1 ♀. *Puglia.* Bari: Barletta, 23.VI.1961, 2 ♀ ♀.

General distribution. France, Switzerland, Tyrol, Italy, Hungary, Pyrenees.

Pardosa agrestis (Westring)

Figures 72–74, 95–97, 100–101

Lycosa agrestis Westring, 1861, Göteborg. Kongl. Vet. Handl., 7: 480. Female holotype from Sweden lost.

Pardosa agrestis.—Roewer, 1954, Katalog der Araneae, 2a: 156. Bonnet, 1958, Bibliographia Araneorum, 2: 3346.

Description. Carapace dark brown. Median and lateral bands are highly variable,

but three principal types are found: one has the median band anteriorly dilated and the lateral bands continuous (Fig. 95). Another type has the median band anteriorly dilated but the lateral bands broken (*pseudoa-gricola* Dahl) (Fig. 97). The third type has the median band pointed in front and the lateral bands continuous (*pseudomonticola* Simon) (Fig. 96). Legs light. Annulations more or less clear. The dark marks on dorsal side of femora may reach to ventral side. Male palpus as in Figures 100, 101. Terminal apophysis without any projecting tooth. Epigynum highly variable. Septum broader than long. Edge of the anterior pockets generally as in Figures 72–74.

Remarks. The lack of projecting teeth on the terminal apophysis distinguishes the male of this species from all others. The females are easily distinguished when the carapace pattern is as evident as in Figure 95. Otherwise they are very hard to identify. *Pardosa agrestis*, with the median band anteriorly pointed and lateral bands continuous (*pseudomonticola* Simon), is distinguished from *P. blanda* and from *P. palustris* by the different shape of the edge of the anterior pockets (compare Figs. 84, 85, 88, 89); from *P. mixta* by having the lateral bands a little broader (perhaps) than the median one, and also the epigyna of the two species are rather different. *Pardosa monticola* has the genital plate at least as long as broad while *Pardosa agrestis* has the genital plate broader than long (compare Fig. 83). The specimens having the carapace pattern as in Figure 97 (*P. agrestis pseudoagricola* Dahl) resemble *P. agricola* and *P. torrentum*. *Pardosa agricola* has the septum about as long as broad with lateral sides generally more sinuous. The legs, moreover, are very distinctly annulated. The lighter abdominal pattern of *P. torrentum* seems to me the best character for distinguishing this species from *P. agrestis*.

Ecology. According to several authors this species lives in the mountains above 2000 m as well as on the plain or near the

sea and seems to prefer open dry places or fields.

Specimens examined from Italy. Piemonte. Lago Maggiore: Astona (SMF). *Veneto.* Verona: Caprino Veronese (MSNF). *Toscana.* Lucca: Borgo a Mozzano, 31.III. 1957; Capanne di Sillano, 1100 m, 4.VII. 1965.

General distribution. Europe.

Pardosa monticola (Clerck)

Figures 82-83, 92, 94, 111-114

Araucis monticola Clerck, 1758, *Aranei Svecici*, p. 91, pl. 4, fig. 5, ♂ ♀. Types from Sweden probably lost.

Pardosa monticola,—Roewer, 1954, *Katalog der Araneae*, 2a: 167. Bonnet, 1958, *Bibliographia Araneorum*, 2: 3390.

Description. Carapace brown. Median light band pointed anteriorly. Lateral bands continuous and extending to the clypeus (Fig. 94). Sides of the head sometimes darkened. Lateral bands slightly broader than the median one. Lateral bands separated from carapace margins by a single dark streak (compare *P. mixta*, Fig. 93). Legs light yellow, spotted on upper side, often annulated, especially third and fourth tibiae and metatarsi. Male palpus as in Figures 111, 112, terminal apophysis with a little tooth, clearly shorter than in *P. blanda*, *P. albata* and *P. torrentum*. Tegular apophysis long and rather sharp. Palpus clothed with black hairs only. Epigynum as in Figure 83. Septum generally longer than broad (but sometimes as long as broad). Median groove limited to the anterior half. The posterior part of the genital plate slightly raised in the middle.

Remarks. The male of *P. monticola* is distinguished from those of *P. blanda*, *P. albata* and *P. torrentum* by the absence of white hairs on the palpus. From *P. torrentum* it also differs by the carapace pattern. From all the other species it differs in the shape of the terminal apophysis. The female of *P. monticola* differs from those of *P. palustris*, *P. blanda* (and *P. albata*?) by

having the genital plate at least as long as broad. *Pardosa monticola* differs from *P. mixta* in carapace pattern and by having the posterior angles of the plate less blunt and wrinkled (compare Figs. 80, 81). It differs very little from *P. agrestis* (*pseudomonticola* Simon), which has the septum broader than long.

On Sila Mountain (Calabria, southern Italy) near the shores of Arvo and Cecita lakes (F. Papi, August 1958) and on the slopes of Monte Pollino 1800 m (E. Mayr, May 1957), there lives a population of *P. monticola* the males of which have the tegular apophysis shorter and not so sharply pointed. Both males and females are slightly smaller. These specimens do not seem to me to be *P. monticola minima* Simon (Figs. 82, 92, 113, 114). (1 ♂ 1 ♀ are deposited in MSNG.)

In the following table I report the measurements of twelve female specimens of *P. monticola* from Sila and ten specimens collected in different countries of Europe (Italy, Germany, France, England). For each group of specimens I have given the lowest measurement (min.), the highest (max.), and the mean value of the group. All measurements are in mm.

	LENGTH OF CARAPACE		
	Min.	Max.	Mean
<i>P. monticola</i>	2.31	2.80	2.56
<i>P. monticola</i> from Sila	1.98	2.67	2.42

	LENGTH OF PLATE		
	Min.	Max.	Mean
<i>P. monticola</i>	0.46	0.50	0.47
<i>P. monticola</i> from Sila	0.36	0.50	0.43

	WIDTH OF PLATE		
	Min.	Max.	Mean
<i>P. monticola</i>	0.43	0.50	0.45
<i>P. monticola</i> from Sila	0.33	0.48	0.42

Ecology. This species lives on the mountains as well as on the plains, on the mountain-grassland as well as on dry, open ground heaths near the sea. According to de Lessert (1910, p. 511) and my own observations, this species does not seem, at least not in the Alps, to reach considerable

altitudes. Above 2000 m it is replaced by *P. mixta*.

Specimens examined from Italy. Veneto. (Canestrini, IZUP). Friuli-Venezia Giulia. Carnia (Di Caporiaeco, MSNF). Liguria. Genova (Frey-Gessner, MSNG). Toscana. Firenze: Londa 1000–1200 m; Arezzo: Mt. Falterona 1650 m (Di Caporiaeco, MSNF); Lucca: Orecchiella, S. Romano, 1220 m. Calabria. Sila Grande, 1450 m, 18.V. 1957 (E. Mayr, MCZ); Mt. Pollino, 1800 m, 14.V. 1957 (E. Mayr, MCZ); Lake Cecita, Lake Arvo, Sila, 8.VIII.1958 (F. Papi); Cosenza: Silvana Manzio, 24.VI.1960 (S. Ruffo, MSNV).

Specimens examined from outside Italy. France. Mt. Canigon, southern France (SMF). Corsica: Vizzavona (SMF). Switzerland. Vaud: Montreux, 400–1100 m (Levi, MCZ). Austria. Tyrol: Seefeld 1200 m, Karwendel Mts. (Levi, MCZ). Germany. Nieder Sachsen: Göttingen (Levi, MCZ).

General distribution. Europe, Afghanistan, Siberia, China.

Pardosa blanda (C. L. Koch)

Figures 88–90, 115–116

Lycosa blanda C. L. Koch, 1833, Arachniden. In Panzer, Faunae Insectorum Germaniae initia. Heft 120, pl. 24. Male holotype and female paratype from near Nassfelde, Salzburg, Austria, probably in British Museum, London.

Pardosa blanda,—Roewer, 1954, Katalog der Araneae, 2a: 160. Bonnet, 1958, Bibliographia Araneorum, 2: 3360.

Description. Carapace dark brown. Median light band narrow, spindle-shaped; occasionally slightly enlarged at the anterior end and at the level of the thoracic furrow, and here sometimes faintly branched. Median band clothed with white pubescence. A narrow line made up of light pubescence only may continue between the posterior median eyes. Lateral bands yellow. Often two very thin dark lines divide each band into three light spots (Fig. 90). Lateral bands about as broad as the median one. Between the lateral band and the carapace margin there is a dark brown band narrower than the light one. The lateral bands

do not continue forward on the clypeus but stop on the sides of the head.

Abdomen with reddish pattern on almost black background. Ventral side thickly clothed with white pubescence. Legs rather darkened. Femora uniform or with dark brown spots on dorsal side. Tibia and metatarsi annulated, especially on the posterior legs. Tarsi uniform. Males with darker and less clearly annulated legs. Male palpus (Figs. 115, 116) with distal end of femur and patella clothed with white hairs. Terminal apophysis forms a strong tooth. Epigynal septum broader than long, not greatly variable in shape. Edge of the anterior pockets as in Figures 88, 89.

Remarks. The male is very close to *P. albata*, *P. monticola* and *P. torrentum*, especially concerning the terminal apophysis of the palpus. It is distinguished from *P. monticola* by the bigger terminal apophysis and the thicker tegular apophysis. Further, *P. monticola* does not have white hairs on the palpus. *Pardosa albata* has the palpus entirely clothed with white hairs. *Pardosa torrentum* has a different carapace pattern. The females are distinguished from those of *P. monticola* and *P. mixta* by the edge of the anterior pockets (compare Figs. 80, 81, 83). *Pardosa blanda* is distinguished from *P. palustris* by the shape of the plate. It is easily distinguished from all other species by the epigynum and the carapace pattern. It may sometimes be difficult to separate *P. blanda* from *P. agrestis* (*pseudomonticola* Simon). The latter has the lateral bands continuous around the head while in *P. blanda* these are often broken off anteriorly on the sides of the head.

Ecology. *Pardosa blanda* lives in mountainous zones between 1000 m and 3000 m, but is especially frequent at about 2000 m. It seems to me that the southern point recorded for this species is Varco of Mt. Pollino (about 2000 m) in the south of Italy (Simon, 1882).

Specimens examined from Italy. Piemonte. Torino: Pratiglione Ivrea (Cavanna, MSNF); Alpi Pennine: Colle d'Olen, 2865

m (Gnecco, MSNG); Macugnaga: Alpe Cicerwald, 1200–1600 m, Val Anzasca. *Valle d'Aosta*. Valsavaranche (Festa, MSNF); Gressoney la Trinité: S. Anna, 2170 m; Lake Gabiet 2339 m; Gressoney la Trinité: 1627 m. *Trentino*. Bolzano (SMF). *Friuli-Venezia Giulia*. Carnia (Di Caporiacco, MSNF) (Di Caporiacco recorded this species under several names: *P. torrentum*, *lugubris*, *agricola*, *palustris*, *monticola*, *nigra*). *Emilia-Romagna*. Forlì: Campigna, I.VII.1924; Piancancelli, 22.VII.1925 (Zan-gheri, CZ). Campigna, Mt. Falco (Di Caporiacco, CZ); Modena (SMF). *Toscana*. Mt. Falterona, 1500–1650 m (Di Caporiacco, MSNF); Arezzo: Colle del Castagno, 1200 m, Mt. Acuti, 1428 m (Di Caporiacco, MSNF); Lucca: Capanne di Sillano, 1100 m. *Marche-Umbria*. Pesaro: Avellana (MSNF); Sibillini Mts., several localities (Ruffo, MSNV). *Lazio*. Montecassino: Mt. Cairo, 1669 m (Cavanna, MSNF). *Abruzzi-Molise*. Pescara: Caramanico (MSNF); Cima Matese, Mts. of Matese (Cavanna, MSNF). *Abruzzi*. (SMF); Sulmona: Mt. Morrone (Cavanna, MSNF); Campitella Matese, 16.VI.1962 (Ruffo, MSNV). *Campania*. Pincintini Mts. (Ruffo, MSNV).

Specimens examined from outside Italy. *Yugoslavia*. Istria: Mt. Učka, 1400 m (Levi, MCZ). *Austria*. Tyrol: Ober-Gurgl im Ötztal, 2000 m (Levi, MCZ); Karwendel Mts., 1200 m (Levi, MCZ).

General distribution. France, Germany, Switzerland, Italy, Czechoslovakia, Austria, Poland, Hungary.

Pardosa albata (L. Koch)

Figures 117–118

Lycosa albata L. Koch, 1870, Jahrb. k.k. Gelehr. Gesell. Krakau, 41: 36. Male and female syntypes from the Tatra Mts. and Bukowina [Carpathian Mts.] probably in the Berlin Museum.

Pardosa albatula Roewer, 1954, Katalog der Araneae, 2a: 196.

Pardosa albata.—Bonnet, 1958, Bibliographia Araneorum, 2: 3350.

Description. Of this species I could examine only two male specimens in the col-

lection of spiders from Carnia studied by Di Caporiacco (1922, 1927), and preserved at the Museum of Natural History of Florence. The only differences from *P. blanda* are that the palpus is covered with white pubescence from the base of the femur to about the middle of the tarsus, and that the tegular apophysis (Figs. 117, 118) has a slightly different shape.

To separate the females of the two species the description by Koch and the distinctive characters for *L. cursoria* (*P. blanda*) (Koch, 1870, p. 42) are not sufficient.

Ecology. Species of the mountainous districts of southern and eastern Europe.

Italian distribution. Carnia.

General distribution. Germany, Hungary, Poland, Austria, Siberia, Italy, Carpathians, Balkans, Transylvania.

Pardosa saltuaria (L. Koch)

Figures 67–71

Lycosa saltuaria L. Koch, 1870. Jahrb. k.k. Gelehr. Gesell. Krakau, 41: 38. Female syntypes from the Tatra Mts. and Bukowina, probably in the Berlin Museum.

Pardosa saltuaria.—Roewer, 1954, Katalog der Araneae, 2a: 178. Bonnet, 1958, Bibliographia Araneorum, 2: 3420.

Pardosa oreophila Simon, 1937, Les Arachnides de France, 6: 1071, fig. 1668, ♀. Female holotype from the French Alps in the Muséum National d'Histoire Naturelle, Paris, examined. NEW SYNONYMY.

Description. Carapace dark brown. Light median band yellow, narrow, and spindle-shaped. Lateral bands yellow, rather wide and continuous. Each lateral band includes, near the edge of the carapace, a narrow brown band made up of spots that approach each other (Fig. 70). Carapace of male darker; median and lateral bands reddish yellow. The median one spindle-shaped, not very clear-cut; the lateral bands are narrow and separated from the edge of the carapace by a dark band and a thin light line. Abdomen reddish brown. Lower spinnerets of female are brown. The male has all black spinnerets. Legs of female reddish yellow with annulations; tibia and meta-

tarsus of fourth pair brown. Male with yellow legs, only femora darkened on upper side.

Remarks. Though often included in the *Pardosa monticola* group, *P. saltuaria* is different from all species of this group. Among Italian *Pardosa*, males of other species also have black spinnerets (*P. bifasciata*, *P. schenkeli*, *P. lapponica*), but *P. saltuaria* differs by the shape of tegular apophysis (Figs. 67, 68). The epigynum of *P. saltuaria* (Fig. 69), though similar to that of species of the *P. monticola* group, is easily distinguishable.

I examined the female holotype of *P. oreophila* Simon (Fig. 71), and find it to be exactly like *P. saltuaria*. The proximal spines of the anterior metatarsus exceed the bases of median ones by about one-third, and the epigynum is smaller, but those characters are not sufficient to keep *P. oreophila* a separate species.

Ecology. This is a species of the Alps, on meadows and open places, from 1000 m as high as 2700 m. It is a common species often misidentified by Di Caporiacco.

Specimens examined from Italy. Friuli-Venezia Giulia. Carnia (Di Caporiacco, MSNF). South Tyrol, Dolomiti (SMF).

Specimens examined from outside Italy. Austria. Tyrol: Ober-Gurgl (Levi, MCZ).

General distribution. Arctic regions, central and southern European mountains, from France to the Balkans.

Pardosa nigra (C. L. Koch)

Figures 123–125

Lycosa nigra C. L. Koch, 1834, Arachniden, in Panzer, Faunae Insectorum Germaniae initia, Heft 122, pls. 13–14, ♀ ♂. Male and female syntypes from a brook of the Nassfelder Alps, Salzburg, Austria, probably in the British Museum, London.

Lycosa celeris Thorell, 1875, Tijdschr. Ent., 18: 106. Two female syntypes from northern Italy, probably lost. (They are not in the Stockholm or Genoa museums, but might have been in Padua with the Canestrini collection.) NEW SYNONYMY.

Acantholycosa nigra,—Roewer, 1954, Katalog der Araneae, 2a: 151.

Pardosa celeris,—Roewer, 1954, *op. cit.*, 2a: 160.
Bonnet, 1958, Bibliographia Araneorum, 2: 3363.

Pardosa nigra,—Bonnet, 1958, *op. cit.*, 2: 3395.

Description. Carapace dark brown, a little lighter in the thoracic region. Lateral light bands absent, or represented by two or three lighter spots, often more evident at level of thoracic furrow. General body color reddish to very dark brown. Abdomen black with brick red pattern. Reddish on ventral side. Both male and female with red-brown legs. Femora darker, almost black. Tarsi reddish yellow, or lighter than other segments. Tibiae of first pair ventrally with four pairs of spines, as well as an apical pair of shorter ones, rarely only three pairs. Male palpus, Figures 123, 124. Epigynum as in Figure 125.

Remarks. In having four pairs of spines on the ventral side of the first tibia, *P. nigra* differs from all other Italian *Pardosa*. Some authors regard this species as belonging to the genus *Acantholycosa* Dahl (Roewer, 1954, p. 152; Di Caporiacco, 1940; Denis, 1963). Since morphological characters of genitalia, especially those of the male palpus, are quite comparable with those of other *Pardosa*, but are quite different in *Acantholycosa*, I shall consider *P. nigra* as a species of *Pardosa*. It seems to me, moreover, that the true *Acantholycosa* have five or more pairs of spines on the ventral sides of the first tibia. Of *Pardosa celeris* I examined four immature specimens (Thorell collection in NRS; type species lost?). They agreed with young specimens of *P. nigra* with which I compared them. They have only four pairs of spines on the first tibia (compare Thorell, 1875, p. 146). Thorell himself indicated that the epigynum is like that of *P. nigra*. Also, the annulation of the legs described by Thorell for *L. celeris* is not exceptional; one finds these characters in lighter specimens of *P. nigra*. *Pardosa celeris* (Thorell) thus is a synonym of *P. nigra* (C. L. Koch).

Ecology. This species lives from sea level up to 3000 m. In mountain regions it

prefers stony places near the snow line. Specimens mature in June and August.

Specimens examined from Italy. *Piemonte.* Torino: Pratiglione Ivrea, 3 ♂♂, 21.VIII.1879 (MSNF). *Valle d'Aosta.* Aosta: Valsavaranche (Festa, MSNF); Gressoney St. Jean, 1385 m (Gnecco, MSNG). *Lombardia.* Valsesia, 1 ♀ (Piccone, 1871, MSNG). *Trentino-Alto Adige.* South Tyrol (Dolomiti) 1 ♂ 1 ♀ (SMF). *Friuli-Venezia Giulia.* Carnia (Di Caporiacco, MSNF). *Veneto.* 1 ♀ (Canestrini, IZUP). *Liguria.* Chiavari, 1 ♀ (SMF). *Alpi.* 3 ♀♀ 1 ♂ (MCZ).

Specimens examined from outside Italy. *Switzerland.* Canton Ticino, 1 ♀ (Pavesi, MSNG). *Crete.* Canea (Roewer, SMF).

General distribution. France, Germany to Russia, Italy, Balkans, Crete.

Pardosa giebeli (Pavesi)

Figures 15–18

Lycosa giebelii Pavesi, 1873, Ann. Mus. civ. Stor. nat. Genova, 4: 164, figs. 7–9, ♂♀. Female, male syntypes from Monte Fibbia and Valle di Fortunei, 2500 m [S. Gottard, Lepontine Alps, Switzerland], in the Museo Civico di Storia Naturale, Genoa, examined.

Pardosa giebeli.—Roewer, 1954, Katalog der Araneae, 2a: 175. Bonnet, 1958, Bibliographia Araneorum 2: 3370.

Description. Carapace dark brown, median light band reddish yellow, more distinct in the thoracic region. At level of the median furrow it sometimes is slightly branched, and in the cephalic region, darker and often faint. The indistinct, broken lateral bands are much clearer posteriorly. Males have the carapace pattern less distinct and darker. Abdomen blackish brown with red pattern. Wide lanceolate median stripe bordered with white hairs. The other spots are confluent, resulting in a single band covering the abdomen dorsum. There are a few white hairs posteriorly. The spinnerets are dark. Legs red-brown. Femora blotched and annulated above, especially near the base, more or less uniformly darkened ventrally; other segments uniform. Male palpus (Figs. 15, 16, 17), observed from the apical end, exhibits a long and

sharpened embolus, lying on the almost transparent alveolus. Epigynum as in Figure 18.

Remarks. *Pardosa giebeli* is closely related to *P. eiseni* (Thorell), which lives in the cold regions of northern Europe and Asia, except in the Alps, where the subspecies *P. eiseni luciae* occurs. The different shape of the embolus distinguishes the males of the two species (compare Figs. 17, 21, 22). I could not examine females belonging with certainty to *P. eiseni luciae*. There are good drawings of *P. giebeli* and *P. eiseni* (= *P. arctica* Kulczynski) in the paper of Kulczynski, 1916; however, the differences in the epigyna of the two species are not as distinct as indicated by figures 69 and 70 of this author. Other species belonging to the *P. giebeli* group have been described from Palearctic and Nearctic regions. *Pardosa uintana* Gertsch, from the United States, of which I examined several specimens, is clearly distinguished from *P. giebeli* by the genitalia.

Ecology. *Pardosa giebeli* lives in the Alps to the highest altitudes. Generally it has been found on meadows between 2000 and 3000 m.

Specimens examined from outside Italy. *Switzerland.* (MSNG); Grundsee, 2310 m, 15.VII.1909, ♂♂♀♀ (MHNG); Riffelberg, 2800 m, 23.VII.1909 (MHNG). *France.* 2 ♀♀ (MCZ). *Austria.* Vorarlberg, VIII.1961 (Neis, SMF).

General distribution. French, Swiss, Italian Alps.

Pardosa eiseni luciae new subsp.

Figures 19–22

Type. Male holotype from Faulhorn, 2545 m, Alps, near Brig, Valais, Switzerland, in the Museum of Comparative Zoology.

Description. Carapace dark brown without bands. Abdomen black with red-brown pattern. Spinnerets black. Legs red-brown; femora annulated, tibia less so. Male palpus illustrated by Figures 19, 20, 22; the angular embolus ends as a spatula. I cannot distinguish females of this subspecies from those of *P. giebeli*. The females in the vial

with the holotype have very faint bands on the carapace, while in *P. giebeli* there is generally a median band, though not very clear; the epigyna are identical, even when cleared and observed from the dorsal side. [Compare the differences between *P. giebeli* and *P. arctica* Kulczynski (= *eiseni*) in Kulczynski 1916, pl. 15, figs. 71–72.]

Remarks. In the shape of embolus this species is without doubt much closer to *P. eiseni* than to *P. giebeli* (compare Figs. 17, 21, 22). *Pardosa giebeli* has a long, sharp-ened embolus; *P. eiseni eiseni* and *P. eiseni luciae* have the embolus bent almost at a right angle and broadened and flattened distally. The distal part of the embolus of the specimen I examined distinguishes *P. eiseni luciae* from *P. eiseni eiseni*. It is not surprising to find that *P. eiseni* has a boreo-alpine distribution as do some other *Pardosa* (e.g., *P. lapponica*). This record is the southernmost record of *P. eiseni*; the specimen differs slightly, and seems to be a new subspecies.

Pardosa schenkeli Lessert

Figures 12–14

Pardosa schenkeli Lessert, 1904, Rev. Suisse zool., 12: 429, pl. 6, figs. 42–44, ♀ ♂. Female, male syntypes from Arella, Valais, in the Muséum d'Histoire Naturelle, Geneva.

Lycosa calida.—Dahl and Dahl, 1927, in Die Tierwelt Deutschlands, 5: 38, figs. 98–102, ♂ ♀. (Not *Lycosa calida* Blackwall.)

Passiena schenkeli.—Roewer, 1954, Katalog der Araneae, 2a: 198.

Pardosa calida.—Bonnet, 1958, Bibliographia Araneorum, 2: 3362 (in part).

Description. The description of *P. bifasciata* fits this species very well. The body pattern is so similar that only genitalia can be used to distinguish *P. schenkeli* and *P. bifasciata*. Male palpus (Figs. 12, 13) has the tegular apophysis with a pointed and outwardly-directed tooth. Epigynum (Fig. 14) has the septum rather long. Connecting canals of the seminal receptacle, which show through the cuticle, have at least two coils.

Remarks. The male of *P. schenkeli* differs from that of *P. bifasciata* in the shape

of the tegular apophysis. The different structure of the anterior pockets and seminal receptacles separates the females of these species.

