

A REVIEW OF THE CHIRODISCINAE  
WITH DESCRIPTIONS OF NEW TAXA  
(ACARINA : LISTROPHORIDAE)  
(Ist. series)

BY

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INTRODUCTION.

The first description of chirodiscine mites was made by TROUESSART and NEUMANN (1890) who described the new genus and species *Chirodiscus amplexans*, found on an Australian bird, *Podargus strigoides* (Latham). This mite was placed first in the subfamily Analgesinae, family Sarcoptidae. During 1895-1897, TROUESSART described the new genera *Labidocarpus* containing the new species *L. rollinati*, *L. megalonyx*, and *L. minor*, and *Schizocarpus* containing a single species, *S. mingaudi*.

CANESTRINI (1892) placed the genus *Chirodiscus* in the family Dermoglyphidae. This was one of the 7 families he listed for the suborder Sarcoptina, which also included the new family Listrophoridae. In 1897, CANESTRINI reviewed the family Listrophoridae, and placed *Chirodiscus*, *Labidocarpus*, and *Schizocarpus* in that family. CANESTRINI and KRAMER (1899) classified listrophorid mites as a subfamily Listrophorinae of the family Sarcoptidae and retained *Chirodiscus*, *Labidocarpus*, and *Schizocarpus* in the subfamily. Subsequently BANKS (1905) returned this group to familial rank, and most authors now accept this status.

EWING (1929) separated a new genus *Alabidocarpus* from *Labidocarpus*. GUNTHER (1942) divided the family into 4 subfamilies, namely Myocoptinae, Listrophorinae, Atopomelinae, and Labidocarpinae. He established a new genus *Neolabidocarpus*, for *Labidocarpus buloloensis* Gunther, 1940, and included it with *Chirodiscus*, *Labidocarpus*, and *Schizocarpus* in the Labidocarpinae. GUNTHER also synonymized *Alabidocarpus* Ewing with *Labidocarpus* Trouessart.

LAWRENCE (1944) established a new genus, *Schizocoptes*, for a new species

*S. conjugatus* and in 1948, he revised the subfamily Labidocarpinae and established the following new genera : *Olalabidocarpus* for *Labidocarpus belsorum* Eyn-dhoven, 1940, *Eulabidocarpus* for *Labidocarpus compressus* Ewing, 1910, and *Prolabidocarpus* for a new species *P. canadensis*. In his revision LAWRENCE considered the genus *Alalabidocarpus* Ewing as valid and presented a key to its 4 new species, *A. megalonyx* (Trouessart), *A. minor* (Rollinat and Trouessart), *A. nasicolus* (Lawrence), and *A. recurvus* (Womersley). LAWRENCE (1959) recognized Labidocarpinae Gunther as a synonym of Chirodiscinae Trouessart, and also recognized *Prolabidocarpus* Lawrence as a synonym of *Schizocarpus* Trouessart.

DOMROW (1958) examined *Neolabidocarpus buloloensis* (Gunther) and found that the type is a late nymphal stage which possesses the definitive characters of the Atopomelinae. He suggested that the exact status of *Neolabidocarpus* must remain uncertain until the adult is found. DOMROW (1961) indicated that *Chirodiscus* is probably a genus of the Atopomelinae. The present writer believes that the distinctive characteristics of the Atopomelinae warrant their continued separation from the Chirodiscinae. *Chirodiscus* is somewhat intermediate between the two groups in that the first two pairs of legs are not strongly modified for clasping, but in common with other members of Chirodiscinae it lacks caruncles on the first two pairs of legs. All Atopomelinae possess caruncles on legs I and II.

#### BIOLOGY.

Little is known about the biology of chirodiscine mites. The presence of the hexapod larva in some adult females of many species has led several workers to believe that these mites are viviparous. LAWRENCE (1944) stated that the female nymph and the male copulate by firmly joining the posterior ends together and facing in opposite directions. The stages and cycle of development of chirodiscine mites remain in question. According to LAWRENCE (1952) the probable cycle of development of *Alalabidocarpus calcaratus* starts with the copulatory nymphal female, with rudimentary legs, being fertilized by the male. Thereafter the nymphal female molts into an eight-legged unchitinized female with strong setae on the posterior legs. The female becomes mature after molting once or twice more. The mature female gives birth to six-legged larvae which molt to either eight-legged chitinized females with incomplete setation of posterior legs or unmodified males. Both sexes molt once again before maturing. It is still not known how the copulatory nymphal female comes into being.

