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The Genus *Schizocarpus* TROUESSART, 1896 (Acari, Chirodiscidae) from the Beaver *Castor fiber* L.: An Example of Multiple Speciation

With 81 Figures and 1 Table

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INTRODUCTION

The first fur mite from beavers, genus *Castor*, was described by TROUESSART, 1896, under the name *Schizocarpus mingaudi* new genus and new species. The typical specimens were collected from *Castor canadensis* KUHL, from California, U.S.A.

DUBININA (1964) examined 22 beavers, *Castor fiber* L. from the Voronesh State Reservation, U.S.S.R., and found 12 species of *Schizocarpus* (= *Histiophorus*), including a species which she identified as *S. mingaudi* TROUESSART, and 11 new species.

FAIN et al. (1984) studying the parasitic mite fauna of the beaver *Castor canadensis* in Indiana, U.S.A., collected eigth species of *Schizocarpus*. Among them seven were new, the eighth was *Schizocarpus mingaudi* TR. These species were described and a lectotype was designated for *S. mingaudi* among the typical material.

Recently we had the opportunity to examine three beavers, *Castor fiber*, from Europe, two had been collected from the River Elbe in the G.D.R., the third one was of an unknown origin. We also received from Dr. M. STUBBE, Halle, G.D.R., a few specimens of *Schizocarpus* that he had collected on the fur of a beaver from Mongolia *(Castor fiber birulai)*.

Among the material that we collected we found four of the species already described by DUBININA from the U.S.S.R. and 21 new species. All these species are described or redescribed and depicted herein. It was, unfortunately, not possible to compare our specimens with the typical material of DUBININA, but all our new species are clearly different from the descriptions and the figures given by this author.

Our descriptions are based exclusively on the male specimens. The females and the immatures in the genus *Schizocarpus* are similar to each other and almost impossible to separate. Difficulties in their recognition are enhanced by the fact that several species are generally present in the same location of the body. We hope that by collecting more material from new specimens of beavers we will be able to identify these stages and to complete the study of this group of mites.

Measurements: The length of the idiosoma is measured dorsally, the mite being mounted dorso-ventrally. The total length of the body includes the gnathosoma until the extremities of the palps. The width is the maximum width of the body (generally in the median part of the body). The length of the opisthosoma is the distance between the setae *g p* and the posterior border of the body (transparent membranes not included). The width of the opisthosoma is the width at the level of the setae *g p*. The width of the opistonotal shield is

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measured in the median part of the shield. The diameter of the suckers b concerns only the internal sclerotized part of the sucker.

Abbreviations: BMNH = British Museum, Natural History; IRSNB = Institut royal des Sciences naturelles de Belgique; MNHN = Museum National d'Histoire naturelle, Paris; NMHU = Naturhistorisches Museum der Humboldt-Universität Berlin, G.D.R.; RMNH = Rijksmuseum van Natuurlijke Historie, Leiden, Nederland.

Types: The holotypes of the new species are deposited in the IRSNB. Paratypes when available in BMNH, MNHN, NMHU, RMNH and in the collections of the authors.

MATERIAL EXAMINED

We have examined the following material:

1. Two beavers *Castor fiber* L. from the basin of River Elbe, in the G.D.R. One, conserved in alcohol, originated from an affluent of the Elbe (at the brook Taube) near Diebzig, at 12 km NNW of Köthen (51° 50' N, 12° 10' E), G.D.R. This beaver had been collected by Department of Zoology, Section of Biosciences, Martin Luther University Halle-Wittenberg, 18. IX. 1976. The second specimen is a tanned skin conserved in IRSNB (1932).

2. One beaver *Castor fiber* from Europe but from an unknown locality. This animal has been conserved in alcohol in IRSNB since 1933.

Besides this material we also received from Dr STUBBE, Halle, G.D.R., a small series of *Schizocarpus* that he had collected on a beaver *Castor fiber* from Mongolia.

LOCATION OF THE MITES ON THE BEAVER

DUBININA (1964) collected from 22 beavers (*Castor fiber*) in the U.S.S.R. twelve species of the genus *Schizocarpus* (= *Histiophorus*). Among these species seven occupied different specific microareas on the beaver. These microareas were the following: *Schizocarpus capitis* DUB. was located on the head, *S. numerosus* DUB. on the head and the dorsum, *S. fedjushini* DUB. on the flanks, *S. brachyurus* DUB. on the abdomen and the legs, *S. brevicauda* DUB. on the median part of the abdomen between anterior und posterior legs, *S. latus* DUB. on the posterior part of the body behind the legs, and *S. grandis* DUB. in three small areas, one near the ear, the second on the abdomen in front of the posterior legs and the third close to the anal area.

FAIN et al. (1984) studying species of *Schizocarpus*, collected from *Castor canadensis* in the U.S.A., observed specialized locations for most of the species that they collected. Specific microareas have also been observed for most of the species that we studying herein. From the three beavers, *Castor fiber*, that we have examined we collected 25 species of *Schizocarpus*, of which four are already described by DUBININA from the U.S.S.R. and 21 are new. Among these new species 15 were located in the following areas: *S. insignis*, *S. intercalatus* and *S. parabrachyurus* were found only on the head; *S. hexapilis* and *S. similis* on the head and on the throat; *S. dubininae* and *S. subhexapilis* on head, the throat and the chest; *S. curtus* on the throat and the chest; *S. radiatus* and *S. ventricosus* almost exclusively on the dorsum and the flanks; *S. pygidialis* on a small area in front of the tail; *S. ornatus* on the anterior legs and a few specimens from the throat; *S. modestus* and *S. humilis* on the posterior legs; *S. subornatus* on the posterior legs and a few specimens on the body behind and in front of these legs. The six other species (*S. exiguus*, *S. pusillus*, *S. parahexapilis*, *S. brevis*, *S. diebzigensis* and *S. subdiebzigensis*) are represented by only few specimens and their location on the body of the host is not significant.

It is to be noted that some species were found in a very small area, e. g. *S. insignis* only on the ear and *S. pygidialis* only on the dorsum immediately in front of the tail.

Concerning the four species described by DUBININA and that we found in our material, two (*S. capitis* and *S. numerosus*) were collected from the head, which agrees with the observations of DUBININA. The third species (*S. fedjushini*) was found by us mainly on the head and rarely in other places, whereas DUBININA recorded that species only from

the flanks above the legs and never on the head. The precise location of our specimens of *S. brevicauda* was not noted.

GEOGRAPHICAL VARIATIONS IN THE COMPOSITION OF THE MITE FAUNA

DUBININA (1964) examining 22 beavers *(Castor fiber)* from Voronesh State Reservation, U.S.S.R., found twelve species of the genus *Schizocarpus*.

From two beavers *(Castor fiber)* originating from the River Elbe in G.D.R. we collected eleven species of this same genus including three species already described by DUBININA from U.S.S.R. *(S. capitis, S. numerosus* and *S. brevicauda)* and eight new species.

From a single beaver *(Castor fiber)* from an unknown locality we collected 16 species of *Schizocarpus*. Among them two are species already described from U.S.S.R. (*S. capitis* DUB. and *S. fedjushini* DUB.) and 14 are new species. Of these new species only one was also represented in the beavers from the River Elbe (= *S. insignis*).

From these observations it appears that the composition of the mite fauna varies considerably according to the origin of the beaver (table 1). That suggests that these various beaver populations have been isolated from each other since a long time.

It is well known that the various populations of *Castor fiber* in Europe are strictly confined to a river basin and that they have very little or no contact with each other. Some of these Eurasian beaver populations have been given the subspecific rank: *Castor fiber fiber* L. for the beaver from Scandinavia, *C. fiber albicus* MATSCHIE for that from the River Elbe in G.D.R., *C. fiber vistulanus* MATSCHIE for the beaver from Poland and Western U.S.S.R., *C. fiber galliae* DESMAREST from the delta of the Rhône, *C. fiber pohlei* SEREBRENNIKOV and *C. f. birulai* SEREBRENNIKOV from W. Siberia and Mongolia etc. Other authors, however, do not accept these subspecific divisions. Our observations on the mite fauna of these populations provide new arguments in favour to the opinion that some of these populations could actually represent valid subspecies (see MATSCHIE, 1907 and FREYE, 1960).

MULTIPLE SPECIATION IN THE GENUS *Schizocarpus*

If we add the 21 new species that we found on our three beavers to the 12 species recorded by DUBININA we arrive to the impressive total of 33 species of *Schizocarpus* all living on the same host but from different geographical areas.

Such extreme speciation is probably unique in parasitology. FAIN & DOMROW (1974) have observed a similar case of extreme speciation in the Australian potoroo or longnosed kangaroo *Potorous tridactylus* (Marsupialia: Macropodidae). This animal was parasitized by 21 species of the genus *Cytostethum* DOMROW (Atopomelidae, Listrophoroidea). More recently FAIN et al. (1984) have recorded eight species of *Schizocarpus* from *Castor canadensis* in the U.S.A. Among them they found *S. mingaudi*, originally described from this host in the U.S.A., and seven new species, all clearly different from the European species of *Schizocarpus*.

Several other cases of multiple speciation have been described in mites, almost all were caused by fur mites of the listrophoroid group (Atopomelidae, Chirodiscidae and Listrophoridae) (FAIN & DOMROW, 1974).

The true cause of multiple speciation is not known. We think that in the case of *Schizocarpus*, it results from the combination of two different mechanisms going in the same direction. First a long isolation of the various populations of beavers. That is indirectly proved by the great difference existing in the composition of the mite fauna from beavers of different origins (table 1). The second mechanism is the microisolation resulting from the existence on the beaver of various microhabitats which differ from each other by the texture and the thickness of the hairs, the skin secretions etc.

Table 1. Distribution of the species of *Schizocarpus* from *Castor fiber* from various localities.

Species	U.S.S.R. (Voronesh) 22 beavers	G.D.R. (Riv. Elbe) 2 beavers	Unknown origin 1 beaver	Mongolia
S. numerosus DUB.	+	+	–	–
S. fedjushini DUB.	+	–	+	–
S. brevicauda DUB.	+	+	–	–
S. capitis DUB.	+	+	+	–
S. grandis DUB.	+	–	–	–
S. brachyurus DUB.	+	–	–	–
S. minor DUB.	+	–	–	–
S. subminor DUB.	+	–	–	–
S. parvus DUB.	+	–	–	–
S. subparvus DUB.	+	–	–	–
S. latus DUB.	+	–	–	–
S. sp.	+	–	–	–
S. parabrachyurus n. sp.	–	+	–	–
S. similis n. sp.	–	+	–	–
S. diebzigensis n. sp.	–	+	–	–
S. modestus n. sp.	–	+	–	–
S. humilis n. sp.	–	+	–	–
S. pusillus n. sp.	–	+	–	–
S. hexapilis n. sp.	–	+	–	–
S. insignis n. sp.	–	+	+	+
S. intercalatus n. sp.	–	–	+	–
S. pygidialis n. sp.	–	–	+	–
S. ornatus n. sp.	–	–	+	–
S. subornatus n. sp.	–	–	+	–
S. dubininae n. sp.	–	–	+	–
S. subdiebzigensis n. sp.	–	–	+	–
S. brevis n. sp.	–	–	+	–
S. curtus n. sp.	–	–	+	–
S. exiguus n. sp.	–	–	+	–
S. subhexapilis n. sp.	–	–	+	–
S. parahexapilis n. sp.	–	–	+	–
S. radiatus n. sp.	–	–	+	–
S. ventricosus n. sp.	–	–	+	–
Species at locality	12	11	16	1

REMARKS ON SOME MORPHOLOGICAL CHARACTERS IN THE GENUS *Schizocarpus* (MALES ONLY)

The various species of *Schizocarpus* studied herein are separated from each other mainly by the characters of the copulatory organs of the males and the immatures. Small modifications appearing in these organs can rapidly produce copulatory barriers resulting in speciation.

The characters of the males in the species of *Schizocarpus* from *Castor fiber* are basically the same as for the species from *Castor canadensis* that we have studied recently (FAIN et al., 1984). The differences existing between the two groups are slight and consist mainly of the aspect and the number of the neotrichial setae *n* and the shape of the suckers.

1. Copulatory organs: These organs are situated on the opisthogaster. They consist of either one or two pairs of ring-like organs serving for the copulation with the larva or the nymphs of the female line. These organs, or a part of them, are generally situated on two punctate shields. More laterally there are two flat partly membraneous lobes serving for the maintaining of the immatures during the copulation. Some of these copulatory organs are true suckers. They consist of sclerotized funnels with a central canal, and they are situated in a conical depression of the soft skin. The cuticle of the immatures

corresponding with these suckers is aspirated and forms during the copulation conical or rounded lobes. Other copulatory organs have not this classical type, some are in the shape of flat or shallow rounded or oval discs with a wide opening. In another type, only observed in some species from *Castor canadensis*, the copulatory organs consist of sclerotized cylindrico-conical tubes.

In the species from *Castor fiber* one can distinguish three different types of attaching organs:

A. Suckers of type A (fig. 1): They consist of a pair of rounded or oval flat or shallow discs or depressions surrounded by a sclerotized ring, they have a large opening and a flat large punctate bottom and no central orifice. In the immatures copulating with these males the posterior part of the body bears a pair of flat rounded and punctate areas, generally larger than the corresponding rings of the male. In the copulating couples the discs of the males are simply in contact with the punctate areas of the immatures and it seems therefore that these discs do not act as normal suckers. The true mode of attachment is not known. A pair of suckers A is present in all the species of *Schizocarpus* from *Castor fiber* except in two species, *S. radiatus* and *S. ventricosus* where these suckers are replaced by suckers of type E. In the species from *Castor canadensis* three species, among the eight known, from this host, are lacking suckers A.

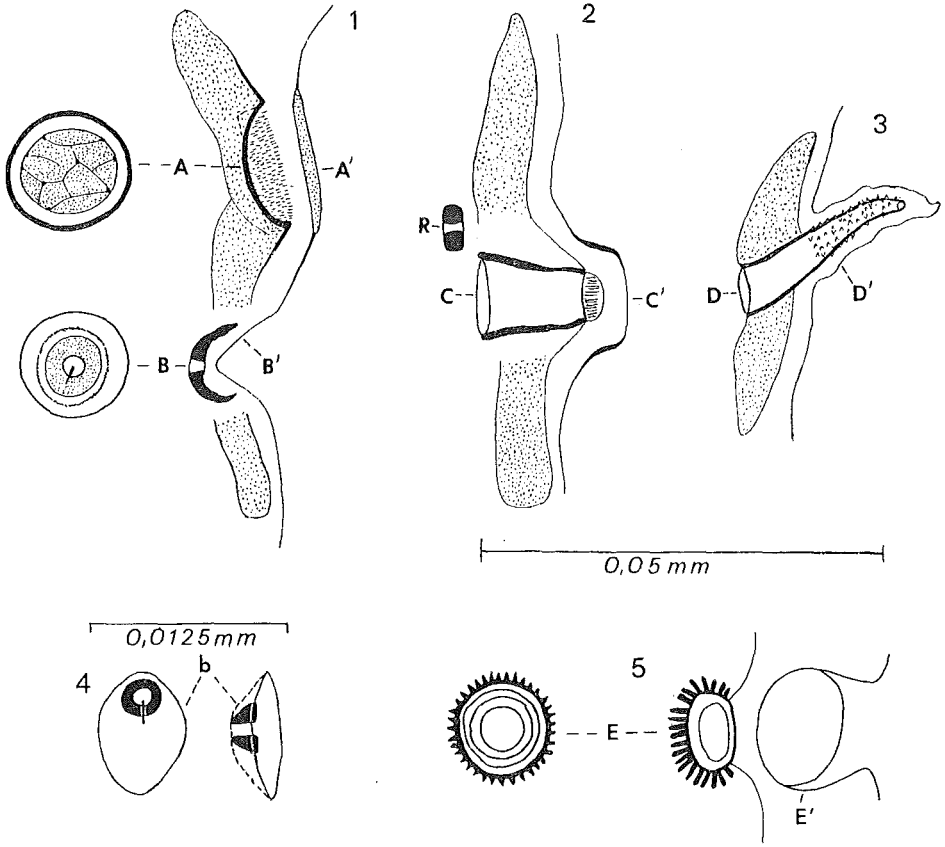
B. Suckers of type B or b (figs. 1; 4): These are true suckers. They are smaller than those of type A. They consist of sclerotized funnel sunk into a small depression of the soft cuticle. A small canal is visible in the center of the funnel and very often also a very small seta. In lateral view it is possible to see that the cuticle of the copulating immature is sucked into this sucker and forms a cone or a rounded lobe (figs. 1 and 4). In our previous paper (FAIN et al., 1984) we have distinguished a sucker B (large) and a sucker b (small). This difference in size was very distinct in the species from *Castor canadensis*. In *S. mingaudi* this sucker has a diameter of 8 to 9 µm (for the sclerotized part) whereas in the seven other species from this host this sucker has a diameter of only 3,5 to 4 µm. We have therefore distinguished a sucker B and a sucker b. In our material from *Castor fiber* the difference in the size of these suckers is much less pronounced. The largest size (4,5 to 6 µm) is found in *S. fedjushini, S. numerosus, S. brevicauda, S. intercalatus* etc.; the smallest (3,5 to 4 µm) in *S. ornatus, S. subornatus* etc. We think therefore that the division into suckers B and b is hardly justifiable and we propose to mention them only with the letter b. A pair of suckers b is present in 16 European species of *Schizocarpus* and absent in the 17 other species.

