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The Ecology, Phylogeny, and Taxonomy of *Stilicolina* (Coleoptera, Staphylinidae, Paederinae)

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Up to the present time little or nothing has been known of the ecology of the rove beetle genus *Stilicolina;* its phylogenetic relationships have not been discussed, and the females could not be identified to species. Newly discovered ecological data are presented in the present paper along with hypotheses of the phylogenetic history of the genus. A key for identification of both the males and females is provided, and all the species are described. The figures will aid in identification and illustrate the characters that support the proposed phylogenetic relationships.

Stilicolina Casey was described in 1905, synonymized with *Omostilicus* Casey by Blackwelder (1939), and the three known species diagnosed and illustrated by Sanderson (1947). Jarrige (1960) described a new species, *S. condei,* and Moore (1964) the larva of a species.

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Abbreviations

A.M.N.H., the American Museum of Natural History
M.C.Z., Museum of Comparative Zoology, Harvard University
U.S.N.M., United States National Museum, Smithsonian Institution

Ecology: *Stilicolina,* a member of the subtribe Stilici, is restricted to the New World and has been collected only in the United States and Mexico. *Stilicolina condei* Jarrige has been reported from caves (Jarrige, 1960; Reddell, 1966; Barr and Reddell, 1967) and *S. tristis* (Melsheimer) has been collected from moss and flood debris. To date, there is no further published information regarding the ecology of the species of *Stilicolina.* The data presented in the following paragraphs indicate that the species exhibit different habitat preferences.

Stilicolina condei is associated with organic debris and raccoon, bat, and cricket guano in the interior of caves in Texas, New Mexico, and Mexico. The species has never been taken from the surface surrounding the cave. Although specimens were collected as close as 10 feet from the entrance, they were found in darkness. Others were found as far as 2000 feet from the entrance. The exclusive capture of *S. condei* in caves suggests that it is a troglophile whose life cycle is completed within the cave. This hypothesis is further supported by the fact that the size of the eyes is reduced (table 1) compared with that of other species of the genus. By using the "Student's T-Test," I found that at the 0.005 level of significance, the length of the eyes of *S. condei* is smaller than the length of the eyes of any of the other species. More significantly, this reduction of the eyes is evident even when *S. condei* is compared with its nearest relative, *Stilicolina fasta* Sanderson, the smallest species of the genus. There is no evidence to support or refute the suggestion by Barr and Reddell (1967) that *S. condei* may also live in nests of mammals.

Stilicolina tristis, known from many states in the eastern United States, is rarely collected, and is found in several habitats. In addition to extraction from moss and flood debris, the species has been taken once from a cave in Kentucky and once from a beaver nest in Texas.

Both *Stilicolina sonorina* (Casey) and *S. fasta* live in leaf litter. *Stilicolina sonorina,* known only from the Chiricahua and Santa Rita mountains,

occurs at about 5500 to 6000 feet elevation, in litter—especially where deep—around and under logs. *Stilicolina fasta,* from the Chiricahua, Huachuca, and Santa Rita mountains of Arizona, is collected at about 6000 to 7000 feet elevation, in shallow leaf litter, near logs and streams.

Circumstantial evidence indicates that *Stilicolina taraxa* lives in the nests of mammals. The holotype and three of the paratypes were taken from a mine in the Chiricahua Mountains. They were collected in debris that was apparently gathered by wood rats, which often nest in mines in the western United States.

PHYLOGENETIC RELATIONSHIPS: The subtribe Stilici, according to Casey (1905) and Blackwelder (1939), includes the genera *Stilicus, Stilicolina, Acrostilicus, Megastilicus, Pachystilicus,* and *Stiliderus.* Most members of these genera have confluent gular sutures, a denticulate labrum, a constricted neck, well-developed eyes; they lack a labral carina, have a truncate ninth sternum and fused parameres, lack the parameroid lobes and therefore the ridges, lack the dorsal process of the parameres, and lack, or have separated, paired and median processes of the internal struts of the aedaegus. Although most of these characters are apomorphic for the Stilici, they are all primitive within this subtribe. The derived characters in the subtribe are: an increased number of labral denticles, reduced eyes, presence of a labral carina, emargination of the ninth sternum, presence of parameroid lobes, presence of ridges on the parameroid lobes, presence of internal struts in the aedeagus, and fusion of the paired processes to the median process of the internal struts.

The closest ancestral relative of *Stilicolina* is probably *Stilicus* (fig. 45) as it is the only other genus in the Stilici sharing the incision of the ninth sternum and the presence of parameroid lobes. The lobes are small, poorly developed, weakly sclerotized, and have no anterior margin in *Stilicus,* but show considerable advancement in *Stilicolina* in which the parameroid lobes are larger, thicker, more strongly sclerotized, usually have a well-defined anterior margin, and often possess elaborate ridges on the surface. *Stilicolina* is apparently the only genus of the Stilici with the ornate dorsal process of the parameres, four to six labral denticles, and, occasionally, the labral carina. In addition, *Stilicolina* is the only member of the subtribe in which the fused parameres are broad and flat. These characters of the labrum and parameres are apparently autopomorphic in *Stilicolina.*

Within *Stilicolina* there are two branches, one consisting of only *S. sonorina,* the other composed of the remaining four species (see fig. 45). *Stilicolina sonorina* is the most primitive species of the genus. The parameroid lobes are large but the poorly defined basal margin and the lack

of prominent carinae and ridges suggest that the parameroid lobes are relatively primitive structures in this species. The internal struts of the aedeagus are present, but the paired and median processes are not fused —again, a primitive characteristic.

The other four species exhibit the following derived characteristics: the basal margin of the parameroid lobes is more strongly defined, the lobes have carinae and prominent ridges on the lateral surface, and the lateral processes of the internal struts are fused to the median process. The parameres of the four species are truncate at the apex. The dorsal process of the parameres of these four species has one pair of lateral projections. The dorsal process has two pairs of lateral projections in *S. sonorina* but, since the homologue of the dorsal process is not known in other genera, it is impossible to suggest which of the two states of the dorsal process is the more primitive.

The most obvious relationships between the remaining species appear to be defined by the configuration of the emargination of the eighth sternum of the males. In one branch leading to *S. condei* and *S. fasta* (fig. 45) this emargination is shallow. A close ancestral relationship can be supported by the presence of prominent, broadly rounded ridges on the parameroid lobes, and by the presence of widely splayed lateral projections of the dorsal process. *Stilicolina condei* appears to have diverged (fig. 45) with a reduction of the eyes and slight elongation of the antennomeres—both, apparently, adaptations to cavernicolous habits. *Stilicolina fasta* developed a labral carina and a slightly different form of the dorsal process of the parameres.

Although in both *S. tristis* and *S. taraxa* the males have a relatively similar deep emargination of the eighth sternum, a close relationship is not indicated by other characters. The parameroid lobes of *S. tristis* are rather simple, with only weak development of the lateral ridges. This species probably developed from the ancestral stock of the four species (fig. 45). The ancestor of the next group to arise (fig. 45) had more prominent ridges on the parameroid lobes and eventually diverged into *S. taraxa, S. condei,* and *S. fasta.* The carina of the parameroid lobes attains its most extreme development in *S. taraxa,* which probably arose (fig. 45) from the stock giving rise to the ancestor of *S. condei* and *S. fasta* (fig. 45) both of which have moderately well-developed ridges on the parameroid lobes. The relationship between the latter two species has already been discussed.

Although the hypothesized relationships are provisional, they will provide a point of reference for future work on the phylogeny of *Stilicolina,* the Stilici, and the Paederinae.

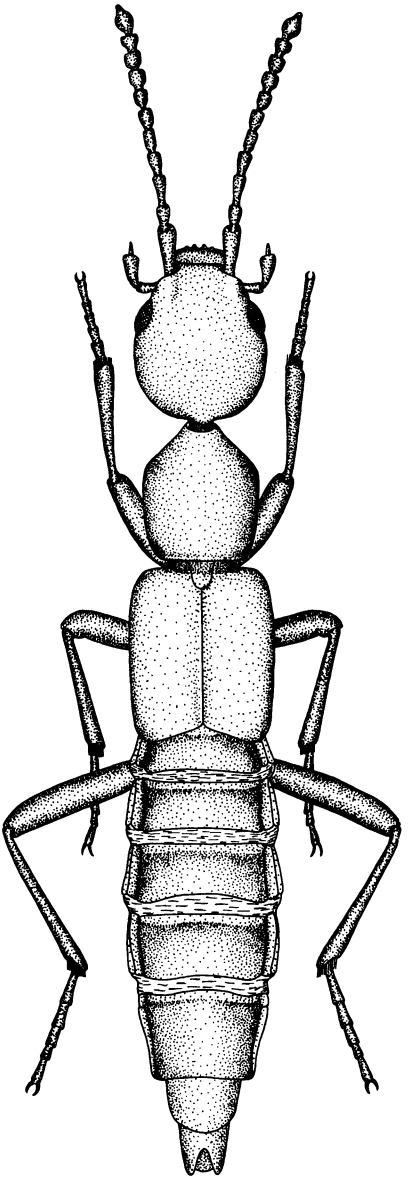


FIG. 1. *Stilicolina taraxa,* new species. Habitus of Holotype, male.