The synonymy of *P. schenkeli* is controversial. It seems to me that the opinion of de Lessert (1910), with which Simon (1937) agrees, should be followed. Dahl (1908), Dahl and Dahl (1927) regard this species as a synonym of *P. calida* (Blackwall), but the description of *P. calida* suits either *P. schenkeli* or *P. bifasciata* equally well. As the species described by de Lessert is clearly illustrated and identifiable, whereas we cannot say the same of *P. calida*, and whereas many of the records of *P. calida* are certain to be referred to *P. bifasciata*, it seems to me better to consider *P. schenkeli* a good species and *P. calida* a synonym of *P. bifasciata*.

The inclusion of *P. schenkeli* and *P. bifasciata* within the genus *Passiena* Thorell (Roewer, 1954, 1958, p. 162) is arbitrary. Roewer attributes to Simon the inclusion of *P. bifasciata* (and consequently of *P. schenkeli*) into the genus *Passiena*. Simon never did that; he limited himself to supposing a proximity of morphological characters of this species to his *Pardosa auberti* and to *Passiena spinicrus* Thorell (Simon, 1898, p. 355). One of the distinctive characters of *Passiena*, according to Roewer, is the presence of four pairs of spines on the ventral side of the first tibia. *Pardosa bifasciata* and *P. schenkeli* have three pairs of spines on the ventral side of the tibiae, besides the little apical pairs. Judging by the drawings of Roewer (1958) all species belonging to *Passiena* have quite different genitalia from those placed in *Pardosa*. In *Pardosa bifasciata* and *P. schenkeli*, the genitalia are as in other *Pardosa* species.

I could examine only one female and one male of *P. schenkeli* from France (MCZ collection). The drawings were made from these specimens.

Ecology. This is a species of the Alps between 1500–2500 m. According to de Lessert (1910) it lives in the upper zone of

conifer forests and pastures. *Pardosa schenkeli* has not yet been recorded for Italy.

General distribution. Alps, Ural of Verchoturijé (Charitonov, 1926).

***Pardosa bifasciata* (C. L. Koch)**
Figures 8–11

Lycosa bifasciata C. L. Koch, 1834. Arachniden. In Panzer, Fauna Insectorum Germaniae initia, Heft 125. Male and female syntypes from Germany, probably in the British Museum, London.

Passiena bifasciata,—Roewer, 1954, Katalog der Araneae, 2a: 198.

Pardosa bifasciata,—Bonnet, 1958, Bibliographia Araneorum 2: 3359.

Description. This is one of the smallest species of *Pardosa* in Italy. Carapace rather long and narrow, dark brown in color. Median light band yellow with parallel edges, extended anteriorly beyond the row of posterior eyes. Yellow, lateral bands wide, continuous. A little dark band contained within each light band near the outer edge (Fig. 11). Carapace of male reddish brown, median and lateral bands less clear. Sternum of females yellow with dark spots or with two narrow dark longitudinal bands. Dark with a light median band on males. Male with lower spinnerets black. Abdomen blackish brown. Anteriorly there is a lanceolate stripe with white pubescence and bordered with black. On each side of the lanceolate stripe is a yellowish band. The bands of the two sides joined into one reaching the spinnerets. Legs yellow, the lateral sides of femora with longitudinal black stripes. Other segments uniform. The male has the femora often more or less uniformly darkened, especially the anterior ones. Palpus as in Figures 8, 9. Epigynum (Fig. 10) has the seminal receptacles generally visible through the cuticle, and the connecting canal of each receptacle coiled once.

Remarks. The color pattern of this species distinguishes it readily from almost all other *Pardosa*. The males differ from those of *P. vittata* by lacking long hairs on the second metatarsi, females by the shape of

epigynum. *Pardosa bifasciata* differs from *P. schenkeli* only by the shape of the genitalia (Figs. 12, 13, 14).

Ecology. This species is found in dry and sandy places amid grass, at low elevations or subalpine regions. Mature specimens have been collected from May to August and September.

Specimens examined from Italy. Trentino. Trento: Levico, 1873, 1 ♂ (Frey-Gessner, MSNG). *Friuli-Venezia Giulia.* Carnia, 2 ♀ ♀ 1 ♂ (Di Caporiacco, MSNF).

Specimens examined from outside Italy. Switzerland. Canton Ticino, 3 ♂ ♂ (Pavesi, MSNG). *France.* 1 ♂ 1 ♀ (mixed with *P. schenkeli*) (MCZ).

General distribution. Throughout continental Europe, Asia Minor.

***Pardosa vittata* (Keyserling)**
Figures 1–7

Lycosa vittata Keyserling, 1863, Verhandl. zool. bot. Gesell. Wien, 13: 369, pl. 10, fig. 7, ♀. Female syntype from Dalmatia in the British Museum.

Pardosa palitans Simon, 1876, Les Arachnides de France, 3: 326, pl. 13, figs. 21, 22, ♀ ♂. Syntypes from numerous localities in southern France and Corsica, in the Muséum National d'Histoire Naturelle, Paris; 1937, *op. cit.*, 6: 1056, 1077, 1130, figs. 1625, 1627, 1675, ♀ ♂. Roewer, 1954, Katalog der Araneae, 2a: 169. Bonnet, 1958, Bibliographia Araneorum, 2: 3399. NEW SYNONYMY.

Pardosa vittata,—Roewer, 1954, *op. cit.*, 2a: 174. Bonnet, 1958, *op. cit.*, 2: 3429.

Description. Carapace rather long and narrow, dark brown. Median light band spindle-shaped or with more or less parallel edges. Lateral bands yellow, wide and continuous, sometimes as wide as the dark bands. Near the edge of carapace a narrow dark band, often not clear, made up of dark spots and points (Fig. 3). Abdomen black with a yellowish lanceolate stripe on the anterior part followed by a row of whitish spots. They are often close to each other and make a single lanceolate band. Flanks whitish gray. Male darker than female. With carapace dark brown, bands usually

present though reduced or sometimes absent. Color of median and lateral bands reddish, the lateral ones sometimes broken. Abdomen black with gray or reddish pattern. Legs of female yellow with femora and tibiae annulated or blotched on upper sides. Metatarsi with one proximal and one distal dark ring. Sometimes, especially on the fourth metatarsi, there is also a median ring. Male with femora blotched on upper sides, darkened ventrally. Other segments uniformly yellow. Metatarsi of second pair ventrally with long hairs (Fig. 6). Male palpus (Figs. 4, 5) has femora blackish, patellae yellow with white hairs, tibiae and tarsi black. Epigynum as in Figure 7.

Remarks. The long-haired metatarsi of second pair of legs distinguish the male of *P. vittata* from all other species. Females have a characteristic epigynum and clearly differ from other *Pardosa*. *Pardosa bifasciata*, *P. schenkeli* and *P. nigriceps* have a body pattern much like that of *P. vittata*.

The characters used by Simon (1876, 1937) to separate *P. vittata* and *P. palitans* are, I believe, absolutely inadequate to distinguish the two species. I collected several specimens in different localities and many have characters of one or the other. Males generally have lateral bands on the carapace but very short spines on lower sides of anterior metatarsi. In females the width of lateral bands varies from specimen to specimen. On the other hand, Simon acknowledges that the characters distinctive of females are vague and variable (Simon, 1937, p. 1077, note). The genitalia of the two species are identical. It appears that *P. palitans* must be regarded as a synonym of *P. vittata*.

Ecology. This species is widespread but never very abundant. *Pardosa vittata* lives in moist places near streams, ponds, swamps and saltmarshes, on the plains as well as on the mountains as high as 1000 m.

Specimens examined from Italy. *Emilia-Romagna.* Modena: S. Anna Pelago, 1070 m, Appennino Tosco-Emiliano, 6.VII.1962; Forlì: Rimini (MSNF). *Toscana.* Lucca:

Massaciuccoli, 8.VI.1958; Pisa: S. Rossore, 7.VI.1958; Caprona, 5.VI.1960; Barbaricina, 6.VI.1960.

Specimens examined from outside Italy. *Switzerland.* Canton Ticino (Pavesi, MSNG). *Yugoslavia.* Dalmatia (MCZ). Istria: Pula, 28.VI.1962 (Levi, MCZ).

General distribution. France, Switzerland, Tyrol, Italy, Greece, Balkans to Caucasus.

Pardosa nigriceps (Thorell)

Figures 39–41

Lycosa nigriceps Thorell, 1856, Nova Act. reg. Soc. sci. Upsala, (3) 2 (1): 116. Female syntypes from Sweden.

Pardosa nigriceps,—Roewer, 1954, Katalog der Araneae, 2a: 168. Bonnet, 1958, Bibliographia Araneorum, 2: 3396.

Description. Carapace dark brown, rather long and narrow. Median and lateral bands wide. Median band reddish in the cephalic region, yellow in thoracic. Cephalic part of median band more or less oval in shape, divided from thoracic part by a thin transverse dark line and two spots. In the thoracic region the band gradually becomes narrower behind. The lateral bands yellow, extending to clypeus. They are separated from the edges of carapace by a narrow brown band. Sternum black with a wide yellow posteriorly-pointed stripe. Sternum almost black in male. Abdomen reddish brown, yellowish on sides and venter. Femora yellow with blotches above, other leg segments uniformly reddish. The male palpus (Figs. 39, 40) has a peculiar long terminal apophysis. Epigynum (Fig. 41) yellowish, the anterior part lightly sclerotized and rather variable.

Remarks. Both the male and female are clearly distinguished from all other Italian species of *Pardosa* by the shape of the genitalia. The carapace pattern of *P. nigriceps* is similar to that of *P. schenkeli*, *P. bifasciata* and *P. vittata*.

Ecology. According to Dahl and Dahl (1927) the species is characteristic of heaths. Simon (1937) says it is common also in swamps. Locket and Millidge (1951) indi-

cate that it is a common species in England on heaths and in open places having partly arboreal habitats. I have never found this species in Italy, although Bertkau (1890) records it from Liguria, and Caffi (1895) from Calabria. Mature specimens are found from May to July.

General distribution. All parts of Europe.

***Pardosa lapponica* (Thorell)**

Figures 30–33

Lycosa lapponica Thorell, 1872, Remarks on Synonyms of European Spiders, p. 273. Male type from Karesuando, Lapland, Sweden.

Pardosa lapponica,—Roewer, 1954, Katalog der Araneae, 2a: 165. Bonnet, 1958, Bibliothographia Araneorum, 2: 3380.

Description. Carapace brown. Median band consists of two round reddish spots in the cephalic region, divided by a dark line, a rhomboidal dark area behind and a reddish yellow band, slightly dilated at level of median furrow. The lateral light bands are yellow, continuous, extending to the clypeus. The lateral bands are separated from the edge of the carapace by a narrow dark band (Fig. 33). Lower spinnerets are dark in the female, black in the male. Upper spinnerets yellow in female, dark or black on dorsal side of male. The legs are reddish, femora slightly blotched. Male palpus (Figs. 30, 31) has a strong tooth behind tegular apophysis. Some white hairs dorsally on the distal part of the tibia. Epigynum as in Figure 32.

Remarks. *Pardosa lapponica* is closely related to *P. ferruginea* and *P. cavannae*. It is possible to distinguish these species by the very dark or black lower spinnerets. The male has a rather different tegular apophysis, and the shield and terminal apophysis are different. The females are distinguished by the different shape of the lips of the genital depression. *Pardosa lapponica* has a boreal-alpine distribution. It is closely related to many northern European species of *Pardosa* besides several North American ones, mainly *Pardosa concinna* (Thorell) and *P. glacialis* (Thorell). It is probably to *P. lapponica* that Calloni referred in his

work "La fauna nivale" (1890) when he mentioned *P. glacialis* as one of the species of the Alpine fauna. (In this case Calloni would have distinguished *P. lapponica* from *P. cincta* Kulczynski.) Females of *P. lapponica* differ from those of *P. ferruginea* also by different shape of epigyna. The curvature of lips of the genital depression is different (compare Fig. 38). Drawings were made from Swedish and Tyrolean specimens.

Ecology. According to Calloni, this species occurs in the highest alpine regions, between 2000 and 2500 m in the eastern Alps. I examined one male specimen from Tyrol determined by Simon as *P. ferruginea* L. Koch (MNHN, No. 1386) and two males and two females from Abisko, Lapland, Sweden (Holm, MCZ).

***Pardosa ferruginea* (L. Koch)**

Figures 36–38

Lycosa ferruginea L. Koch, 1870, Jahrb. k.k. Celehr. Gesell. Krakau, 41: 46. Female holotype from Tatra Mountains, probably in the Berlin Museum.

Pardosa ferruginea,—Roewer, 1954, Katalog der Araneae, 2a: 162. Bonnet, 1958, Bibliothographia Araneorum, 2: 3368.

Description. Carapace red-brown. Median light band reddish in the cephalic region and oval; yellowish and little dilated at level of median furrow in the thoracic region. Lateral bands very faint, narrow, distinct only posteriorly. Abdomen brown with a reddish yellow pattern covering most of the dorsum. Spinnerets brownish, about the same color as body. Legs of females reddish yellow, clearly annulated. Legs of males with femora reddish and annulated, other segments lighter, not annulated or with very pale annulations on posterior pairs.

Remarks. *Pardosa ferruginea* is closely related to *P. lapponica* and *P. cavannae*. The males are easily distinguishable from those of *P. lapponica* by the tegular and terminal apophysis and by the shield shape. Moreover, they do not have black spinnerets. Between *P. ferruginea* and *P. cavannae* the dif-

ferences are smaller, but the shape of the tegular apophysis is sufficient to distinguish them. Females of *P. ferruginea* differ from those of *P. lapponica* by the shape of the lips of the epigynum.

Ecology. *Pardosa ferruginea* lives in the Alps above 1000 m elevation in the conifer forests.

Specimens examined from Italy. Friuli-Venezia Giulia. Carnia (Di Caporiacco, MSNF).

Specimens examined from outside Italy. Switzerland. Val Tantermozza [Val Tavetsch] 1800 m (SMF). Austria. Engadina near Zernez, Bergwald, 1700 m (Grasshoff, SMF).

General distribution. France, Germany, Siberia, Italy, Balkans.

Pardosa cavannae Simon Figures 34–35

Pardosa cavannae Simon, 1881, Boll. Soc. Ent. ital., 13: 21. Male holotype from top of Monte Amaro 2739 m, Majella Abruzzo, in the Muséum National d'Histoire Naturelle, Paris, examined.

Pardosa frigida,—Roewer, 1954, Katalog der Araneae, 2a: 163 (in part); Bonnet, 1958, Bibliographia Araneorum, 2: 3370 (in part). (Not *Pardosa frigida* Simon, 1876, Les Arachnides de France, Paris, 3: 353, pl. 13, fig. 15, ♀.)

Description. Carapace dark brown. Median light band absent. Lateral bands faint, narrow, of nearly the same color as carapace. Abdomen black with a reddish lanceolate stripe. Palpus as in Figures 34 and 35.

Remarks. The only mature specimen of *P. cavannae* is a male and differs from *P. ferruginea* by the shape of the tegular apophysis.

I consider *P. cavannae* different from *P. frigida* Simon, 1876, unlike Simon, who in 1937 synonymized *P. cavannae* with *P. frigida*. Simon described the male of *P. cavannae* and the female of *P. frigida*, and I do not think that the male of the first species matches the female of the other. Probably the female *P. cavannae* has an epigynum of the type of *P. ferruginea* and *P. lapponica*,

but the drawing of the epigynum of *P. frigida* has a quite different shape. Simon (1876) indicates that *P. frigida* is intermediate between *Pardosa* and the species group of *Lycosa cinerea* [the genus *Arctosa*]. *Pardosa cavannae* is a true *Pardosa*. *Pardosa cavannae* was described from the Appennines, while *P. frigida* is from the Alps (Faillefeu, Basse-Alpes, France).

Ecology. This species probably likes high altitudes. It was found on Mt. Amaro, 2739 m (Majella-Abruzzo) by G. Cavanna in August.

Pardosa paludicola (Clerck) Figures 23–25

Araneus paludicola Clerck, 1757, Aranei Svecici, p. 94, pl. 4, fig. 7, ♂ ♀. Syntypes from Sweden lost.

Pardosa paludicola,—Roewer, 1954, Katalog der Araneae, 2a: 169. Bonnet, 1958, Bibliographia Araneorum, 2a: 3399.

Description. Carapace dark brown. Median and lateral bands reddish. Median band rather wide, slightly dilated in the cephalic and thoracic regions at level of median furrow, here also sometimes slightly branched. Lateral bands narrow and continuous around the carapace, serrated especially on the lower edges. Abdomen black with reddish pattern. Often the pattern covers all the dorsal side of the abdomen assuming a reddish color with only some black spots. Legs of female reddish brown. Legs of male reddish brown with femora blotched or annulated on upper side, other segments uniform. The genitalia are illustrated from French specimens.

Remarks. The male of *P. paludicola* is similar to that of *P. sordidata*, but the genitalia differ. The females of *P. paludicola* have a very characteristic epigynum, easily distinguishable from the nearest species: *P. sordidata* and *P. giebeli*.

Ecology. *Pardosa paludicola* lives on the plains as well as at moderate altitudes in the mountains. According to several authors it is common in meadows, vineyards, edges of woods, and near swampy places.

I have never collected this species, and among the spiders from Carnia, Romagna and Florence determined by Di Caporiacco there are no specimens of *P. paludicola*. I examined specimens from France (MNHN, MCZ). However, there are numerous literature references of this species occurring in Italy.

General distribution. Europe to Siberia, Turkestan (Turkmenistan), North Africa.

Pardosa sordidata (Thorell)

Figures 26–29

Lycosa sordidata Thorell, 1875, Tijdschr. Ent., 18: 105. Female holotype from Riesengebirge [Giant Mts. Poland-Czechoslovakia].

Pardosa sordidata,—Roewer, 1954, Katalog der Araneae, 2a: 172. Bonnet, 1958, Bibliographia Araneorum, 2: 3422.

Description. Carapace red-brown. Median band absent. Lateral light band only barely visible, more evident posteriorly, made up of two or three spots (Fig. 29). Abdomen blackish with brick red pattern. All colors are more marked on male, which has also very dark spinnerets. Femora of the female have two rings dorsally, uniformly dark ventrally. First and second femora darker ventrally. Other segments reddish without annulations. The male has the first femora black, slightly striped with yellow dorsally. Femora of second pair black along the proximal two-thirds of dorsal side and yellow-brown on the distal third. First and second femora are dark on ventral side. Third and fourth femora with two annulations dorsally, more or less darkened ventrally. Proximal half of first tibia almost black. First tarsus dark brown. Second tibia slightly darkened at base. Other segments yellow. The distinctive feature of the male palpus (Figs. 26, 27) is the bent lamina on the external side of shield. Epigynum as in Figure 28.

Remarks. *Pardosa sordidata* is closely related to *P. paludicola*. The genitalia of male and female are sufficient to distinguish the two species.

Ecology. This is a species of the mountain districts near 1500 m in coniferous for-

ests and in *Pinus mugus* forests. *Pardosa sordidata* was found either near water courses or on meadows (Kulczynski, 1909: 686). I have examined 2 ♂♂ and 2 ♀♀ collected in Switzerland, Vaud: Caux, 1100–1500 m, 31.V.1958 (H. & L. Levi, MCZ). Mr. K. Thaler has recently found this species near Lake Garda (*in litt.*).

Pardosa lugubris (Walckenaer)

Figures 56–59

Araneae lugubris Walckenaer, 1802, Fauna Parisienne, 2: 239. Types from Paris vicinity, lost.

Pardosa lugubris,—Roewer, 1954, Katalog der Araneae, 2a: 166. Bonnet, 1958, Bibliographia Araneorum, 2: 3381.

Description. Females: carapace reddish brown. Light median band wide, with subparallel edges. Ocular trapezoid area covered with white hairs. Lateral bands indistinct, more evident posteriorly (Fig. 59). Male carapace dark brown. Median light band reddish in the cephalic region, yellowish in thoracic region. Ocular area and median band covered with white hairs. Lateral bands absent. Abdomen reddish brown with yellow-red pattern, darker with red pattern in males, and covered with white hairs as an extension of the median carapace band. Legs of females with annulations much clearer on femora and tibiae. Males have femora dark brown except distally, more or less annulated, other segments uniformly yellow. Male palpus (Figs. 56, 57) has brown segments covered with black hairs. Tip of long, narrow tarsus light. Septum of the epigynum characteristically anchor-shaped (Fig. 58).

Remarks. The males of the closely related *Pardosa lugubris* and *P. amentata* have similar palpi but the palpus of *P. amentata* (Figs. 60, 61) is wider than that of *P. lugubris*, and the carapace patterns differ. Females differ from *P. hortensis*, *P. proxima* and *P. cribrata* by carapace pattern and shape of epigynum.

Ecology. *Pardosa lugubris* is one of the most common Italian species. In woods, especially where there is little underbrush, numerous specimens are found running over

leaf litter. Specimens are mature from April through July and September. *Pardosa lugubris* lives in all parts of Italy in lowland to subalpine regions.

Specimens examined from Italy. *Piemonte.* Casale Monferrato (Negri, MSNG). *Lombardia.* Pavia (MSNG). *Trentino.* Levico (Doria, MSNG). *Veneto.* Belluno (MSNF). *Friuli-Venezia Giulia.* Carnia (Di Caporiaeco, MSNF). *Emilia-Romagna.* Modena: S. Anna Pelago, 1070 m, Appennino Tosco Emiliano. *Toscana.* Pisa: S. Rossore. *Campania.* Piano Acernese, 1163 m (Ruffo, MSNV). *Basilicata.* Matera: Policoro; Via Appia, km 491, 1000 m, between Potenza and Matera (Levi and Tongiorgi, MCZ).

Specimens examined from outside Italy. *France.* Manche: 2 km W of Quettehou (Lamore, MCZ); St. Vaast-la-Hougue (Lamore, MCZ). Seine et Marne: Woods of Fontainebleau (Levi, MCZ). Yonne: Champigny (Lamore, MCZ). Oise: near Chantilly (Levi, MCZ). *Corsica* (SMF). *Switzerland.* Vaud: Montreux, 400–1100 m (Levi, MCZ); Caux 1100–1500 m (Levi, MCZ). *England.* Surrey: Box Hill near Dorking (Levi, MCZ). *Germany.* Hessen: Eppenhain im Taunus (Levi, MCZ); Nieder Sachsen: Göttingen (Levi, MCZ). *Sweden.* Stockholm (Levi, MCZ). *Belgium.* Teruren (Levi, MCZ). *Austria.* Tyrol: Seefeld, 1200 m, Karwendel Mts. (Levi, MCZ); Brixlegg (SMF). *Yugoslavia.* Istria: N slope of Mt. Ucka, 1100 m (Levi, MCZ). *Slovenia:* Bled 500–700 m (Levi, MCZ). *Croatia:* Plitvice (Levi, MCZ).

General distribution. Palearctic.

Pardosa amentata (Clerck)

Figures 60–63

Araneus amentatus Clerck, 1757, *Aranei Svecici*, p. 96, pl. 4, fig. 8, ♀♂. Syntypes from Sweden lost.

Pardosa amentata,—Roewer, 1954, *Katalog der Araneae*, 2a: 157. Bonnet, 1958, *Bibliographia Araneorum*, 2: 3351.

Description. Carapace brown. Median light band reddish in the cephalic region, yellow posteriorly; oval toward anterior, narrowed and again dilated at level of me-

dian furrow, where it is slightly branched and more or less suddenly reduced at the posterior end. Lateral bands broken into three segments (Fig. 63). Male carapace brown or tawny. Usually median band evident only in thoracic region; lateral bands reduced or absent. Abdomen black with reddish pattern, often uniformly dark brown. Legs reddish yellow and clearly annulated in females. Males with femora blotched or striped on upper sides, more or less uniformly darkened on venter. Other segments uniform, only a little darkened or annulated on dorsal side.

Male palpus (Figs. 60, 61), segments very dark, almost black. Tibia and tarsus covered with very thick black hairs. Epigynum (Fig. 62) with a very characteristic semilunar area on the anterior part of genital depression.

Remarks. The male of *P. amentata* is separated from that of *P. lugubris* by the shape of tarsal segment of the palpus, which is much wider, and by the carapace pattern. The females of the two species can be separated by the shape of epigynum and body pattern.

Ecology. All authors indicate that *P. amentata* lives equally well on plains and in the mountains. I found this species to be common in alpine regions between 1000 m and 2000 m elevation, but never in flat country. It is found near water courses and in moist meadows. Mature specimens are found throughout the summer in the Alps.

Specimens examined from Italy. *Piemonte.* Macugnaga, Val Anzasca: Alpe Cicerwald 1656 m; Alpe Burki, 1585 m; Val Quarazza, 1300, 1600 m; Monferrato: Lerma (Filippa, MSNG); Colle d'Olen, Alpi Pennine (Gnecco, MSNG); Lago Maggiore: Ascona (SMF). *Trentino.* Trento: Levico (Doria, MSNG). *Abruzzi-Molise.* Matese: Esule (MSNF). *Toscana.* Lucca: Capanne di Sillano, 1100 m, 4.VII.1965.

