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On the Siphonaptera collected by Dr. J. M. de la Barrera in the province of Mendoza during 1939

(With 34 figures)

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In vol. IX of the Revista del Instituto Bacteriológico, 1940, p. 605, t. 622, appeared the translation of the descriptions of 5 new Siphonaptera discovered by Dr. J. M. de la Barrera during his plague-investigation in the western provinces of the Argentine Republic in 1937/8. On p. 605 the hope was expressed that the study of the Rodent fauna of the Republic would be continued and further material of Siphonaptera be obtained. The hope has been fulfilled beyond expectation. The second collection submitted by the Instituto Bacteriológico contains the fleas collected by Dr. de la Barrera and his staff during 1939 in the province of Mendoza and consists of over 1200 specimens. It is the largest collection I have seen from South America. I am grateful to have had the privilege to study this magnificent material and extend here to Dr. de la Barrera and his assistants my sincerest congratulations on their great success and cordially thank them for the skill and patience employed in amassing and preserving such an

important collection. The specimens represent 22 species, of which no less than 10 are new.

The great addition to the list of Argentine fleas due to Dr. de la Barrera's collections leaves no doubt that the number of unknown species occurring from Tierra del Fuego to Jujuy is large. Many of the species now known stand morphologically far apart from the nearest known relatives, and this fact again suggests that they are merely isolated samples of groups of species or perhaps genera. There is still much to be discovered.

We have included in the Report on the second collection here presented the descriptions of two new Argentine fleas which are in the Charles Rothschild collection, one from Tierra del Fuego (W. P. Reynolds) and the other from Jujuy (E. Budin).

Some of the species are represented by large numbers of specimens, which throw light on the individual variability of the species, and the long series of mounted specimens of such species often reveal differences which are due to the process of clearing and mounting and to the position which one or the other sclerite has assumed on the slide. Such differences might sometimes be mistaken for specific distinctions. But what gives the collection a much greater interest is the discovery of features of importance for the student of the morphology of fleas, some of the features being quite unique. I draw special attention to the remarkable modification of the mandible in *Eritranis andricus* (fig. 26 A), in which the teeth of the subapical area of the posterior side are drawn out into short hair-like filaments, and to the still more surprising development of the apex of the proboscis into a piercing organ in the genera *Tiarapsylla* and *Craneopsylla* (fig. 32 A & C), quite unlike the end of the proboscis of any other flea in structure (and function). The individual variability of the proboscis in the number of segment in *Ectinorus polymerus* and *Dysmicus barrerai*, in both of which the labial palpi consist of from 6 to 8 segments, is worthy of emphasis, as the variability proves that a difference in the number of segments in the labial palpus is as such not of generic value in the *Rhopalopsyllinae*, to which these genera belong. Another morphological feature occurring in the same subfamily obtains in the bristles of the antenna: long bristles occur on the antennae of some of the species of *Tetrapsyllus* and *Parapsyllus* on segment II, which is the normal position of long antennal bristles in fleas; where long bristles are found in the allied genera, such as *Ectinorus* and *Panallius*, they are, however, invariably placed on segment I, a mysterious change in position. One of the most

interesting questions to which Argentine fleas give rise refers to the change of host from mammal to bird. The tribe *Parapsyllicae* (— formerly the species were all included in one genus *Parapsyllus* —) is known only from the Andesian countries, the species being evidently numerous. In Patagonia and Tierra del Fuego these fleas have come into contact with birds nesting on the ground or in burrows, and new species or subspecies are found in these southern regions. One of these species of bird-fleas is circumpolar, being as yet known only from St. Paul in the Indian Ocean, the Falklands, Chile and Australia and occurring in the nests of Penguins and Puffins, sometimes in large numbers. These bird-fleas, their distinctions and distribution, have been dealt with in Eos 1942 (published by the Instituto Español de Entomología, Madrid).

Localities and dates of the specimens collected in the province of Mendoza in 1939.

Las Catitas, 15. VI and 20 VII.
Los Molles, 28 and 30 V.
La Paz, 24 II. to 7 IV.
Malargüe, 8, 25 and 26 V.
San Rafael, 17 IV. to 29 V., and 30 VI.
Santa Rosa, 23 VI. to 28 VII.

HECTOPSYLLA Fraunfeld 1860; genotype *H. psittaci* Fraunf.

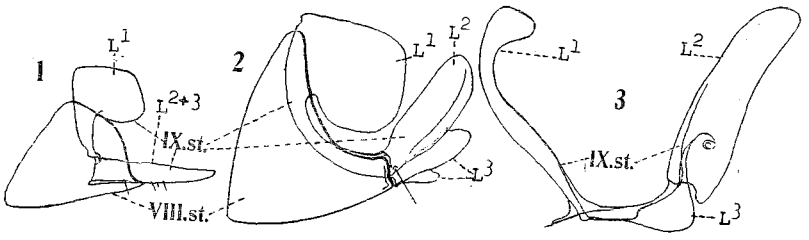

FIG. 1. — *Tunga penetrans*. FIG. 2. — *Hectopsylla*, diagram. FIG. 3. — *Ceratophyllus*, diagram. (*)

(*) EXPLANATION OF LETTERING OF FIGURES

an, angle; art, articulation; B. c., bursa copulatrix; Caps, capsule of phallosome; Cl, clasper of male; Dcl, dorsal apical claw of phallosome; Ds, tooth on underside of dorsal claw of phallosome; F, movable digitoid of clasper; L^1, L^2, L^3, lobes composing sternum IX of male of *Hectopsylla*; Lab, labium; Lcl, lateral apical claw of phallosome; Ld, lateral loboid of phallosome; Lo, Lo^1, Lo^2, apical lobes of sternum VIII of male; Lph, lateral lobe of phallosome of *Hectopsylla*; M, manubrium of clasper; M^1 and M^2, dorsal and ventral manubria of clasper in *Hectopsylla*; Max, maxilla; Mtp, metepimerum; Nk, neck of phallosome; On, ventral subbasal claw of sternum IX; P^1, P^2, P^3, movable appendages of clasper; Par, paramere of phallosome; Pen, penistube; Phal, phallosome; Rig, denticulate ridge of lateral loboid of phallosome; R. s., spermatheca; Sc^1, Sc^2, sclerites at apex of phallosome; Sens, sensilium; Sin, sinus of phallosome; Sp, spur of clasper; st., sternum; Styl, stylet; t, tergum; td, tendon; Tpl, tergo-pleurite of segment IX of female; Vcl, ventral apical claw of phallosome; Ves, vesicle of phallosome; Vld, ventral loboid of phallosome.

The ♀♀ being stick-fast fleas, whereas the ♂♂ move about on the host, it is far easier to obtain ♀♀ than ♂♂. Most of the swollen ♀♀ have the legs damaged, tarsi and tibiae and often even the femora (or some of them) being lost, probably torn away by the claws or teeth of the host.

♂. Dr. J. M. de la Barrera's material contains the hitherto unknown ♂♂ of two species and both sexes of a new one, the collection enabling me to study for the first time at a dissection of a ♂ the complicated terminal segments, the homology of which had remained somewhat obscure, specially as regards the sclerites composing sternum IX. The dissection shows that sternum VIII is triangular in a lateral aspect (as on the slide), ventrally not divided longitudinally in the middle line, anteriorly projecting upwards and ventrally prolonged backwards, the oblique posterior margin being concave and rather strongly sclerotized and the ventral apical angle more or less truncate (fig. 2, 4, 11). On each side of the body there are behind this large triangle three sclerites, which are connected with each other and represent sternum IX; we refer to them as upper, median and ventral lobes (see diagram fig. 2). The upper lobe (L^1) is the largest and covers the greater part of the claspers and its processes; proximally it extends downwards as a narrow strip which joins the bases of the two lower lobes; the ventral margin of L^1 being convex (more or less) and L^2 long and not very far removed from L^1; the sinus between the two is a deep and narrow slit. The third lobe (L^3) is shorter than L^2, not entirely separated from it and articulated with the apex of sternum VIII. In some species the lobes L^3 of the two sides are not separated from each other except apically, while in other species they are separated to the base. In *H. coniger* a small additional lobe appears below L^3 (as in diagram fig. 2). L^1, L^2 and L^3 are different in the various species, more or less; but as they suffer easily in the process of clearing and mounting and do not always lie in the same position on the slides, the specific differences can only be ascertained with some degree of certainty if several specimens are available for comparison. In former publications we have generally referred to L^1 as being a part of sternum VIII, an error of observation excusable by the indistinctness of the outline of the upper end of VIII. st. in the few ♂♂ we had in the collection. The exposed upper lobe L^1 is present in the Chigoe (*Tunga penetrans* L. 1758), but L^2 is absent (amalgamated with L^3), while L^3 is a long narrow sclerite in lateral aspect (diagram fig. 1). Compared with a flea of a more normal type (*Ceratophy-*

llus, diagram fig. 3), L^1 evidently corresponds to the upper widened end of the vertical arm of IX. st., this arm being entirely covered by tergum VIII in *Ceratophyllus*, or in other genera by sternum VIII, whereas in *Hectopsylla* sternum VIII covers only the extreme base of IX. st.; the two sections of the ventral arm of *Ceratophyllus* evidently correspond to L^2 and L^3.

Tunga, *Hectopsylla* and *Rhynchopsyllus* (this is the correct spelling) are probably derived from Hare-fleas. The pale, non-sclerotized lobes we find on the inner (= upper) side of the central, ventral, apical section of VIII. st. of *Cediopsylla* Jordan 1925 (the section separated from the large lateral flap by a deep narrow incision) somewhat resembles L^3 of *Hectopsylla*, but appears really to belong to VIII. st.

♀. In our diagnosis of the genus in 1906 we did not mention that tergum IX consists in the ♀ of two sclerites, one placed behind the other and both undivided in the dorsal median line; they are connected by a pale membrane and the second bears the sensilium (fig. 9). Sternum VIII is not clearly noticeable on the slide, not being sclerotized; but in an alcohol specimen viewed from behind there is, below the large opening of the oviduct, a soft lump bearing in the middle a small compressed hump. Tergum VIII which extends down almost to the level of the ventral margin of sternum VII, bears in the lower three-fifths three submarginal rows of bristles (fig. 8, 9), one row being outside and two on the inner surface, the free margin overlapping the next segment; the posterior row of the inner side is placed on a sclerotized line or low ridge and some of its bristles are rather stout, though pale like the others. The non-sclerotized sternum IX bears some minute hairs below the anal sternite and is medianly concave from these hairs downwards; in a lateral aspect there are consequently two outlines, the anterior one being that of the concavity and the posterior line that of the convex side. The spermatheca is similar in all the species, but is smaller and narrower in *H. gemina* than in any other known species, and larger in *H. psittaci;* its body is more or less regularly ovale or elliptical and its posterior end round (whereas in *Rhynchopsyllus* the orifice is placed on a projection); the individual variability of the spermatheca is rather considerable. We have not yet noticed any obvious specific differences in the bursa copulatrix and its short duct.

The sexes can usually be recognized as belonging to the same species by the number of plantar bristles on tarsal segment V; but as the number is the same in some species and the tarsi often missing, other parts have to be consulted as well, such as the

presence or absence of a lateral marginal lobe on the occiput, the size of the thoracic processes, and the number of bristles on the metepimerum. In the key to the species generally more than one character is mentioned.

The genus is known from Argentina to Ecuador and one species (*H. psittaci*) occurs also in Brazil (accidentally introduced into European aviaries). We must expect that many more species will be discovered in the Andesian countries.

1. **Hectopsylla cypha** sp. nov. (fig. 4 to 8)

San Rafael and Santa Rosa, on *Microcavia australis*, a small series of ♂♂ and over 30 ♀♀. — Las Catitas, on *Octomys barrerae*, 1 ♀ and 13 ♀♀ — Most of the ♀♀ much swollen, legs damaged. Type ♂ from S. Rafael.

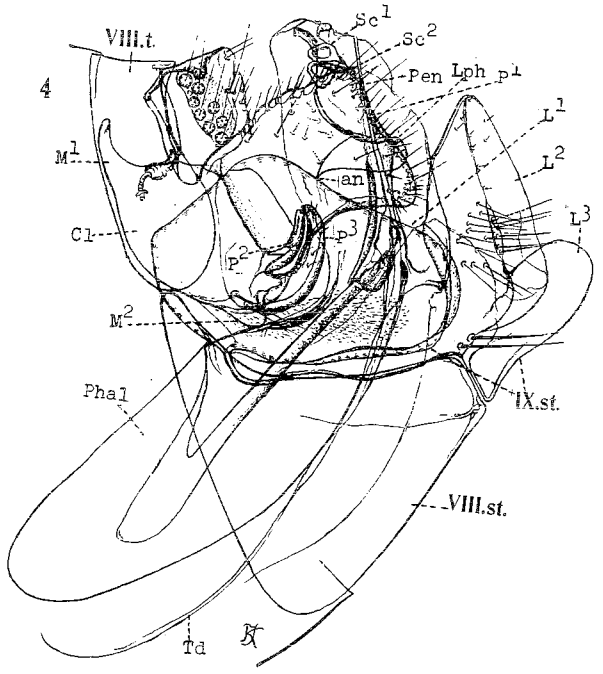

FIG. 4. — *Hectopsylla cypha*, terminal segments of male.

In a provisional report sent to Dr. J. M. de la Barrera I referred to this species as *H. coniger*, being misled in the determination by the strong development of the lateral thoracic processes, the presence of four pairs of plantar bristles on segment V of the

tarsi, as in *H. coniger*, and the rather close resemblance of the ♂ genitalia to those of *H. coniger*. A comparison of mounted specimens of both sexes with all the known species leaves no doubt that they represent a new species different in many details from *H. coniger* (Argentina) and more nearly related to *H. eskeyi* Jordan 1933 (known only from Perú). The male is distinguished, inter alia, by bearing a lateral patch of longish bristles on the second lobe of sternum IX, an the female by the long thoracic processes combined with a narrow rim to the sensilium, four pairs of plantar bristles, a large spermatheca, the absence of a marginal lobe on the occiput, etc. Much swollen females, which are as a rule rather difficult to identify in *Hectopsylla*, because they have generally lost the tarsi, are in the present case easily recognized with a moderately strong lens: the abdomen is rounded-oblong, the sclerites farther apart than in the allied species, the firts tergite more or less vertical and separated from tergite II by a pale hump which projects above the base of II and often above the apex of I (fig. 7). Within the base of this hump we often find the proventriculus, which appears to have been moved dorsad by the pressure of the forward-upward development of the large eggs. The proventriculus is indicated in fig. 7; in other swollen ♀♀ of *H. cypha* it is in a normal position. Strongly swollen females of *H. cypha* have possibly ceased to suck blood, having become mere egg-carriers after the accumulation of an adequate fat-body. This interesting physiological question requires investigation in all the stick-fast fleas.

In both sexes of *H. cypha* the metepimerum has 3 bristles, in one female an additional bristle on one side close to stigma. In all specimens all tarsi with four pairs of plantar bristles on segment V. Chaetotaxy otherwise apparently without distinctions.

♂. Anterior border of sensilium (fig. 4) widening considerably downwards, being dorsally narrower and ventrally much broader than the two rows of grooves combined. Apex of sternum VIII (fig. 4, VIII. st.) truncate, broader than in *H. eskeyi* Jord. 1933 and *H. gemina* Jord. 1939. Anterior margin of clasper (Cl) more or less evenly convex; its upper manubrium M^1 long, curved, variable, the lower one (M^2) short, rather indistinct as a rule. Large process P^1 of clasper nearly as in *H. coniger*, about as long as broad, dorsally somewhat convex, the dorsal apical angle less projecting than the ventral one, both rounded, distal margin slightly incurved, ventral margin concave; the small bristles of dorsal margin more numerous than in the allied species; distal margin as usual with a somewhat variable number of thin bristles.

Both sclerites of the pair of pincers (P^2 and P^3) curved upwards, P^3 as usual the larger of the two, its base somewhat variable in width, being in some specimens broader than in the type figured. Sternum IX with three lobes each side; upper lobe (L^1) much the largest, irregularly ovate, extending downward-backward and bearing on the inner surface a large patch of small hair-like spinules, in type its upper anterior corner anguliform, which is

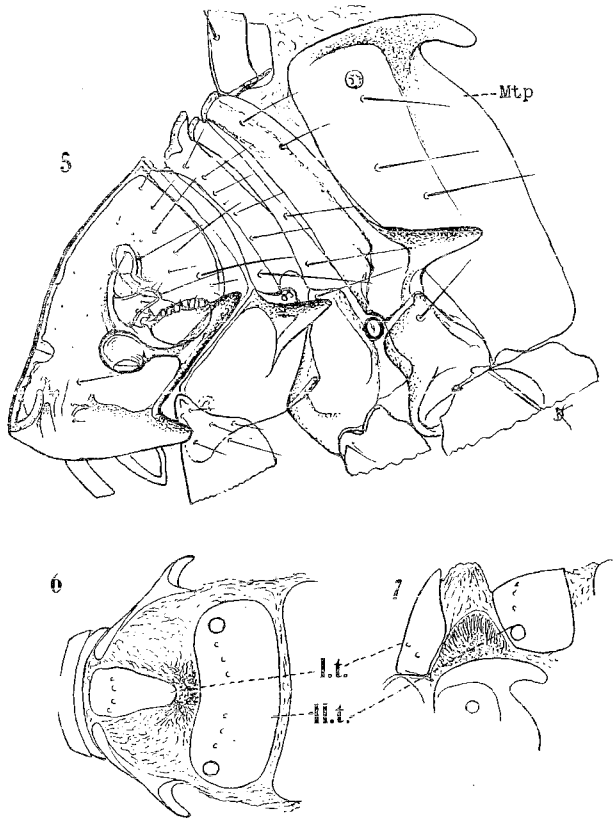

FIG. 5. — *Hectopsylla cypha*, head and thorax. FIG. 6. — Abdominal terga I and II, of the same dorsal aspect. FIG. 7. — Lateral aspect of the same.

evidently an artificial condition in this mounted specimen, the corner being rounded in the four others; upper margin of L^1 slightly incurved; L^2 conical, bearing a patch of fairly long thin bristles below the middle and two stouter and longer ventral ones near the base; L^3 a little more than half the length of L^2, not much more than twice as long as broad, distally rounded, here resembling the wider portion of an egg, ventral margin concave in proximal half or nearly straight; L^3 of right and left side of

body only distally separated from one another. Tendons (Td) of phallosome not reaching above or beyond the frontal end of phallosome; penis-tube (Pen) narrow, with obtuse tooth in middle of ventral (= posterior) side; paramere of phallosome with an apical and a subapical sclerite, both small, but conspicuous on the slide: upper one (Sc^1) produced apically on posterior side into a short nose rounded at the tip, the ventral portion of Sc^1 appearing as an irregular halfring or transparent triangle; Sc^2 contiguous with Sc^1 and somewhat resembling a tennis-racket or battle-dore, the frame of a pale area being produced backwards into a sort of handle; a ridge-like sclerotization connects the anterior corner of Sc^2 with a pale lobe (Lph) which is rounded at apex and extends across the penis-tube; the ventral and proximal margins of this lobe from a very sharp angle (at an).