GENUS *STILICOLINA* CASEY

Stilicolina CASEY, 1905, p. 219, 228, 229; Type species: *Stilicolina tristis* (Melsheimer). BLACKWELDER, 1939, 1952; SANDERSON, 1947; JARRIGE, 1960; MOORE, 1964; REDDELL, 1966; BARR AND REDDELL, 1967.

Omostilicus CASEY, 1905, p. 219, 229, 230; Type species: *Omostilicus sonorina* CASEY. BLACKWELDER, 1939, 1952; SANDERSON, 1947.

Length 5.0–8.5 mm. Form moderately large, robust (fig. 1) and subcylindrical to depressed; head depressed (fig. 42). Body densely pubescent with dense, fine, microtuberculate sculpturing and fine granulate ground sculpturing; setae arising from microtubercles (figs. 43, 44) on dorsum of head, pronotum and elytra; head with imbricate sculpturing between microtubercles (fig. 43); pronotum with wrinkles between microtubercles (fig. 44). Color dark brown to reddish yellow, but most often reddish brown.

HEAD: Labrum with denticles on anterior margin (figs. 22–25, 27); median denticle present and poorly developed or absent (figs. 24, 25, 27); with midlongitudinal, dorsal carina present (figs. 22, 23) or absent (figs. 24, 25, 27); anterior margin with median emargination (figs. 22–25, 27); with midlongitudinal groove on ventral surface. Clypeus not distinctly delimited (figs. 1, 28–31). Tentorial maculae usually evident as black spots on anterior half of head. Compound eyes present and of variable size. Neck present and strongly constricted (fig. 1). Gular sutures confluent on at least basal portion (figs. 32, 33). Maxillary palpus with acicular fourth article; third article stout and apically incrassate; first article small (fig. 8). Labium with three segmented palpi; with membranous lobes arising from near base of palpi (fig. 10). Mentum with two or three pairs of setae (figs. 7, 10).

THORAX: Pronotum with narrow anterior margin; lateral margins with anterior portion strongly convergent toward posterior margin; posterior margin wider than anterior margin (fig. 1). Pronotal lateral marginal bead present; anterior portion confluent with posterior end of protergosternal suture. Protergosternal suture present but weakly developed. Postprocoxal lobe present and well developed. Prosternum with prominent midlongitudinal carina (figs. 34, 35). Protrochantin flat and exposed. Prosternal process broad, with median carina and with lateral margin explanate; process not reaching prohypomeron (figs. 34, 35). Procoxal cavities open posteriorly (figs. 30, 35).

Scutellum with apex exposed and anterior portion depressed (fig. 1). Elytra longer than prothoracic length (fig. 1); epipleural ridge absent; hypopleural ridge present. Metathoracic wings fully developed. Mesocoxae contiguous. Mesosternum with broad depression.

Legs long and slender (fig. 1). Tibiae without longitudinal row of spines. Procoxae conical and elongate. Protibiae with several transverse ctenidia on inner side. Metatibiae with prominent ctenidium on outer side (fig. 1). Tarsomeres slender, not bilobed or expanded (fig. 1). Tarsal formula 5–5–5.

ABDOMEN: Segments III to VI each with two pairs of laterosternites; laterosternites longitudinally divided (fig. 1). Segment VII with two pairs of transversely divided laterosternites (fig. 1). Sternum VIII of males with posterior margin emarginate; emargination of variable size (figs. 36–38, 40). Tergum IX with deep V-shaped emargination and with more shallow, broader V-shaped emargination of lateral portion (fig. 41). Sternum IX of males long, slender, and not divided longitudinally; posterior margin emarginate with spiniform process on each side of apex (fig. 39). Sternum IX of females longitudinally divided; each sternite long, slender, and with spiniform process at apex. Tergum X of hemispherical shape and attached to inner dorsal surface of tergum IX (fig. 41); sternum X absent.

Aedeagus trilobed. Parameres fused, broad (fig. 6) and flattened (fig. 4) and with dorsal process between parameroid lobes (fig. 5); dorsal process variously modified (figs. 15, 16, 18–20). Parameroid lobes well developed (figs. 4, 5, 6), with prominent ridges present or absent (figs. 15, 16, 18–20). Internal struts well developed (fig. 4); with one paired (fig. 4b) and one median processes (fig. 4a); processes ventrally directed and with paired processes (4b) distad of median process (4a).

RECORDED DISTRIBUTION: *Mexico:* Neuva Leon, San Luis Potosi, Tamaulipas. *United States:* Arizona, Arkansas, Kentucky, Missouri, New Jersey, New Mexico, Ohio, Oklahoma, Pennsylvania, South Carolina, Texas, Washington, D. C.

DISCUSSION: *Stilicolina* is a member of the subtribe Stilici (Casey, 1905), which can be recognized by the narrow neck, confluent gular sutures, open procoxal cavities, acicular fourth article of the maxillary palpus, and posteriorly flexile antennae. The subtribe has five North American representatives, *Pachystilicus, Stilicus, Acrostilicus, Megastilicus,* and *Stilicolina.* The latter genus can be separated from the first four genera by the absence of the umbilicate punctation of the head, and from *Megastilicus* by the presence of four or six labral denticles and the long flexible setae of the head and thorax.

Stiliderus, an Oriental region taxon, can be separated from *Stilicolina* by: the expanded tarsomeres and coarsely punctate elytra, the absence of an incision of the ninth tergum, and the asymmetrical aedeagus. Future studies may demonstrate that *Stiliderus* is more closely related to another subtribe because it differs in so many apomorphic characteristics.

KEY TO THE SPECIES OF *Stilicolina*

The males of *Stilicolina* are relatively simple to identify by external and aedeagal characteristics. The females are similar to one another and must be identified by using several characters in combination. The comparisons must be made carefully, particularly when determining the presence or absence of the labral carina. In cases of dubious identification of females, measurements of the head must be taken and compared with table 1.

1. Eighth sternum with emargination of posterior margin (figs. 36–38, 40) ..... Males 2
   Eighth sternum unmodified ..... Females 6
2(1). Prosternal carina not extending to anterior margin of prothorax (fig. 34); sternum VIII with broadly, deeply emarginate posterior margin (fig. 36); gular sutures separated for most of length (fig. 32); mentum with three pairs of setae (fig. 7) ..... *sonorina*
   Prosternal carina extending to anterior margin of prothorax (fig. 35); eighth sternum with posterior margin variously modified; gular sutures confluent for most of length (fig. 33); mentum with two pairs of setae (fig. 10) 3
3(2). Sternum VIII shallowly emarginate (fig. 38) 4
   Sternum VIII deeply emarginate (figs. 37, 40) 5
4(3). Head with suborbital grooves on lateral side (figs. 33, 42) ..... *condei*
   Head without suborbital grooves on lateral side ..... *fasta*
5(3). Sternum VIII with lateral margins convergent at apex (fig. 40); labrum with midlongitudinal carina (fig. 22) ..... *taraxa*
   Sternum VIII with lateral margins divergent at apex (fig. 37); labrum without midlongitudinal carina (fig. 24) ..... *tristis*
6(1). Prosternal carina becoming obsolete anteriorly, not extending to anterior margin of prothorax (fig. 34); labrum quadridentate (fig. 27); mean (±3 standard deviation) for head length/eye length = 6.66 (6.27–7.53) ..... *sonorina*
   Prosternal carina well developed along entire length and extending to near anterior margin of prothorax (fig. 35); labrum hexadentate (figs. 22–25); mean of head length/eye length variable 7
7(6). Labrum without midlongitudinal carina (figs. 24, 25) 8
   Labrum with midlongitudinal carina (figs. 22, 23) 9
8(7). Eyes reduced (fig. 29); mean (±3 standard deviations) for head length/eye length = 5.96 (5.06–6.86) ..... *condei*
   Eyes normal (fig. 31); mean (±3 standard deviations) for head length/eye length = 4.59 (4.26–4.92) ..... *tristis*
9(7). Mean (±3 standard deviations) of head length = 1.27 mm. (1.15–1.39 mm.); large species (6.5–8.0 mm.); head with base rounded (fig. 1) ..... *taraxa*
   Mean (±3 standard deviations) of head length = 0.98 mm. (0.86–1.10 mm.); small species (5.0–7.0 mm.); head with basal angles angulate (fig. 30) ..... *fasta*

Stilicolina sonorina (Casey)
Figures 2, 7, 11, 16, 27, 28, 32, 34, 36

Omostilicus sonorina CASEY, 1905, p. 230. Holotype: Arizona. Male. (U.S.N.M.) The type was not studied.