Specimens examined from outside Italy. *France.* Manche: St. Vaast-la-Hougue (Lamore, MCZ). *Switzerland.* Vaud: Montreux, 400–1100 m (Levi, MCZ); Caux, 1100–1500 m (Levi, MCZ). *Germany.* Nieder

Sachsen: Göttingen (Levi, MCZ). *Austria*. Tyrol: Seefeld, 1200 m, Karwendel Mts. (Levi, MCZ); Brixlegg (SMF); Pertisan (SMF); Salzburg: Fusch, 850 m, Hohe Tauern (Levi, MCZ); Garmig (SMF). *Yugoslavia*. Croatia: Plitvice (Levi, MCZ); Slovenia: Bled, 500–700 m, Alpi Giulie (Levi, MCZ). *Crete*. Topolia (Roewer, SMF).

General distribution. Europe to Siberia, Turkestan (Turkmenistan), North Africa.

Pardosa riparia (C. L. Koch)

Figures 42–45

Lycosa riparia C. L. Koch, 1833, Arachniden. In Panzer, Faunae Insectorum Germaniae initia, Heft 120, pl. 19. Male and female syntypes from Germany probably in the British Museum, London.

Pardosa kervillei,—Roewer, 1954, Katalog der Araneae, 2a: 164.

Pardosa riparia,—Bonnet, 1958, Bibliographia Araneorum, 2: 3417.

Description. Carapace brown or reddish brown, often dark brown in males. Median and lateral bands yellow or reddish yellow. Median band more or less spindle-shaped, sometimes slightly dilated anteriorly. Lateral bands separated from the edge of carapace by a dark band slightly narrower than the light ones (Fig. 44). Males sometimes have bands divided into three segments. Spinnerets dark brown. Legs yellow with reddish brown annulations. Tarsi yellow. Males have femora uniformly dark proximally and slightly annulated distally. Femora of first pair darker ventrally, fourth femora darkened along their length. Other segments uniformly yellow. Male palpus (Figs. 42, 43) with segments dark brown. Epigynum as in Figure 45.

Remarks. Both male and female are readily separated from *P. pullata*, *P. femoralis* and *P. prativaga* by the shape of the genital organs.

Ecology. This is a species of meadows, pastures and alpine regions between 1000 and 2000 m.¹

Specimens examined from Italy. Valle d'Aosta. Gressoney la Trinité: Capanna S.

Anna, 2170 m. *Friuli-Venezia Giulia*. Carnia (Di Caporiacco, MSNF).

Specimens examined from outside Italy. *Switzerland*. Vaud: Caux 1100–1500 m (Levi, MCZ). *Austria*. Tyrol: Seefeld 1200 m, Karwendel Mts. (Levi, MCZ); Pertisan (SMF).

General distribution. Palearctic.

Pardosa pullata (Clerck)

Figures 49–51

Araneus pullatus Clerck, 1757, Aranei Svecici, p. 104, pl. 5, Fig. 7, ♀. Female holotype from Sweden lost.

Pardosa pullata,—Roewer, 1954, Katalog der Araneae, 2a: 171. Bonnet, 1958, Bibliographia Araneorum, 2: 3413.

Description. Carapace red-brown. Light median band regularly narrowed toward the posterior. Reddish in the cephalic region, yellow in thoracic region. Lateral band yellow, continuous, but often more or less broken into three segments; separated from margin of carapace by a darker band almost half as wide as the yellow one. Males generally darker, sometimes with lateral bands on carapace. Spinnerets dark. Leg annulations, if present, dorsally on femora only. On male, annulations limited to proximal half of femora. Other segments reddish in females, lighter in males, uniform. Tarsi yellow. In male palpus (Figs. 49, 50), ascending branch of tegular apophysis has a sharp tip. Seen from the side, the apex of the tegular apophysis is far from the edge of bulbus. Epigynum as in Figure 51.

Remarks. Males of *P. pullata* are closely related to those of *P. prativaga* and *P. femoralis*, but can be separated by the lack of annulations on legs. It is possible to distinguish them from *P. prativaga* by the different tegular apophysis, and from *P. femoralis* by the different shape of the

¹ *Pardosa cursoria* (C. L. Koch) of Canestrini and Pavesi (1868, 1870), though regarded by Bonnet (1958) as *P. riparia*, would be much better referred to *P. blanda* (C. L. Koch). The reasons are given in the synonymy and in the observations about this species in P. Pavesi, 1873, Ragni del Canton Ticino, pp. 161–162.

lateral part of the tegulum. The epigynum is almost like that of *P. femoralis* but females can be separated by the different septum shape. The body pattern of *P. pullata*, as well as of *P. prativaga* and *P. femoralis* is like that of *P. riparia* (Fig. 44).

Ecology. This species prefers colder climates, and elevations to 2000 m. In England it is found with *P. prativaga* (Locket and Millidge, 1951) and it is regarded as one of the most common species of the genus. Simon (1937) says that it occurs throughout France. I have never found *P. pullata* in Italy, not even in places where *P. prativaga* is abundant, although there are numerous literature records of this species occurring in Italy.

Specimens examined from outside Italy.

Denmark. Silkeborg (MCZ). *England.* Surrey: Box Hill, Dorking (Levi, MCZ). Hampshire: Stockbridge (Levi, MCZ). *Germany.* Hessen: Eppenhain im Taunus (Levi, MCZ). *Austria.* Salzburg: Fusch 850 m, Hohe Tauern (Levi, MCZ). *Switzerland.* Vaud: Caux 1100–1500 m (Levi, MCZ). *Spain.* Teruel, Sierra de Abrarracin (Kraus, SMF).

General distribution. All parts of Europe, Asia Minor to Turkestan (Turkmenistan).

Pardosa femoralis Simon

Figures 46–48

Pardosa femoralis Simon, 1876, Les Arachnides de France, Paris, 3: 345, pl. 13, figs. 13–14. ♀ ♂. Female, male syntypes from Pietra Cava, Maritime Alps in the Muséum National d'Histoire Naturelle, Paris, No. 18764, examined. Roewer, 1954, Katalog der Araneae, 2a: 162. Bonnet, 1958, Bibliographia Araneorum 2: 3367.

Lycosa montivaga Kulczynski, 1898, Razpr. spraw. wydmat. przyrod. Akad. Umiej., 36: 106, pl. 2, figs. 83, 84, ♀ ♂. Syntypes from Oberer Adlitzgraben, Semmering Pass, 180–1300 m, Austria, probably in the Budapest Museum.

Description. Carapace red-brown. Median light band yellowish clear only at level of median furrow. Lateral bands yellowish, slightly notched. Carapace of male almost black. Lateral bands, if present, divided into

three portions. Femora dark with two or three annulations distinguishable. Other segments uniformly reddish yellow. Male palpus (Figs. 46, 47) with a pointed and sclerotized piece on the ectal part of tegulum. Epigynum (Fig. 48) with septum strongly dilated posteriorly and anterior edges dark and sclerotized.

Remarks. The male differs from that of *P. prativaga* by having the lateral piece of the tegulum larger and darker, by lacking white hairs on the palpus, and by lacking annulations on the legs. Possibly it can be separated from *P. pullata* by having the ascending branch of the tegular apophysis blunt at the end and reaching to the edge of the bulbus. The shape of the epigynum of *P. femoralis* is between that of *P. prativaga* and *P. pullata*. It is separated from the first by uniform coloration of the legs, from the second by having the septum of the epigynum shorter and wider posteriorly. Notwithstanding some discrepancies between the description of *P. montivaga* (Kulczynski) and the types of *P. femoralis*, I believe that it is possible to agree tentatively with the hypothesis of Dahl (1908), also adopted by Kratochvil (1935), about the identity of *P. montivaga* and *P. femoralis*. Roewer (1954, p. 165) considers *P. montivaga* to be a subspecies of *P. riparia* from an erroneous interpretation of work of Petruszewicz (1935). Petruszewicz indeed refers to *P. riparia* as *P. prativaga*.

Ecology. This is a mountain species.

Italian distribution. *Pardosa femoralis* has not been found within the political borders of Italy, but very close: e.g., Saint-Martin-Vesubie, Alpi Marittime. It must be considered as belonging to the Italian fauna. Of this species I examined, besides the syntypes, 3 ♀ and 1 ♂ from the Alps (MCZ). Drawings were made from French specimens.

General distribution. From Macedonia to the Pyrenees through the Alps.

Pardosa prativaga (L. Koch)

Figures 52–55

Lycosa prativaga L. Koch, 1870, Jahrb. k.k. Gelehr.

Gesell. Krakau, 41: 43. Female, male syntypes from Siebernbürgen, Merau, and Galacia, probably in the Berlin Museum.

Pardosa fervida Simon, 1876, Les Arachnides de France, 3: 336, pl. 13, fig. 17, ♀. Female holotype from Corsica in the Muséum National d'Histoire Naturelle, Paris, No. 1710, examined. Roewer, 1954, Katalog der Araneae, 2a: 162. Bonnet, 1958, Bibliographia Araneorum, 2: 3368. NEW SYNONYMY.

Pardosa prativaga,—Roewer, 1954, *op. cit.*, 2a: 170. Bonnet, 1958, *op. cit.*, 2: 3408.

Description. Carapace red-brown. Median light band generally limited to the thoracic region only, yellow or reddish yellow. Lateral bands separated from the edge of carapace by a dark band almost as wide as the light ones. Often the light bands are not clear anteriorly, sometimes they are divided into two or three segments. The male is darker and the bands are often faint. Spinnerets brown. Legs of females yellow with red-brown annulations, those of male with very clear brown annulations. Male palpus (Figs. 53, 54) has ascending branch of tegular apophysis blunt at apex, which seen from the side reaches the edge of the bulb. Patella and tibia with white hairs on external side. Epigynum (Fig. 55) is variable.

Remarks. The males of *P. prativaga* can be separated from those of *P. pullata* which have the tegular apophysis, as seen from the side, pointed and not reaching to the edge of the bulb. *Pardosa prativaga* differs from *P. femoralis* by not having the ectal corner of the tegulum sclerotized and pointed. Females of *P. prativaga*, *P. pullata*, and *P. femoralis* are easily separable by the shape of epigynum. The carapace pattern is like that of *P. riparia* (Fig. 44).

The holotype of *P. fervida* appears to be a specimen of *P. prativaga*. On the basis of body color it cannot even be referred to *P. prativaga fulvipes* (Collett) (= *sphagnicola* Dahl). Figure 52 shows the epigynum of the holotype of *P. fervida*.

Ecology. *Pardosa prativaga* is common and locally abundant. It is possible to find it in damp fields and near swampy places, especially on the plains. Near Pisa, speci-

mens of both sexes are mature in May and June.

Specimens examined from Italy. *Piemonte.* Torino: Pratiglione Ivrea, IV.1879 (MSNF). *Emilia-Romagna.* Forli: Villa-grande, 20.VII.1947 (Zangheri, CZ). *Toscana.* Pisa: S. Rossore, Spring 1958; Lucca: Capanne di Sillano, 1100 m, 4.VII.1965. *Campania.* Picentini Mts.: Piano Laceno (Ruffo, MSNV). *Calabria.* Sila: Fago del Soldato; Volpintesa; Loricca; Mt. Botte Donato; Silvana Mansio; Carmigliatello, 20–26.VI.1960 (Ruffo, MSNV). Aspromonte: Gambarie (Ruffo, MSNV).

Specimens examined from outside Italy. *Finland.* Tvärninne, VIII.1959 (Papi). *Switzerland.* Vaud: Montreux 400–1100 m (Levi, MCZ).

General distribution. Europe to Siberia, Kamchatka.

Pardosa luctinosa Simon Figures 139–142

Pardosa luctinosa Simon, 1876, Les Arachnides de France, 3: 347, pl. 13, figs. 24, 25, ♀ ♂. Male and female syntypes from Corsica in the Muséum National d'Histoire Naturelle, Paris, No. 1709, examined. Roewer, 1954, Katalog der Araneae, 2a: 165. Bonnet, 1958, Bibliographia Araneorum, 2: 3381. Tongiorgi, 1964, *Monit. Zool. Ital.*, 72: 243–253.

Description. Carapace dark brown. Median light band reduced, generally more evident and yellow in posterior region. Lateral bands yellowish with serrated edges and cut off at several points by dark lines and spots (Fig. 141). Male darker than female. Median and lateral bands generally faint or absent. Abdomen almost black, anteriorly with a lanceolate yellowish stripe, flanked by spots of the same color. The lanceolate band is followed by a series of four or five yellowish spots, often united into a single band. On males only the gray lanceolate stripe is generally visible. Legs of females brown. One ring sometimes at the distal ends of tibiae and metatarsi. Legs of males have femora dark brown with a light ventral spot on the apical third, or sometimes a ring on the first leg. Patella

reddish yellow. Tibia and metatarsus reddish brown with a dark annulation on the proximal as well as on the distal end. Tarsi lighter. Male palpus (Figs. 139, 140), distal part of femur, patella, and tibia yellow on upper side, black ventrally. Tarsus dark. Tibia with white hairs on dorsal side. Epigynum as in Figure 142.

Remarks. *Pardosa luctinosa* is closely related to *P. italica*. The females have a similar epigynum but it is possible to separate them by color pattern. Lateral bands are continuous in *P. luctinosa*, while they are clearly broken in *P. italica*; *Pardosa luctinosa* lacks leg annulations; *P. italica* has legs clearly annulated. The males of the two species have a very different tegular apophysis. *Pardosa wagleri* differs from *P. luctinosa* by the genitalia. In the epigynum of the first species the septum is flat, while in *P. luctinosa* it has a posterior furrow. The tegular apophysis of *P. wagleri* is strongly hooked but that of *P. luctinosa* only a little.

Ecology. *Pardosa luctinosa* is halophilic and lives exclusively in saltmarshes or in places where the saline concentration of the ground and water is very high. *Salicornia* habitat is characteristic of this species, and here it is possible to find it together with *P. cribrata* (Tongiorgi, 1964).

Specimens examined from Italy. Veneto. 3 ♀ ♀ (Canestrini, IZUP). Toscana. Pisa: S. Rossore, 29.V.1958, 20.V.1962. Puglia. Bari: Barletta, 2.VI.1962.

General distribution. Corsica, Italy, Yugoslavia, Crete, Hungary, Russia, Turkestan, Siberia.

Pardosa italica n. sp.

Figures 135–138

Type. Male holotype and female paratype from Lago di S. Giuliano, Matera, Basilicata, 5.VI.1962 (P. Tongiorgi, H. W. Levi and L. R. Levi) in the Museo Civico di Storia Naturale, Genova.

Description. Carapace dark brown covered with gray pubescence. Median light band reddish yellow, generally limited to thoracic region. Two reddish spots behind the posterior lateral eyes. The median band

is dilated at level of median furrow and faintly branched, then narrower posteriorly. Lateral light bands reddish yellow, clearly broken (Fig. 137). The two posterior spots sometimes joined. Male similar to female. Median band is often conspicuous, oval and dilated in the cephalic region. Clypeus yellow. Chelicera reddish yellow in the female, yellow in male, in both sexes darkened at the point. Sternum dark brown. Abdomen black covered with gray pubescence. Anterior lanceolate band reddish. Abdominal pattern consists of four brown spots, two on each side of the median band, and a series of yellow spots, the posterior ones fused. The abdomen of males has the median yellow spots flanked by two to three light spots. Generally there is one long spot in about the middle of the abdomen and another smaller spot more posteriorly. Females with legs reddish yellow, clearly annulated. Male with legs yellow. Femora annulated, tibiae with very pale annulations, metatarsi and tarsi uniform. Palpus (Figs. 135, 136) with segments yellow as are the first legs. Epigynum (Fig. 138) similar to that of *P. luctinosa*.

Remarks. *Pardosa italica* is closely related to *Pardosa luctinosa*. The females of the two species differ in carapace pattern. The median light band is indistinct and the lateral bands continuous in *P. luctinosa*, while in *P. italica* the median band is clear and the lateral ones broken. *Pardosa luctinosa* has the legs dark with annulations only on the femora, while *P. italica* has light and clearly annulated legs. The abdominal pattern is also different. The male is easily distinguished by the shape of the terminal and tegular apophysis; furthermore, the palpal articles are uniformly light. Both male and female are smaller than in *P. luctinosa*. *Pardosa italica* is easily distinguishable from *P. wagleri* by the genitalia.

Pardosa italica is the species to which the footnote in Tongiorgi, 1964, page 244, refers.

Ecology. *Pardosa italica* lives along the edges of rivers, streams and lakes at low elevations, another character that distinguishes

it from *P. luctinosa*, which lives exclusively in places of high salinity. Specimens are mature in June and July.

Specimens examined from Italy. Toscana. Pisa: Barbaricina, 19.VII.1963, 1 ♀. *Basilicata.* Matera: Lake of S. Giuliano, near the Via Appia antica (Levi, Tongiorgi, 5.VI.1962), 3 ♂♂, 3 ♀♀ (1 ♂, 1 ♀ paratype in MCZ). *Puglia.* Bari: Barletta, near the mouth of river Ofanto, 23.VI.1961, 1 ♂; 2.VI.1962, 2 ♀♀.

Pardosa wagleri (Hahn)

Figures 128–131

Lycosa wagleri Hahn, 1822, Monographie der Spinnen, 3 Heft, 10: 2.

Pardosa wagleri,—Roewer, 1954, Katalog der Araneae, 2a: 175. Bonnet, 1958, Bibliographia Araneorum, 2: 3430.

Description. Carapace brown, covered with gray pubescence. The gray pubescence causes living specimens to have an ash gray color. Median light band only in the thoracic region, indistinct, yellowish red. Lateral bands yellow, narrow and divided into three or four spots. Ocular area not darker than other parts of carapace, covered with gray hairs (Fig. 131). Male much darker than female. Median band almost absent, lateral bands reduced. The abdomen is gray-black, generally without pattern. Sometimes a yellow lanceolate stripe and some yellowish spots are present, but always indistinct. Often on the abdomen there are some spots and transverse lines made up of white pubescence. Legs yellow, blotched or annulated with brown; always very pale. Metatarsi uniform, especially those of fourth leg. Males have all metatarsi uniformly yellow.

Male palpus (Figs. 128, 129) with a characteristic tegular apophysis strongly bent. Palpal segments black, tip of tarsus light. Epigynum (Fig. 130) easily distinguishable by the slender septum. This may have a more or less long peduncle.

Remarks. The only species that can be confused with *P. wagleri* are *P. luctinosa* and *P. saturatior*. The males of *P. luctinosa* can be distinguished by the different shape

of the tegular apophysis. The females differ in that the septum of the epigynum of *P. wagleri* is plain, while that of *P. luctinosa* is posteriorly hollow. The differences between *P. wagleri* and *P. saturatior* have been discussed under *P. saturatior*.

Ecology. *Pardosa wagleri* lives on the plain and up the mountains to middle altitudes. It likes stream beds and edges of rivers when these are pebbly or, less often, sandy. *Pardosa wagleri* can easily be seen running quickly on the water surface and sometimes also diving. The color of *P. wagleri* hides the animal among the stones. Contrary to the observations of Dahl (1908, p. 418), that *P. wagleri* lives only on the edges of water courses with rapid current, I found this species also on pebbly edges of streams that barely flow during summer. The species is mature from May to July.

Specimens examined from Italy. Piemonte. Alessandria: Casale Monferrato (Negri, MSNG); Lerma (Filippa, MSNG). *Liguria.* Albenga. *Toscana.* Lucca: Piano della Rocca; Barga; Livorno: Chioma Riv., 26.VI.1965. *Basilicata.* Potenza (Levi, Tongiorgi). *Puglia.* Bari: Barletta.

General distribution. European mountains from Spain to the Balkans.

Pardosa saturatior Simon

Figures 132–134

Pardosa wagleri var. *nigra* Dahl, 1908, Nova Acta Leopoldiana, 88: 380. Syntypes from Partnach 1100–1400 m [near Garmisch-Partenkirchen, Bavaria] probably at the Berlin Museum. Not *Pardosa nigra* (C. L. Koch).

Pardosa wagleri saturatior Simon, 1937, Les Arachnides de France, 6: 1067, 1124. New name for *P. wagleri nigra* Dahl.

Pardosa wagleri atra,—Roewer, 1954, Katalog der Araneae, 2a: 175 (in part). Not *Lycosa atra* Giebel, 1869.

Description. Carapace brown, very dark, covered with gray pubescence. Small median light band indistinct, reddish, limited to the thoracic region. Lateral bands yellowish, broken in three or four spots. Males have the carapace almost black and some reddish spots are scarcely perceptible along

the edges of carapace. Abdomen gray-black with only very faint pattern. The whole body color is rather dark. Legs of females reddish yellow, clearly annulated. Males have yellow legs with femora black (or annulated dorsally and black ventrally, except distally). Patellae and tibiae blotched dorsally, metatarsi and tarsi uniform. Generally, *P. saturator* resembles *P. wagleri* but is larger and much more colorful.

The genital organs of both sexes are identical with those of *P. wagleri*, except in proportions. Differences in the illustrations of the two species may be due to individual variability and different rotation of palpus.

Remarks. *Pardosa saturator* is separated from *P. wagleri* by being larger, darker, and living in a different habitat. *Pardosa wagleri* lives on the plains or at middle altitudes; *P. saturator* lives in the alpine regions from 1500 m to the limits of glaciers and even higher. One sees *P. saturator* running on moraines, on the debris that covers glaciers, and often on the ice itself.

P. wagleri and *P. saturator* must be regarded as two different species. The two forms have similar genitalia, but are mainly separated by the size and differences in the ecology. They live at different altitudes, *P. wagleri* on plains and along the lower courses of rivers and of streams. The upper limit of this species must be located between 1000 to 1400 m, but most populations live between sea level and 300 to 400 m. *Pardosa saturator* seems limited to altitudes above 1400 m, the optimal habitat being over 2000 m, near glaciers. The two do not come into contact or, if there is a zone of overlap it is in the area between about 1000 to 1400 m altitude; in this area the populations stay separate (Dahl, 1908, p. 418).

Further, the maturity periods of the two species differ. It is possible to collect mature *P. wagleri* males and females in June and July, but at the end of July the animals are rare and males have disappeared. In August we can find specimens

of both sexes of *P. saturator* and many females are carrying their egg sacs.

Specimens examined from Italy. *Piemonte.* Macugnaga: Belvedere Glacier, 1930 m, VIII.1962; Val Anzasca, 1500 m, VIII.1962; Val Quarazza, 1400 m, VII.1962. *Friuli-Venezia Giulia.* Carnia (Di Caporiacco, MSNF).

Specimens examined from outside Italy. *Switzerland.* Graubünden: Val del Diavel am Piz Quattervalls, 2000 m (Grasshoff, SMF). Graubünden National Park, Val Tantermozza [Val Tavetsch], 1800 m (Grasshoff, SMF).

General distribution. Alps.

Pardosa nebulosa (Thorell)

Figures 119–122

Tarentula nebulosa Thorell, 1872, Remarks on Synonyms of European Spiders, p. 330. Female holotype from Italy probably lost.

Pardosa nebulosa,—Roewer, 1954, Katalog der Araneae, 2a: 168. Bonnet, 1958, Bibliographia Araneorum, 2: 3394.

Description. Carapace brown. Median light band yellowish, strongly branched at level of thoracic furrow. Less clear and dilated as an oval spot behind the posterior row of eyes. Lateral bands yellow, distinct with irregular edges. Along edges of carapace dark spots are more or less evident (Fig. 121). The males sometimes have lateral bands clearly outlined in contrast to the interbranching of the median band by dark lines. Sternum dark brown, labium brown, maxillae yellow. Clypeus light brown. Legs yellow and clearly annulated in females. Generally, femora with three to four annulations not much extended on ventral side; one faint ring on patella; two on tibia, and one distal apical; three on metatarsi. The male has only the femora blotched on the upper side, other segments more or less uniform. Male palpus as in Figures 119, 120. Epigynum as in Figure 122.

Remarks. The only species of the Italian fauna that can be compared to *P. nebulosa* are *P. naevia* and *P. aenigmatica*. *Pardosa nebulosa*, one of the biggest Italian species

of *Pardosa*, was found in Italy by Canestrini according to Thorell. I examined some specimens from the Thorell collection preserved at the Natural History Museum of Stockholm, but among them did not find the female from Italy on which the description of the species, without doubt, was based. I saw the females from Dalmatia, also mentioned by Thorell (1872, p. 331), and males and females from Russia and Hungary. When the present study was already drafted I had the opportunity to examine also one Italian female specimen of *P. nebulosa* from the Canestrini collection (IZUP), and I have found that its morphology agrees perfectly with the other specimens of the same species that I had already examined. It is possible that it is the female described by Thorell.

General distribution. Italy, Hungary, Balkans to Caucasus. Thorell does not mention the place where the Italian specimens were collected.

Pardosa naevia (L. Koch)

Figure 126

Lycosa naevia L. Koch, 1875, Aegyptische und Abessinische Arachniden, p. 72, pl. 7, fig. 2, ♀ ♂. Female, male syntypes from Province Hamaszen, Ethiopia, in the Berlin Museum.

Pardosa naevia,—Roewer, 1954, Katalog der Araneae, 2a: 180. Bonnet, 1958, Bibliographia Araneorum, 2: 3394.

Description. Carapace dark brown. Light median band strongly branched in the thoracic region, expanded as an oval spot behind the posterior row of eyes. Lateral bands yellow, narrower than the dark ones. Related with the interrays of the branching median band, there are, on the lateral bands, two narrow darker lines, and near the edge of carapace, three black spots, the posterior of which is much more distinct (similar to the carapace of *P. nebulosa*, Fig. 121). Clypeus brown-black. Chelicerae reddish yellow. Maxillae yellow, labrum dark brown. Sternum black, a little lightened on sides. Abdomen black with yellow pattern, ventrally yellow. Legs reddish yellow. Femora, patellae and tibiae blotched

uniform. The male of this species has not been found yet in Sardinia.

