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NEW NORTH AMERICAN FLEAS

BY ROBERT TRAUB

During the course of investigations of adult and larval Siphonaptera in the collections of Cornell University and the University of Illinois, several apparently undescribed genera and species were discovered. One new genus and four new species are herein described. The war has interrupted further studies, especially on the collections from Mexico and Central America in Field Museum, and on my own Mexican collections. I am indebted to Dr. W. L. Jellison of the United States Public Health Service, Dr. M. A. Stewart of the University of California, and Mr. George P. Holland of the Department of Agriculture of British Columbia for aid in the study of *Doratopsylla hamiltoni* sp. nov., and to Dr. Karl Jordan, of the British Museum, for advice regarding the new genus *Jellisonia*. My thanks are due also to Dr. Robert Matheson of Cornell University, to Professor J. S. Stanford of the Utah State Agricultural College, and to Mr. William J. Gerhard, Curator of Insects at Field Museum of Natural History, for making possible the study of the collections in their charge. The type of *Jellisonia klotsi* and paratypes of the remaining new forms have been deposited in Field Museum.

Family Ceratophyllidae
Subfamily Ceratophyllinae
Tribe Ceratophilini

*Jellisonia*¹ gen. nov.

Genotype *Jellisonia klotsi* sp. nov.

¹The genus is named for Dr. W. L. Jellison of the United States Public Health Service, who has contributed much to the knowledge of North American Siphonaptera.

Diagnosis.—A genus of fleas nearly related to *Pleochaetis* Jordan (1933, p. 77). Distinguished from *Pleochaetis* by having the dorso-lateral bristles of the tibiae, from middle to apex, short and virtually uniform, forming a comb as in *Peromyscopsylla* and *Leptopsylla*; further distinguished in having a prominent stout bristle directed cephalad, near the apex of the distal arm of the ninth sternum in the male; male with eighth sternum and eighth tergum spiculose, and with the intersegmental membrane between the eighth and ninth segments more or less expanded and spiculose; body of receptaculum seminis of female strongly convex above, somewhat concave below, its dorsal and ventral surfaces thus almost parallel; style of female without a dorsal bristle, with one long apical bristle and one shorter ventral one; style elongate, about four times as long as its width at the base.

The genus *Jellisonia* is found on various mice in Mexico. The author's collection includes undescribed species collected in Nuevo Leon, Vera Cruz, and Michoacan.

***Jellisonia klotsi*¹ sp. nov.**

Type from Cerro Tancitaro, near Tancitaro, Michoacan, Mexico. Altitude 8,000 feet. A male in the collection of Field Museum of Natural History. Collected from a harvest mouse, *Reithrodontomys c. chrysopsis*, July 12, 1941, by Robert Traub (Fourth Hoogstraal Biological Expedition to Mexico).

Paratypes.—Twelve males and seven females, 7,800 to 10,500 feet altitude, on Cerro Tancitaro, July 5–24, 1941, all from the same mouse. Allotype from same specimen as the type, also in Field Museum of Natural History. Paratypes to be distributed.

Diagnosis.—Head, male and female: Frons evenly rounded, with median tubercle small but distinct; stippled cephalad of first row of bristles; preantennal region with three rows of bristles, the anterior row somewhat irregular, with eight bristles, smallest near base of antenna; middle row with four well-developed bristles; posterior row with three large bristles, the largest cephalad and dorsad of eye; a series of about four tiny hairs inserted along antennal groove cephalad and dorsad of eye. Eye conspicuous, well pigmented. Genal process fairly broad, becoming acuminate. A small seta near base of four-segmented maxillary palpus; maxilla an acute triangle, extending to apex of second segment of five-segmented labial palpus;

¹ The species is named for Dr. A. B. Klots, who has helped the author on innumerable occasions.

labial palpus about three-quarters length of forecoxa. Bristles on second antennal segment short, shorter than or subequal to second segment. A row of tiny hairs caudad of first antennal segment and of antennal groove; postantennal region with three rows of bristles, the most anterior row with four bristles; the middle with five; the caudal with five or six large bristles, with some small intercalated hairs.