In the description of *Alalabidocarpus nasicolus*, LAWRENCE (1938) suggested that this species feeds on sebaceous secretions at the base of the host's hair. In the same description, LAWRENCE indicated that locomotion of this mite must be limited because of the strong modification for grasping of the first and second pairs of legs.

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SYSTEMATICS.

Suborder Sarcoptiformes Reuter.

Supercohort Acaridiae Latreille.

Cohort Psoroptidia Yunker.

Superfamily Listrophoroidea Canestrini.

Family Listrophoridae Canestrini.

Subfamily Chirodiscinae Trouessart.

Chirodiscinae TROUESSART, 1892, *Rev. Sci. Natur. ouest*, p. 50 ; LAWRENCE, 1959, *Acarologia*, 1 : III ; ZUMPT, 1961, *Publ. S. African Inst. Med. Res.* 9 : 312.

Labidocarpinae GUNTHER, 1942, *Proc. Linn. Soc. N. S. Wales*, 67 : 109 ; WOMERSLEY, 1943, *Trans. Roy. Soc. S. Austr.* 67 : 17 ; LAWRENCE, 1948, *Jour. Parasitol.* 34 : 369 ; LAWRENCE, 1956, *Mem. Inst. Sci. Madagascar* 9 : 147.

*Type genus.* *Chirodiscus* Trouessart and Neumann, 1890.

*Diagnosis.* Body oblong, dorso-ventrally or laterally compressed. Legs I and II strongly modified for clasping hairs, without caruncles. Legs III and IV not enlarged, not modified for clasping hairs, with or without caruncles. Males with adanal copulatory suckers except *Chirodiscus*. Most species parasitic on hairs of bats.

Seven described genera, 14 described species, 1 new genus, and 7 new species are recorded.

*Key to the genera of Chirodiscinae.*

- |   |   |
|---|---|
| 1. Body dorso-ventrally compressed..... | 2 |
| Body laterally compressed.....          | 3 |

2. Legs I and II strongly enlarged distally and with broad blunt tips. Male with adanal copulatory suckers..... *Schizocoptes* Lawrence  
 Legs I and II slightly enlarged distally and with pointed tips. Male without adanal copulatory suckers..... *Chirodiscus* Trouessart
3. Tarsi III and IV each with claw, with or without caruncle..... 4  
 Tarsi III and IV without claws, caruncles present..... *Schizocarpus* Trouessart
4. Tarsus III ending with 3 smooth spurs, tarsus IV ending with 2 smooth spurs....  
*Olalabidocarpus* Lawrence  
 Tarsi III and IV not as above..... 5
5. Tarsi III and IV each ending with 1 smooth spur..... 6  
 Tarsus III ending with 2 denticulated spurs, tarsus IV ending with 1 denticulated spur ..... 7
6. Tarsi III and IV each with caruncle, located between claw and spur.....  
*Paralabidocarpus* n. gen.  
 Tarsi III and IV without caruncles..... *Labidocarpus* Trouessart
7. With long setae immediately posterior to propodosomal shield. Legs III and IV distinctly separated from legs I and II..... *Eulabidocarpus* Lawrence  
 With minute setae immediately posterior to propodosomal shield. Legs III and IV closely adjoining legs I and II..... *Alabidocarpus* Ewing

Genus *Chirodiscus* Trouessart and Neumann.

*Chirodiscus* TROUESSART and NEUMANN, 1890, *Bull. Sci. France Belgique* 22 : 392 ; CANESTRINI, 1897, *Prospetto acarof. ital.* 7 : 889 ; CANESTRINI and KRAMER, 1899, *Das Tierreich* 7 : 28.

*Type species.* *Chirodiscus amplexans* Trouessart and Neumann, 1890.

*Diagnosis.* Body dorso-ventrally compressed. Propodosomal shield absent. Legs I and II slightly enlarged distally and with pointed tips. Leg III with 5 segments ; tarsus with caruncle, without claws. Leg IV similar to III. Legs III and IV closely adjoining legs I and II. Monotypic.