Remarks. Identification of the specimens on hand with *P. naevia* is not certain. There are some differences in regard to the color patterns of the carapace between the description of *P. naevia* of Koch and my specimens, but the genitalia seem alike. *Pardosa nebulosa* and *P. naevia* have a similar carapace pattern but different genitalia. The females of *Pardosa naevia* are easily separated from those of *P. aenigmatica* by the carapace pattern.

The species heretofore has been known only from Ethiopia. Since our knowledge of the lycosids of North Africa is very scarce, it can not be excluded that the distribution of *P. naevia* reaches the Mediterranean basin.

Specimens examined from Italy. Sardinia. 1 ♀ (SMF); Cagliari: Guspini (Oristano Campidano), May, 1924, 2 ♀ ♀ (Ferruglio, MSNF).

General distribution: Ethiopia, Sardinia.

Pardosa aenigmatica n. sp.

Figure 127

Type. Female holotype from Esule, mountains of Matese, Abruzzi Molise, 16. VII.1874. (G. Cavanna) in the Museo di Storia Naturale, Firenze.

Note. One female paratype in Museo Civico di Storia Naturale, Genova and one female paratype in Museum of Comparative Zoology, Cambridge.

Description. Carapace red-brown. Median light band spindle-shaped, not particularly prominent. Lateral bands broken into three segments, hardly lighter than the carapace. Abdomen black with a reddish pattern. Legs reddish brown. Femora with three brown annulations more or less darkened; other segments blotched or darkened on the ventral sides. Carapace length 3 mm, width 2.2 mm. Total body length 7.0 mm. Length of first femur 2 mm, patella-tibia 2.5 mm, metatarsus 1.5 mm, total length of first leg 7.2 mm. Fourth femur 2.6 mm, patella-tibia 3.5 mm, metatarsus 3.2

and annulated with brown; other segments mm. Total length of fourth leg 11.1 mm. Epigynum as in Figure 127.

Remarks. *Pardosa aenigmatica* is related to *P. naevia*, judging by the shape of the epigynum, but has a different body color pattern. The specimens do not fit any other species described for Italy or southern Europe. Only the description of *P. frigida* is close, but the body size and shape of the epigynum of this species are different. Unfortunately, the type of *P. frigida* is lost. I do not think that the females of *P. aenigmatica* belong with the male of *P. cavannae* (see *P. cavannae* for further discussion). Some North African species have epigyna closely resembling that of *P. aenigmatica* but none fits exactly. It will be necessary to study the male to learn the relationship of *P. aenigmatica*.

Italian distribution. *Abruzzi-Molise*. Mountains of Matese.

***Pardosa cribrata* Simon**
Figures 148, 149, 152, 153

Pardosa cribrata Simon, 1876, Les Arachnides de France, 3: 342. Female, male syntypes from the Golfe du Lion, southern France, in the Muséum National d'Histoire Naturelle, Paris. Roewer, 1954, Katalog der Araneae, 2a: 161. Bonnet, 1958, Bibliographia Arancorum 2: 3365.

Description. Carapace dark brown. Light median band yellow, spindle-shaped, sometimes a little extended beyond the line of the posterior eyes. Lateral bands yellow but not very evident, being covered with little dark spots and black hairs. They are continuous and are kept apart from the edge of the carapace by a well-marked black line (Fig. 148). Carapace of male darker and lateral bands less distinct. Abdomen blackish speckled with yellow. The whole body, particularly the abdomen of *P. cribrata*, has a greenish cast that is more evident on animals that have been preserved in alcohol for a short time. Abdominal pattern yellow. The four or five spots following the anterior lanceolate band are sometimes more or less fused. Legs on females reddish

yellow, strongly blotched and annulated dark; seldom yellow with pale annulations. Legs of males yellow; femora of first pair black, those of the other legs blotched on upper sides and ventrally darkened. Other segments dusky. Male palpus as in Figures 152, 153. Epigynum as in Figure 149.

Remarks. *Pardosa cribrata* can be separated from *P. hortensis* and *P. proxima*, with which it is very often collected, by the following characters: the male is separated by carapace pattern from males of *P. hortensis*. The shape of the terminal and tegular apophysis is sufficient to separate the males of *P. cribrata* and *P. proxima*. Females of *P. cribrata* are easily separated from those of the other two species by the carapace pattern. *Pardosa hortensis* has the median band clearly dilated in front and at the median region; *P. proxima* and *P. cribrata* have a spindle-shaped median band and the lateral bands broken. Since it resembles *P. hortensis* and *P. proxima* it must often have been confused with those two species; otherwise we could not explain the few records of the Italian collectors.

Note. Near Nuova Siri, Calabria, on the sandy edges of a stream near the sea, Prof. F. Papi collected several male and female specimens of a *Pardosa* that I tentatively placed in *P. cribrata catalonica* Simon (Simon, 1937, p. 1075, female holotype from Menton, Maritime Alps, in MNHN). The specimens have genitalia like those of *P. cribrata* but the size is much smaller and color lighter. The sternum in both sexes is yellow, sometimes in females a little darker on sides, and in males brown with a large median yellow spot. The carapace is brown in both sexes but much lighter than in typical specimens. The median band is wider and a little dilated anteriorly in several specimens. The lateral bands are more clear cut. The abdomen of females is almost yellow, darker in males, but rather light posteriorly. Legs of females are yellow with very pale annulations or without rings.

It is with some doubt that I regard these specimens as belonging to the subspecies

P. cribrata catalonica. Not very far away, near Metaponto, I collected typical specimens of *P. cribrata cribrata*, and I do not see any reason to consider the two localities or the spider populations ecologically or geographically divided. On the other hand, specimens of smaller size and lighter color of other species were collected on the slopes of Monte Pollino and in Sila (see *P. monticola*). [The drawings of *P. cribrata*, that of the male in particular, made by Roewer (1958, p. 50, fig. 10 a-c) are rather different and do not fit the European specimens.]

Ecology. *Pardosa cribrata* is a common species. The habitat of this species is dry places near rivers, streams, ponds and marshes. It is possible to find it also on fields either in the low country or in mountains. The most typical habitat is edges of salt marshes where it is found with *P. luctinosa* which it resembles in carapace pattern and color. The species is mature in April and July.

Specimens examined from Italy. *Piemonte.* Alessandria: Casale Monferrato (Negri, MSNG). *Emilia-Romagna.* Ravenna: S. Alberto, 12.V.1947 (Zangheri, CZ). *Toscana.* Pisa: 6.IV.1960; S. Rossore, 27.V.1958, 7.VI.1958, 20.V.1952, 17.V.1963; Barbaricina, 19.VII.1963. Caprona. Lucca: Massaciuccoli, 7.VII.1963. Levigliani, Alpi Apuane, 660 m, 4.VI.1960. Livorno: Stagno, 22.VII.1963. Siena: Lugnano (MSNF). *Puglie.* Bari: Barletta, mouth of river Ofanto, 2.VI.1962; Canne, 23.VI.1961; Taranto: edges of river Lato, June 1962. *Basilicata.* Matera: Metaponto, 14.VI.1961; Lake of S. Giuliano Matera, 5.VI.1962. *Sardegna.* 1 ♀ (SMF).

General distribution. France, Spain, Italy.

Pardosa proxima (C. L. Koch)

Figures 146-147, 156-157

Lycosa proxima C. L. Koch, 1848, Die Arachniden, 15: 53, figs. 1453, 1454, ♂ ♀. Female, male syntypes from Greece, probably in the British Museum, London.

Pardosa proxima,—Roewer, 1954, Katalog der

Araneae, 2a: 171. Bonnet, 1958, Bibliographia Araneorum, 2: 3410.

Description. Carapace reddish brown. Median and lateral bands yellow. The median band spindle-shaped, the lateral ones clearly broken into three or, more rarely, four spots (Fig. 146). Males only a little darker than females with bands equally distinct. Sternum reddish brown. Abdomen brown with reddish yellow or reddish pattern, often not very clear. Legs of females reddish yellow with brown annulations. The males have femora of first pair black or darkened, femora of other pairs annulated. Other segments yellow suffused with dark. Male palpus (Figs. 156, 157) has all segments reddish brown. Epigynum as in Figure 147.

Remarks. *Pardosa proxima* differs from *P. hortensis* by carapace pattern. Males are easily separated from those of *P. hortensis* because they have all palpal segments red-brown while in *P. hortensis*, femur and patella are yellow and the other two segments black. Both males and females closely resemble *P. cribrata*. The continuous lateral bands and the greenish color of body separate *P. cribrata* from *P. proxima*.

The individual variability of *P. proxima* is great even within the same population. For example, I have collected on the edges of Fiume Centa (Albenga, 30.VI.1958) a female specimen that has an epigynum identical to that of *P. proxima*, but the median band of the carapace is anteriorly dilated and the lateral bands are continuous and very wide. All legs are yellow without annulations. Some authors have attempted to distinguish also, in Italy, the subspecies *P. proxima poetica* Simon and *P. proxima tenuipes* (L. Koch) from the typical form *P. proxima proxima* (C. L. Koch). Since the two subspecies in question do not display a geographical separation in the Italian peninsula, and in fact they have been found together, I believe that they represent different aspects of variability of *P. proxima*. Nearly all the specimens I have examined belong to the typical form. The femora of

the first pair of legs of males are generally very dark and sometimes even black.

Ecology. This species has a widespread distribution. It lives in all parts of Italy, mostly on meadows, along the exposed stream beds, on the edges of ponds, lakes, and swampy places. It is also common in fields together with *P. hortensis*. It lives at low as well as middle altitudes. Specimens mature in spring and summer.

Specimens examined from Italy. *Piemonte.* Alessandria: Casale Monferrato (Negri, MSNG). *Liguria.* Genova (MSNG); La Spezia (Mazza); Albenga. *Emilia-Romagna.* Forlì; Ladino, Carpena, Colmano, Cappuccinini (Zangheri, CZ). *Toscana.* Firenze: Piccioli (Cavanna, MSNF), S. Gervasio (Di Caporiacco, MSNF). Arezzo: Monterchi (Di Caporiacco, MSNF). Livorno: Stagno. Lucca: Levigliani, Alpi Apuane, 600 m; Pania della Croce. Alpi Apuane, 1170 m; Massaciuccoli (some specimens with continuous lateral bands). Pisa: S. Rossore; Barbaricina; Caprona; S. Giuliano. Island of Giglio (Doria, MSNG); Island of Capraia (D'Albertis, MSNG); Island of Elba: Poggio (Kraus, SMF). *Sicilia.* Siracusa: Mt. Lauro, Iblei Mts. (Alicata); Brucoli (Alicata). Palermo: Bisacquino, Mt. Gennardo, 800 m, Mt. Triona (Alicata). Messina: Portella Femmina Morta, Nebrodi Mts. (Alicata).

Specimens examined from outside Italy. *Yugoslavia.* *Istria:* near Pula (Levi, MCZ). Examined also specimens from Corsica, Germany, Austria, Macedonia, Albania, Crete (SMF).

General distribution. Great Britain, central and southern Europe, Balkans to Mesopotamia, North Africa, Canary Islands, Azores.

***Pardosa hortensis* (Thorell)**
Figures 150–151, 154–155

Lycosa hortensis Thorell, 1872, Remarks on Synonyms of European Spiders, p. 299. Female and male syntypes from Pymont (Waldeck) and Nürnberg, Germany.

Pardosa hortensis,—Roewer, 1954, Katalog der

Araneae, 2a: 163. Bonnet, 1958, Bibliographia Araneorum, 2: 3374.

Description. Carapace reddish brown. Median light band expanded in cephalic region and in thoracic region at level of median furrow. Lateral bands reddish yellow, broken (Fig. 150). Abdomen brown with yellow tawny pattern. The male generally has the median band evident only on the thoracic region and lateral bands indistinct. The legs clearly annulated on females. The males have all femora and segments of third and fourth legs annulated; patellae, tibiae, tarsi and metatarsi of first and second legs yellow and uniform. Male palpus with yellowish femur and patella contrasting strongly against the black tibia and tarsus. The little terminal apophysis is located under the laminar process of shield (Figs. 154, 155). Epigynum (Fig. 151) has the septum variable. It can be shaped simply as an upside-down T or the septum may be dilated in the middle, constricted between the dilation and the transverse portion.

Remarks. Both sexes of *P. hortensis* differ from *P. proxima* by carapace pattern. The median band is dilated in *P. hortensis* but spindle-shaped in *P. proxima*. The species is separated from *P. cribrata* by the shape of the median and lateral bands, which are continuous. A careful examination is necessary to distinguish the females of *P. hortensis* from those of *P. strigillata* and *P. pseudostrigillata*. Females are easily separated from those of *P. lugubris* by body pattern.

Ecology. Together with *P. proxima*, *P. hortensis* is the common Italian species. *Pardosa hortensis* lives in dry places as well as in moist ones. It is particularly abundant on meadows and fields. It lives from low to middle altitudes. Mature specimens are found in the spring, females also in summer and fall through October.

Specimens examined from Italy. *Piemonte.* Alessandria: Lerma (Filippa, MSNG). *Friuli-Venezia Giulia.* Carnia (Di Caporiacco, MSNF). *Veneto* (Canestrini,

IZUP). *Emilia-Romagna*. Forlì: Premilcuore, Cappuccinini (Zangheri, CZ); Ravenna: Pineta S. Vitale (Zangheri, CZ); Modena: S. Anna Pelago, 1070 m. *Toscana*. Firenze: Piccioli, Carmignano; Lastra a Signa, Mt. Fiesole (Di Caporiacco, MSNF). S. Marcello Pistoiese: Mt. Teso, 1500 m (Cavanna, MSNF). Arezzo: Passo of Consuma, 1023 m (MSNF). Livorno: Gabbro. Lucca: Bagni di Lucca, Levigliani, 600 m, Alpi Apuane. Pisa: S. Rossore; Barbaricina, Montemagno, Caprona, S. Giuliano. *Campania*. Ravello (Levi, MCZ). Lattari Mts., 800 m, between Gragnano and Agerola, peninsula Sorrentina (Levi, MCZ). *Basilicata*. Stream Percopo, near river Bradano; Km 491 Via Appia; between Potenza and Matera; Potenza, 800 m (Levi, Tongiorgi, MCZ). *Puglia*. Bari: Gioia del Colle. *Calabria*. Sila: Lake Cecita (Papi).

Specimens examined from outside Italy. *Yugoslavia*. Istria: N slope of Mt. Ucka, 1100 m (Levi, MCZ). *Slovenia*: Bled, 500–700 m, Alpi Giulie (Levi, MCZ).

General distribution. Great Britain, central, eastern and southern Europe to Caucasus, North Africa, Japan.

Pardosa strigillata Simon

Figures 143–144, 158–159

?*Lycosa atomaria* C. L. Koch, 1848, *Die Arachniden*, 15: 31, fig. 1437, ♀. Female holotype from Nauplia, Greece.

Lycosa strenua Thorell, 1872, *Remarks on Synonyms of European Spiders*, p. 302. Female syntypes from Italy. (Not *L. strenua* Nicolet, 1849; not *L. strenua* Rainbow, 1920.)

Pardosa strigillata Simon, 1876, *Les Araclmides de France*, 3: 338, pl. 12, fig. 6, pl. 13, figs. 9, 10, ♀ ♂. Female, male syntypes from Corsica in the Muséum National d'Histoire Naturelle, Paris. Roewer, 1954, *Katalog der Araneae*, 2a: 173. Bonnet, 1958, *Bibliographia Araneorum* 2: 3424.

Pardosa subita Simon, 1876, *op. cit.*, 3: 356. (New name for *L. strenua* Thorell.) (Not *Lycosa subita*,—Kulczynski, 1887.)

Pardosa atomaria,—Roewer, 1954, *op. cit.*, 2a: 159. Bonnet, 1958, *op. cit.*, 2: 3358.

Description. Carapace dark reddish brown. Light median band yellow, dilated

anteriorly and at level of thoracic furrow, where it is clearly branched. Lateral bands yellow, broken, with irregular edges (Fig. 143). At times the lateral bands are continuous but serrated. Male as female, but darker. Sternum black. Abdomen generally black with yellow pattern. Anterior lanceolate band reddish yellow. The yellow pattern takes up most of dorsal side of abdomen. It is not difficult to find specimens with the abdomen very light; the dark parts are then reduced to small loose spots. Legs reddish yellow, clearly annulated on the female, less on the male. Palpus (Figs. 158, 159) with femora black, and distal end and lateral sides yellow. Patellae yellow; tibiae and tarsi black. Epigynum as in Figure 144.

Remarks. *Pardosa strigillata* is closely related to *P. pseudostrigillata*. The males of the two species differ mainly by the shape of the tegular apophysis (compare Figs. 160, 161). In contrast, females are very difficult to separate. There are, indeed, some small differences in the shape of the epigynum and in spination of the first legs, that may be used successfully to separate the two species. In the color of carapace and structure of genital organs, *P. strigillata* is very like *P. hortensis*. A careful inspection of morphological characters is, therefore, necessary. As the synonymy of *Pardosa strigillata* is rather confused, I will summarize it briefly.

In 1872 Thorell described, without providing any drawing, *Lycosa strenua*. The name *strenua* could not be maintained, because it was preoccupied by the *Lycosa strenua* Nicolet, and therefore Simon (1876, p. 356) renamed it *P. subita*. At the same time, Simon (1876, p. 338) described *P. strigillata*, the description of which fits rather well the original description that Thorell had given of *L. strenua*. In fact, Simon in 1937 considered *P. subita* as a synonym of *P. strigillata*. The drawings of *P. strigillata* published by Simon (1876, 1937), though not very clear, permit the identification of the species.

I was able to examine many specimens of both sexes of *P. strigillata* collected in Sardinia and Corsica (Kraus det., SMF). I examined also six females and one male collected at La Spezia and Canton Ticino (Collection Canestrini, IZUP). The specimens of the Canestrini collection are labelled as *Lycosa strenua* Thorell and it is very likely that the original description of *P. strenua* by Thorell himself was based on the two females of this group (Thorell, 1872, p. 303).

There is another species very closely related to *P. strigillata*, namely *Pardosa atomaria* (C. L. Koch) (C. L. Koch, 1848, fig. 1437). The original description and drawing are unfortunately too poor and therefore inadequate to identify the species, and there is no other description or illustration of *P. atomaria* based on the original material which, as far as I know, is lost.

The drawing of the epigynum of a female of *P. atomaria* given by Kulczynski (1908, pl. 2, fig. 23), though well done, could be referred to *P. strigillata* and *P. pseudostrigillata* as well. Kulczynski himself ascribes his specimen only tentatively to *P. atomaria*. The figures of the palpus and the epigynum given by Giltay (1932) are uselessly schematic. Therefore, I consider *P. atomaria* (C. L. Koch) a doubtful species. Because the type as well as the other described specimens of *P. atomaria* come from the Balkans and Asia Minor where *P. strigillata* is rather common, and because, on the basis of the drawings of C. L. Koch, Kulczynski and Giltay, it is impossible to distinguish the two species, I would be inclined to consider *atomaria* as a synonym for *strigillata*.

Ecology. *Pardosa strigillata* lives on sandy places especially along edges of streams (Simon, 1937) as high as 400–500 m. Denis (1952) records the capture of one female at 2120 m on the massif du Carlit (east Pyrenees). Mature specimens of both sexes have been collected in April, mature females also in September. I could not examine any specimens of *P. s. ligurica* Simon.

Italian distribution. *Pardosa strigillata* seems to replace *P. hortensis* in Sardinia. It

is one of the more frequent species on the island, while *P. hortensis* is almost unknown there. The only two records of *P. hortensis* in Sardinia are those of Magretti (1880) and Garnari (1902), and they could easily have mistaken it for *P. strigillata*.

As for the other Italian records, among the spiders of Carnia (Di Caporiacco, 1922, 1927), and Romagna (Di Caporiacco, 1926, 1938, 1949), and Umbria (Di Caporiacco, 1950), I have not found any specimen of *P. strigillata*. All specimens identified as *P. strigillata* by Di Caporiacco were either juvenile specimens (especially of *P. hortensis*) or misidentified. I could not check other records. Probably it would be much better to assign the records in the province of Florence to *P. pseudostrigillata* (Di Caporiacco, 1923, 1936).

Specimens examined from Italy. Liguria. La Spezia (Canestrini, 1873, IZUP). *Sardegna.* S. Vito, Sarrabus, IV.1872 (Gestro, MSNG). Sassari: Ozieri, 320 m, Lagadozo, 21.IV.1955 (Kahmann leg. Kraus det., SMF).

Specimens examined from outside Italy. Besides the specimens of *P. strigillata* of Italy and Sardinia, I saw several females from Crete, Skyros and Vityna (Greece), and from Montenegro. (Unfortunately, I have not found any male among them so the identification remains doubtful.) These specimens, by the characters indicated above, are *P. strigillata*.

France. Corsica: Biguglia, 28.IV.1952; Asco Tal 17.IX.1953; Stream Prunelli 17.IV.1955; Lucciana, 21.IV.1954; Corte, 15.IV.1952 (leg. Kahmann, det. Kraus 1955, SMF). *Yugoslavia.* Montenegro: Radakovic, 17.VIII.1959; Petrovac, 16.VIII.1959 (Papi). *Greece.* Archadia; Peloponneso: Vityna VII.1926 (Roewer, SMF); Tripolitza (Roewer, SMF); Pikerini (D'Albertis, MSNG). Sporadi. Isl. Skyros, 22.III.1958 (Schelkept, SMF). *Crete*, VI.1926 (Roewer, SMF).

General distribution. Southern Europe from Portugal, France to the Balkans.

Pardosa pseudostrigillata n. sp.

Figures 145, 160–161

Lycosa subita,—Kulczynski, 1887. Rozpr. Spraw.

Wydz. Mat. Przewyred. Akad. Umiej., 16: 254, pl. 5, figs. 4-5, ♀ ♂. (Not *P. subita* Simon, 1876.)

?*Lycosa maculata* Rosca, 1939, Zool. Anz., 125(3, 4): 95, figs. 6-9 ♂ ♀. Male and female syntypes from Dobrogea, Romania, destroyed. (Fuhn, in litt. to Dr. H. W. Levi.)

Type. Male holotype from Cerreto, Tosco-Emiliano Appennins, Italy, in the Museo di Storia Naturale, Genova.

Description. *Pardosa pseudostrigillata*, as far as we know, has a body pattern similar to that of *P. strigillata*. The differences between the two species are here described. The genitalia are illustrated by Figures 145, 160, 161.

Remarks. *Pardosa maculata* (Rosca) is very close to *P. pseudostrigillata*. On the drawing of Rosca's species it is possible to observe a laminar process of the shield on the male bulbus. Besides *P. hortensis*, which has a similar process but, according to Rosca, different structure of the palpus, I know of only one other similar species, *P. pseudostrigillata*. The form I give here as *Pardosa pseudostrigillata* is identical to the one that Kuleczynski (1887) described under the name of *P. strenua* [= *P. strigillata*].

Actually, though it was not pointed out in the text of Kuleczynski, the drawings (at least that of the male palpus) of this author reveal substantial differences between this species and *P. strigillata*. The tegular apophysis of the male palpus is undoubtedly different. The description of the female does not allow differentiation of the two species.

The males I was able to study (two collected at Cerreto¹ and one in province of Forlì) are certainly identical to that represented by Kuleczynski. On a lot of females collected at Villa Mercatale, near Florence,

I was able to find some characters that permit differentiating them from typical *P. strigillata*. They are:

1) On all specimens of *P. strigillata* that I examined, the basal spines of anterior metatarsi hardly reach the base of the median ones (cf. Simon, 1937, p. 1080). On the specimens of *P. pseudostrigillata* the basal spines are longer, overlapping the middle of the median ones.

2) Ventral to the first tibia of *P. strigillata* there are two pairs of spines. A third pair is placed more apically and shifted sideways. The spines are rather thin and short. In *P. pseudostrigillata* there are three pairs of spines on the ventral sides of the first tibia, the third pair being in a line with the other two pairs. Besides, spines are longer and stronger. These characters can be sometimes variable, particularly the position of the third pair of spines.

3) In all the specimens of *P. pseudostrigillata* that I have examined, a dark sclerotized process that protrudes from the anterior corner of each pocket of the epigynal septum is present (Fig. 145). This process is not distinctly visible in *P. strigillata* and I do not know whether this character can have a taxonomic value.

On this basis I have tentatively ascribed these females to *P. pseudostrigillata*. Only after this paper was submitted have I been able to study one male and one female of *P. pseudostrigillata* kindly sent to me by Mr. K. Thaler of Innsbruck. They were collected near Limone, Garda Lake, 31.V.1963, in a talus field with scanty vegetation near a stream at 300 m elevation. I can now confirm that the above-mentioned females match the male of *P. pseudostrigillata*.

Specimens examined from Italy. *Emilia-Romagna.* Forlì: Lardiano, 4.XI.1923, 1 ♂, 3 ♀ ♀ juv. (Zangheri, CZ). *Reggio Emilia:* Cerreto, 1 ♂ (MSNG). *Toscana.* Firenze: Vinci, Villa Mercatale, 60 m, 19.VI.1921 (Di Caporiacco, MSNF) (determined by Di Caporiacco as *P. strigillata* and *P. amenata*).