C. Suckers of type C and D (figs. 2–3): These suckers consist of cylindricoconical sclerotized tubes. They are observed only in the species living on *Castor canadensis* and are absent in the European species (see FAIN et al., 1984).

D. Suckers of type E (figs. 5; 74; 76): These suckers resemble in structure and situation the suckers A but they are deeper, are not punctate and have stronger and denticulate walls. They act as true suckers and they correspond in the immatures to conical or rounded prominent lobes which proves that their sucking ability. Suckers of type E are observed only in *S. radiatus* and *S. ventricosus.*

2. Chaetotaxy of the idiosoma (in males):

Anal setae: Typically there are three pairs of anal setae. The *a 1* and *a 2* are ventral and situated either on the posterior or on the postero-lateral border of the body, the *a 3* are situated either in front of the opisthogastric shields or more laterally in the series of *14* and *15* setae. The setae *a 2* may be lacking in some species. In *S. exiguus* both setae *a 1* and *a 2* are paramedian; in *S. brevis* only *a 1* is paramedian; in most of the other species these setae are much more lateral. In *S. radiatus* the *a 2* are in front of the shield close to the *a 3*.



Figs. 1–5.

Figs. 1–3. Copulatory suckers (A and B) or tubular copulatory organs (C and D) in males with their corresponding organs in the immatures (A', B', C' and D') in 1, *Schizocarpus mingaudi* TROUESSART, 1896; 2, *Schizocarpus indianensis* FAIN, WHITAKER & SMITH (1984); 3, *Schizocarpus spinifer* FAIN, WHITAKER & SMITH (1984). – Fig. 4. Sucker of type b, in ventral (to the left) and in lateral (to the right) view. – Fig. 5. *Schizocarpus radiatus* n. sp., male: sucker of type E in ventral (to the left) and latero-oblique (to the right) view, with their corresponding immature (E').

Setae *l 4* and *l 5*: These setae are always situated laterally. The *l 5* is more posterior and longer and stronger than *l 4*.

Setae *d 2*, *d 3*, *d 4* and *d 5*: The setae *d 2*, *d 3* and *d 4* are either microsetae or vestigial (represented by a ringlet). The *d 5* can easily be distinguished from *a 1* and *a 2* by their dorsal situation. They are generally very short; in a few species they have a medium length.

Setae *sc i* and *sc e*: There are either very short and thin (in most of the small species) or moderately long and thicker. Setae *s cx* are very short or absent.

Setae *h* are always well developed, sometimes very long; the *sh* are thin and short; *l 1* are generally shorter than *h*.

Specialized neotrichial setae *n* on the suctorial area: These setae do not belong to the anal or the dorso-lateral series of setae and we have considered them as neotrichial. In the species from *Castor fiber* there are either one, two or three pairs of setae *n*, either sessile or pedunculate, according to the species. In the species from *Castor canadensis* only sessile setae *n* have been observed.

3. Size of tarsi III and IV: We have measured the length and the width of tarsi III and IV in all the species studied herein. The tarsi III are generally twice as long as wide and twice as long as the corresponding tarsi IV. The tarsi IV are either as long as wide or only very slightly longer than wide.

4. Solenidia of tibiae III and IV (*phi III* and *IV*): In all the species studied herein *phi III* is longer than *phi IV*. In most of the species the ratio of the lengths *phi III* : *phi IV* varies from 1,4 : 1 to 1,6 : 1. In *S. numerosus* and *S. fedjushini* this ratio is lower (1,25 : 1 and 1,33 : 1, respectively). In seven other species this ratio is higher, from 1,75 : 1 to 1,8 : 1 (*S. insignis, S. parabrachyurus, C. brevicauda, C. hexapilis, C. subhexapilis, S. radiatus* and *S. parahexapilis*). The highest ratio (from 1,95 : 1 to 2 : 1) is observed in *S. curtus, S. exiguus, S. pusillus* and *S. modestus*. The length of *phi III* varies from 30 to 52 μm, that of *phi IV* from 21 to 30 μm.

SPECIES GROUPS IN THE GENUS *Schizocarpus*

Based on males the species of the genus *Schizocarpus* from *Castor fiber* fall into five groups:

Group I: With one pair of suckers A, one pair of smaller suckers b and one pair of setae *n* either sessile or pedunculate. This group contains 16 species from medium to large size except for one species, *S. pygidialis* which is a small species.

Group II: With one pair of suckers A and two pairs of setae *n* either sessile or pedunculate. Suckers b absent. This group contains 10 small species.

Group III: With one pair of suckers A and three pairs of setae *n* of which at least one is distinctly pedunculate. Suckers b absent. Setae *a 2* are lacking. The third pair of setae *n* represents probably the setae *a 2* that have migrated in the suctorial area (on ventral surface of opisthosoma). Setae *sc i* and *sc e* are very thin and short. This group contains three small species.

Group IV: With one pair of suckers A and one pair of sessile setae *n*. Suckers b are absent. This group contains two large species.

Group V: With one pair of suckers E and one pair of shortly pedunculate setae *n*. No suckers b. This group contains two species.

LIFE CYCLE OF GENUS *Schizocarpus*

We have described this life cycle in our previous work (FAIN et al., 1984).

KEY TO THE SPECIES OF GENUS *Schizocarpus* FROM *Castor fiber* (MALES ONLY)

1. Opisthogaster with one pair of suckers A, one pair of smaller suckers b and one pair of setae *n*. (group **"numerosus"**) 2
— Opisthogaster without suckers b. With either one pair of suckers A or one pair of suckers E. With either one, two or three pairs of setae *n*. 17
2. Suckers A paramedian, contiguous in the midline and very large. Suckers b slightly more anterior and lateral to suckers A. With a pair of small sessile setae *n* close to the midline and situated immediately behind suckers A. Total length of body 400–440 μm (from the description of DUBININA). **S. grandis** (DUBININA, 1964)
— Suckers A smaller, situated far from the midline. Suckers b not distinctly outside and in front of suckers A. 3
3. Suckers b situated behind the suckers A. 4
— Suckers b situated either inside or in front of suckers A. 8
4. Setae *n* pedunculate and situated between suckers A and b along an almost longitudinal line joining these suckers. Total length 349–382 μm.
S. numerosus (DUBININA, 1964)

— Setae *n* either sessile or pedunculate and not situated along a longitudinal line joining suckers A and b. 5

5. Setae *n* sessile, situated inside of an oblique line joining suckers A and b. Setae *a 3* situated in front of the shield. **S.** sp.
— Setae *n* pedunculate, situated either in front and inside of suckers b or behind these. Setae *a 3* more lateral, situated at the anterolateral corners of the shields. 6

6. Setae *n* situated close to the midline along the line joining suckers A and in front and inside of suckers b. Opisthogastric shields completely punctate. Total length 350–370 µm (from the description of DUBININA). **S. brachyurus** (DUBININA, 1964)
— Setae *n* far from the midline and behind the suckers b. Opisthogastric shields punctate only along a peripheric ring, the middle, bearing the suckers A is not punctate. 7

7. Suckers b situated between suckers A and setae *n*, and either along a longitudinal line joining suckers A to setae *n* or slightly more internal. Suckers A as well as setae *n* 30 µm apart. Opisthogastric shields more or less square. Total length 365–380 µm. **S. intercalatus n. sp.**
— Suckers b distinctly more external than the line joining suckers A to setae *n*. Suckers A 36 µm apart, setae *n* 60 µm apart. Opisthogastric shields broadly oval. Total length 363–395 µm. **S. parabrachyurus n. sp.**

8. Suckers b situated in front and slightly outside of suckers A, they are separated from the latter by a cuticular fold. Setae *n* sessile, situated inside of suckers b. Total length 350–398 µm. **S. fedjushini** (DUBININA, (1964)
— Suckers b situated either inside and in front of suckers A or inside and approximately on the line joining the suckers A. Setae *n* either sessile or pedunculate. 9

9. Suckers A close to the posterior margin of the opisthogastric shields and far apart. Suckers b slightly more inside and in front of suckers A. Setae *n* pedunculate and situated in front and outside sucker A. Total length 360–390 µm (from description of DUBININA). **S. brevicauda** (DUBININA, (1964)
— Suckers A more anterior on the shields. Suckers b much more close to the midline. Setae *n* sessile. 10

10. Setae *a 3* long, situated in front of the opisthogastric shields. Setae *n* in front of suckers b. 11
— Absence of setae in front of the opisthogastric shields, the setae *a 3* are situated either laterally close to setae *l 4* or ventrally behind the setae *n*. Setae *n* either behind or inside of the suckers b. 13

11. Opisthogastric shields very wide, completely punctate and fused in the midline. Setae *n* paramedian and closer to the midline than the suckers b. Suckers A 72 to 74 µm apart and situated on a punctate area. 12
— Opisthogastric shields punctate only along oval peripheric rings, the center being bare. These rings are separated in the midline. Setae *n* and suckers b more distant from the midline, both at the same distance from the latter. Suckers A 40 µm apart, surrounded by a narrow punctate ring and situated on a soft area. Total length 350–390 µm. **S. capitis** (DUBININA, (1964)

12. Suckers b situated close to the setae *n*. Opisthogastric shields not punctate in the area separating suckers A and b. Total length 475 µm. **S. diebzigensis n. sp.**
— Suckers b more posterior and separated from the setae *n* by a pair of punctate curved bands. Opisthogastric shields almost completely punctate. Total length 435 µm. **S. subdiebzigensis n. sp.**

13. Opisthogastric shields very wide and fused in the midline. The internal thirds of these shields bear a pair of elongate oval paramedian areas carrying in their anterior third the suckers b. Setae *n* paramedian situated along the posterior margin of the shields, far behind the suckers b. 14

— Opisthogastric shields much smaller and widely separated in the midline. Without elongate paramedian areas. Setae *n* situated either between the suckers b or outside and close to them. 15

14. Setae *a 1* and *a 2* 105 and 45 μm long respectively. Diameter of sucker A 12 μm. Width of the fused opisthogastric shields 120 μm. Total length of body 435 to 458 μm. **S. dubininae n. sp.**

— Setae *a 1* and *a 2* 18 and 10 μm long respectively. Diameter of sucker A 10 μm. Width of the fused opisthogastric shields 105 μm. Total length of body 412 to 429 μm. **S. similis n. sp.**

15. Setae *n* paramedian and situated inside the suckers b on the transverse line joining the latter. Total body length 270 to 298 μm. **S. pygidialis n. sp.**

— Setae *n* more external than the suckers b and situated behind them on elongate sclerotized bases. 16

16. Setae *a 3* situated slightly behind the setae *n*. Suckers b situated on the line joining suckers A. Total body length 315–353 μm. **S. ornatus n. sp.**

— Setae *a 3* situated laterally, immediately in front of the setae *l 4*. Suckers b distinctly more anterior than suckers A. Total length of body 337 to 345 μm. **S. subornatus n. sp.**

17. Opisthogaster with one pair of suckers A (not denticulate) and either one, two or three pairs of setae *n*. 18

— Opisthogaster with one pair of suckers E (with denticulate walls) and one pair of setae *n*. (group **"radiatus"**) 32

18. Opisthogaster with one pair of setae *n*. Large species: total length 360 to 530 μm. (group **"latus"**) 19

— Opisthogaster with either two or three pairs of setae *n*. Smaller species: total length 260 to 380 μm. 20

19. Total length 360 to 380 μm. Opisthogastric shields of medium size, not punctate in their median part and separate from each other. Absence of longitudinal sclerite. Setae *n* situated between the shields. **S. latus** (DUBININA, 1964)

— Total length 515 to 530 μm. Opisthogastric shields very large, completely punctate and fused anteriorly. With a thick longitudinal median sclerite extending beyond the posterior margin of the body and bearing at its posterior extremity a pair of setae *n*. **S. insignis n. sp.**

20. With two pairs of setae *n*; one sessile, the other either sessile or pedunculate. (group **"minor"**) 21

— With three pairs of setae *n*. (group **"hexapilis"**) 30

21. Both pairs of setae *n* are sessile and situated in front of the suckers A. Total length of body 299 μm. **S. pusillus n. sp.**

— Both pairs of setae *n* situated behind or at the same transverse level as suckers A. One pair of setae *n* is sessile, the other pair is pedunculate. 22

22. Both pairs of setae *n* situated outside of suckers A at the same level as the latter. Total body length 280 to 320 μm. **S. parvus** (DUBININA, 1964)

— At least the pedunculate pair of setae *n* situated behind the suckers A. 23

23. The pedunculate pair of setae *n* situated behind suckers A; the sessile pair of setae *n* situated outside of these suckers. Both pairs of these setae are situated on a curved semi-circular sclerotized band surrounding suckers A laterally. Setae *a 1* and *a 2* very close to the midline and far from the setae *l 5*. Total body length 298 to 310 μm. **S. exiguus n. sp.**

— Both pairs of setae *n* are situated behind the suckers A. Absence of lateral curved semi-circular sclerotized band around suckers A. Setae *a 1* and *a 2* lateral except in *S. brevis* where *a 1* are paramedian and in *S. subminor* where *a 1* and *a 2* are situated between the midline and setae *l 5*. 24

24. Pedunculate setae *n* more external than suckers A, the sessile setae *n* more internal than these suckers. Suckers A widely separated from each other. Total length of body 280 to 300 µm. **S. subminor** (DUBININA, 1964)
— Both pairs of setae *n* situated behind or behind and inside of the suckers A. Situation of suckers A variable. 25

25. The pair of sessile setae *n* much more internal than the pair of pedunculate setae *n*; both pairs of setae are joined by a curved sclerotized band. Total length of body 273 to 309 µm. **S. humilis n. sp.**
— The pair of sessile setae *n* either outside of the pair of pedunculate setae *n* or in front of them. 26

26. Suckers A situated in the posterior half of the shields. Setae *a 1* and *a 2* situated close together and immediately behind the setae *n*. Total length 320 µm. **S. subparvus** (DUBININA, 1964)
— Suckers A situated more forwards in the median part of the shield. Setae *a 1* and *a 2* not very close to the setae *n*. 27

27. Setae *a 1* paramedian and very close to each other, the setae *a 2* more external but slightly closer to *a 1* than to *l 5*. Setae *n* situated on a non-punctate area. Total length of body 282 to 285 µm. **S. brevis n. sp.**
— Setae *a 1* not close to the midline but lateral and close to *a 2* and *l 5*. Setae *n* situated on the punctate shield. 28

28. Both suckers A and both pairs of setae *n* situated on a transverse slightly concave line. Total length of body 294 to 318 µm. **S. curtus n. sp.**
— At each side the sucker A and setae *n* are situated on a strongly oblique line directed postero-internally. 29

29. Pedunculate setae *n* very close to each other. Total body length 280 to 380 µm (from DUBININA). **S. minor** (DUBININA, 1964)
— Pedunculate setae *n* far from each other (35 µm apart). Total body length 286 to 312 µm. **S. modestus n. sp.**

30. Only one pair of setae *n* is pedunculate, the two others are sessile. All these setae *n* are situated far behind the suckers A and close together. Total body length 294 to 315 µm. **S. parahexapilis n. sp.**
— The three pairs of setae *n* are shortly pedunculate and situated closer to sucker A, one pair of them being situated at the level of these suckers or slightly more in front of them. 31

31. One pair of setae *n* is situated close to the midline and inside of the opisthogastric shields and the suckers A. Total body length 302 to 319 µm. **S. hexapilis n. sp.**
— The three pairs of setae *n* are situated on the punctate shield along a curved line running outside around the suckers A and being separated from them by a cuticular fold. Total body length 314 to 335 µm. **S. subhexapilis n. sp.**

32. With two pairs of unequal setae (*a 2* and *a 3*) in front of the opisthogastric shields, the latter longer than wide and bearing a pair of suckers of type E approximately in their internal half. Posterior margin of body with one pair of setae (*a 1*) close to the *l 5*. Setae *n* situated on the soft cuticle. Setae *gp* 12 µm long. Total body length 399 to 402 µm. **S. radiatus n. sp.**
— Absence of setae in front of the opisthogastric shields, the latter being wider than long and bearing in their external half the suckers E and in their internal half a pair of small subcuticular ringlets. Setae *a 3* situated laterally. Posterior margin of body with two pairs of setae (*a 1* and *a 2*). Setae *n* situated on the shield. Setae *gp* 25–30 µm long. Total body length 368 to 395 µm. **S. ventricosus n. sp.**

STUDY OF THE SPECIES

Family: Chirodiscidae TROUESSART, 1892
Subfamily: Labidocarpinae GUNTHER, 1942
Tribe: Schizocarpini FAIN, 1971
Genus: **Schizocarpus** TROUESSART, 1896
Schizocarpus TROUESSART, 1896a: 28
Histiophorus FRIEDRICH, 1895: 433 (published in March 1896)
Haptosoma KRAMER, 1896: 134
Prolabidocarpus LAWRENCE, 1948: 369

We have discussed the status and given a new definition of this genus in our previous paper (FAIN et al., 1984).

