

NOTES ON THE GENUS *SPELAEORHYNCHUS*  
DESCRIPTION OF *S. PRAECURSOR* NEUMANN  
AND OF TWO NEW SPECIES <sup>1</sup>

BY

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During the summer 1961 the senior author had the opportunity to examine the bat collection of the U.S. National Museum, Washington, and to collect on these animals numerous specimens of mites belonging to the genus *Spelaeorhynchus* Neumann. The present work is devoted to the study of that material.

Most of these specimens agree perfectly well with the original description of *S. praecursor* Neumann, and they are considered here as belonging to that species. They had been collected on *Artibeus jamaicensis* from Puerto Rico and Republica Dominicana.

Our material comprises also another species clearly distinct from *S. praecursor*, which had been found on *Monophyllus portoricensis* from Republica Dominicana. It is described here under the name *Spelaeorhynchus monophylli* sp. n.

A third species, also new, is described here. It had been collected by J. C. on *Chilonycteris rubiginosa* from Guatemala.

REVIEW OF THE LITERATURE.

In 1902, NEUMANN found in the collection of Ixodidae of the Museum of Berlin, four specimens of a curious tick that had no other label than " Ohne Vaterland ". They were mixed together with a single specimen of the common african tick *Hyalomma aegyptium* (L.). NEUMANN described this new tick under the name *Spelaeorhynchus praecursor* n. g., n. sp. surmising that it was an african tick.

The same year OUDEMANS (1902) erected for this genus a new family Spelaeorhynchidae.

Later NEUMANN (1906) found, in the collection of the British Museum, a new specimen of his *Spelaeorhynchus praecursor*. It was labelled as follows : " From

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*Carollia brevicauda*, Pernambuco. — J. F. G. Smith Esq. ". NEUMANN concluded from these new data that the true origin of this parasite was not Africa or Asia as he thought so far but tropical America. He also could ascertain that the host was a bat.

NEUMANN (1911), in his monography on the Ixodidae, published in " Das Tierreich ", divided this family into two subfamilies : Ixodinae and Spelaeorhynchinae.

A second species of the genus *Spelaeorhynchus* (*S. latus*) was described by BANKS (1917). It was recovered from an undetermined bat, in Canal Zone. BANKS, considering that this genus was : " as closely related to the Parasitidae as to the Ixodidae " proposed to remove the family Spelaeorhynchidae from the Ixodidae and to place it in the Parasitoidea. This statement has been followed by VITZTHUM (1940 and 1942), BAKER and WHARTON (1952) and STRANDTMANN and WHARTON (1958).

FONSECA (1935) related the discovery of *S. latus* Banks 1917, only females, from several bats of Brazil : *Glossophaga soricina* (Pallas) *Lonchoglossa ecaudata* Wied. and *Hemiderma perspicillata* L.

#### SYSTEMATIC POSITION OF THE GENUS *Spelaeorhynchus*.

NEUMANN (1902), in his original description, has discussed the systematic position of this unusual acarine. He considered that the most striking character that separates it from all the other so far described species was the structure of the gnathosoma : " L'acarien dont la description précède se distingue principalement de tous ceux que nous connaissons par les particularités du rostre et surtout le développement du camerostome » (p. 36). As a matter of fact, he did not clearly decide whether this new genus was to be included in the Gamasidae or in the Ixodidae. In a later work (1911) he accepted the statement of OUDEMANS (1902) who had put it in a new group, but unlike this author, he did not give it the family rank, considering that it was merely a subfamily of the Ixodidae.

BANKS (1917) expressed another opinion : " I consider that this genus is fully as closely related to the Parasitidae as to the Ixodidae, and would place it in a family in the superfamily Parasitidoidea. The head is very different from the capitulum of the ticks, and the sternal plate, posterior genital opening, and the retractile mandibles ally it more to the Parasitidae ".

For ZUMPT (1951) the Spelaeorhynchidae are close to the hypothetical Proixodoidea.

FONSECA (1958), showing the presence in *Spelaeorhynchus latus* of a rather well-developed Haller's organ, expressed the opinion that this species is a primitive Ixodid.

The present study shows that the genus *Spelaeorhynchus* does not agree perfectly neither with the Mesostigmata nor with the Ixoxides, but that it is nevertheless much closer to the first group.

At first aspect these parasites resemble more a tick than a gamasid-mite. The body is thick, more or less flattened and rounded and the dorsal surface is partially covered by a sclerotized podosomal shield almost completely bare. However, a more careful study of the morphological characters of these acarines leads us to another opinion. These observations can be summarized as follows :

1) *Gnathosoma* : in the larvae the gnathosoma is typically laelaptoid : the hypostome is short and not toothed, there is no tectum, the palps are normal in shape and in direction and there is a small bifurcate tritosternum. In the adult female the hypostome is short, as in the larva, but the gnathosomal base is very large and transformed into a strongly sclerotized tunnel in order to contain the very big chelicerae. The palps are rejected laterally and they are moving in dorso-lateral direction. The widening of the cheliceral tunnel is not particular to *Spelaeorhynchus* but it is also encountered in the genus *Zumptiella* Fain (Halarachnidae).

2) *Vulva* : the vulva is situated ventrally, far behind and close to the terminal or subterminal anus. In the Ixodidae the vulva is situated in the podosomal region and that is also true in most of the Mesostigmata. Dr. G. O. EVANS has drawn our attention to the fact that in the genus *Oncoscelus* Delfinado and Baker (Spinturnicidae) the vulva is also very posterior and close to the anus. These posterior vulvae of *Spelaeorhynchus* and *Oncoscelus* are devoid of any sclerotized plates as it is the rule in the other Mesostigmata.

3) *Sternal shield* : this shield is strongly sclerotized, much more than the dorsal shield.

It is probable that the strong sclerotization of this shield is closely related with the manner of life of these parasites which seem to be fixed permanently to their host by means of their powerful chelicerae. The posterior migration of the vulva is probably also not a primitive character but might be induced secondarily for the same reason. As a matter of fact, all the mites that we have collected were attached on the base of the ear, generally on the tragus. They were strongly clung to their host by means of their chelicerae and it has been generally necessary to cut the tissues around the mites in order to remove them. In all the cases not only the mouth parts but also the anterior region of the idiosoma was sunk into the tissues of the host. The anterior legs of the mites were always free and strongly directed dorsally. In this position the sternal region becomes firmly appressed to the skin of the host, more especially as the mouth of the acarine is not terminal but ventro-terminal.

This special condition has probably prevented a normal functioning of the vulva situated in that region and has finally lead to its migration towards the posterior part of the body. On the other hand the close contact of the sternal region of the mite with the skin of the host may have induced the sclerotization of this region.

It seems thus that some or all of the main specialized characters that are encountered in this mite are induced secondarily as a consequence of the permanent fixation of the mite in ventral or ventro-terminal position.

4) *Sensory plate of tarsus I* : the structure of this plate is much simpler than in the ticks and cannot be homologized with an Haller organ (fig. 12-13).

5) *Structure of the coxae* : in the adult female the basal part of the coxae are sunk into the body. In the young females this internal part is not yet visible. A rather similar modification of the coxae is observed in the Spinturnicidae where all the coxae are fused with the idiosoma.

6) *Loss of the ambulacra in the adults* : these ambulacra are present in the larva and in the young female which have not yet fed. NEUMANN (1902) surmised that the mites are attached to the host by means of both the chelicerae and the legs and that the ambulacra are pulled away when the mite is removed from the host. That is not true, for in all the mites that we have seen the legs were not attached to the host but free.

7) *Anal shields and cribrum (adults)* : an anal shield is present but it is fragmented in three platelets surrounding the anal setae. A cribrum with very small spines directed anteriorly (ventrally when the cribrum is terminal) is present in all the species. These characters are typically Mesostigmatid.

8) *Peritreme* : the spiracle is situated in the posterior half of a small ellipsoidal peritreme unlike as in the ticks where the spiracle is situated in the middle of a peristigmatic chitinous membrane (fig. 14).