¹ *Note.* On the label in the vial the name of the locality is only shown as Cerreto. The specimens have been probably collected at Passo del Cerreto. (Reggio Emilia, Appennino Tosco Emiliano), but in Italy there are many other localities so named. Some are in Tuscany and in Florence province.

***Pardosa morosa* (L. Koch)**

Figures 64–66

Lycosa morosa L. Koch, 1870, Jahrb. k.k. Gelehr.

Gesell. Krakau, 41: 47. Female syntypes from several localities in the Tatra mountains and Bohemia, probably in the Berlin Museum.

Pardosops morosa,—Roewer, 1954, Katalog der Araneae, 2a: 197.*Pardosa morosa*,—Bonnet, 1958, Bibliographia Araneorum, 2: 3393.

Description. General color of body very dark. Carapace wide and very dark brown. Median light band reddish yellow. It is generally clear at level of median furrow where it appears as a branched spot. Sometimes on the cephalic region there is a lighter area or yellowish spots. The lateral bands are broken into three or more rather narrow spots. The male is darker. Abdomen dark brown with indistinct red pattern. Legs red-brown with dark annulations. Male legs more or less uniformly darkened. Male palpus as in Figures 64, 65. Epigynum as in Figure 66.

Remarks. *Pardosa morosa* is closely related to *P. strigillata* and *P. pseudostrigillata*. The male is separated from others by the different shape of the process of shield. This process is rather blunt and short in *P. morosa* but flattened and slender in *P. strigillata* and *P. pseudostrigillata*. Females of this species are separated by color pattern.

Ecology. According to Simon, Dahl, and de Lessert the characteristic habitat of *P. morosa* is the same as that of *P. wagleri*, the edges of lakes, rivers and streams made up of pebbles, stones or, at least, rough sand. I have never found *P. morosa* with *P. wagleri* either on the plains or in the mountains. According to de Lessert (1910), this species is common on the lake of Geneva and along the banks of the Rhone. It is likely that *P. morosa* will be found in Italy in zones of middle altitude.

Italian distribution. Among spiders from Carnia and Romagna identified by Di Caporiacco are specimens classified as *P. morosa* but either these are juveniles or the identification is wrong. I examined specimens from France and Galicia (MCZ) and

from Lausanne (det. by Pavesi as *P. paludicola*, MSNG). Other records are by Di Caporiacco (1951a), Bertkau (1890) and Jackson (1926).

General distribution. France, Central Europe to Poland, Italy to Balkans.

SPECIES OF DOUBTFUL OCCURRENCE IN ITALY, AND QUESTIONABLE SPECIES

***Pardosa arenicola* (O. P.-Cambridge)**

Figures 75–76

Lycosa arenicola O.P.-Cambridge, 1875, Ann. Mag. Nat. Hist., (4)16: 253, pl. 8, fig. 9a, b, ♀♂. Male and female syntypes from Island of Portland, Chesil Beach, England, in the University Museum, Oxford.

This species was twice recorded for Italy by Di Caporiacco (1940, 1950). It is a northern European species and the females can be separated only with difficulty from those of other species of *P. monticola* group. The identification of specimens collected on Cima Galbana, 1583 m (Lessini Mts., Verona) [This collection was lost during the last war], is probably wrong because it is far from the typical habitat. The female collected on a sandbank of S. Giuliano (Laguna di Venezia) could be this species but the identification carried out on only one female is questionable. I have never been able to collect *P. arenicola* nor could I check the identity of Di Caporiacco's specimens. Therefore I question the presence of this species in Italy. Figures 75 and 76 show the epigyna of two specimens of *P. arenicola* from England and Germany. For more information about this species, see Tongiorgi, 1965.

***Pardosa aeronauta* (Contarini)**

Lycosa aeronauta Contarini, 1847, Atti Ist. Venezia Sci. Lett. Art., 6: 441–444.

From the short note of Contarini it is impossible to identify the species. Thorell (1872, p. 292) gives a short description of this species based on some data from Nimmi. Thorell regards *P. aeronauta* as probably belonging to the *P. monticola* group. Since Thorell's species is impossible to recognize

from the description, I regard this name as a *nomen inquirendum*. According to Contarini the species is abundant on the salty sandbanks of Valle Grassabò (Venezia).

Pardosa subglacialis C. L. Koch in Calloni

Pardosa subglacialis.—Calloni, 1890, La fauna nivale con particolare riguardo ai viventi delle alte Alpi, Pavia, pp. 139, 274, 410, 436.

Calloni says he received from Koch a communication on the existence of a new species called *P. subglacialis*. Koch never published a description of this species. The name is a *nomen nudum*.

Pardosa frigida Simon 1876

Pardosa frigida Simon, 1876, Les Arachnides de France, 3: 353, pl. 13, fig. 15, ♀. Female holotype from Faillefeu, Basses Alps, France, lost.

The reasons for considering this species distinct from *P. cavannaec*, not following the later opinion of Simon, are explained in the discussion of *P. cavannaec*. From the description, *P. frigida* could be a species of the group of *P. ferruginea*, but the epigynum shape is quite different. For the present I do not know any specimens of this species, and I cannot relate *P. frigida* to any of the other species of *Pardosa*. The specimens from Monte La Bioula, 3000 m, Valle d'Aosta: Gran Paradiso National Park, determined by Di Caporiacco (1928), were juvenile and the identification doubtful. I regard *P. frigida* as a questionable species.

REFERENCES CITED

BERTKAU, P. 1890. Arachniden gesammelt vom 12. November 1888 bis zum 10. Mai 1889 in San Remo von Prof. Dr. Oskar Schneider. Pp. 1–11. Privately printed.

BONNET, P. 1958. Bibliographia Araneorum. Toulouse, 2(4): 3027–4230.

CAFFI, E. 1895. I Ragni di Calabria. Bergamo, pp. 1–62.

CALLONI, S. 1890. La fauna nivale con particolare riguardo ai viventi delle alte Alpi. Pavia, pp. 1–478.

CANESTRINI, G. AND P. PAVESI. 1868. Araneidi italiani. Atti Soc. Ital. Sci. Nat., 11: 738–872. Atti Riunione Straordinaria Soc. Ital.

Sci. Nat., Vicenza, 1868 (1869), pp. 406–540. Sep., pp. 1–135.

———. 1870. Catalogo sistematico degli Araneidi italiani. Arch. Zool Anat. Fisiol., 2: 60–64, pls. III–IV. Sep., 1–44.

CHARITONOV, D. E. 1926. Materialy k faunnie Paoukov Verchotourskogo Ourala. Izv. Biol. Inst. Perm., 5: 49–60, pl. 1.

CONTARINI, N. 1847. Notizie sulla fauna terrestre e particolarmente sulla ornitologia del Veneto Estuario con cenni sul passaggio degli Uccelli e sulla caccia. In: Venezia e le sue Lagune. Venezia, 2(1): 157–260.

DAHL, F. 1908. Die Lycosiden oder Wolfspinnen Deutschlands und ihre Stellung im Haushalt der Natur. Nova Acta Acad. Caes. Leop.-Carol., 88: 175–678, 86 figs.

DAHL, F. AND M. DAHL. 1927. Spinnentiere oder Arachnoidea. II. Lycosidae s. lat. Tierwelt Deutschlands, pp. 1–80, 192 figs.

DENIS, J. 1952. Araignées du Massif du Carlit (Pyrénées orientales). Bull. Soc. Hist. Nat. Toulouse, 87: 51–73.

———. 1963. Araignées des Dolomites. Atti Ist. Ven. Sci. Lett. Arti Venezia, 121: 253–271, 16 figs.

DI CAPORIACCO, L. 1922. Saggio sulla fauna aracnologica della Carnia e regioni limitrofe. Mem. Soc. Ent. Ital., 1: 60–111.

———. 1923. Aracnidi dei dintorni di Firenze. Mem. Soc. Ent. Ital., 2: 107–112.

———. 1926. Aracnidi della Provincia di Forlì. Mem. Soc. Ent. Ital., 4: 229–258.

———. 1927. Secondo saggio sulla fauna aracnologica della Carnia e regioni limitrofe. Mem. Soc. Ent. Ital., 5: 70–130.

———. 1928. Aracnidi della Capraia. Boll. Soc. Ent. Ital., 60: 124–127.

———. 1936. Saggio sulla fauna aracnologica del Casentino Val d'Arno superiore e Alta Val Tiberina. Festschr. Strand, Riga, 1: 326–369.

———. 1938. Aracnidi di Romagna. Boll. Soc. Eustachiana Camerino, 36: 3–10.

———. 1940. Arachniden aus der Provinz Verona (Norditalien). Folia Zool. Hydrobiol., 10: 1–37, 3 figs.

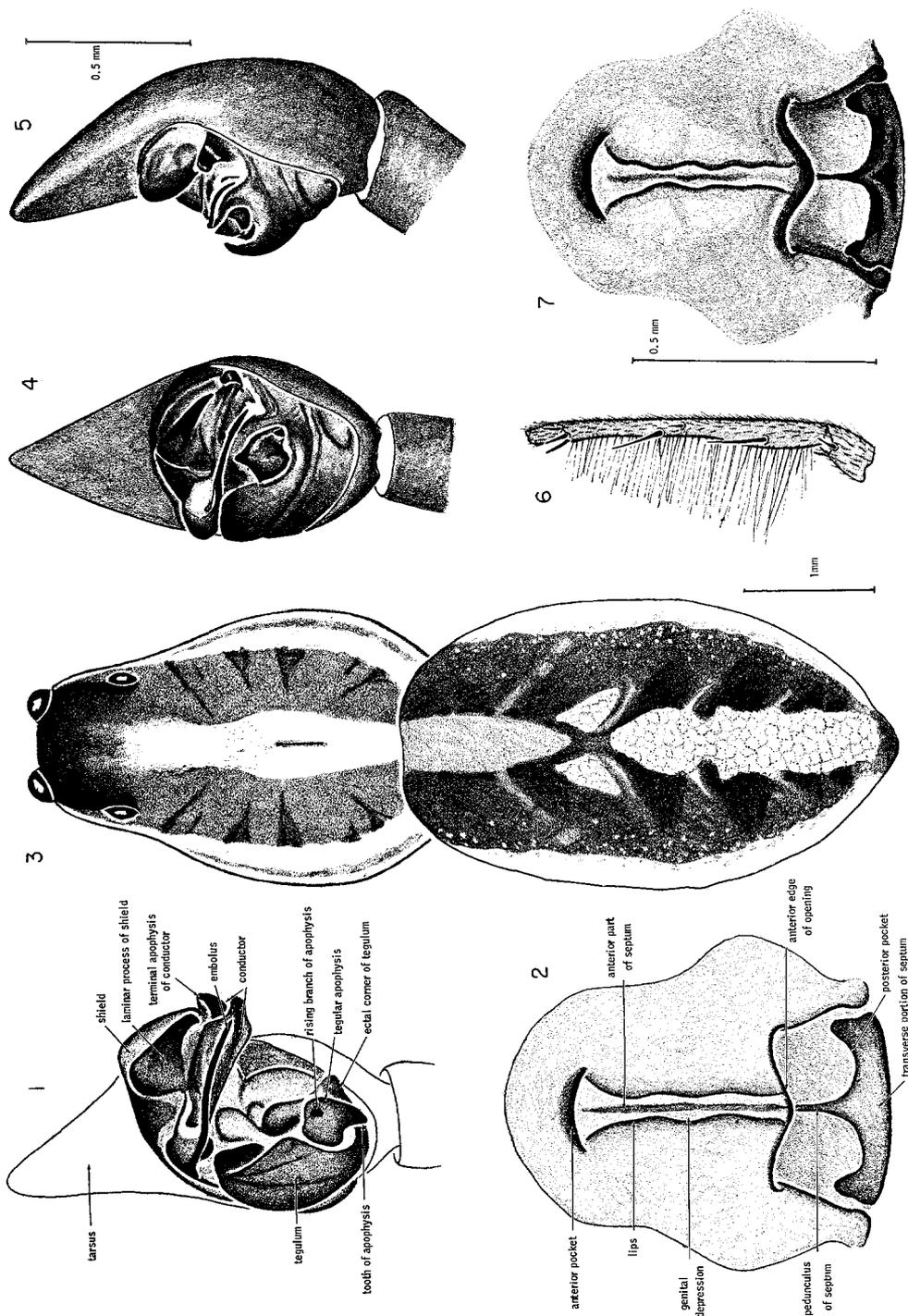
———. 1949. L'Aracnofauna della Romagna in base alle raccolte Zangheri. Redia, 34: 237–288, 4 figs.

———. 1950. Gli Aracnidi della Laguna di Venezia. Boll. Soc. Venez. Stor. Nat. Mus. Civ. Stor. Nat. Venezia, 5: 114–140, 8 figs.

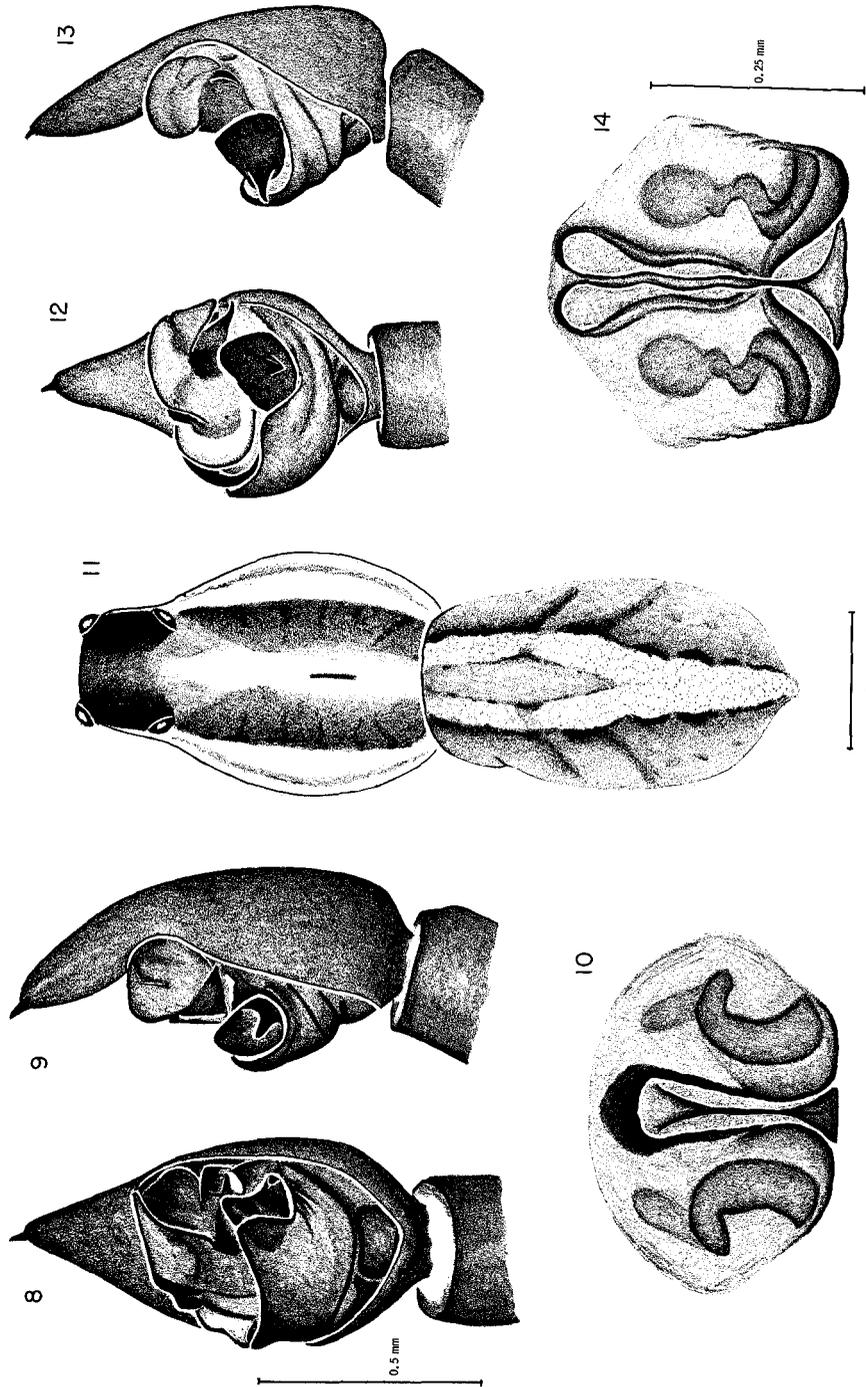
———. 1951a. Aracnidi. In: Il Parco nazio-

- nale del Gran Paradiso. Pubbl. 1925-1932. Torino, 1951, pp. 192-195. (Repr. from: Parco Naz. Gran Parad., 2: 1928.)
- . 1951b. Aracnidi dell'Alta Valle dell'Orco. In: Il Parco nazionale del Gran Paradiso. Pubbl. 1925-1932. Torino, 1951, pp. 325-330. (Repr. from Parco Naz. Gran Parad., 3, 1932.)
- GARNERI, G. A. 1902. Contribuzione alla fauna sarda. Aracnidi. Boll. Soc. Zool. Ital., 3: 57-103.
- GILTAY, L. 1932. Arachnides recueillis par M. D'Orchymont au cours de ses voyages aux Balkans et en Asie Mineure en 1929, 1930 et 1931. Bull. Mus. Roy. Hist. Nat. Belgium, 8: 1-40.
- HOLM, Å. 1947. Svensk Spindelfauna. Egentliga Spindlar. Araneae. Fam. 8-10. Oxyopidae, Lycosidae och Pisauridae. Stockholm, pp. 1-48, 20 figs., 10 pls.
- JACKSON, A. R. 1926. A list of spiders found by Mr. H. Donisthorpe at Bordighera in northern Italy. Ent. Rec. J. Variat. London, 38: 26-28.
- KOCH, C. L. 1848. Die Arachniden. Nürnberg, 14: 1-210.
- KOCH, L. 1870. Beiträge zur Kenntniss der Arachnidenfauna Galiziens. Jahrb. k.k. Gelehr. Gesell. Krakau, 41: 1-56.
- KRATOCHVIL, J. 1935. Araignées nouvelles ou non encore signalées en Yougoslavie. Folia Zool. Hydrobiol., 8: 10-25.
- KULCZYNSKI, W. 1887. Beitrag zur Kenntniss der Arachniden Fauna Tirols. Rozpr. Spraw. Wyzd. Mat. Przyrod. Akad. Umiej, 16: 245-356, pls. V-VIII.
- . 1908. Fragmenta arachnologica, VI. Araneae nonnullae in Cypro insula et in Palaestina a Cel. Prof. Dr. G. Ceconi lectae. Bull. Acad. Cracovie, 1908: 49-85, pl. II.
- . 1909. Fragmenta arachnologica VII. XI. De Pisauridis et Lycosidis Europaeis nonnullis. Bull. Acad. Cracovie, 1909: 427-444, pl. XXII.
- . 1916. Araneae Siberiae occidentalis arcticae. Zap. Imp. Akad. Nauk, 28: 1-44, 2 pls.
- LESSERT, R. DE. 1910. Catalogue des Invertébrés de la Suisse III. Araignées. Mus. Hist. Nat. Genève, pp. 1-636.
- LOCKET, C. H. AND A. F. MILLIDGE. 1951. British Spiders. Ray Society, London, 1: 1-310.
- MAGRETTI, P. 1880. Una seconda escursione zoologica all'Isola di Sardegna. Atti Soc. Ital. Sci. Nat., 23: 18-41.
- PAVESI, P. 1873. Enumerazione dei Ragni nei dintorni di Pavia. Atti Soc. Ital. Sci. Nat., 16: 68-78.
- PETRUSEWICZ, K. 1935. *Lycosa riparia* C. L. Koch, *L. riparia sphagnicola* Dahl und *L. montivaga* Kulcz. Ann. Mus. Zool. Polon., 11: 21-25.
- ROEWER, C. F. 1954. Katalog der Araneae. Bruxelles, 2a: 1-923.
- . 1958. Exploration du Parc National de l'Upemba. Araneae Lycosaeformia IIa (Lycosidae). Inst. Parc. Nat. Congo Belge, Bruxelles, 55: 1-518, 291 figs.
- SIMON, E. 1876. Les Arachnides de France. Paris, 3: 1-364, pls. VIII-XI.
- . 1882. Aracnidi raccolti da G. Cavauna al Vulture, al Pollino ed in altri luoghi dell'Italia meridionale e centrale, nei mesi di Luglio e di Agosto 1880. Boll. Soc. Ent. Ital., 14: 31-48.
- . 1898. Histoire naturelle des Araignées. Paris, 2(2): 193-380.
- . 1937. Les Arachnides de France. Paris, 6: 645-1298.
- THOBELL, T. 1872. Remarks on synonyms of European spiders. III. Uppsala, pp. 229-374.
- . 1875. Descriptions of several European and North African spiders. Kongl. Svenska Vet.-Akad. Handl., Stockholm, 13: 3-203.
- TONGIORGI, P. 1964. Un Ragno earatteristico dei terreni salmastri: *Pardosa luctinosa* Simon [= *Pardosa entzi* (Chyzer)] (Araneae—Lycosidae). Monit. Zool. Ital., 72: 243-253.
- . 1966. Wolf spiders of the *Pardosa monticola* group (Araneae—Lycosidae). Bull. Mus. Comp. Zool., Cambridge, 134(9): 335-358.

(Received 4 February 1965.)

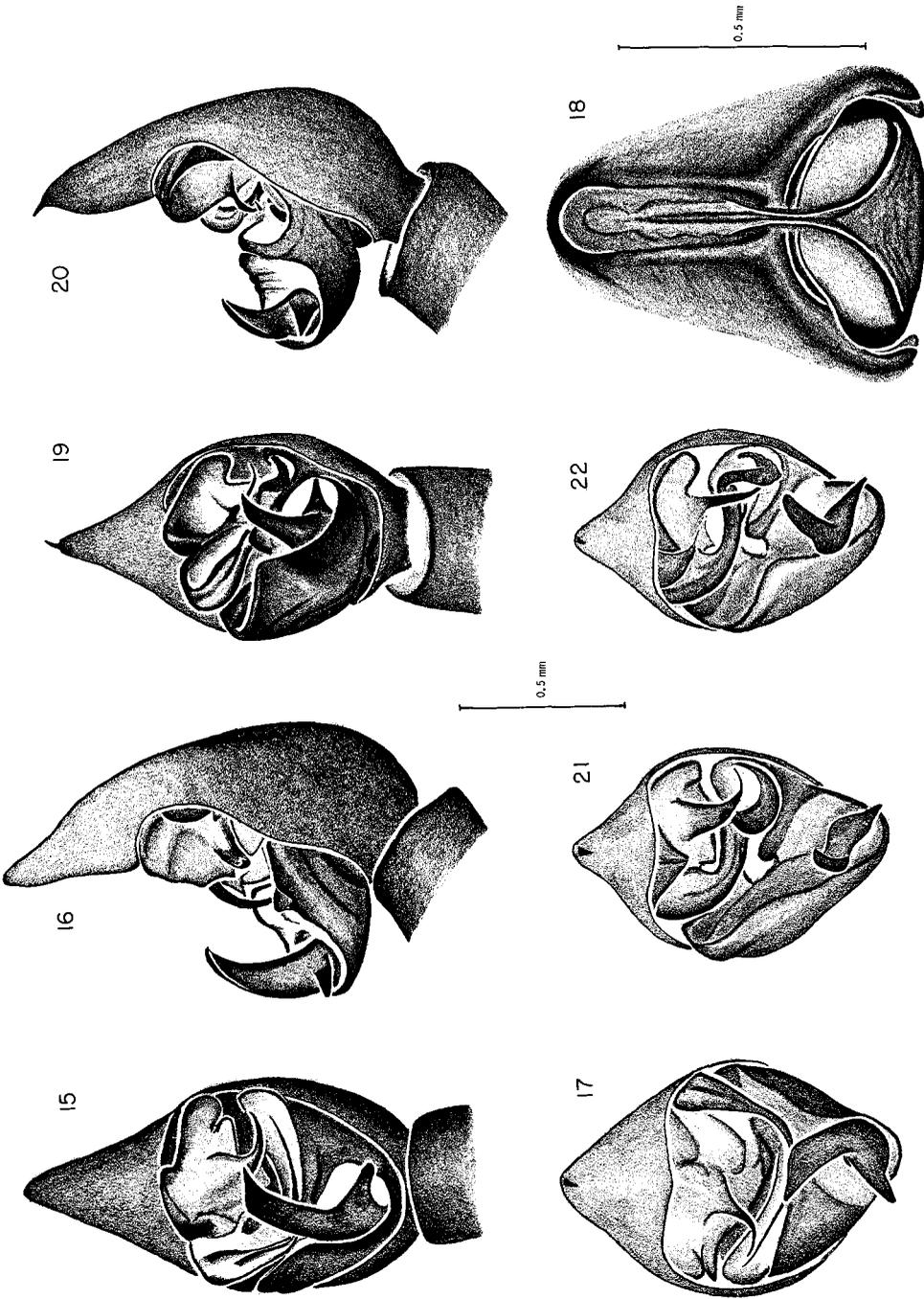


Figs. 1-7. *Pardosa vittata* (Keyserling) [Pisa, Toscana]. 1. Left palpus expanded. 2. Epigynum. 3. Female. 4-5. Left palpus. 4. Ventral view. 5. Lateral (ectal) view. 6. Second left metatarsus of male. 7. Epigynum.