Stilicolina sonorina (Casey): BLACKWELDER, 1939; SANDERSON, 1947.

Length, 7.0 to 8.5 mm. Form, robust.

Range of head length/head width = 0.98–1.14. Range of head length/eye length = 6.28–7.46. Eyes small, well developed (fig. 28); range of length 0.19–0.22 mm.; suborbital, longitudinal groove absent. Gular sutures separated along most of length; sutures confluent posteriorly (fig. 32). Mentum with one pair of setae on lateral, apical angle, with one seta laterad of midline (fig. 7). Labrum with four denticles on anterior margin; median denticle absent; midlongitudinal carina absent (fig. 27).

Prosternal carina present near coxae and obsolete to absent anteriorly (fig. 34).

Seventh sternite of males with broad, shallow emargination of posterior margin. Eighth sternum of males with deep, broad emargination of posterior margin; emargination margined with setae; setae increasingly long laterally (fig. 36).

Parameres sharply acuminate apically (fig. 11; see also Sanderson, 1947, fig. A) and with apex strongly reflexed dorsally (fig. 11); lateral margin dorsally reflexed and with spiniform process (fig. 11). Parameroid lobe without prominent, longitudinal, explanate ridge (fig. 16); with pair of spiniform processes on ventral margin (fig. 11). Dorsal process of parameres broad, round and with two pairs of short, rounded processes; dorsal margin with rounded emargination (fig. 16). Internal struts with paired and median processes separated (figs. 9, 11).

FEMALE: Gular sutures not as deeply divided as in male. Abdomen with eighth sternum unmodified.

DISTRIBUTION: Arizona (fig. 2).

MATERIAL EXAMINED: 44 specimens. *Arizona:* Cochise County, Chiricahua Mountains, Ash Spring, 6000 feet, May 7–13, 1968 (L. Herman; A.M.N.H.), eight males, ten females; South Fork Canyon, 5500 feet, May 10, 1968 (L. Herman; A.M.N.H.), three females; Chiricahua Mountains (U.S.N.M.), 10 males, nine females; Pima County, Santa Rita Mountains (U.S.N.M.), two males, two females.

DISCUSSION: *Stilicolina sonorina* is readily separated from all of the other species by numerous characteristics of the aedeagus, the eighth sternum of the males, shape of the head, size of the head and eyes (table 1), the gular sutures, and the prosternal carina. This species was originally described in a separate genus, *Omostilicus*. Blackwelder (1939) made no

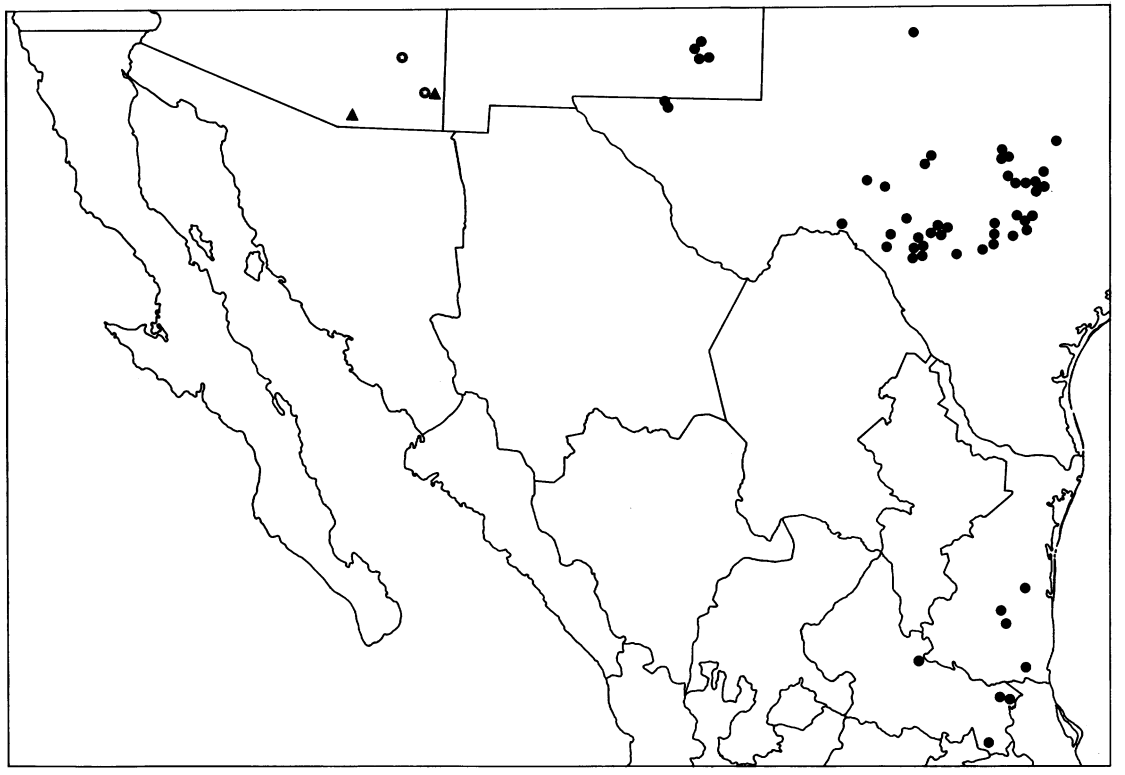


FIG. 2. Distribution: *Stilicolina condei* Jarrige (black dots); *S. sonorina* (Casey) (triangles); *S. taraxa,* n. sp. (circle and star).

comments when he moved the species to *Stilicolina,* but the transfer appears to be justified as *Stilicolina* is the only genus of the Stilici with well-developed parameroid lobes, with a dorsal process of the parameres and with a deeply emarginate ninth sternum.

Stilicolina tristis (Melsheimer)
Figures 3, 5, 13, 19, 24, 31, 37

Stilicus tristis MELSHEIMER, 1844, p. 40.
Stilicolina tristis (Melsheimer): CASEY, 1905; BLACKWELDER, 1939, 1952; SANDERSON, 1947.

HOLOTYPE: Pennsylvania, Museum of Comparative Zoology, Cambridge, Massachusetts. The type was not studied.

Length, approximately 6.5 mm. Form, slender.

Range of head length/head width = 1.11–1.19. Head length/eye length = 4.45–4.74. Eyes large (fig. 24); range of length 0.24–0.27 mm. Gular sutures confluent along most of length; sutures gradually separated anteriorly (as in fig. 33). Mentum with one pair of setae on lateroapical angle; without setae laterad of midline (as in fig. 10). Labrum with three pairs of denticles on anterior margin; median denticle absent; midlongitudinal carina absent (fig. 24). Head with basal angles broadly rounded (fig. 31).

Prosternal midlongitudinal carina present and well developed to anterior margin of sternum (as in fig. 35).

Seventh sternite of males with broad, shallow emargination. Eighth sternum with broad, deep emargination; lateral sides of emargination divergent posteriorly; anterior margin of emargination broadly rounded and margined with fine setae; sternum without setae on posterior portion (fig. 37).

Parameres with lateral margin sinuate; apex broadly rounded (see Sanderson, 1947, fig. D); lateral margin partially reflexed dorsally; apex slightly to strongly reflexed (fig. 13). Parameroid lobes with low, obsolete longitudinal ridge near dorsal edge; ridge weakly developed and broadly rounded (figs. 13, 19). Dorsal process of parameres broad and flattened; lateral processes broad; dorsal margin sinuate and with broad, rounded median emargination (figs. 5, 19). Internal struts with paired and median processes fused (fig. 13).

FEMALE: Abdomen with seventh and eighth sterna unmodified.

DISTRIBUTION: Arkansas, Kentucky, Missouri, New Jersey, Ohio, Oklahoma, Pennsylvania, South Carolina, Texas, Washington, D.C. (fig. 3).