A. DESCRIPTION OF OUR MATERIAL

1. **Schizocarpus numerosus** (DUBININA, 1964) **nov. comb.**
Histiophorus numerosus DUBININA, 1964: 119 (figs. 6, 7)

This species was described from *Castor fiber*, from Voronesh, U.S.S.R. The mites were located on the head and the dorsum.

We found 22 males of this species from the same host (one beaver) from an affluent of the River Elbe, at Diebzig, G.D.R. These specimens were located on the head, mainly the ears. We give here a brief description of these specimens.

Male (figs. 6–7; 10): Length and width of idiosoma in 4 specimens (in µm): 330 x 170, 329 x 180, 315 x 160 and 305 x 176. Total length of these specimens: 360, 353, 345 and 330 µm respectively. Opisthosoma 105 µm long and 145 µm wide. Opisthonotal shield wider (80 µm) than long in the midline (70 µm); its anterior border excavate. Opisthogastric shields separated in midline, much longer than wide; each bearing an anterior sucker A, a posterior sucker b and between these suckers a short pedunculate seta *n*. Length of setae of idiosoma (in µm): *sc i* 25–30; *sc e* 12–15; *h* 60–80; *sh* 20; *d 5* 20–35; *l 1* 35–40; *l 4* 35; *l 5* 125; *a 1* 28; *a 2* 18; *a 3* 25; Setae *d 5* are very lateral and in front of *l 4* but more dorsal than the latter.

2. **Schizocarpus fedjushini** (DUBININA, 1964) **nov. comb.**
Histiophorus fedjushini DUBININA, 1964: 123 (fig. 9)

This species was described from *Castor fiber*, from Voronesh, U.S.S.R. The mites were located on the lateral parts of the body.

We found 24 male specimens of this species from a beaver *Castor fiber* from an unknown locality. This animal is conserved in alcohol in the IRSNB since 1933. Most of our specimens (23) were located on the head and only one on the chest.

Description of our specimens:

Male (figs. 8; 9; 11): Length and width of idiosoma in 3 specimens (in µm): 360 x 172, 358 x 180 and 330 x 185. Total length: 398, 390 and 360 µm respectively. Opisthosoma 109 µm long and 149 µm wide. Opisthonotal shield as long (80 µm in midline) as wide, with anterior border slightly concave. Opisthogastric shields longer than wide, resembling those of *S. numerosus*; they bear an anterior sucker b and a posterior sucker A, both separated by an oblique cuticular fold. Seta *n* is situated on the shield inside of the anterior sucker b. Length of some idiosomal setae (in µm): *sc i* 30–35; *sc e* 15; *h* 60; *sh* 20–25; *d 5* 55–60; *l 1* 50; *l 4* 40–45; *l 5* 120; *a 1* 30; *a 2* 20–25; *a 3* 30.

3. **Schizocarpus parabrachyurus nov. spec.**

Male (figs. 12; 14–15): Length and width of idiosoma in holotype 339 x 180 µm; total length 375 µm. Idiosoma in 3 paratypes (in µm): 360 x 190, 345 x 150 and 328 x 183; total length 395, 380 and 363 µm respectively. Opisthosoma 100 µm long and 140 µm wide.

Opisthonotal shield 66 µm long (in midline) and 69 µm wide; minimum width 60 µm; anterior corners produced. Opisthogastric shields widely separated in midline, forming sclerotized oval rings obliquely oriented and diverging posteriorly, their diameters are 45 x 38 µm. Inside of these rings the cuticle is soft, not punctate. The suckers A are situated on this soft area of the shields, they have a diameter of 12–13 µm and are surrounded by a thick punctate ring. Suckers b situated behind and outside of suckers A. A pair of pedunculate setae *n* is present on the posterior border of the shield. Length of some idiosomal setae (in µm): *sc i* 22; *sc e* 16; *h* 60–70; *sh* 20; *d 5* 24; *l 1* 30–35; *l 4* 70; *l 5* 130–150; *a 1* 80; *a 2* 20; *a 3* 60.

Host and locality: Holotype and 14 paratypes male from *Castor fiber*, from Diebzig, G.D.R., 18. X. 1976.

Remarks: This species is close to *S. brachyurus*. It differs from it by the following characters: 1) Setae *n* situated on the posterior border of the shield (they are at the level of suckers A in *S. brachyurus*); 2) Sucker b more lateral; 3) Opisthogastric shield not punctate in its middle and ring-like (completely punctate in *S. brachyurus*); 4) Setae *a 3* longer (60 µm).

4. **Schizocarpus intercalatus nov. spec.**

Male (figs. 13; 16–17): Length and width of idiosoma in holotype 344 x 160 µm, total length 378 µm. Idiosoma in 3 paratypes (in µm): 345 x 175, 342 x 170 and 332 x 170; total length 380, 374 and 365 µm respectively. Opisthosoma 105 µm long and 135 µm wide. Opisthonotal shield strongly sclerotized, 90 µm long (in the midline) and 78 µm wide; minimum width 69 µm; its anterior border slightly concave with anterior corners poorly developed. Opisthogastric shields large, more or less square in shape with their internal borders straight and more or less parallel, these shields are 40 µm long and 42 µm wide Suckers A round, 12 µm wide and 30 µm apart. Suckers b 4 to 5 µm wide. Setae *n* pedunculate situated behind suckers b. The suckers A and b and the setae *n* are more or less on the same straight line. Lengths of some idiosomal setae (in µm): *sc i* 25; *sc e* 8; *h* 60–70; *sh* 15; *d 5* 22; *l 1* 60–70; *l 4* 70–80; *l 5* 130–150; *a 1* 70–80; *a 2* 25; *a 3* 70–80.

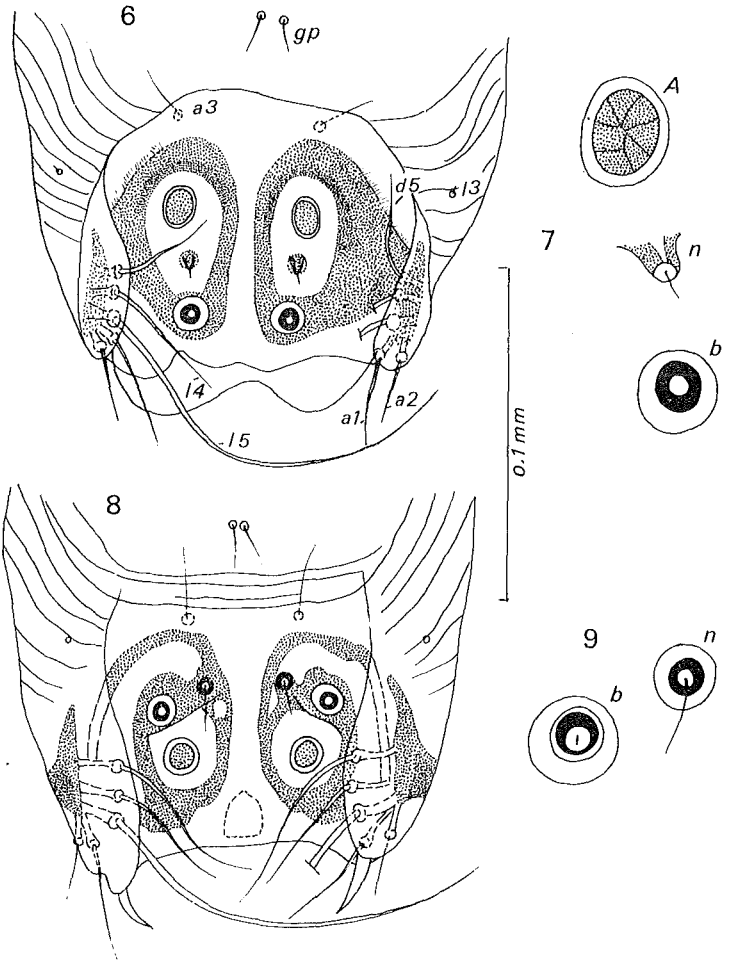
Host and locality: Holotype and 10 paratypes male from a beaver *Castor fiber* of unknown origin. This animal is conserved in alcohol in IRSNB since 1933. The mites were fixed on the head, especially in the vibrissae area.

Remarks: This species is close to *S. brachyurus* and *S. parabrachyurus*. It is clearly distinguished from these species by the square aspect of the opisthogastric shields. In addition it differs from *S. brachyurus* by the posterior situation of setae *n* and the structure of the opisthogastric shields which are not punctate in their median part. It also differs from *S. parabrachyurus* by the more internal situation of suckers b which are on the same straight line as suckers A and setae *n*. The suckers b are 66 µm apart, whereas in *S. parabrachyurus* these suckers are only 18 µm apart.

5. **Schizocarpus brevicauda** (DUBININA, 1964) **nov. comb.**
Histiophorus brevicauda DUBININA, 1964: 127 (figs. 6, 11)

This species was described from *Castor fiber*, from Voronesh, U.S.S.R. The mites were found on the abdomen of the host between anterior and posterior legs.
We have found seven male specimens of this species on *Castor fiber* from Diebzig, G.D.R., the exact location of the mites was not precised.

Description of our specimens:
Male (figs. 18–19; 25): Length and width of idiosoma in 3 specimens (in µm): 321 x 165, 318 x 160, and 315 x 150. Total length of these specimens (in µm): 354, 350 and 348. Opisthosoma 100 µm long and 140 µm wide. Opisthonotal shield 75 µm long in midline and 60 µm wide, with anterior border excavate and antero-lateral corners produced. Opistho-



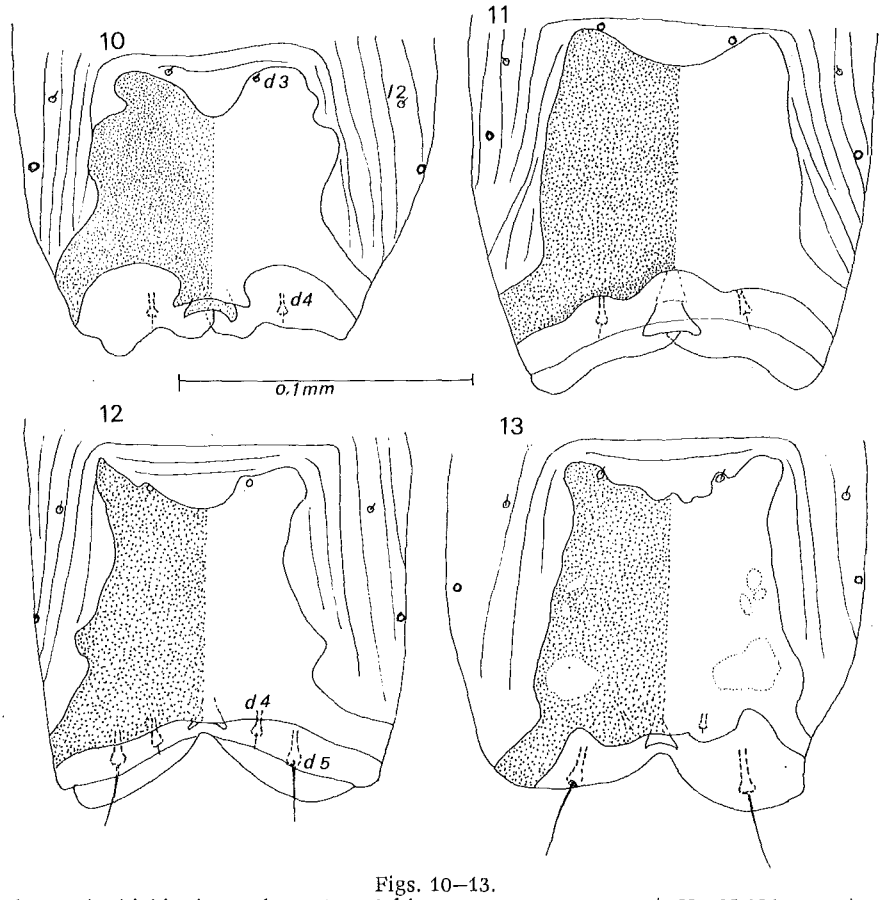
Figs. 6–9.
Figs. 6–7. *Schizocarpus numerosus* (DUBININA, 1964), male: 6, opisthogaster; 7, suckers A and b and setae *n* enlarged. – Figs. 8–9. *S. fedjushini* (DUBININA, 1964), male: 8, opisthogaster; 9, sucker b and setae *n* enlarged.

gastric shields widely separated in midline, bearing the suckers A. Suckers b on the soft cuticle. These shields are punctate in an anterior triangular part and more posteriorly around the suckers A, the latter being situated close to the posterior margin of the shield. Length of some idiosomal setae (in μm): *sc i* 20–25; *sc e* 12; *h* 50–60; *sh* 15–20; *d 5* 18; *l 1* 25–30; *l 4* 60; *l 5* 140; *a 1* 60; *a 2* 20; *a 3* 60.

Remarks: Our specimens differ from original figures of DUBININA by the following characters: opisthogastric shields different in shape and not punctate in their median area, body smaller, suckers A more closer to each other. They could represent a new species, however we think that the typical material of *S. brevicauda* should be examined before to make a decision.

6. **Schizocarpus capitis** (DUBININA, 1964) **nov. comb.**
Histiophorus capitis DUBININA, 1964: 121 (fig. 8)

The typical host of that species is *Castor fiber*, the typical locality Voronesh, U.S.S.R. The mites were collected from the head of the host.



