

## FAMILY HYSTRICHOPSYLLIDAE TIRABOSCHI

- 1904 Hystrichopsyllinae Tiraboschi, Archiv. de Parasit., 8: 242.  
 1905 Hystrichopsyllidae Baker, Proc. United States Nat. Mus., 29: 124.  
 1905 Ctenopsyllidae Baker, Proc. United States Nat. Mus., 29: 124.  
 1909 Hystrichopsyllidae Oudemans, Nov. Zool., 16: 155.  
 1915 Leptopsyllidae Rothschild, Ent. Mo. Mag., 51: 80.  
 1915 Hystrichopsyllidae Rothschild, Ent. Mo. Mag., 51: 83.  
 1926 Leptopsyllidae Dampf, Ent. Mitt., 15: 384.  
 1926 Hystrichopsyllidae Dampf, Ent. Mitt., 15: 385.  
 1929 Hystrichopsyllidae Ewing, Manual External Parasites, p. 172.  
 1936 Ctenopsyllidae Wagner, Tierwelt Mitteleuropas, Bd. 6, Abt. 17, s. 14.

The Hystrichopsyllidae and the Ischnopsyllidae differ from the other families of fleas occurring in our fauna by the presence of a dorsal sulcus separating the frons from the posterior region of the head and permitting motion between the two. Unfortunately, this character is not always distinct among the various genera, and some experience is required to recognize transitional forms. The following characteristics, which pertain to the eastern genera, are additional aids in distinguishing the hystrichopsyllids. In a few genera the females have a double receptaculum seminis, while in others this structure is single. The members of the latter group possess both a genal and a pronotal ctenidium (except in *Catallagia*). The eyes are weakly developed or absent. The maxillae are roughly triangular and taper to a sharp point. In most cases there are two or more rows of bristles on the abdominal tergites, and in most instances the abdominal tergites are further armed with short stout teeth. Three to five antepygial bristles are present on a side, except in the case of *Nearctopsylla* which has one or two. The family is represented in the East by ten genera which may be separated by the following key:

### Key to the Eastern Genera of Hystrichopsyllidae

1. First abdominal tergite with a ctenidium consisting of spines as long as those of the pronotum ..... *Stenoponia*, p. 81
- First abdominal tergite without such a ctenidium ..... 2

2. Genal ctenidium absent ..... 3  
    Genal ctenidium present ..... 4
3. Females with two receptacula seminis ..... *Atyphloceras*, p. 80  
    Females with one receptaculum seminis ..... *Catallagia*, p. 102
4. Genal ctenidium consisting of more than three spines ..... 5  
    Genal ctenidium consisting of less than three spines ..... 8
5. Genal ctenidium consisting of five or six spines ..... 6  
    Genal ctenidium consisting of four spines ..... 7
6. Spines of the genal ctenidium spatulate, arranged in a vertical line....  
    ..... *Nearctopsylla*, p. 90  
    Spines of the genal ctenidium long and slender, arranged in a horizontal row ..... *Hystrichopsylla*, p. 78
7. Frons with two or more spiniforms near the frontal angle .....  
    ..... *Ctenopsyllus*, p. 88  
    Frons without such spiniforms ..... *Doratopsylla*, p. 92
8. Genal ctenidium consisting of two spines, one overlapping the other . . 9  
    The two spines of the genal ctenidium separated and not overlapping ..... *Peromyscopsylla*, p. 84
9. Fifth tarsal segment of the fore and middle legs with a basal submedian pair of bristles ..... *Epitedia*, p. 95  
    Fifth tarsal segment of the fore and middle legs without a basal submedian pair of bristles ..... *Tamiophila*, p. 100

#### HYSTRICHOPSYLLA TASCHENBERG

*Hystrichopsylla* Taschenberg, 1880, Die Flohe, p. 83.

Genotype: *Pulex talpae* Curtis

Eye vestigial. Labial palpus consisting of five segments. A genal and a pronotal ctenidium present. Abdomen with a row of lateral teeth on tergites II, III, and IV. Each abdominal tergite armed with three rows of bristles. Females with two receptacula seminis. Three antepygial bristles present in the male, four in the female, on each side. Anterior tibia provided with a comb of robust heavily pigmented bristles on the posterior border. Fifth tarsal segment of each leg armed with five pairs of lateral plantar bristles, without a basal submedian pair. Size large, four or five millimeters in length.