Thorax: Eighteen spines in pronotal ctenidium; a row of five bristles cephalad on each side, a few fine hairs intercalated between some of the bristles. Mesonotum and metanotum each with three rows of bristles, but first row very incomplete. Mesepisternum with two bristles, one larger median, and one smaller, and with one fairly large bristle near ventro-caudal border. Mesepimeron with three rows of bristles, three, three, and two; the two posterior ones the longer. Supraepisternum of metathorax well developed, with two caudal bristles; infraepisternum with one bristle in dorso-caudal angle. Metaepimeron with bristles in two irregular rows of four, plus one in the dorso-caudal angle.

Legs: Prothoracic femora with about ten small thin lateral bristles; meso- and metathoracic femora with one each. Apical half of pro- and mesotibiae with dorso-lateral bristles short and subequal, forming a comb. Comb extending proximad of middle on hind tibia. Protibiae about equal to length of proximal three tarsal segments; mesotibiae and hind tibiae shorter than proximal two segments of respective tarsi. Basal segment of protarsus about equal to second and fifth, but longer than third and fourth. Basal segment of midtarsus slightly shorter than second and third combined; second almost equal to third and fourth combined, and slightly longer than fifth. Basal segment of hind tarsus about equal to second and third combined; second equal to third and fourth combined; fifth and third subequal. Fourth segment in each case the smallest. Distal tarsal segment of each leg with four pairs of lateral plantar bristles and a somewhat displaced median basal pair.

Abdomen: Both sexes with two rows of bristles on abdominal segments 2-6; cephalic row of small bristles, not reaching spiracles; caudal row of larger bristles extending ventrad to level of spiracles; tiny hairs intercalated between those of larger row. One bristle on each side on basal sternum.

Sexual differences in abdomen: First tergum of male with one or two teeth on each side and with three rows of bristles, the first row very incomplete; second and third terga with two teeth on each side,

fourth with one. Female with first tergum with three rows of bristles, first row very incomplete; with tergal teeth as follows: 1, 2, 2, 1.

In female, sterna 3-6 bear bristles on each side as follows: 3, 2 (or 3), 2, 2. Male with these bristles 2, 2, 2, 1. Male with middle antepygidial bristle well developed, others vestigial. Female with three antepygidial bristles, middle one twice length of others.

Subfamily Neopsyllinae

Tribe Neopsyllini

*Epitedia stanfordi*¹ sp. nov.

Type from Fillmore, Millard County, Utah. In Field Museum of Natural History. Collected from *Peromyscus truei* Shufeldt, October 21, 1939, by L. Leatham and J. S. Stanford.

Paratypes.—Allotype female, with the same data as type, in Field Museum of Natural History. An additional male and two females in the author's private collection.

Diagnosis.—Separated from all known *Epitedia* by the prominent caudally directed process immediately ventrad to each group of antepygidial bristles. This projection is especially developed in the male. Also characteristic in that the apical portion of the distal arm of the ninth sternum bears eight small teeth, in addition to the larger four along the margin, and in that the tenth sternum of the female bears only one long bristle on its ventrocephalic angle, not a clump of two or three bristles.

Near *Epitedia wenmanni* Rothschild (1904, p. 642), the immovable process of the male clasper being divided into a cephalic and a caudal process, the cephalic process extending farther dorsad than the caudal one; no spiniforms at the ventro-caudal margin of the movable finger or exopodite; caudal margin of the exopodite straight, not concave; the tail of the receptaculum seminis of the female clearly extending into the head; dorsal and ventral antepygidial bristles each about one-third the length of the middle one. Separated from *E. wenmanni* by the distal arm of the ninth sternum of the male being straight, not elbowed, and bearing marginal hairs as far apically as the smaller spines, not merely proximad of the spines; the apical portion of the distal arm of the ninth sternum with eight small teeth, in two rows of six and two, in addition to the four