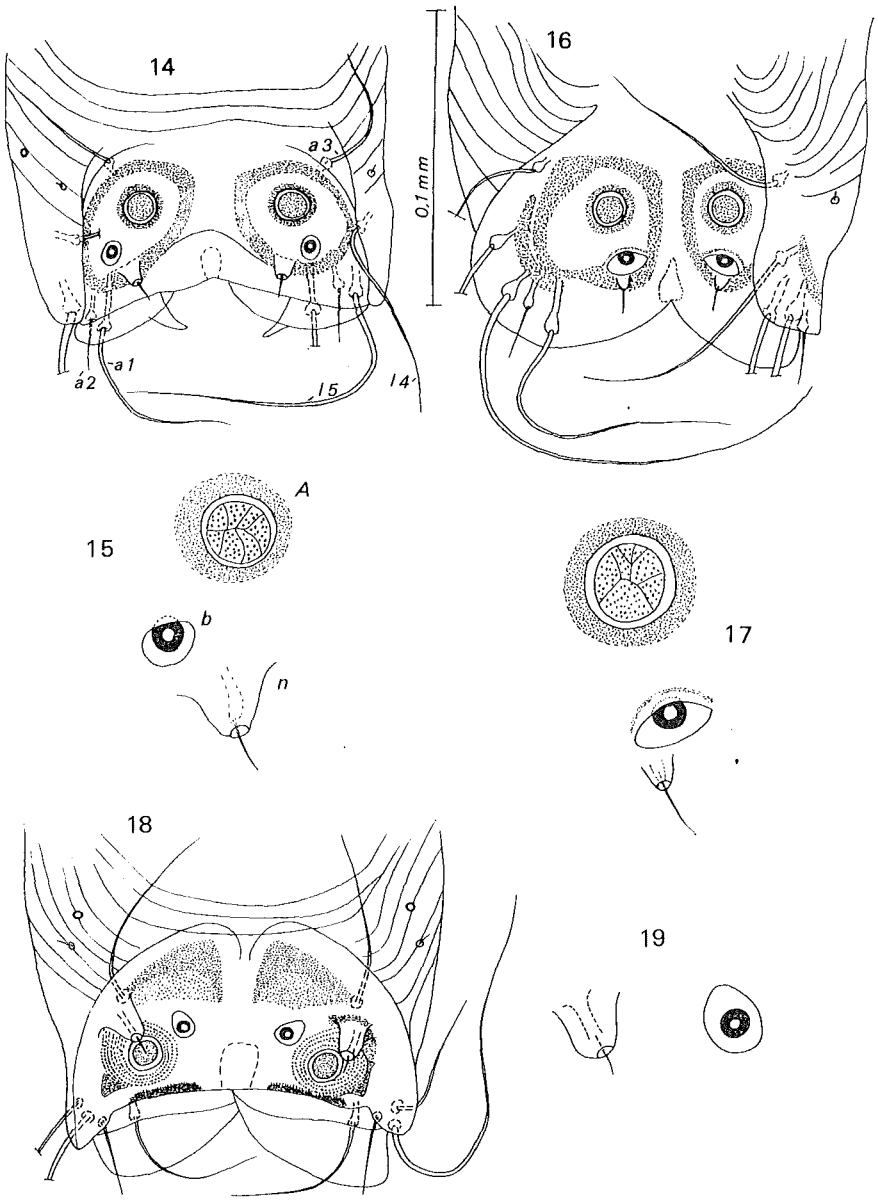
Figs. 10–13.
Opisthonotal shields in males: 10, *Schizocarpus numerosus* (DUBININA, 1964); 11, *Schizocarpus fedjushini* (DUBININA, 1964); 12, *Schizocarpus parabrachyurus* n. sp.; 13, *Schizocarpus intercalatus* n. sp.

We found 19 male specimens of that species from two beavers *Castor fiber*, the one from Diebzig, G.D.R., the other from an unknown locality (conserved in IRSNB). The mites were fixed on the head mainly in the area of the vibrissae and on the ears.

Description of our specimens:
M a l e (figs. 20–21; 26): Length and width of idiosoma in 3 specimens (in µm): 345 x 188; 343 x 185 and 318 x 178; total length 390, 380 and 350 µm respectively. Opisthosoma 87 µm long and 170 µm wide. Opisthonotal shield well sclerotized, 75 µm long in midline and with anterior border slightly concave and anterior corners moderately produced. Opisthogastric shields forming a punctate ring encircling a non-punctate area bearing suckers A and more internally the non-pedunculate setae *n* and immediately behind these the suckers b. Diameter of suckers A 11 µm (the punctate ring around them not included), of suckers b 4 to 5 µm. Length of idiosomal setae (in µm): *sc i* 22–25; *sc e* 12; *h* 70–80; *sh* 12–15; *d 5* 21; *l 1* 35; *l 4* 100; *l 5* 150; *a 1* 75; *a 2* 30; *a 3* 50.

7. **Schizocarpus pygidialis nov. spec.**

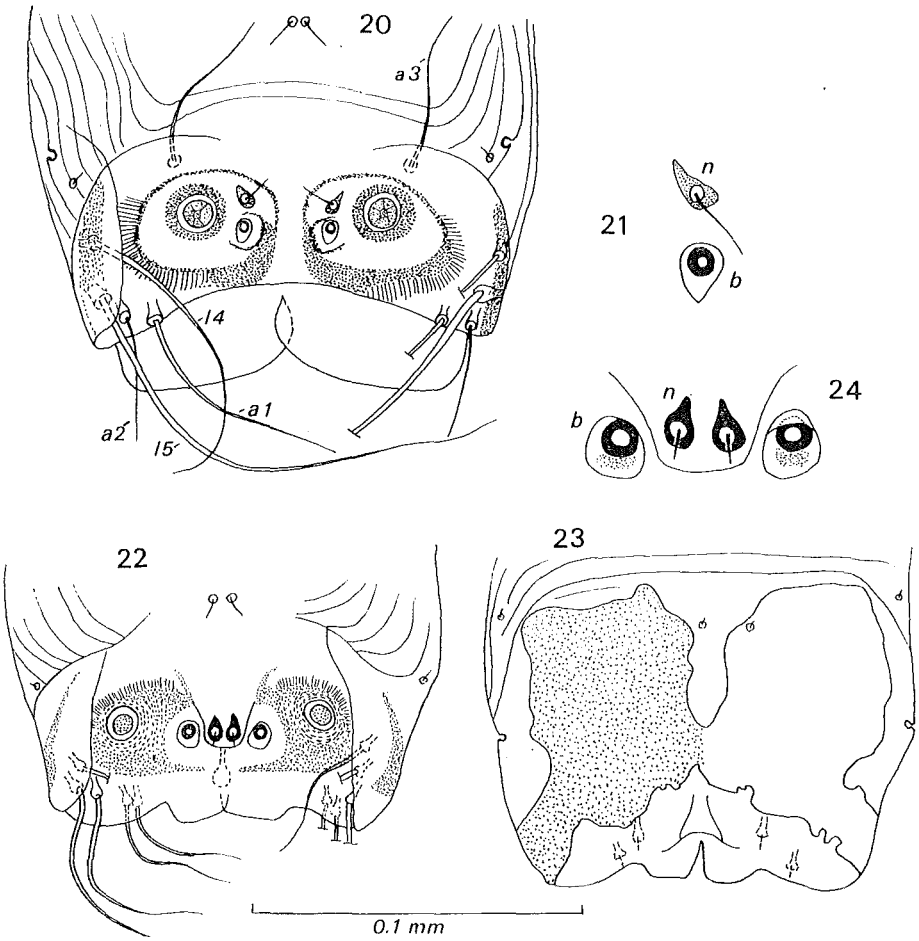
M a l e (figs. 22–24): Length and width of idiosoma in holotype 262 x 159 µm, total length 298 µm. Idiosoma in 3 paratypes (in µm): 260 x 165, 249 x 148 and 240 x 165; total length of these paratypes 290, 282 and 270 µm respectively. Opisthosoma 87 µm long and 135 µm



Figs. 14–19.

Figs. 14–15. *Schizocarpus parabrachyurus* n. sp., male: 14, opisthogaster; 15, sucker A and b and setae *n* enlarged. — Figs. 16–17. *Schizocarpus intercalatus* n. sp., male: 16, opisthogaster; 17, sucker A and b and setae *n* enlarged. — Figs. 18–19. *Schizocarpus brevicauda* (DUBININA, 1964), male: 18, opisthogaster; 19, setae *n* and sucker b enlarged.

wide. Opisthonotal shield relatively very wide (105 μm), anterior border deeply incised. Opisthogastric shield punctate, more or less oval and bearing a sucker A oval in shape (diameters 10 x 8 μm). Between both shields is a large non-punctate area bearing a pair of suckers b and more internally and on the same transverse line a pair of sessile setae *n* inserted into small triangular sclerotized bases. In some specimens the setae *n* are slightly more anterior than suckers b. The setae *n* are enveloped in a membranous fold



Figs. 20–24.
Figs. 20–21. *Schizocarpus capitis* (DUBININA, 1964), male: 20, opisthogaster; 21, setae *n* and sucker b enlarged. – Figs. 22–24. *Schizocarpus pygidialis* n. sp., male: 22, opisthogaster; 23, opisthonotal shield; 24, sucker b and setae *n* enlarged.

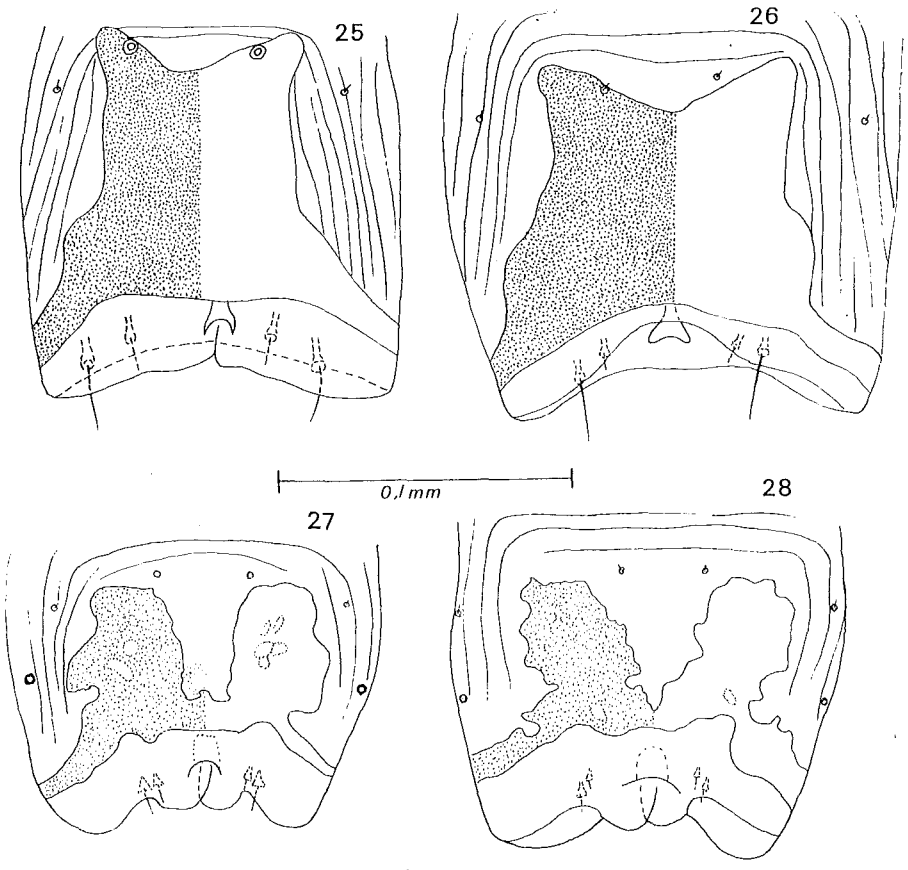
that originate from the anterior margins of the shields. Length of some idiosomal setae (in μm): *h* 105; *sh* 10; *d* 5 4; *l* 1 42; *l* 4 70; *l* 5 75; *a* 1 50; *a* 2 40; *a* 3 45.

Host and locality: Holotype and 12 paratypes male from a beaver *Castor fiber* of unknown origin. This animal is in the IRSNB. All the mites were fixed on a small area of the dorsum immediately in front of the tail.

Remarks: This species is the most close to *S. capitis.* It differs from it by the much smaller size of the body, the different aspect of the opisthogastric shields (completely punctate and not forming a ring), the different situation of setae *n* between the suckers b and not in front of them, the aspect of the opisthonotal shield and the location of the mites on the body of the host.

8. **Schizocarpus ornatus nov. spec.**

Male (figs. 27; 29–30): Length and width of the idiosoma in the holotype 315 x 180 μm, total length 359 μm. Length and width in 3 paratypes (in μm): 298 x 164, 291 x 162 and

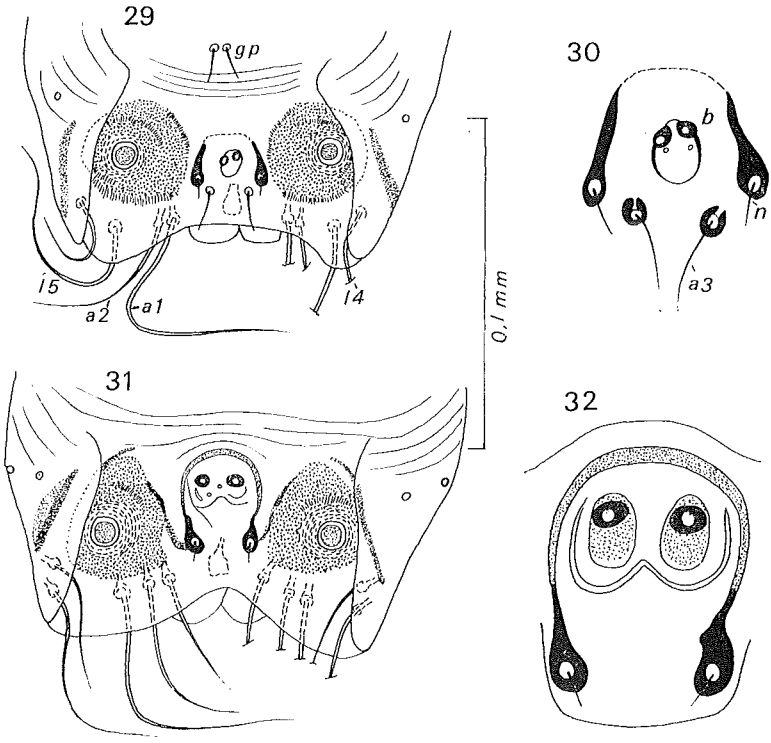


Figs. 25–28.
Opisthonotal shields in males: 25, *Schizocarpus brevicauda* (DUBININA, 1964); 26, *Schizocarpus capitis* (DUBININA, 1964); 27, *Schizocarpus ornatus* n. sp.; 28, *Schizocarpus subornatus* n. sp.

279 x 160; total length 327, 320 and 315 µm. Opisthosoma in a paratype 87 µm long and 132 µm wide. Opisthonotal shield 100 µm wide, very deeply incised by a long anterior cleft. Opisthogastric shields rounded, completely punctate and well separated from each other; they bear relatively small suckers A (diameter 8 µm). Suckers b very small (diameter 3,5 µm), situated very close to the midline on the soft cuticle. There are 2 pairs of setae behind the suckers b, the more anterior is situated on elongated sclerotized bases and it represents the setae *n*; the second one is more posterior and longer and we think that it represents the setae *a 3* which have migrated on the suctorial area. Length of idiosomal setae (in µm): *sc i* 3; *sc e* 3; *h* 80–90; *d 5* 7; *l 1* 40–50; *l 4* 30; *l 5* 75; *a 1* 65; *a 2* 18 to 33. The *l 1* are dilated basally. Setae *sc i* and *sc e* are microsetae.

Host and locality: Holotype and 47 paratypes male from a beaver *Castor fiber* of unknown origin (specimen in IRSNB). Most of the paratypes were fixed to the anterior legs (internally and externally), a few paratypes were found on the throat.

Remarks: This species differs from the other species of the group I by the presence of the setae *a 3* on the suctorial area, the shape of the bases of setae *n*, the vestigial aspect of *sc i* and *sc e*, the length of setae *a 1* almost as long as *l 5*, the paramedian situation and the small size of suckers b.