This critical study of some of the main characters of the genus *Spelaeorhynchus* has shown that the mites of this group are much more related with the Mesostigmata than to the Ixodides. All the characters except some highly specialized ones are typically laelaptoid. We think that most or all these specialized characters (modification of the gnathosoma with a very strong development of the chelicerae, strong sclerotization of the sternal shield, dorsal orientation of the anterior legs, loss of ambulacra, lateral position of the palps which are moving in dorso-lateral direction, posterior migration of the vulva) may be explained by the permanent fixation of the mite at the host. They are therefore nothing else than adaptation without phylogenetic signification. We propose then to maintain the family Spelaeorhynchidae into the Mesostigmata.

#### REMARKS ON SOME MORPHOLOGICAL CHARACTERS OF THE GENUS SPELAEORHYNCHUS.

##### I. ADULT FEMALE :

1. *Shape of the body* : The adult female has a more or less piriform idiosoma, the opisthosoma is much wider than long, the maximum width being situated in the opisthosoma, either in its anterior third or in its middle. Strangely enough this particular shape of idiosoma is also encountered in some very specialized



mites living under the scales of lezards (Pterygosomidae : Trombidiformes) or snakes (Omentolaelaptidae [Mesostigmata] and some ticks).

In the young females the idiosoma is broadly ellipsoidal or ovoidal.

2. *Cuticle* : finely striate, the striation may become inconspicuous in the old females.

3. *Idiosomal shields* :

*Dorsal shield* : finely punctuate and weakly sclerotized, without a network pattern, always longer than wide. Its anterior border is close to the anterior margin of the idiosoma, posteriorly it extends on the anterior part of the opisthosoma.

*Sternal shield* : punctuate and strongly sclerotized. A weak network pattern may be present (*S. chilonycteris*) (fig. 22). In *S. monophylli* the cuticle that surrounds the shield laterally and posteriorly is distinctly punctuate and sclerotized (especially in the old specimens), though less than the shield itself. This cuticular sclerotization is absent in the two other species (fig. 15). Two pairs of conspicuous scutal glands are visible on the sternal shield in all the species.

*Anal shields and cribrum* : the anus is situated on the soft skin, however there are three small punctuate and very weakly sclerotized shields surrounding the three anal hairs. Behind the posterior hair is a short but wide area, bearing very small spines, which is probably the homologous of the cribrum in the Mesostigmata (fig. 23).

*Genital shield* : completely absent.

4. *Spiracle* : situated on the lateral surface of the body, at the level of the fourth coxa. The spiracle opens in the posterior half of a very short, elliptic peritreme (fig. 14).
5. *Genital aperture* : in the form of a short transversal slit, situated ventrally and in the posterior part of the body, a little in front of the anus.
6. *Gnathosoma* : our study shows that the gnathosoma is completely free and not fused with the idiosoma as thought so far. The gnathosoma is in the shape of a very strongly sclerotized ring or tunnel. The mouth is ventro-terminal. This tunnel is incompletely divided by two median projections arising from its internal walls (a dorsal and a ventral one) (fig. 7). Each of these cavities contains a very powerful and strongly sclerotized chelicera. The two narrow and relatively short palps are inserted on the antero-lateral parts of the gnathosoma-ring ; they are directed dorsally. In *S. praecursor* and *S. monophylli* the dorsal surface of the gnathosoma shows a distinct network structure (fig. 1 and 3). In *S. chilonycteris* this surface bears only 8 longitudinal parallel lines (fig. 23).

The gnathosomal ring in *Spelaeorhynchus* seems to be formed dorsally by the fusion of the palpal coxae considerably hypertrophied and ventrally by these coxae

fused with the deutosternum and the hypostome. Its aspect resembles rather well the gnathosoma of the genus *Zumptiella* (Mesostigmata) whose chelicerae are also contained in a sclerotized tunnel. However in *Zumptiella* this tunnel and the chelicerae are smaller and the palps relatively larger and dorso-terminal.

The internal structure of the gnathosoma is difficult to study. It seems that the chelicerae, with their very strong chelate-dentate fingers act only as attaching organs. There are also several other transparent stylets (apparently 2 pairs) arising from the internal surface of the ventral gnathosomal wall. The inner surface of the tunnel bears, at a short distance from the mouth, a circlet of delicate and branched spinelets. These spinelets are lacking along the ventral surface of the tunnel (fig. 17-18).

The palps are made of 5 free articles. The trochanter presents a large ventral projection which recovers partly the femur and prevents this segment to move in ventral direction (fig. 10).

7. *Legs* : they are fairly well developed and consist of 6 main articles. All the femora are divided into basi and telo-femur. Among the tarsi, only the II, III and IV are divided into basi and telo-tarsus. In the adult females the coxae are partly sunk into the body. In the young females the coxae are incompletely developed and only the free part is visible.

In the legs I and II the trochantera are inserted on the dorsal surface of the coxae. This disposition prevents the ventral moving of these segments of the legs and shows that they normally move in dorsal direction. The posterior legs are normally inserted and move in ventral direction (fig. 1). In the adult females all the tarsi have lost their ambulacra and the tarsi end into stump-like extremities. In these specimens the two apico-ventral setae may be present or lost. In the youngest female of our collection (*S. praecursor*, from *Artibeus*) all the legs except one at one side bear complete ambulacra (a sucker and two well-formed claws on a long pretarsus) (fig. 12). In another female, with a little broader opisthosoma, only leg I at one side still bears an ambulacrum. It seems thus that the ambulacra are caduc and fall as soon as the adult female starts to feed.

#### 8. *Chaetotaxy of the idiosoma* :

For the facility of the description we shall divide the hairs into several groups :

*Postero-lateral hairs* : they are situated along the postero-lateral margins of the opisthosoma. Their number varies according to the species : about 50 pairs in *S. chilonycteris*, 30 pairs in *S. praecursor* (from *Artibeus*) and 15 to 20 pairs in *S. monophylli*.

*Ventro-lateral hairs* : about 10 to 12 pairs in the 3 species. These hairs are situated on the ventral surface of the opisthosoma, at each side of the median line. The most posterior hairs of this group are situated approximately at the level of the vulva ; they are close to the postero-lateral hairs and not clearly separable from them.

*Genital hairs* : one pair situated at the level of the vulva and distinctly separated from the most internal hairs of the precedent group.

*Anal hairs* : they are 3 in number : 2 laterals situated at each side and at the level of the anus and one median behind the anus.

*Sternal hairs* : 3 pairs, the anterior ones situated immediately in front of the shield are always shorter and thinner than the posterior ones.

*Scutal and periscutal hairs* : 7 to 9 pairs situated along or on the margins of the scutum. Only 2 pairs (antero-laterals) are situated on the scutum. The most posterior pair consists of two paramedian hairs situated distinctly behind the scutum.

*Dorso-lateral hairs* : 4 or 5 pairs of dorsal hairs situated along the margins of the podosoma, among them 2 pairs are situated at the level of the spiracles and 2 or 3 pairs in front of the latter.

*Postero-dorsal hairs* : 2 or 3 paramedian pairs situated in the posterior part of the dorsum, not far from the cribrum.

All these idiosomal hairs are barbed at one side in their apical half or third, except the postero-lateral hairs which are nude.

#### 9. *Sensory plate of tarsus I* (fig. 12-13) :

Dorsally and in the apical half of the tarsus I there is a small slightly depressed area which bears 4 well-developed solenidia and 3 very small broadly conical hairs among which one or two are prolonged into a very thin and rather short seta. Basally, this area is limited by a chitinous ring horseshoe-shaped. The base of this horseshoe is more sclerotized and ridged than the lateral arms.

This sensory plate is more simple than the Haller's organ in the ticks.

