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On The Relationships of the Spider Genus *Cybaeodes* (Araneae, Dionycha)

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ABSTRACT

Scanning electron microscopic studies of spinneret morphology and leg setation suggest that the spider genus *Cybaeodes* Simon belongs not to the Clubionidae, where it was classically placed, or the Gnaphosidae, where it was recently transferred, but rather to the Liocranidae. Indeed, the genus *Cerrutia* Roewer, originally described as a lio-

cranine, is placed as a junior synonym of *Cybaeodes*, and its type species, *Cerrutia molaria*, is considered a valid member of *Cybaeodes*. Four new species are described: *C. avolensis* from Sicily, *C. alicatai* from Tunisia, *C. carusoi* from Algeria, and *C. sardus* from Sardinia.

INTRODUCTION

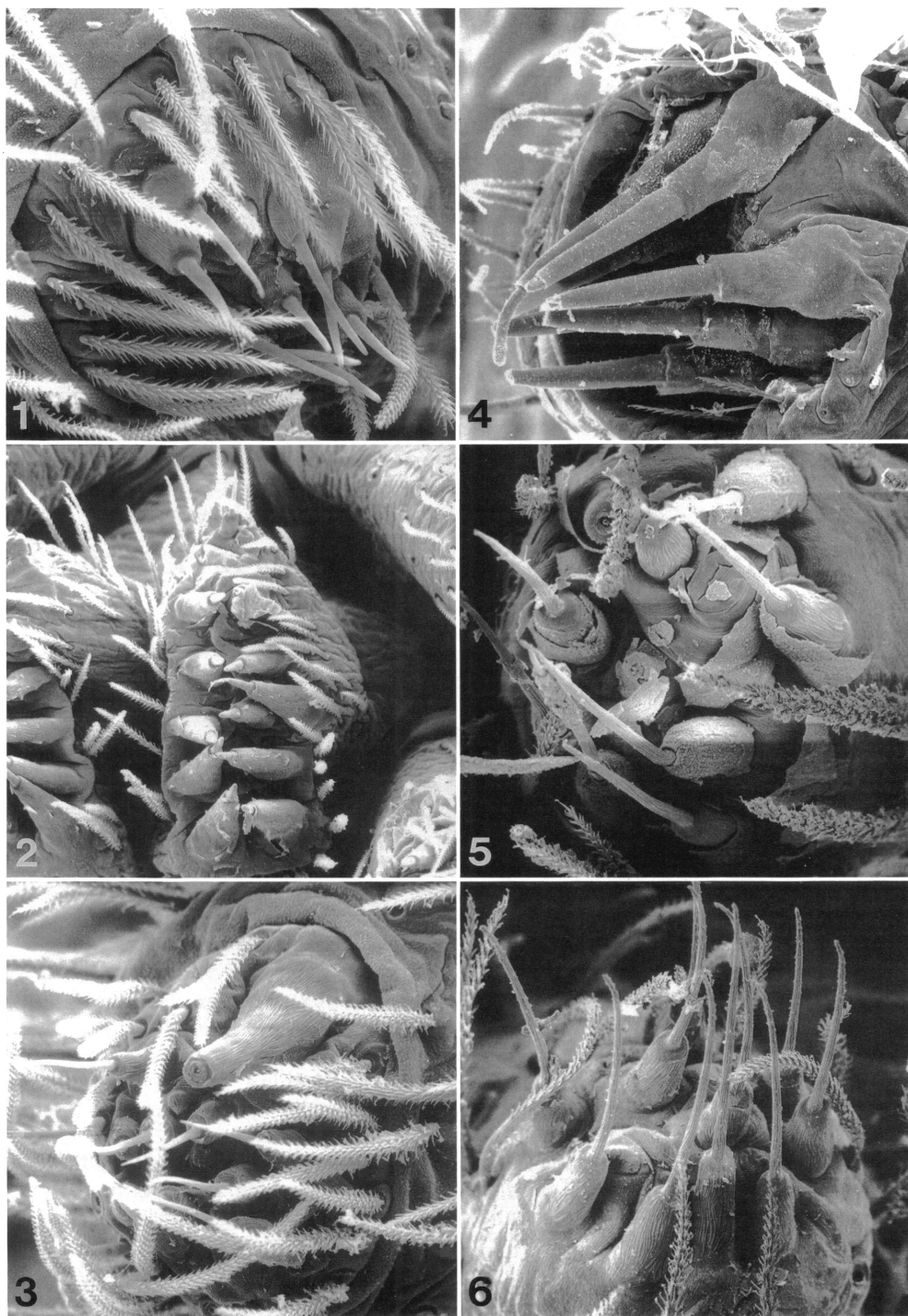
The spider genus *Cybaeodes* has long been enigmatic. Although originally described, over a century ago, by Simon (1878) for *Cybaeodes testaceus*, based on a female from Corsica, the genus has remained largely unknown, not least because males were only recently attributed to the group. Simon (1914) added a second species, *Cybaeodes madidus*, based on females from southern France, and

Banks (1898) erroneously added to the genus the appropriately named Californian species *Cybaeodes incerta*, also based on females only. That Californian species was subsequently placed in the dictynoid genus *Saltonia* by Roth and Brown (1975).