This genus is represented in the East by a single rare species which is parasitic on wild mice.

*Hystrichopsylla gigas tahavuana* (Jordan)

(Plate XXI, figs. 106, 107, 108)

1929 *Hystrichopsylla gigas tahavuana* Jordan, Nov. Zool., 35:173, fig. 8.

1933 *Hystrichopsylla gigas tahavuana* Stewart, Jour. New York Ent. Soc., 41:260.

1933 *Hystrichopsylla gigas tahavuana* Jordan, Nov. Zool., 39:65:

**FEMALE.** In the single specimen at hand the preantennal region of the head is armed with a distinct row of about seven bristles, below which are two widely separated much stouter ones which may be part of another row. Frons and gena with numerous scattered small setae. Genal ctenidium consisting of five long slender spines. Posterior margin of the antennal groove with a number of small setae. Postantennal region apparently armed with two rows of bristles in addition to the marginal row. Genal process prominent and acuminate (Plate XXI, fig. 108). Pronotum armed with two rows of bristles and ctenidium of about fifteen spines on a side. Meso- and metanotum each armed with four or five rows of bristles. Each abdominal tergite armed with three rows of bristles. Second abdominal tergite with five to seven lateral teeth, third with four, and fourth with one or two on a side. Abdominal sternites armed with numerous bristles. Sternite VII without a deep sinus, the posterior margin uneven in outline. Head of the receptaculum seminis more or less quadrangular, much wider than the tail. For further details concerning the structure of the female genitalia, see Plate XXI, fig. 107.

The above description and the accompanying illustrations are based on a female taken from "*Microtus pennsylvanicus*" at Adirondack Lodge, Essex County, New York, loaned through the courtesy of Dr. Karl Jordan.

**MALE.** In his description of the male of the eastern subspecies, Dr. Jordan (1929) states: "About the middle of clasper and oblique row of three long bristles, in front of them four to six much smaller ones and a few marginal hairs; near and at posterior margin from four to six bristles, of which the two upper ones are moderately large. Ventral arm of IX st. characteristic; with four each side and the apex enlarged upwards on (each side) into a compressed cone which leans slightly distad." His illustration is redrawn in Plate XXI, fig. 106.

**EASTERN HOSTS.** Short-tailed Shrew ("*Blarina brevicauda*"), Meadow Mouse ("*Microtus pennsylvanicus*"), White-footed Mouse (*Peromyscus leucopus noveboracensis* (Fischer)).

**EASTERN LOCALITY.** New York.

**TYPE MATERIAL.** The eastern subspecies of this species described by Jordan as *H. gigas tahavvauana* was based upon a male and female from "*Blarina brevicauda*" and female from "*Microtus pennsylvanicus*" at New York, which are in the N. C. Rothschild Collection (British Museum).

## ATYPHLOCERAS JORDAN AND ROTHSCILD

*Atyphloceras* Jordan and Rothschild, 1915, Ectoparasites, 1: 59.

Genotype: *Ceratophyllus multidentatus* C. Fox

Genal ctenidium absent; pronotal ctenidium present. Eye reduced. Labial palpus consisting of five to eight segments. Abdominal tergites I to VI with two to seven lateral teeth on a side. Three antepygial bristles present on a side. Fifth tarsal segment of each leg armed with five pairs of lateral plantar bristles. Females with two receptacula seminis.

This genus is represented in the East by a single rare species which is found on small mammals.

*Atyphloceras bishopi* Jordan

(Plate XXI, figs. 105, 109)

1933 *Atyphloceras bishopi* Jordan, Nov. Zool., 39: 63, figs. 11, 12.

The following description and the accompanying illustrations are taken from Jordan's original descriptions as no specimen has been available for study.

**MALE.** Distinguished from *A. multidentatus* C. Fox (California) and *A. echis* J. and R. (Arizona) by the tubercle of the frons being more distant from the anterior oral angle, by the labial palpus consisting of five segments, instead of six or more, and by the posterior abdominal segments. Distance of the frontal tubercle from the anterior oral angle twice as long as in other known species of the genus. Postantennal region of the head with four rows of bristles, of which the second consists of only one or two bristles. Labial palpus reaching to the apex of the fore coxa. Each abdominal tergite armed with three rows of bristles; tergites I-VI further armed with apical teeth (on the two sides together) as follows: 8, 12, 9, 7, 6, 2. **MODIFIED SEGMENTS:** Process of the clasper conical with five or six bristles at the apex and posterior margin and five or six small ones laterally and dorsally, on the inner side of the apex a stronger bristle. Movable finger long and broad. Posterior arm of sternite IX narrow, slightly widened at the apex, where it is armed with a number of bristles of various sizes. For further details concerning the structure of the male genitalia, see Plate XXI, fig. 105.