*Chirodiscus amplexans* Trouessart and Neumann.

*Chirodiscus amplexans* TROUESSART and NEUMANN, 1890, *Bull. Sci. France Belgique* 22: 393 ; TROUESSART, 1893, *C. R. Soc. Biol. (France)* 45 : 699 ; CANESTRINI, 1897, *Prospetto acarof. ital.* 7 : 900 ; CANESTRINI and KRAMER, 1899, *Das Tierreich* 7 : 28.

*Diagnosis.* Female : length 800 microns, width 240 microns. Male : length 700 microns, width 200 microns. Pair of setae of moderate length on dorsum at level of leg I. Two pairs of setae of moderate length on dorsum at level intermediate between legs I and II. Two pairs of long lateral setae just anterior to coxae III. Posterior end of female with pair of long setae. Posterior end of male with 3 pairs of setae, with dorso-lateral and ventro-medial pairs long and subequal and middle pair much shorter.

*Type host.* Bird : *Podargus strigoides* (Latham).

*Type locality.* South Australia.

*Deposition of types.* Muséum National d'Histoire Naturelle de Paris.

*Distribution.* South Australia : 2 females and 1 male from *Podargus strigoides* recorded by TROUESSART and NEUMANN, 1890.

*Material examined.* No specimens were available for study.

*Discussion.* According to TROUESSART (1893), the finding of *Chirodiscus amplexans* on *Podargus strigoides* was accidental; he believed that the normal host was probably a species of marsupial.

Genus *Labidocarpus* Trouessart.

*Labidocarpus* TROUESSART, 1895, *Bull. Soc. Ent. France*, p. 38, 84; CANESTRINI, 1897, *Prospetto acarof. ital.* 7 : 888; CANESTRINI and KRAMER, 1899, *Das Tierreich* 7 : 27; EWING, 1929, A manual of external parasites, p. 44; GUNTHER, 1942, *Proc. Linn. Soc. N. S. Wales* 67 : 110; LAWRENCE, 1948, *Jour. Parasitol.* 34 : 374; ZUMPT, 1961, *Publ. S. African Inst. Med. Res.* 9 : 313.

*Type species.* *Labidocarpus rollinati* Trouessart, 1895.

*Diagnosis.* Body strongly compressed laterally. Propodosomal shield extending posteriorly to or beyond level of leg II. Pair of setae of moderate length immediately posterior to propodosomal shield. Legs I and II strongly enlarged distally and with broad blunt tips. Legs III and IV each with 4 segments; tarsus with 1 posteriorly curved claw and 1 smooth spur of moderate size. Leg IV distinctly shorter and weaker than leg III. Legs III and IV distinctly separated from legs I and II.

Four species are recorded.

Key to the species of *Labidocarpus*.

1. With pair of sclerotized longitudinal bars on mid-dorsum immediately posterior to propodosomal shield..... 2  
Without these bars..... 3
2. Two pairs of lateral setae just dorsal to coxae III..... *L. tanganyikensis* n. sp.  
One pair of lateral setae just dorsal to coxae III..... *L. cristatus* Lawrence
3. Postero-lateral projections of propodosomal shield each with minute seta. Female with 32-36 annulations on dorsum..... *L. rollinati* Trouessart  
Postero-lateral projections of propodosomal shield without setae. Female with 37-43 annulations on dorsum..... *L. natalensis* Lawrence

*Labidocarpus rollinati* Trouessart.

(Figs. 1, 2).

*Labidocarpus rollinati* TROUESSART, 1895, *Bull. Soc. Ent. France*, p. 39, 85; CANESTRINI, 1897, *Prospetto acarof. ital.* 7 : 897; CANESTRINI and KRAMER, 1899, *Das Tierreich* 7 : 28; LAWRENCE, 1948, *Jour. Parasitol.* 34 : 374.

