THE SUBFAMILY LISTROPHORINAE GUNTHER WITH A DESCRIPTION OF A NEW SPECIES OF THE GENUS *LISTROPHORUS* PAGENSTECHER FROM TEXAS (ACARINA, LISTROPHORIDAE) [1]

BY

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The subfamily Listrophorinae Gunther contains members which are found attached to the hair of mammalian hosts. Their nearest relatives within the family Listrophoridae are members belonging to the subfamilies Labidocarpinae Gunther and Chirodiscinae McDaniel and Lawrence which are characterized by the modification of the first two pairs of legs for clasping the hair of the mammalian host. The members of the subfamily Listrophorinae are classified within three genera : *Listrophorus* Pagenstecher, *Eurchiroides* Womersley and *Lynxacarus* Radford. *Eurchiroides* and *Lynxacarus* are monotypical genera while the genus *Listrophorus* contains 23 species including the new species herein described from Texas.

From the establishment of the genus *Listrophorus* in 1861 to RADFORD'S 1950 listing of the members of this genus, the author has not found in the literature any work in which members of this group are treated as a unit. RADFORD (1950) listed 18 species and has, since that date, added three additional new members. LAWRENCE (1951) described a new species from South Africa. None of the later works provide a key as they are concerned solely with the description of new taxa.

It is the purpose of this paper to erect a key to the North American members of the subfamily Listrophorinae which are characterized by the modification of the mouthparts (specifically the labium) for clasping the hair of their mammalian host. Within the North America region ten members of the subfamily occur extending from Guelph, Ontario to St. Marks, Florida and southern Texas (Kleberg County). The range of the subfamily would appear to be unlimited and could be expected to accompany the host throughout its range. However, there appears to be a definite relationship between the geographical area and the species of the genus *Listrophorus* that is to be found on a particular host. The Hispid Cotton

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Rat, *Sigmodon hispidus*, may contain different species in different geographical regions. RADFORD (1948) described a new species of *Listrophorus* (*L. bakeri*) from the Hispid Cotton Rat (*Sigmodon hispidus texanus*) from Georgia. The same species was found to infest the same host off the coast of South Carolina (Bulk Islands). *L. bakeri* is a distinct species and is not even a close relative of *L. klebergi*, also found on the Hispid Cotton Rat (*S. h. texanus*) in Texas. *L. bakeri* does not contain the peg-like lateral setae which, along with the blade-like anal setae relates *L. klebergi* to *L. floridanus*. In addition *L. bakeri*, unlike the remaining members of the North American species of the genus *Listrophorus*, has the posterior portion of the body rounded and is devoid of the caudal lobes. The presence of two widely separated species on the same host but, at present, the restriction of the parasite species to certain geographical areas would indicate that there does not exist a continuous chain between the population known as *S. h. texanus*, especially since we are dealing with a subspecies rather than a species. The answer probably lies in the classification of the host. The host relationship of the remaining members of the North American members of the subfamily Listrophorinae takes on a wide variety of hosts but being restrictive to the orders Lagomorpha, Rodentia, and Carnivora. The genus *Lynxacarus* Radford was taken from the genus *Lynk* (Carnivora) in Georgia.

In contrast to the above finding regarding the cotton rat as a host, the presence of *L. dipodomius* from the kangaroo rats shows a continuous distribution for the genus *Dipodomys*, having been collected from *D. microps* and *D. ordii* from Utah Lake, Utah County, Utah by ELZINGA (1964), from *D. spectabilis* from Santa Fe, New Mexico by RADFORD (1953) and from *D. ordii* from Mustang Island, Nueces County, Texas by the author. It is probable that *L. dipodomius* will be found where the genus *Dipodomys* occurs.

The occurrence of two or more species of *Listrophorus* on a single host also involves the Black Muskrat (*Ondatra zibethica macrodon*). From this host is recorded *L. dozieri*, *L. americanus*, and *L. validus* (the latter reported as " from Muskrat " by BANKS 1909). From a study of the type slide of BANKS' species of *L. validus*, the author feels that *L. americanus* is possibly a synonym of *L. validus*. The description given by BANKS (1909) is not sufficient to establish this fact and no slide material of *L. americanus* has been seen during this study. Therefore, it is felt for the present that both *L. americanus* and *L. validus* should be retained at the species level. [1] In the case of *L. dozieri*, the paired terminal anal setae set it apart from *L. validus* and *L. americanus*. The taxonomic position of this species is also left pending until the study referred to for *L. validus* and *L. americanus* is undertaken. At that time slide material will be studied in connection with the complex between the three members from the Muskrat of Canada, Eastern United States, and Texas.