**FEMALE.** Abdominal tergites I-VI armed with apical teeth (on both sides together) as follows: 8, 13, 8, 8, 5, 2. Other

general structural details as in the male. Sternite VII divided by a rounded sinus into two lobes, of which the upper does not extend so far distad as the lower. Heads of the receptacula seminis equal in size, globular, not much shorter than the tails. For further details of the structure of the female genitalia, see Plate XXI, fig. 109.

EASTERN HOSTS. Short-tailed Shrew (*Blarina brevicauda talpoides* (Gapper)), Meadow Mouse (*Microtus pennsylvanicus pennsylvanicus* (Ord)).

EASTERN LOCALITY. New York.

TYPE MATERIAL. Male holotype from Fairport, New York, on *Blarina brevicauda talpoides* (Gapper), and female allotype from Mendon Ponds, Monroe County, New York, on *Microtus pennsylvanicus pennsylvanicus* (Ord) in the N. C. Rothschild Collection (British Museum).

#### STENOPONIA JORDAN AND ROTHSCILD

*Stenoponia* Jordan and Rothschild, 1911, Proc. Zool. Soc. London, p. 391.

Genotype: *Hystrichopsylla tripectinata* Tiraboschi

Frontal tubercle absent. A genal, a pronotal, and an abdominal ctenidium present. Labial palpus short, not extending much beyond the apex of the maxilla. Eye vestigial or absent. Club of the antenna short. First abdominal tergite with a ctenidium whose spines are as long as those in the pronotal ctenidium; second to fifth abdominal tergites with rows of short, stout teeth. Four to six antepygial bristles present on a side in the female; three or four in the male. Posterior border of the tibia with numerous heavily pigmented bristles. Fifth tarsal segment with four pairs of lateral plantar bristles and a basal median pair. Females normally with only one receptaculum seminis. Size large, four or five millimeters in length.

This genus is represented in the East by a single species which is found on various wild mice.

#### *Stenoponia americana* (Baker)

(Plate XXV, figs. 128, 130, 132)

1898 *Hystrichopsylla americana* Baker, Ent. News, 10: 37.

1904 *Hystrichopsylla americana* Baker, Proc. United States Nat. Mus., 27: 432.

1905 *Hystrichopsylla americana* Baker, Proc. United States Nat. Mus., 29: 137.

1915 *Stenoponia americana* Rothschild, Ectoparasites, 1: 30.

1919 *Stenoponia wetmorei* Chapin, Bull. Brooklyn Ent. Soc., 14: 52.

1929 *Stenoponia americana* Jordan, Nov. Zool., 35: 176.

1937 *Stenoponia americana* Jordan, Nov. Zool., 40: 285.

**FEMALE.** Preantennal region of the head with six bristles, of which three are arranged in an oblique line near the antennal groove, while three are located on the lower gena. Numerous small setae scattered over the frons. Genal ctenidium consisting of about thirteen spines on a side. Genal process wide, rounded distally. Second antennal segment armed with about six bristles, one or two of which are longer than the third antennal segment. Postantennal region of the head armed with about six bristles and a number of small setae (Plate XXV, fig. 132). Pronotum with a ctenidium of twenty-five or twenty-six spines on a side. Anterior to the ctenidium are about four rows of bristles. Meso- and metanotum each with four or five rows of bristles. Each abdominal tergite armed with about three rows of bristles. First abdominal tergite with a ctenidium of about twenty-one spines on a side. Abdominal tergites II to IV each with a series of short stout teeth. The number of teeth in each series is variable; usually tergite V bears the fewest teeth. Five antepygidial bristles present on a side. Bristles on the posterior margin of the tibia very long and heavily pigmented. Seventh sternite divided by a deep but narrow sinus into two lobes. The lower of these lobes tapers to a long point while the other is wider and rounded. Head of the receptaculum seminis spherical; tail very long. For further details concerning the structure of the female genitalia, see Plate XXV, fig. 130.