Figs. 8-11. *Pardosa bifasciata* (C. L. Koch). 8, 9. Left palpus [Canton Ticino]. 8. Ventral view. 9. Lateral view. 10. Epigynum. 11. Female [Levico, Trentino].

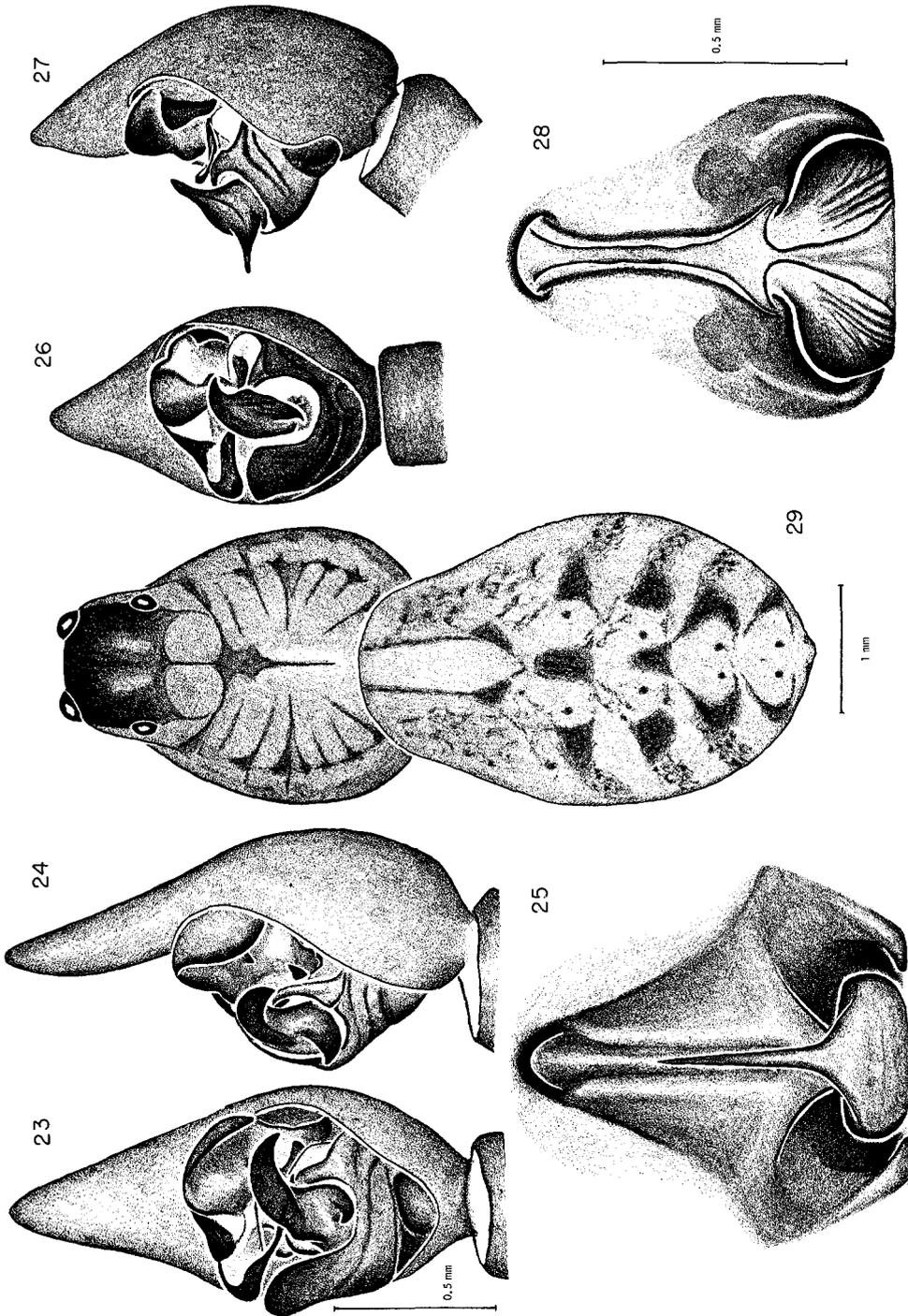
Figs. 12-14. *P. schenkeli* Lessert [France]. 12, 13. Left palpus. 12. Ventral view. 13. Lateral view. 14. Epigynum.



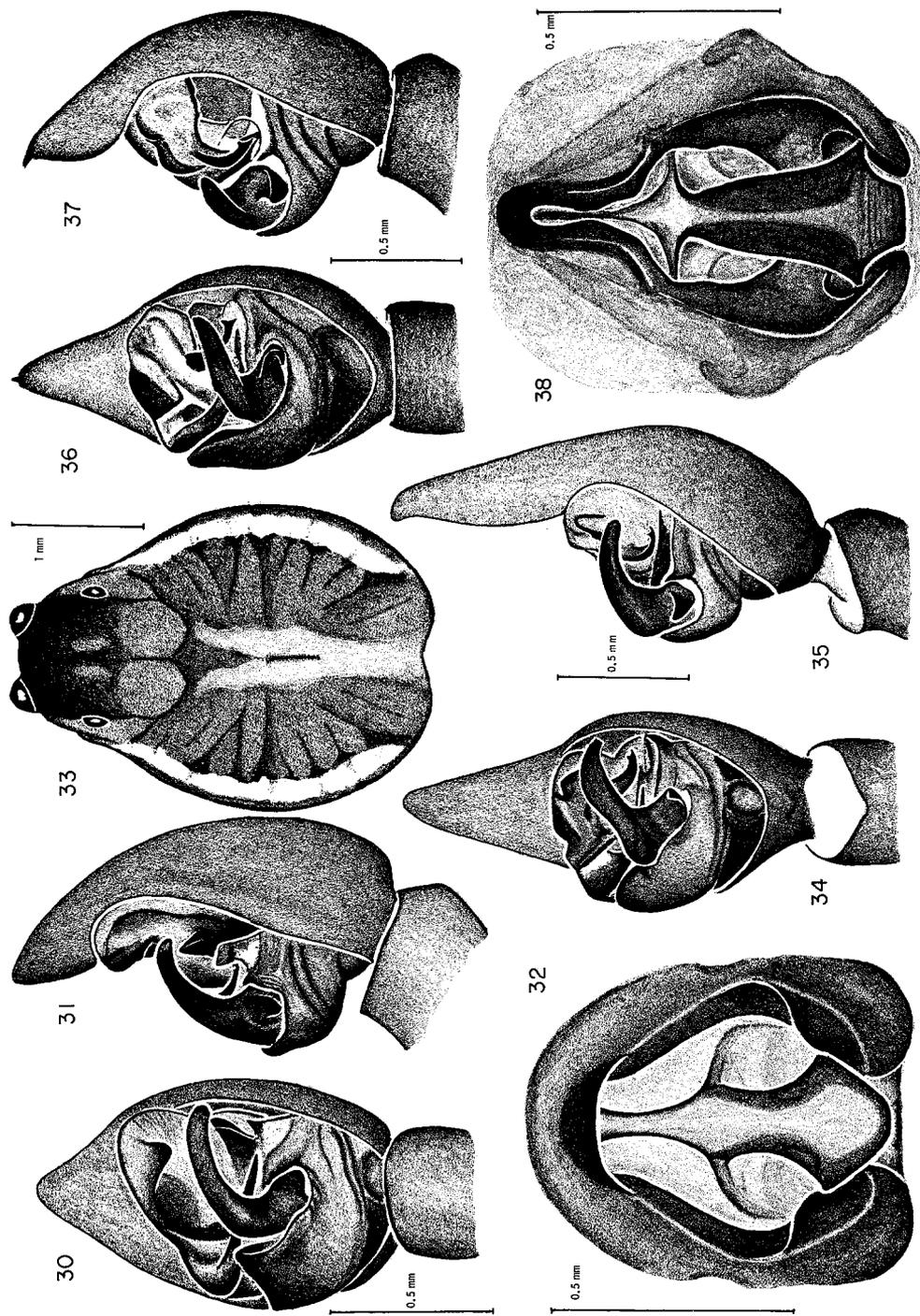
Figs. 15-18. *Pardosa giebeli* [Pavesti] [Switzerland]. 15, 16. Left palpus. 15. Ventral view. 16. Lateral view. 17. Right palpus, apical view. 18. Epigynum.

Figs. 19-20, 22. *P. eiseni luciae* n. subsp. [Foulhorn, Switzerland]. 19-20, 22. Left palpus. 19. Ventral view. 20. Lateral view. 22. Apical view.

Fig. 21. *P. eiseni eiseni* [Thorell] [Finland]. Apical view.



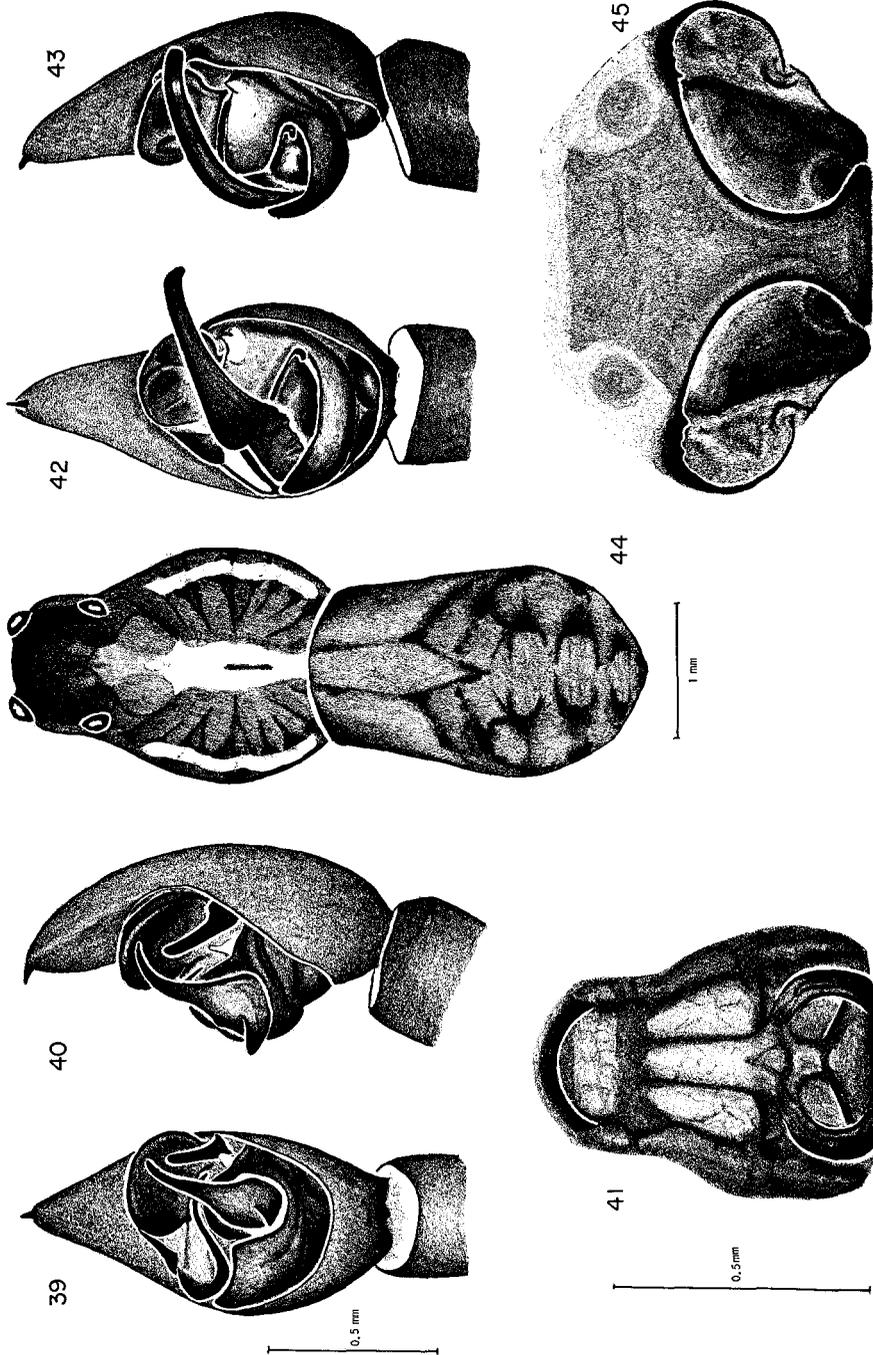
Figs. 23-25. *Pardosa paludicola* (Clerck) [France]. 23, 24. Left palpus. 23. Ventral view. 24. Lateral view. 25. Epigynum.
 Figs. 26-29. *P. sordidata* (Thorell) [Switzerland]. 26, 27. Left palpus. 26. Ventral view. 27. Lateral view. 28. Epigynum. 29. Female.



Figs. 30-33. *Pardosa lapponica* (Thorell). 30, 31. Left palpus [Tyrrol]. 30. Ventral view. 31. Lateral view. 32. Epigynum [Lapland]. 33. Female carapace [Lapland].

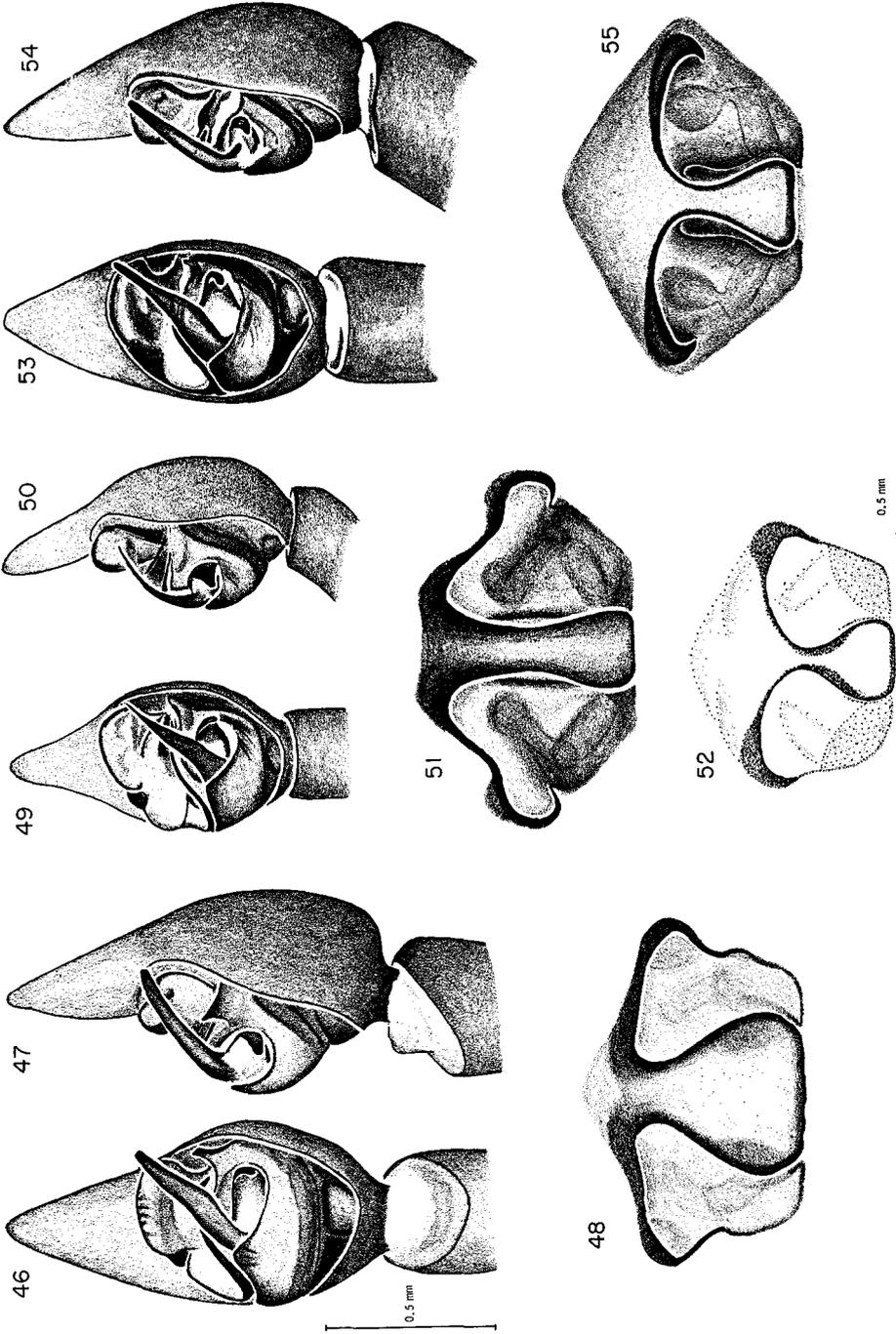
Figs. 34, 35. *P. cavannae* Simon [Monte Amaro, Abruzzo]. 34, 35. Left palpi. 34. Ventral view. 35. Lateral view.

Figs. 36-38. *P. ferruginea* (L. Koch). 36, 37. Left palpus [Switzerland]. 36. Ventral view. 37. Lateral view. 38. Epigynum [Carnic Alps].



Figs. 39-41. *Pardosa nigriceps* [Thorell]. 39, 40. Left palpus [England]. 39. Ventral view. 40. Lateral view. 41. Epigynum [France].

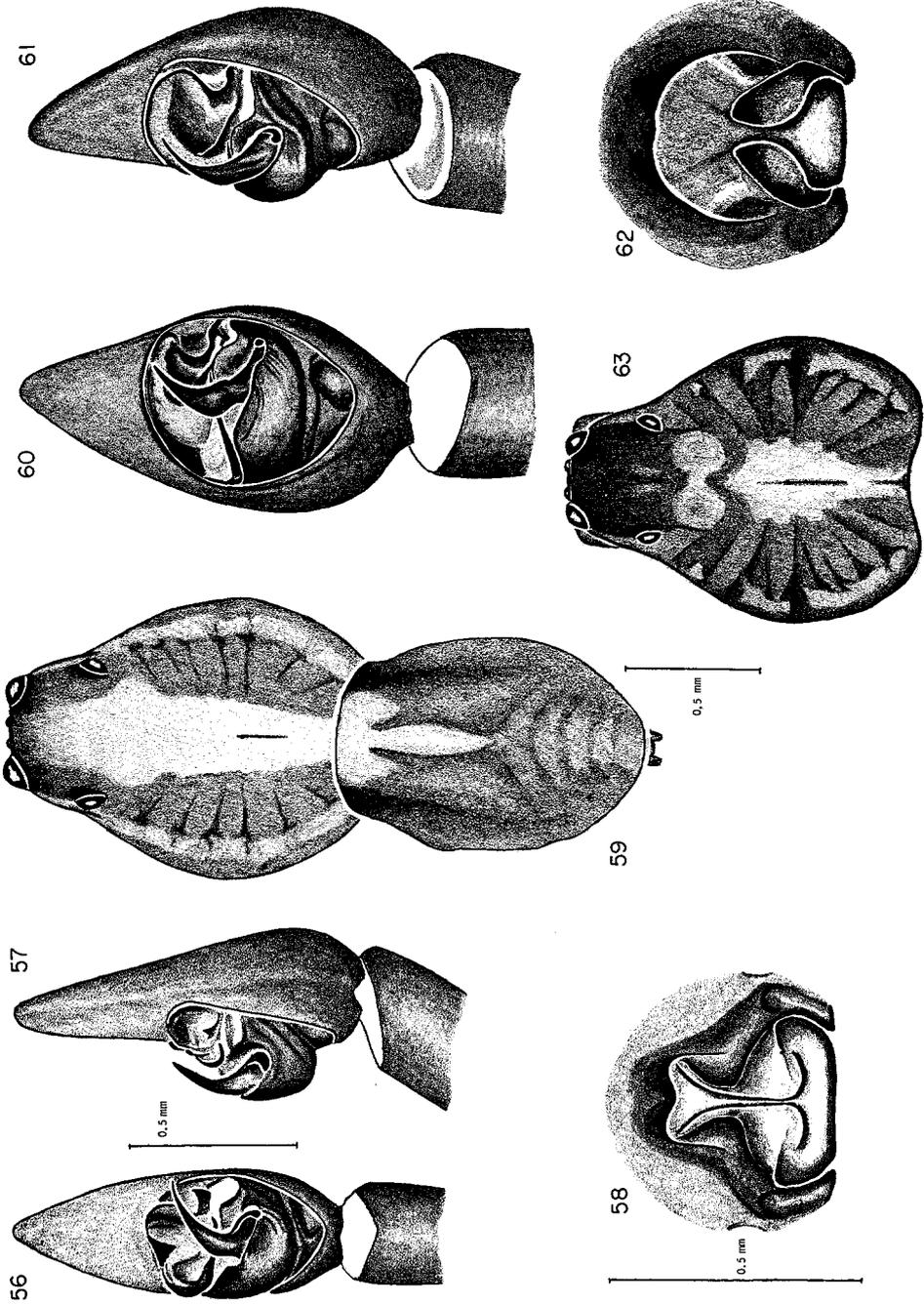
Figs. 42-45. *P. riparia* [C. L. Koch]. 42, 43. Left palpus [Carnic Alps]. 42. Ventral view. 43. Lateral view. 44. Female [Tyrol]. 45. Epigynum.



Figs. 46-48. *Pardosa femoralis* Simon [France]. 46, 47. Left palpus. 46. Ventral view. 47. Lateral view. 48. Epigynum.

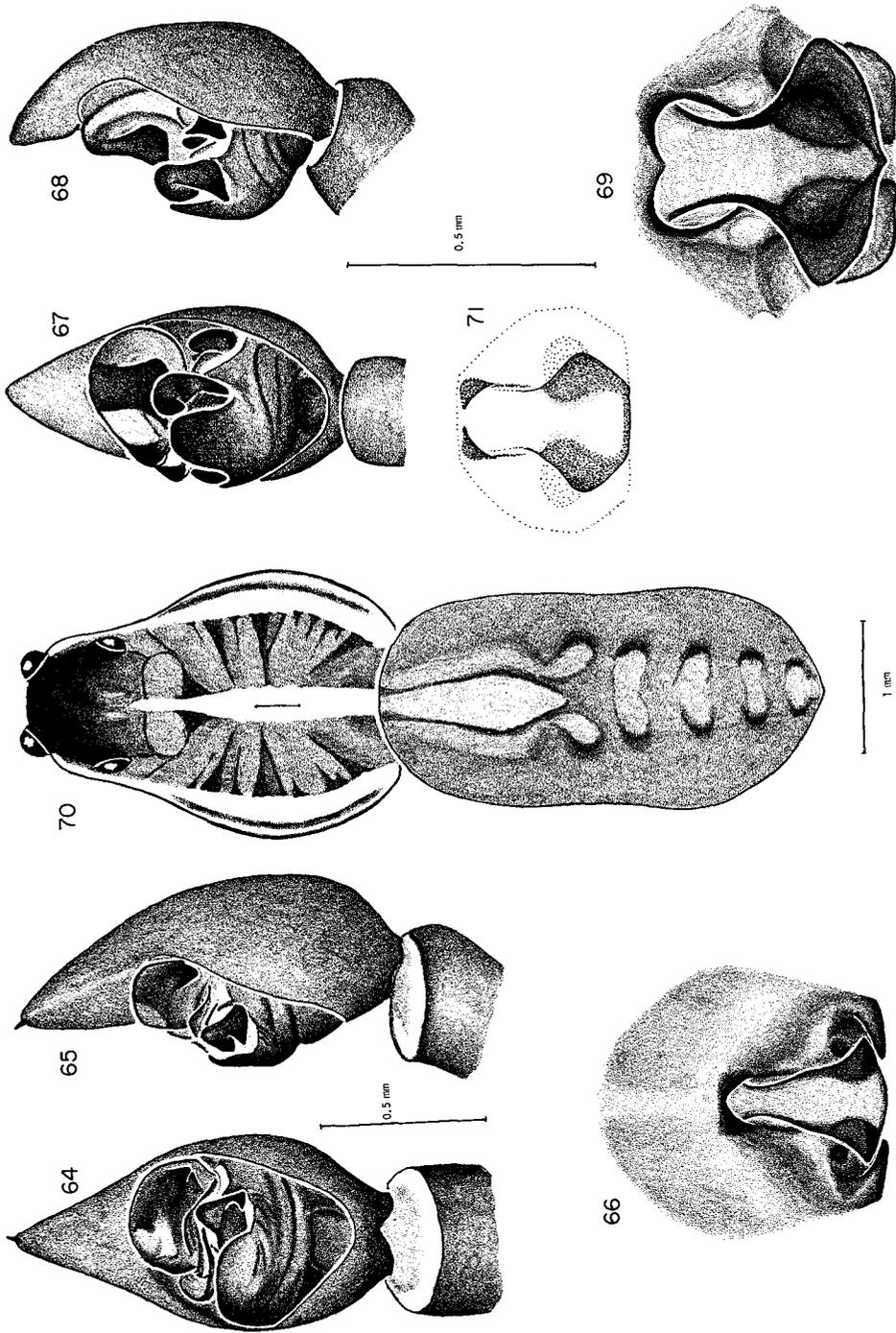
Figs. 49-51. *P. pullata* (Clerck) [Salzburg, Austria]. 49-50. Left palpus. 49. Ventral view. 50. Lateral view. 51. Epigynum.

