

"Of *A. spinosus*, I examined 16 specimens, all of which agree with each other in every particular, while *A. Howardi* shows distinct and marked differences." (Oct. 29, 1894.)

It will be seen from the above, that the credit of differentiating this new species is very largely due to Mr. Pergande. Although this beginning of our information concerning it is very inadequate, there will, I trust, be no further difficulty about its separation from its congeners, thanks to Mr. Pergande's excellent comparative studies. It is apparent from this and other similar instances, how great is the advantage of having the types preserved in some place where reference can be made to them. Descriptions are often imperfect, and even those by the best authors frequently omit some characters differentiating the species from others not at that time discovered.

[P. S.—I have just received the following information from Prof. Gillette regarding the occurrence of *Aspidiotus Howardi*:—"A very few scattering scales were found in one orchard at Cañon City—the owner of the orchard I do not know—and the others were all found on the fruit of a native plum tree. The tree was in the back door-yard of a Mr. Helm, and growing beside a tight board fence. Most of the scales were on plums next the fence and near the ground in the shade. Most of the fruits in that position had from one to three or four scales."—T. D. A. C.]

#### PRELIMINARY STUDIES IN SIPHONAPTERA.—I.

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The following will form the first of a series of papers on the Siphonaptera, in which will be mentioned all known species, together with such new species as have come to my notice. Besides what has been drawn from the examination of a large series of specimens in my own collection, and many kindly sent me by Taschenberg, Howard, Bruner, Osborn, Comstock and others, I have borrowed freely from previous papers on the subject, and especially from Taschenberg's "Die Flohe."

The existing number of species of this order will undoubtedly be found to very greatly exceed the number already known. A large proportion of mammalian animals probably act as hosts to various species of fleas, but the list of hosts as at present known is comparatively very small indeed. The group, though certainly an interesting one, has been very much neglected. I would suggest that during the immediate future, collectors in all quarters pay particular attention to the collecting of these forms.

Order *Siphonaptera*, Latr.\*

1798. Schellenberg, Helvetische Entom. I., p. 15. (Rophoteira.)  
 1801. Lamarck, Syst. d. Anim. s. Vert., p. 313 (Aptera.)  
 1805. Latreille, Hist. nat. des Crust. et des Insect. XIV. (Suctoria.)  
 1825. Latreille, Fam. nat. du Regne Animal. (Siphonaptera.)  
 1826. Kirby and Spence, Introd. to Entom. IV. (Aphaniptera.)  
 1829. Stephens, Cat. Brit. Insect. (Pulicidæ.)

Wings entirely absent; mouth parts suctorial; maxillary palpi four-jointed;† labrum and clypeus wanting; eyes, when present, two in number and simple; antennæ three-jointed; tarsi five-jointed. Metamorphosis complete, larva footless, with a well-developed head.

## Table of Families.

Small fleas with a proportionally very large head; thoracic rings very narrow; pregnant female a stationary parasite, with abdomen worm-like or spherical; labial palpi one-jointed; third joint of antennæ without transverse incisions; no "combs" of spines on head, thorax, or abdomen; eyes present; species tropical or subtropical. . . . *Sarcopsyllidæ*.

Larger fleas with a proportionally small head; thoracic rings broad; head, pronotum, or abdomen often with "combs" of spines; antennal grooves sometimes covered on the outside by a chitinous scale; antennæ with terminal joint transversely creased, or cleft into lamellæ on one side; eyes sometimes absent; species widely distributed.

Labial palpi with more than ten joints; abdomen in pregnant female becoming so swollen as to lose its original shape. . . . *Vermipsyllidæ*.

Labial palpi three to five-jointed; never a stationary parasite, and never with the abdomen so swollen that the original form is lost. . . *Pulicidæ*.

Fam. *Sarcopsyllidæ*, Tschb.

1880. Taschenberg, Die Flöhe, p. 43.

## Table of Genera.

Head angulated above in front; maxillæ very small, scarcely projecting; abdomen of pregnant female spherical with sutures obsolete. *Sarcopsylla*.

\* Rophoteira, in part; aptera, in part; suctoria, pre-occupied.