♀. Head (fig. 5) similar to that of *H. stomis*, *H. gemina* and others, differing from that of *H. coniger* in the frons not being angulate some distance above the ventral corner and in the posterior margin not bearing a lateral lobe. Sclerotized processes of thorax longer and narrower than in most species; lobe of metepimerum curved in all the specimens and often longer than in fig. 5. Abdominal tergite I (fig. 6, 7) narrow, much longer than broad, narrowed from beyond middle to apex. Anterior rim of sensilium (fig. 8) similar to that of *H. gemina* (fig. 9), slightly wider in middle than dorsally and ventrally, narrower than the two rows of grooves combined. Tergite VIII (fig. 8) ventrally more or less regularly rounded in unmounted specimens (generally somewhat distorted in mounted ones); as in other species along lower three-fifth of posterior margin a row of slender bristles on outside and two rows on inside, the posterior one of the inner rows on a rather conspicuous dark line (or ridge) and about four of its bristles stouter than the others; the number of bristles variable; the striated margin beyond the bristles as broad as in *H. eskeyi*, much broader than in *H. gemina*. Body of spermatheca R. s.) as broad as apex of hindtibia, tail measured on posterior side about half as long as the body is broad; size of spermatheca variable to some extent, as in other species. Length ♂ 1.0-1.3, ♀ (swollen) 1.6-2.4 mm.; hindfemur ♂ 0.25-029, ♀ 0.25-0.33 mm.

2. **Hectopsylla gemina** Jordan 1939 (fig. 9 and 11)

San Rafael, Santa Rosa (VI & VII), and La Paz, on *Microcavia australis* 23 ♂♂ and 120 ♀♀. At La Paz accidentally 1 ♀ on *Langostomus maximus* and 2 ♀♀ on *Galea leucoblephara*. Origi-

nally described from 7 ♀♀ obtained by Dr. J. M. de la Barrera at Fortin Uno and Santa Rosa on *Microcavia australis*.

The plantar bristles on segment V of all tarsi are invariably three pairs in the series obtained. Metepimerum usually with 4 bristles, very rarely with 3 or 5, in both sexes. In one ♀ abdominal tergite III with one bristle each side, in the other specimens none; subbasal bristle of VII absent in some ♀♀.

♂. Sensilium (fig. 11) as in *H. cypha*. Apex of sternum VIII narrow, variable in width on the slides, rounded or truncate. Large process P^1 of clasper trapeziform, with the distal angles rounded off, upper angle smaller than lower one, the sclerite a little broader near apex than at base, its dorsal margin slightly concave and without bristles; the pair of pincers, P^2 and P^3,

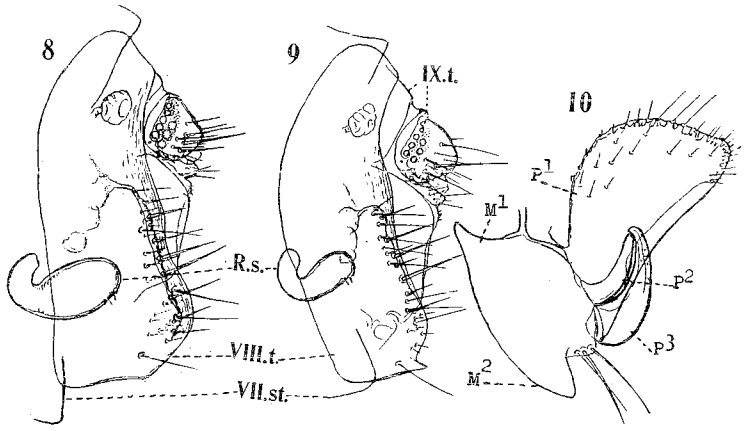

FIG. 8. — *Hectopsylla cypha*, terminal segments of female. FIG. 9. — The same of *H. gemina*. FIG. 10. — *Hectopsylla broscus*, clasper of male.

different in shape from the pincers of allied species: P^2 small, nearly straight, tip very slightly curved upward-forward, P^3 very broad in basal twothirds, apical third narrow, on posterior side a ridge of variable size bearing two to five small bristles; clasper (Cl) with two or three long and some small bristles at corner of lower area which bears the pincers; upper manubrium M^1 curved backward, lower one, M^2, much shorter, its tip more or less curved forward; frontal margin of clasper convex in or below middle. Tendons of phallosome extending much beyond and above the anterior end of the phallosome, being much longer than in *H. cypha;* apex of phallosome appearing truncate, as seen in figure, the anterior apical, angle slightly rounded as a rule, the posterior

one projecting, acute in a lateral view, but the projecting part really a rounded lobe; penis-tube (Pen) characteristic, bearing below middle of ventral margin a sharp prominent tooth, conspicuous on the slides, above the tooth or on a level with it a sclerotized ring in the phallosome; as in most fleas, the sclerites composing the phallosome require further study.

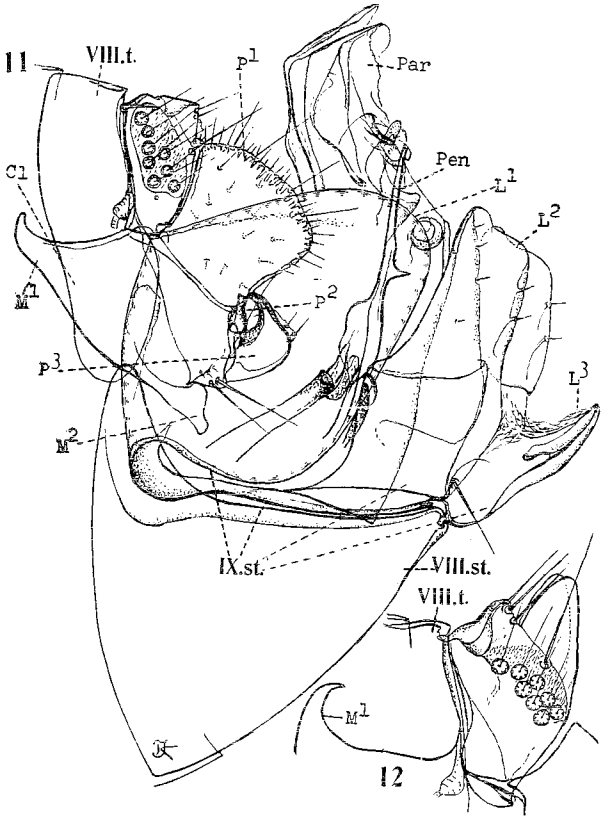

FIG. 11. — Terminal segments of *Hectopsylla gemina male*. FIG. 12. — A portion of the terminal segments of *Hectopsylla stomis* male.

♀. Abdominal sclerites not much separated in swollen specimens, the intersegmental membranes being short; in most ♀♀ the sclerites overlapping. Tergite VIII (fig. 9) with ventral posterior angle projecting as a tooth; the striated posterior margin beyond the bristles very narrow. Spermatheca (R. s.) always much smaller than in *H. cypha,* but variable, in most specimens as slender, or nearly, as in fig. 9.

3. **Hectopsylla stomis** Jordan 1925 (fig. 12)

La Paz, on *Lagostomus maximus* 5 ♂♂ and 29 ♀♀ — San Rafael, accidentally on *Microcavia australis* 1 ♀ — Originally described from ♀♀ obtained by Miss Runnacles on birds at Canada Mariano; in the Charles Rothschild collection also from Bahia Blanca off *Conepatus* (*Mephitis* partim) and from Pigüe off *Lagostomus maximus,* the normal host.

The genitalia of the ♂ are figured in *Rev. Soc. Ent. Argentina,* VI, p. 20, 1934. The large lateral lobe marked VIII. st. in that figure belongs to sternum IX (see remarks under *Hectopsylla,* diagram fig. 2). In the ♂♂ sent by Dr. de la Barrera this lobe is distally more or less rounded. The shape of the three lobes of sternum IX depends much on their position on the slide, the median ventral lobes specially being easily affected by the clearing process and the pressure of the cover-glass, differing considerably on some of the slides. The right and left ventral lobes are separated down to their bases. Te tendons of the phallosome do not extend above the anterior end of it. The anal segment differs considerably from that of all the other *Hectopsylla.* I did not mention this peculiarity in 1934, because it seemed advisable to wait for confirmation by a second specimen. As shown in fig. 12, the grooves of the sensilium are much nearer to the apical margin than to the base, and the apical margin of the anal sclerite is enlarged into a conspicuous, triangular, bare sclerite with rounded apex, one each side. These sclerotized flaps appear to belong to the tergum of the anal segment; they will have to be studied at an unmounted specimen. Segment V of the tarsi bears 4 pairs of plantar bristles, but (as mentioned in the original description) occasionally in one or the other leg there are 4 on one side of V and 3 on the other.

4. **Hectopsylla broscus** Jordan & Rothschild 1906 (fig. 10)

San Rafael, on *Conepatus suffocans* 1 ♂, 1 ♀. — Te original 12 ♀♀ were collected by Carlos Berg on *Conepatus humboldti* in the Pampa Central. The ♀ described as *H. mazzai* Costa Lima 1935 was obtained at Jujuy en *Zaëdyus pichyi caurinus.* The true host seems to be *Conepatus.*

In the original description tarsal segment V is said to bear 6 pairs of plantar bristles, which was correct only as regards the type specimen. The one ♀ and 4 ♀♀ before me in which some

of the tarsal segments V are preserved (the other ♀♀ have lost it) present the following range of variability (the numbers above and below the line refer to the tarsi of the right and left legs, and the numbers separated by a colon: are those of the plantar bristles of the right and left sides of the same tarsal segment V):

$$\text{♂}\ \frac{6:6}{—}\ ,\ \frac{6:6}{—}\ ,\ \frac{6:6}{—}\ ;$$

$$\text{♀♀}\ \frac{6:6}{—}\ ,\ \frac{6:6}{6:6}\ ,\ \frac{6:6}{6:6}\ ;$$

$$\frac{6:6}{—}\ ,\ \frac{6:6}{—}\ ,\ \frac{6:6}{—}\ ;$$

$$\frac{5:5}{—}\ ,\ \frac{—}{—}\ ,\ \frac{5:6}{—}\ ;$$

$$\frac{5:5}{—}\ ,\ \frac{—}{—}\ ,\ \frac{5:6}{—}\ ;$$

$$\frac{5:5}{—}\ ,\ \frac{—}{—}\ ,\ \frac{5:6}{—}\ .$$

In Costa Lima's ♀ the numbers are

$$\frac{5:5}{5:5}\ ,\ \frac{6:6}{6:6}\ ,\ \frac{—}{—}\ .$$

We may assume that the midtarsal segment V has occasionally 5 plantar bristles on one side like segment V of hindtarsus.

The ♂ sent by Dr. J. M. de la Barrera is the first I have seen. It has, unfortunately, been distorted so much by an accident in the process of clearing it for mounting that it is advisable to figure only the claspers (fig. 10): The large process P^1 is shaped somewhat like a half-moon, being longest ventrally and here slightly concave to near apex; from the ventral apical rounded angle to the base the distal and dorsal margins form a nearly even curve, there being no apical dorsal angle; the bristles at the margins have suffered and are probably more numerous in perfect specimens than in our figure. Both sclerites P^2 and P^3 are long, slender and curved. The tendons of the phalosome are as long as in *H. gemina,* extending forward well beyond the anterior end of the phallosome and making at least half a convolution above it.

The striated free apical margin of tergite VIII of ♀, behind the rows of bristles, as narrow as in *H. gemina*. The present species and *H. coniger* Jordan & Rothschild 1906 are the only known *Hectopsylla* in which posterior margin of the head of the ♀ bears a lateral lobe.

KEY TO SPECIES OF *Hectopsylla*

Group I. — In both sexes tarsal claws with a prominent basal tooth lying along the claw. Segment V of all tarsi with 7 or 8 pairs of plantar bristles. ♀ without process on metepimerum.
One species ..... *H. psittaci* Frauenfeld 1860, South America, also in aviaries in Europe.

Group II. — Tarsal claws with very short basal hump directed sidewards. Segment V of tarsi at most with 6 pairs of plantar bristles. Metepimerum of ♀ with process at upper angle of posterior margin. Here belong the other 7 known species.
A. Males.

a. Large process P^1 of clasper apically much expanded in a distal-ventral direction, apical margin concave, ventral margin about as long as hindtarsal segments I and II together. Anal segment bearing a pair of naked apical sclerites projecting backwards (fig. 12) ..... *H. stomis* Jordan 1925, Argentina.
Process P^1 (fig. 10) nearly halfmoon-shaped, rounded from apical ventral angle to base of dorsal margin, no dorsal angle. *H. broscus* Jordan & Rothschild 1906, Argentina.
Process P^1 trapeziform, broadest at apex, dorsal and ventral apical angles rounded ..... b.

b. Lateral lobe L^2 of sternum IX with large lateral patch of bristles (fig. 4) ..... *H. cypha* sp. nov., Argentina.
No patch of longish bristles on L^2 of IX.st. ..... c.

c. Apex of paramere truncate, the posterior apical angle projecting well backwards; apical half of ventral lobe of sternum IX much narrower than basal half, pointed, slightly curved upwards, claw-like; penis-tube with a sharply pointed tooth below middle (fig. 11); tendons of phallosome curving much above anterior end of phallosome; stout middle apical bristle of posterior side of foretibia reaching to or beyond apex of tarsal segment II ..... *H. gemina* Jordan 1939, Argentina.
Posterior apical angle of paramere not conspicuously projecting backwards; tooth of penis-tube obtuse; median lobe of sternum IX with 2 or 3 long ventral bristles at base; stout apical middle bristle of posterior side of foretibia not reaching to apex of tarsal segment II ..... d.

d. Metepimerum with 2 bristles; abdominal terga II to VII with one or two each side; basal rim of sensilium broader throughout than the two rows of grooves together; 4 pairs of plantar bristles on tarsal segment V.
H. coniger Jordan & Rothschild 1906, Argentina.

Metepimerum with 3 or 4 bristles; abdominal tergites II to VII with 3 bristles each side; basal area of sensilium dorsally and laterally narrower than the two rows of grooves together, ventrally much wider ..... e.

e. Tarsal segment V with 4 pairs of plantar bristles.
H. eskeyi Jordan 1933, Perú.
With 5 pairs ..... *H. suarezi* Fox 1929, Ecuador.

B. Females.

f. Posterior margin of head with prominent lateral lobe ... g.
The lobe absent or barely indicated ..... h.

g. Frons convex halfway between ventral corner and internal tuber; metepimerum with 3, rarely 4 bristles; abdominal tergite II with 2 or 3 bristles each side; the dark line bearing the row of stout bristles on inner surface of tergite VIII slightly, but distinctly, concave, at or above ventral margin several bristles on outer surface distant from the subapical bristles; segment V in all tarsi with 6 pairs of plantar bristles, but often 6 pairs in some tarsi and 5 in the others, or 6 bristles on one side of the segment and 5 on the other. ... *H. broscus.*
Frons with distinct obtusely pointed hump close below the internal tubercle; on metepimerum 2 bristles; on abdominal tergite II one each side; sclerotized line on inner side of tergite VIII not evenly concave, above ventral margin no bristles distant from subapical ones; segment V of all tarsi with 4 pairs of plantar bristles ..... *H. coniger.*

h. Basal rim of sensilium much broader at sides than the two rows of grooves together; 4 pairs of plantar bristles on tarsal segment, occasionally 3 bristles on one side of the segment and 4 on the other ..... *H. stomis.*
Basal rim of sensilium in middle of side at most nearly as broad as the two rows of grooves together ..... i.

i. Spermatheca measured from anterior margin of tail to apex of its body as long as or longer than segment I of hindtarsus . j.
Spermatheca about one-fifth shorter than segment I of hindtarsus; tergite VIII with ventral apical angle projecting as a tooth (fig. 9); segment V of all tarsi with 3 pairs of plantar bristles; process of metepimerum shorter than in the species following with the exception of *H. eskeyi* ..... *H. gemina.*

j. Processes of metepisternum and metepimerum short, the latter not curved down or very slightly ..... *H. eskeyi.*
Process of metepimerum more or less strongly curved down k.

k. Process of metepisternum measured from posterior dorsocorner of mesosternite (the corner projecting upwards) two thirds the length of segment I of maxillary palpus; segment V of tarsi with 5 pairs of plantar bristles ..... *H. suarezi.*
Metepisternal process (fig. 5) as long as segment I of palpus; tarsal segment V with 4 pairs of plantar bristles ... *H. cypha.*

5. **Pulex irritans** Linnaeus 1758

San Rafael, on *Pseudalopex griseus* 9 males & 6 females, and on *Conepatus suffocans* 1 male and 4 females. La Paz, on *Lagostomus maximus* 52 males and 92 females, and on *Microcavia australis* 2 males.

This is the firts large series of the human flea taken on a wild rodent which I have seen. The specimens are on the small side, the length varying in the male from 1.36 to 1.87 mm., hindfemur from 0.36 to 0.47 mm., in the female from 1.89 to 2.67 mm., hindfemur from 0.45 to 0.56 mm. The absence of large females is noteworthy. But small specimens occur also elsewhere. More interesting than size are two other features of the series: 1) All the specimens have a tooth at the genal margin, whereas in a few of our specimens from other districts of South America and in a larger percentage of our Old World material the tooth is absent sometimes on one side of the head only. 2) The proboscis is on an average longer than elsewhere, particularly in the females, except in some of the San Rafael specimens. In the La Paz males the proboscis reaches at least to the middle of segment IV of the maxillary palpus and at most to its apex; in some females from La Paz it extends to two-thirds of segment IV, in a larger number beyond the apex and in the majority to the apex. Collections from other parts of the Argentine Republic frequently contain large and small specimens, with short or long proboscis, even if taken in the same human dwellings or found on the same host, such as *Conepatus, Pseudalopex* and

426 SIPHONAPTERA COLLECTED BY DR. J. M. DE LA BARRERA, ETC.

Didelphys. The La Paz material suggests that the mixture of small and large specimens does not represent the normal individual variability of *Pulex irritans* in Argentina, but is one of the cases of a more recently immigrated population amalgamating with an older fauna, a question which invites investigation.

6. **Polygenis platensis cisandinus** Jordan 1939

San Rafael, on *Graomys griseoflavus* 1 male and 3 females; on *Microcavia australis* 1 female. La Paz, on *Graomys griseoflavus* 5 males and 11 females. Santa Rosa, on *Graomys griseoflavus* and in its nest 25 males and 59 females; on *Microcavia australis* one female.

The series collected in 1938 was obtained on *Microcavia australis*, except one male found on *Graomys griseoflavus*. It is of some in-

terest to know that the two large collections sent by Dr. J. M. de la Barrera from San Juan and Mendoza contain only this one *Polygenis.*

Tiamastus plesius sp. nov. (fig. 13)

Malargüe, on *Microcavia australis* 1 female.