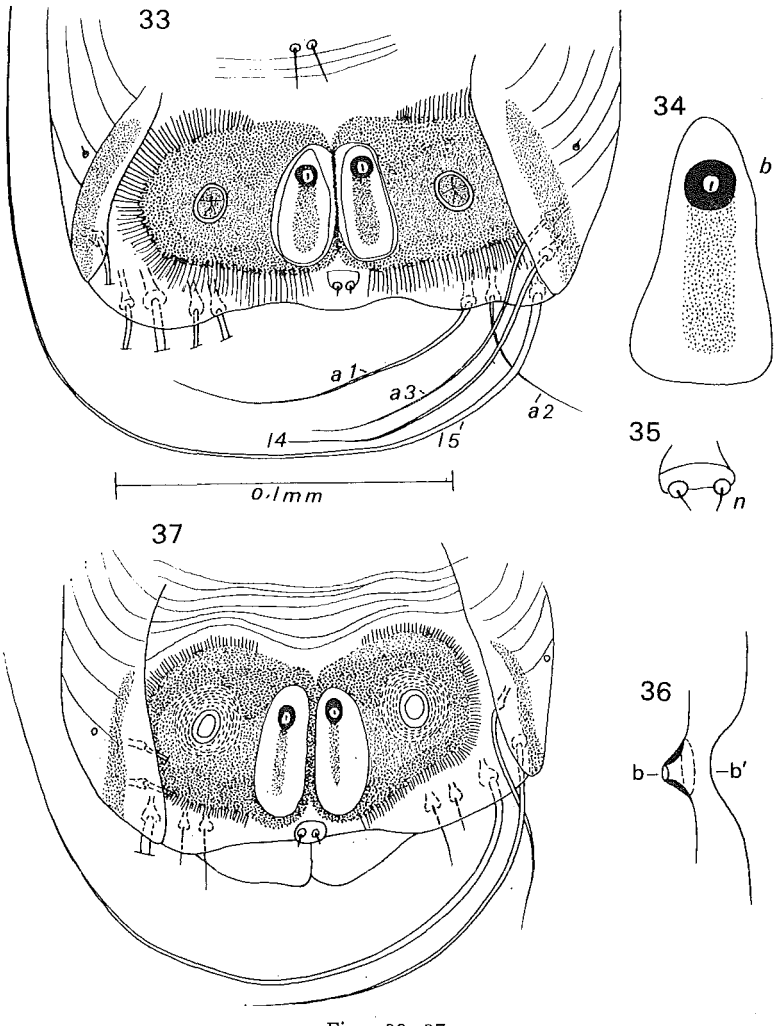
Figs. 29–32.
Figs. 29–30. *Schizocarpus ornatus* n. sp., male: 29, opisthogaster; 30, setae *n* and *a 3* and sucker b enlarged. – Figs. 31–32. *Schizocarpus subornatus* n. sp., male: 31, opisthogaster; 32, setae *n* and sucker b enlarged.

9. **Schizocarpus subornatus nov. spec.**

M a l e (figs. 28; 31–32): Length and width of idiosoma in holotype 297 x 165 µm, total length 337 µm. Length and width in 3 paratypes (in µm): 312 x 180, 303 x 170 and 300 x 153 µm; total length 345, 340 and 332 µm respectively. Opisthosoma 84 µm long and 150 µm wide. Opisthonotal shield 95 µm wide, with a very deep anterior cleft. Opisthogastric shields resembling those of *S. ornatus;* diameter of suckers A 9 to 10 µm. The shields are separated by a structure resembling that of *S. ornatus* and consisting of a pair of small paramedian suckers b more anterior than in *S. ornatus*, and by only one pair of sessile setae (= setae *n*). Length of idiosomal setae (in µm): *sc i* and *sc e* are microsetae; *h* 85; *sh* 15; *d 5* 5; *l 1* 60; *l 4* 70–75; *l 5* 80–90; *a 1* 50; *a 2* 45; *a 3* 40.

H o s t a n d l o c a l i t y : Holotype and 33 paratypes male from a beaver *Castor fiber* of unknown origin and conserved in the IRSNB. Almost all the paratypes were fixed to the posterior legs, a few specimens were found on the body either in front and behind these legs.

R e m a r k s : This species differs from *S. ornatus* by the more anterior situation of suckers b, the absence of a pair of setae behind the setae *n*, the presence of a pair of setae *a 3* in front of *l 4*. In *S. ornatus* there are only four pairs of setae on posterior part of the body whereas in *S. subornatus* there is a fifth pair in front of setae *l 4*. This fifth pair exists in fact in the first species but it has migrated on the ventral surface behind the setae *n*.

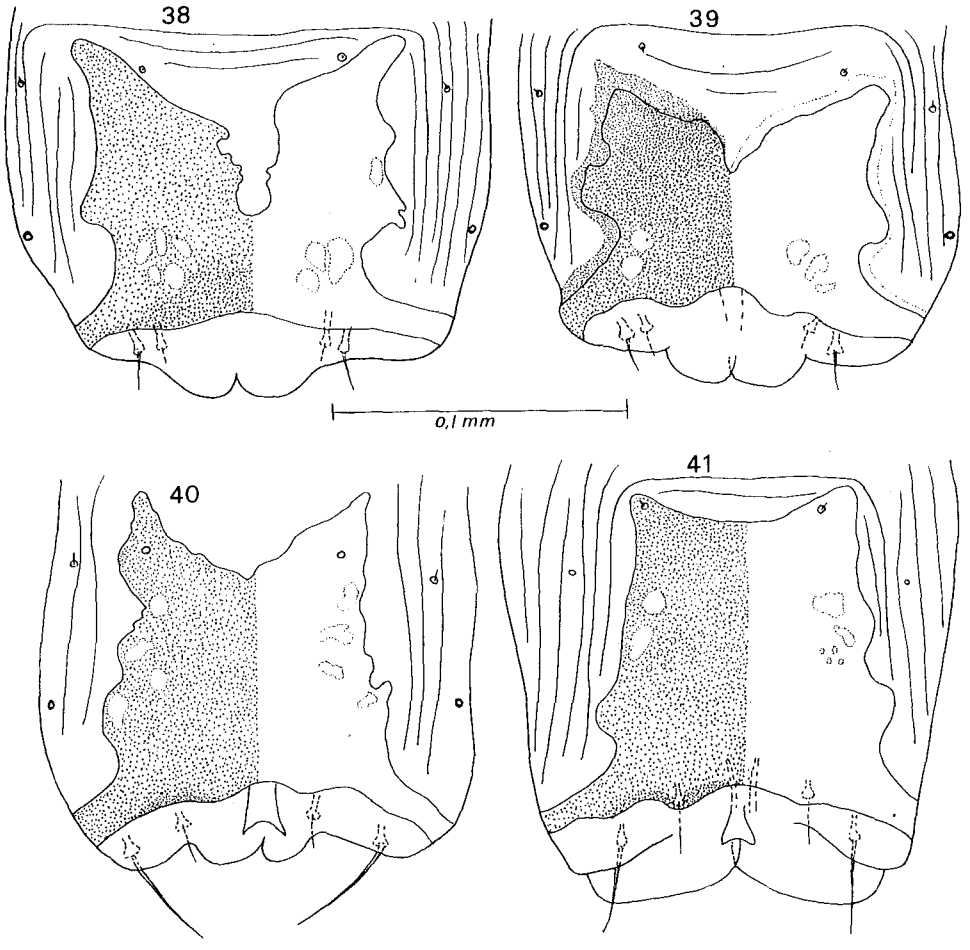


Figs. 33–37.
Figs. 33–36. *Schizocarpus dubininae* n. sp., male: 33, opisthogaster; 34, sucker b enlarged; 35, setae *n* enlarged; 36, lateral view of sucker b in copulation with an immature (enlarged). — Fig. 37. *Schizocarpus similis* n. sp., male: opisthogaster.

10. **Schizocarpus dubininae nov. spec.**

This species is named for Dr Helena DUBININA the prominent Soviet Acarologist who was the first to demonstrate multiple speciation in this group of mites.

M a l e (figs. 33–36; 38): Length and width of the idiosoma in the holotype 380 x 220 μm, total length 435 μm. Length and width in 3 paratypes (in μm): 408 x 210, 393 x 212 and 390 x 214; total length 458, 444 and 440 μm respectively. Opisthosoma 105 μm long and 220 μm wide. Opisthonotal shield irregular in shape, with a deep anterior cleft, it is 50 μm long in midline and 108 μm wide; minimum width 75 μm. Opisthogastric shields very wide, meeting in the midline and forming a very wide punctated area much wider (125 μm) than long (55 μm) and bearing laterally the suckers A and close to the midline a pair of narrowly oval structures each carrying in its anterior third a sucker b, 5 to 6 μm wide. Setae *n* sessile and very small, they are paramedian and situated behind the oval structures. Length of idiosomal setae (in μm): *sc i* 10 (very thin); *sc e* 13; *h* 160; *sh* 24; *d 5* 20;



Figs. 38–41.
Opisthonotal shields in males: 38, *Schizocarpus dubininae* n. sp.; 39, *Schizocarpus similis* n. sp.; 40, *Schizocarpus diebzigensis* n. sp.; 41, *Schizocarpus subdiebzigensis* n. sp.

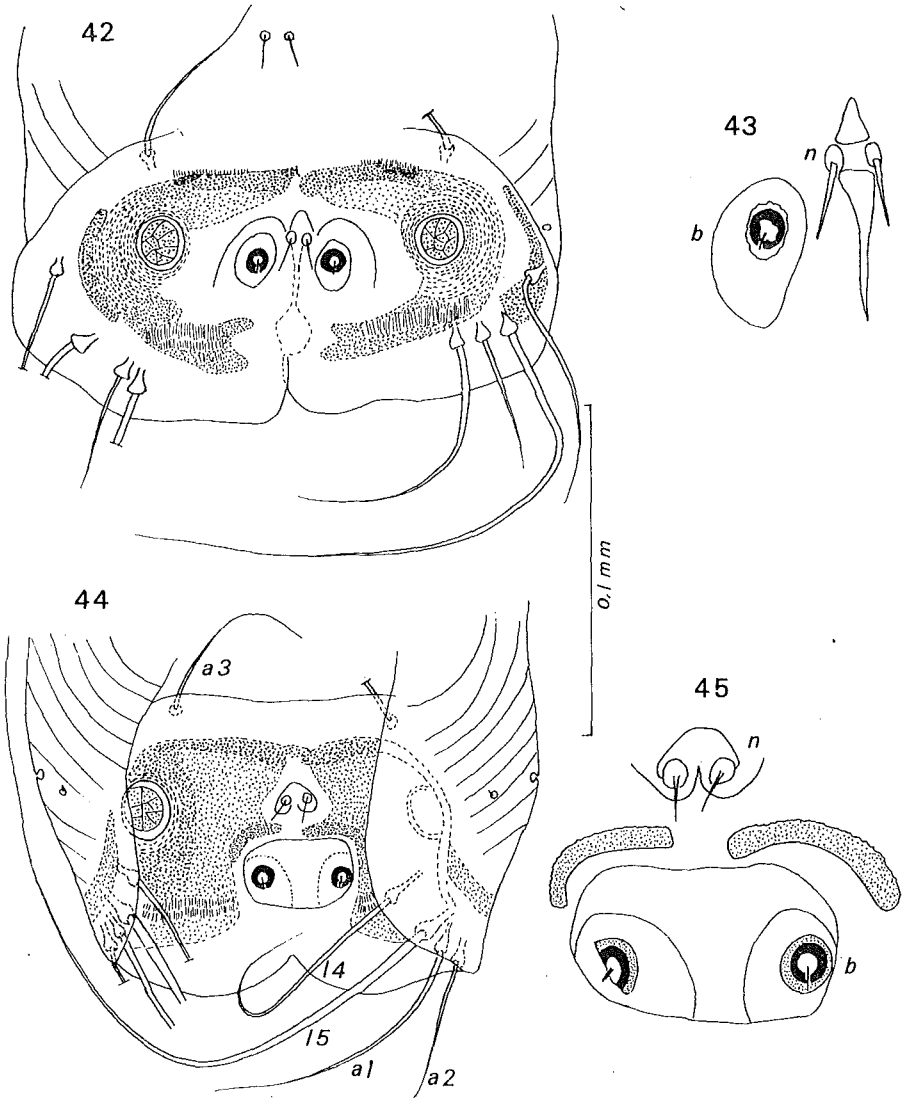
l 1 106; *l 4* 90; *l 5* 300; *a 1* 105; *a 2* 45; *a 3* 90. The *a 3* are situated laterally, slightly in front of the *l 4*.

Host and locality: Holotype and 38 paratypes male from a beaver *Castor fiber* of unknown origin and conserved in the IRSNB. The specimens were collected from the anterior part of the body, chest and throat (17 paratypes) and the head (21 paratypes, most of them from area of the vibrissae).

Remarks: This species is clearly distinguished from the other species of the group I by the shape of the opisthogastric shields, very wide and bearing a pair of elongate oval structures bearing the suckers b.

11. **Schizocarpus similis nov. spec.**

Male (figs. 37; 39): Length and width of the idiosoma in the holotype 375 x 220 µm, total length 425 µm. Length and width in 3 paratypes (in µm): 378 x 215, 372 x 208 and 360 x 212; total length 429, 423 and 412 µm respectively. Opisthosoma 120 µm long, 175 µm wide. Opisthonotal shield 45 µm long in midline and 105 µm wide, with anterior margin



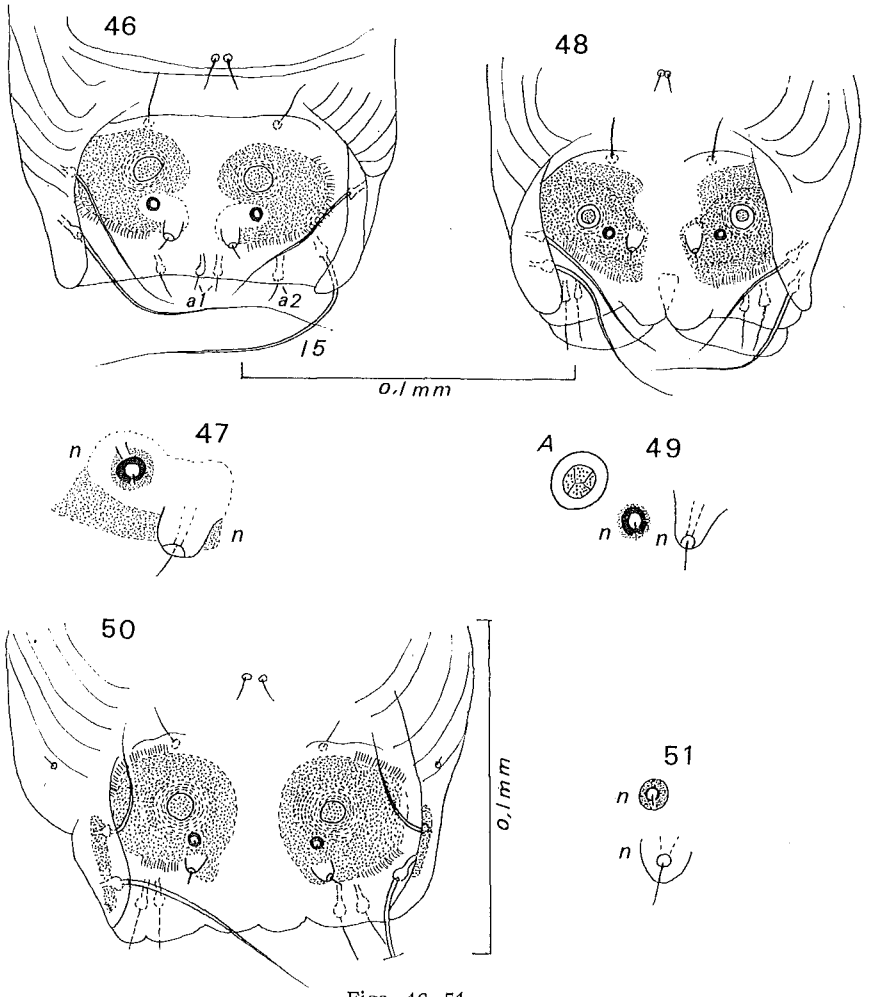
Figs. 42–45.