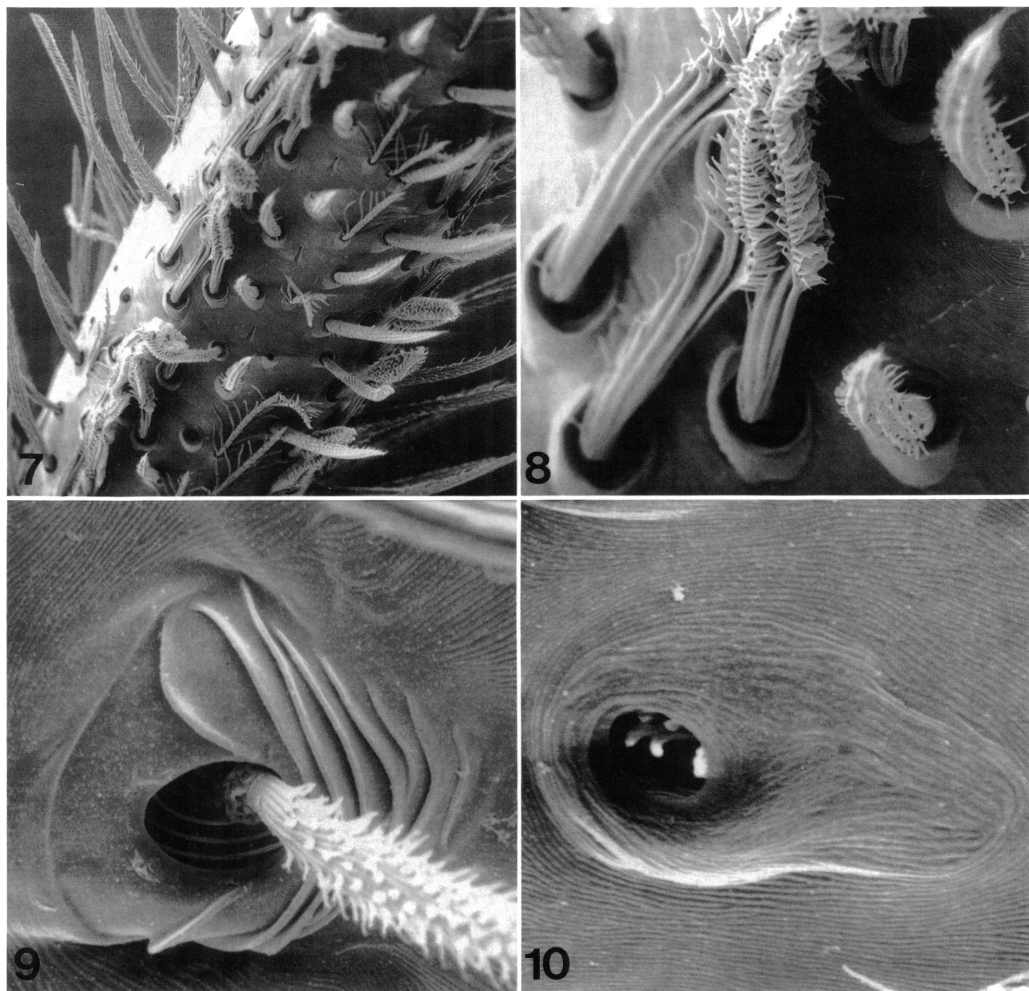
Simon (1893) established the family-group name Cybaeodeae, and eventually conceived of that group as including just *Cybaeodes*, the

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Figs. 1-6. *Cybaeodes marinae* Di Franco, spinnerets. 1-3. Female. 4-6. Male. 1, 4. Anterior lateral spinnerets. 2, 5. Posterior median spinnerets. 3, 6. Posterior lateral spinnerets.