### III. LARVA :

The larvae that we have dissected from gravid females have an ovoid body with a short opisthosoma and well-developed legs. The cuticle of the idiosoma is finely verrucose. The gnathosoma is of the laelaptoid type and there is no tectum. The base is not abnormally developed and the free palpal articles, five in number, are thick and longer than the base. They arise from the apical part of the gnathosomal base and are directed forwards. (fig. 4-5). The gnathosomal base bears three pairs of simple setae, one pair is situated on the base itself and the two other pairs occupy the most anterior part of the base (hypostome ?) A deutosternal groove seems to be present but it does not carry teeth. A small but well-distinct tritosternum is present in all the larvae, it is longer in the larvae of *S. praecursor* than in those of *S. monophylli* ; in the first species it is always bifid while in *monophylli* some larvae have a short, simple, non bifid, tritosternum (fig. 4). The palps are made of 5 free articles. The trochanter is bare. The other segments bear simple hairs except the tibiae that carry 2 more or less cylindrical setae. Number of setae :

trochanter 0 ; femur 5 ; genu 4 ; tibia 8 ; tarsus 6 (fig. 4-5). The chelicerae are very thick, more or less conical in shape and very weakly sclerotized ; they end into two stumpy digits, the fixed digit being very short, and they contain numerous bundles of muscles (fig. 6). The legs are long and end into normally-developed but very weakly attached ambulacra. Sensory area of tarsus I as in the adult.

Genus *Spelaeorhynchus* Neumann, 1902.

1. *Spelaeorhynchus praecursor* Neumann, 1902.

*Spelaeorhynchus praecursor* Neumann, 1902 : 31 ; Oudemans, 1902 : 55, Neumann, 1906 : 220 ; 1911 : 135 ; Banks, 1917 : 198 ; Vitzthum, 1940 : 55-56 ; 1942 : 774 ; Baker and Wharton, 1952 : 61 ; Strandtmann and Wharton, 1958 : 142.

*Spelaeorhynchus latus* Banks : 1917 : 197, syn. nov. ; Fonseca, 1935 : 145 ; 1958 : 56.

We were not able to get the original specimens for our study and one can suppose that they are lost.

Fortunately one of us (A. F.) could recover from the common Central-American bat *Artibeus j. jamaicensis*, numerous specimens that agree closely with the original description of NEUMANN. All these parasitized bats had been captured in the Great Antillae (Puerto-Rico and Republica Dominicana) and they belong to the collections of the U.S. National Museum of Washington. Several additional specimens of that species had been collected by D. J. on the same host in Cuba.

Through the courtesy of Dr E. BAKER, Washington, we could examine one cotype of *Spelaeorhynchus latus* Banks. This study has shown that there are no specific differences between the species of BANKS and our specimens from *Artibeus*. We can thus conclude that they are synonyms.

All the specimens that we have collected are females. Among them are 2 young females, all the others are adult specimens. No males were recovered and we believe that the males are free and live in the nests of the bats.

FEMALE (fig. 1, 2, 7-14) : The general characters have been described above. The two young females that we have collected differ from the adults by the following characters : 1) much smaller size of the opisthosoma which is shorter and narrower ; 2) presence of an ambulacrum on all the legs except on leg III at one side (specimen n° AA) or only on the leg I at one side in the other specimen (specimen n° A 1) ; in the adult female the ambulacra are always lost ; 3) absence of the basal intra-tissular part of the coxae. The other characters are identical in both young and adult females.

In the young females the body is more or less ovoidal or ellipsoidal and the opisthosoma very short. In the older specimens the opisthosoma develops especially in transversal diameter so that in most of the specimens the opisthosoma is much wider than long (approximately twice as wide as long).

*Dorsally* there is a large, slightly sclerotized and finely punctuate scutum. This shield is longer than wide. It begins at a short distance behind the anterior margin of the idiosoma and extends on the anterior third of the opisthosoma. Along its anterior border there are 2 pairs of strong hairs, among which the internal

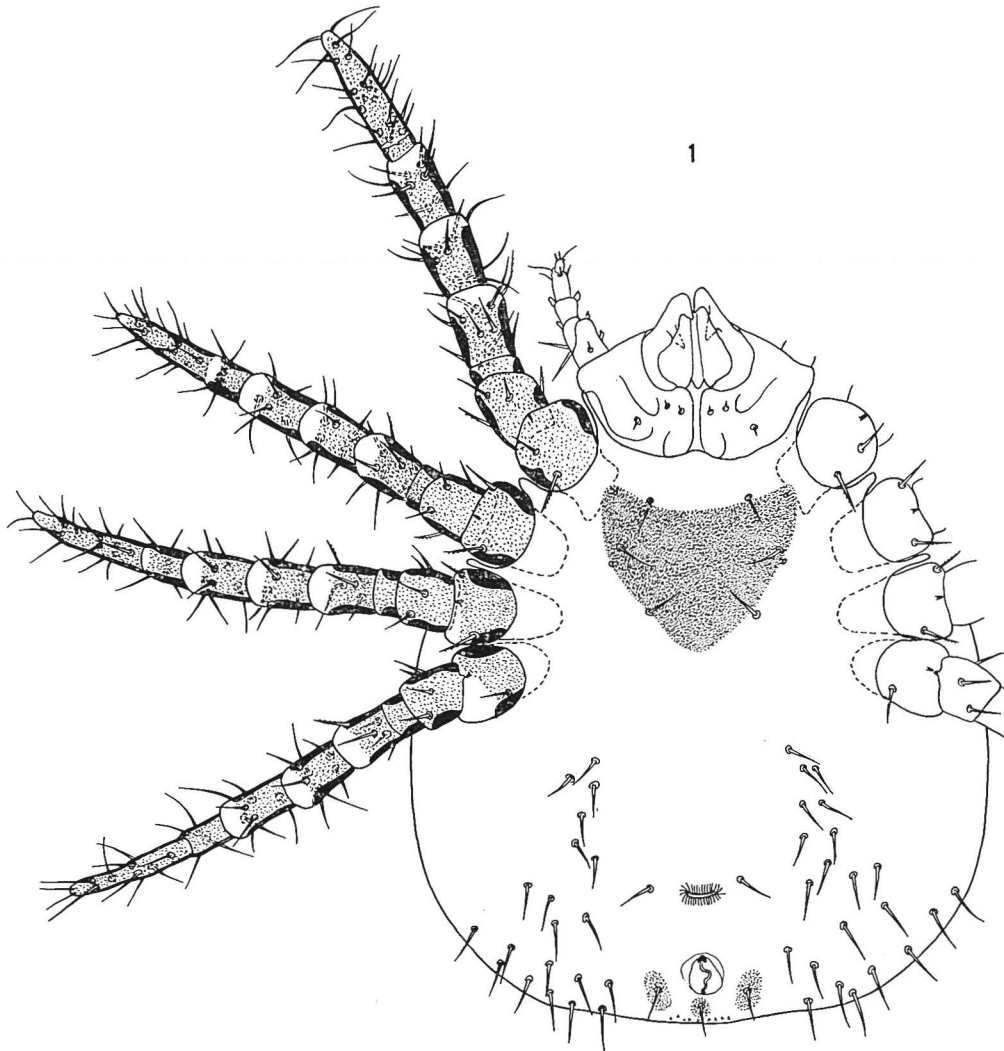


FIG. 1. — *Spelaerhynchus praecursor* Neumann. Female in ventral view (specimen off *Artibeus jamaicensis* from Republica Dominicana).

pair is situated immediately in front of the shield and the outer pair on the shield. Along the lateral margins of the shield there are 6 to 7 pairs of similar hairs. Of them, only the anterior pair is situated on the shield ; the posterior pair is paramedian and situated a little far behind the scutum. All these hairs are 90 to 120  $\mu$  long