Very close to *T. callens* Jordan & Rothschild 1923, found by Mr. H. E. Box at Pilcañeu, Rio Negro, on *Ctenomys haigi;* differing in the abdominal sternum VII. In *T. callens* (and *T. subtilis* Jordan & Rothschild 1923, from Chubut, on *Phyllotis xanthopygus*) the apex of the lateral sinus of sternum VII is formed by a sclerotized semicircle which is placed some distance behind the row of bristles in

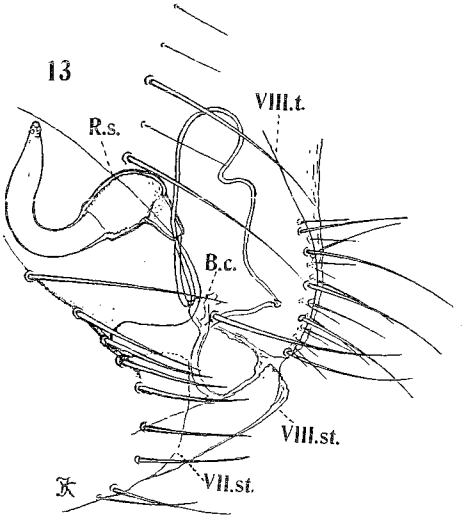

FIG. 13. — Terminal segments of *Tiamastus plesius* female.

all 7 females we have of the two species mentioned; in the new species the sinus is indicated near the third and fourth bristles, touching the pits in which these bristles are inserted (fig. 13). As this is the case on both sides of the specimen, I consider the position of the bottom of the sinus close to the bristles to be normal for this species. Te sinus is deeper than in *T. callens,* but the outline of the segment is so indistinct that the width and depth of the sinus must remain doubful for the present. The row of bristles is curved as shown in fig. 13, the upper 4 or 5 bristles standing in a straight oblique row; the third to fifth bristles are shorter than the upper 2 and not drawn out into long thin points. On the side of tergum VIII, from the stigma downwards, there is a

row of 2 long and 3 short bristles on one side and 3 long and 4 short on the other; farther down, separated from the row by a wide gap, a pair of long bristles or a single one. The spermatheca is like that of *T. callens*, only the nose is a little shorter. Length 2.1, hindfemur 0.45 mm.

8. **Tiamastus longinasus** sp. nov. (fig. 14)

San Rafael, on *Microcavia australis* 1 female.

Differs from all the known species in the extraordinarily long terminal projection of the spermatheca (fig. 14). Chaetotaxy of body and legs on the whole as in *T. callens*, *T. subtilis* and the preceding sp. nov. Eye about one-fifth smaller. Proboscis longer,

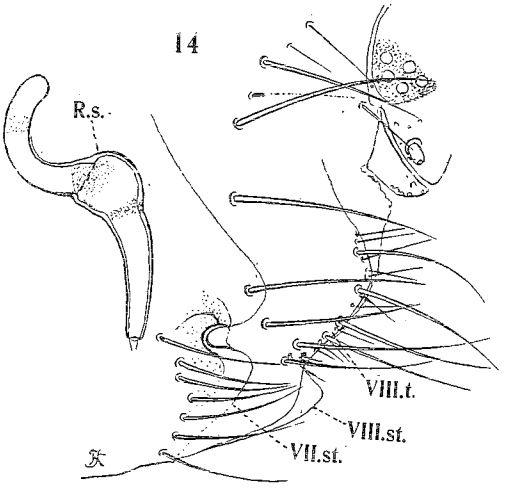

FIG. 14. — Terminal segments of *Tiamastus longinasus* female.

reaching to the underside of femur. Metanotum and abdominal tergum I with 7 apical spines each on the two sides together. Segment II of maxillary palpus a little more than one-half longer than I; in the preceding new species as in most specimens of *T. callens* twice (or nearly) as long as I. Longest apical bristle of segment I of hindtarsus reaching to apex of III, but not as in *T. palpalis* beyond III. Segment I of midtarsus longer than in the allied species; relative length of mid — and hindtarsal segments: 15, 19, 13, 7, 17; 39, 26, 18, 10, 19. Sternum VII with a row of 7 bristles each side; the sclerotized semicircle of the sinus much smaller than in *T. callens* and *T. subtilis*, sharply defined and well separated from the row of bristles. Tergum VIII from the stigma downwards

with a row of 7 or 8 long bristles and 3 shorter ones, 2 of the long ones being ventral, at apical margin 4 long bristles on the outside and about a dozen short ones on the inside. Immediately below sensilium one bristle, not present in any other known species of *Tiamastus,* longer on the right side than on the left. Nose of spermatheca as long as the tail, apex of tail round as in *T. cavicola* Weyenbergh 1881, not acuminate as in the other species. Length 2,0, hindfemur 0.48 mm.

9. **Tiamastus palpalis** Rothschild 1911 (fig. 15)

The species was described from a single female in the Paris Museum obtained off *Ctenomys brasiliensis* in the Chaco of Santiago, Argentina. It is quite likely that this *Ctenomys* was not the true

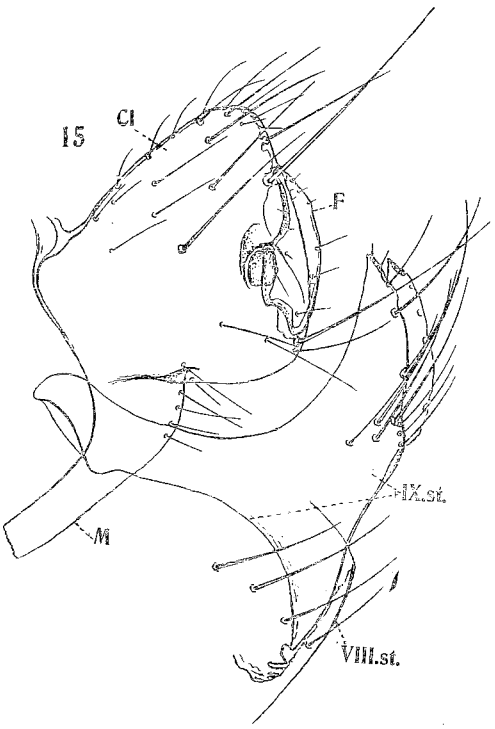

FIG. 15. — Genitalia of *Tiamastus palpalis* male.

brasiliensis, but one of the numerous forms named by Oldfield Thomas. The spermatheca and sternum VII could not be described and figured as they were too indistinct in the insufficiently cleared specimen. There is in the Charles Rothschild collection a male which differs from all the other known species like the female *pal-*

palis in the eye being small and without pigment and in the bristles of the hindleg being longer. This is evidently the male of *palpalis*. Fig. 15 represents its genitalia. The terga of the thorax and abdomen have fewer bristles than in other species: metanotum with 2 rows, the anterior third row of other species being missing in *palpalis;* bristles in anterior row on tergum II 4?, III 4, IV 2, V 1?, VI 0, VII 2, on the two sides together. Longest apical bristle of anterior side of hindtibia reaching to near apex of tarsal segment II, longest of hindtarsal I beyond apex of III, longest of II to base of claw. Midtarsal segment II longer than in other species (as is also the case in the female). Relative length of mid— and hindtarsal segments: 9, 12, 8, 5, 13; 25, 19, 13, 6, 15. Genitalia closely resembling those of *T. callens*: dorsal apical angle of large process P^1 more pronounced, its curve steeper; digitoid F broad at base, strongly narrowed from base, gradually curved upwards, the tip less pointed than in *T. callens*, because the posterior margin is evenly curved to the tip, not flattened at apex; ventral arm of sternum IX one-fourth longer than in *T. callens*, bristles of apical half less closely together, and the lateral ones in front of middle more numerous.

Collected by Sr. E. Budin on *Ctenomys haigi* at El Chaguarat near Villa Carolina, San Pedro, Jujuy, 1 August 1919.

The fleas hitherto placed into *Parapsyllus Enderlein* 1903 have been segregated by me into 7 genera in Eos 1942 (Madrid). In the Key I have given in Eos the genera are divided into two groups: in the first group containing 3 genera the first abdominal tergum bears a comb of short spines, whereas in the second group of 4 genera these spine are absent. As the comb is sometimes reduced to a few spines, we may expect species to be discovered in which the comb is present in some specimens and absent in others. It may, therefore, be useful to give here a Key to the genera which is mainly based on other distinctions.

KEY TO THE GENERA OF THE TRIBUS *Parapsyllicae*

a. Frontal tubercle of head narrow, elongate-triangular ..... b.
Frontal tubercle of head transverse or similar to a poplar-leaf ..... c.

b. Labial palpus with 4 segments. Bristles of segment II of longer than those of I. Anterior ventral corner of metasternum medianly produced downwards as a rounded tubercle. Ventral arm of sternum IX of male like a sledge-runner or boot in lateral aspect. Orifice of spermatheca on a projection, or body of spermatheca large, curved down and forming with the tail an acute ventral angle ..... *Tetrapsyllus* Jordan 1931.

Labial palpus with 5 segments. Bristles of segments I and II of antenna short. Ventral margin of head with transparent rim, the bristles below eye being distant from margin ..... *Listronius* Jordan 1942.

c. Sensilium large in both sexes, with more than 50 pits each side. Apical fifth of mandible (except apex) with the small teeth drawn out into short filaments. In male the subdorsal bristles of the posterior row of pronotum close together. In female one or more long bristles on pleurite of tergum IX below sensilium. stylet quite short and placed nearer to the dorsal side of segment than to ventral margin ..... *Eritranis* Jordan 1942.
Sensilium with fewer than 30 pits each side. Mandible with normal small teeth d.

d. Metanotum dorsally behind row of long bristles membranous, here not differentiated from the intersegmental membrane. Claws of all tarsi strongly asymetrical ..... *Panallius* Jordan 1942.
Claws of tarsi at most slightly asymmetrical. Marginal area of metanotum behind row of bristles normal ..... e.

e. Frontal tubercle more or less transverse, its anterior upper angle not or only slightly directed upwards. No bristles below eye. Anterior ventral corner of metasternum medianly produced downwards into a rounded tubercle (as in *Tetrapsyllus*). Segment V of foretarsus broad, the first to third plantar bristles in a very oblique row, the third pair being much shifted inward. Above middle of forecoxa a transverse row of enlarged bristles ... *Delostichus* Jordan 1942.
Frontal tubercle similar to a poplar-leaf, rounded at sides, the apex pointing obliquely upwards. Anterior ventral corner of metasternum without a tubercle directed downwards. Bristles of forecoxa normal in size. Segment V of foretarsus about twice as long as broad ..... f.

f. Small marginal bristles above frontal tubercle curved down, conspicuous (if not broken off). Episternum of metathorax without bristles, at most with a small hair. On sole of tarsal segment V very few small hairs, in hindtarsus at most 3 ..... *Parapsyllus* Enderlein 1903.
Marginal bristles above frontal tubercle quite small. Episternum of metathorax with bristles. Small hairs on sole of tarsal segment V numerous ..... g.

g. Abdominal tergum I with comb of short spines .... *Ectinorus* Jordan 1942.
Abdominal tergum I without any apical spines ..... *Dysmicus* Jordan 1942.

Tetrapsyllus Jordan 1931. — Genotype Pulex corfidü Rothschild 1904.

Novit. Zool. XI p. 619 (from Chile) is represented in Argentina by 3 species: *T. amplus* Jordan & Rothschild 1923, from Chubut (and Chile, type), *T. tantillus* Jordan & Rothschild 1923, from Chubut, and *T. bleptus* Jordan & Rothschild 1923, from Otro Cerro, Catamarca. There are no specimens of the genus in the de la Barrera collections.

No bristles between the anteocular row and the postocular bristles. Abdominal tergum I with short apical spines. Above middle of forecoxa an oblique row of large conspicuous bristles (fig. 17 B). Segment V of foretarsus (fig. 17 C) broad, about one-third longer

than broad, firts three pairs of plantar bristles large, placed in an oblique row, the third pair being much closer together than the first; claws asymmetrical (fig. 17 C & D, different aspects), much larger than in mid— and hindtarsi. Digitoid F of male u-shaped, but with the anterior arm (inserted in the clasper) much shorter than the free posterior one, which is finger-like, gently convex on posterior side and exposed behind the margin of clasper (fig. 17 A). In female two or three bristles below sensillium on lateral sclerite of segment IX (as in *Eritranis*); body of spermatheca transverse, strongly dome-shaped dorsally, not enlarged downward, its ventral outline forming a continuous curve with the tail (fig. 17 E).

Delostichus Jordan 1942. — Genotype: *Parapsyllus talis* Jordan 1936, Novit. Zool. XXXIX p. 305, fig. 68, 69.

Apart from these rather conspicuous distinctions the four known species of *Delostichus* closely agree in their morphology. A general survey of the characters which they have in common will save repeating these details in the descriptions of new species, of which there exist probably quite a number in the Andesian countries. However, some of the somatics mentioned below are not restricted to this new genus, being present in one or the other of the allied genera, but deserve mention because they may indicate that near relationship exists with the one genus concerned rather than with the other.

No sclerotized band from base of antennal groove upwards; dorsal outline of head not strongly sclerotized, no distinct inward projection marking the division of frons from occiput. Genal process short, obliquely truncate, either slightly incurved or rounded, ventrally strongly convex. Bristles of segment I of antenna longer than those of II, in some species long, in others short, sometimes different in length in the sexes. On terga of thorax and abdomen (I to VII) one row of bristles, but on meso— and metathorax and abdominal segments I and II a few small bristles representing an anterior row; one long bristle lower than stigmata on terga I to VII; on underside of mesonotum a row of thin spines; metasternum with median process pointing downwards; basal abdominal sternum with 1 to 7 small lateral hairs; striation of thorax and abdomen very dense in most places. On outer surface of forefemur 3 or 4 bristles, the posterior one long, on inner surface 1 or 2, ventral; on outer surface of hindfemur 2 or 3 lateral bristles in anterior half and 1 ventral one near apex, on inner side an uninterrupted subventral row (10 or fewer); foretarsus short, segments I and II

about one-fifth longer than broad, III and IV broader than long; segment I of midtarsus shorter than II; two bristles of hindtarsal segment II extend beyond IV. Hindtibia with 6 dorsal notches (including apical one, between second and third notches a small bristle or a pair of which the outer one is short (in *D. xenurus* and *D. coxalis*, occasionally also in *D. talis*). Terminal segments. Male: Anal tergum short, its bristles apical and subapical. Female: Stylet marginal; in front of it two bristles, between which the usual small sensory cone, below stylet one bristle, no other lateral bristles between stylet and sensilium; anal sternum with apical and subapical bristles only; widened area of tergum VIII projecting as a broad lobe, studded with bristles. Duct of bursa copulatrix more or less curved backwards (fig. 17 E & F). Small pale species; abdomen darker above than below.

KEY TO THE SPECIES

A. Posterior margin of genal process incurved; longest postmedian bristle of hindtibia reaching beyond apex of tibia; bristles of segment I of antenna long, at least in ♀.

1. *D. talis* Jordan 1936, Novit. Zool. XXXIX p. 305, fig. 68, 69; Argentina, R. Negro, on *Microcavia australis*. Hindmargin of forecoxa slanting above the stout bristles; bristles of segment I of antenna reaching beyond club in female ♀, a little shorter in male ♂. In male ♂ apical angle of sternum VIII projecting as a strongly sclerotized short rounded lobe; ventral arm of sternum IX like the end of a spear, beyond middle widened dorsally and ventrally and narrowed from there to apex; lateral loboid of paramere inconspicuous, apex of paramere with short dorsal hook, below which a short rectangular tooth, and far ventral a pair of sharply defined longish conical teeth. In female duct of bursa copulatrix longer than in the other species, longer than segment I of midtarsus, its apex curved downward forward.

2. *D. octomyos* sp. nov. Hindmargin of forecoxa strongly convex above the stout bristles (fig. 7 *B*). In ♂ no bristle of segment I of antenna reaching beyond middle of club; ventral apical angle of sternum VIII not projecting as a sclerotized lobe; loboid of paramere very conspicuous, rounded at apex, below apex a sclerotized, striated-denticulated projection which is obliquely truncate and broader than long (fig. 7 *A*). In ♀ the duct of the bursa copulatrix slightly shorter than segment I of midtarsus, the bursa hanging down, not directed forward.

3. *D. coxalis* Rothschild 1909, Novit. Zool. XVI p. 62 pl. X fig. 1, 2; Peru, on Vizcacha. Hindmargin of forecoxa strongly convex above the stout bristles. In ♂ bristles of segment I of antenna reaching only to base of club; those of sternum VIII longer than hindtarsal segment I; manubrium of clasper broad; vertical arm of sternum IX with long pointed apex wich is directed upward, in middle of hindmargin a large apically rounded lobe, ventral arm narrow in middle, apical half broad; paramere of phallosome with

dorsal, subdorsal and ventral apical hooks, all long, ventral one turned upwards, loboid nearly as in *D. talis*. In ♀ duct of bursa copulatrix short, about half as long as midtarsal segment I, more or less upright, anterior wall of bursa sclerotized, anguliform (fig. 16 *F*).

B. Posterior margin of genal process rounded; proboscis not reaching to apex of coxa; bristles of segment I of antenna short in both sexes.

4. *D. xenurus* Rothschild 1914, Novit. Zool. XXI p. 241, fig. 4, 5; Peru, on Vizcacha. In ♂ ventral arm of sternum IX much broader at base than vertical arm, gradually narrowed to apex; dorsal angle of paramere a long hook, some distance below it a shorter sharply defined hook, both moderately curved down, no ventral hook or tooth. In ♀ antepygidial bristle (as in ♂) much shorter than lowest bristle of tergum VII; duct of bursa copulatrix somewhat longer than hindtarsal segment III.

10. **Delostichus talis** Jordan 1936 (fig. 16, 17 C & D)

Originally described from material obtained by Dr. J. M. de la Barrera and Sr. M. A. Riesel in 1924. The present collection contains a very large series of both sexes, 118 ♂♂ and 119 ♀♀; the normal host of the species is *Microcavia australis*, only 9 ♂♂ and 10 ♀♀ were found on three other rodents.

San Rafael, on *M. australis* 73 ♂♂ & 66 ♀♀; on *Pseudalopex griseus* 8 ♂♂ & 8 ♀♀; on *Galea leucoblephara*, 1 ♀. — La Paz, on *M. australis* 1 ♂ & 1 ♀. — Malargüe on *M. australis* 22 ♂♂ & 24 ♀♀. — Santa Rosa, on *M. australis* 13 ♂♂ & 18 ♀♀; on *Rattus rattus* 1 ♂ & 1 ♀.