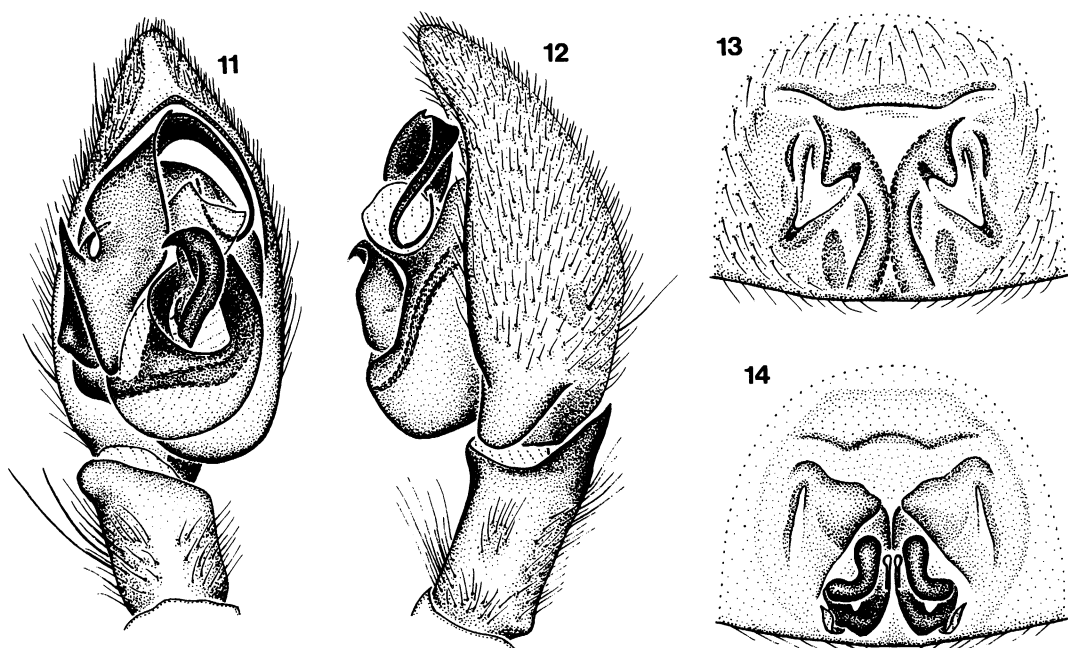
Figs. 7–10. *Cybaeodes marinae* Di Franco, female. 7, 8. Tarsus I, ventral views. 9. Trichobothrial base from tarsus I. 10. Tarsal organ from leg I.

African genus *Andromma* Simon (1893), and *Baeriella* Simon (1903). The last of these names, established for a female from northern Argentina, was based on a misplaced gnaphosid that was erroneously transferred to the Corinnidae by Lehtinen (1967) but actually belongs to the laroniine genus *Eilica* (see Platnick, 1985). Simon (1878, 1893) apparently considered the Cybaeodeae as close relatives of gnaphosoids, particularly of the Cithaeronidae (see Platnick, 1991), but in the subsequent catalog of Roewer (1955), Cybaeodeae was placed as a tribal-level group within the Liocraninae, equivalent in rank to the Miturgeae, Liocraneae, Phrurolitheae, and

Attacobieae. In more recent literature, Roewer's Miturgeae constitute the family Miturgidae, his Liocraneae and Phrurolitheae are combined in the family Liocranidae, and his Attacobieae contains only the unstudied Brazilian species *Attacobius luederwaldti* (Mello-Leitão).

Until recently, the relevant remaining literature on Cybaeodeae subsequent to Simon included only the description of some additional African *Andromma* by Fage (1936) and Lessert (1936), and the addition of the genus *Macedoniella* by Drensky (1935), based on females from Yugoslavia.

However, Di Franco (1989) substantially



Figs. 11–14. *Cybaeodes molar* (Roewer). 11. Left male palp, ventral view. 12. Same, retrolateral view. 13. Epigynum, ventral view. 14. Same, dorsal view.