*Diagnosis.* Female : length 305-323 microns, greatest depth (at level of leg III) 91 microns; 32-36 annulations on dorsum. Male : length 256-275 microns, grea-

test depth (at level of leg III) 85-97 microns ; 18-19 annulations on dorsum. Propodosomal shield with pair of postero-lateral projections and 1 postero-medial projection ; minute seta on each postero-lateral projection. Without pair of sclerotized longitudinal bars on mid-dorsum immediately posterior to propodosomal shield. Without serrated crests on mid-dorsum. One pair of lateral setae just

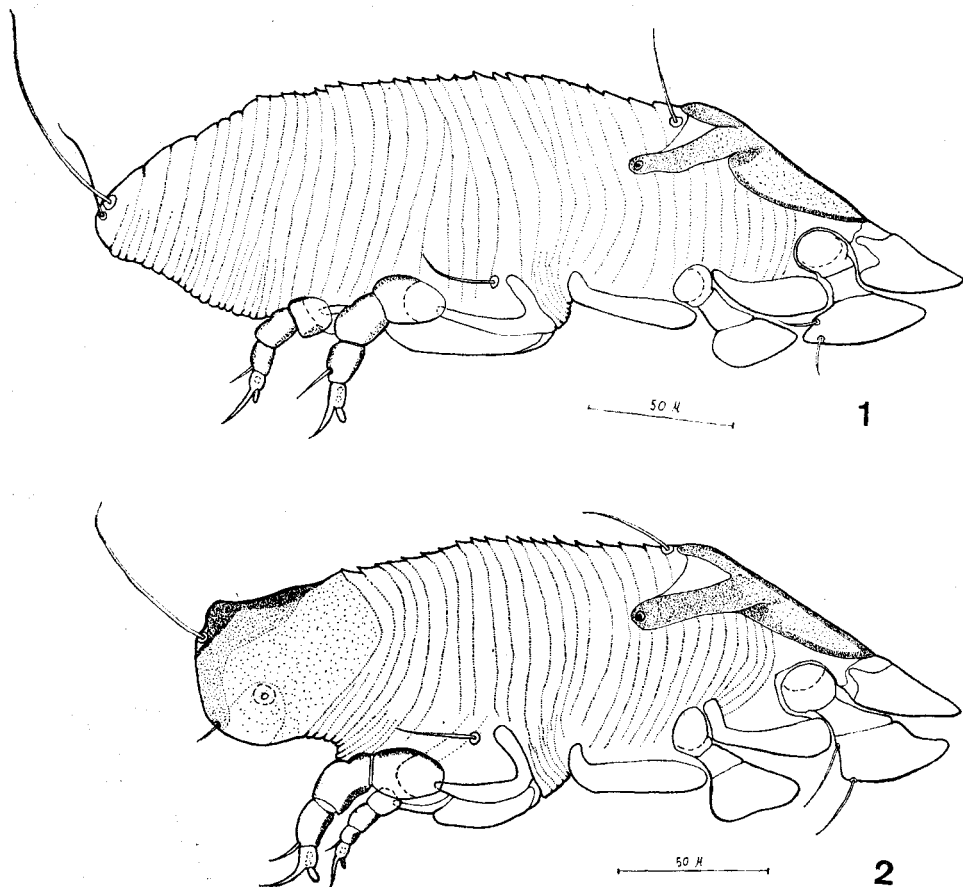


FIG. 1. *Labidocarpus rollinati* Trouessart, lateral view of female.

FIG. 2. *Labidocarpus rollinati* Trouessart, lateral view of male.

antero-dorsal to coxae III. Posterior end of female with 2 pairs of setae ; ventral pair about  $1/2$  as long as dorsal pair. Posterior end of male with pair of long setae near dorsal margin and pair of minute setae near ventral margin.

*Type host.* Bat : *Rhinolophus ferrumequinum* Schreber.

*Type locality* : France.

*Deposition of types.* Muséum National d'Histoire Naturelle de Paris.

*Distribution.* France : from *Rhinolophus ferrumequinum* collected by ROLLINAT, recorded by TROUESSART, 1895 ; France : from *Rhinolophus hipposideros* Bechstein, recorded by ROLLINAT and TROUESSART, 1897.

*Material examined.* Type series including 2 females and 7 males.

*Labidocarpus natalensis* Lawrence.

*Labidocarpus natalensis* LAWRENCE, 1952, *Parasitol.* 42 : 140 ; LAWRENCE, 1959, *Trans. Roy. Soc. S. Africa* 35 : 575 ; ZUMPT, 1961, *Publ. S. African Inst. Med. Res.* 9 : 314.