Figs. 52-55. *P. pratijaga* (L. Koch). 52. Epigynum [Holotype of *P. ferridja*]. 53-55. [Pisa, Toscana]. 53, 54. Left palpus. 53. Ventral view. 54. Lateral view. 55. Epigynum.

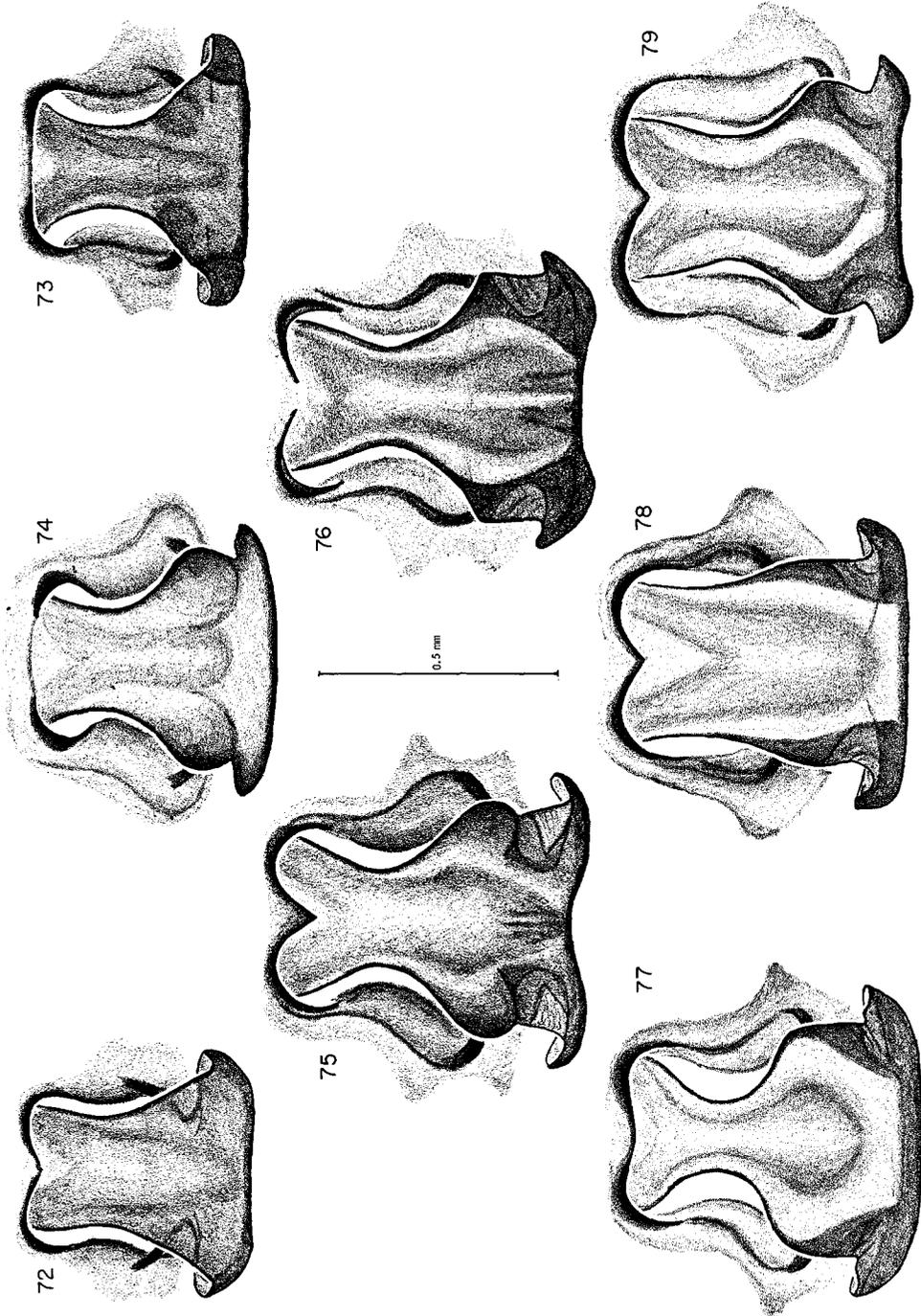


Figs. 56-59. *Pardosa lugubris* (Walckenaer). 56-57. Left palpus [Basilicata]. 56. Ventral view. 57. Lateral view. 58. Epigynum. 59. Female [Pisa, Toscana].

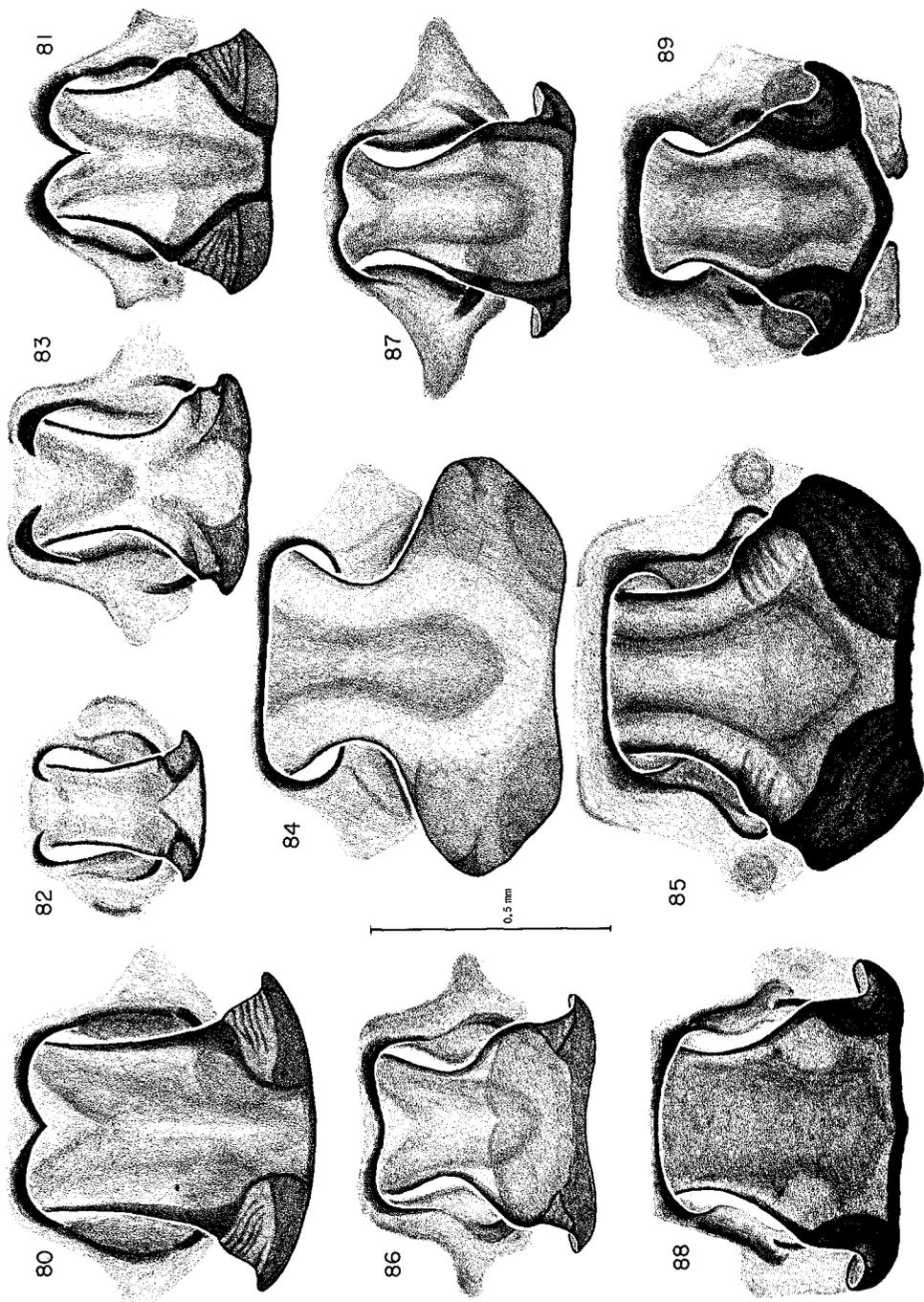
Figs. 60-63. *P. amenitara* (Clerck). 60-61. Left palpus [Switzerland]. 60. Ventral view. 61. Lateral view. 62. Epigynum. 63. Female carapace [Macugnaga, Piemonte].



Figs. 64-66. *Pardosa morosa* (L. Koch). 64-65. Left palpus [France]. 64. Ventral view. 65. Lateral view. 66. Epigynum [France].
Figs. 67-71. *P. saltuaria* (L. Koch). 67-68. Left palpus [Carnic Alps]. 67. Ventral view. 68. Lateral view. 69. Epigynum [Carnic Alps]. 70. Female [Austria]. 71. Epigynum of holotype of *Pardosa oreophila* [Alps].



Figs. 72-74. *Pardosa agrestis* (Westring) [Italy and France]. Epigyna.
Figs. 75-76. *P. arenicola* (O. P.-Cambridge), epigyna [England and Germany].
Figs. 77-79. *P. agricola* (Thorell), epigyna [Finland and England].



Figs. 80-81. *Pardosa mixta* (Kulczynski), epigyna [Gressoney, Valle d'Aosta].
 Figs. 82-83. *P. monticola* (Clerck), epigyna [Sila and Arezzo].
 Figs. 84-85. *P. palustris* (Linnaeus), epigyna [France and Italy].
 Figs. 86-87. *P. torrentium* Simon, epigyna [Pisa and Casale Monferrato].
 Figs. 88-89. *P. blanda* (C. L. Koch), epigyna [Gressoney, Valle d'Aosta].

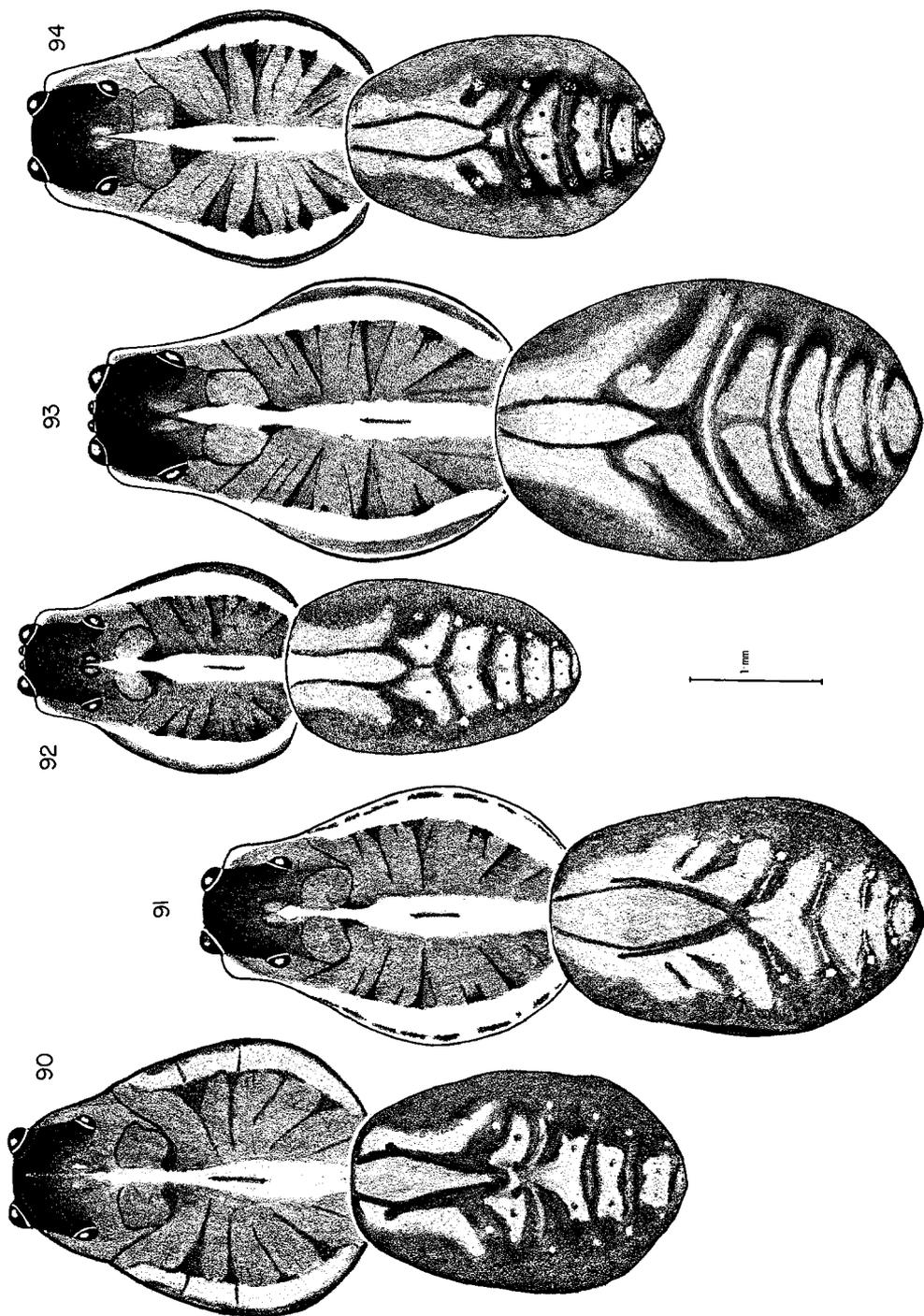
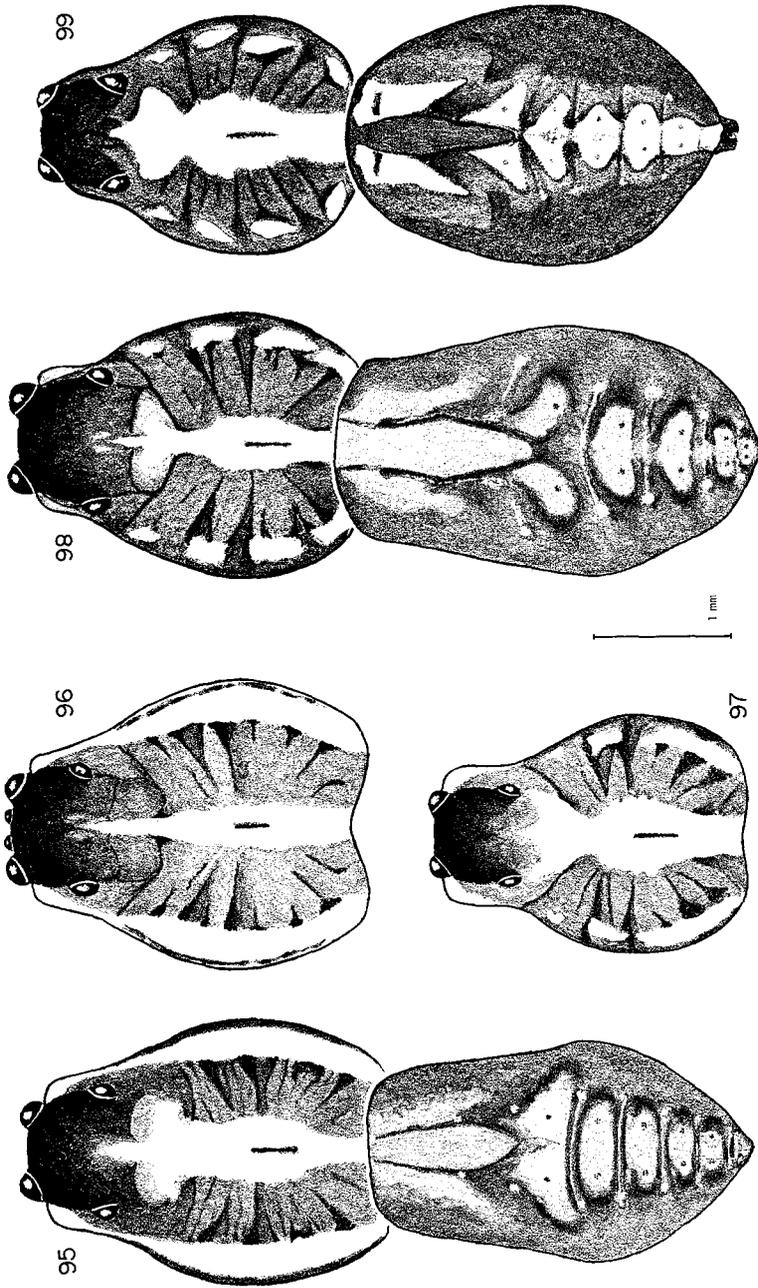


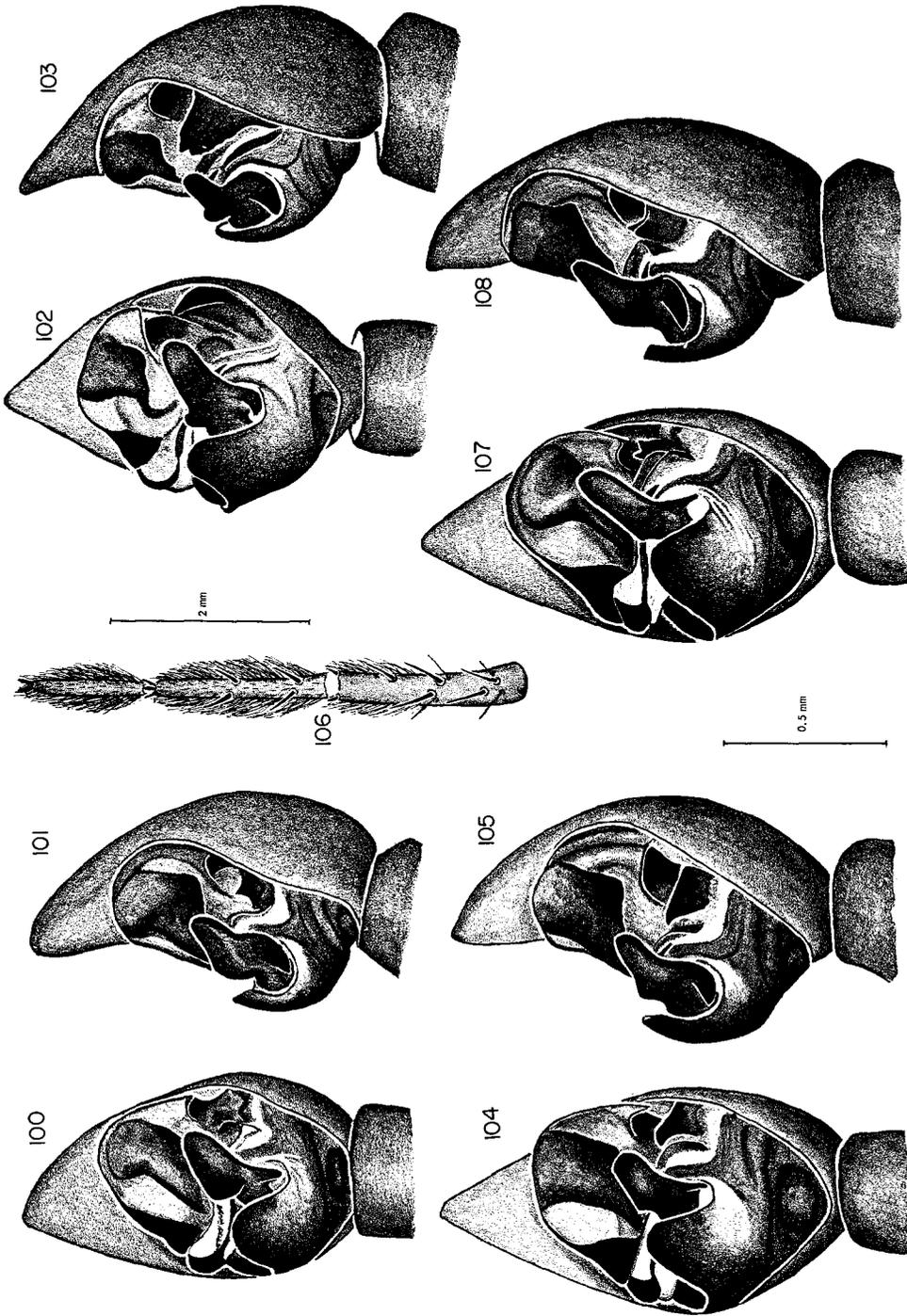
Fig. 90. *Pardosa blanda* [C. L. Koch], female [Gressoney, Valle d'Aosta].
 Fig. 91. *P. palustris* (Linnaeus), female [Gressoney, Valle d'Aosta].
 Fig. 92. *P. monticola* [Clerck], female [Sila, Calabria].
 Fig. 93. *P. mixta* [Kulczynski], female [Canton Ticino, Switzerland].
 Fig. 94. *P. monticola* [Clerck], female [Arezzo, Toscana].



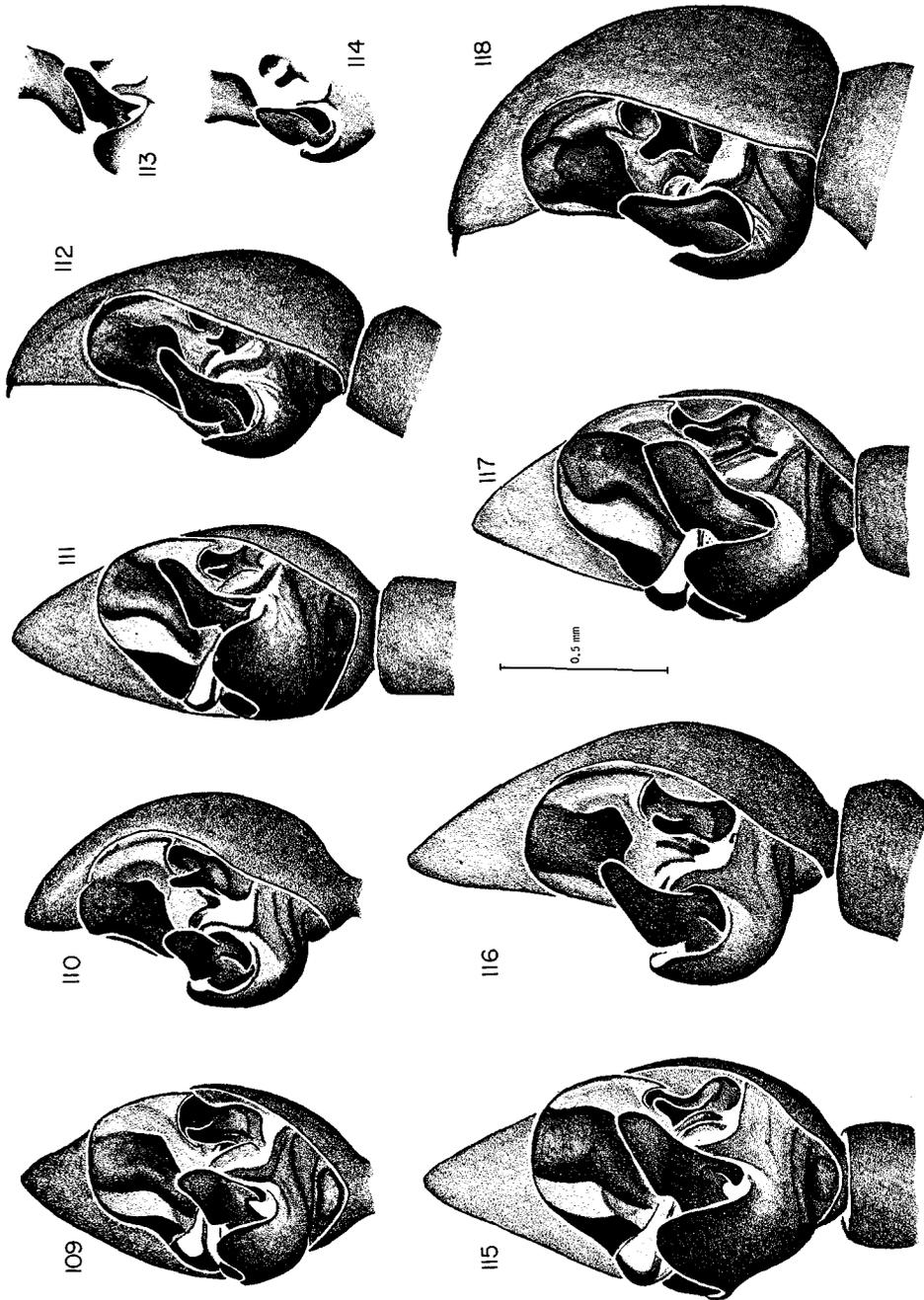
Figs. 95-97. *Pardosa agrestis* (Westring). 95. Female [France]. 96. Female carapace [Finland]. 97. Female carapace [Lucca, Toscana].

Fig. 98. *P. agricola* (Thorell), female [Finland].