As was to be expected, the large series of specimens is variable in the details of chaetotaxy and structure, the original description based on a few specimens requiring amplification, as is usual systematics on the receipt of ampler material. On the metanotum, which bears a subapical row of 10, less often 12, long bristles, one or two dorsal bristles of this row are rather frequently replaced by small bristles, which is especially often the case in examples in which the metanotum is more convex than usual. The anterior row of the metepimerum consists of 1 to 5 bristles, usually 2, and the posterior row of 3 to 5, usually 3 or 4. While abdominal tergum I always has a small comb of short apical spines, such spines are present on tergum II in some specimens and absent in others. Most specimens have 5 enlarged bristles on the forecoxa, others 4 or 6; sometimes only one of the hindmarginal bristle is enlarged instead of two the upper one of the pair being small in this case; the marginal bristle above this pair is always much smaller than the lateral bristles placed below the enlarged ones. The row on the inner surface of the hindfemur contains 7 to 9 bristles, and on the outer

surface of the hindtibia there are from 7 to 13 subdorsal bristles, including the apical ones. There are 6 dorsal notches on the hindtibia, inclusive of the apical notch, the fourth notch bearing 3 bristles as in the other species of this genus; between notches II and III and again between IV and V, there is a small dorsal hair, of which one or the other is sometimes much enlarged, in that case the tibia presenting 7 notches; in one of the ♀♀ with 7 notches the long bristles of the fourth notch is not developed on one hindtibia, but normal on the other. The longest postmedian dorsal bristle of the hindtibia extends beyond the apex of the tibia, and the longest apical one beyond the apex of tarsal segment I. In both sexes the

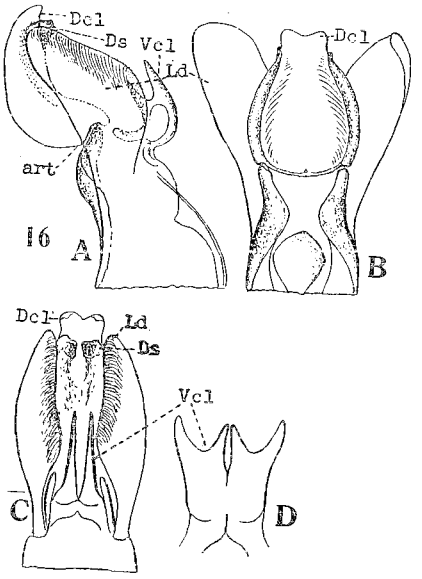

FIG. 16. — Terminal sclerites of phallosome of *Delostichus talis*; *A*, lateral view; *B*, dorsal view; *C*, ventral view; *D*, ventral claw, ventral view.

longest bristle of hindtarsal segment I reaches to or beyond II, and the longest of II beyond middle of V, being longer in ♂ than in ♀. Measurements of midtarsus: ♂, I 10, II 12 to 14, III 7 or 8, IV 5, V 12 to 14; ♀, I 9 to 12, II 12 to 16, III 7 to 10, IV 4 or 5, V 12 to 15; hindtarsus: ♂, I 25 to 27, II 17 to 19, III 8 to 11, IV 5 or 6, V 13 or 14; ♀, I 21 to 33, II 16 to 22, III 9 to 13, IV 5 or 6, V 12 to 16; hindtarsus in small: ♀ 21, 16, 9, 5, 12; in large: ♀ 33, 20, 11, 6, 15.

Terminal segments: sensilium with 16 grooves each side. Projecting apical angle of sternum VIII of ♂ in some specimens more triangular than in others; at the widest point of the ventral

arm of sternum IX there are in the type 2 stoutish bristles (not drawn broad enough in fig. 68 of 1936), in other males 3, 4 or 5, usually 4; in the same figure sternum VIII bears 2 bristles, there should have been 4, the pits of the two missing bristles were not noticed at the time I drew the figure; the usual number of the bristles on this segment is 8 on the two sides together, sometimes 9 or 10, one of these additional bristles being ventral and slighly more forward than the row; the shape of the digitoid F depends to some extent on the position in the cleared specimen, being usually less convex on the frontal side than in fig. 68 of 1936; in this figure a ridge resembling an inverted top-boot is indicated below the longish apical bristle of the clasper; the ridge is on the inner side of the clasper and its upper posterior end is connected with the incrassation round the pit of the bristle, the connection being left out in the figure. The apical section of the phallosome is slightly obscured in the type and has been further studied at the fresh material (fig. 16). There is a distinct joint between the apical section, or paramere, and the main body of the phallosome, the dorsal wall of the elongate elliptical body being prolonged distad on the right and left sides and articulated with the sclerotized dorsal sclerite of the paramere (at art). The paramere consists of dorsal and ventral claws moving in a vertical plane and a pair of lateral loboids. These loboids (Ld) are a continuation of the outer covering of the main body of the phallosome and lie close to the dorsal claw, being convex on the outer side and concave on the inner, remotely resembling the shells of a pea-pod, with the apex rounded off. They are pale and in cleared specimens of the present species easily espace notice; the ventral marginal area is striated on the outer side, a small portion of the margin denticulate, and the marginal area of the inner side irregularly reticulate. The dorsal claw (Dcl) is strongly convex dorsally (fig. 16 A), concave ventrally, the apex being more or less sharply pointed. In a view from above (fig. 16 B) it is rounded at the base and sides, the apex being about half as broad as the base and sinuate; the sides are strongly sclerotized and articulate with the sclerotized sides of the neck of the phallosome; the lateral stripe turns ventrad distally and forms on the underside of the dorsal claw a tooth (CDs) of a somewhat variable shape. The ventral claw (Vcl), movable independantly of the dorsal claw, is convex ventrally at the base and has each side two long teeth, the posterior (or ventral) tooth being a little longer than the other; they are often more divergent than in fig. 16 A. In ventral aspect (fig. 16 C) only the ventral teeth are visible; but if pressure is applied the two teeth separate

and the dorsal teeth appear between them (fig. 16 D). The spermatheca varies in the height of the dome of its body and the length of its tail.

11. **Delostichus octomyos** sp. nov. (fig. 17 A, B & E)

A series of both sexes at Las Catitas, on *Octomys* sp.

Close to *D. talis* Jord. 1936, but even unmounted specimens easily recognized by the forecoxa of both sexes and the taild-end of the

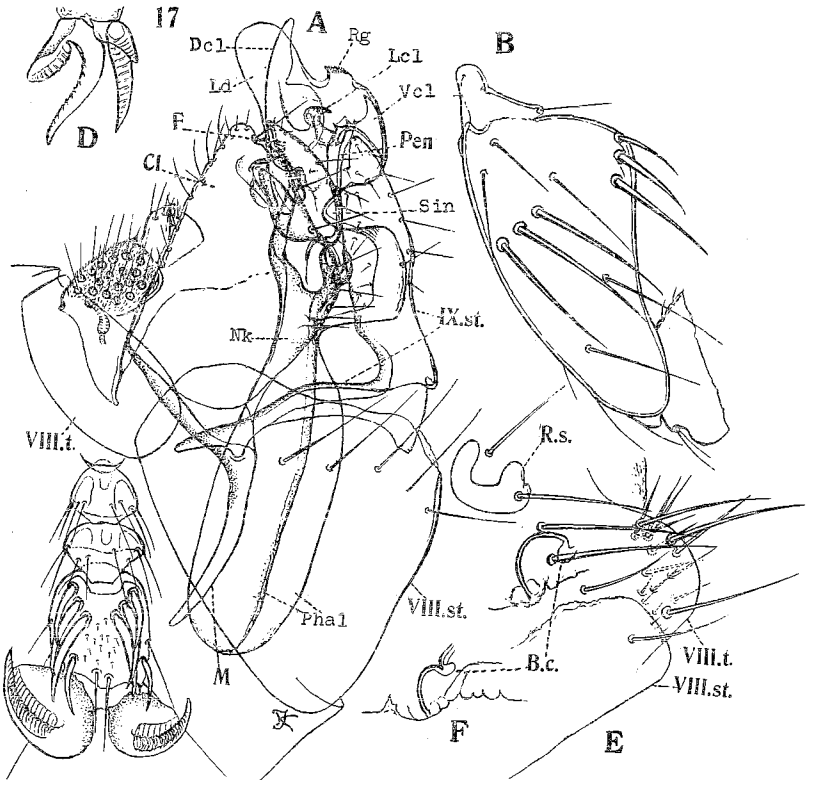

FIG. 17. — *A*, terminal segments of *Delostichus octomyos* male; *B*, forecoxa of female; *C*, foretarsus of female; *D*, foretarsal claw, different aspect; *E*, a portion of the terminal segments of female; *F*, bursa copulatrix and duct of *Delostichus coxalis*.

male. Above antennal groove a row of 4 long slender bristles (rarely 3), the last and longest being the ventral one of the subapical row; as in *D. talis* below this long bristle close to the ventral angle of the occiput a short thin bristle which is only slightly longer than the short bristles of the row present in the male above the antennal groove. Bristles of segment II of antenna

not reaching beyond middle of club in male, some extending beyond club in female. Abdominal tergum I with fewer apical spines than in *D. talis,* on the two sides together usually 6, often 4, rarely fewer or 7. On side of forecoxa (fig. 16 B) 3 to 5 large bristles and at hindmargin 2 similar but shorter ones; the marginal bristle placed above the latter stouter than in *D. talis,* but variable in thickness. Asymmetry of foretarsal claws rather more pronounced than in *D. talis.*

Male. Apart from the phallosome, the genitalia (fig. 17 A) similar to those of *D. talis.* Clasper (Cl) irregularly elongate-triangular, with the tip rounded; manubrium (M) narrow as in *D. talis* and *D. xenurus* (much broader in *D. coxalis*), but shorter, being less than two-thirds the length of the clasper. Ventral arm of IX. st. as in *D. talis,* but the lanceolate bristle-bearing portion longer, less pointed, with fewer bristles, those of ventral margin more widely and more evenly spaced, and the short broadish bristles present in *D. talis* dorsally at widest point absent. Proximal half of phallosome (Phal) narrower than in *D. talis;* paramere very different, the most conspicuous part of it being the loboid (Ld), by which ♂♂ can be separated from *D. talis* at a glance; it projects as a broad, apically rounded lobe; below it a short truncate marginal projection (Rg) separated from the large lobe by a rounded sinus and apically striate-denticulate, this projection corresponding to the denticulate portion of the ventral margin of the loboid in *D. talis;* from this tooth forward (in fig. 17 A downward) the ventral margin is first slightly convex and then, about halfway to the neck (Nk) of the phallosome, curves upward and again downward, forming a deep bay (Sin), which is rounded or triangular; the dorsal claw (Dcl) broad in basal half and narrow in distal half, feebly sclerotized; the ventral claw (Vcl) curved upwards, pointed, feebly sclerotized, a single hook (each side), not a double one as in *D. talis.* Above the end-tube of the penis (Pen) a strongly sclerotized hook (Lcl) curved down.

Female. On tergum VIII, from the stigma down, a row of 4 to 8 bristles and on the outside of the rounded apical lobe 3 or 4 bristles, usually 4, the inner surface bearing 13 to 16, most of which are short, the smallest being placed near the longish subapical ventral bristles. Spermatheca somewhat variable in size and proportions, the tail being usually slenderer than in the specimen figured (fig. 17 E); no reliable difference from the spermatheca of *D. talis.* Duct of bursa copulatrix (fig. 17 E) longer than in *D. coxalis* (fig. 17 F), but about one-third shorter than in *D. talis,* the bursa

(B. c.) hanging down. As in *D. talis* the length of the stylet variable.

Length: female 1.6 to 2.1 mm, male 1.4 to 1.6; hindfemur: 0.25 to 0.29, ♀ 0.29 to 0.35 mm.

Ectinorus Jordan 1942. — Genotype: *Pulex cocyti* Rothschild 1904, Novit Zoo. XI, p. 617, pl. 9, fig. 26; pl. 10, fig. 21 (Chile).

In Eos 1942 three species are mentioned by name. In the present paper 4 additional species and a subspecies are described. The inclusion of *E. setosicornis* sp. nov., which stands rather apart from the other species, makes it necessary to add to the diagnosis published in Eos that the bristles of segment I of the antenna are sometimes long in both sexes. The genus is not a homogeneous one, being composed of 5 morphologically more or less diverse types, which, on the discovery of more species, may or may not be considered generically different. For the time being it appears to me more convenient for the student of Siphonaptera to keep the 7 species together in one genus than to separate them in 4, 5 or 6 genera. As the genus now stands, it comprises all the species of *Parapsyllicae* in which abdominal tergum I bears short marginal spines and the anterior ventral corner of the metasternum is medianly not produced downwards into a rounded tubercle (as it is in *Tetrapsyllus* and *Delostichus*). The known species are all Argentine with the exception of *E. cocyti*, which is Chilean.

KEY TO SPECIES:

a. Foretibia dorsally wih 5 notches ..... b.
Foretibia dorsally with 6 notches (fifth and sixth subapical and apical close together) ..... d.

b. Labial palpus consisting of 6 to 8 segments. Apex of ventral arm of sternum IX of male produced downward into a lobe which bears at the rounded apex some long bristles (fig. 22 *A*). Body of spermatheca (fig. 22 *C*) longer than broad, dorsally concave, ventrally convex, orifice ventral ..... *E. polymerus* sp. nov.
Labial palpus with 5 segments ..... c.

c. ventral arm of sternum IX of male short, strongly sclerotized, truncate, without bristles, apex divided into several short processes. Pro- and mesonotum and abdominal terga without bristles in front of the row of long ones, except a small one below the stigma on the anterior terga. Female not known.
E. levipes Jordan & Rothschild 1923.
Ventral arm of sternum IX of male as long as vertical arm, slender, with bristles (fig. 18 *A*). Terga of thorax and abdomen with small bristles in front of the row of long ones. Body of spermatheca narrowed towards orifice, densely ringed transversely (fig. 19 *A* & *B*) ..... *E. trionyx* sp. nov.

d. Lonsgest apical bristle of segment II of hindtarsus not extending beyond segment IV. Sternum IX of male long and slender. Body of spermatheca elliptical (fig. 19 *C*).

E. cocyti Rothschild 1904.

Longest apical bristle of segment II of hindtarsus reaching beyond segment IV ..... e.

e. Labial palpus with 6 segments ..... *E. disjugis* sp. nov.
Labial palpus with 5 segments ..... f.

f. Bristles of segment I of antenna short. Vertical arm of sternum IX of male short; ventral arm with a strongly sclerotized claw near base (fig. 20). Digitoid F ventrally produced backwards into a pointed curved-up tail. Female not known ..... *E. onychius* Jordan & Rothschild 1923.
Bristles of segment I of antenna long. Clasper (not digitoid) with long narrow ventral process directed backwards and bearing long bristles (fig. 23). Body of spermatheca pyriform, widest near apex, which is truncate and bears the orifice (fig. 25) ..... *E setosicorn* sp. nov.

12. **Ectinorus trionyx** sp. nov. (fig. 18, 19 A & B)

Santa Rosa, on *Microcavia australis* one male (tipe). — Malargüe, on the same host 2 males & 3 females. — Las Catitas, on *Octomys barrerae*. 2 males.

Closest to *E. cocyti* Rothschild 1904 (Chile); thoracic and abdominal terga with fewer small bristles, basal abdominal sternum with some small bristles on the side in both sexes, bristles of tibiae and tarsi longer, and the terminal abdominal segments different.

Proboscis reaching in male to apex of forecoxa, in female to apex of trochanter; labial palpus consisting of 5 segments, the last one a little longer than the last of the maxillary palpus. Genal lobe shorter than in *E. cocyti*, the eye correspondingly larger. Segment I of antenna in male with a bristle at anterior apical corner which reaches to segment V of club, the other bristles short, in female 4 bristles of segment I long, the one at posterior angle the longest and thickest, reaching to apex of club, the other 3 at mos to middle of club. The subapical row of occiput contains in the male 11 to 13 bristles, in the female 9 to 12; between this row an base of antennal groove 3 long bristles in male and 2 in female.

Bristles of thorax: in male on pronotum a row of 12 (two sides together) and an additional long bristle obliquely above the lowest of the row; mesonotum with 4 to 6, 10 to 12; metanotum with 4 to 7, 10 or 11; in female on pronotum 0,12 or 13, mesonotum 3 to 6, 10 or 11; metanotum 2 to 6, 9 or 10. On metepimerum each side (4 (2,2), in male occasionally 5 (3,2 or 2,3). Proportional length of thoracic terga (dorsally) 6 : 8 : 17, i. e. the metanotum about twice the length of the mesonotum, measured from anterior dorsal angle to row of long bristles.

On abdominal tergum I 6 to 8 spines in male, 3 to 8 in female; bristles in male on I 3 or 4, 9 to 11, II 3 to 6, 15 or 16, III and IV 1 or 2, 14 to 16, V 0,13 to 15, VI 0,14 or 15, VII 0,13 or 14; in female on I 2 to 6, 9 or 10, II 1 to 6, 15 or 16, III 0,14 to 16, IV to VI 0,14 or 15, VII 0 or 1, 6 to 8; one of the small bristles of II to IV in male and of II and occasionally III in female below stigma, 2 or 3 bristles of the posterior row lower than stigma, with the exception of segment VII in female. On side of basal abdominal sternum 3 to 5 small bristles in male, 2 to 8 in female; on the other

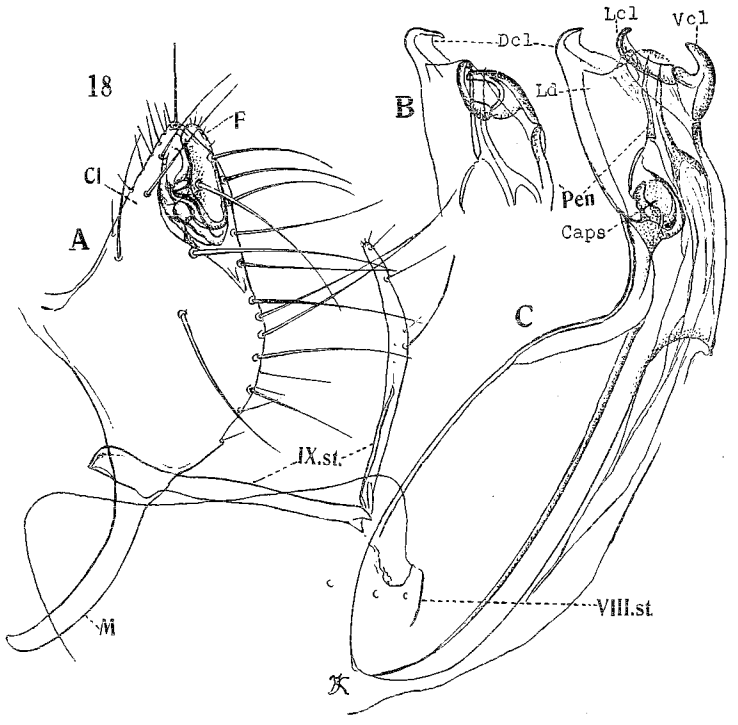

FIG. 18. — Genitalia of *Ectinorus tryonix* male; *A*, clasper and sternum IX; *B*, apex of phallosome, the pair of claws closed; *C*, phallosome, the claws open.

sterna (two sides together) in male on III 0 to 2, 4 to 6, IV to VII 0,4; in female on III 2 to 8, 6 to 8, IV to VI 0,4 to 6, VII 0,6 or 7. Sensilium with 17 pits each side (sometimes 18?).