MATERIAL EXAMINED: 14 specimens. *New Jersey:* Warren County, Phillipsburg, May 25, 1909, May 20, 1917, September 9, 1917, May 5, 1918,

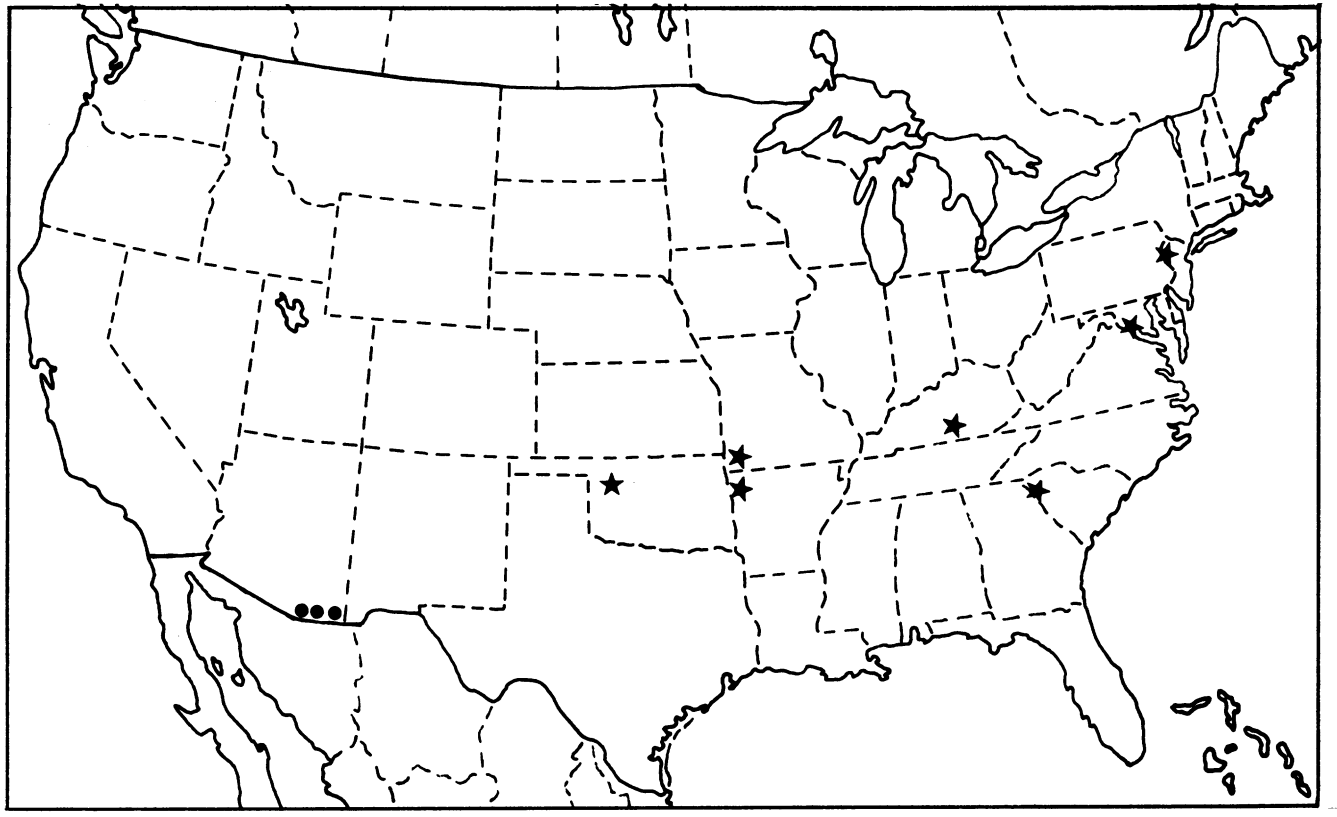


FIG. 3. Distribution: *Stilicolina fasta* Sanderson (black dots); *S. tristis* (Melsheimer) (stars).

May 19, 1918, May 21, 1918, one male, seven females. *Kentucky:* Adair County, 1 mile west northwest of Glensfor, Helm's Cave, June 21, 1957, one male. *Washington, D.C.:* one female. *Oklahoma:* Major County, 2.5 miles south of Cleo, on Cimarron River, June 12, 1968 (L. Herman), one male. *Missouri:* Barry County, 6 miles southeast of Cassville, June 4, 1963 (N. and B. Marston), one male. *Texas:* from a beaver nest, one female.

Additional collecting records have been published from Clemson, South Carolina, Washington County, Arkansas, Ohio (Sanderson, 1947), and Pennsylvania (Melsheimer, 1844).

DISCUSSION: *Stilicolina tristis* has been confused with *S. taraxa* but the males are readily separated by the distinct configuration of the emargination of the eighth sternum, and various aedeagal characters, particularly the absence in *S. tristis* of a midlongitudinal labral carina, and by comparison with the measurements in table 1.

Stilicolina taraxa, new species

Figures 1, 2, 4, 6, 8, 14, 15, 21, 22, 35, 39, 40, 41

HOLOTYPE: Arizona: Cochise County, Chiricahua Mountains, Paradise. July 24, 1962, collected by R. E. Graham from debris in a mine. Male. (A.M.N.H.)

LARVA: Moore, 1964 (as *Stilicolina tristis*).

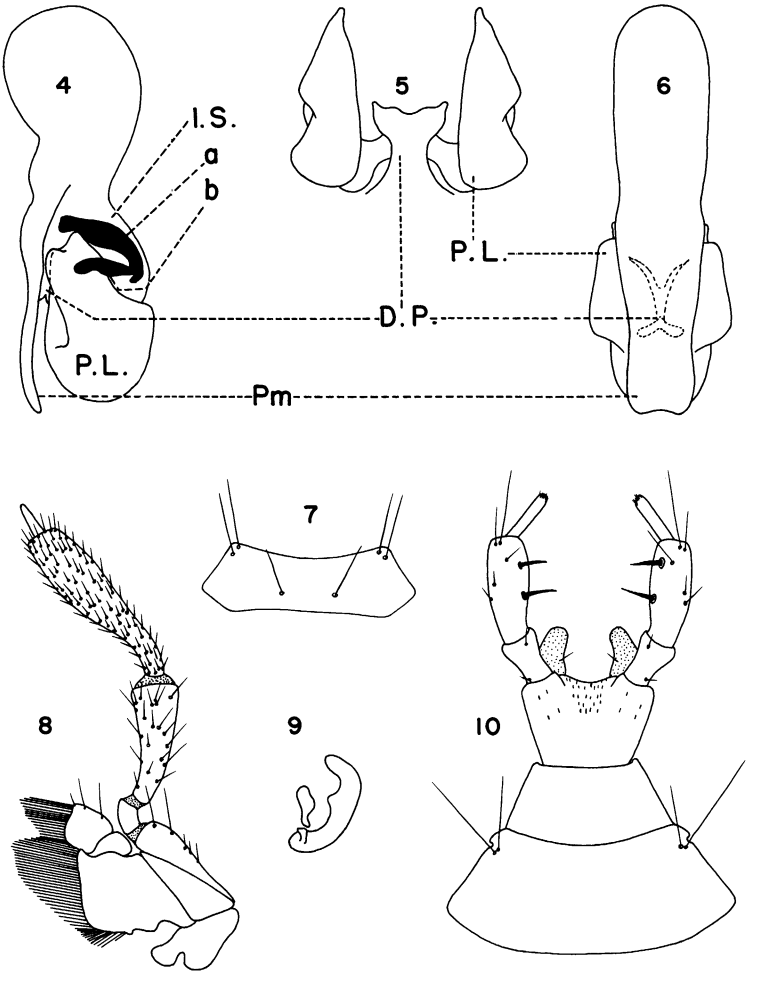
DESCRIPTION OF THE HOLOTYPE: Length, approximately 7.5 mm. (range of species 6.5–8.0 mm.).

Head length/head width = 1.12, (range 1.12–1.78). Head length/eye length = 2.17, (range 2.12–2.26). Eyes well developed; length, 0.269 mm. (range 0.24–0.28 mm.). Head without suborbital, longitudinal groove. Gular sutures separated on anterior portion only (as in fig. 33). Mentum without pair of median setae (cf. fig. 7); with pair of setae on lateral, apical angle (as in fig. 10). Labrum with midlongitudinal carina; with three pairs of denticles; with small, median denticle in median emargination (fig. 22).