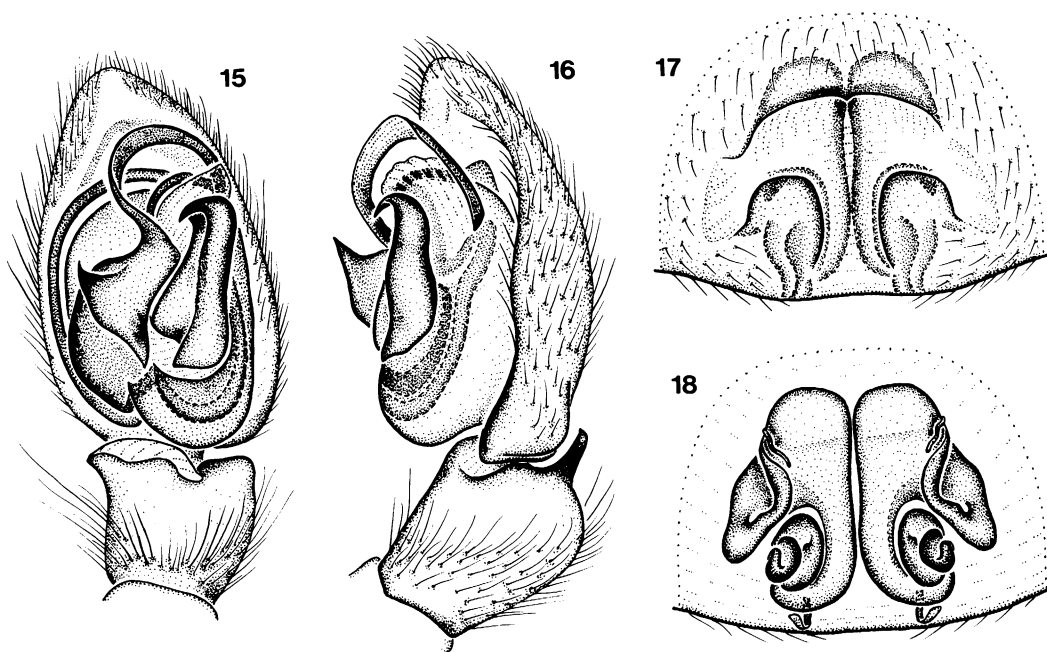
advanced our knowledge of *Cybaeodes* by describing an additional species, *C. marinae*, based on material of both sexes from Sicily and Lazio. The first-attributed males of the genus showed a gnaphosid-like spinneret morphology, with elongate and heavily sclerotized anterior lateral spinnerets bearing enlarged spigots (fig. 4). The genus was therefore assigned by Di Franco to the family Gnaphosidae, a reasonable decision given the information then available about spinneret morphology in dionychan spiders. In the same paper, Di Franco (1989) also provided the first detailed illustrations of the Mediterranean species described by Simon.

Here we present the results of further study, by scanning electron microscopy, of specimens of *Cybaeodes marinae*, and also of the genus *Cerrutia*, a liocranine genus described by Roewer (1960) for a male and female from Sicily. In addition, four new species of the genus are described, based on material kindly made available by Pietro Alicata and Italo Marcellino of the Dipartimento di Biologia Animale, Università di Catania (UC). We thank the Consiglio Nazionale delle Ricerche, Rome, for supporting our collabora-

tion through a N.A.T.O. Senior Fellowship to the second author, Manfred Grasshoff of the Natur-Museum Senckenberg for lending type material, Mohammed U. Shadab, Peling Fong, and William Barnett of the American Museum of Natural History for help with illustrations and scanning electron micrographs, and Charles Dondale of the Centre for Land and Biological Resources Research, Ottawa, John Murphy of Hampton, England, and Darrell Ubick of the California Academy of Sciences for helpful comments on a draft of the manuscript. Other specimens examined are in the collections of the American Museum of Natural History (AMNH) or the Museo Civico di Storia Naturale, Verona (MCSN). The format of the descriptions follows that of Ubick and Platnick (1991); all measurements are in millimeters.

RELATIONSHIPS

If Simon had studied only males (rather than only females) of *Cybaeodes*, we suspect that he would, without hesitation, have assigned the genus to the Gnaphosidae, for the anterior lateral spinnerets of *C. marinae* males



Figs. 15–18. *Cybaeodes avolensis*, new species. 15. Left male palp, ventral view. 16. Same, retrolateral view. 17. Epigynum, ventral view. 18. Same, dorsal view.

bear several greatly enlarged piriform gland spigots (fig. 4), and the male anterior lateral spinneret morphology in general is gnaphosoid in appearance. However, females of the same species have normal, small, unmodified piriform gland spigots (fig. 1; note that the magnification is twice that of fig. 4, and that males and females are nearly identical in size), and their anterior lateral spinnerets are conical rather than tubular in shape, only slightly sclerotized, and not widely separated (as in males, or in female gnaphosids).