**MALE.** General structure essentially as in the female except that four antepygidial bristles are present on a side. **MODIFIED SEGMENTS:** Process of the clasper broad and lobular with a number of slender bristles distally. Movable finger curved, extending slightly more distad than the process, armed with a number of small bristles. Manubrium curved, not long. Penis bladelike, its spring not completing a single turn. Posterior arm of sternite IX expanded distally and armed with numerous slender bristles. For further details concerning the structure of the male genitalia, see Plate XXV, fig. 128.

**RECORDS.** ALABAMA—Dale County, April 4, 1937, on "cotton mouse," male (R. E. Dyer). FLORIDA—Tallahassee, January 15, 1938, on same host, female (B. V. Travis). IOWA—Dubuque, November 4, 1937, on *Peromyscus leucopus noveboracensis* (Fischer), female; Eldon, November 12, 1927, on *Sciurus carolinensis leucotis* (Gapper), male, two females;

Sabula, November 18, 1937, on *Peromyscus leucopus noveboracensis* (Fischer), female (T. Scott). MARYLAND—Bladensburg, March 31, 1901, on "*Peromyscus leucopus*," male (H. S. Barber); College Park, February 17, 1932, on same host, male and female (R. Greenfield); Plummer Island, February 22, 1928, on same host, female (A. Wetmore); February 6, 1927, on same host, female (H. S. Barber); January 1, 1930, on same host, female (A. K. Fischer); December 30, 1915, on *Mus musculus musculus* (Linnaeus), female, two males (R. C. Shannon); Kensington, February 22, 1924, on "*Microtus pennsylvanicus*," female (H. S. Barber). MASSACHUSETTS—Martha's Vineyard, September 7, 1936, on "*Evotomys species*," male; Chilmark, October 28, 1937, on *Microtus pennsylvanicus pennsylvanicus* (Ord), female; Gayhead, September 25, 1937, on *Zapus hudsonius* (Zimmerman), male; October 27, 1937, on *Peromyscus leucopus fusus* Bangs, female; November 16, 1937, on *Microtus pennsylvanicus pennsylvanicus* (Ord), male and female; same data, October 13, 1937, female; same data, October 27, 1937, female and male; Edgartown, October 29, 1937, on *Peromyscus leucopus fusus* Bangs, male and female; October 15, 1937, on *Microtus pennsylvanicus pennsylvanicus* (Ord), two females (one with two receptacula seminis!); October 13, 1937, on "Norway-rat," female; Vineyard Haven, September 11, 1937, on *Microtus pennsylvanicus pennsylvanicus* (Ord), male (C. N. Smith). TENNESSEE—Greenbriar, April 18, 1931, on *Peromyscus leucopus leucopus* (Rafinesque), male (R. L. Boke). VIRGINIA—East Falls Church, November 17, 1929, male and female; December 4, 1927, two females; January 7, 1927, male and female, on "*Peromyscus leucopus*" (E. A. Chapin); Petersburg, April 7, 1933, on same host, female (H. S. Peters).

EASTERN HOSTS. Red-backed Mouse ("*Evotomys species*"), White-footed Mouse (*Peromyscus leucopus noveboracensis* (Fischer)), Meadow-mouse (*Microtus pennsylvanicus pennsylvanicus* (Ord)), "Cotton-mouse," Jumping Mouse (*Zapus hudsonius hudsonius* (Zimmerman)), "Norway-rat."

EASTERN LOCALITIES. Alabama, Iowa, Maryland, Massachusetts, Maine, Tennessee, Virginia.

TYPE MATERIAL. Female holotype from Orono, Maine, on "*Evotomys species*" in the United States National Museum. Male allotype from Eldon, Iowa, an *Glaucomys volans volans* (Linnaeus) in the Iowa State College Collection.

This species is among the largest found in our fauna and finds

a place with *Hystrihopsylla gigas tahavuana* Jordan and *Tamioiphila grandis* (Rothschild), all three being four or five millimeters in length. Like the other two it is a parasite of small mice but it is much more abundant. Pre-eminently a fall and winter species, it has been collected from September to April, and its favorite host seems to be the white-footed mouse.