Prosternal carina present and well developed to near anterior margin of prothorax (fig. 35).

Seventh sternite of abdomen unmodified. Eighth sternum of abdomen with deep, broad, median emargination; emargination with anterior margin broadly and shallowly arcuate; lateral margins of emargination convergent posteriorly and with mesal apices rounded; apex of sternum without setae (fig. 40).

Parameres emarginate at apex (fig. 11). Parameroid lobe with broad, large, explanate ridge near ventral margin; edge of ridge sinuate (figs.



FIGS. 4–10. 4. *Stilicolina taraxa,* new species, aedeagus, lateral view, parts labeled. 5. *S. tristis* (Melsheimer), aedeagus, posterior view, parts labeled. 6. *S. taraxa,* new species, aedeagus, ventral view, parts labeled. 7. *S. sonorina* (Casey), mentum. 8. *S. taraxa,* new species, left maxilla. 9. *S. sonorina* (Casey), internal struts of aedeagus. 10. *S. fasta* Sanderson, labium.

Abbreviations: a, median process of internal struts; b, pair processes of internal struts; D. P., dorsal process of parameres; I. S., internal struts; P. L., parameroid lobe; Pm, parameres.

6, 14, 15, 21). Dorsal process of parameres broad, flat, and with dorsal edge emarginate and sinuate (fig. 15). Internal struts with median and

paired processes fused (figs. 4, 14).

FEMALE: Abdomen with eighth sternum unmodified.

DISTRIBUTION: Arizona (fig. 2).

MATERIAL EXAMINED: Nine paratypes. Same data as holotype (A.M.-N.H.), two males, one female; Arizona: one male, two females determined as *Stilicolina tristis* by J. L. LeConte (M.C.Z.); Fort Grant (U.S.-N.M.), two females; Chiricahua Mountains (U.S.N.M.), one female.

DISCUSSION: The males of *Stilicolina taraxa* can be separated from the males of all the other species by the more extreme modification of the eighth sternum and by the various aedeagal characters discussed above. The females of *Stilicolina taraxa* can be separated from all the other species, except *S. fasta,* by the presence of a median denticle and a midlongitudinal carina on the labrum. *Stilicolina taraxa* and *S. fasta* can be separated by differences of the size and shape of the head and the size of eyes (table 1).

Stilicolina taraxa until now has been confused with *S. tristis* by LeConte (1880) who listed the species in Pennsylvania and Arizona and by Moore (1964) who described Arizonian staphylinid larvae associated with adults that he identified as *S. tristis.* Comparisons of the aedeagus, the eighth sternum of the male, and the labrum will readily separate *S. taraxa* and *S. tristis.*

Stilicolina fasta Sanderson

Figures 3, 10, 17, 20, 23, 26, 30, 43, 44

Stilicolina fasta SANDERSON, 1947, p. 28.

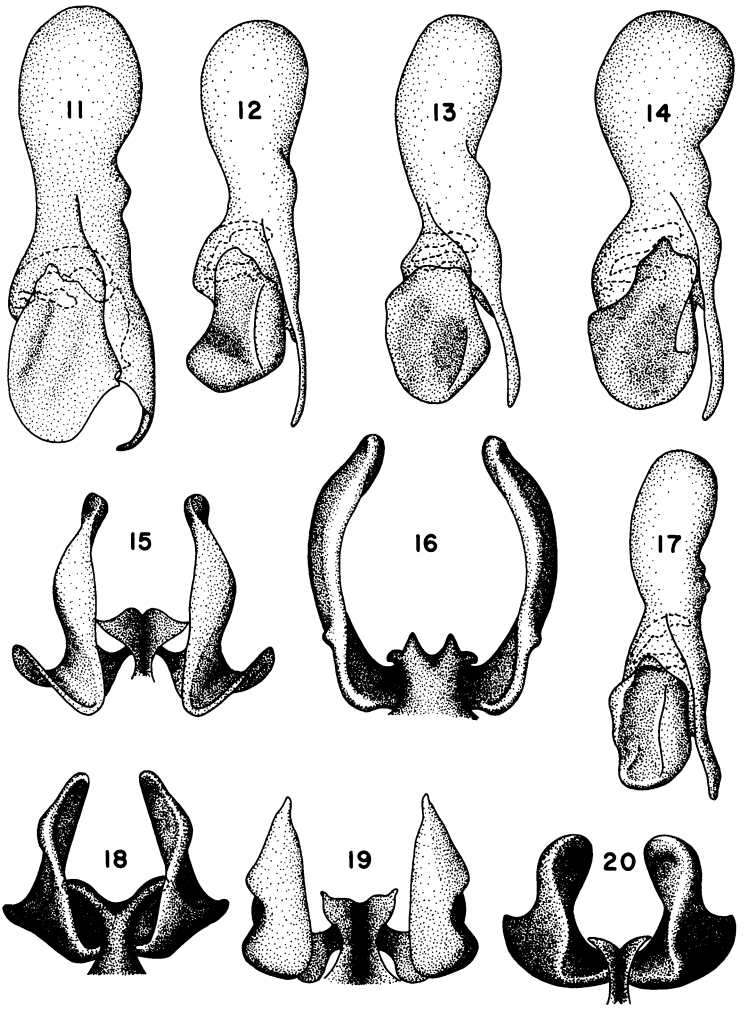
HOLOTYPE: Arizona, Cochise County, Huachuca Mountains, July. Male. Deposited at Cornell University. The type was not studied.

Length, 5.0–7.0 mm.

Range of head length/head width = 1.07–1.14. Range of head length/eye length = 4.18–4.97. Eyes well developed (fig. 30); range of length 0.19–0.22 mm. Head without longitudinal, suborbital groove. Gular sutures separated on anterior portion only (as in fig. 33). Mentum with pair of setae on lateroapical angle (fig. 10); without setae laterad of midline (cf. fig. 7). Labrum with midlongitudinal carina; with three pairs of denticles; with small denticle in median emargination (fig. 23). Head with basal angles well developed (fig. 30).

Prosternal midlongitudinal carina present and well developed to anterior margin of prosternum (as in fig. 35).

Seventh sternite unmodified. Eighth sternum of males with broad, shallow emargination; emargination rounded and margined by fine setae; sternum with setae present to apex (as in fig. 38).



FIGS. 11–20. 11. *Stilicolina sonorina* (Casey), aedeagus, lateral view. 12. *S. condei* Jarrige, aedeagus, lateral view. 13. *S. tristis* (Melsheimer), aedeagus, lateral view. 14. *S. taraxa,* new species, aedeagus, lateral view. 15. *S. taraxa,* new species, posterior view of aedeagus, showing posterior view of parameroid lobes and dorsal process of parameres, parameres removed. 16. *S. sonorina* (Casey), posterior view of aedeagus, showing posterior view of parameroid lobes and dorsal process of parameres, parameres removed. 17. *S. fasta* Sanderson, aedeagus, lateral view. 18. *S. condei* Jarrige, posterior view of aedeagus, showing posterior view of parameroid lobes and dorsal process of parameres, parameres removed. 19. *S. tristis* (Melsheimer), posterior view of aedeagus showing posterior view of parameroid lobes and dorsal process of parameres, parameres removed. 20. *S. fasta* Sanderson, posterior view of aedeagus, showing posterior view of parameroid lobes and dorsal process of parameres, parameres removed.

Parameres broad; lateral margins gradually convergent toward apex; apex nearly truncate (see Sanderson, 1947, fig. F). Parameroid lobes with explanate ridge on lateral side; edge of ridge straight, not sinuate (figs. 17, 20). Dorsal process slender, flat, and with lateral processes slender and acuminate; dorsal margin acutely emarginate (fig. 20). Internal struts with paired and median processes fused (fig. 17).

FEMALE: Abdomen with eighth sternum unmodified.

DISTRIBUTION: Arizona (fig. 3).

MATERIAL EXAMINED: 61 specimens. *Arizona:* Cochise County, Huachucha Mountains, Ramsey Canyon, 6500–7000 ft., May 9, 1968 (V. Roth; A.M.N.H.), eight males, twelve females; Chiricauha Mountains, Ash Spring, 5600 ft., May 7–13, 1968 (L. Herman; A.M.N.H.), ten males, 3 females; Greenhouse Canyon, 3 miles south of the Southwestern Research Station, 6000 feet, May 5, 1968 (L. Herman; A.M.N.H.) one female; Chiricahua Mountains (without further data) (Hubbard and Schwarz; U.S.N.M.) two males, three females; Pima County, Santa Rita Mountains, Madera Canyon, March 17, 1968, June 8, 1968, May 19, 1968, June 7, 1952, (K. Stephen; A.M.N.H.), five males, four females; Santa Rita Mountains (without further data) (Hubbard and Schwarz; U.S.N.M.) eleven males, two females.