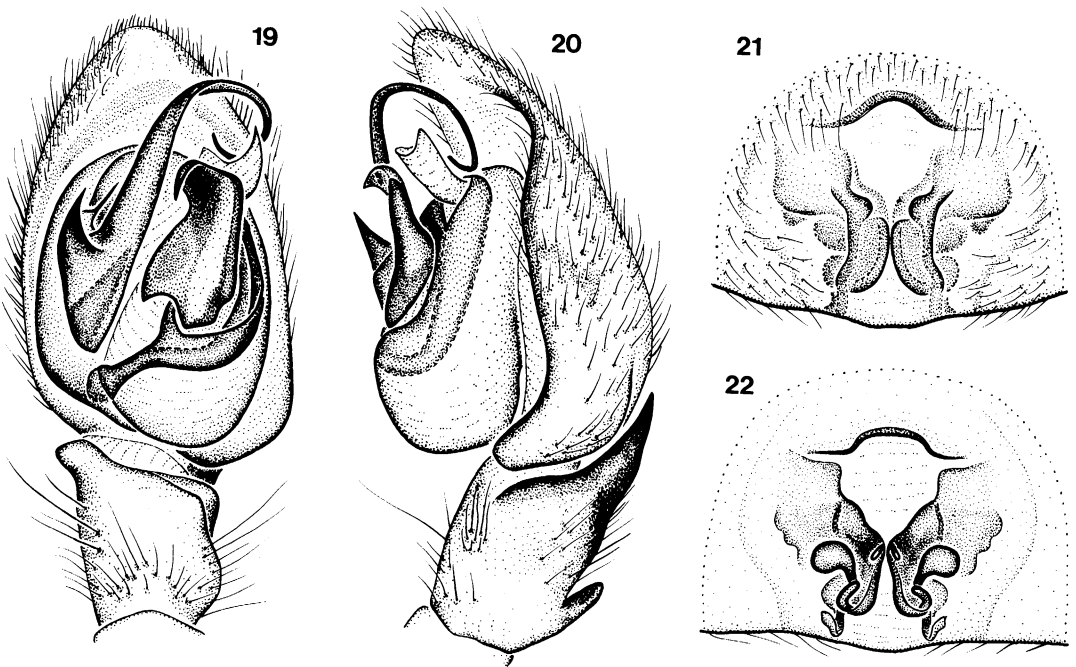
In a recent survey of spinneret morphology in gnaphosoid spiders, Platnick (1990) argued that widened piriform gland spigots are a synapomorphy of true Gnaphosidae, and all gnaphosids examined to date show widened piriform gland spigots on the anterior lateral spinnerets of both sexes. In that paper, similarly widened piriform gland spigots were reported from some Clubionidae (*Clubiona* and *Clubionoides*), but in those groups, as in *Cybaeodes*, only males show the modified spigots. Because females of *Cybaeodes* have unmodified piriform spigots, that genus does not seem to belong to the Gnaphosidae.

In addition, the anterior metatarsi and tarsi

of *Cybaeodes* bear, in both sexes, two ventral rows of modified setae (figs. 7, 8) that, under light microscopy, closely resemble those found in the genera *Liocranum*, *Mesiotelus*, and *Hesperocranum*, all currently placed in the Liocranidae (see Ubick and Platnick, 1991). The tibiae and metatarsi also bear multiple pairs of ventral spines, as is typical of liocranids. We therefore suggest that *Cybaeodes* should be transferred into the Liocranidae.

Interestingly, Roewer (1960) described a genus, *Cerrutia*, on the basis of a male and female from Sicily, which he assigned to the “Clubionidae, Liocraninae, Liocraneae.” Study of the type specimens of the only known species, *Cerrutia molaria*, indicates that *Cerrutia* is a junior synonym of *Cybaeodes*. Although Roewer noted the gnaphosid-like attributes of the anterior lateral spinnerets, his placement of the genus as a close relative of *Liocranum* appears to be correct.

Although males of *Liocranum*, *Mesiotelus*, and *Hesperocranum* do not have enlarged piriform gland spigots, we can report here that some other genera listed as liocranids by Roewer (1955) show sexual dimorphism in



Figs. 19–22. 19, 20. *Cybaeodes carusoi*, new species. 21, 22. *C. alicatai*, new species. 19. Left male palp, ventral view. 20. Same, retrolateral view. 21. Epigynum, ventral view. 22. Same, dorsal view.

spinneret morphology similar to that found in *Clubiona* and *Clubionoides*. In the course of a continuing study of clubionoid spinneret morphology, Platnick has observed enlarged piriform gland spigots in males of *Agroeca* (a classical liocranid) as well as of *Neoanagraphis* and *Rhaeboctesis*. *Neoanagraphis* is currently listed as a clubionid (see Lehtinen, 1967: 251), but its relationships remain enigmatic, and reasons for rejecting Lehtinen's (1967) transfer of *Rhaeboctesis* from the Liocranidae to the Gnaphosidae were presented by Platnick (1990).