1. A redescription of *L. validus* and a study of *L. americanus* is at present under study by the author and Professor M. A. PRICE, Texas A & M University, and will appear in a later publication.

The remaining members of the North American fauna are *L. grassii* from the Marsh Rice Rat (*Oryzomys palustris* [1]), *L. floridanus* from a Gopher (*Geomys tuza tuza*) and *Geomys floridanus austrinus* and *L. gibbus* from *Lepus californicus*.

In comparing material of *L. gibbus* made available through the kindness of Marc ANDRÉ of the Laboratoire d'Acarologie, it was established that the material from the above host is definitely the same species recorded by TROUESSART from *Lepus* [2] *cuniculus* in France.

The following species is named in honor of Robert J. KLEBERG and the King Ranch as the host which contained the new species of *Listrophorus* described in this paper was collected from a portion of the old King Ranch which was allocated to the Texas College of Arts and Industries as a research area.

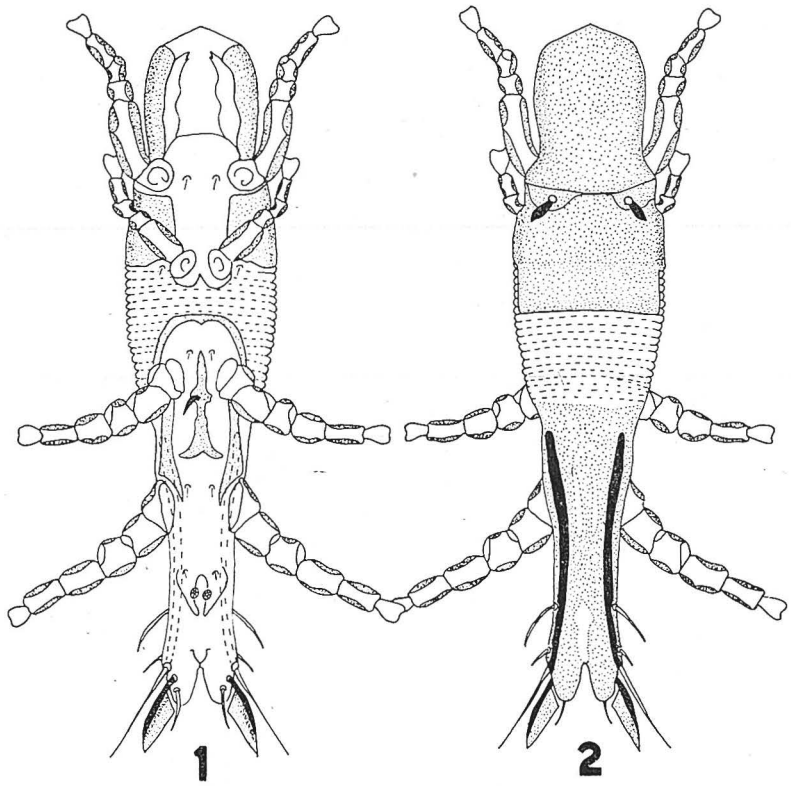
Listrophorus klebergi n. sp.

Male. — Body laterally compressed, elongated, narrowing posteriorly, numerous fine annulations posterior to dorsal head and propodosomal plates. Skin transparent in annulated areas. Legs well-developed. Labium highly modified, of usual Listrophorinae type, that is with flap-like plates to clasp hairs of host (Fig. 5). Dorsum with well-developed head, propodosomal and opistosomal plates. Head plate narrowing to a point at anterior end ; posterior section emarginated around legs I, beset with 2 setae which are highly modified (Figs. 2 and 5), Propodosomal shield extending to coxal region of body ending at position of legs II. Without setae, middle section of dorsum annulated, this annulation extending along margin of body to region of legs IV. Opistosomal plate covering dorsal region, bearing 2 elongated darkly sclerotized areas, these areas extending to posterior section of opistosomal. plate Opistosomal plate bearing 2 pairs of setae. These after period placed along margin of plate. Ventrally the gnathosoma not clearly delineated. Two simple setae placed between the coxa of legs I, small, not visible when specimen not mounted in dorso-ventral position on slide (Fig. 1). Extension of propodosomal plate extending to ventral region between coxa of legs I and II. Two pairs of microsetae ; one between apodemes of legs III and one between coxa of legs IV. Coxal apodemes of legs III producing an arch enclosing the male genitalia. A pair of sclerotized plates border the genitalia extending from the coxa of legs III to the coxa of legs IV (Fig. 1). All legs with conicals. A pair of membranous lobes containing the anal suckers and 2 microsetae posterior to coxa of legs IV and adjacent to most anterior pair of dorsal opistosomal setae. Anal region split into two lobes with 4 anal setae. The second pair of anal setae strongly expanded into a blade-like structure (Figs. 1 and 2) the other 3 pairs of normal structure with the third

1. According to HALL and KELSON (1959) since the type locality is Brady County, Georgia, U.S.A., the host subspecies would be *Oryzomys palustris palustris*.