¹ This species is named for Professor J. S. Stanford, who has contributed much to our knowledge of Siphonaptera.

large marginal teeth. *E. wenmanni*, in contrast, has only four small ventral teeth in addition to the marginal four. The new species has the caudal margin of the caudal process of the male immovable clasper trigonal, not rounded, and bearing some bristles in a row for two-thirds its length instead of merely a few at the apex and one far ventrad at the base of the exopodite; the receptaculum seminis of the female is longer and narrower than that of *E. wenmanni*, the maximum width of the head being only twice the diameter of the tail where it enters the head, not three times; and the seventh sternum of the female bears a shallower, more evenly rounded sinus than that of *E. wenmanni*.

Although the receptaculum seminis of *E. stanfordi* is much like that of *Epitedia faceta* Rothschild (1915b, p. 34), the species are very distinct. In *E. faceta* the male bears two recurved spiniforms at the ventro-caudal angle of the exopodite, the caudal margin of the exopodite is concave, and the cephalic lobe of the immovable process is at a level with the caudal lobe. Additional differences are pointed out in the key and in the discussion of *E. faceta* below.

Epitedia faceta Rothschild.

Neopsylla faceta Rothschild, *Ectoparasites*, 1, p. 32, 1915; Chapin, *Bull. Brooklyn Ent. Soc.*, 14, p. 50, 1919; Jordan, *Nov. Zool.*, 35, p. 176, 1929.

Epitedia faceta Jordan, *Nov. Zool.*, 41, p. 124, 1938; Fox, *Fleas of Eastern U. S.*, p. 98, 1940; Wagner, *Zeit. Parasit.*, 11, p. 465, 1940.

This flea has been known only from the original pair described by Rothschild. A small series of fleas in the collection at Cornell University agrees almost exactly with the original description. There are two males and two females from *Glaucomys volans*, the flying squirrel, taken at Ithaca, New York, by D. E. Sollberger, September 14, 1937, and one male and two females probably taken on the same host and in the same locality by Professor J. S. Stanford, January 9, 1928. Two pairs of these specimens are now in the Cornell University Collection and the remainder are in my own collection. While the types of this species came from a red squirrel, *Sciurus hudsonicus*, there is some indication that it may be characteristic of *Glaucomys* and may be a nest form.

KEY TO KNOWN SPECIES OF EPITEDIA IN THE UNITED STATES

Males (the male of *E. testor* Rothschild is not known)

1. Process of clasper undivided. 2
- Process of clasper divided to form two lobes. 3

2. Exopodite or movable finger about three times as long as wide at greatest point; dorsal margin of apex of distal arm of ninth sternum evenly rounded, not peaked.
E. scapani Wagner (1936b, p. 657) = *E. jordani* Hubbard (1940, p. 10)
 Exopodite or movable finger about four or five times as long as wide at greatest point; dorsal margin of distal arm of ninth sternum angulate or with a peak near the apex, not even rounded. *E. stewarti* Hubbard (1940, p. 11)
3. With a prominent caudally directed process immediately ventrad to each group of antepygidial bristles; apex of distal arm of ninth sternum with about eight spines or teeth in addition to the larger marginal four; caudal border of caudal process trigonal, not evenly rounded. *E. stanfordi* sp. nov.
 Without a prominent caudally directed process immediately ventrad to each group of antepygidial bristles; apex of distal arm of ninth sternum with only three or four spines in addition to the larger marginal four, although perhaps with one or two hairs; caudal margin of caudal process evenly rounded, not angular. 4
4. Exopodite or movable finger with caudal margin definitely concave and bearing two recurved spiniforms at the ventro-caudal angle; apex of cephalic process nearly on a level with that of caudal process; with only three spines, and a few stout hairs, proximad of the marginal four teeth on the apex of the distal arm of the ninth sternum. *E. faceta* Rothschild (1915b, p. 32)
 Exopodite or movable finger with a straight caudal border, not concave, and without recurved spiniforms at the ventro-caudal angle; apex of cephalic process definitely extending more dorsad than caudal process; with four spines proximad of the marginal four teeth on apex of the distal arm of the ninth sternum. *E. wenmanni* Rothschild (1904, p. 642)