Given that enlarged piriform gland spigots may be found in males (only) of both the Clubionidae and Liocranidae, spinneret morphology does provide additional evidence regarding the placement of *Cybaeodes*. True clubionines are unusual among dionychans in lacking cylindrical glands (Kovoor, 1987; Platnick, 1990). Comparison of the spigots on the posterior median and lateral spinnerets of male and female *Cybaeodes* (figs. 2, 3, 5, 6) leaves no doubt that *Cybaeodes* females are well supplied with cylindrical glands, and thus that (as suggested by leg setation), *Cybaeodes* is better placed in the Liocranidae than in the Clubionidae.

SYSTEMATICS

Cybaeodes Simon

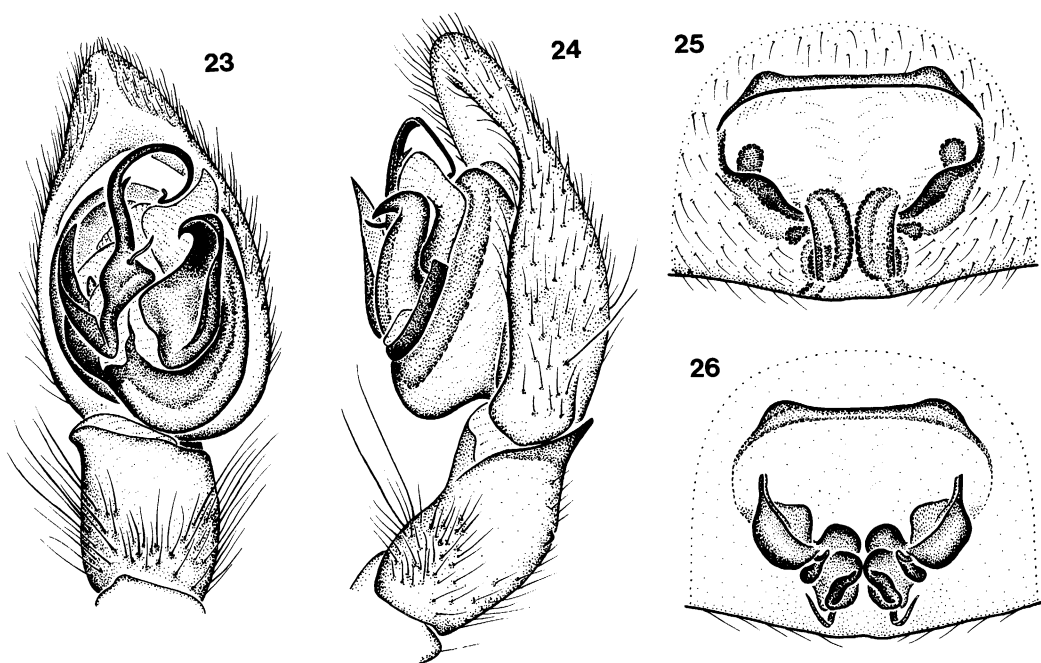
Cybeodes Simon, 1878: 205 (type species by monotypy *Cybeodes testaceus* Simon).

Cybaeodes: Simon, 1893: 387 (corrected spelling, original name based on the generic name *Cybaeus*, which was also misspelled as *Cybeus* by Simon, 1878: 206).

Cerrutia Roewer, 1960: 88 (type species by original designation *Cerrutia molaria* Roewer). NEW SYNONYMY.

DIAGNOSIS: *Cybaeodes* can easily be recognized by the combined presence of gnaphosid-like anterior lateral spinnerets in males (but not females) and two ventral rows of modified setae on the anterior legs of both sexes. The extremely small eyes (see Roewer, 1960: fig. 1a) seem also to be diagnostic (both of the cavernicolous species *C. molaria* and the other, presumably epigeal species), and we would not be surprised to find that blind, cavernicolous members of *Cybaeodes* occur in Mediterranean caves.

DESCRIPTION: To the detailed descriptions provided by Roewer (1960) and Di Franco (1989), we can add that the trichobothrial bases bear several chevron-shaped ridges (fig. 9), that the tarsal organ is elongate, with a



Figs. 23–26. 23, 24. *Cybaeodes marinae* Di Franco. 25, 26. *C. sardus*, new species. 23. Left male palp, ventral view. 24. Same, retrolateral view. 25. Epigynum, ventral view. 26. Epigynum, dorsal view.

round opening and elevated receptors (fig. 10), and that the male palpal tibia bears a small prolateral lobe (as in *Liocranum* and *Hesperocranum*).

SYNONYMY: Roewer's redescription of the genus can probably be ascribed to Simon's lack of *Cybaeodes* males and his association of the genus more closely with gnaphosids than with other liocranids.