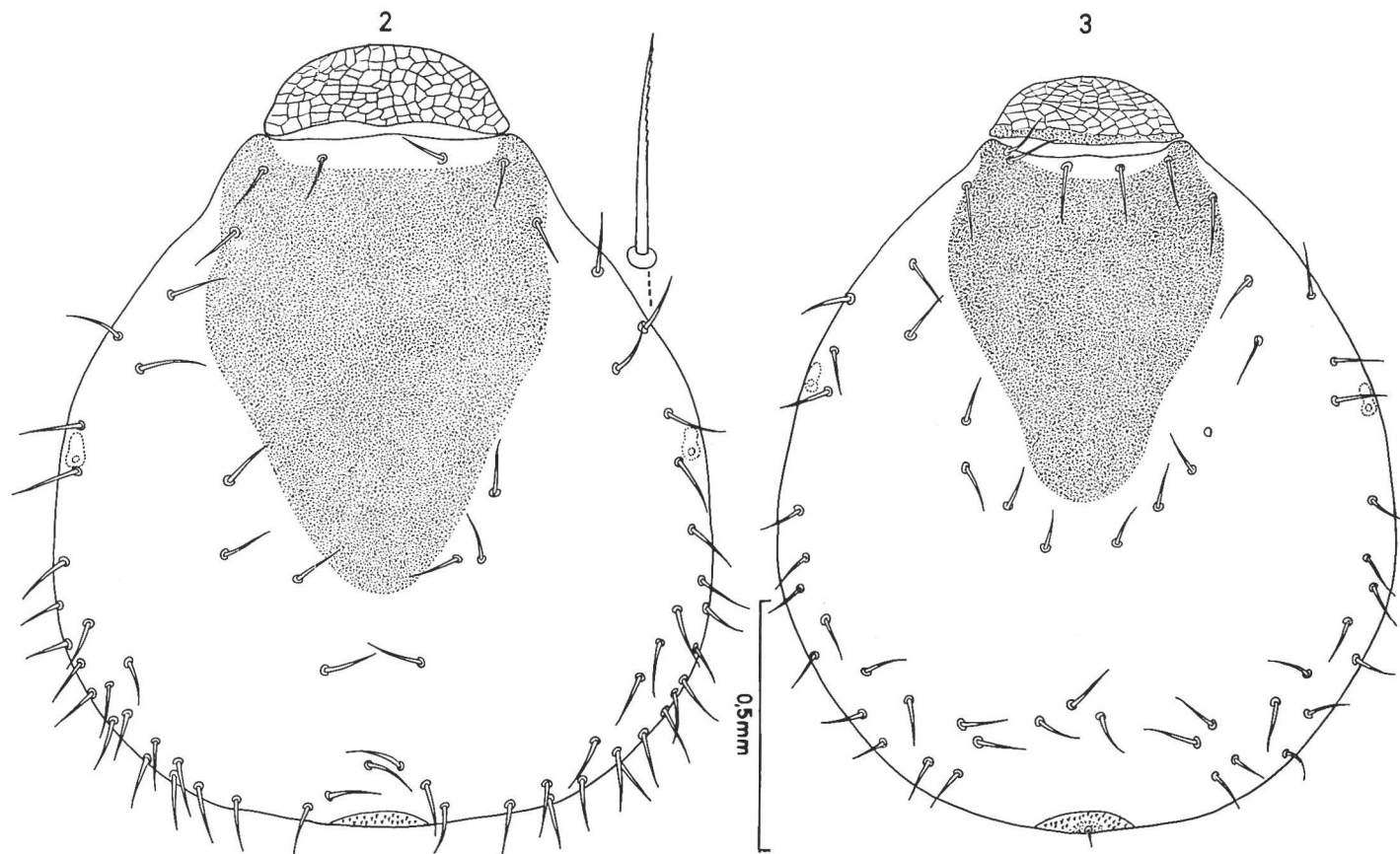


FIG. 2-3. — *Spelaeorhynchus praecursor* Neumann (2) and *S. monophylli* sp. n. (3) : females in dorsal view (n° 2 is a specimen from *Artibeus jamaicensis* ; n° 3 is a composite figure made mainly after the type).

and they are finely barbed in their apical half or third but only at one side. There are 4 or 5 dorso-lateral hairs situated along the margins of the podosoma. They are 120 to 140  $\mu$  long and barbed as the preceeding ones. The two most posterior pairs of this group are situated at the level of the spiracles. The 2 or 3 pairs of postero-dorsal hairs are paramedian and situated near the posterior margin of the body. In the old females these hairs are far behind the posterior pair of periscutal

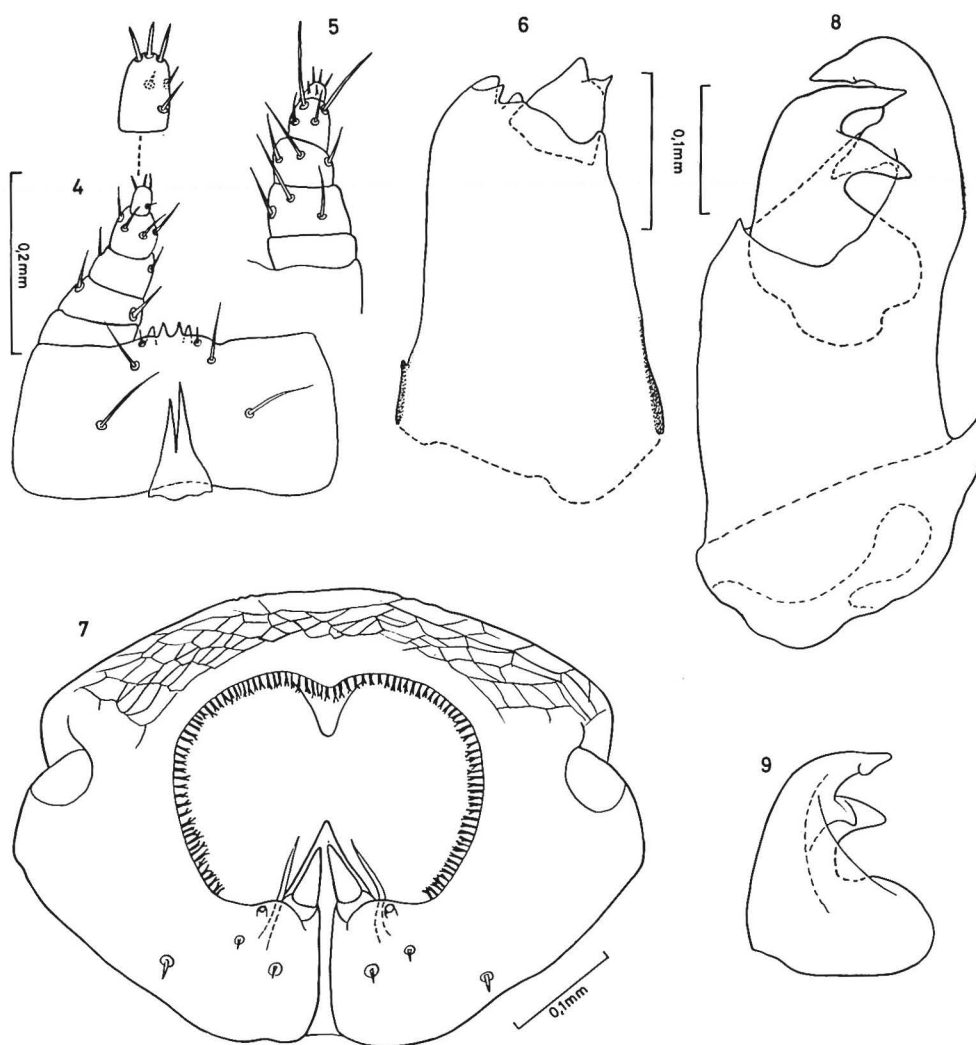


FIG. 4-9. — *Spelaeorhynchus praecursor* Neumann.

Adult female : gnathosoma with the mouth turned completely ventrally (7) ; chelicera in latero-internal view (8) and movable digit in latero-external view (9). Larva : gnathosoma in ventral view (4) ; palp in dorsal view (5) ; chelicera in ventro-lateral view (6). (N. B. : fig. 7 and 8 are made after specimen n° A 6 ; fig. 9 after specimen n° A 7).