*Diagnosis.* Female : length 330 microns, 37-43 annulations on dorsum. Male : length 267 microns, 18-21 annulations on dorsum. Propodosomal shield with pair of postero-lateral projections and 1 postero-medial projection ; without setae on postero-lateral projections. Without pair of sclerotized longitudinal bars on mid-dorsum immediately posterior to propodosomal shield. Without serrated crests on mid-dorsum. One pair of lateral setae just antero-dorsal to coxae III. Posterior end of female with 2 pairs of setae ; ventral pair about  $2/5$  to  $1/2$  as long as dorsal pair. Posterior end of male with setae similar to those of *L. rollinati*.

*Type host.* Bat : *Rhinolophus clivosus* Cretzschmar.

*Type locality.* Noodsberg Caves, Wartburg, Natal, South Africa.

*Deposition of types.* Unknown.

*Distribution.* Natal, South Africa : several females, males and immature stages from *Rhinolophus clivosus*, February 1951, recorded by LAWRENCE, 1952 ; Cape Town, South Africa : several females from *Rhinolophus capensis* Lichtenstein collected by ZUMPT, September 1957, recorded by LAWRENCE, 1959.

*Material examined.* No specimens were available for study.

*Labidocarpus cristatus* Lawrence.

*Labidocarpus cristatus* LAWRENCE, 1953, *Parasitol.* 43 : 269 ; ZUMPT, 1961, *Publ. S. African Inst. Med. Res.* 9 : 314.

*Diagnosis.* Female : length 328 microns, greatest depth 85 microns ; 56 annulations on dorsum. Propodosomal shield with pair of postero-lateral projections and 1 postero-medial projection ; seta of moderate length on each postero-lateral projection. With pair of sclerotized longitudinal bars on mid-dorsum immediately posterior to propodosomal shield. With about 60 serrations in crest on mid-dorsum. One pair of lateral setae just dorsal to coxae III. Posterior end of female with 2 pairs of setae ; ventral pair about  $1/2$  as long as dorsal pair. Posterior end of male with setae similar to those of *L. rollinati*.

*Type host.* Bat : *Myotis tricolor* (Temminck).

*Type locality.* Town Bush Cave, Pietermaritzburg, South Africa.

*Deposition of types.* Probably in the Natal Museum, Pietermaritzburg, South Africa (LAWRENCE stated " N. M. 5728 " in the original description).

*Distribution.* Pietermaritzburg, South Africa : 4 females from *Myotis tricolor*, March 1952, recorded by LAWRENCE, 1953.

*Material examined.* No specimens were available for study.

*Discussion.* Males have not been recorded.

***Labidocarpus tanganyikensis* new species.**

(Figs. 3, 4).

*Female.*

Idiosoma stout and strongly compressed laterally. Dorsal margin slightly convex. Length 317 microns (299-342), greatest depth (at level of leg III) 117 microns (98-122).