Females

1. Tail of receptaculum seminis deeply projecting into lumen of head (body); head of receptaculum seminis concave above; upper and lower antepygidial bristles about one-third the length of the middle one. 2
 Tail of receptaculum seminis not evidently projecting into head (body); head of receptaculum seminis convex above, upper and lower antepygidial bristles very small, only about one-fourth the length of the middle one. 5
2. With a definite, caudally directed process, immediately ventrad to each group of antepygidial bristles; with only one long bristle on the ventro-cephalic angle of the tenth sternum (substylar flap); head of receptaculum seminis definitely concave above, relatively narrow, and at its maximum only about twice the width of the tail where it enters the head. . . . *E. stanfordi* sp. nov.
 Without a caudally directed process immediately ventrad to each group of antepygidial bristles; with a group of two or three bristles at the ventro-anterior angle of the tenth sternum (substylar flap); head of receptaculum seminis as above or shallowly concave dorsally, and wider, about three times the width of the tail where it enters the head. 3
3. Seventh sternum with three long bristles and three or four short ones on each side (known only from one female, which is in England, and original description). *E. testor* Rothschild (1915b, p. 34)
 Seventh sternum with four or five long bristles and five to seven shorter ones on each side. 4

4. Head of receptaculum seminis definitely concave above, relatively narrow, being at its maximum only twice the width of the tail where it enters the head; seventh sternum on each side with a row of four long bristles, a dorsal group of two and a ventral group of two, and five cephalic and ventrocephalic small ones; labial palpus extending about seven-eighths of the length of the forecoxa. *E. faceta* Rothschild (1915b, p. 32)

Head of receptaculum seminis shallowly or scarcely concave dorsally, wider, being at its maximum about three times the width of the tail where it enters the head; seventh sternum on each side with five long bristles in a more dorsal group of three and a more ventral group of two, and cephalad to these are seven smaller ones; labial palpus extending only two-thirds or three-quarters the length of the forecoxa. *E. wenmanni* Rothschild (1904, p. 642)

5. Sinus of seventh sternum evenly rounded, like half an ellipse, shallow; lobe of this sinus of seventh sternum also evenly rounded.

E. stewarti Hubbard (1940, p. 11)

Sinus of seventh sternum deeper but not evenly rounded, somewhat like a quarter of a circle; lobe of this sinus of seventh sternum ventrally somewhat extended caudally, at times acutely.

E. scapani Wagner (1936b, p. 657) = *E. jordani* Hubbard (1940, p. 10)

Family Ctenopsyllidae

Subfamily Ctenopsyllinae

Tribe Ctenopsyllini

Peromyscopsylla duma sp. nov.

Type from Logan Canyon, Cache County, Utah. A male in the collection of Field Museum of Natural History. Collected from *Microtus* sp., September 1, 1938, by Professor J. S. Stanford.

Paratypes.—Ten females, from *Microtus* sp. (allotype from Logan), *Clethrionomys* sp., and *Peromyscus* sp., from Logan and Hyrum, Cache County, Utah, August and September, 1938, all collected by J. S. Stanford. One allotype and one paratype in Field Museum of Natural History.

Diagnosis.—Related to *Peromyscopsylla selenis* Rothschild (1906, p. 322) in that the distal arm of the ninth sternum of the male lacks marginal bristles in the apical half and bears three bristles and a proximad row of hairs near its base. Distinct in that the apical margin of the eighth sternum of the male bears only three long bristles and one small hair on each side, instead of four long bristles and two small hairs; in that the ventral margin of this sternum has a definite sinus and is not straight as in *P. selenis*; the lowest large bristle along the caudal border of the exopodite of the male is dorsal to the midpoint of the margin, while in *P. selenis* this bristle is

definitely ventral to the midpoint; the caudal margin of the exopodite is not semicircular but is ventrally straighter so that the exopodite is somewhat triangular, with a rounded dorsal apex. The seventh sternum of the female has a very shallow wide sinus that extends almost from the ventral margin to the dorsal lobe, in contrast to *P. selenis*, which bears a small, deeper sinus that is only as wide as the lobe ventrad. In the new species the female seventh sternum bears six or seven long bristles in a row while that of *P. selenis* has five bristles in an irregular line.