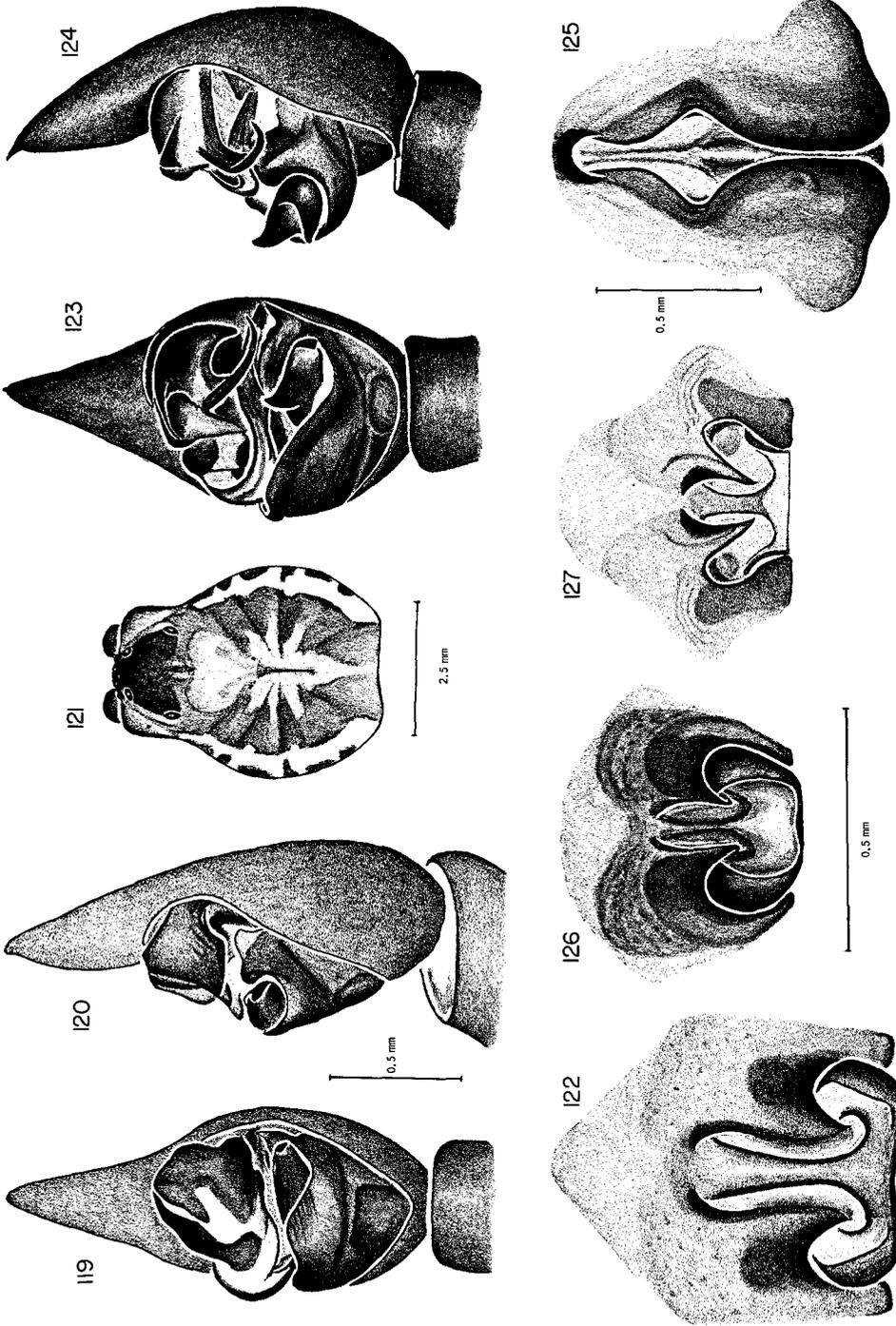
Fig. 99. *P. torrentium* Simon, female [Pisa, Toscana].



Figs. 100-101. *Pardosa agrestis* (Westring). Left palpus [France]. 100. Ventral view. 101. Lateral view.
 Figs. 102-103. *P. palustris* (Linnaeus). Left palpus [Gressoney, Valle d'Aosta]. 102. Ventral view. 103. Lateral view.
 Figs. 104-106. *P. mixta* (Kulczynski). 104-105. Left palpus [Valsavaranche, Valle d'Aosta]. 104. Ventral view. 105. Lateral view. 106. Male first leg.
 Figs. 107-108. *P. agricola* (Thorell). Left palpus [Finland]. 107. Ventral view. 108. Lateral view.



Figs. 109-110. *Pardosa torrentum* Simon. Left palp [Pisa, Toscana]. 109. Ventral view. 110. Lateral view.
 Figs. 111-114. *P. monticola* (Clerck). 111-112. Left palp [Arezzo, Toscana]. 111. Ventral view. 112. Lateral view.
 113-114. Tegular and terminal apophyses [Mt. Sila, Cniabrial]. 113. Ventral view. 114. Lateral view.
 Figs. 115-116. *P. blanda* (C. L. Koch). Left palp [Carnic Alps]. 115. Ventral view. 116. Lateral view.
 Figs. 117-118. *P. albata* (C. L. Koch). Left palp [Carnic Alps]. 117. Ventral view. 118. Lateral view.

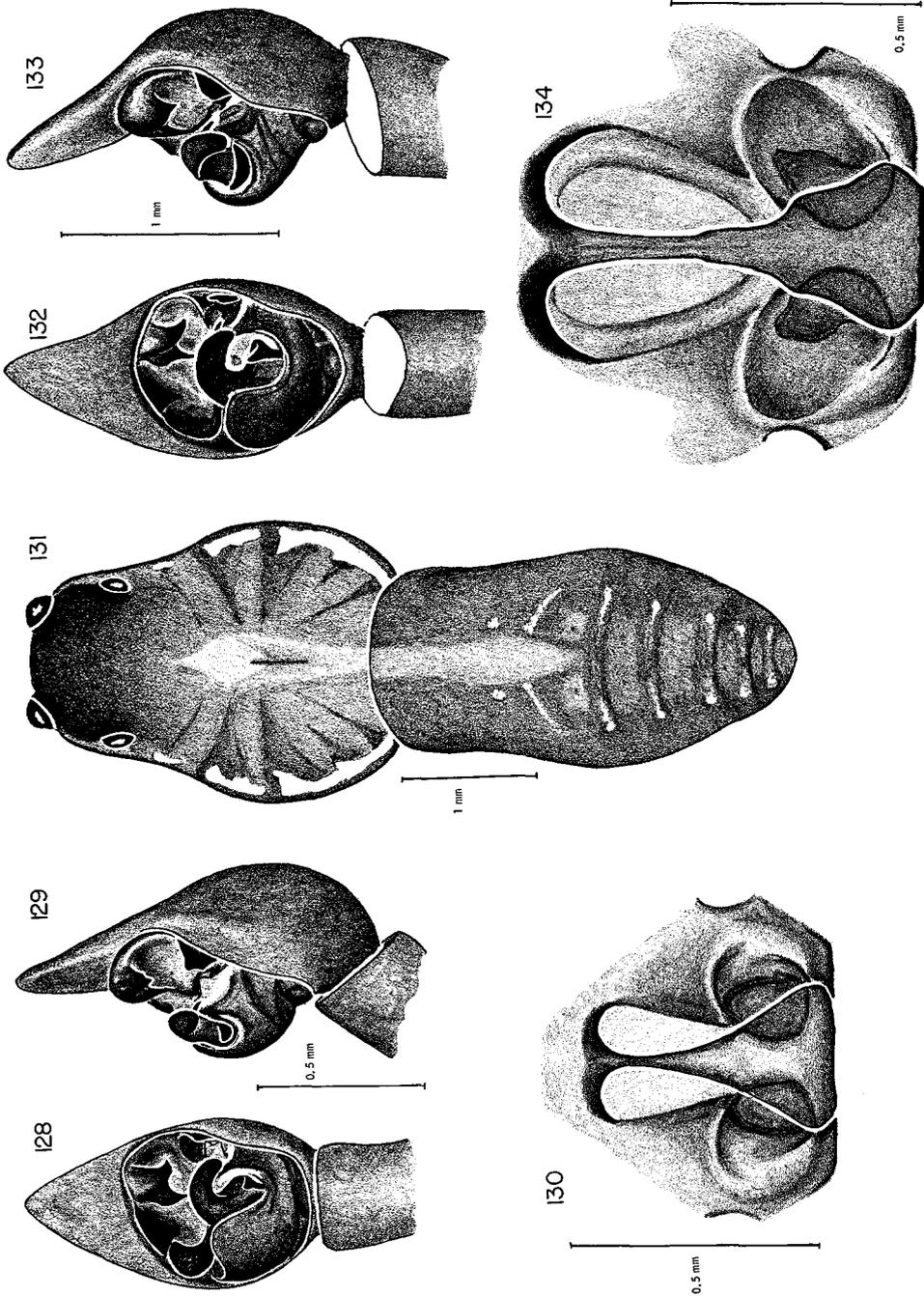


Figs. 119-122. *Pardosa nebulosa* (Thorell). 119-120. Left palpus [Hungary]. 119. Ventral view. 120. Lateral view. 121. Female carapace. 122. Epigynum [Nicolopol, Russia].

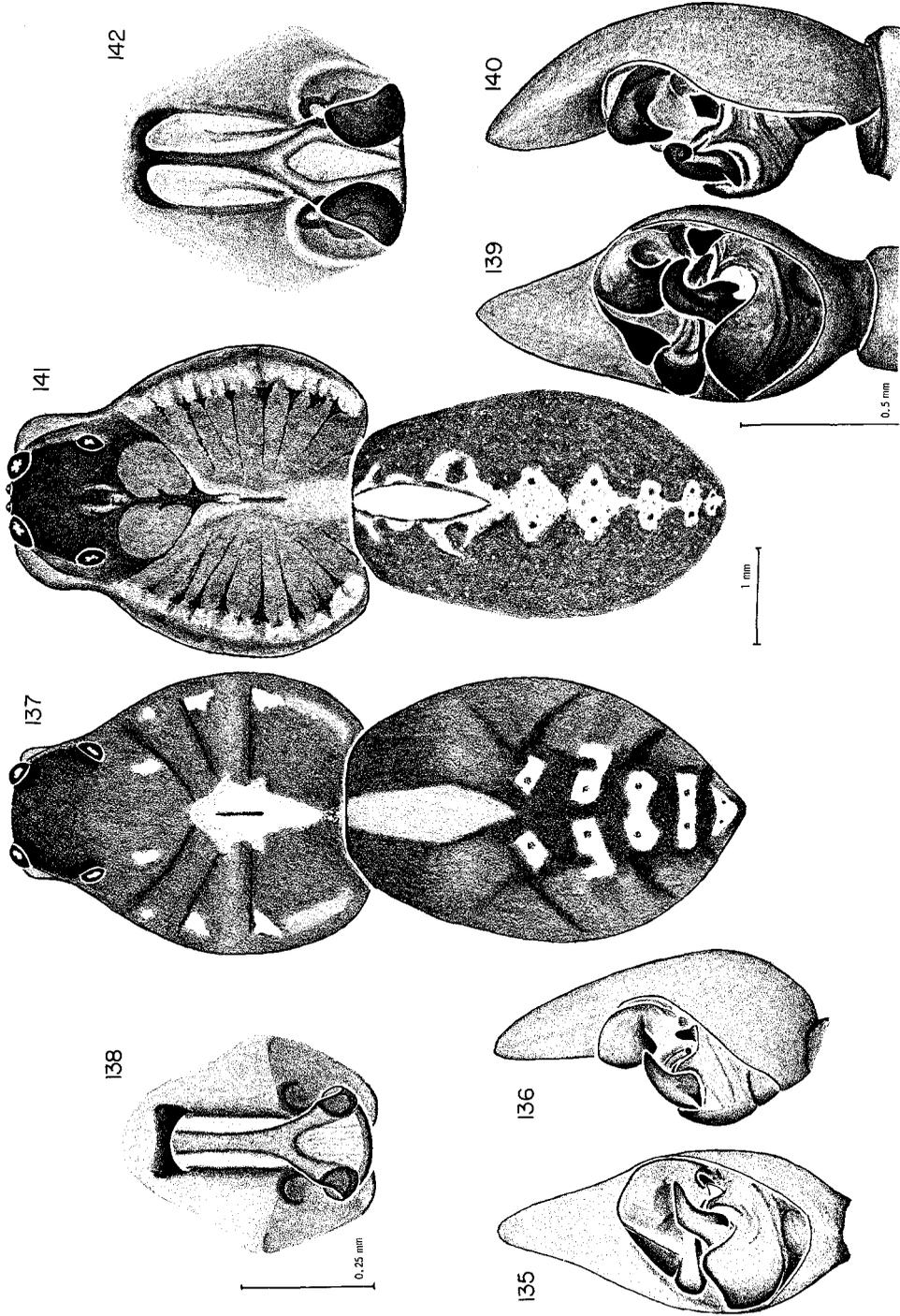
Figs. 123-125. *P. nigra* (C. L. Koch). 123-124. Left palpus [Pratiglione Ivrea, Piemonte]. 123. Ventral view. 124. Lateral view. 125. Epigynum [Valsesia].

Fig. 126. *P. naevia* (Thorell), epigynum [Sardegna].

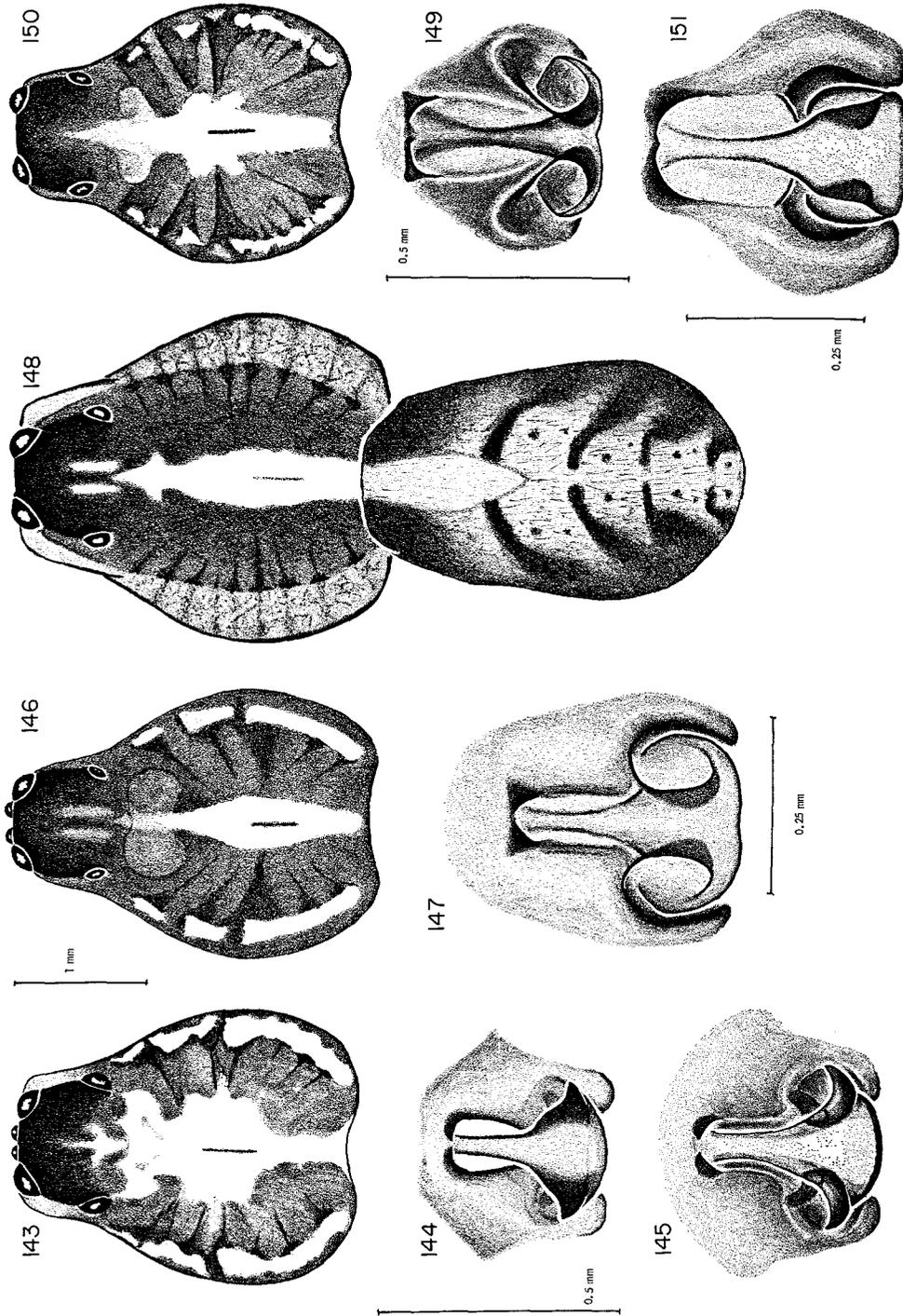
Fig. 127. *P. aenigmatica* n. sp., epigynum [Esule, Mts. of Matese, Abruzzi-Molise].



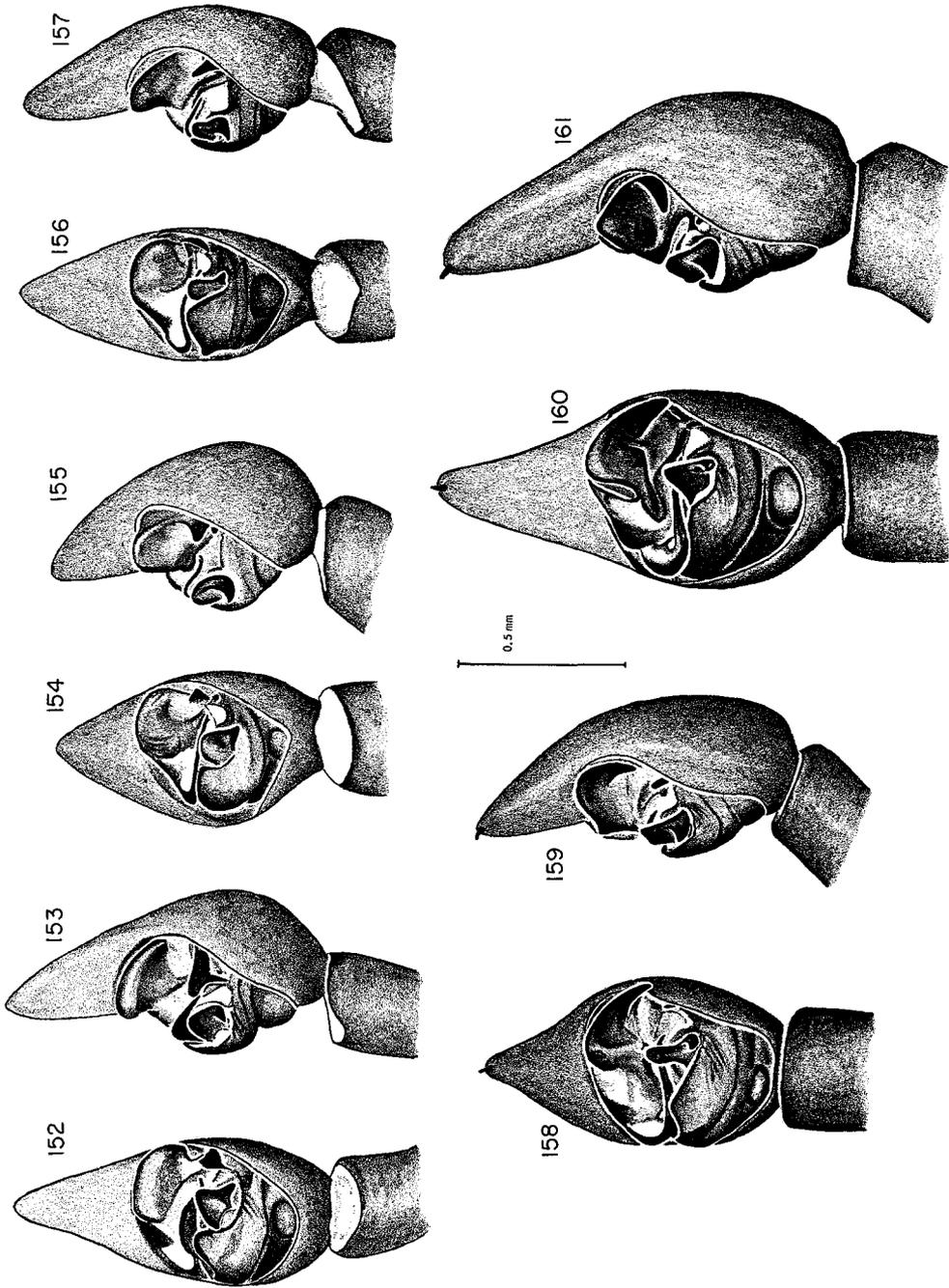
Figs. 128-131. *Pardosa wagleri* (Hahn). 128-129. Left palpus [Lucca, Toscana]. 128. Ventral view. 129. Lateral view. 130. Epigynum [Lucca, Toscana]. 131. Female.
Figs. 132-134. *P. saturator* Simon. 132-133. Left palpus [Macugnaga, Piemonte]. 132. Ventral view. 133. Lateral view. 134. Epigynum [Pisa, Toscana].



Figs. 135-138. *Pardosa italica* n. sp. 135-136. Left palpus [Matera, Basilicata]. 135. Ventral view. 136. Lateral view. 137. Female epigynum [Matera, Basilicata]. 138. Epigynum.
 Figs. 139-142. *P. lucifrosa* Simon. 139-140. Left palpus [Pisa, Toscana]. 139. Ventral view. 140. Lateral view. 141. Female epigynum [Pisa, Toscana]. 142.



Figs. 143-144. *Pardosa strigiflata* Simon [Sardagna]. 143. Female carapace. 144. Epigynum.
 Fig. 145. *P. pseudostrigiflata* n. sp. Epigynum [Vinci, Toscana].
 Figs. 146-147. *P. proxima* (C. L. Koch) [Pisa, Toscana]. 146. Female carapace. 147. Epigynum.
 Figs. 148-149. *P. cribrata* Simon [Pisa, Toscana]. 148. Female. 149. Epigynum.
 Figs. 150-151. *P. hortensis* (Thorell) [Pisa, Toscana]. 150. Female carapace. 151. Epigynum.



Figs. 152-153. *Pardosa cribrata* Simon. Left palpus [Metaponto, Basilicata]. 152. Ventral view. 153. Lateral view.
 Figs. 154-155. *P. hortensis* (Thorell). Left palpus [Pisa, Toscana]. 154. Ventral view. 155. Lateral view.
 Figs. 156-157. *P. proxima* (C. L. Koch). Left palpus [Pisa, Toscana]. 156. Ventral view. 157. Lateral view.
 Figs. 158-159. *P. strigillata* Simon. Left palpus [France]. 158. Ventral view. 159. Lateral view.
 Figs. 160-161. *P. pseudostrigillata* n. sp. Left palpus [Cerreto, Toscana]. 160. Ventral view. 161. Lateral view.

INDEX

Valid names are printed in italics. Page numbers refer to main references.

- aenigmatica*, *Pardosa*, 304
aeronauta, *Pardosa*, 311
agrestis, *Pardosa*, 285
agricola, *Pardosa*, 284
albata, *Pardosa*, 288
albatula, *Pardosops*, 288
amentata, *Pardosa*, 297
arctica, *Pardosa*, 290
arenicola, *Pardosa*, 311
atomaria, *Lycosa*, 308
auberti, *Pardosa*, 291
bifasciata, *Pardosa*, 292
blanda, *Pardosa*, 287
calida, *Lycosa*, 291
cavannae, *Pardosa*, 295
celeris, *Lycosa*, 289
cincta, *Pardosa*, 294
concinna, *Pardosa*, 294
cribrata, *Pardosa*, 305
cribrata catalonica, *Pardosa*, 305
eiseni eiseni, *Pardosa*, 291
eiseni luciae, *Pardosa*, 290
femoralis, *Pardosa*, 299
ferruginea, *Pardosa*, 294
fervida, *Pardosa*, 300
frigida, *Pardosa*, 312
giebeli, *Pardosa*, 290
glacialis, *Pardosa*, 294
herbigrada, *Pardosa*, 283
hortensis, *Pardosa*, 307
italica, *Pardosa*, 301
kervillei, *Pardosa*, 298
lapponica, *Pardosa*, 294
luctinosa, *Pardosa*, 300
lugubris, *Pardosa*, 296
maculata, *Lycosa*, 310
mixta, *Pardosa*, 282
monticola, *Pardosa*, 286
monticola minima, *Pardosa*, 286
montivaga, *Lycosa*, 299
morosa, *Pardosa*, 311
naevia, *Pardosa*, 304
nebulosa, *Pardosa*, 303
nigra, *Pardosa*, 289
nigriceps, *Pardosa*, 293
oreophila, *Pardosa*, 288
palitans, *Pardosa*, 292
paludicola, *Pardosa*, 295
palustris, *Pardosa*, 283
pratigaga, *Pardosa*, 299
proxima, *Pardosa*, 306
proxima poetica, *Pardosa*, 306
proxima tenuipes, *Pardosa*, 306
pseudostrigillata, *Pardosa*, 309
pullata, *Pardosa*, 298
riparia, *Pardosa*, 298
saltuaria, *Pardosa*, 288
saturatior, *Pardosa*, 302
schenkeli, *Pardosa*, 291
sordidata, *Pardosa*, 296
spinicrus, *Passiena*, 291
strenua, *Lycosa*, 308
strigillata, *Pardosa*, 308
subglacialis, *Pardosa*, 312
subita, *Pardosa*, 308
torrentum, *Pardosa*, 284
uintana, *Pardosa*, 290
vittata, *Pardosa*, 292
wagleri, *Pardosa*, 302
wagleri atra, *Pardosa*, 302
wagleri nigra, *Pardosa*, 302