Figs. 42–43. *Schizocarpus diebzigensis* n. sp., male: 42, opisthogaster; 43, sucker b and setae *n* enlarged. – Figs. 44–45. *Schizocarpus subdiebzigensis* n. sp., male: 44, opisthogaster; 45, suckers b and setae *n* enlarged.

excavated, the lateral margins irregular and the anterior corners produced. Opisthogastric shields as in *S. dubininae* but narrower (total width 105 μm). Length of idiosomal setae (in μm): *sc i* 5; *sc e* 16; *d 5* 15; *h* 150; *sh* 35; *l 1* 100; *l 4* 105; *l 5* 250; *a 1* 18 (very thin); *a 2* 10 (very thin); *a 3* 60.

Host and locality: Holotype and 11 paratypes male from the head and the throat of a beaver *Castor fiber* from Diebzig, G.D.R.; 6 paratypes male from a dried skin of *Castor fiber* from River Elbe (unknown locality; skin in the IRSNB). Mites from the head.

Remarks: This species is very close to *S. dubininae*. It differs from it mainly by the



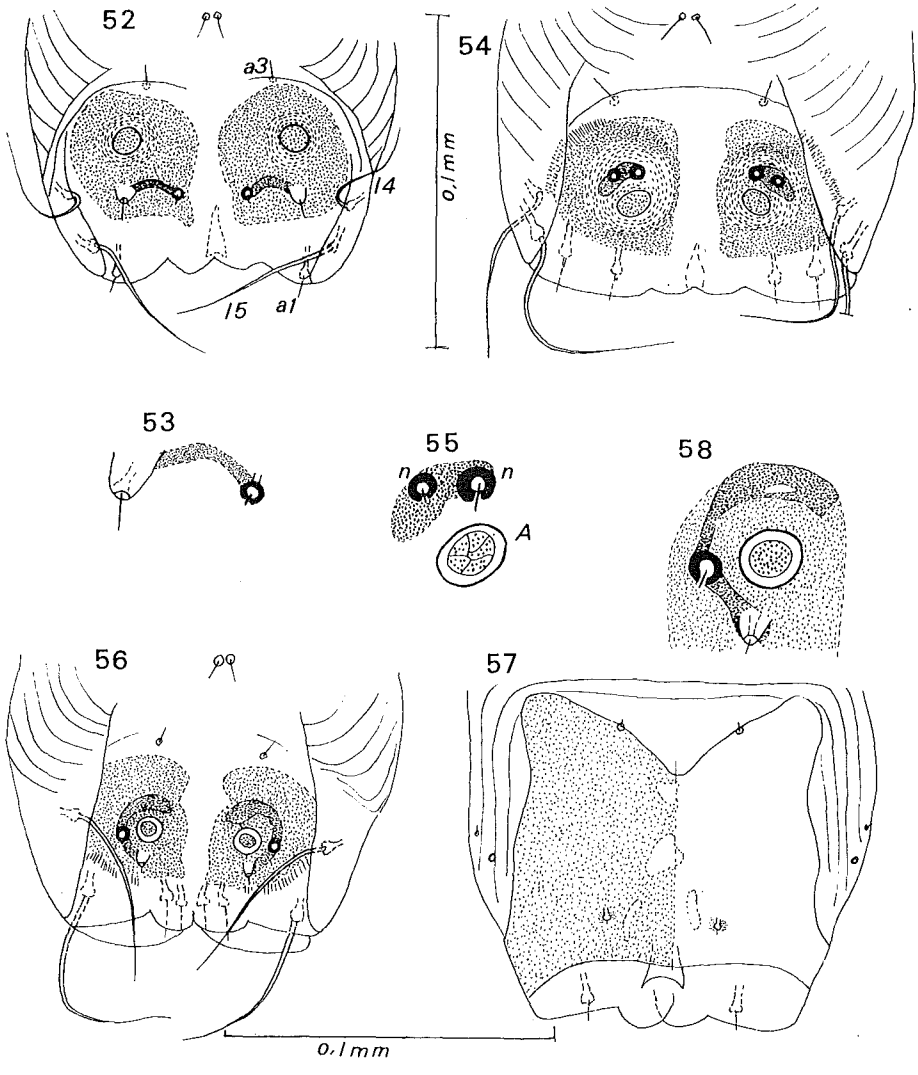
Figs. 46–51.

Figs. 46–47. *Schizocarpus brevis* n. sp., male: 46, opisthogaster; 47, setae *n* enlarged. – Figs. 48–49. *Schizocarpus curtus* n. sp., male: 48, opisthogaster; 49, sucker A and setae *n* enlarged. – Figs. 50–51. *Schizocarpus modestus* n. sp., male: 50, opisthogaster; 51, setae *n* enlarged.

great difference in length of the setae *a 1* and *a 2*, the shorter *a 3*; the narrower opisthogastric shields.

12. **Schizocarpus diebzigensis nov. spec.**

M a l e (figs. 40; 42–43): The holotype and only known specimen is in rather poor condition. The idiosoma is approximately 420 µm long and 210 µm wide but this specimen is slightly stretched. Opisthonotal shield 75 µm long in the midline and 90 µm wide, minimum width 75 µm; its anterior border is excavated and the anterior corners strongly produced. Opisthogastric shields large, well punctate except in its internal part which is very lightly or not punctate. These shields bear in their lateral part a large sucker A (about 16 µm diameter). Suckers A are 72 µm apart. Suckers b are situated close to the midline. Setae *n* are sessile, paramedian and slightly in front of suckers b. Length of idiosomal setae (in µm): *sc i* 35; *sc e* 15; *h* incomplete; *sh* 18; *d 5* 37; *l 1* 60–70; *l 4* 75; *l 5* 225; *a 1* 105; *a 2* 40; *a 3* 60. The *a 3* are situated in front of the opisthogastric shields.



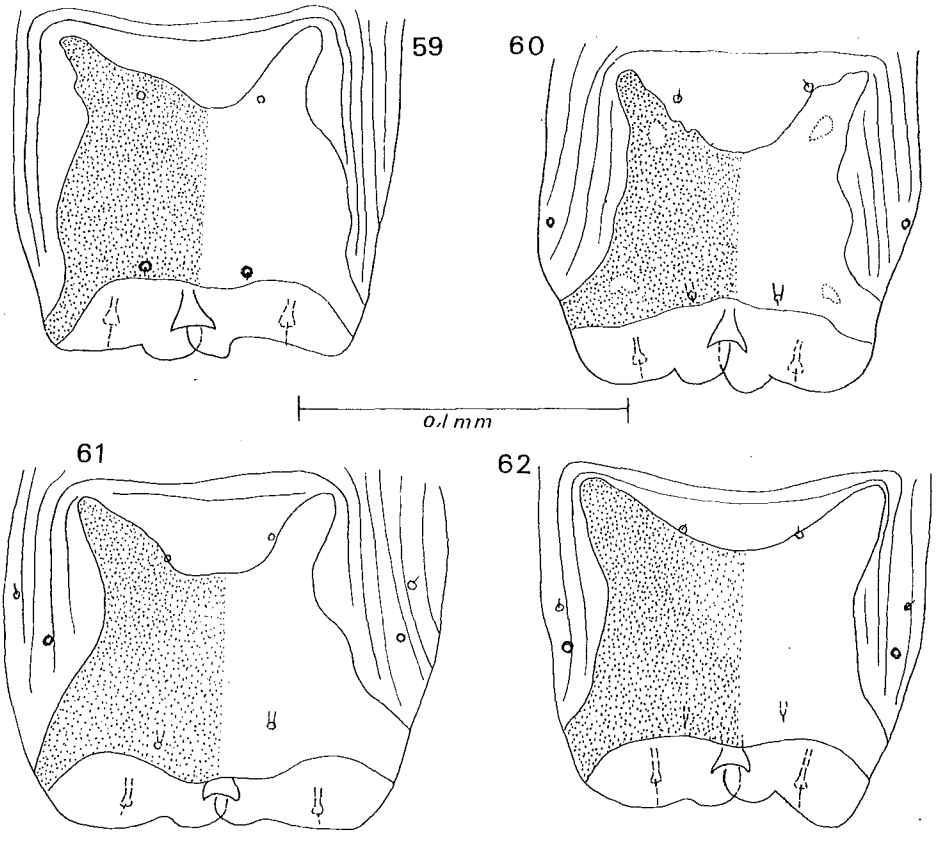
Figs. 52–58.
Figs. 52–53. *Schizocarpus humilis* n. sp., male: 52, opisthogaster; 53, setae *n* enlarged. – Figs. 54–55. *Schizocarpus pusillus* n. sp., male: 54, opisthogaster; 55, sucker A and setae *n* enlarged. – Figs. 56–58. *Schizocarpus exiguus* n. sp., male: 56, opisthogaster; 57, opisthonotal shield; 58, sucker A and setae *n* enlarged.

Host and locality: Holotype and only known specimen from *Castor fiber*, from Diebzig, G.D.R. The mite was attached to a hair of the ear.

Remarks: This species presents very wide opisthogastric shields as in *S. dubininae* and *S. similis*. It is distinguished from these species by the anterior situation of the *a 3* and the *n* setae, the more posterior situation of the suckers b and the different shape of the opisthogastric shields, without paramedian elongate structures.

13. **Schizocarpus subdiebzigensis nov. spec.**

Male (figs. 41; 44–45): Length and width of the idiosoma in the holotype 400 x 225 µm, total length 435 µm. Opisthosoma 120 µm long and 172 µm wide. Opisthonotal shield



Figs. 59–62.
Opisthonotal shields in males: 59, *Schizocarpus brevis* n. sp.; 60, *Schizocarpus curtus* n. sp.; 61, *Schizocarpus modestus* n. sp.; 62, *Schizocarpus humilis* n. sp.

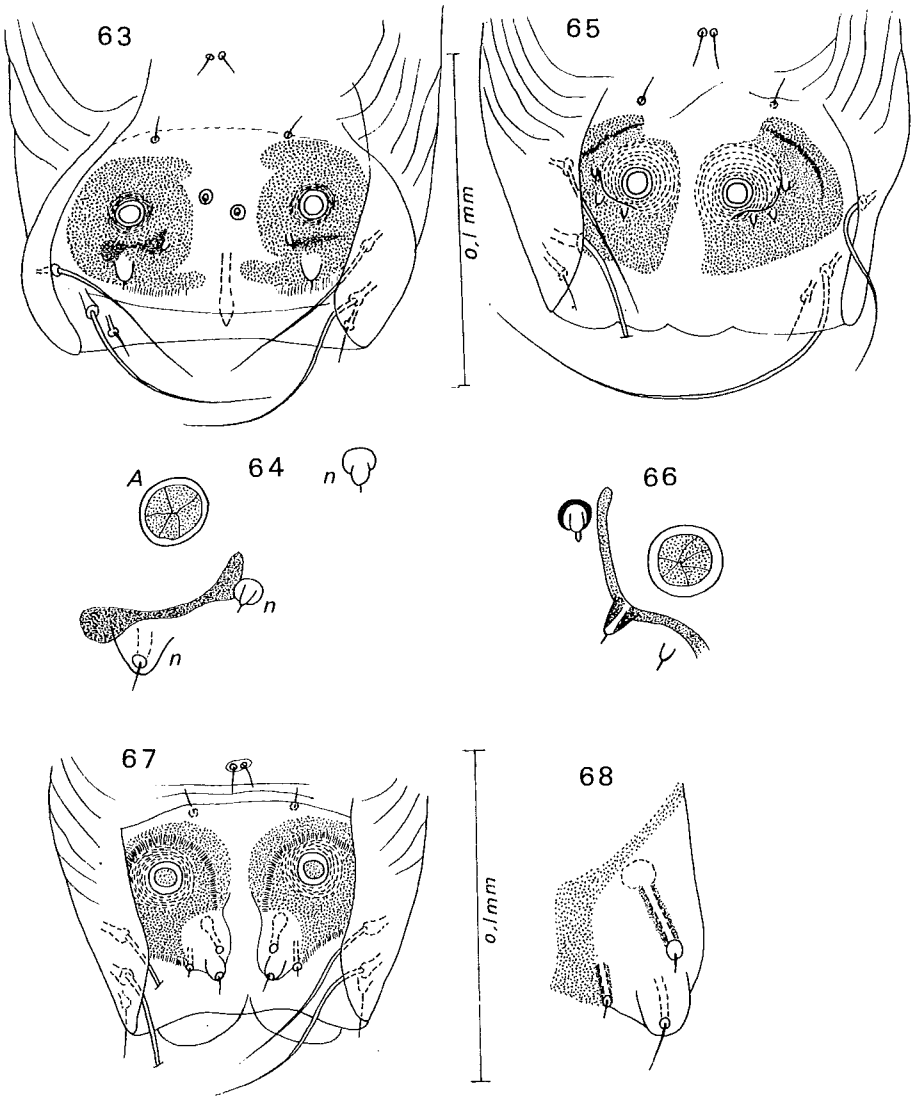
rectangular, 90 µm long in the midline and 82 µm wide; with anterior border slightly concave and anterior corners very poorly developed. Opisthogastric shields as in *S. diebzigensis* but with punctation extending close to the midline. Suckers A large, situated very laterally. Suckers b close to the midline and situated more posteriorly than in *S. diebzigensis*, behind the pair of sessile *n* setae, and separated from the latter by two sclerotized curved bands. Length of idiosomal setae (in µm): *sc i* at least 40; *sc e* 20; *h* 120; *sh* 30; *d 5* 30; *l 1* 72; *l 4* 90; *l 5* 240; *a 1* 90; *a 2* 35; *a 3* 70. The *a 3* are situated in front of the opisthogastric shields.

Host and locality: Holotype male and only known specimen from the neck of a beaver *Castor fiber* from an unknown locality. Animal in the IRSNB.

Remarks: This species is distinguished from *S. diebzigensis* by the greater size of the opisthogastric shields extending until the midline or close to it, the more posterior situation of the suckers b which are separated from the setae *n* by a pair of paramedian curved bands, the shape of the opisthonotal shield with anterior border only slightly concave.

14. **Schizocarpus brevis nov. spec.**

Male (figs. 46–47; 59): Length and width of the idiosoma in the holotype 255 x 151 µm, total length 285 µm. Idiosoma in a paratype 258 x 149 µm, total length 282 µm. Opistho-

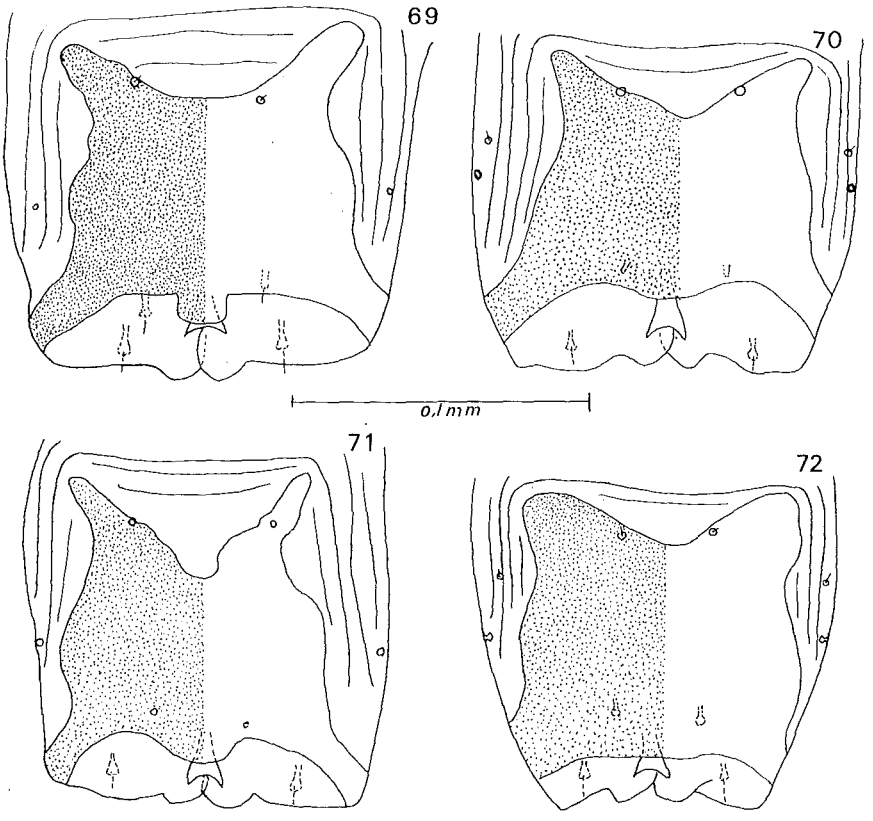


Figs. 63–68.