2. This is the generic name appearing on the slide. The species is now recorded as *Oryctolagus cuniculus*.

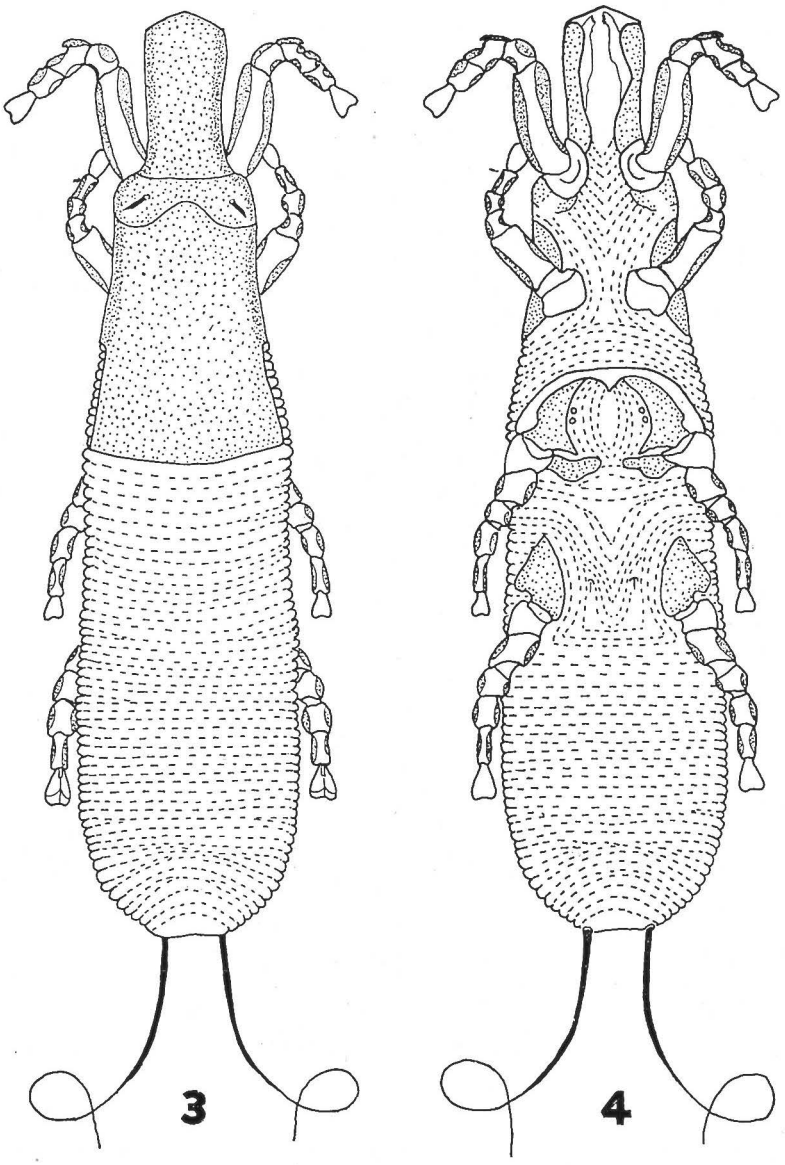
pair being at least two times as long as the other 2 pairs. The fourth pair very small and spur-like. A pair of lateral setae adjacent to the lobes which contain the anal suckers. Legs well-developed with legs I longer than II, III, and IV with the femur being the largest segment (Fig. 5). Legs IV thicker than other legs ; legs II smaller than other legs.



FIGS. 1-2. — *L. klebergi*, male holotype.
Fig. 1, dorsum ; Fig. 2, venter.