On forecoxa 14 to 18 bristles. On mid— and hindfemora a row 7 to 9 bristles on outside and inside in male, 8 on outside in female and 8 to 10 on inside, no additional bristles above the rows (in *E. cocyti* with additional ones). Foretibia with 5 dorsal notches, the stoutest dorsal apical bristle reaching beyond middle of segment II of tarsus; hindtibia with 6 dorsal notches, but between the second

and third notches one dorsal bristle which is stouter than the dorso-lateral ones, and between fourth and fifth notches 2 or 3 such additional stout bristles (in *S. cocyti* 7 notches and some minute bristles), the additional bristles behind the median notch sometimes placed close to the notch, which then appears to bear 3 bristles as in *E. cocyti* instead of 2; long bristle of second notch of hindtibia reaching beyond fourth notch and the long one of the fourth beyond apex of tibia; longest apical dorsal one of hindtibia usually longer than ventral one, extending to or beyond apex of tarsal segment I (but much shorter in one tibia in one of the males); one bristle of segment II of hindtarsus reaching at least to middle of V, often to apex, as does one of III; segment IV of foretarsus broader than long, V twice as long as broad. Measurements:

		Foretarsus	Midtarsus	Hindtarsus
Male .	small	6, 5, 7, 5, 4, 11	14, 13, 8, 5, 12	30, 21, 11, 6, 13
	large	8, 8, 6, 5, 12	17, 18, 10, 6, 14	39, 27, 13, 7, 15
Female	small	7, 7, 6, 4, 12	15, 16, 9, 6, 14	37, 25, 13, 7, 14
	large	8, 8, 6, 4, 13	20, 19, 9, 5, 14	46, 30, 14, 7, 16

Modified Segments. Male: On sternum VIII a row of 6 to 8 bristles on the two sides together, in one specimen an additional bristle in front of the row, apical margin rounded-convex behind the bristles. Manubrium M of clasper long and narrow, more or less slightly curved (fig. 18 A). Clasper irregularly triangular, much longer than broad, dorsal margin nearly straight, ventral (= posterior) margin slightly rounded in anterior half, then almost straight up to uppermost large marginal bristle, at this point faintly angulate, at posterior margin a row of 8 to 10 long bristles and some smaller ones, on side 5 to 7 long bristles and at dorsal margin a variable number of short ones, at apex a moderately long one. Digitoid F lateral, but not far from posterior margin, finger-like, longer than broad, a little curved upwards, apex rounded, projecting a very short distance beyond margin of clasper, bristles of F short and thin. Sternum IX narrow, its vertical arm nearly straight, forming a right angle with the ventral arm, apex of vertical arm somewhat variable, its lower angle (on anterior side) projecting more in some specimens than in others; ventral arm thinner than in *E. cocyti*, practically of even width from base to apex, in apical half with 3 slender ventral bristles, the distance between which is variable, the subapical one short, at tip and on side a few minute ones. Phallosome (fig. 18 B, C) with three terminal hooks each side, the two lower ones (Lcl and Vcl) being like a pair of claws, represented closed in fig. 18 B and open in fig. 18 C.

Female: Apex of stigma of tergum VIII distant from margin; above stigma 3 to 6 bristles each side; from stigma downwards inclusive of apical margin on outside 7 or 8 bristles, on inside 10 to 14; apical margin incurved above ventral bristles; in one specimen a bristle below sensilium on pleurum of segment IX. Stylet lateral (in *E. cocyti* marginal), slightly conical, nearly thrice as long as broad (5:14). Body of spermatheca densely ringed (fig. 19 A, B), convex above and concave below, longer than tail, orifice terminal. Duct of bursa copulatrix (fig. 19 A) much shorter in proportion

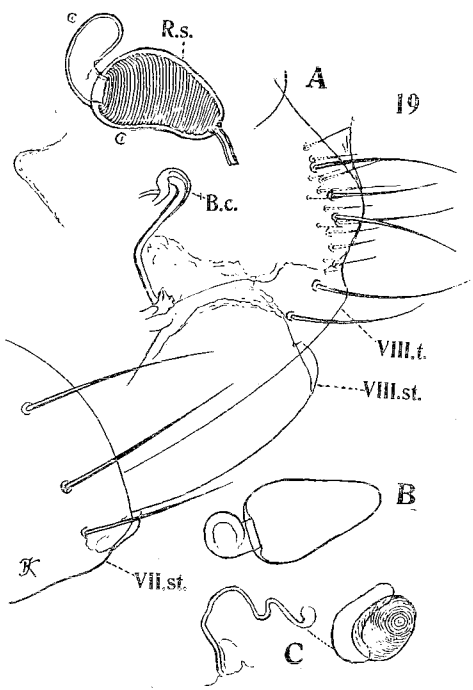

FIG. 19. — *A* and *B*, *Ectinorus trionyx* female; *C*, *Ectinorus cocyti*.

to the size of the flea than in *E. cocyti* (fig. 19 C), being undulate in *E. cocyti* and about as long as segment II of hindtarsus, while in *E. trionyx* the duct is curved once and only half as long as that segment; the duct is preserved in our females of *E. cocyti*, but the spermatheca has been lost in mounting (as in many of the old preparations in the collection), with the exception of the recently mounted specimen from which fig. 19 C is taken. Length: male 1.7 to 2.3, female 2.5 mm., hindfemur in male 0.35 to 0.43, in female 0.40 to 0.45 mm.

13. **Ectinorus onychius fueginus** subsp. nov. (fig. 20 A)

Tierra del Fuego, Estancia Viamonte, on *Belonopterus chilensis*, October 1931 (W. P. Reynolds), one male. The occurrence on the Spur-winged Lapwing is probably accidental, the true host presumably being *Ctenomys fueginus* Philippi 1888.

Like *E. onychius onychius* Jordan & Rothschild 1923 (from Chubut) but the bristles of the hindleg more numerous and the genitalia different in some detail. On outer side of hindfemur a subventral

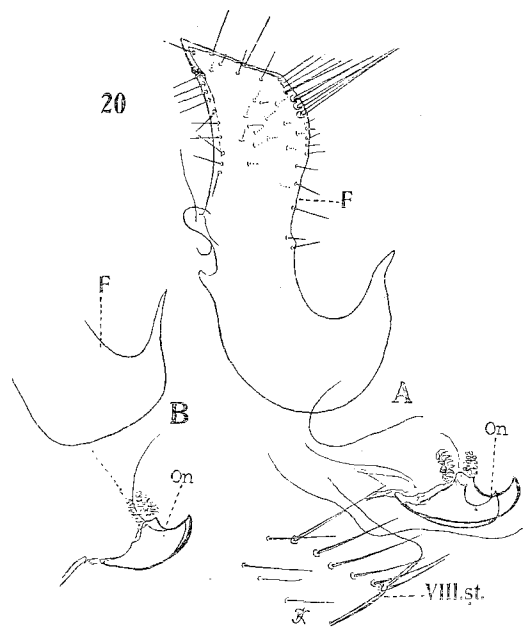

FIG. 20. — *A*, *Ectinorus onychius fueginus* male; *B*, *E. onychius onychius* male.

row of 9 bristles, on inner side 15 on one femur and 17 on the other, inclusive of the lateral bristles placed near the dorso-marginal ones; on outer side of hindtibia 24 or 25 bristles including the subventral ones, but excluding the ventral marginal bristles, the number being 12 to 16 in *E. o. onychius*. Digitoid F of clasper (fig. 20 A) narrower, its anterior apical angle sharper, its ventral margin more strongly and more evenly curved, the ventral backward extension broader in a vertical sense and the tail broader. The pair of claws (On) of sternum IX longer and their curved portion narrower than in *E. o. onychius*, of which we figure for comparison the ventral portion of the digitoid and the pair of ventral claws (fig. 20 B).

14. **Ectinorus disjugis** sp. nov. (fig. 21 A & B)

Parapsyllus onychius, Jordan, Novit. Zool. 1939 XLI, p. 297 (error of determination).

El Chaguarat, near Villa Carolina, San Pedro, Jujuy, on *Ctenomys adax*, August 1919 (E. Budin), 1 female.

When I recorded this specimen as the female of *E. onychius* I was still unaware that the species varied geographically. The male from Tierra del Fuego (see above) being different from the two

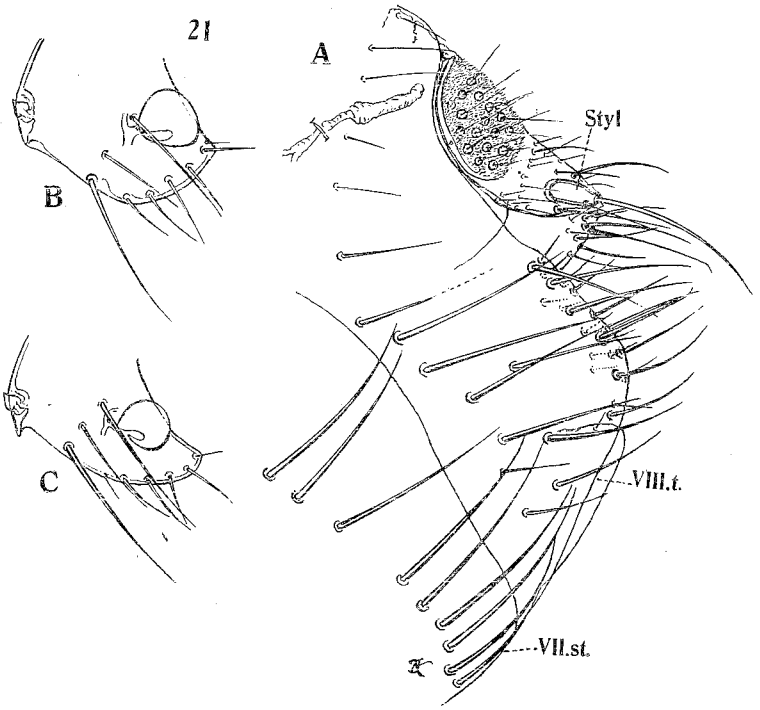

FIG. 21. — *A, Ectinorus disjugis* female, terminal segments; *B*, the same, lower area of head; *C, E. onychius onychius.*

we have from the Chubut district, *E. onychius* must be expected to be different again in far away Northern Argentina. Te female from Jujuy, therefore, represents either a new subspecies of *E. onychius* or a distinct species. The difference in the genal area of the head favours the second alternative.

Labial palpus with 6 segments, extending to the apex of the forecoxa. Genal area (fig. 21 B) broader than in *E. onychius* (fig. 21 C), and the genal process shorter. Bristles of antenna

short. Small bristles in front of row of long ones (two sides together) on pronotum 2, mesonotum 13 and 2 near base, metanotum 5, tergum I of abdomen 9 (one row), II to V 11 each, VI 8, VII 9, one of the small bristles below stigma on II to V; on sternum II about 20 (each side), on III a row of 10 (two sides together), IV 10, V 8, VI 12, VII 18. On tergum I a comb of 7 spines. Tergum VIII from stigma downwards with 19 bristles on outerside and 14 or 15 on inner (fig. 21 A). On metepimerum 0 on one side (1,3) and 6 on the other (3,3). Internal fork of hindcoxa above middle as in *E. onychius*. On one hindfemur 5 subventral bristles on outside and 13 on inside, on the other femur 7 on outside and 11 on inside. Mid— and hindtibiae with a stout dorsal bristle between the second and third notches instead of a thin one and with only 4 dorso-lateral bristles. Longest apical bristle of hindtarsal segment II extending beyond middle of V, second longest to near apex of IV; on sole of V numerous small hairs from apex to near second pair of plantar bristles, in *E. onychius* the hairy area extending to first pair. Stylet marginal, a little more than twice as long as broad (Spematheca and bursa copulatrix lost). Length 2.5, hindfemur 0.53 mm.

15. **Ectinorus polymerus** sp. nov. (fig. 22)

Las Catitas, on *Octomys barrerae* and in its nest, 9 males and 1 female.

Distinguished by the labial palpus consisting of 6 to 8 segments. The female is too much damaged by KOH for description, but the proboscis proves the specimen to belong to the same species as the males; the spermatheca and the duct of the bursa copulatrix are fortunately preserved.

The proboscis reaches below the base of the forefemur; in the specimen selected as type one labial palpus has 7 segments and the other 8. In front of eye the usual 3 bristles, further upwards a small one and inwards from the frontal tubercle a longer small bristle. Apex of genal process rounded. On occiput a subapical row of 10 bristles and behind middle another row of 8 or 9 (the two sides together); between this postmedian row and the base of the antennal groove 2 or 3 long bristles at nearly equal distances; at dorsal edge of antennal groove a row of about 25 small bristles (male). Bristles of antenna short.

Bristles on thorax: pronotum 0 to 6, 14, mesonotum 3 to 7, 12 to 13, metanotum 5 to 8, 12; metepimerum 2, 3. On abdominal terga I 3 to 6, 11 to 12, II 8 to 13, 15 to 18, III 3 to 10, 15 to 17, IV

0 to 3, 14 to 16, V 0,14 to 15, VI 0,13, VII 0,12 or 13; on basal sternum each side 3 to 9; on the other sterna (two sides together) III to VI 4 or 5, VII 4 to 6. One bristle of posterior row of terga lower than stigma and of anterior row directly below stigma on II and usually also on III. Stigmata round, diameter about twice that of the pits of the posterior bristles.

On forecoxa 26 to 30 bristles, inclusive of some small ones at anterior margin. Midfemur with two rows of bristles on outer surface and one row on inner; hindfemur with a row of 8 or 9 on outside and a row of 10 or 11 on inside; foretibia with 5 dorsal notches, mid— and hindtibiae with 6, no stout dorsal bristles in between the notches, only slender ones which are as most as thick as the dorso-lateral bristles. On all tibiae the dorsal notch bearing the longest bristle placed in middle, the tibiae measured from extreme base to the farthest point at side, the median notch bearing 3 bristles; on outer side of hindtibia 7 to 11 bristles, none on inner side. Stoutest apical one of posterior side of foretibia extending beyond middle of tarsal segment I longest median bristle of hindtibia far beyond apex of tibia, longest posterior apical one of hindtibia much beyond apex of tarsal segment I, and the longest of the anterior side to apex of I, 2 of hindtarsal I beyond III and 1 or 2 of II beyond middle of V. In foretarsus IV broader than long, V a little over twice as long as broad. In between second pair of plantar bristles of V in mid —or hindtarsus or in both one of the ventral hairs much prolonged, thin, but conspicuous. Measurements (male):

	Foretarsus	Midtarsus	Hindtarsus
Smallest male	7, 7, 6, 4, 13	14, 13, 8, 5, 14	29, 21, 11, 7, 15
Largest male	8, 8, 7, 4, 14	19, 16, 10, 6, 16	38, 26, 14, 8, 17

Sensilium with 17 to 20 (?) pits.

Modified segments. Male: On sternum VIII (fig. 22) 15 to 18 each side)., some ventral ones being arranged in two almost horizontal rows one behind the other, the rows separated by a shallow sinus and probably placed on a swelling the ventral apical angle below the level of the posterior bristles of the second row rounded, projecting below the ventral margin immediately preceding it, the posterior margin from this lobe to the dorsal curve of the segment almost evenly, but slightly rounded. Manubrium (M) of clasper slightly dilated before being curved up and narrowed to a point. Clasper (Cl) of the same type as in *E. cocyti* Rothschild 1904; at and near its posterior margin 9 to 12 long bristles and several others at apex and dorsal margin; digitoid F very distinctive, la-

teral (in *E. cocyti* marginal), half of it projecting above the margin of the clasper, apical half broader than basal half, but the base itself again broadened, anterior margin concave in basal half, obtusely angulate in middle, then straight, upper anterior angle about

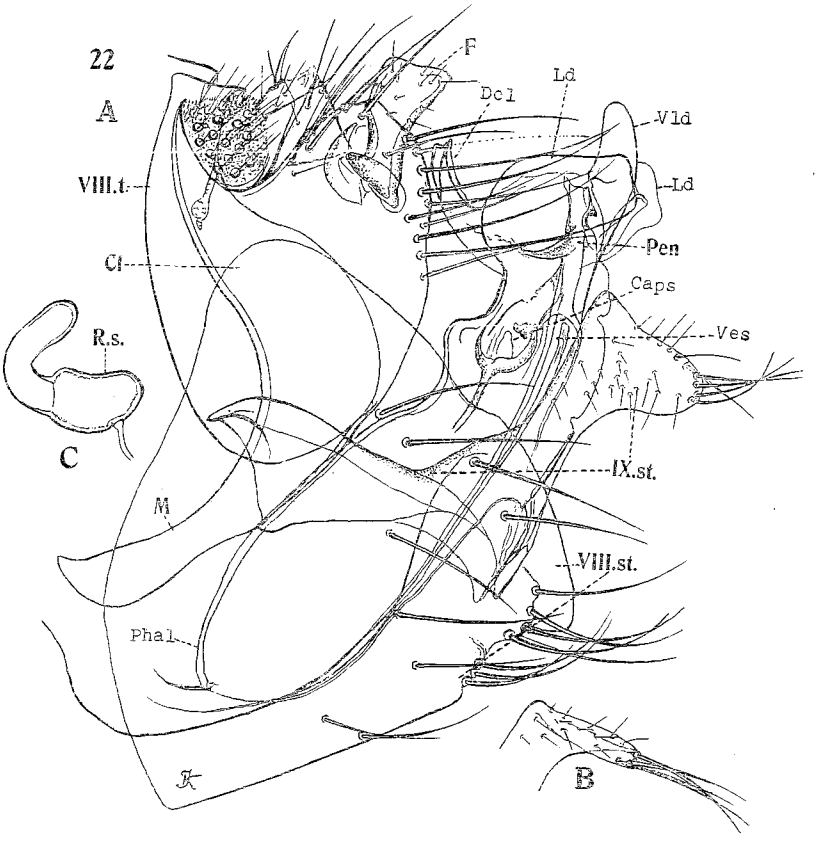

FIG. 22. — *A*, terminal segments of *Ectinorus polymerus* male; *B*, apex of sternum IX, folded; *C*, spermatheca.