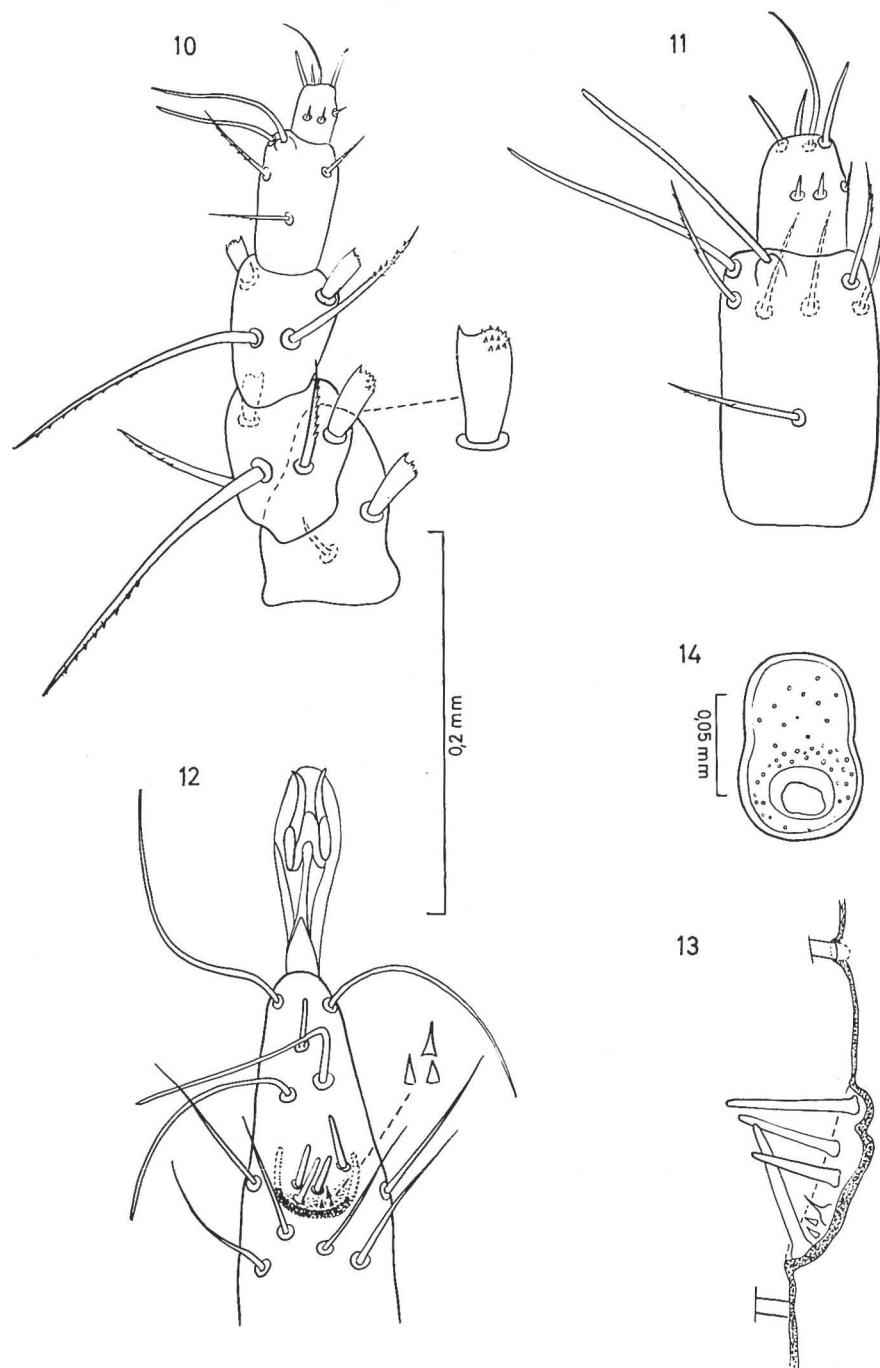


FIG. 10-14. — *Spelaeorhynchus praecursor* Neumann : Young female (specimen A 1) : right palp in dorsal view (10) ; tibio-tarse of the same but enlarged (11) ; dorsal view of the sensory area of tarsus I (12). Adult female : lateral view (anterior surface) of the sensory area of tarsus I (13) ; peritreme in specimen n° A 5 (14).

hairs. They have the same shape and size (120 to 140  $\mu$ ) as the dorso-lateral hairs. There are about 30 pairs of postero-lateral not barbed hairs, measuring 80 to 150  $\mu$ .

*Ventrally* : there is a strongly sclerotized sternal shield, wider than long (see table I) and bearing two pairs of scutal glands and the 2th pair of sternal hairs. The two other pairs of sternal hairs are situated on the soft skin. The anterior pair is distinctly shorter (60 to 78  $\mu$ ) than the other pairs (85 to 100  $\mu$ ) (in three specimens). All these hairs are finely barbed at one side in their apical half. The vulva is situated at a short distance in front of the anus. It is in the form of a small transversal slit, without any sclerotized structure and is flanked by a pair of hairs long of 80 to 90  $\mu$  (in three specimens). Anus situated ventrally, close to the posterior margin of the body and flanked by two anal hairs, 54 to 72  $\mu$  long, situated on small, more or less triangular-shaped and poorly sclerotized platelets. The post-anal hair is shorter (50-60  $\mu$ ) than the anterior-ones and is situated on a small punctuate rounded platelet. The 3 anal hairs are finely barbed as are the sternal hairs. Behind the post-anal hair is a transversally elongate area bearing very small but numerous spinelets (cribrum).

*Gnathosoma* : as described above. The dorsal surface of the gnathosoma presents a very distinct network pattern. For the measurements of the gnathosoma see table I. The ventral surface of the gnathosoma bears 3 pairs of small spinules and one pair of pores. Palps relatively small and directed latero-dorsally. They are made of 5 segments. The trochanter, femur and genu bear one or two modified much flattened and transparent hairs. On the tibia there are two dorsal more or less cylindrical hairs. Number of hairs : trochanter 2 ; femur 5 ; genu 4 ; tibia 8 ; tarsus 7. Chelicerae very strong, ending in two well-developed digits of equal length. Each digit with two strong retrorse processes : an apical and a median one. The median process bears an additional much smaller and blunt process, this additional process is internal on the fixed digit and external on the movable digit.

LARVA (fig. 4-6) : the larvae that we have dissected from gravid females are in poor condition and the chaetotaxy of the idiosoma could not be studied. Cuticle of the idiosoma finely verrucose. Other characters described above.

Cotype of *Spelaeorhynchus latus* Banks, 1917.

In spite of the fact that this specimen has been mounted in a not suitable medium (balsam) all the main characters are clearly observable.

A careful study of this specimen shows no differences with the specimens that we have described above from *Artibeus*. The principal measurements are very similar or identical, and all the other characters (structure of the gnathosoma, chelicerae, palps, legs, shields, length and structure of the chaetotaxy, number of idiosomal hair, etc...) agree closely with these specimens. We may thus conclude that *S. latus* is a synonym of *S. praecursor*.

TABLE I  
Comparative measurements of some female specimens of *S. praecursor* (in microns)  
(N. B. : L. = length, W. = width).

	Young females		Adult females					
Host	<i>Artibeus</i>	<i>Artibeus</i>	<i>Artibeus</i>		<i>Artibeus</i>		?	?
Locality	Rep. Dominicana	Puerto-Rico	Rep. Dominicana		Puerto-Rico		Canal Zone	?
	(Roja Cabo)	(Santa Catalina)	(Roja Cabo)		(Santa Catalina)	(Aguas Buenas)	(Bas Obispo)	
Nº specimen	A A	A 1	A 2	A 4	A 3	A 5	Cotype of <i>S. latus</i> Banks	Description of <i>S. praecursor</i> by Neumann (1902)
Idiosoma								
L. (gnathosoma included)	1150	1140	1770	1590	1620	1780	1650	1700
W. (at level of spiracle)	800	870	1560	1320	1320	1500	1230	1400
Sternal shield								
L. (in midline)	288	318	300	318	300	324	294	—
W. (maximum)	420	414	420	438	420	438	390	—
Dorsal shield								
L. (in the midline)	828	780	840	888	800	850	(?) 830	800
W. (maximum)	696	678	690	690	630	720	654	700
Gnathosoma								
W. (maximum)	528	546	492	540	540	510	498	—
Maximum width of mouth	258	264	270	258	246	240	278	265
W. of palp	—	± 300	—	—	± 300	—	—	320
Chelicerae								
L. (fixed digit included)	468	450	480	528	468	476	435	500
Peritreme								
L.	90	90	84	90	90	90	90	90
W.	—	48	48	48	?	55-60	48	—
Leg I :								
L. (coxa excluded)	1020	1068	1008	1092	1050	1098	920	—
W. of femur	120	120	120	126	130	126	119	—
Leg IV :								
L. (coxa excluded)	975	1038	1080	1020	1038	1092	935	—
W. of femur	109	114	120	114	114	120	114	—