The related *Peromyscopsylla catatina* is easily separated from the new species. *P. catatina* bears only three bristles on each side of the eighth sternum of the male, not seven as in the new species, and the ninth sternum of the male bears a series of five or six longish bristles near the base of the distal arm, not three. The apical margin of the seventh sternum of the female of *P. catatina* is very different also, and bears a ventrally directed shallow short sinus, and the margin ventrad of the sinus is convex. In *P. duma* the sinus is so shallow and wide that it extends to the ventral margin.

Tribe Doratopsyllini

Doratopsylla (*Corrodopsylla*) *hamiltoni*¹ sp. nov.

Type from Champaign, Champaign County, Illinois. A male, in the collection of Field Museum of Natural History. Collected from short-tailed shrew, *Blarina brevicauda* Say, November 17, 1940, by Robert Traub.

Paratypes.—The allotype, in Field Museum of Natural History, from the same species of shrew as the type, taken at Piper City, Iroquois County, Illinois, by E. J. Koestner and Robert Traub. Five males and two females from Urbana and Champaign, 1939 and 1940, also from *Blarina brevicauda* (two in Field Museum of Natural History). Two females from lesser short-tailed shrew, *Cryptotis parva* Say, collected at Ithaca, New York, by W. J. Hamilton, Jr.

Diagnosis.—Near *Doratopsylla* (*Corrodopsylla*) *curvata* Rothschild (1915a, p. 25) but the genal process above the last genal spine wider, as wide as the last genal spine; without processes or projections between the two groups of antepygidial bristles in the male;

¹ This flea is named for Dr. W. J. Hamilton, Jr., of the Department of Zoology, Cornell University, who has collected some of the paratypes of this species from *Cryptotis parva*.

and the eye vestigial and represented only by the outlines. In *D. curvata* the genal process is narrower than the last genal spine; the eye appears as a relatively pigmented triangular area above the last genal spine; and both sexes bear a pair of processes between the two groups of antepygidial bristles. In the male of the new species the dorsal process of the clasper is somewhat longer than the ventral process and there is no small triangular projection or lobe at the point of junction of the dorsal and ventral processes. In *D. curvata* there is a small but distinct lobe between the processes of the clasper, and, according to Rothschild (1915a, p. 27), the processes are of equal length. However, in Montana specimens of *D. curvata* the dorsal process seems shorter than the ventral. Unlike *D. curvata*, *D. hamiltoni* lacks a hair on the apex of the caudal margin of the ventral process. The ventral process seems shorter and broader in the new species, and the exopodite or movable finger is smaller and wider than that of *D. curvata*. The caudal border of the apex of the distal arm of the ninth sternum of *D. hamiltoni* is rounded, not angular like that of *D. curvata*. In the female of *D. hamiltoni* the dorsal lobe of the seventh sternum is rounded, not straight like that of *D. curvata* and there is no sinus ventrad of the acute tip; and the head of the receptaculum seminis is shorter and broader. The tail of the receptaculum seminis is somewhat dilated at the apex instead of being evenly rounded as in *D. curvata*.

Remarks.—Dr. Jordan in 1929 reported the occurrence of *D. curvata* on *Blarina* in the Adirondacks of New York state. It would be interesting to compare his specimens with the Illinois and Ithaca, New York, specimens of *hamiltoni*. *D. curvata* is a western species, and while it may occur in New York state, Jordan's specimens may prove to be referable to *hamiltoni*.

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