90°, but rounded off, apical margin slightly concave, a little more than half as long as the anterior margin, posterior angle acute, posterior margin slightly concave. Sternum IX conspicuously different from that of other species: its vertical arm much broadened upwards, the upper angle acute, curved forward, apical margin from upper to lower angle half as long as the anterior margin of the vertical arm measured in a straight line; ventral arm broad at base and apex, its dorsal margin nearly straight from before middle to apex, ventral margin concave, the apical area dilated ventral into a very prominent rounded lobe bearing ventrally 4 or 5 fairly stout

bristles, which are about as long as the apex of the ventral arm is broad, at apical margin and on sides a variable number of small ones; in some specimens the apical lobe appears very narrow (fig. 22 B), being accidentaly folded in the process of mounting, the digitoid likewise being distorted in such preparations. Dorsal margin of phallosome more or less convex above the capsule (Caps). Apex of phallosome widely open in all the specimens; the terminal lobes very distinct, upper one (Dcl) claw-like, narrow, its apex

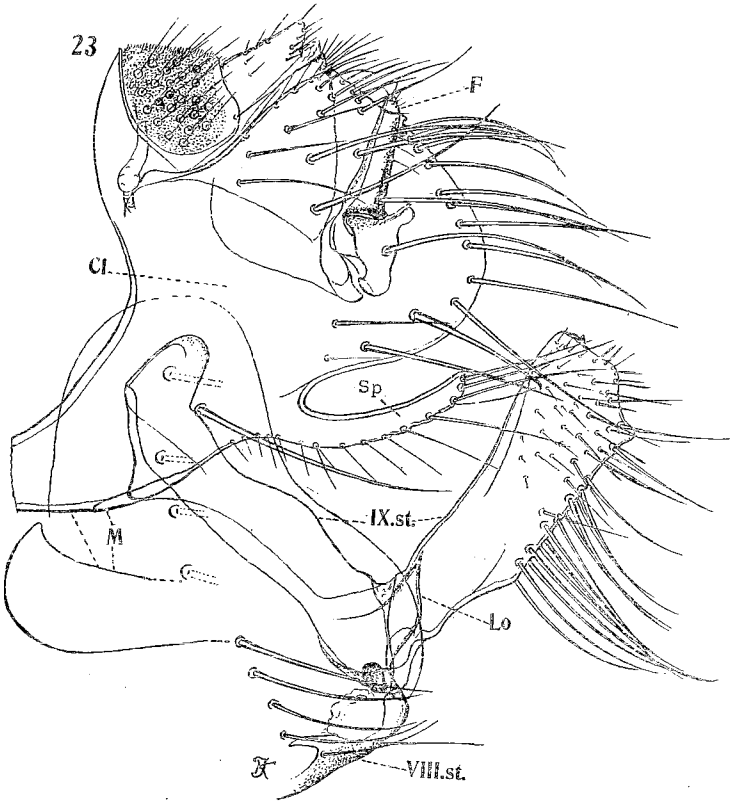

FIG. 23. — *Ectinorus setosicornis*, terminal segments of male.

truncate-incurved, lateral loboid (Ld) large, feebly sclerotized, proximally rounded on dorsal side, apically truncate, with the angles rounded, third lobe (Vld) finger-like, slightly concave on upper (= anterior) side and convex ventrally, rounded at apex; no (Lcl); penis-tube (Pen) with a short ventral tooth near apex and a much longer one more forward on dorsal side.

Female: Stylet a little over twice as long as broad, apparently a short distance away from margin of segment. Body of sperma-

theca (fig. 22 C) somewhat shorter than tail, concave dorsally and convex ventrally, orifice ventral, ringlets of body faintly indicated (in this specimen, mutilated by HOK). Length: male 1.7 to 1.9, hindfemur 0.37 to 0.45 mm.

The ventral lobe (Vld) is possibly homologous with the ventral claw of *E. trionyx* (fig. 18).

16. **Ectinorus setosicornis** sp. nov. (fig. 23, 24, 25)

Los Molles, on *Lagidium viatorum* 5 males and 16 females.

The only species in this genus with the bristles of segment I of the antenna long in both sexes (fig. 25 B) and the male clasper bearing a long narrow process (fig. 23, Sp) like most species of *Dysmicus*.

Labial palpus with 5 segments, reaching to or a little beyond apex of forecoxa. Genal process longer than in the other species of the genus, bearing at apex 1 to 3 short bristles, below eye 2 large ones in male, the anterior one sometimes smaller, 1 large one and further forward a smaller one in female, and in both sexes 2 very small marginal bristles towards the ante-ocular row of 3; the median bristle of this eye-row smaller in female than in male, at some distance from the row a much smaller bristle at the antennal groove in male only. On occiput a posterior row of 9 to 11 in male (two sides together) and usually 8, rarely 9, in female, the second from below being absent in female; in front of the row, above the antennal groove, 2 large bristles in male and 1 in female.

Bristles on thorax: in male on pronotum 4 or 5,12, mesonotum 10 or 11,9 to 11, metanotum 6 to 9,9 or 10; in female on pronotum 3 to 5,10 to 12, mesonotum 10 to 15, 8 to 10, metanotum 7 to 10,8 to 10; on metepimerum in both sexes each side 5 or 6 (2:3 or 4). Spines on abdominal tergum I 3 to 6. Bristles on terga in male on I 7,8, II 8 to 10, 12, III 2,12, IV, 12, VII 0 to 2,10; in female on I 8 to 10,8 or 9, II 10 to 15,12 or 13, III 10 to 12,11 to 13, IV 7 to 10,11 or 12, VII 10 to 12,10 to 12. On terga II and III one bristle of the anterior row below stigma; on III to V of female and often also on II and VI 2 bristles of the posterior row lower than stigma, in male one only. Sensilium with 23 or 24 pits each side (number more variable?).

Forecoxa with 20 to 25 bristles. Mid- and hindfemora with one row of bristles each side, outside row of hindfemur 6 to 8, inside row 10 to 15. Foretibia with 6 dorsal notches, stoutest dorsal apical bristle at most reaching to apex of tarsal segment I. Mid-

and hindtibiae with 7 dorsal notches, fifth and seventh bearing 3 bristles, the others 2, no stout additional dorsal bristles between these notches, only a few minute ones; on outer surface of hindtibia 7 or 8 dorso-lateral bristles, on inner side a lateral row of 5 or 6. On tarsal segment V the third pair of plantar bristles much nearer together than the first pair; at apex the usual pair of ventral ones, but proximally of this pair another pair, or in fore- and midtarsus 3 additional bristles, or even 4, besides a number of small hairs. Segment IV of foretarsus longer than broad, V thrice as long as broad. Longest bristle of fifth dorsal notch of hindtibia not reaching to apex of tibia, longest apical

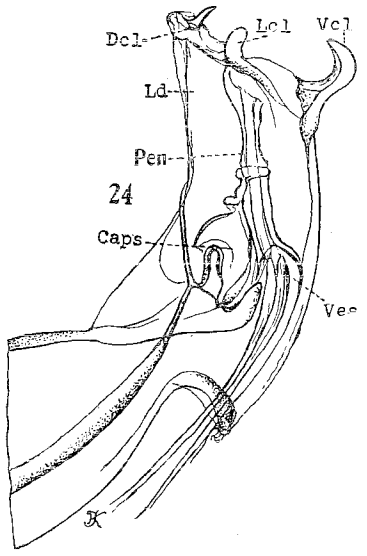

FIG. 24. — *Ectinorus setosicornis*, phallosome.

one of mid- and hindtibiae not reaching apex of tarsal segment I, longest anterior apical bristle of hindtibia somewhat longer than the longest apical one of the posterior side; no bristle of hindtarsal segment I extending to apex of II, but 2 of II reaching beyond IV. Measurements:

		Foretarsus	Midtarsus	Hindtarsus
Male	small	11, 14, 10, 8, 17	25, 21, 15, 8, 18	44, 27, 17, 11, 21
	large	12, 15, 11, 9, 20	28, 25, 18, 10, 22	50, 31, 20, 12, 23
Female	small	11, 13, 11, 8, 17	25, 25, 16, 9, 20	48, 28, 18, 11, 23
		13, 17, 14, 9, 21	33, 29, 20, 11, 23	57, 36, 22, 12, 26

Modified Segments. Male: Sternum VIII (fig. 23) with a vertical row of 8 to 10 bristles each side and a single ventral sub-

apical one; ventral apical angle rounded, somewhat projecting; above this angle a very sharply pointed lobe (Lo), about twice as long as broad, emphazized in the drawing; the lobe is for the greater part covered by the external apical area of the segment, the margin of this area commencing on the outside of the rounded ventral apical projection, sternum VIII having on each side of the body in the ventral third two apical margins, an inner one

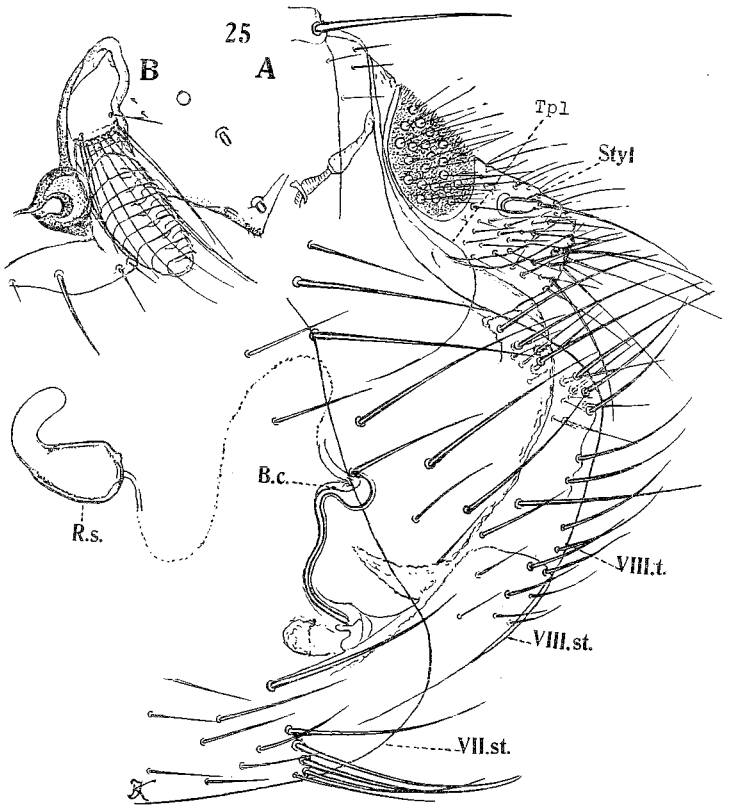

FIG. 25. — *A*, *Ectinorus setosicornis*, terminal segments of female; *B*, antenna.

bearing the pointed lobe Lo and an outer one which is ventrally and dorsally convex and medianly concave. Manubrium M of clasper widened-rounded ventrally at the end, with the tip directed upwards. Clasper with long ventral spur (Sp) somewhat variable in width, bearing a variable ventral row of bristles, of which the distal ones are long; posterior margin of clasper rounded, more or less ventricose, with about 12 bristles from ventral side to the small marginal tooth, and about the same mumber

on the side, at dorsal margin small bristles. Digitoid F lateral, straight, narrow, tapering, its apex projecting a little beyond the margin of the clasper. Vertical arm of sternum IX resembling that of *Panallius galeanus,* its upper end projecting backwards as a rounded lobe; ventral arm of the same type as in *P. galleanus* and in *Dysmicus barrerai* but the apical three-fifths broader than the basal two-fifths, bearing long bristles along the ventral margin, apical third with numerous small bristles on side, a ventral subapical tooth more or less prominent, apical margin truncate, with a tooth near upper angle variable in size. Phallosome (fig. 24) of the same type as in *E. trionyx*: dorsal claw (Dcl) below upper angle, lateral claw (Lcl) rounded in type and another specimen, narrower and almost pointed in others (in which the claws are less far apart), ventral claw (Vcl) longer than in *E. trionyx;* penis-tube also longer; lateral loboid (Ld) not projecting beyond apex of phallosome.

Female: Above stigma of tergum VIII (fig. 25 A) 2 to 4 bristles, from stigma down and along ventral and apical margins on outer surface 25 to 27 bristles, on inside 13 or 14; apical margin of some specimens incurved behind the lower internal bristles; stigma ending at or very near margin. Stylet lateral, about twice as long as broad. Spermatheca (R. s.) broadest posteriorly, nearly truncate, the body pyriform, orifice terminal. Duct of bursa copulatrix curved twice (B. c.), duct and bursa measured in a straight line about one-third shorter than hindtarsal segment II.

Length: male 2.3 to 2.9, hindfemur 0.48 to 0.53 mm.; female 2.8 to 3.1, hindfemur 0.51 to 0.69 mm.

This species connects *Ectinorus* with *Panallius* and *Dysmicus.*

Eritranis Jordan 1942. — Genotype: *Parapsyllus andricus* Jordan 1939, Novit. Zool. XLI, p. 300, fig. 263, 265.

The teeth of the mandible, on the posterior side, drawn out into short filaments (fig. 26 A), the exceptionally large sensilium bearing over 50 pits each side (fig. 27), and the very short stylet being placed above the middle of the side of the anal segment are remarkable features which sharply separate the genus from all other *Rhopalopsyllinae.*

The single species is distinguished in many other ways; some of the somatics mentioned below may be generic distinctions, a point which can only be ascertained when at least one more species of the genus has become known. The position of the stylet is particularly interesting. Judging from this species and other fleas, the stylet

is evidently not homologous with the true cercus of other insects, but is part of the last tergum and probably derived from its tergopleurite (upper pleurite of a generalized abdominal segment). Its original position in fleas, I think, is at the ventral margin of the tergum; from here it has wandered up to the lateral surface in many fleas and has then finally disappeared in a small number of genera. It would be worth while to study the question at the larvas and pupae of such genera as *Hectopsylla* and *Trichopsylla* in which the stylet is lost.

17. **Eritranis andricus** Jordan 1939 (fig. 26, 27)

Parapsyllus andricus Jordan l. c.; and in Revista Instituto Bacteriologico 1940 IX, p. 618, fig. 263, 265 (San Juan, on *Galea leucoblephara*). Fig. 264 represents the foretibia of *Dysmicus barrerai*.

Santa Rosa, on *Microcavia australis*, 3 males and 5 females.

The foretibia being imperfect in the single specimen from which the species was described, we give here a figure of the tibia of a Santa Rosa male (fig. 26 B). A large species. Proboscis reaching to middle or end of trochanter in male, to the underside of the femur in female, the labial palpus consisting of 5 segments. Apex of genal process pointed, bearing 2 small bristles at the tip, sometimes with another below them, and 3 large ones below the eye, the posterior one of them close to the eye, occasionally a fourth bristle behing the eye. Subapical row of occiput with 12 to 14 bristles (the two sides together), between this row and the base of the antenna usually 3 long bristles, sometimes 4 or even 5. Apex of segment I of antenna in male with a few short bristles and at anterior apical corner or near it a longer one, which nearly reaches to the middle of the club; in female 3 or 4 long bristles and some shorter ones, the longest being placed at the posterior apical angle and extending beyond club.

Bristles of thorax and abdomen as described in 1939, but the numbers variable, as was to be expected. In female the row on pronotum normal. Bristles on abdomen of female: on tergum I 6 to 12,11 to 14, II 3 to 16,17 to 19, III 2 or 3,16 to 19, IV 0,15 to 18, V 0,15 to 18, VI 0,15 to 17, VII 1 to 7, 7 to 10; on basal abdominal sternum a lateral patch of 15 to 19 small ones each side, on III (two sides together) 8,8 to 10, IV 0,4 to 7, V 0,5 to 7, VI 0,6 to 9, VII 0 to 2,9 to 13. While in the male some of the bristles of tergum VII are placed lower than the stigma, they are in the female all above the level of the stigma.

Bristles of the tibiae and tarsi characteristic of the species and almost alike in the sexes. The stout dorsal apical one of foretibia reaching to near apex of segment II of tarsus (fig. 26 B); apical pair of forefemur very long. Long median dorsal briste of mid- and hindtibiae extending beyond apex of tibiae, longest dorsal apical one of hindtibia beyond apex of tarsal segment I, longest of segment I beyond III, and the longest of II to or beyond middle of V, as a rule a little longer in female than in male; in all tarsi V

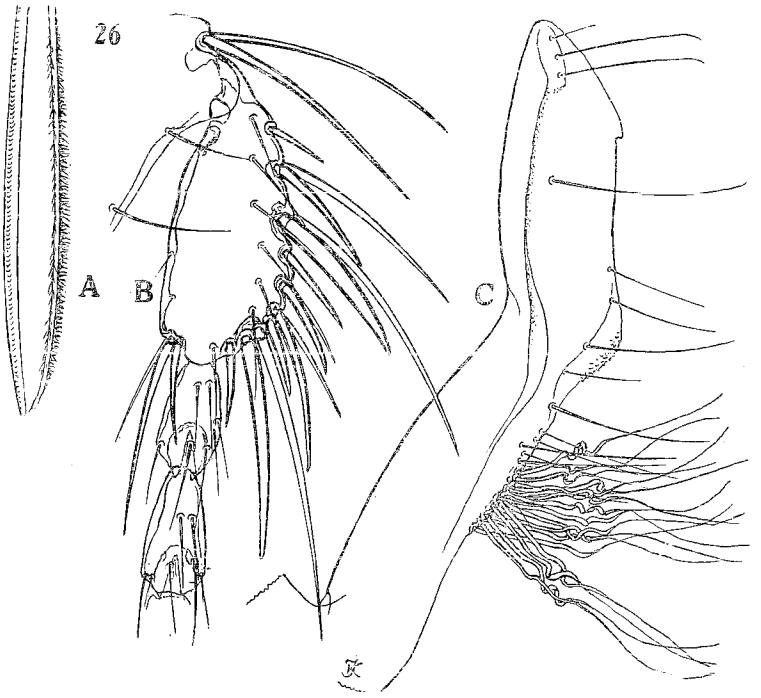

FIG. 26. — *Eritranis andricus*. A, mandible of female; *P*. foretibia of male; *C*. ventral arm of sternum IX of male

with 2 ventral apical bristles and on sole many small hairs from apex to third plantar pair; this pair closer together than second. In foretarsus V about twice as long as broad in male, a little longer in female; IV of hindtarsus only one-third longer than broad. On outer side of hindtibia 10 to 15 dorso-lateral bristles in male, and 10 to 13 in female, on inner side a lateral row of 6 in male and 5 to 8 in female. Largest dorsal notch of tibiae in middle, not below it, and bearing 2 bristles; between this notch and subapical one several stout dorsal bristles, and on mid- and hindtibiae 1 or 2 between second and third notches. Measurements:

	Male	Female
Foretarsus .	12 to 13, 12 to 14, 10 to 11, 7, 17 to 19.	12 to 15, 13 to 16, 10 to 12, 7 to 9, 19 to 21.
Midtarsus ..	30 to 36, 25 to 28, 13 to 15, 8 or 9, 19 to 21.	38 to 41, 29 to 31, 15 to 17, 8 to 10, 21 to 23.
Hindtarsus .	60 to 66, 40 to 42, 16, 9 or 10, 21 or 22.	60 to 73, 40 to 48, 16 to 20, 21 to 24.