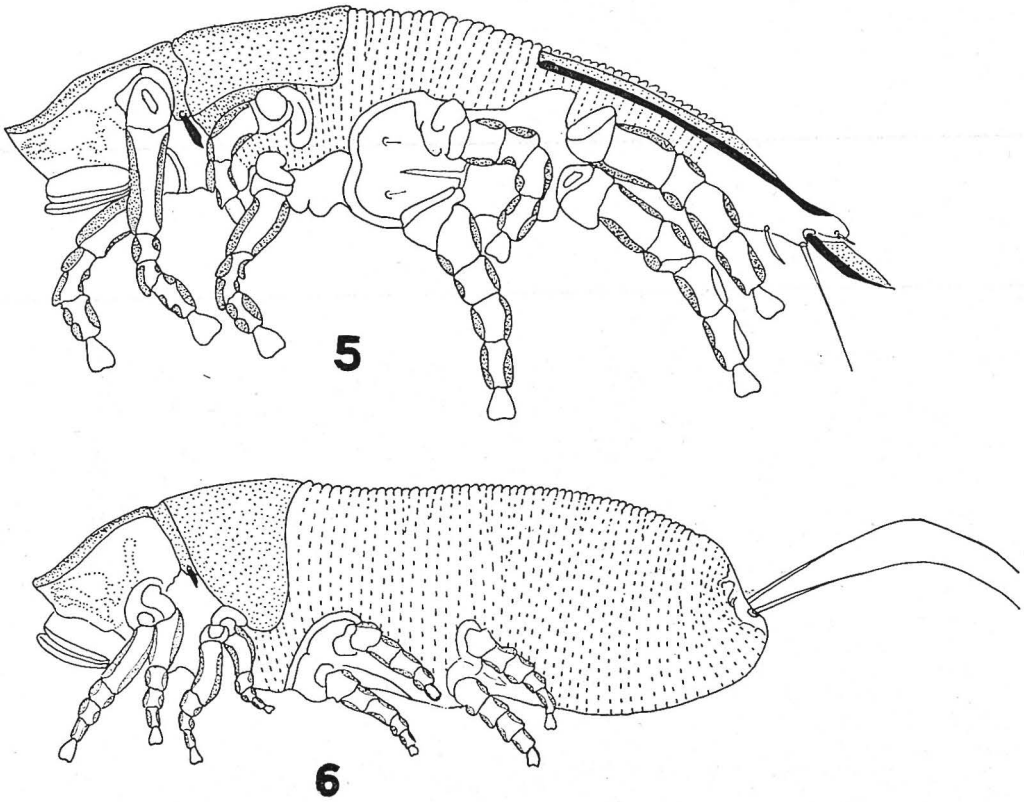
Female. — Without anal blade-like setae, posterior portion of body rounded and not clefted as in male and with 2 very long anal setae. Legs similar to those of male. Propodosomal shield beset with same highly modified setae found in male (Figs. 3 and 6). Propodosomal shield elongated, curving to ventral area of female. Opistosomal region without plates, with numerous annulations. Ventrally with labium modified as male, genital area enclosed by apodemes of legs III, 2 small genital suckers present within arch of apodemes (Fig. 4). Coxal plates well-developed in legs III and IV. Entire ventral region annulated except for coxal apodemes and plates. A pair of microsetae located between the coxal plates of legs IV. Anal setae and placed at apical section of abdomen. All legs with conicals.

L. klebergi n. sp. may be separated from all other members of the genus *Listrophorus* except *L. floridanus* by the presence of the pair of peg-like lateral spines on the propodosomal shield. It can be separated from *L. floridanus* by the modified anal lobe setae of the male surrounded on inner and outer flank by a hyaline membrane (blade-like). In *L. floridanus* the anal lobe setae have truncated ax-like distal ends.



FIGS. 3-4. — *L. klebergi*, female allotype.
Fig. 3, dorsum ; Fig. 4, venter.

This species is described from the male holotype and allotype female from the Hispid Cotton Rat *(S. h. texanus)* collected three miles southwest of Kingsville, Kleberg County, Texas on April 22, 1963 and deposited in the United States National Museum (U.S.N.M. No. 0000), Washington, D. C. Paratypes collected at type locality on same date as holotype and deposited in the Laboratoire d'Acarologie, à Paris, France (male and female), the Institute of Acarology, Wooster, Ohio (male and female), and the author's personal collection.



FIGS. 5-6. — *L. klebergi*, lateral view.
Fig. 5, male holotype ; Fig. 6, female allotype.

The parasites were found not to be restricted to any specific area of the body. During this inspection it was noted that the mites are able to move quite rapidly from one area of the host to another and only when close to the skin were they observed to use the labium for clasping the hair. That they only move up and down the host hair as described for members of the subfamily Labidocarpinae and Chirodiscinae was not observed as they were very efficient in disappearing within the host's forest of hair.

All parasites were removed by submerging the host in a mixture of detergent

and water. The parasites were recovered by the use of a 5 ml. automatic pipette manufactured by the Keys Scientific Corporation, No. P 2023, and placed on slides for determination.

KEY TO the GENERA OF THE SUBFAMILY LISTROPHORINAE OF THE WORLD.