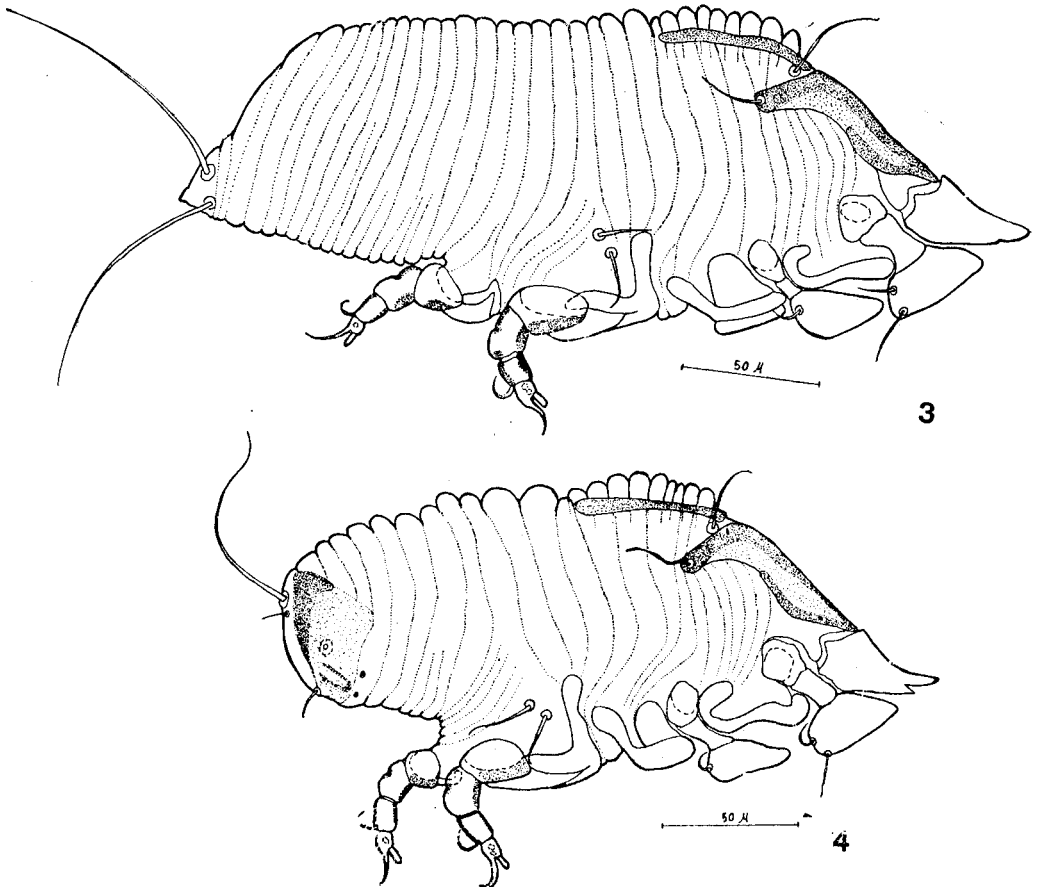


FIG. 3. *Labidocarpus tanganyikensis* n. sp., lateral view of female.

FIG. 4. *Labidocarpus tanganyikensis*, lateral view of male.

*Dorsum.* Propodosomal shield with acute antero-medial projection and pair of postero-lateral projections; without postero-medial projections. Six annulations on each side ventral to propodosomal shield. Seta of moderate length on each postero-lateral projection of propodosomal shield. Pair of sclerotized longitudinal bars on mid-dorsum immediately posterior to propodosomal shield. With 9 serrations in crest on mid-dorsum between sclerotized longitudinal bars. With 28 (26-29) annulations posterior to propodosomal shield.

*Venter.* Two subequal pairs of lateral setae of moderate length immediately dorsal to coxae III. Without setae between coxae III or between coxae IV. Opisthosoma about  $1/3$  total length, with about 21 annulations. Posterior end with 2 subequal pairs of setae.

*Legs.* Leg I with 2 setae on posterior margin of terminal segment. Leg II with 1 seta on posterior margin of terminal segment. Leg III with 4 segments; 1 distal seta on posterior margin of penultimate segment; tarsus bearing 1 posteriorly curved claw and 1 smooth spur of moderate size on distal end, and 2 minute spurs on medial surface. Leg IV distinctly shorter than leg III; with segmentation, setation, and tarsal ending similar to those of leg III, with only 1 minute spur on medial surface of tarsus.

Gnathosoma without setae.

#### *Male.*

Idiosoma stout and strongly compressed laterally. Dorsal margin slightly convex. Length 247 microns (244-250), greatest depth (at level of leg III) 122 microns (116-128).

*Dorsum.* With propodosomal shield, setation, sclerotized longitudinal bars, and crest as in female. With 18 annulations posterior to propodosomal shield.

*Venter.* Setation as in female. Opisthosoma about  $1/4$  total length, with about 10 annulations. Posterior end with pair of long setae near dorsal margin, pair of minute setae near ventral margin, and pair of very minute setae immediately ventral to bases of dorsal pair.

*Legs.* Legs as in female.

*Gnathosoma.* Without setae.

*Type host.* Bat : *Coleura afra* (Peters).

*Type locality.* Amboni Caves, Tanganyika, Africa.

*Deposition of types.* Holotype female, allotype male, and 6 paratypes deposited in the United States National Museum, Washington, D. C., and 7 paratypes in the University of California's Department of Entomology and Parasitology, Berkeley.

*Distribution.* Tanganyika, Africa : 8 females, 2 males, 4 nymphs and 1 copulatory nymph from *Coleura afra* collected by R. LEECH and E. ROSS, 11 November 1957.