*Host and locality* : 1) The host and the locality of the typical material (4 ♀♀) are not known ; 2) the types of *Spelaeorhynchus latus* Banks, 1917 had been collected in Bas Obispo, Canal Zone, Panama, 27-I-1912. Host unknown ; 3) Our numerous female specimens have been collected by one of us (A. F.) in 1961, only on one host : *Artibeus jamaicensis jamaicensis*, from different localities : a) Puerto-Rico : at Santa Catalina (bats captured on 4-III-1912) : 2 bats infested for 6 examined ; at Aguas Buenas (12-I-1912) 8 bats infested for 10 examined ; at Arecibo (19-I-1899) 6 bats infested for 15 examined — b) República Dominicana : at Rojo Cabo (28-VIII-1916) 9 bats infested for 11 examined ; at Manuel Vieta (9-III-1922). The bats from Puerto Rico and Rep. Dominicana are in the collection of the U.S. National Museum, Washington. — c) Cuba, at Gualbeiro cave, Soledad : two female mites collected by E. FOLK (M. C. Z.).

It is interesting to note that all the mites recovered by one of us were fixed on the lower part of the ear, mostly on the tragus more rarely in the depth of the ear. The types are probably lost. The material studied above is deposited in the U.S. National Museum, Washington. Several ♀♀ are in the Institute of Acarology and in the collections of the authors.

## 2. *Spelaeorhynchus monophylli* sp. n.

(fig. 3, 15-21).

This species is distinct from *S. praecursor* Neumann by the following characters :

- 1) Smaller size of the body and of most of the organs. Chaetotaxy distinctly shorter.
- 2) Number of postero-lateral setae much smaller (only 15 to 18 pairs).
- 3) Different structure and size of the sternal shield. The shield has approximately the same length as in *S. praecursor* but is much smaller, moreover around the shield itself is a wide area where the cuticle is distinctly sclerotized. The total width of this area, including the shield, is much greater than the width of the sternal shield in *S. praecursor* (see tables I and II).

FEMALE (holotype) : Idiosoma (gnathosoma included) 1560  $\mu$  long and 1290  $\mu$  wide (at the level of the spiracle). Other measurements are in table II. General aspect as in *S. praecursor*. The dorsal shield is relatively smaller in its anterior part. Sternal shield relatively narrower (350  $\mu$ ) than in *S. praecursor* (420  $\mu$ ) and surrounded by a large punctuate and distinctly sclerotized area extending laterally. The maximum width of this area, including the shield, is 500  $\mu$ . The distance between the anterior scutal glands (in the anterior corners of the shield) is 315  $\mu$  for 380  $\mu$  in *S. praecursor* (specimen n° A 5). Idiosomal hairs distinctly shorter than in *S. praecursor* : antero-sternals 30  $\mu$  ; postero-sternals 66  $\mu$  ; prescutals 90-100  $\mu$  ; dorso-laterals 100  $\mu$  ; postero-laterals (16 pairs) 75-105  $\mu$  ; postero-dorsals 90  $\mu$  ; ventro-laterals (11 pairs) 70 to 75  $\mu$  ; anals 30 to 45  $\mu$  ; genitals 72  $\mu$ . Anus and

genital slit as in *S. praecursor*. Gnathosoma, palps and chelicerae much alike in *S. praecursor* but smaller. Legs as in *S. praecursor* but the hairs are shorter.

LARVA : it resembles closely the larva of *S. praecursor* but the tritosternum is shorter : in one larva the tritosternum is in the shape of a short triangular flap without lacinae, in the other the tritosternum ends in two lacinae, shorter than in the larvae of *S. praecursor*. Anus not clearly observed. Cuticle of the idiosoma completely verrucose ; chaetotaxy of the idiosoma : ventrally there are 3 pairs of

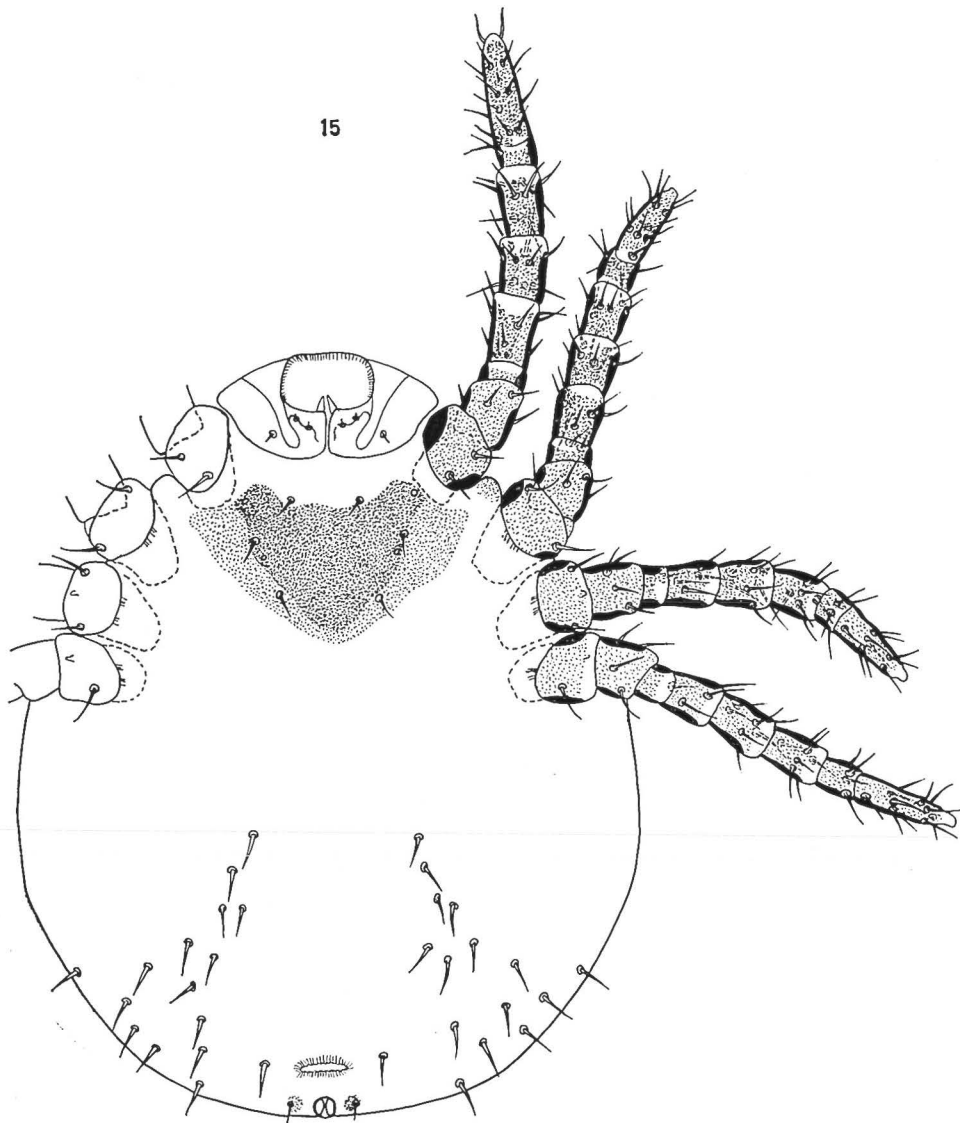


FIG. 15. — *Spelaorhynchus monophylli* sp. n. Female in ventral view.

sternal hairs (80 to 90  $\mu$ ) and 8 pairs of opisthosomal hairs (75 to 135  $\mu$ ); dorsally there are approximately 13 pairs of hairs 70 to 100  $\mu$  long. All these hairs are strong but simple and not barbed. Other characters as in the larva of *S. praecursor*.