Cybaeodes molar (Roewer),
new combination
Figures 11–14

Cerrutia molar Roewer, 1960: 88 (holotype female and allotype male from Cozzo S. Croce, Grotta Molara, Palermo, Sicily, Italy, in Natur-Museum Senckenberg, examined).

DIAGNOSIS: Males differ from those of *C. marinae* in having a much wider embolar base (compare figs. 11, 12 with Di Franco, 1989: fig. 2); the rectangular shape of the epigynum clearly differs from that of the other known females (compare figs. 13, 14 with Di Franco, 1989: figs. 3, 5, 6).

MALE: Total length 6.24. Carapace 2.78 long, 2.04 wide. Femur II 2.59 long. Eye sizes and interdistances: AME 0.04, ALE 0.07,

PME 0.05, PLE 0.07; AME-AME 0.08, AME-ALE 0.09, PME-PME 0.16, PME-PLE 0.13, ALE-PLE 0.07; MOQ length 0.18, front width 0.10, back width 0.23. Leg spination: femora: I d1-1-1; II d1-1-1, p1-1-1, r0-1-0; III, IV r1-1-1; tibia II p0-1-1, v2-3-3. Palp with large median apophysis pointed and curved distally, wide embolar base with small peak on its anterior ridge, short embolar projection in front of second small, mediodorsally curved projection; retrolateral tibial apophysis longer and thicker than in *C. marinae* (figs. 11, 12).

FEMALE: Total length 7.02. Carapace 3.33 long, 2.59 wide. Femur II 2.96 long. Eye sizes and interdistances: AME 0.04, ALE 0.08, PME 0.05, PLE 0.09; AME-AME 0.10, AME-ALE 0.11, PME-PME 0.23, PME-PLE 0.23, ALE-PLE 0.12; MOQ length 0.20, front width 0.18, back width 0.27. Leg spination: femora: I, II d1-1-1; III, IV r1-1-1; tibia II p0-1-1, v1p-3-2. Epigynum with large anterior ridge and posterolateral v-shaped ridges surrounding two small invaginations (fig. 13); vulva with two large tubular and curved median spermathecae and small paramedian ducts (fig. 14).

MATERIAL EXAMINED: Only the types.

DISTRIBUTION: Known only from Sicily.

***Cybaeodes avolensis*, new species**

Figures 15–18

TYPES: Male holotype and female allotype taken in pitfall traps at Cava Grande di Avola, Siracusa, Sicily, Italy (Sept. 6–Oct. 12, 1989; A. Adorno), deposited in MCSN.

ETYMOLOGY: The specific name refers to the type locality.

DIAGNOSIS: Males of this species can be recognized by the combined presence of an irregularly shaped palpal tibia, a small tibial apophysis, and a short embolar projection (figs. 15, 16); females can be recognized by wide, straight, sclerotized anterior epigynal ridge and two posterolateral tubercles (fig. 17).

MALE: Total length 4.44. Carapace 1.92 long, 1.51 wide. Femur II 1.67 long. Eye sizes and interdistances: AME 0.05, ALE 0.05, PME 0.07, PLE 0.06; AME-AME 0.04, AME-ALE 0.02, PME-PME 0.09, PME-PLE 0.07, ALE-PLE 0.05; MOQ length 0.18, front width 0.18, back width 0.23. Leg spination: femora: II r0-0-1; IV p0-0-1; tibiae II p0-1-0, v2-2-2. Median apophysis long, thick, pointed, curved distally (fig. 15); retrolateral tibial apophysis small (fig. 16).

FEMALE: Total length 4.07. Carapace 1.85 long, 1.44 wide. Femur II 1.30 long. Eye sizes and interdistances: AME 0.05, ALE 0.06, PME 0.05, PLE 0.05; AME-AME 0.06, AME-ALE 0.04, PME-PME 0.09, PME-PLE 0.09, ALE-PLE 0.06; MOQ length 0.18, front width 0.16, back width 0.20. Leg spination: femora: II r0-0-1; IV p0-0-1; tibiae II v1-3-3. Epigynum with wide anterior epigynal ridge (fig. 17); vulva with large anterior saclike spermathecae and coiled median ducts (fig. 18).

OTHER MATERIAL EXAMINED: ITALY: Sicily: *Siracusa*: Cava Grande di Avola, pitfall traps, Sept. 6.–Nov. 15, 1989 (UC, AMNH), 7♂; Vendicari (Noto), pitfall traps, Sept. 18–Nov. 18, 1984 (UC), 3♂.