#### PEROMYSCOPSYLLA I. FOX

*Peromyscopsylla* I. Fox, 1939, Proc. Ent. Soc. Washington, 41: 47.

Genotype: *Ctenopsyllus hesperomys* Baker

Head subangulate in front. Fronto-genal angle acute. Anterior margin of the head with a series of bristles; two, three, or four of those near the fronto-genal angle thickened and pigmented. Genal ctenidium more or less horizontal, consisting of two spines variable in size according to the species. Genal process prominent, variable in shape. Metanotum and abdominal tergites armed dorsally with short, stout teeth. Other details as in *Ctenopsyllus Kolenati*.

This genus is represented in the East by three species which parasitize the common small mammals.

#### Key to the Eastern Species of *Peromyscopsylla*

1. Lower genal spine extending more distad than the upper one .....2  
Upper genal spine extending more distad than the lower one *P. catatina*
2. Sternite VII of the female with a deep sinus; movable finger of male not rounded apically .....*P. hesperomys*  
Sternite VII of the female without a deep sinus; movable finger rounded apically .....*P. scotti*

#### *Peromyscopsylla hesperomys* (Baker)

(Plate XXIII, figs. 117, 118, 119)

- 1904 *Ctenopsyllus hesperomys* Baker, Proc. United States Nat. Mus., 27: 428.  
1905 *Ctenopsyllus hesperomys* Baker, Proc. United States Nat. Mus., 29: 136.  
1914 *Ctenopsyllus hesperomys* C. Fox, United States Public Health Ser. Hyg. Lab., Bull. 97, Pl. XX, fig. 55.  
1915 *Leptopsylla hesperomys* Rothschild, Nov. Zool., 22: 304.  
1928 *Leptopsylla hesperomys* Stewart, Cornell Univ. Agric. Exp. Sta., Mem. 101, p. 869.  
1929 *Leptopsylla hesperomys* Jordan, Nov. Zool., 35: 177.  
1933 *Leptopsylla hesperomys* Stewart, Jour. New York Ent. Soc., 41: 260.  
1933 *Leptopsylla hesperomys* Jordan, Nov. Zool., 39: 62.  
1939 *Peromyscopsylla spinifrons* I. Fox, Proc. Ent. Soc. Washington, 41: 48, Pl. 6, figs. 1, 2.



**FEMALE.** Anterior margin of the head with a row of ten or eleven bristles, of which two to four are short, toothlike spiniforms, while the rest are of the usual form. Lower gena with three long bristles, above which are three well-developed bristles in series, more or less forming a diagonal across the upper portion of the head. Frons and gena further armed with numerous small setae. Upper of the two ctenidial spines much shorter than the lower and closely associated with the long spatulate genal process which extends well beyond it. Postantennal region of the head armed with four irregular rows of bristles; first row consisting of about five bristles, second, third, and fourth rows of six each. Between the second and third rows are two or three irregularly arranged bristles. Along the posterior margin of the antennal groove are a number of small setae (Plate XXIII, fig. 117). Pronotum with a single distinct row of bristles and a ctenidium of fourteen or fifteen spines on a side. Meso- and metanotum each with three or four irregular rows of bristles. Each abdominal tergite with two rows of bristles. First five abdominal tergites and the metanotum armed with two or three stout dorsal teeth on a side. Sternite VII divided by a deep sinus, the upper lobe prominent, more or less triangular, the lower lobe wider. Tail of the receptaculum seminis about three-fifths as long as the head, which is oval and gradually merges into the tail. For further details concerning the structure of the female genitalia, see Plate XXIII, fig. 118.

**MALE.** Chaetotaxy of the head in the specimens examined differing somewhat from that of the female. Anterior border of the head armed with eight or nine bristles, of which the first three in the vicinity of the fronto-genal angle are heavily pigmented and spiniform. Five long bristles situated in the upper region of the head while the lower region bears three long, stout bristles. Numerous small setae irregularly scattered over the preantennal region of the head. Lower of the two genal spines extending slightly more distad than the upper. Genal process sometimes spatulate and sometimes rather slender, extending well beyond the rounded termination of the upper genal spine. Postantennal region of the head with about five irregular rows of bristles; first row consisting of two bristles, second of three, third of four, fourth of five, and the fifth or marginal row of about seven. A series of about eight setae along the posterior margin of the antennal groove. **MODIFIED SEGMENTS:** Genitalia closely resembling those of *P. catatina* (Jordan); the movable finger differing in shape, being widest below the middle and

tapering apically. Posterior margin of the movable finger armed with three robust bristles and two or three smaller ones, anterior margin armed with about five weak bristles. Apex of posterior arm of sternite IX rather abruptly pointed, its posterior margin with three long bristles and a number of small ones. For further details of the structure of the male genitalia, see Plate XXIII, fig. 119.