*Host and locality* : *Monophyllus portoricensis* at Trujillo Alto (bats captured in December 1911) and at S. Juan (bats captured in April 1909) : Puerto Rico. All the mites were rather deeply embedded in the skin and fixed, by means of their chelicerae,

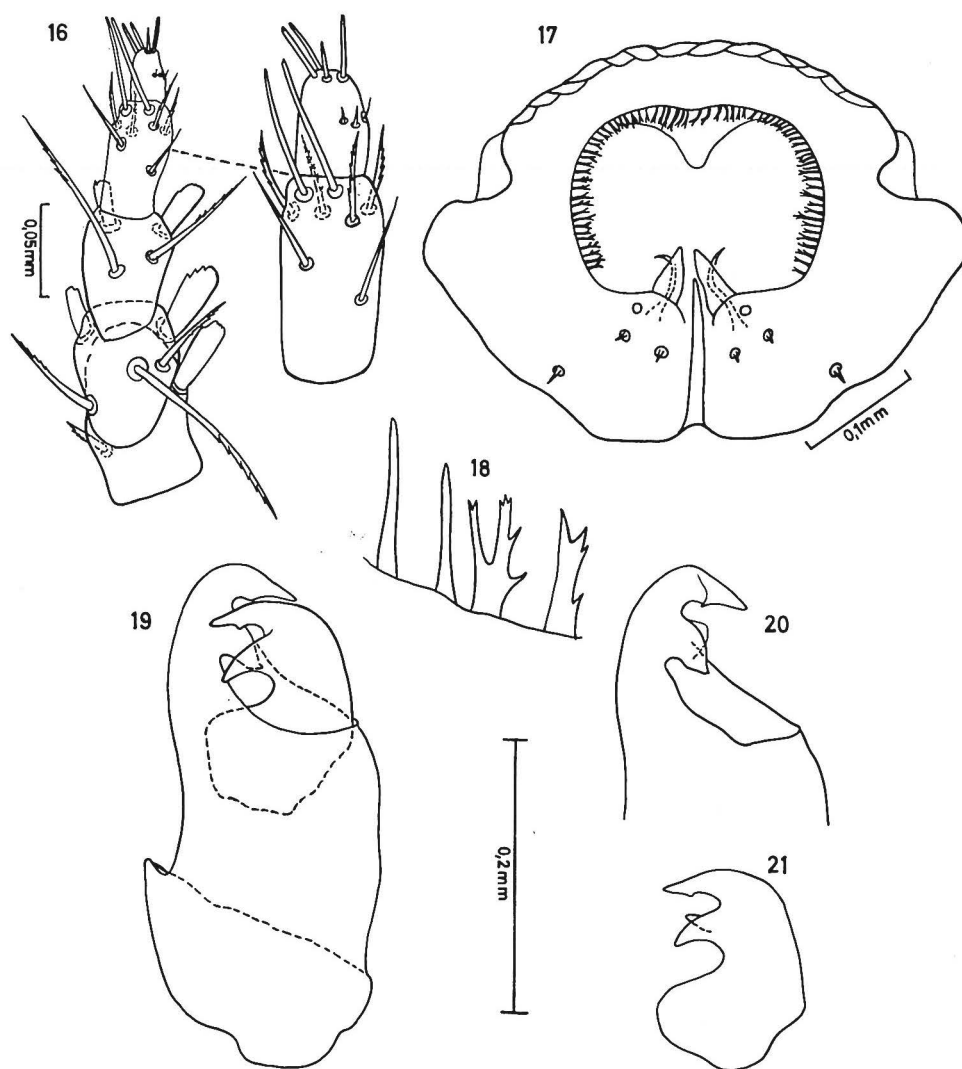


FIG. 16-21. — *Spelaeorhynchus monophylli* sp. n.

Adult female n° M 4 : palp in dorsal view (16) ; gnathosoma with the mouth turned completely ventrally (17) ; internal gnathosomal spinelets (18) ; chelicera in internal view (19) with fixed (20) and movable digit (21) separated to show the forking of the median process.

on the base of the ear, especially the tragus. The parasitized bats are in alcohol in the U.S. Nat. Museum. The mites had been collected by A. F. in August 1961. We have also received from Dr J. TAMSITT a specimen belonging to *S. monophylli*. It had been collected in Puerto-Rico (near El Verde, Luquillo Forest, El Yunque Mountains) on 3 August 1965 (coll. J. TAMSITT).

*Types* : In the U.S. National Museum.

### 3. *Spelaeorhynchus chilonycteris* sp. n.

This species is clearly distinct from the two other species in the genus by the following characters :

- 1) The dorsal surface of the gnathosoma does not carry a network pattern but 8 parallel longitudinal lines
- 2) Idiosoma with approximately 50 pairs of postero-lateral hairs.
- 3) Different shape of the palpal hairs.
- 4) Scutum and sternal shield relatively shorter.
- 5) Presence of a network pattern in the anterior half of the sternal shield.
- 6) Gnathosoma as wide as in *S. praecursor* but with a smaller mouth.

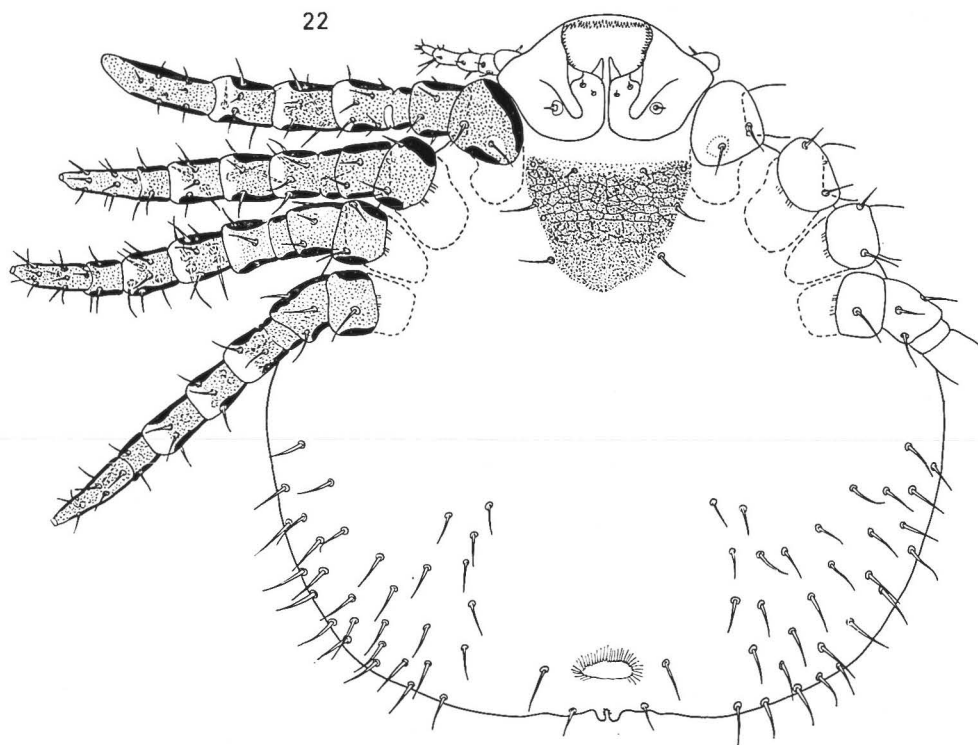


FIG. 22. — *Spelaeorhynchus chilonycteris* sp. n. Holotype female in ventral view.



FEMALE (holotype and only specimen known) (fig. 22-25) : for measurements see table II. Most of the characters as in the two other species described above. Scutum and sternal shield well sclerotized. Anus and vulva as in the other species of the genus. Legs as long as in *S. monophylli* but a little thicker. Gnathosoma approximately as wide as in *S. praecursor* but with a narrower mouth ; dorsal surface of the gnathosomal ring without a network pattern but with 8 parallel longitudinal lines. Chaetotaxy of the idiosoma : there are 50 pairs of postero-lateral hairs. Other hairs of the same number as in the other species. Length of the hairs : antero-sternals : 36  $\mu$  ; postero-sternals 78  $\mu$  ; antero-anals 66  $\mu$  ; postero-anal 48  $\mu$  ; genitals 90  $\mu$  ; postero-laterals 90-150  $\mu$  ; ventro-laterals 60-95  $\mu$  ; dorso-laterals 120  $\mu$  ; postero-dorsals 120  $\mu$ . Palps : there is only one palp left ; the flathairs of the 3 basal free-articles seem to be thicker and not so flattened as in the two other species, but it is possible that the orientation of the palp is not suitable for a correct study of these hairs.