Figs. 63–64. *Schizocarpus hexapilis* n. sp., male: 63, opisthogaster; 64, sucker A and setae *n* enlarged. – Figs. 65–66. *Schizocarpus subhexapilis* n. sp., male: 65, opisthogaster; 66, sucker A and setae *n* enlarged. – Figs. 67–68. *Schizocarpus parahexapilis* n. sp., male: 67, opisthogaster; 68, setae *n* enlarged.

soma 63 μm long, 120 μm wide. Opisthonotal shield 85 μm wide, with anterior border excavated and the anterior corners strongly produced. Opisthogastric shields punctate bearing the suckers A in their internal half. Diameter of suckers A 8 to 9 μm, they are 24 μm apart. There are two pairs of setae *n* situated behind suckers A on a non-punctate area: one, the most anterior is sessile, the other more posterior and internal is pedunculate. Length of idiosomal setae (in μm): *h* 80; *sh* 25; *d 5* 6; *l 1* 60; *l 4* 45–50; *l 5* 85; *a 1* 5; *a 2* 12; *a 3* 12. Setae *a 1* are situated very close to the midline, the *a 2* are more lateral.

Host and locality: Holotype and one paratype male from the head (close to the vibrissae) of a beaver *Castor fiber* of unknown origin. Animal in IRSNB.



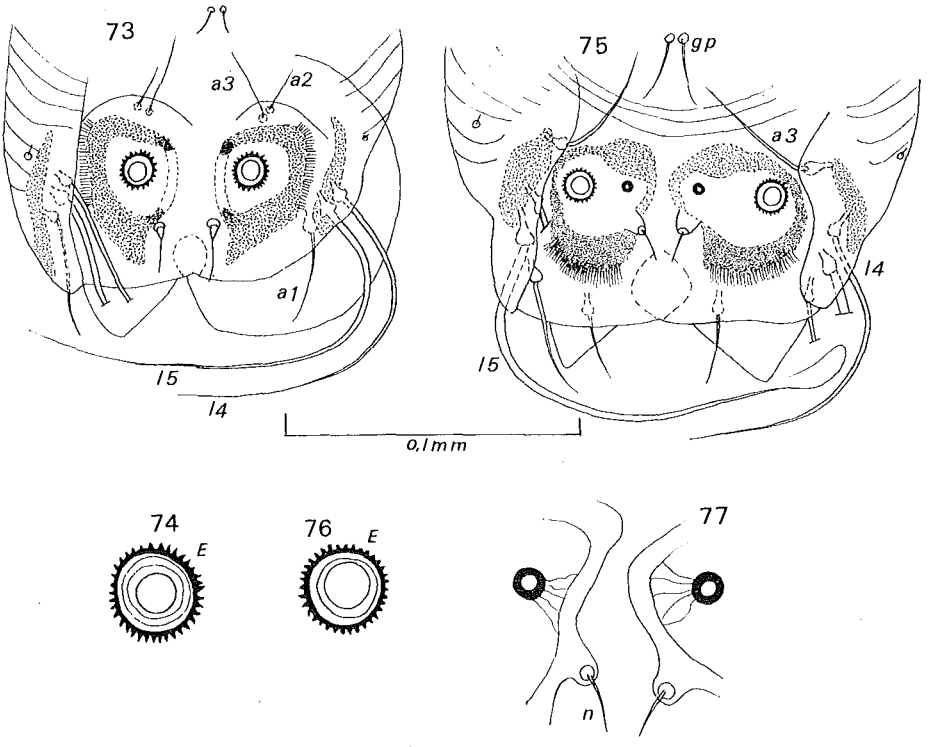
Figs. 69–72.
Opisthonotal shields in males: 69, *Schizocarpus pusillus* n. sp.; 70, *Schizocarpus hexapilis* n. sp.; 71, *Schizocarpus subhexapilis* n. sp.; 72, *Schizocarpus parahexapilis* n. sp.

Remarks: This species is the most close to *S. minor* (DUBININA). It differs from it by the following characters: Setae *n* not situated on the punctate shield, setae *a 1* very close to the midline (they are lateral in *S. minor*), different shape of the opisthogastric shields. This species is distinguished from *S. subparvus* (DUBININA) by the more anterior situation of suckers A on the shields, the situation of setae *n* not on the punctate shield, the paramedian situation of setae *a 1*.

15. **Schizocarpus curtus nov. spec.**

Male (figs. 48–49; 60): Length and width of the idiosoma of the holotype 285 x 153 µm, total length 318 µm. Idiosoma in three paratypes (in µm): 283 x 138, 276 x 130 and 270 x 135; total length 304, 305 and 294 µm respectively. Opisthosoma 90 µm long and 129 µm wide. Opisthonotal shield 80 µm wide, with anterior border deeply excavated and anterior corners strongly developed. Opisthogastric shields punctate, more widely separated than in *S. brevis* and bearing smaller suckers A (7,5 to 8 µm diameter) more distant from each other (43 µm apart) and two pairs of setae *n* of which the internal is pedunculate and the external sessile. The suckers A and the setae *n* are situated on an oblique line oriented postero-internally. Length of idiosomal setae (in µm): *sc i* and *sc e* very thin and short (5 µm); *h* 72; *sh* 15–20; *d 5* 6; *l 1* 50; *l 4* 50–60; *l 5* 70–75; *a 1* 12; *a 2* 12; *a 3* 10–13. The setae *a 1* and *a 2* are close to each other and far from the midline.

Host and locality: Holotype and 13 paratypes male from a beaver *Castor fiber*



Figs. 73–77.
Figs. 73–74. *Schizocarpus radiatus* n. sp., male: 73, opisthogaster; 74, sucker E enlarged. – Figs. 75–77. *Schizocarpus ventricosus* n. sp., male: 75, opisthogaster; 76, sucker E enlarged; 77, subcuticular rings and setae *n* enlarged.

of unknown locality. Animal in the IRSNB. The mites were fixed to the throat (13 paratypes) and the chest (1 paratype).

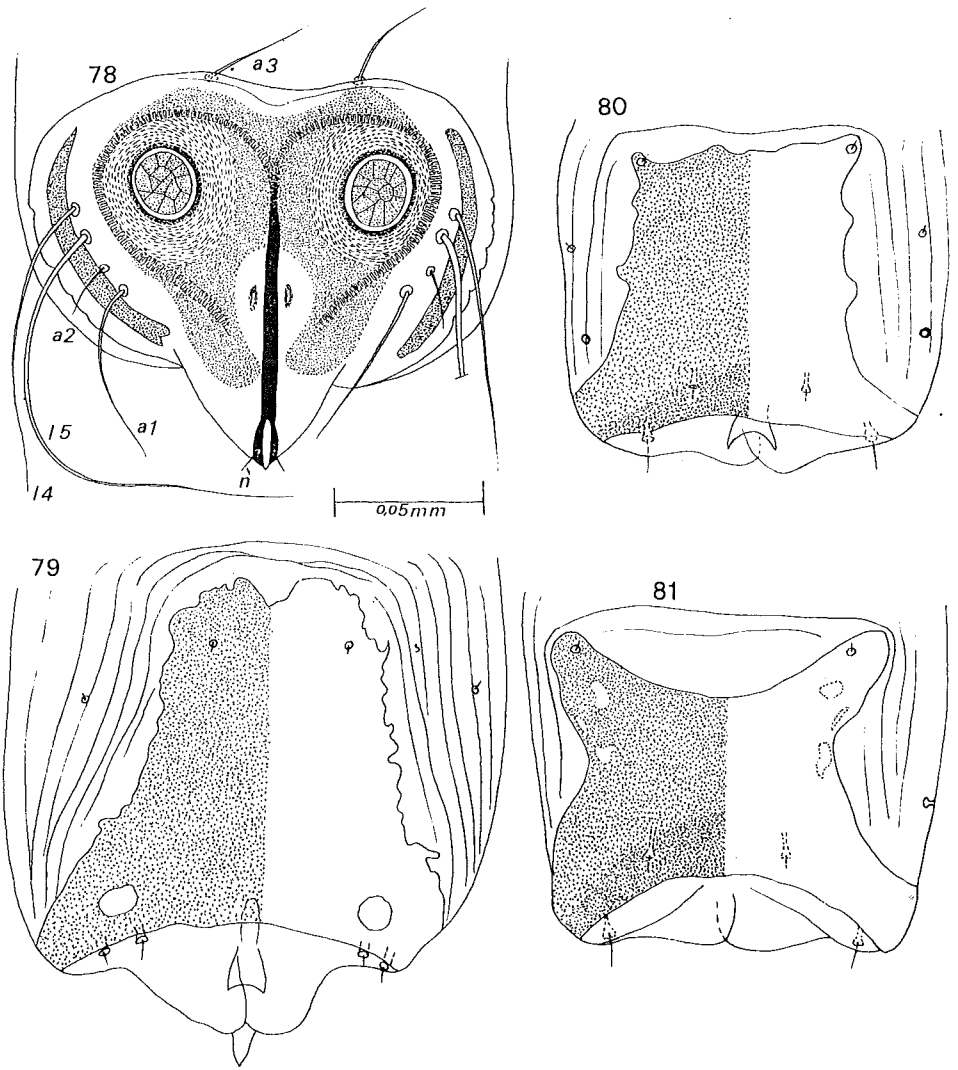
Remarks: This species differs from *S. minor* and *S. brevis* by the more anterior situation of the setae *n*, especially the pedunculate setae which are on the same level as the sessile setae, and by the different shape of the opisthogastric shields.

16. **Schizocarpus modestus nov. spec.**

Male (figs. 50–51; 61): Length and width of the idiosoma in holotype 258 x 150 µm, total length 288 µm. Idiosoma in 3 paratypes (in µm): 285 x 150, 273 x 148 and 255 x 148; total length 312, 299 and 286 µm respectively. Opisthosoma 90 µm long and 135 µm wide. Opisthonotal shield poorly sclerotized, with not defined limits, 100 µm wide, with a deeply incised anterior border. Opisthogastric shields large, rounded (diameter 40 µm) and more strongly punctate around the suckers A, the latter 7 to 7,5 µm wide. The sessile pair of setae *n* is situated immediately behind suckers A, the pedunculate setae *n* are situated behind the latter. The suckers A are 37 µm apart, the pedunculate setae *n* are 35 µm apart. Length of idiosomal setae (in µm): *sc i* and *sc e* very thin, 5 µm long; *h* 60; *sh* 10–15; *d 5* 10; *l 1* 40; *l 4* 50; *l 5* 70–75; *a 1* 8; *a 2* 10; *a 3* 12.

Host and locality: Holotype and 6 paratypes male from a beaver *Castor fiber* from Diebzig, G.D.R. The mites were fixed to the posterior legs.

Remark: This species differs from *S. minor* by the much greater distance between the pedunculate setae *n*. In *S. minor* these setae are very close to each other.



Figs. 78–81.
Figs. 78–79. *Schizocarpus insignis* n. sp., male: 78, opisthogaster; 79, opisthonotal shield. — Fig. 80. *Schizocarpus radiatus* n. sp., male: opisthonotal shield. — Fig. 81. *Schizocarpus ventricosus* n. sp., male: opisthonotal shield.

17. **Schizocarpus humilis nov. spec.**

Male (figs. 52–53; 62): Length and width of the idiosoma of holotype 250 x 160 µm; total length 273 µm. Idiosoma in 4 paratypes (in µm): 279 x 153; 270 x 160; 258 x 150 and 255 x 140; total length 309, 300, 283 and 280 µm respectively. Opisthosoma 80 µm long and 115 µm wide. Opisthonotal shield 87 µm wide with anterior border concave. Opisthogastric shields large, rounded, completely punctate bearing rather large suckers A (diameter 8,5 to 9 µm) 42 µm apart. Setae *n* situated behind suckers A, the pedunculate pair being more external than the sessile one, both are separated by a sclerotized convex band. Length of setae of idiosoma (in µm): *sc i* and *sc e* very thin and short (3 to 4 µm); *h* 70; *sh* 15; *d 5* 5; *l 1* 50; *l 4* 40 to 50; *l 5* 50–60; *a 1* 5; *a 3* 3. The setae *a 2* are lacking.

Host and locality: Holotype and 11 paratypes male from a beaver *Castor fiber* from Diebzig, G.D.R. The mites were fixed to the posterior legs.

Remarks: This species is the closest to *S. subminor*. It differs from it by the absence of setae *a 2*, the very short *a 1* and *a 3*, the presence of a sclerotized bridge between setae *n* at each side, the shorter distance between pedunculate and sessile setae at each side.

18. **Schizocarpus pusillus nov. spec.**

Male (figs. 54–55; 69): Length and width of the idiosoma in the holotype 279 x 160 µm, total length 299 µm. Opisthosoma 87 µm long, 129 µm wide. Opisthonotal shield 90 µm wide, 75 µm long in midline, minimum width 80 µm. Anterior border slightly excavated, anterior corners produced. Opisthogastric shields punctate, rounded, approximately 40 µm long and 37 µm wide, bearing distinctly behind their middle the suckers A, the latter are oval (diameters 6,5 x 8,4 µm). There are two pairs of sessile setae *n* situated in front of suckers A. Length of idiosomal setae (in µm): *sc i* and *sc e* very thin and short (4 to 5 µm); *h* 60–65; *sh* 15; *d 5* 6; *l 1* 40–45; *l 4* 50–55; *l 5* 70–80; *a 1* 6; *a 2* 12; *a 3* 12.

Host and locality: Holotype male and only known specimen fixed to the chest of a beaver *Castor fiber* from Diebzig, G.D.R.

Remark: This species is well characterized by the situation of both pairs of setae *n* in front of the suckers A and the absence of pedunculate setae *n*.

19. **Schizocarpus exiguus nov. spec.**

Male (figs. 56–58): Length and width of idiosoma in the holotype 268 x 151 µm, total length 298 µm. Idiosoma in 2 paratypes: 276 x 150 µm and 280 x 155 µm; total length 304 and 310 µm respectively. Opisthosoma 84 µm long and 124 µm wide. Opisthonotal shield 96 µm wide, its anterior border with a median cleft. Opisthogastric shields shaped as in *S. pusillus* with a rounded sucker A (diameter 7,2 µm). Slightly in front and extending laterally there is a curved sclerotized and not punctate band bearing laterally and posteriorly the two setae *n*, an external sessile and an internal pedunculate. Suckers A are 21 µm apart, pedunculate setae *n* 30 µm apart. Length of idiosomal setae (in µm): *sc i* and *sc e* very thin and short (5–6); *h* 50–60; *sh* 12; *d 5* 5; *l 1* 40–50; *l 4* 30–40; *l 5* 75–90; *a 1* 3; *a 2* 6; *a 3* 5. Setae *a 1* and *a 2* are situated very close to the midline.

Host and locality: Holotype and 2 paratypes male from a beaver *Castor fiber* of unknown origin and conserved in IRSNB. The mite were located on the venter in front of posterior legs (2 specimens) or on the head (1 specimen).

Remarks: This species belongs to the groupe "*minor*" and is the most close to *S. subparvus* (DUB.) and *S. brevis*. It differs from both of these species by the presence on the shields of a curved sclerotized band running outside of the suckers A and bearing the setae *n*; moreover the sessile setae *n* are lateral and outside of these suckers and at the same level as them (they are posterior to these suckers in *S. subparvus* and *S. brevis*), the setae *a 2* are more internal and closer to the midline than the pedunculate setae (distinctly more external in the two other species), the suckers A have a more central situation on the shields and the pedunculate setae *n* are farther apart than in these species.