DISCUSSION: The males of *Stilicolina fasta* and *S. condei* have a similar emargination of the eighth sternum but *S. fasta* can be separated by the different aedeagal characters and by the absence of the suborbital groove.

Stilicolina condei Jarrige

Figures 2, 12, 18, 25, 26, 29, 33, 38, 42

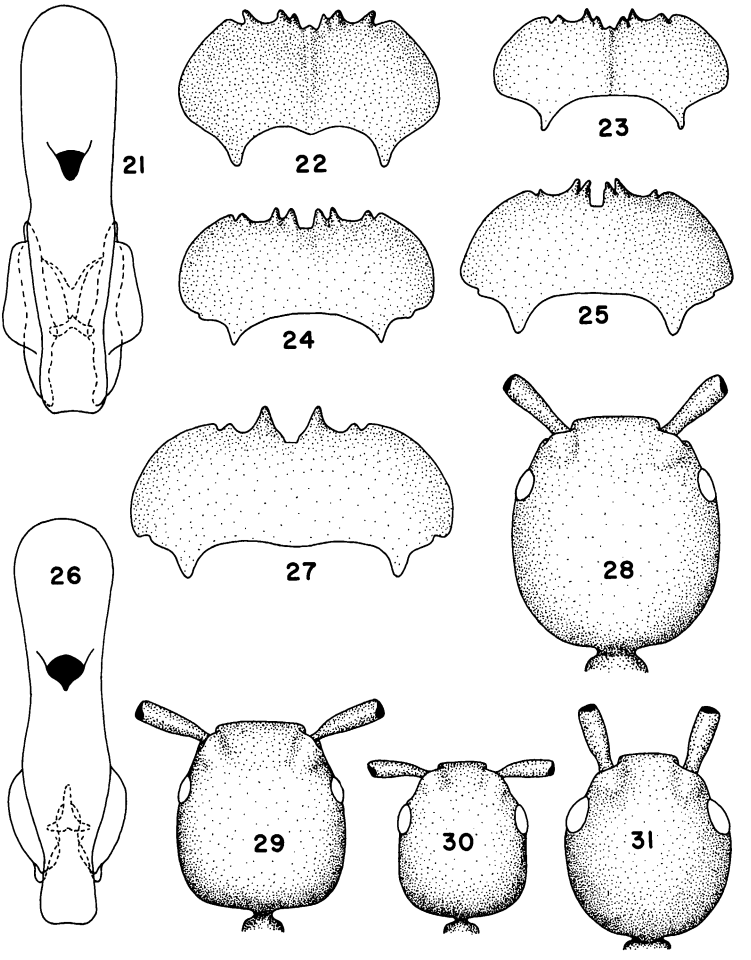
Stilicolina condei JARRIGE, 1960, p. 49; REDDELL, 1966; BARR AND REDDELL, 1967.

HOLOTYPE: Texas, Wilson Ranch, Cave. June 25, 1956. Male. Deposited in the Museum of Paris. The type was not studied.

Length, approximately 6.5–4.0 mm. Form, slender.

Range of head length/eye length = 5.11–7.18. Range of head length/head width = 0.97–1.19. Eyes small but well developed (fig. 29); range of length 0.16–0.21 mm. Head of males with suborbital, longitudinal groove (fig. 42). Gular sutures separated at anterior margin only (fig. 33). Mentum with two pairs of setae on lateroapical angles; median setae absent (as in fig. 10). Labrum with three pairs of denticles; median denticle and midlongitudinal carina absent (fig. 25). Head with basal angles well developed (fig. 29).

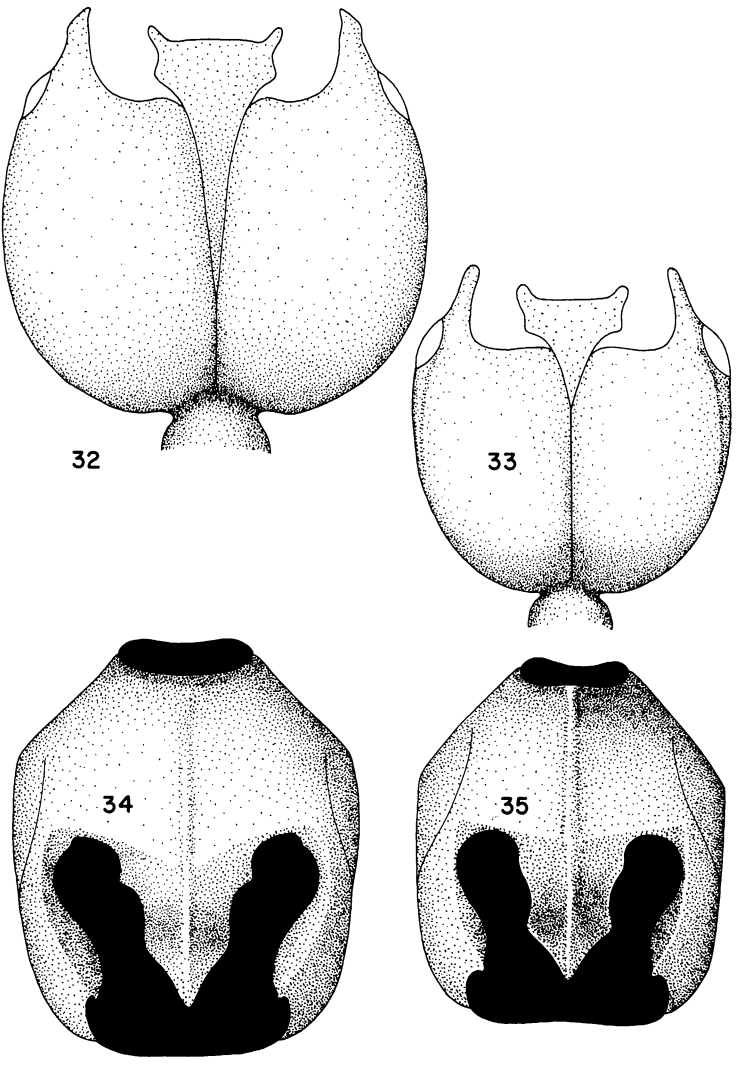
Prosternal carina present, well developed and extending to anterior



FIGS. 21–31. 21. *Stilicolina taraxa,* new species, aedeagus, ventral view. 22. *S. taraxa,* new species, labrum, dorsal view, setae removed. 23. *S. fasta* Sanderson, labrum, dorsal view, setae removed. 24. *S. tristis* (Melsheimer), labrum, dorsal view, setae removed. 25. *S. condei* Jarrige, labrum, dorsal view, setae removed. 26. *S. condei* Jarrige, aedeagus, ventral view. 27. *S. sonorina* (Casey), labrum, dorsal view, setae removed. 28. *S. sonorina* (Casey), head, dorsal view, setae removed. 29. *S. condei* Jarrige, head, dorsal view, setae removed. 30. *S. fasta* Sanderson, head, dorsal view, setae removed. 31. *S. tristis* (Melsheimer), head, dorsal view, setae removed.

margin of prosternum (as in fig. 35).