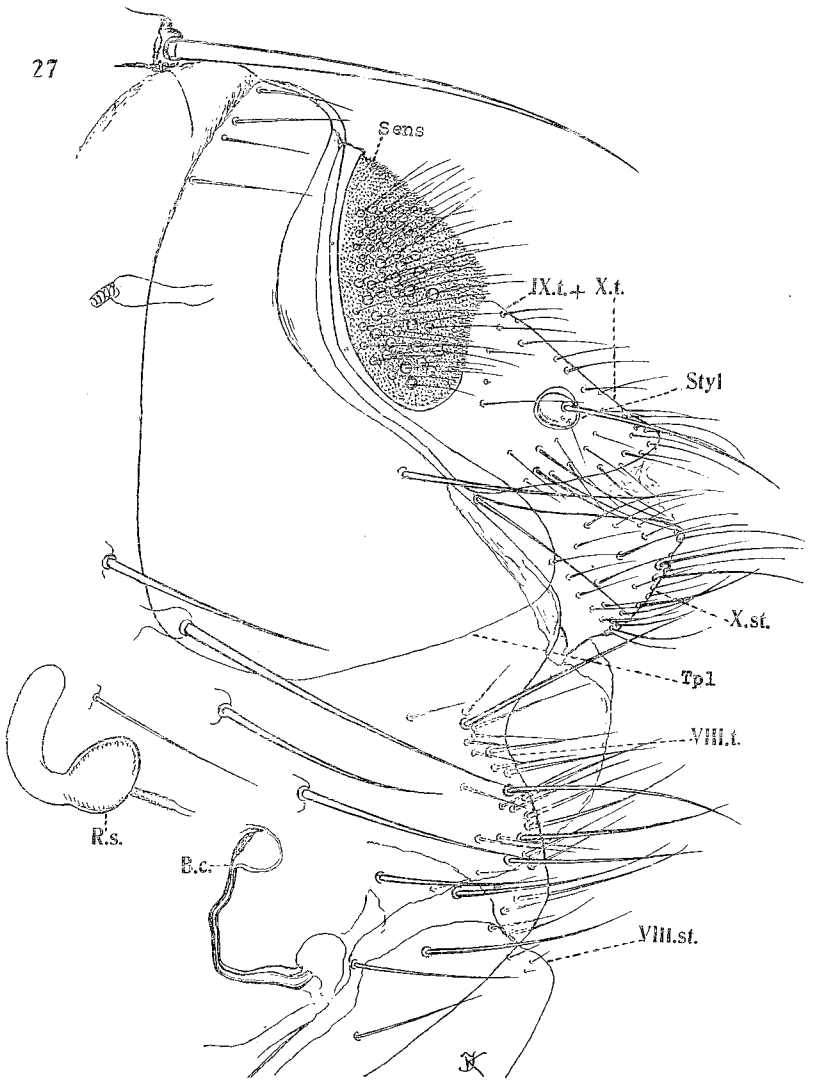

FIG. 27. — *Eritranis andricus*, terminal segments of female.

In the original description the proportional length of V of foretarsus was given as 10, a misprint for 17.

Many of the bristles of the clasper are long (most of them broken off in type). The ventral arm of sternum IX is here refigured (fig. 26 C), as it is defective in the type: on the anterior side of the elbow there is a patch of 14 or 15 long twisted bristles on the right and left arms together, almost concealing the straight bristles; elbow irregularly dentate, with a few slender bristles above and below it; at apex long bristles and a short one (in type one of the long ones broken away).

In female (fig. 27) tergum VIII bears above the stigma 3 to 5 bristles each side and from the stigma downwards on the outer surface (inclusive of apical margin) 10 to 17, on inner side at and near margin 16 to 25, most of the latter small as usual. Stylet (Styl) usually with a minute subapical bristle, a similar or larger one at apex and a large subapical one, in one specimen 2 large bristles on the left stylet; in another specimen the stylet only half the normal size and the pit in which it is inserted indistinct. Body of spermatheca (R. s.) ovate or irregularly elliptical in outline, not symmetrical, a little longer than broad, with the orifice subventral. Duct of bursa copulatrix long.

Length of hindfemur in male 0.67 to 0.75, in female 0.75 to 0.80 mm.

Panallius Jordan 1942. — Genotype: *Parapsyllus galeanus* Jordan 1939, Novit. Zool. XLI, p. 294, fig. 256 to 260.

Easily recognized by the metanotum being membranous dorsally behind the row of bristles, which is curved forward, the claws of all tarsi very strongly asymmetrical, segment I of hindtarsus half as long as the tibia, and segment II of hindtarsus half as long as I. No comb on abdominal tergum I. So far only one species is known.

18. **Panallius galeanus** Jordan 1939

Parapsyllus galeanus Jordan, l. c., and Revista Instituto Bacteriologico 1940, IX, p. 603, San Juan, on *Galea leucoblephara*.

San Rafael, on *Microcavia australis*, 7 males & 16 females. La Paz, on the same host 2 males & 6 females, and on *Lagostomus maximus* 2 females. Santa Rosa, on *Microcavia australis* 3 males & 4 females.

In the original description the foretibia is said to bear « an additional stout apical bristle », which should read « the strongest apical bristle particularly stout ». The range of variability in the number of bristles of body and legs is greater than in the original series of specimens, the dorso-lateral bristles of the hindtibia, for

instance, vary in the male from 14 to 22 and in the female from 9 to 18. On sternum VII of female there are from 19 to 32 bristles, the posterior row containing from 13 to 20 (the most frequent number being 16, on the two sides together), and the anterior bristles vary from 5 to 12. The hindtibia has 6 or 7 dorsal notches bearing 2 bristles, the median notch and the apical one 3; in between the second and third notches or between fifth and sixth or in between both pairs of notches a stout dorsal bristle, sometimes 2 between the fifth and sixth, some specimens bearing 7 notches and 3 stout additional bristles. The small ring shown in fig. 259 (of 1939 & 1940) proximally of the patch of bristles on sternum IX is really a double tooth clearly visible in some males and merely a dark mark in others. The very broad manubrium of the clasper is a very distinctive feature. The duct of the bursa copulatrix forms a single arc, being usually curved backwards, more rarely straighened (by pressure). Sensilium with 20 pits (the number slightly variable?) each side.

Dysimicus Jordan 1942. — Genotype: *Parapsyllus barrerai* Jordan 1939, Novit Zool. XLI, p. 297, fig. 261, 262, 264

Distinguished from the allied genera by a combination of characters: Frontal tubercle like a poplar-leaf (more or less), the marginal bristles above it quite short, episternum of metathorax with bristles, abdominal tergum I without spines, claws of tarsi symmetrical, metanotum and teeth of mandible normal, sensilium with fewer than 25 pits each side.

8 species are known, 2 of them new and here described: 2 from Peru, 1 from Bolivia and 4 from Argentina.

KEY TO THE ARGENTINE SPECIES

a. Foretibia with 5 dorsal notches, the first notch being absent ..... b.
Foretibia with 6 dorsal notches; labial palpus with 5 segments; in male segment II of hindtarsus short and apically dilated, apex of ventral arm of sternum IX prolonged upwards; body of spermatheca subglobular.
D. budini Jordan & Rothschild 1923, Otro Cerro, Catamarca, on *Andinomys edax*.

b. Labial palpus with 6 to 8 segments ..... *D. barrerai* Jordan 1939, San Juan.
Labial palpus with 5 segments ..... c.

c. Segment I of midtarsus one-half longer than V; tail of spermatheca measured in a straight line very little more than one-half longer than the body is broad (fig. 30). Male not known ..... *D. ixanus* sp. nov.
Segment I of midtarsus little longer than V; tail of spermatheca twice as long as the body is broad. Sternum VIII of male with two lobes each side at ventral angle (fig. 28), posterior tooth at ventral margin of sternum IX distant from apex ..... *D. hapalus* sp. nov.

19. **Dysmicus barrerai** Jordan 1939

Parapsyllus barrerai Jordan l. c.; and Revista Instituto Bacteriologico 1940, IX, p. 614, fig. 261, 262, 264; San Juan, on *Galea leucoblephara*.

San Rafael, on *Microcavia australis* 10 males & 19 females, on *Pseudalopex griseus* 5 males & 3 females, on *Conepatus suffocans* 1 female, and on *Galea leucoblephara* 1 male. Malargüe, on *Microcavia australis* 3 males & 5 females. Santa Rosa, on the same host 1 male & 3 females, and on *Graomys griseoflavus* 1 female. Las Catitas, on *Octomys barrerae* sp. and in its nest 51 males & 59 females.

The species seems to flourish in the nest of *Octomys*, which is probably its true host. The range of variability in this long series is considerable. The number of segments of the labial palpus varies in both sexes from 6 to 8; sometimes the two palpi of the same specimen differ by a segment, and occasionally a segment is clearly separated on one side and not on the other of the same palpus. The bristles of the foretibia are somewhat stouter in the female than in fig. 264 of 1939, which was taken from the male. The ventral spur of the clasper of the male is usually a little longer and of more uniform width than in the type specimen (fig. 261 of 1939); the apex of sternum IX is strongly rounded in the original figure, but the present series shows that the shape of the apex of this sclerite depends on its position on the slide, the upper apical angle being often less than 90°, with the tip rounded and the apical margin more or less straight; the anterior ventral tooth is frequently double and the apical hook variable in length; there are at the apical dorsal angle and near the apical margin some minute bristles which have accidentally been left out in fig. 261. Variability of bristles on abdominal sternum VII of female 0 to 6,9 to 13. Duct of bursa copulatrix forming a single arc as in the next species. Sensilium with 17 pits in both sexes.

20. **Dysmicus hapalus** sp. nov. (fig. 28, 29)

Santa Rosa, on *Graomys griseoflavus* and in its nest 3 males & 5 females (mostly badly damaged by KOH).

Nearest to *D. barrerai*, but the labial palpus consists of 5 segments. As in that species the genal process and the bristles on antennal segment I short. Proboscis reaching to or a little beyond apex of forecoxa. Bristles on pronotum (both sides together) 4,12 to 14, on mesonotum 11 to 14,12, on metanotum 5 to 10,12; on metepi-

merum 4 to 6. On abdominal terga I 9 or 10,10 to 12, II 12 to 17,15 to 17, III 9 to 14,16 or 17, VII in male 4?, 14 or 15, in female 10 to 13,12 or 13. Basal abdominal sternite in basal half of side in male 2 to 8 and in female 11 to 13 small bristles. Sterna III to VII in male 6 bristles each, in female on III and IV 1 to 3,7

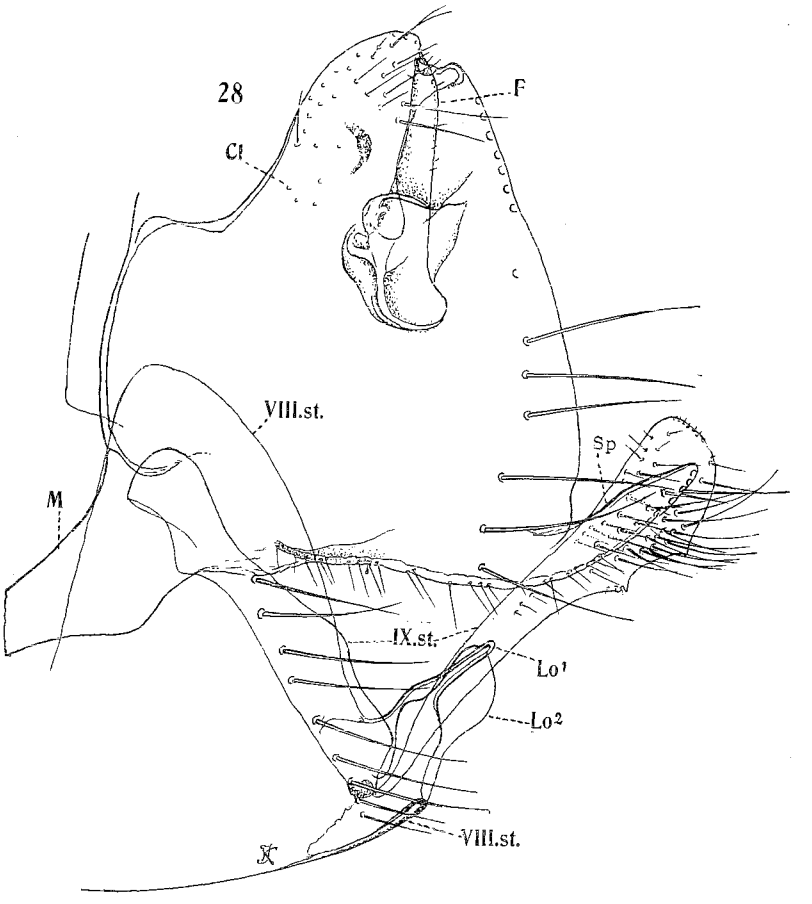

FIG. 28. — *Dysmicus hapalus*, genitalia of male.

to 10, V 0 to 2,8, VI 0,7 or 8, VII 2,11 to 13. In female of *D. barrerai* the bristles more numerous, especially on sterna II and III.

On forecoxa about 30 bristles; foretibia with 5 dorsal notches; on outside of hindtibia 12 to 18 dorso-lateral bristles, on inner side usually none, sometimes one; longest dorsal apical one of midtibia reaching in male beyond tarsal segment II, being somewhat shorter in female; the corresponding bristle of hindtibia extending beyond apex of tarsal segment I, 3 apical bristles of I reaching to or beyond

apex of II, and 3 of II in male to apex of V and 2 in female to base of V. Between second and third dorsal notches of hindtibia or 2 dorsal bristles, the upper thin and the other much stouter, being larger in female than in male; in wide interspace between fourth and fifth notches or 2 very small dorsal bristles. Measurements:

	Male	Female
Foretarsus	10, 10, 7, 5, 14	9, 10, 7, 5, 14
Midtarsus	16, 16, 10, 6, 15	19, 18 or 19, 11, 7, 15 or 16
Hindtarsus	39, 26, 16, 10, 19	35 or 36, 24 or 25, 14, 8 or 9, 17 or 18

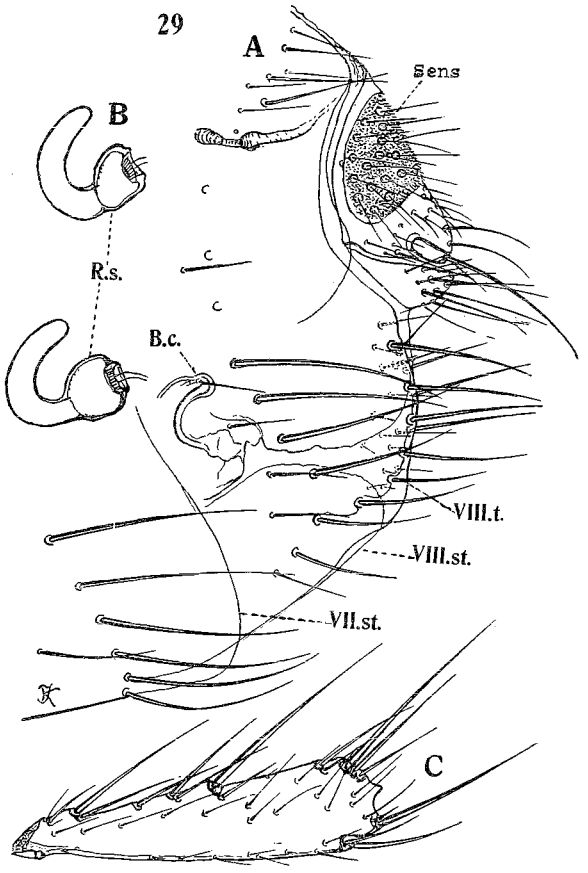

FIG. 29. — *Dysmicus hapalus*. *A*, terminal segments of female; *B*, spermatheca of another female *C*, hindtibia of female.

According to these measurements the midtarsus of the male is shorter and the hindtarsus longer than in the female; but as the legs are preserved in only one male and two females, we must

expect that the measurements will not be confirmed by a series with undamaged legs.

Modified Segments. Male: Sternum VIII (fig. 28) on each side with a row of 7 to 9 bristles and two lobes, one lobe (Lo^1) being narrow in distal half and the other (Lo^2) apically broad and round. Clasper (Cl) similar to that of *D. barrerai,* apex sinuate, from sinus downwards a row of long bristles, which are more numerous than in *D. barrerai;* ventral spur (Sp) much broader than in that species and bearing numerous bristles, of which 3 to 5 ventral ones at the apex are long. Manubrium likewise broader. Vertical and ventral arms of sternum IX longer than in *D. barrerai,* the ventral arm about 5 times as long as subapically broad, apex widened, strongly rounded (variable according to position on slide), not truncate, the ventral margin of the widened area with two teeth, the posterior one about halfway between the anterior tooth and the apex; on widened area many small bristles and a patch of long ones.

Female: Tergum VIII with 7 or 8 bristles above the stigma (fig. 29 A, B), from stigma down inclusive of apical margin 20 to 26 bristles on outer surface and 17 to 19 on inner; the apical margin not incurved below the inner bristles. Body of spermatheca (R. s.) dorsally more convex than ventrally, tail somewhat longer than in *D. barrerai,* more or less narrowed to apex, in 4 of the 5 females the body more asymmetrical than in fig. 29 A and the tail more distinctly narrowed apically, as shown in fig. 29 B. Duct of bursa copulatrix (B. c.) shorter than in *D. barrerai.*

Length: male 2,4 to 2.7, female 2.5 to 2.8 mm.; hindfemur in both sexes 0.48 to 0.51.

21. **Dysmicus ixanus** sp. nov. (fig. 30).

San Rafael, on *Microcavia australis* 1 female.

As in *D. hapalus* the labial palpus with 5 segments. A smaller species, differing especially in the spermatheca and legs. Proboscis reaching almost to the trochanter. Bristles on terga: pronotum 3,14, mesonotum 9,13 and a few minute ones nearer base, metanotum 8,14, abdominal terga I 10,11, II 13,17, III 14,17, V 12,17, VI 14,16, VII 11,14. Metepimerum 5. Basal sternum 24 one side, 25 the other. Sternum III ?, IV to VI 7, VII 4,12. Lowest bristle of anterior row of terga II to VII obliquely below and behind stigma as in *D. hapalus.* On one forecoxa 25 and on the other 29 bristles inclusive of apical ones; on outside of one hindtibia 8 dorsolateral brisles and 10 on the other; between second and third dorsal

notches of mid- and hindtibiae one thin bristle, not a stout one as in *D. hapalus*. Forestarsal segment I a very little shorter than II; midtarsal I longer than in *D. hapalus*, being one-half longer than V. Measurements: Foretarsus 9, 9.5, 6.5, 5, 12; midtarsus 21, 17, 9, 6, 14; hindtarsus 35, 25, 12, 7, 16.