RECORD. NEW HAMPSHIRE — Mount Chocorua, Carroll County, October 1, 1926, on *Peromyscus maniculatus gracilis* (LeConte), female (F. Harper).

EASTERN HOSTS. White-footed Mouse (*Peromyscus leucopus noveboracensis* (Fischer), etc.), "Kingfisher's nest."

EASTERN LOCALITIES. New Hampshire, New York, Pennsylvania, Tennessee.

TYPE MATERIAL. Female holotype from Franconia, New Hampshire, on "*Peromyscus*" in the United States National Museum.

*Peromyscopsylla scotti* I. Fox  
(Plate XXII, figs. 111, 112, 113)

1939 *Peromyscopsylla scotti* I. Fox, Proc. Ent. Soc. Washington, 41: 49, Pl. 6, figs. 4, 5.

FEMALE. Chaetotaxy of the head essentially as in *P. hesperomys*. Lower of the two genal spines extending only slightly more distad than the upper. Genal process spatulate and prominent (Plate XXII, fig. 111). Each abdominal tergite armed with one to three short, stout teeth on a side, the anterior tergites usually with more teeth than the posterior. Four antepygidial bristles present on a side. Sternite VII unlike that of *P. hesperomys*, without a deep sinus, and its margin irregular in outline. Receptaculum seminis of characteristic shape; tail about as long as the head which is about twice as long as wide. For further details concerning the structure of the receptaculum seminis, see Plate XXII, fig. 113.

MALE. Chaetotaxy of the head and general structure as in the female. MODIFIED SEGMENTS: Process of the clasper rounded, armed with three or four slender bristles. Movable finger rounded apically with three robust bristles and a number of smaller ones. Posterior arm of sternite IX with numerous setae on the posterior margin. For further details concerning the structure of the male genitalia, see Plate XXII, fig. 112.

RECORDS. MASSACHUSETTS — Edgartown, November 13,

1937, on *Peromyscus leucopus fusus* Bangs, male; October 29, 1937, female (C. N. Smith).

EASTERN HOST. White-footed Mouse (*Peromyscus leucopus noveboracensis* (Fischer), etc.).

EASTERN LOCALITIES. Iowa, Massachusetts.

TYPE MATERIAL. Female holotype from *Peromyscus leucopus noveboracensis* (Fischer) at Dubuque, Iowa, and male allotype (described above) from Edgartown, Massachusetts, in the United States National Museum.

***Peromyscopsylla catatina* (Jordan)**

(Plate XXII, figs. 110, 114, 115)

1928 *Leptopsylla catatina* Jordan, Nov. Zool., 34:186, fig. 10.

1929 *Leptopsylla catatina* Jordan, Nov. Zool., 35:171.

1933 *Ctenopsyllus catatina* Stewart, Jour. New York Ent. Soc., 41:259.

1937 *Leptopsylla catatina* Jordan, Nov. Zool., 40:285.

MALE. Bristles of the pre- and postantennal regions of the head arranged essentially as in *P. hesperomys*. Upper of the two genal spines more recurved and extending further distad than the lower. Genal process not markedly spatulate, and extending slightly more distad than the upper genal spine, if at all (Plate XXII, fig. 114). Pronotum with a single row of bristles and a ctenidium of about thirteen spines on a side. Meso- and metanotum each with four rows of bristles. Metanotum and first five abdominal tergites armed with three or four short stout dorsal teeth on a side; sixth abdominal tergite armed with one to three such teeth on a side. Three antepygial bristles present on a side, the middle by far the longest. MODIFIED SEGMENTS: Upper region of the clasper more or less triangular, no well-defined process set off. Movable finger with the posterior margin more or less rounded, the anterior margin also convex but to a lesser degree. Posterior margin of the movable finger armed with two or three long bristles and several smaller ones. Manubrium slender, about as long as the penis. Penis broad and bladelike, its spring not long. Sternite IX expanded distally, the apex subacuminate; armed on the posterior margin with five or six long bristles and many smaller ones. For further details concerning the structure of the male genitalia, see Plate XXII, fig. 115.