20. **Schizocarpus hexapilis nov. spec.**

Male (figs. 63–64; 70): Length and width of the idiosoma in the holotype 282 x 153 µm, total length 309 µm. Idiosoma in 3 paratypes (in µm): 287 x 156, 270 x 152 and 260 x 148, total length 319, 302 and 294 µm. Opisthosoma 93 µm long and 138 µm wide. Opisthonotal shield 105 µm with anterior border excavated. Opisthogastric shields punctate, bearing suckers A (diameter 8 to 8,5 µm) and 2 pairs of very short pedunculate setae *n* situated behind the suckers A. There is a third pair of pedunculate setae *n* on the soft

cuticle between the two shields. Length of idiosomal setae (in µm): *sc i* and *sc e* very thin and short (5–6); *h* 60; *sh* 12; *d 5* 6; *l 1* 55; *l 4* 55; *l 5* 60–70; *a 1* 7; *a 3* 6. The *a 2* are lacking.

Host and locality: Holotype and 8 paratypes male from a beaver *Castor fiber*, from Diebzig, G.D.R. The mites were located on the throat (holotype and 7 paratypes) and on the ear (one paratype).

Remark: This species is well characterized by the presence of three pairs of setae *n* on the opisthogaster.

21. **Schizocarpus subhexapilis nov. spec.**

Male (figs. 65–66; 71): Length and width of idiosoma in the holotype 305 x 153 µm, total length 330 µm. Idiosoma in 3 paratypes (in µm): 300 x 150, 285 x 148 and 283 x 145, total length 335, 316 and 314 µm respectively. Opisthosoma 90 µm long and 141 µm wide. Opisthonotal shield 93 µm wide with anterior margin more excavated than in *S. hexapilis* and with anterior corners strongly produced. Opisthogastric shields punctate, resembling those of *S. hexapilis* but wider and with larger suckers A (diameter 9 to 9,5 µm), the latter being closer to the midline (23 µm apart). These shields also bear three pairs of pedunculate setae *n* situated along a curved line slightly behind and outside of suckers A. Length of idiosomal setae (in µm): *sc i* and *sc e* very thin and short (6); *h* 45; *sh* 20; *d 5* 4; *l 1* 45; *l 4* 55; *l 5* 75; *a 1* 8; *a 3* 4. Setae *a 2* are lacking.

Host and locality: Holotype and 22 paratypes male from a beaver *Castor fiber* from an unknown locality and conserved in IRSNB. The mites were located on the head (8 specimens), the throat (5 specimens) and the chest (12 specimens).

Remarks: This species belongs to the group "*hexapilis*", with 3 pairs of setae *n* on the opisthogaster. It differs from *S. hexapilis* by the different situation of these setae on the opisthogaster, all these pairs of setae being situated laterally, outside of the suckers A, moreover the opisthogastric shields have a different shape and the suckers A are closer to each other than in *S. hexapilis*.

22. **Schizocarpus parahexapilis nov. spec.**

Male (figs. 67–68; 72): Length and width of the idiosoma in the holotype 270 x 160 µm, total length 299 µm. Idiosoma in 3 paratypes (in µm): 285 x 158, 270 x 150 and 265 x 145, total length 315, 302 and 294 respectively. Opisthosoma 81 µm long and 118 µm wide. Opisthonotal shield 96 µm wide and 75 µm long in midline, with anterior margin slightly concave. Opisthogastric shields longer (45 µm) than wide (39 µm), bearing suckers A in their anterior half, the latter having a diameter of 9 µm and being 36 µm apart. The postero-internal part of the shields is not punctate and bears three pairs of setae *n* including one posterior pedunculate and two more anterior sessile. Length of idiosomal setae (in µm): *sc i* and *sc e* very thin short (5–6); *h* 60–70; *sh* 18; *d 5* 4; *l 1* 45; *l 4* 45–50; *l 5* 50–60; *a 1* 7; *a 3* 6. The setae *a 2* are lacking.

Host and locality: Holotype and 3 paratypes male from a beaver *Castor fiber* of unknown origin conserved in IRSNB. The mites were located on the throat and the chest.

Remarks: This species differs from the two other species of the group "*hexapilis*" by the posterior situation of the setae *n* and by the shape of these setae (only one pair pedunculate and two pairs sessile).

23. **Schizocarpus radiatus nov. spec.**

Male (figs. 5; 73–74; 80): Length and width of idiosoma in holotype 372 x 198 µm, total length 402 µm. Idiosoma in 3 paratypes (in µm): 376 x 190, 374 x 194 and 369 x 185, total length 406, 399 and 408 respectively. Opisthosoma 105 µm long and 183 µm wide.

Opisthonotal shield strongly sclerotized, 84 µm wide and 93 µm long in midline; shape almost rectangular with anterior border not incised. Opisthogastric shields more or less quadrangular with the median part, bearing suckers E, not punctate. The suckers E have toothed walls resembling toothed watch wheels, their total diameter, including the toothed wall, is 14–15 µm, they are 24 µm apart. Behind these suckers and more close to the midline is a pair of pedunculate setae *n*. Length of idiosomal setae (in µm): *sc i* 30–35; *sc e* 12–15 (very thin); *h* 45; *sh* 15; *d 5* 7–10; *l 1* 42; *l 4* 150; *l 5* 170; *a 1* 36. There are two unequal pairs of setae in front of the opisthogastric shields, we think that they are the *a 2* (15 µm) and *a 3* (25–30 µm).

Host and locality: Holotype and 29 paratypes male from a beaver *Castor fiber* of unknown locality. Animal in IRSNB. The mites were located on the dorsum and the flanks (24 specimens), on the posterior legs (5 specimens) and the head (2 specimens).

Remarks: This species is well characterized by the shape of the suckers (type E), the presence of two pairs of setae in front of the opisthogastric shields and the quadrangular shape of these shields.

24. **Schizocarpus ventricosus nov. spec.**

Male (figs. 75–77; 81): Length and width of idiosoma in the holotype 360 x 210 µm, total length 383 µm. Idiosoma in 4 paratypes (in µm): 375 x 230, 366 x 212, 355 x 208 and 348 x 205, total length 395, 387, 375 and 368. Opisthosoma 78 µm long and 210 µm wide. Opisthonotal shield 85 µm wide and 60 µm long in midline; with anterior margin concave and anterior corners well developed. Opisthogaster bulged, the suctorial plate being turned posteriorly. Opisthogastric shields with median part non punctate like in *S. radiatus* but forming thick strongly sclerotized and broadly oval rings (diameters 35 x 50 µm). The suckers E are situated in the external half of the shields, their diameter is 12–14 µm and they are 48 µm apart. There is a pair of pedunculate setae *n* on the inner border of the shields, and slightly more in front and on the non-punctate part of the shield a pair of small apparently sub-cuticular rings. Length of idiosomal setae (in µm): *sc i* 50; *sc e* 12; *h* 50; *sh* 20; *d 5* 8; *l 1* 50; *l 4* 120–150; *l 5* 180; *a 1* 30; *a 2* 40; *a 3* 60–70. Setae *g p* are longer (25 to 30 µm) than in all the other known species of *Schizocarpus*.

Host and locality: Holotype and 54 paratypes male from a beaver *Castor fiber* from unknown origin and conserved in IRSNB. The mites were found on the dorsum from neck to tail (46 specimens) and the flanks (8 specimens).

Remarks: This species presents the same type of suckers (E suckers) as *S. radiatus*. It differs from this species by the following characters: Absence of setae (*a 2* and *a 3*) in front of opisthogastric shields, the setae *a 2* are behind these shields and the *a 3* in front of the setae *l 4*; opisthogastric shields more sclerotized and oval in shape; suckers E smaller with teeth less developed and situated in the lateral half of the shields; setae *g p* longer.

25. **Schizocarpus insignis nov. spec.**

Male (figs. 78–79): Length and width of idiosoma in the holotype: 490 x 270 µm, total length 529 µm. Idiosoma in 3 paratypes (in µm): 498 x 260, 490 x 240 and 480 x 245; total length 530, 525 and 515 respectively. Opisthosoma 180 µm long and 240 µm wide. Opisthonotal shield strongly sclerotized, tapering forwards, with anterior border convex but slightly notched in its middle, it is 120 µm long in midline and 105 µm wide. Opisthogastric shields very large and fused in the midline forming a triangular shield tapering posteriorly. There is a pair of very large suckers A (diameters 30 x 25 µm), and a thick median longitudinal sclerite beginning in the median part of the shield and extending behind the posterior margin of the body where it is enveloped by a membrane. The posterior extremity of this sclerite bears a pair of short setae *n*. Length of idiosomal setae (in µm): *sc i* 80–90; *sc e* 30; *h* 185; *sh* 35; *d 5* 12; *l 1* 150; *l 4* 120; *l 5* 200; *a 1* 100; *a 2* 18; *a 3* 50.

Host and locality: Holotype and 20 paratypes male from a beaver *Castor fiber* of unknown origin. This animal is conserved in IRSNB. Other paratypes male: 12 from a beaver of the same species from Diebzig, G.D.R., and 12 from a beaver of the same species from Bulgan-gol, Mongolia. All these mites (holotype and paratypes) were found attached to the hairs of the ears.

Remarks: This species is well characterized by its very large size, the triangular shape of the opisthogastric shield, the presence of a thick longitudinal sclerite on the opisthogaster.

B. SPECIES OF *Schizocarpus* DESCRIBED FROM *Castor fiber* AND NOT AVAILABLE FOR OUR STUDY

1. **Schizocarpus grandis** (DUBININA, 1964) **nov. comb.**
   Histiophorus grandis DUBININA, 1964: 129 (figs. 12, 13)
Described from *Castor fiber*, from Voronesh, U.S.S.R.

2. **Schizocarpus brachyurus** (DUBININA, 1964) **nov. comb.**
   Histiophorus brachyurus DUBININA, 1964: 125 (fig. 10)
Described from *Castor fiber*, from Voronesh, U.S.S.R.

3. **Schizocarpus minor** (DUBININA, 1964) **nov. comb.**
   Histiophorus minor DUBININA, 1964: 137 (fig. 15)
Described from *Castor fiber*, from Voronesh, U.S.S.R.

4. **Schizocarpus subminor** (DUBININA, 1964) **nov. comb.**
   Histiophorus subminor DUBININA, 1964: 137 (fig. 15)
Described from *Castor fiber*, from Voronesh, U.S.S.R.

5. **Schizocarpus parvus** (DUBININA, 1964) **nov. comb.**
   Histiophorus parvus DUBININA, 1964: 134 (fig. 15)
Described from *Castor fiber*, from Voronesh, U.S.S.R.

6. **Schizocarpus subparvus** (DUBININA, 1964) **nov. comb.**
   Histiophorus subparvus DUBININA, 1964: 134 (fig. 15)
Described from *Castor fiber*, from Voronesh, U.S.S.R.

7. **Schizocarpus latus** (DUBININA, 1964) **nov. comb.**
   Histiophorus latus DUBININA, 1964: 132 (fig. 14)
Described from *Castor fiber*, from Voronesh, U.S.S.R. According to the original description this species is recognizable by the following characters: large size of the body, opisthogastric shields in the shape of rings with the median parts not punctate, there is one pair of setae *n* situated between the shields, one pair of suckers A and only one pair of setae (*a* 3) in front of the shields. These characters separate clearly *S. latus* from our *S. radiatus*, *S. ventricosus* and *S. insignis*.

8. **Schizocarpus** sp.
   Histiophorus mingaudi DUBININA, 1964: 112 (figs. 1–5), nec TROUESSART, 1896

We think that the species described by DUBININA as *Histiophorus mingaudi* (TROUESSART) (= *Schizocarpus mingaudi*) belongs in fact to a new species close to *S. mingaudi*. Recently we had the possibility to examine and to redescribe the typical specimens of *S. mingaudi* and to designate a lectotype (see FAIN et al., in press). This lectotype, as well as the new specimens of that species that we collected in the U.S.A., differ from the drawings of DUBININA mostly by the more posterior situation of the setae *n* (at the same level as the suckers B) and by the shape of the opisthonotal shield with an anterior border much more incised and with two long antero-lateral arms. The true *S. mingaudi* seems to be restricted to *Castor canadensis*, from North America. It is very abundant on this host.

9. **Schizocarpus castoris** (FRIEDRICH, 1895) species inquirenda
Histiophorus castoris FRIEDRICH, 1895: 28 (plate IV); TROUESSART, 1896b: 35

This species was described by FRIEDRICH from specimens collected on a beaver *Castor fiber* from former Germany. Therefore it cannot be a synonym of *S. mingaudi* which is an American species. Apparently FRIEDRICH did not recognize the sex of his specimens. His description and figure are unadequate and no any measurement is given. It is not possible to recognize this species from the original description and the types are probably lost. *S. castoris* likely corresponds to one of the 33 species found so far on *Castor fiber* in Europe.

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Summary

The fur mites of the genus *Schizocarpus* TROUESSART, 1896 parasitic on the beaver *Castor fiber* L. have been studied. The mites were collected from three beavers of which two originated from the river Elbe in the G.D.R. and one from an unknown locality. The mites collected belong to 25 species; among them four were already described from beavers *Castor fiber* from the U.S.S.R. by DUBININA (1964) and 21 are new. All these species are described and depicted. Only the male specimens are described, the females and the immatures are similar to each other and are almost impossible to recognize. As already observed by DUBININA most of our species occupied different specific microareas on the host. These microareas were as follows for 15 new species: *Schizocarpus insignis, S. intercalatus* and *S. parabrachyurus* were found only on the head; *S. hexapilis* and *S. similis* on the head and on the throat; *S. dubininae* and *S. subhexapilis* on the head, the throat and the chest; *S. curtus* on the throat and the chest; *S. radiatus* and *S. ventricosus* on the dorsum and the flanks, exceptionally on other places; *S. pygidialis* on a small area in front of the tail; *S. ornatus* on the anterior legs and a few specimens from the throat; *S. modestus* and *S. humilis* on the posterior legs; *S. subornatus* on the posterior legs and a few specimens on the body behind and in front of these legs. The six other species (*S. exiguus, S. pusillus, S. parahexapilis, S. brevis, S. diebzigensis* and *S. subdiebzigensis*) are represented by only few specimens and their location on the body is therefore not significant.

The multiple speciation observed in these mites results probably from microisolation caused by the existence of various microhabitats on the body of the beaver, the latter being in relation with differences in the hairs (texture and thickness) or in skin secretions. Multiple speciation could also be explained, at least in part, by the strict confinement of the beaver populations resulting into isolation of the mite fauna. This opinion is based on the fact that the composition of the mite fauna living on the beavers varies considerably according to the origin of the beaver population. Each beaver population bears much more endemic species of *Schizocarpus* (8 for the beavers of U.S.S.R., 7 for those from G.D.R. and 13 for a single beaver of unknown origin) than species common to two or three different populations of hosts (see table 1).

These observations provide new arguments in favour to the opinion that some of the beaver populations could actually represent valid subspecies.

Zusammenfassung

DIE GATTUNG *Schizocarpus* TROUESSART, 1896 (ACARI, CHIRODISCIDAE) VOM BIBER *Castor fiber* L.: EIN BEISPIEL DER MULTIPLEN SPEZIATION

Die Haarmilben der Gattung *Schizocarpus* TROUESSART, 1896 von drei Bibern *Castor fiber* L. wurden untersucht. Zwei dieser Biber stammen aus dem Elbe-Mulde-Becken der DDR und einer von einer unbekannten Lokalität. Die davon abgesammelten Milben gehören zu 25 Arten, von denen 21 neu sind. Die meisten dieser Arten bewohnen spezielle Kleinbereiche auf ihrem Wirt. Die vielfache Neubildung von Arten, die bei diesen Milben beobachtet wurde, ergibt sich wahrscheinlich aus dem Bestehen verschiedener Nischen auf dem Körper des Bibers. Diese haben unterschiedlichen Haaraufbau und Haardicke. Andererseits sind Beziehungen zu Hautsekretionen möglich. Mehrfache Artneubildung konnte auch durch die deutliche Beschränkung auf die Biber-Populationen erklärt werden, die zu einer Isolation der Milben-Fauna führt. Diese Auffassung stützt sich auf den Befund, daß die Zusammensetzung sich beträchtlich je nach der Herkunft der Biber-Population verändert. Diese Beobachtungen ergeben neue Hinweise zugunsten der Auf-

fassung, daß einige der Biber-Populationen als gültige Unterarten betrachtet werden können.

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