*Discussion.* This species may be differentiated from the other members of *Labidocarpus* by the following characters : 2 pairs of lateral setae, 9 serrations in crest on mid-dorsum of both sexes ; 2 subequal pairs of setae on posterior end of female.

Genus *Schizocarpus* Trouessart.

*Schizocarpus* TROUESSART, 1896, *Bull. Soc. Ent. France*, p. 28, 92 ; TROUESSART, 1896, *Compt. Rend. Soc. Biol. (France)*, p. 110 ; CANESTRINI, 1897, *Prospetto acarof. ital.* 7 : 889 ; CANESTRINI and KRAMER, 1899, *Das Tierreich* 7 : 27 ; LAWRENCE, 1959, *Acarologia* 1 : III.

*Haptosoma* KRAMER, 1896, *Zool. Anz.* 19 : 136.

*Prolabidocarpus* LAWRENCE, 1948, *Jour. Parasitol.* 34 : 369.

*Type species.* *Schizocarpus mingaudi* Trouessart, 1896.

*Diagnosis.* Body weakly compressed laterally. Propodosomal shield extending posteriorly to anterior margin of leg II. Two pairs of setae of moderate length immediately posterior to propodosomal shield. Legs I and II strongly enlarged distally and with broad blunt tips. Leg III with 5 segments ; tarsus with caruncle, without claws. Leg IV subequal in length to leg III in female, distinctly shorter than leg III in male ; segmentation and tarsus similar to those of leg III. Legs III and IV distinctly separated from legs I and II. Monotypic.

*Schizocarpus mingaudi* Trouessart.

(Figs. 5, 6).

*Schizocarpus mingaudi* TROUESSART, 1896, *Bull. Soc. Ent. France*, p. 28, 93 ; TROUESSART, 1896, *Compt. Rend. Soc. Biol. (France)*, p. 110 ; CANESTRINI, 1897, *Prospetto acarof. ital.* 7 : 899 ; CANESTRINI and KRAMER, 1899, *Das Tierreich* 7 : 27 ; BANKS, 1905, *Proc. U. S. Nat. Mus.* 28 : 95 ; LAWRENCE, 1959, *Acarologia* 1 : III.

*Haptosoma truncatum* KRAMER, 1896, *Zool. Anz.* 19 : 134.

*Prolabidocarpus canadensis* LAWRENCE, 1948, *Jour. Parasitol.* 34 : 369.

*Diagnosis.* Female : length 400-641 microns, greatest depth (at level of leg III) 171-232 microns ; 50-75 annulations on dorsum. Male : length 350-512 microns, greatest depth (at level of leg III) 171-214 microns ; 39-48 annulations on dorsum. Propodosomal shield completely separated on mid-dorsum, forming U-shaped structure on each side. Minute seta on middle of posterior margin of each side of propodosomal shield. Pair of setae of moderate length on venter immediately dorsal to apex of apodeme of legs III. Pair of lateral setae just dorsal to coxae III. Posterior end of female with 3 pairs of setae ; dorsal pair longest, middle pair about  $\frac{3}{4}$  as long as dorsal pair, and ventral pair much shorter than middle pair. Posterior end of male with 5 pairs of setae ; fourth pair from dorsal margin longest and strongest, third and fifth pair about  $\frac{1}{2}$  as long as fourth pair, 2 dorsal pairs much shorter than third pair.

*Type host.* Beavers : *Castor fiber* Linnaeus, and *Castor canadensis* Kuhl.



FIG. 5. *Schizocarpus mingaudi* Trouessart, lateral view of female.

FIG. 6. *Schizocarpus mingaudi* Trouessart, lateral view of male.

*Type locality.* Europe and North America.

*Deposition of types.* Muséum National d'Histoire Naturelle de Paris.

*Distribution.* Europe and North America : from *Castor fiber* and *Castor canadensis* recorded by TROUESSART, 1896. Texas, California, and Washington : from *Castor* recorded by BANKS, 1905. Canada : from *Castor canadensis* recorded by LAWRENCE, 1948.

*Material examined.* Several females, males, and immature stages from *Castor canadensis* collected near Hastings, Minnesota, U.S.A. by D. H. JANZEN, April, 1961.