FEMALE. General structure essentially as in the male. Abdominal sternite VIII armed with numerous bristles varying in size. Sternite VII with a small angular lobe projecting posteriorly which varies in shape, the margin below the lobe convex

(Plate XXII, fig. 110). Receptaculum seminis essentially as in *P. hesperomys*.

RECORDS. MAINE—Mount Katahdin, August 26, 1928, on "*Eutamias gapperi ochradelus*," male and female (F. Harper). MARYLAND—College Park, February 17, 1932, female (R. Greenfield). MASSACHUSETTS—Ashburnham, October 12, 1927, female (F. Harper). NEW HAMPSHIRE—Mount Chocorua, Carroll County, October 1, 1926, female (F. Harper).

EASTERN HOSTS. Opossum ("*Didelphis virginiana*"), Hairy-tailed Mole (*Parascalops breweri* (Bachman)), Short-tailed Shrew ("*Blarina brevicauda*"), Meadow-mouse ("*Microtus pennsylvanicus*"), Red-backed Mouse ("*Eutamias gapperi*").

EASTERN LOCALITIES. Maine, Maryland, Massachusetts, New Hampshire, New York, Pennsylvania.

TYPE MATERIAL. Female holotype from Rolling Rock Club, Ligonier, Pennsylvania, on "*Didelphis virginianus*" in the N. C. Rothschild Collection (British Museum).

#### CTENOPSYLLUS KOLENATI

*Ctenopsyllus Kolenati*, 1863, Horae Soc. Ent. Ross., 2: 37.

Genotype: *Pulex segnis* Schönherr

Head angulate in front, the frontal tubercle absent. Frons with two or more spiniforms near the frontal angle. Eye vestigial. Genal ctenidium consisting of four unequal spines. Three or four antepygial bristles present on a side. Posterior margin of the hind tibia armed with a series of about fourteen medium-sized bristles, among which are three or four long bristles (Plate XXIV, fig. 123). Fifth tarsal segment of each leg armed with four pairs of lateral plantar bristles and a basal submedian pair.

This genus is represented in the East by a single introduced species parasitic on rats and mice. The species is not uncommon in the southeastern states but has not as yet penetrated to the interior, according to the records available. It is said to stand alone among rodent fleas in refusing to attack man.

#### *Ctenopsyllus segnis* (Schönherr)

(Plate XXIV)

1811 *Pulex segnis* Schönherr, Kongl. Svenska Vetenskakad. Nya. Handl. (2nd s.), 32: 98, Pl. V, figs. A, B.

1832 *Pulex musculi* Duges, Ann. d. Sci. Nat. (1st s.), 27: 163.

- 1856 *Ctenophthalmus musculi* Kolenati, Die Parasiten der Chiropteren, p. 33.
- 1895 *Typhlopsylla musculi* Baker, Can. Ent., 27:190.
- 1896 *Typhlopsylla mexicana* Baker, Can. Ent., 28:85.
- 1904 *Ctenopsyllus mexicanus* Baker, Proc. United States Nat. Mus., 27:430.
- 1905 *Ctenopsyllus musculi* Baker, Proc. United States Nat. Mus., 29:136.
- 1910 *Leptopsylla musculi* C. Fox, United States Mar. Hosp. Ser., Bull. 30:140, Pl. IV, figs. 1-5.
- 1914 *Ctenopsyllus musculi* C. Fox, United States Public Health Ser. Hyg. Lab., Bull. 97, Pl. XV, fig. 26; Pl. XX, fig. 54.
- 1925 *Leptopsylla musculi* C. Fox, United States Public Health Ser., Rep. 40:1922.
- 1925 *Leptopsylla musculi* C. Fox, Insects and Disease of Man, p. 140, fig. 67.
- 1928 *Leptopsylla musculi* Stewart, Cornell Univ. Agric. Exp. Sta., Mem. 101, p. 869.
- 1929 *Leptopsylla segnis* Hasseltine, United States Public Health Ser., Rep. 44:583.
- 1931 *Leptopsyllus musculi* C. Fox, United States Public Health Ser., Rep. 46:574.
- 1933 *Ctenopsyllus segnis* Stewart, Jour. New York Ent. Soc., 41:259.
- 1934 *Ctenopsyllus segnis* Shaftesbury, Jour. Elisha Mitchell Sci. Soc., 49:256.
- 1935 *Leptopsylla musculi* Vogel and Cadwallader, United States Public Health Ser., Rep. 50:1953.