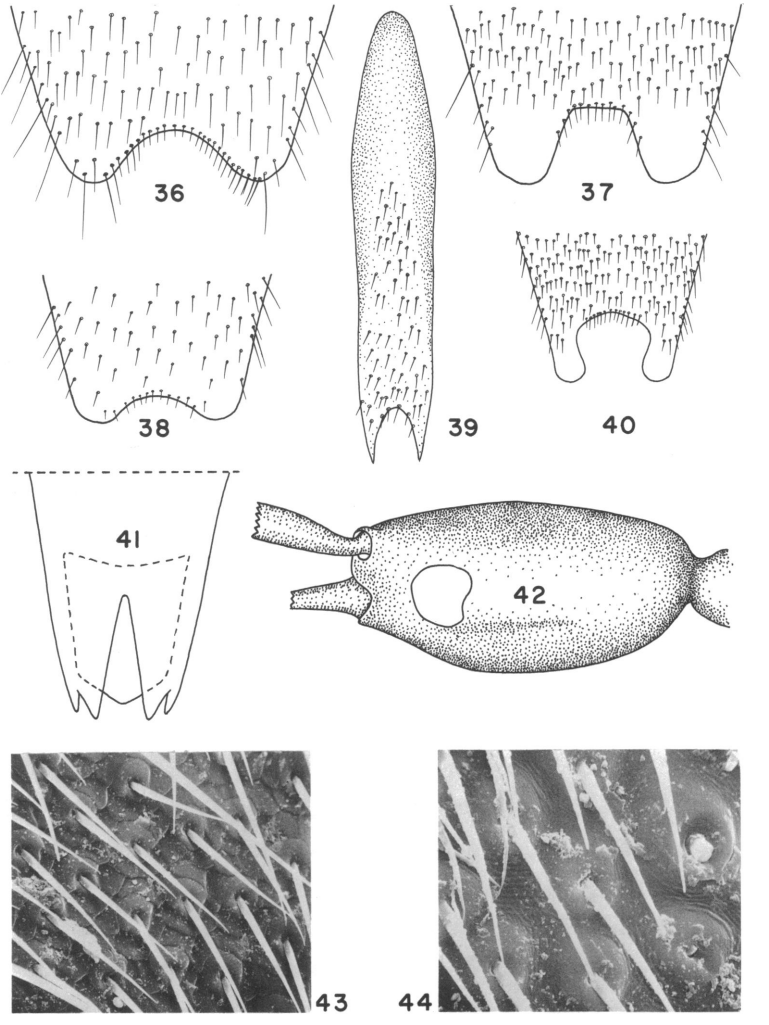
Seventh sternite of male unmodified. Eighth sternum of male with shallow, rounded emargination; sternum with pubescence to apex (as



FIGS. 32–35. 32. *Stilicolina sonorina* (Casey), head, ventral view, male. 33. *S. condei* Jarrige, head, ventral view, male. 34. *S. sonorina* (Casey), prothorax ventral view. 35. *S. taraxa*, new species, prothorax ventral view.

in fig. 38).

Parameres broad with sinuate lateral margin; lateral margins sinuate (fig. 26); apex slightly reflexed (fig. 12); apical margin slightly emarginate to rounded (fig. 26). Parameroid lobes with broad, slightly ex-



FIGS. 36–44. 36. *Stilicolina sonorina* (Casey), abdomen, apex of eighth sternum, male. 37. *S. tristis* (Melsheimer), abdomen, apex of eighth sternum, male. 38. *S. condei* Jarrige, abdomen, apex of eighth sternum, male. 39. *S. taraxa,* new species, abdomen, ninth sternum, male. 40. *S. taraxa,* new species, abdomen, apex of eighth sternum, male. 41. *S. taraxa,* new species, abdomen, apex of ninth tergum, and tenth tergum. 42. *S. condei* Jarrige, head lateral view, palpi and part of antennae and mandibles removed, male. 43. *S. fasta* Sanderson, head, dorsal view, integumental sculpturing. ×860. 44. *S. fasta* Sanderson, pronotum, dorsal view, integumental sculpturing. ×1720.

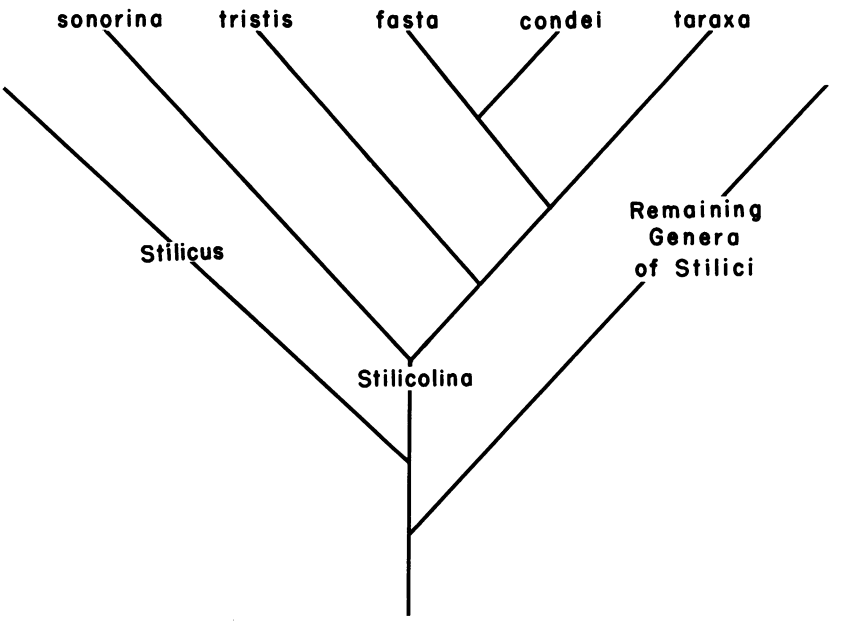


FIG. 45. Diagram of a proposed phylogeny of *Stilicolina*.

planate ridge (fig. 18); with broad, rounded emargination of dorsal margin (fig. 12). Dorsal process of parameres large, rounded and with long, slender, rounded lateral processes; dorsal margin with broad, deep, round emargination (fig. 18). Internal struts with lateral processes attached to median process (fig. 12).

FEMALE: Head without suborbital groove. Abdomen with eighth sternum unmodified.

DISTRIBUTION: *Mexico:* Nueva Leon, San Luis Potosi, Tamaulipas. *United States:* New Mexico, Texas (fig. 2).

DISCUSSION: The males of *Stilicolina condei* and *S. fasta* have a similar emargination of the eighth sternum but the presence on *S. condei* of a suborbital groove and the presence on *S. fasta* of a midlongitudinal labral carina will readily distinguish the species. The smaller eyes of *S. condei* and characteristics of the aedeagus, particularly the shape of the parameroid lobes and the configuration of the dorsal process of the parameres will aid separation of the males of these two species.

The female can be separated by the absence in *S. condei* of the midlongitudinal labral carina and by the ratio: head length/eye length (table 1).

TABLE 1

MEASUREMENTS (IN MILLIMETERS) OF THE HEAD AND EYE OF ADULTS OF THE SPECIES OF *Stilicolina*

(The mean, standard deviation, and sample size are given in that order for each species.)

	Head Length			Head Width (Sexes Combined)			Eye Length			Head length / Eye Length		
sonorina ♂	1.44	0.04	20	1.34	0.08	43	0.209	0.009	20	6.90	0.21	20
sonorina ♀	1.39	0.04	23	—	—	—	0.210	0.008	23	6.66	0.21	23
tristis (Sexes combined)	1.13	0.02	4	0.99	0.04	4	0.247	0.008	4	4.59	0.11	4
taraxa (Sexes combined)	1.27	0.04	8	1.11	0.04	8	0.272	0.013	8	4.66	0.15	8
fasta ♂	0.97	0.04	33	0.88	0.04	56	0.218	0.008	33	4.57	0.16	33
fasta ♀	0.98	0.04	24	—	—	—	0.213	0.006	24	4.59	0.16	24
condei ♂	1.17	0.07	33	1.07	0.07	61	0.187	0.011	33	6.27	0.41	33
condei ♀	1.14	0.04	28	—	—	—	0.191	0.009	28	5.96	0.30	28

The females of both *S. condei* and *S. tristis* lack a labral carina and must be separated by comparisons of the measurements in table 1.