1. Legs III and IV hypertrophied in the male, associated with Carnivora, *Lynx rufus floridanus*..... *Lynxacarus* Radford
   Legs III and IV not hypertrophied, legs IV may be thicker than other legs, but not greatly enlarged..... 2
2. Coxae III of male dilated, fused into a large single plate, associated with *Sigmodon* sp. *Eurychiroides* Womersley
   Coxae III of male not dilated or fused into a single large plate, the coxae separated into single plates with each leg..... *Listhophorus* Pagenstecher

KEY TO THE SPECIES OF THE GENUS *Lynxacarus* OF NORTH AMERICA.

The genus *Lynxacarus* Radford contains but one species, *Lynxacarus morlani* Radford, recorded from Thomas County, Georgia.

KEY TO THE SPECIES OF THE GENUS *Listrophorus* OF NORTH AMERICA.

1. Posterior portion of body of male separated into two distinct caudal lobes..... 2
   Posterior portion of body of male rounded, not separated by a split that forms distinct caudal lobes, posterior tip of body surrounded by a hyaline flap.. *bakeri* Radford
2. Posterior portion of body with caudal prolongation extending from coxal region of legs IV ; legs IV slightly larger than other pairs..... *gibbus* Pagenstecher
   Posterior portion of body without caudal prolongation, abdomen rounded and tapering gradually..... 3
3. Anal lobe setae variously modified, some with a hyaline blade or merely enlarged at the end 4
   Anal lobe setae of different sizes, but simple and straight..... 6
4. Peg-like lateral spine present on propodosomal shield..... 5
   Peg-like lateral spine absent on propodosomal shield, caudal lobes of male broadly triangular, surrounded on outer and inner flank by a hyaline membrane, giving appearance of a blade..... *dipodomius* Radford
5. Modified anal lobe setae of male surrounded on outer and inner flank by a hyaline membrane (blade-like) ; male genitalia located between coxa of legs III ; opistosomal shield with two elongated sclerotizations on lateral margins ; five pairs of anal lobe setae. *klebergi* n. sp.
   Modified anal lobe setae narrow with truncated ax-like distal ends, six pairs of anal lobe setae..... *floridanus* Radford
6. Anal lobe setae single, there being a single large terminal anal setae on each lobe.... 7
   Anal lobe setae double, there being two large terminal anal setae on each lobe.... *dozieri* Radford
7. Posterior pair of legs hypertrophied in male, at least one of the pairs or both..... 8
   Posterior pair of legs not hypertrophied ; posterior pair may be enlarged, but subequal in both sexes..... *americanus* Radford

8. Legs IV hypertrophied in male, caudal lobes small, appearing as 2 lobe-like protrusions; anal suckers small, without chitinized bars..... *validus* Banks
Legs III and IV hypertrophied in male; chitinized shield of leg III without setae; anal suckers with chitinized bars..... *grassii* Radford

SYNOPSIS OF THE GENUS *Listrophorus* OF THE WORLD.

Species	*Host*
L. americanus Radford	*Ondatra zibethica macrodon*
L. argentinus Hirst	*Scapteromys tomentosus*
L. bakeri Radford	*Sigmodon hispidus texanus*
L. bothae Hist	Gerbille
	Rattus manipulus
	Tatera liodon smithi
	Tatera bantsi bantsi
	Taterona benvenuta
L. brevicaudatus Ulrich	*Lapus timidus*
L. cucullatus Trouessart	*Rattus norvegicus*
L. dipodicola Tragardh	*Gerbillus gerbillus*
L. dipodomius Radford	*Diopodomys microps*
	D. ordii
	D. spectabilis
L. dozieri Radford	*Ondatra zibethica macrodon*
L. floridanus Radford	*Geomys tuza tuza*
L. frontalis Hirst	*Oryzomys delticola*
L. genettus Radford	*Genet* sp.
L. gibbus Pagenstecher	Angora rabbits
	Lepus californicus
	Oryctolagus cuniculus
	Rabbits
L. grassii Radfort	*Oryzomys palustris*
L. klebergi n. sp.	*Perognathus hispidus*
	Sigmodon hispidus texanus
L. leporicolus Lawrence	*Lepus saxitilis*
L. leuckarti Pagenstecher	*Microtus arvalis*
L. lophuromys Radford	*Lophuromys sikapusi*
L. mustelae Megnin	*Mustela nivalis*
L. pagenstecheri Haller	*Sciurus vulgaris*
L. suncus Radford	*Suncus caeruleus giganteus*
L. theoderi Radford	*Meriones libycus*
L. validus Banks	Muskrat
	Ondatra zibethicus

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