† Packard, in a late paper (Proc. Bost. Soc. Nat. Hist., XXVI., Sept., 1894, pp. 312-355), follows some of the old authors in calling the maxillary palpi five-jointed (l. c. p. 348). I cannot see the reason for reiterating statements that have been proven incorrect. In the near future, I will review those portions of this paper which seem to be original.

Head evenly rounded from occiput to mouth; maxillæ large, curved, projecting downward and backward; abdomen of pregnant female worm-like, sutures distinct. . . . . *Rhynchopsylla*.

Genus *Sarcopsylla*, Westwood.

1836-40. Westwood, Trans. Ent. Soc., London, II., p. 199.

Table of Species.

Hind angles of metathoracic scales rounded; eyes and antennæ in anterior half of head, which is acutely angled in front above; first four tarsal joints in foreleg longer than broad; length (free female, and male), 1 mm.; parasitic on mammals. . . . . *penetrans*.

Hind angles of metathoracic scales angulated; eyes and antennæ in posterior half of head, which is obtusely angled in front above; first four tarsal joints in forelegs nearly as broad as long; length, 1-1.5 mm.; parasitic on gallinaceous birds. . . . . *gallinacea*.

*Sarcopsylla penetrans*, L.

1767. Linne, Syst. Nat. Ed., XII., p. 1021. (*Pulex penetrans*.)

This flea is undoubtedly found throughout the tropical and subtropical regions of both hemispheres. It has been found on a great variety of mammalian animals, including man. It is commonly known in this country and South America as "jigger flea," "chigoe," or "chique."

*Sarcopsylla gallinacea*, Westwood.

1874-5. Westwood, Ent. Mo. Mag., XI., p. 246.

This species will probably eventually be found to occur throughout the range of *S. penetrans*. I have received specimens taken on chickens (through Mr. L. O. Howard) from the Department collection, as follows:—From Florida, Apr. 27, No. 6220, A. S. Packard; from Floresville, Texas, No. 3648; from Hockley, Texas, Jan. 30, 1894, No. 3648; from Meridian, Miss., No. 4053.

The genital organs in the male of this species differ quite widely from those of the male of *S. penetrans*.

*Sarcopsylla grossiventris*, Weyenberg.

1879. Weyenberg, Boletín de la Acad. Nat. de Ciencias d. r. Repub. Argent., III., p. 188. (*Pulex grossiventris*.)

This is a *Sarcopsylla* and a good species, but was insufficiently described. The very large size (length of male, 2.5-3.25 mm.; of pregnant

female, 6-6.5 mm.) and the small metathoracic scale would separate it from *S. penetrans*. It was found on *Dasypus minutus*, Desm., and is probably restricted in range to southern South America, as nothing of the sort seems to have come to the notice of Bonnet.

Genus *Rhynchopsylla*, Haller.

1860. v. Frauenfeld, Sitzungsber. D. K. Akad. d. Wiss. Wien., XL., p. 462. (Hectopsylla.)

1880. Haller, Archiv. f. Naturgeschichte Jahrg. 46., p. 72. Taf. IV. (Rhynchopsylla.)

This genus contains but one species,

*Rhynchopsylla pulex*, Haller.

1860. v. Frauenfeld, Sitzungsber. D. K. Akad. d. Wiss., Wien., XL., p. 462. (Hectopsylla psittaci.)

1880. Haller, Archiv. f. Naturgeschichte Jahrg. 46., p. 72. Taf. IV. (Rhynchopsylla pulex.)

First mentioned by Frauenfeld, as taken from a species of *Psittacus*. Later was also found on a *Molossus*, sp.

Fam. *Vermipsyllidae*, Wagner.

1889. Wagner, Horæ Soc. Ent. Ross. T., XXIII., No. 1-2, p. 205.

The family contains but one genus,

Genus *Vermipsylla*, Schimkewitsch.

1885. Schimkewitsch, Zool. Anz., No. 187.

Wagner (l. c.) characterizes this genus as follows:—Terminal antennal joint with nine circular incisions; mandibles double the length of maxillary palpi; labial palpi with 11 to 13 pseudo-joints; pregnant female with swollen abdomen. Parasitic on Ungulates.

*Vermipsylla alacurt*, Schimk.

1885. Schimkewitsch, Zool. Anz., No. 187. (Female.)

1889. Wagner, Horæ Soc. Ent. Ross. T., XXIII., No. 1-2, p. 205. (Male.)

(To be continued.)