*Host and locality* : the only specimen known has been collected by one of us (J. C.) on a *Chilonycteris r. rubiginosa* (Field n° 743-744) ; cat. n° 65100-01) at San Luis, Dept. Escuintla, Guatemala. (1700 ft) (22-X-1948).

*Type* : in the Chicago Natural History Museum.

#### 4. *Spelaeorhynchus* sp.

Two female specimens of *Spelaeorhynchus*, found on *Carollia brevicauda* from Pernambuco, Brazil, do not agree entirely with the specimens collected from *Artibeus*, and described above. They have a smaller sternal shield, and the peritreme, the chelicerae and the legs are a little shorter. By all the other characters, however, they agree with the specimens that we have described as *S. praecursor* (see tables I and II.) We prefer not to give them a specific name for the moment and wait that other specimens become available from the same host before to make a decision about their systematic position.

One of these specimens belongs to the collection of the British Museum. It had been seen by NEUMANN (1906) and is labelled " From *Carollia brevicauda*. Pernambuco. J. F. G. Smith Esq. ".

The second specimen has been collected on the same host and from the same locality by one of us (A. F.) in 1961. This specimen is in the U.S. National Museum, Washington.

#### ACKNOWLEDGMENTS.

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We wish particularly to express our appreciation to Dr E. W. BAKER, Washington, for the loan of typical material of *Spelaeorhynchus latus* Banks and for his intervention and help in collecting the material that is studied here.

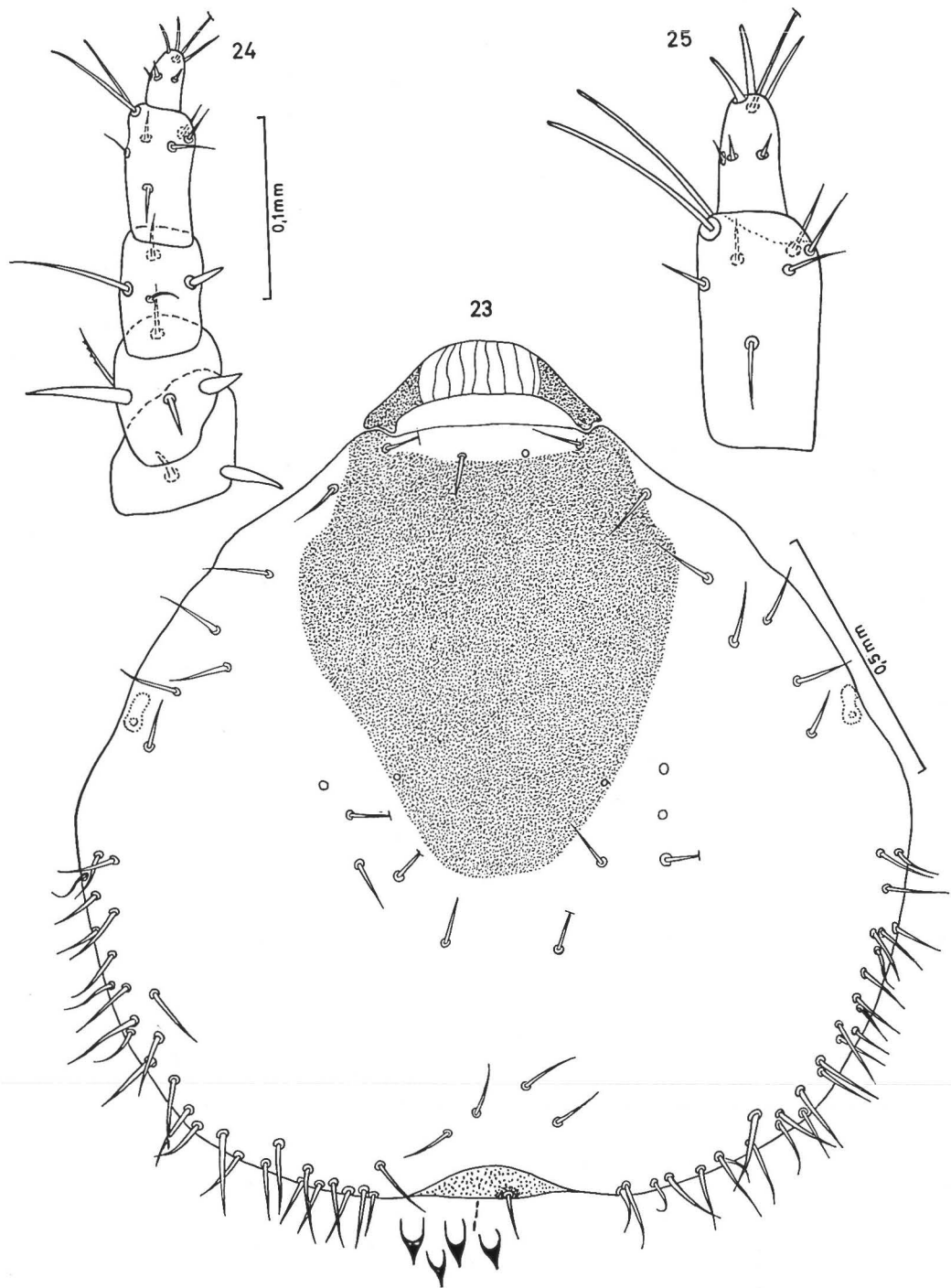


FIG. 23-25. — *Spelaeorhynchus chilonycteris* sp. n.  
 Holotype female in dorsal view (23) ; palp of ditto in dorso-lateral view (24) and tibio-tarsus enlarged (25) (N. B. : the spinelets of the cribrum are figured, strongly enlarged, behind the posterior margin of the mite).

TABLE 11

Comparative measurements of some female specimens of *Spelaeorhynchus monophylli* sp. n.,  
*Spelaeorhynchus chilonycteris* sp. n. and *Spelaeorhynchus* sp. (in microns)  
(N. B. : L. = length W. = width).

	<i>S. monophylli</i> sp. n.			<i>S. chilonycteris</i> sp. n.	<i>S. sp.</i>	
Host	<i>Monophyllus portoricensis</i>			<i>Chilonycteris</i> <i>v. rubiginosa</i>	<i>Carollia brevicauda</i>	
Locality	Puerto-Rico (Trujillo Alto)			Guatemala	Brazil (Pernambuco)	
Nº specimen	M 1 (holotype)	M 2 (paratype)	M 3 (paratype)	holotype	Specimen of British Museum, seen by Neumann	—
Idiosoma						
L. (gnathosoma included)	1560	1500	1440	1650	1680	1680
W. (at level of spiracle)	1290	1200	1170	1440	1470	1400
Sternal shield						
L. (in the midline)	285	300	300	284	270	270
W. (maximum)	350	340	325	390	366	390
W. of shield including lateral punctuate areas	500	450	490	—	—	—
Dorsal shield						
L. (in the midline)	660	600	600	840	(?) 850	850
W. (maximum)	564	560	546	690	630	660
Gnathosoma						
W. (maximum)	450	396	450	510	504	492
Maximum width of mouth	204	210	210	210	240	240
Chelicerae						
L. (fixed digit included)	384	360	372	402	?	420
Peritreme						
L.	78	78	78	73	80	79
W.	42	42	42	(?) 32	48	?
Leg I						
L. (coxa excluded)	858	840	840	840	—	912
W. of femur	108	108	102	120	—	126
Leg IV						
L. (coxa excluded)	810	800	798	804	—	960
W. of femur	96	102	96	108	—	102

We are also very grateful to Dr D. JOHNSON, Curator of the Mammals in the U.S. National Museum, Washington who allowed one of us (A. F.) to examine the bats conserved in this Museum.

We are greatly indebted to Dr G. O. EVANS, British Museum, London, for his interesting advices about some morphological characters of these mites and for the loan of material.

We thank Dr J. R. TAMSITT, Puerto Rico, for the sending of material.

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