Two apical bristles of hindtarsal segment I reach beyond II, and 2 of II beyond IV. Above stigma of tergum VIII 6 bristles, from the stigma downwards inclusive of apical margin 21 on outer side and 17 on inner side; margin of widened area not incurved below inner bristles. Stylet a little shorter than in *D. hapalus*, not quite twice as long as broad the proportions being in *hapalus* 7 : 15 and

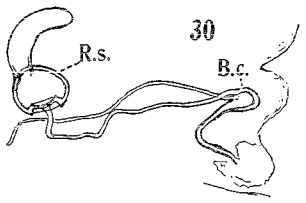

FIG. 30. — *Dysimicus ixanus*, spermatheca and bursa copulatrix.

7 : 16, and in *ixanus* 6 : 11. Tail of spermatheca (fig. 30) much shorter than in *D. barrerai* and *D. hapalus*, the body a little broader than long. Length 2.0, hindfemur 0.43 mm.

Listronius Jordan 1942. — Genotype: *Parapsyllus ulus* Jordan & Rothschild 1923, Ectoparasites I, p. 354, fig. 369.

Frontal tubercle an acute triangle, its sides straight, not rounded. Confined to the southern districts of Argentina? 3 species are known, each by a single specimen: *L. ulus* J. & R., 1923, Chubut district, a male on *Abrothrix suffusus*. *L. fortis* J. & R., 1923, Chubut district, a female on *Akodon iniscatus*. *L. robertsianus* Jordán 1939, Malvinas (Falklands), one female from a burrow in which nested *Spheniscus magellanicus* and *Procellaria aequinoctialis*.

Parapsyllus Enderlein 1903. — Genotype: *Pulex longicornis* Enderlein 1901 (St. Paul).

This genus, which contains the Penguin fleas, has been dealt with in Eos 1942. The genus will certainly be discovered in Argentine territory wherever Penguins and Puffins and other oceanic birds breed.

22. **Phthiropsylla agenoris** Rothschild 1904

La Paz, on *Chaetophractus* villosus 1 female. San Rafael, on the same host 2 males & 1 female. Santa Rosa, on *Canis familiaris* 2 females. In 1937 Dr. J. M. de la Barrera collected the species at Fortin Uno, Río Negro, on *Lepus europaeus* 1 male; in 1938 at San Juan on *Galea leucoblephara* 3 females, and at Mendoza on *Chaetophractus villosus* 2 males and 2 females. Wagner separated the species as *Phthiropsylla* in 1939.

23. **Neotyphloceras crassispina hemisus** Jordan 1936

Santa Rosa, on *Graomys griseoflavus,* one female.... This subspecies is evidently restricted to the eastern side of the Andes; we have it from the Río Negro district, Tucumán and. Catamarca, Argentina and from Potosí and Sucre in Bolivia. In Chile occurs *Noc. chilensis Jordan* 1936.

24. **Tiarapsylla argentina** sp. nov. (fig. 31, 32 A, B, 33, 34).

San Rafael, on *Ctenomys mendocinus* 7 males and 21 females. By the unfortunate mistake in the supply of chemicals (to which we have referred before) all males and some females of this series have been badly damaged; for that reason I have selected as type a well-preserved female.

Tiarapsylla Wagner 1937 is intermediate between *Cleopsylla* Rothschild 1914 and *Nonnapsylla* Wagner 1938, combining characteristics of both, the new species on the whole agreeing best with *Tiarapsylla.*

The new species differs from *N. rothschildi* Wagner 1938 (East Bolivia) and *T. titschacki* Wagner 1937 (Southern Peru; known to me only from the description and figures) in the second segment of the antenna (fig. 31) bearing only one long bristle istead of a row of long ones, in the pronotum being shorter and its anterior row reduced to 2 or 3 bristles each side, in the abdominal tergum II and following being devoid of short apical spines and in the bristles of the hindtibia (fig. 32 A) being longer. The genal area is not entirely fused with the helmet, a pale suture running from the base of the antennal groove forward and then as a thin line downward, but not crossing the ventral margin as it does in *Nonnapsylla.* The abdominal terga II to VII have only one row of bristles, as in *Nonnapsylla,* and the spermatheca has the same

peculiar shape as in that genus, bearing some similarity to the spermatheca of *Craneopsylla* Jordan 1931. The helmet is almost identical with that of *T. titschacki*, being narrow and its frontal margin not angulate in the middle as it is in *Nonnapsylla*. Its comb extends a little farther dorsad than in Wagner's figure and contains 10 spines in the female and 9 in the male; in front of the comb ventrally 2 long thin bristles and submarginally a row of very minute ones in the angles between the short broad marginal sclerotizations; the pale depression above the comb smaller than in *T. titschacki*. On genal area two long bristles and in between them one or two thin ones; genal process above genal comb

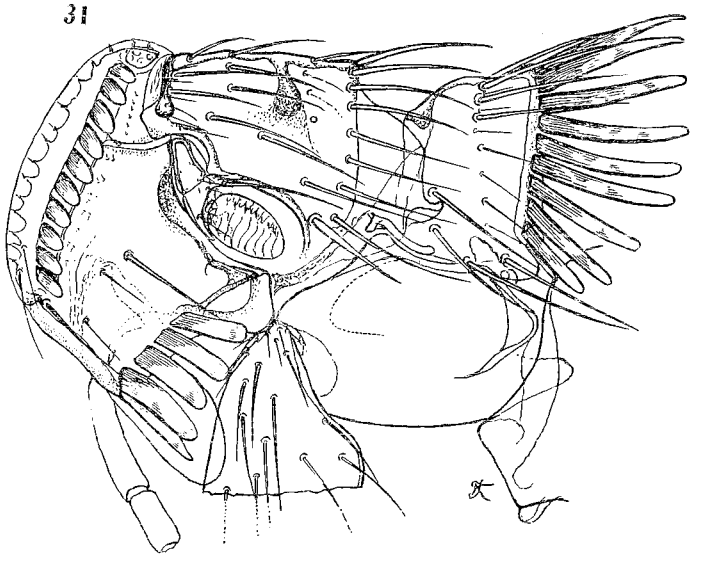

FIG. 31. — *Tiarapsylla argentina*, head and thorax of female.

obliquely truncate, broader than in *T. titschacki*. Occiput with two incrassations as in that species, the anterior much narrower than the postmedian one; in front of the most ventral bristle of the posterior row a shorter and much stouter one, and the dorsal bristles of the posterior row stouter than the lateral ones.

The most remarkable modification in the morphology of this flea obtains in the labial palpus (fig. 32 B); a comparative description of it will be found under the next species, *Craneopsylla wolffhuegeli*.

Pronotum with a comb of 18 spines in female and 16 or 17 in male, apices of spines rounded, below the comb usually a small additional spine; two rows of bristles, the posterior row with 16,

of which the dorsal pair is slightly the thickest and the fifth and sixth counted from above much reduced in length and thickness; the anterior row reduced to two long bristles, occasionally with a smaller one above them; there is perhaps a connection between the enlargement of the anterior bristles and the reduction of the median posterior ones. Mesonotum with two rows of bristles, a few additional dorsal ones and a large number at and near base; on underside

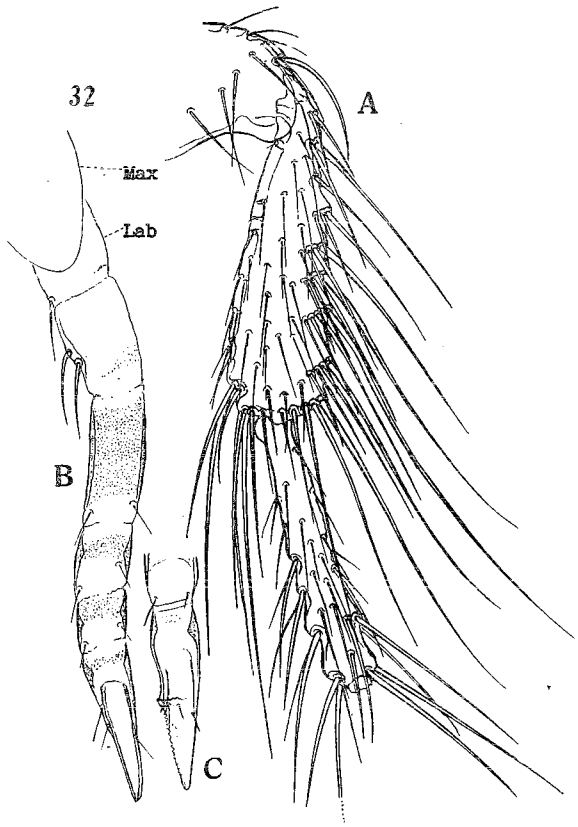

FIG. 32. — *A* and *B*, *Tiarapsylla argentina*, proboscis and hindleg of female; *C*, apex of proboscis of *Craneopsylla wolffhuegeli* female.

of mesonotal collar about 16 thin spines. Metanotum likewise with two rows, the posterior one with 14 to 19 and the anterior row with 13 to 18 bristles. Mesopleura with 9 to 11 bristles; metepisternum with 4 or 5, of which the dorsal one is often small, the others being always large; on metepimerum 4,5, less often 4,4.

Abdominal tergum I with 1 to 5 apical spines; bristles on I 2 to 5, 14 to 16, II 2,25 to 27, III to VI 0,24 to 27, VII in male 0,14

and in female 1 to 5,16 or 17. Basal sternum without lateral bristles; the other sterna with one row containing usually 10 to 12 bristles (on the two sides together), more rarely 8 or 9, in front of the row no bristles or only 1. Stigmata within the row of bristles, on the median terga 3 bristles below the stigma, on VI and VII 2, sometimes 2 also on V, and on VII occasionally 1. Antepygidial bristles long, 2 in male, 3 in female.

On inner side of hindcoxa a comb of 5 to 7 spiniform bristles, the row continued by some spiniforms drawn out into a hair. Mid- and hindfemora without a complete row of bristles, near apex an oblique transverse row of 4 (fig. 32 A), on inner side one subapical ventral bristle, no lateral ones, dorsal marginal bristles rather long. Foretibia with 6 dorsal notches and midtibia with 7 or 8, some of the bristles very long, all close together, no gap between the bristle at anterior apical corner and the dorsal ones, the longest bristle as long as tibia or longer; hindtibia (fig. 32 A, female) with 8 or 9 dorsal notches, the bristles much longer than in *T. titschacki*, the longest apical ones reaching beyond apex of tarsal segment I; on outer side of hindtibia 15 to 22 bristles, not counting the ventral and subventral ones. Bristles of hindtarsus longer in male than in female, longest apical one of segment I reaching to or beyond apex of III, 2 of II beyond middle of V (female) or beyond apex (male); on sole of V numerous small hairs in apical half, and 2 apical stout bristles, first pair of plantar bristles in between second pair in all tarsi.

MEASUREMENT OF TARSI

	Male	Female
Foretarsus .	8 or 9, 9, 7, 6, 7 or 18	7 to 9, 8 or 9, 7, 5, or 6, 16 or 17
Midtarsus ..	19 to 21, 18 or 19, 8 or 9, 5, 15 or 16	21 to 26, 20 to 23, 12 to 14, 7 or 8, 16 to 18
Hindtarsus .	40 to 45, 25 to 31, 14 or 15, 8 to 10, 17	46 to 53, 29 to 34, 16 to 21, 11 12, 17 to 20

Modified Segments. Male: Sternum VIII with 10 or 11 bristles (probably more variable, not countable in the defective specimens). Tergum VIII with straight horizontal ventral margin, the posterior ventral angle acute (fig. 33, an), halfway between stigma and ventral margin two long bristles close together. Manubrium of clasper, measured ventrally, a little longer than body of clasper, almost gradually narrowed to a point, but at one-third from base somewhat widened; body of clasper slightly less than twice as long as broad, widest near apex; opposite the apex of digitoid F

the margin of clasper bears a strongly sclerotized and minutely serrate short conical projection, below which the margin is incised, bearing below the incision another, larger triangular projection; the upper projection is the end of a sclerotised marginal ridge; at the distal and dorsal margins and on the side a variable number of bristles, about 25, all much shorter than the clasper is broad; on inner side a number of small bristles indicated in the figure by dotted lines; at ventral margin near base of digitoid F one or two minute bristles. Digitoid marginal, about three times as long as

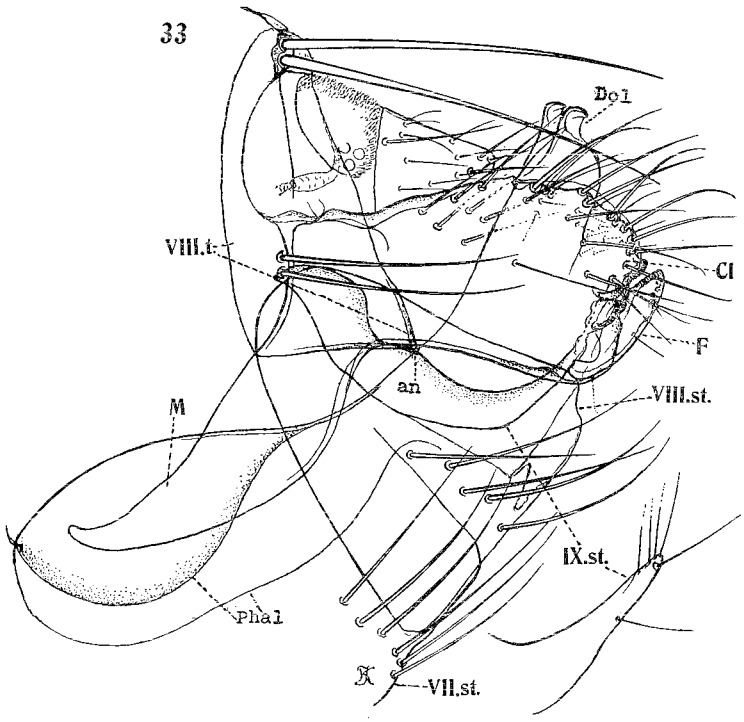

FIG. 33. — *Tiarapsylla argentina*, genitalia of male.

broad, posterior margin slightly and almost evenly rounded, apex more or less acuminate, but not sharp, varying according to the position on the slide, anterior margin minutely denticulate like the opposite margin of the clasper (also in *Craneopsylla*), besides some minute hairs two longer slender bristles, the longer below apex, the shorter near middle.

Sternum IX as in figure 33, the vertical arm not forming an angle with the ventral arm, the latter gradually narrowed to a point; the apex drawn separately, as it is covered by the clasper

and digitoid in the specimen, its bristles thin, one at ventral margin beyond middle. Terminal dorsal process (one each side) of paramere of phallosome dorsally rounded (Del), ventrally incurved, somewhat resembling the head and neck of a partridge or pigeon.

Female: Stylet short, at most twice as long as broad. Tergum VIII dorsally completely divided, the sclerite extending on the slides much above the membranous median area, no bristles above the stigma, from the stigma down from 26 to about 30 on the outer and inner surfaces together, the posterior margin with broad sinus

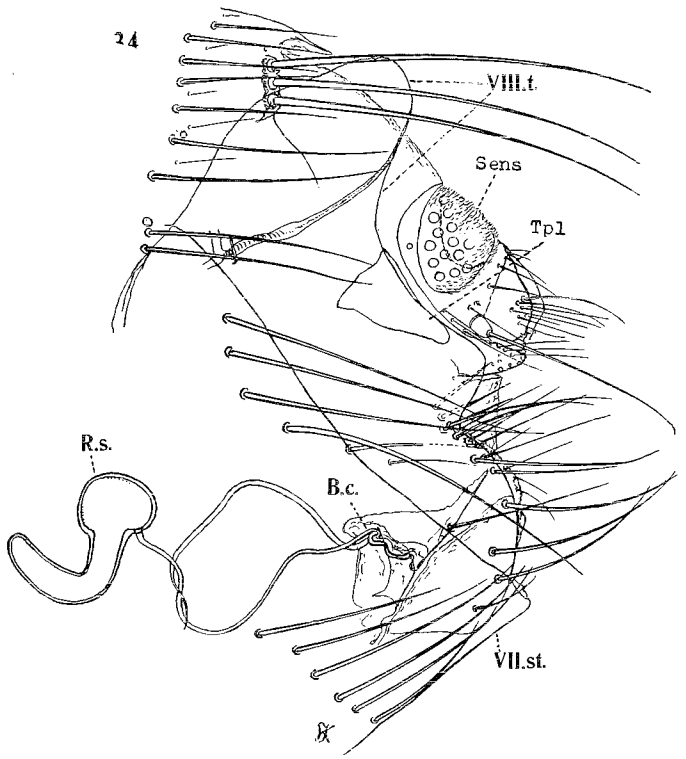

FIG. 34. — *Tiarapsylla argentina*, terminal segments of female.

behind the external upper submarginal bristles. Duct of bursa copulatrix (B. c.) short, curved twice, the blind duct long and somewhat broader (except apically) than the duct of the spermatheca. Body of spermatheca subglobular as in *Nonnapsylla*, more projecting ventrally than dorsally, orifice ventral, close to tail.

Length: male 1.7 to 1.9, hindfemur 0.4 mm.; female 2.3 to 2.5, hindfemur 0.45 to 0.51 mm.

25. **Craneopsylla wolffhuegeli** Rotschild 1909 (fig. 32 C).

La Paz, on *Graomys griseoflavus* one pair. We have the species also from Buenos Aires, Río Negro, Tucumán, Córdoba, and Paraguay.

The unique modification of the apex of the proboscis observed in *Tiarapsylla, Nonnapsylla* and *Craneopsylla* is best understood if the proboscis is compared with thaf of the allied genera *Plocopsylla* and *Sphinctopsylla* Jordan 1931. In the latter genera the proboscis is truncate and bears at the apical margin some small bristles; sometimes a small pale cone projects from the interior of the last segment, evidently a prolongation of the internal membrane of the labial palpus. In *Tiarapsylla argentina* (*T. titschacki* has not been compared) segment V (fig. 32 B) is elongate conical and from its interior protrudes a long cone which has the appearance of a sixth segment. There is no break in the outer contour which would indicate segmentation, and I regard this apical cone as a modification of the inner membrane, sclerotized and stiff; the small bristles at the side of V are homologous with the apical bristles of *Plocopsylla* and other fleas. In *Nonnapsylla* and *Craneopsylla* there is a further modification. In these fleas the apex of segment V bears a transverse ridge which projects on the anterior side of each palpus as a distinct tooth, and the rigid cone which protrudes from the interior of V in each palpus is serrate on the anterior side (fig. 32 C). This modification of the flea proboscis indicates that the function of the labial palpus is also modified. When a flea with a normal proboscis pierces the skin of the host the two labial palpi separate and lie right and left on the skin. The end-structure of the proboscis of *Tiarapsylla, Nonnapsylla* and *Craneopsylla* suggests that the apices of the labial palpi also penetrate into the skin. If not dislodged by the process of mounting, the apices of the mandibles and epipharynx are seen closely packed together in segment V of the palpal tube.

What is above called the inner membrane of the labial palpi is really the side of the external wall which lies along the other palpus and has become mebranous when the palpi developed into a tube protecting and guiding the epipharynx and mandibles.