DISTRIBUTION: Known only from Sicily.

***Cybaeodes alicatai*, new species**

Figures 21, 22

TYPE: Female holotype from Oued Zeed (Ain Draham), Tunisia (June 13, 1969; P. Alicata), deposited in MCSN.

ETYMOLOGY: The specific name is a patronym in honor of the collector.

DIAGNOSIS: Females can be recognized by the small, curved anterior epigynal ridge and the lateral, sac-shaped spermathecae (figs. 21, 22).

MALE: Unknown.

FEMALE: Total length 4.07. Carapace 1.55 long, 1.03 wide. Femur II 1.15 long. Eye sizes and interdistances: AME 0.04, ALE 0.07, PME 0.06, PLE 0.09; AME-AME 0.02, AME-ALE 0.02, PME-PME 0.08, PME-PLE 0.06, ALE-PLE 0.02; MOQ length 0.14, front width 0.09, back width 0.16. Leg spination: tibiae II v1-2-1. Epigynum with long, sinuous posteromedial ridges (fig. 21); vulva with lateral sac-shaped spermathecae (fig. 22).

OTHER MATERIAL EXAMINED: TUNISIA: Col des Ruines (Ain Draham), June 13, 1969 (P. Alicata, AMNH), 1♀.

DISTRIBUTION: Known only from Tunisia.

***Cybaeodes carusoi*, new species**

Figures 19, 20

TYPE: Holotype male taken at an elevation of 400 m on Pic des Singes (Bejaïa), Algeria (Nov. 3, 1984, I. Marcellino), deposited in MCSN.

ETYMOLOGY: The specific name is a patronym in honor of Dr. Domenico Caruso, organizer of the expedition on which the type was collected.

DIAGNOSIS: Males of this species can be recognized by the presence of two tibial apophyses: the larger is retrolateral, long, and triangular, the smaller dorsal and medially placed (fig. 20); the median apophysis is large, rectangular, with a small hook, curved ventrally, on its apical medial edge (fig. 19).

MALE: Total length 2.96. Carapace 1.48 long, 1.11 wide. Femur II 1.11 long. Eye sizes and interdistances: AME 0.05, ALE 0.07, PME 0.07, PLE 0.07; AME-AME 0.02, AME-ALE 0.01, PME-PME 0.06, PME-PLE 0.09, ALE-PLE 0.02; MOQ length 0.16, front width 0.14, back width 0.16. Leg spination: femora II p0-0-1; III r0-0-1; IV p0-0-1, r0-0-1; tibiae II v1-2-1. Bulb with unexpanded embolar base, short and thick embolar projection, dorsally with another, more slender projection; conductor with lateral long peak on its apical edge (fig. 19); palp with two tibial apophyses (fig. 20).

FEMALE: Unknown.

OTHER MATERIAL EXAMINED: None.

DISTRIBUTION: Known only from Algeria.

Cybaeodes sardus, new species

Figures 25, 26

TYPES: Female holotype taken at an elevation of 550 m in the Parco Laconi, Nuoro, Sardinia, Italy (Oct. 1, 1963; P. Alicata), deposited in MCSN.

ETYMOLOGY: The specific name refers to the type locality.

DIAGNOSIS: Females of this species can be recognized by the wide, straight, sclerotized anterior epigynal ridge and the two posterolateral epigynal ridges (fig. 25).

MALE: Unknown.

FEMALE: Total length 3.33. Carapace 1.48 long, 1.30 wide. Femur II 1.30 long. Eye sizes and interdistances: AME 0.04, ALE 0.05, PME 0.05, PLE 0.05; AME-AME 0.02, AME-ALE 0.01, PME-PME 0.07, PME-PLE 0.06, ALE-PLE 0.07; MOQ length 0.14, front width 0.14, back width 0.18. Leg spination: femora: I p0-0-1; II p0-0-0; III p0-0-0, r0-0-0; IV p0-0-1, r0-0-1; tibiae II v1-2-1. Epigynum with wide, straight anterior ridge (fig. 25); vulva with large lateral spermathecae and median curved ducts (fig. 26).

OTHER MATERIAL EXAMINED: None.

DISTRIBUTION: Known only from Sardinia.

Cybaeodes marinae Di Franco

Figures 23, 24

Cybaeodes marinae Di Franco, 1989: 27, figs. 1–4 (male holotype from Pendici Monte Pagano, Nebrodi, Sicily, Italy, in MCSN, examined).

NOTE: We include here supplemental figures of the male palp (figs. 23, 24) as the embolar base bears a ventrally projecting spur that was inadvertently omitted from the original illustrations.

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