MATERIAL EXAMINED: 137 specimens. *Texas:* Bandera County, Haby Water Cave, 10 miles north of Vanderpool, on organically rich silt in darkness, July 23, 1966 (D. McKenzie, J. Reddell), two males, one female; Bandera County, Fossil Cave, 10 miles north of Vanderpool, on organically rich silt in darkness, July 23, 1966 (D. McKenzie, J. Reddell), one female; Bexar County, Madla's Cave, 5 miles north of Helotes, October 6, 1963 (J. Russell, D. McKenzie), three males; Bexar County, Madla's Cave, 5 miles north of Helotes, in organic debris 200 feet from cave entrance, April 1, 1965 (J. Reddell), one female; Burnet County, Longhorn Caverns, in Longhorn Cavern State Park, November 4, 1957 (T. C. Barr), two females; Burnet County, Pie Cave, near Longhorn Caverns, on moist dirt and guano, July 24, 1963 (B. Russell), one male, three females; Comal County, Fischer Cave, near Fischer store, October 9, 1966 (D. McKenzie), one male, one female; Comal County Rittiman Cave, January 2, 1967 (J. Reddell, D. McKenzie, A. R. Smith), one male, one female; Comal County, Voges Cave, 9 miles north of New Braunfels, October 16, 1965 (D. McKenzie), two males, one female; Comal County, Natural Bridge Cave, 4 miles north of Bracken, July 13, 1963 (J. Reddell), two males, one female; Comal County, Kappelman Salamander Cave, 18 miles northwest of New Braunfels, found in organic debris 50 feet below and 50 feet from entrance, January 1, 1965 (J. Reddell, T. Raines), one male; Coryell County, Tippit Cave, in eastern Fort Hood, October 4, 1964 (D. McKenzie), three males, two females; Crockett County, Dudley Cave, 5 miles east of Ozona, found in organic debris 200 feet from entrance, December 13, 1964 (J. Reddell), one female; Culberson County, Olive's Cave, 5 miles south of State Line, June 26, 1967 (J. Reddell, J. Fish, A. R. Smith), one male, one female; Culberson County, Wiggley Cave, 4 miles south of State Line, June 27, 1967 (J. Reddell, J. Fish, A. R. Smith), one male, one female; Culberson County, Ulk Cave, 5 miles south of State Line, June 29, 1967 (J. Reddell), one male; Culberson County, Gyp Joint, 10 miles south of State Line (where El Paso-Carlsbad Highway crosses State Line), June 22, 1963 (J. Reddell), one male, one female; Edwards County, Hughes Cave, 8 miles west of Camp Wood, found in organic matter in darkness, August 14, 1965 (J. Reddell, J. Fish), one female; Edwards County, Deep Cave, 8 miles south of Carta Valley, found in raccoon droppings, September 4, 1965 (J. Reddell, D. McKenzie), three males, one female; Edwards County, Devil's Sink Hole, 8 miles west of Rockspring, October 26, 1963 (J.

Reddell, J. Porter), one female; Edwards County, Deep Cave, 8 miles south of Carta Valley found in raccoon droppings, September 4, 1965 (J. Reddell, D. McKenzie), one male; Hays County, Boyett Cave, on Devil's Backbone, May 19, 1965 (W. M. Andrews), three females; Kendall County, Prassell Ranch Cave, 10 miles north of Boerne, found in silt along the stream passage about 1000 feet from entrance, March 14, 1965 (J. Reddell, J. Fish, D. McKenzie), three males, four females; Kerr County, Goat Trap Cave, 8 miles southwest of Hunt, September 1, 1968 (J. Reddell, S. Fowler), two males, two females; Kerr County, Smith Cave, 10 miles southwest of Kerrville, September 1, 1968 (J. Reddell, S. Fowler), one female; King County, River Styx Cave, February 12, 1968 (R. W. Mitchell), one female; Medina County, Boehm's Cave, 3 miles south of Lake Medina, February 16, 1964 (J. Reddell, D. McKenzie), one female; Medina County, Koch Cave, 10 miles north of Hundo, October 7, 1963 (J. Reddell, D. McKenzie), two males; Menard County, Powell's Cave, 8 miles west of Menard (downstream passage), October 1, 1967 (J. and J. Reddell), one male, one female; Menard County, Powell's Cave, found on organic debris 8 miles northwest of Menard, September 7, 1964 (B. Russell), one male; Real County, Pape Cave, September, 1966 (D. McKenzie), one male; Real County, Skeleton Cave, 5 miles northwest of Leaky, August 18, 1963 (J. Reddell, D. McKenzie), one male; Real County, Maby Cave, 10 miles northeast of Leaky, October 30, 1963 (D. McKenzie), one male; San Saba County, Cicurina Cave, 18 miles southeast of San Saba, November, 1966 (T. Raines), three males, one female; San Saba County, Cicurina Cave, 8 miles south of Bend, September 1, 1963 (J. Reddell), three males; San Saba County, Gorman Cave, in organic debris several hundred feet from entrance, 6 miles southeast of Bend, Colorado River, March 15, 1962 (J. Reddell), one female; Stonewall County, Aspermont Bat Cave, 10 miles south of Aspermont, May 1963 (J. Reddell, B. Russell), one female; Sutton County, Felton Cave, 12 miles southwest of Sonora, found on decaying root 2000 feet from entrance, April 7, 1964 (J. Reddell), one female; Travis County, Lunsford Cave, 20 miles northwest of Austin, May 19, 1965 (W. H. Russell), one female; Travis County, Spanish Wells, 15 miles northwest of Austin, June 26, 1963 (B. Russell), four males, two females; Travis County, Kretschmar Fluted Sink, 15 miles northwest of Austin, September 15, 1963 (J. Reddell, B. Russell), two females; Travis County, McNeil Quarry Cave, 2 miles north of McNeil, July 25, 1963 (J. Reddell, B. Russell), two females; Travis County, Spanish Wells, about 10 miles west of Leander, October 6, 1963 (B. Russell), one female; Travis County, Lunsford Cave, 10 miles west of Leander,

October 14, 1963 (B. Russell), one female, one male; Uvalde County, Carson Cave, 1 mile south of Montell, found in silt and cave cricket guano 10 feet inside entrance but in darkness, April 24, 1966 (J. Reddell, E. Alexander), two males; Uvalde County, Whitecotton Bat Cave, 1 mile south of Montell, on bat guano 300 feet from entrance, April 24, 1966 (J. Reddell, E. Alexander), one male; Uvalde County, Indian Creek Cave, 22 miles northwest of Uvalde, on organic debris 300 feet from entrance, March 6, 1965 (J. Reddell), one female; Uvalde County, Picture Cave, 2 miles southwest of Indian Creek Cave, found under rocks on silt, March 7, 1965 (J. Reddell), one female; Val Verde County, Langtry Lead Cave, October 1966 (T. Raines), one male; Val Verde County, Emerald Sink, 5 miles north of Langtry, January 25, 1964 (J. Reddell, J. Porter, D. McKenzie), two males; Val Verde County, Oriente Milestone Molasses Bat Cave, 20 miles northeast of Del Rio, found 300 feet from entrance on organic debris, April 2, 1965 (J. Reddell), one male, one female; Williamson County, Beck Ranch Cave, 4 miles west of Round Rock, May 16, 1966 (T. Barr, R. Mitchell, W. Andrews), three females; Williamson County, Bat Well, 10 miles northwest of Georgetown, August 8, 1965 (B. Russell) one male, one female; Cascade Cave, Boerne, June 17, 1938 (K. Dearolf), one female; Heidrich Cave, New Brunfels, June 20, 1938 (K. Dearolf), two males. *New Mexico:* Eddy County, Russell's Slush Pit, 5 miles east of Artesia, found on organic debris, December 30, 1964, (J. Reddell, B. Russell), one female; Eddy County, Beetle Cave, 5 miles east of Artesia found on organic debris, December 30, 1964 (J. Reddell, B. Russell), one male, one female; Eddy County, Milliped Cave, 20 miles north of Carlsbad found on organic debris, December 13, 1964 (J. Reddell, B. Russell), three males; Eddy County, Sinkhole Flat, Sink #1, 20 miles north of Carlsbad, found on organic debris, December 30, 1964 (J. Reddell, B. Russell), one male. *Mexico:* Nueva Leon, Cueva de la Boca near Villa Santiago, December 4, 1966 (T. Raines), one female; San Luis Potosi, Cueva del Desierto, El Guayalote, July 17, 1967 (J. Reddell, P. Russell), one male; San Luis Potosi, 13 miles south of San Francisco, November 30, 1968 (J. Sumbera, W. Ramsel, D. Faith, J. MacIntire), one male, one female; San Luis Potosi, Santo del Arroyo, 10 miles northeast of Valles, on 30-foot level and Big Room, November 26, 1963 (J. Reddell), three females; San Luis Potosi, Sotano del Tigre, 10 miles northeast of Valles, February 1, 1968 (J. Reddell, R. Mitchell), two males; San Luis Potosi, Sotano de la Tinaja, 10 kilometers northeast of Valles, December 24, 1963 (D. McKenzie), one female; San Luis Potosi, Sotano de Tlamaya, at Tlamaya, 8 miles northeast of Xilitla, July 7, 1964 (T. Raines), one male; Tamaulipas,

Rancho del Cielo, 9 miles northwest of Gomez Farias, 4200 feet, June 3, 1967 (R. Mitchell), one female; Tamaulipas, Cueva Abajade Carreterra, 20 miles southwest of Tula, July 17, 1967 (J. Fish, J. Reddell), one female; Tamaulipas, Bee Cave, 8 kilometers north of Chamal, April 10, 1966 (J. Fish, E. Alexander, D. McKenzie, R. Felton), one male, one female; Tamaulipas, Sotano de las Piñas, at La Joya de Salas, June 5, 1965 (D. McKenzie), one male.

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