MALE. Anterior margin of the head with a series of nine bristles, of which two are robust spiniforms. Five other long bristles present, arranged as in Plate XXIV, fig. 125. Preantennal region of the head further armed with numerous small setae. Most dorsal of the four genal spines the broadest; the third genal spine the longest. Labial palpus extending more than halfway down the length of the fore coxa. Postantennal region of the head with four rows of bristles, of which the first consists of three or four bristles, the second and third of four or five, and the fourth of six. Pronotum armed with a single row of bristles and a ctenidium of about eleven spines on a side. Meso- and metanotum each armed with three or four irregular rows of bristles. Each abdominal tergite armed with two rows of bristles, one consisting of short bristles and the other of long ones. MODIFIED SEGMENTS: Dorsal region of the clasper lobular, no distinct process set off. Movable finger rounded at the posterior margin and armed with six bristles, of which three are longer than the others. Manubrium rather long and curved distally. Penis broad and bladelike; spring long. Paramere of the penis large and conspicuous. Distal end of the posterior arm of sternite IX expanded, the posterior margin with a number of

hairlike setae. For further details concerning the structure of the male genitalia, see Plate XXIV, figs. 122, 124.

**FEMALE.** Chaetotaxy of the head and general structure as in the male except that four antepygidial bristles are present, two short ones and two long ones. Sternite VII without a sinus. Head of the receptaculum seminis much longer than wide. For further details concerning the structure of the female genitalia, see Plate XXIV, fig. 126.

**RECORDS.** FLORIDA—Jacksonville, January 25, 1934, on *Rattus norvegicus* (Erxleben), numerous specimens; Melbourne, April 6, 1909, on same host, female; Tallahassee, July 12, 1937, on "*Rattus alexandrinus*," male; January 16, 1937, on "*Rattus rattus*," two males, two females; January 20, 1937, on "*Mus musculus*," male, two females; January 17, 1937, on "*Peromyscus gossypinus*," male and female. LOUISIANA—Jeanerette, February 23, 1927, on same host, male (Dikeman). SOUTH CAROLINA—Folly Beach, Charleston County, January 2, 1938, on "*Mus species*," two males (D. G. Nichols).

**EASTERN HOSTS.** House-rat (*Rattus norvegicus* (Erxleben)), House-mouse (*Mus musculus musculus* (Linnaeus)), Roof-rat ("*Rattus alexandrinus*"), Cotton-rat ("*Sigmodon hispidus*"), Black Rat ("*Rattus rattus*"), White-footed Mouse ("*Peromyscus gossypinus*").

**EASTERN LOCALITIES.** Florida, Georgia, Louisiana, Massachusetts, New York, North Carolina, Pennsylvania, Rhode Island, Virginia, (Mexico, Europe).

**TYPE MATERIAL.** Twenty specimens from "*Mus musculus*" at Sweden. Location of types not ascertained.

#### NEARCTOPSYLLA ROTHSCILD

*Nearctopsylla* Rothschild, 1915, Nov. Zool., 22: 307.

Genotype: *Ctenopsyllus brooksi* Rothschild

Frontal tubercle absent. A genal and a pronotal ctenidium present. Genal comb vertical composed of five spatulate spines. Eye absent. Labial palpus composed of five segments. One or two long antepygidial bristles present on a side. Fifth tarsal segment of fore and middle legs with five pairs of lateral plantar bristles; fifth tarsal segment of the hind legs with four pairs of lateral plantar bristles.

This genus is represented in the East by a single species known from various small mammals.

**Nearctopsylla genalis (Baker)**

(Plate XXIII, figs. 116, 120, 121)

- 1904 *Ctenophthalmus genalis* Baker, Proc. United States Nat. Mus., 27: 424.  
1904 *Ctenopsyllus hygini* Rothschild, Nov. Zool., 11: 650, Pl. XV, fig. 85; Pl. XVI, figs. 93, 94.  
1905 *Ctenophthalmus genalis* Baker, Proc. United States Nat. Mus., 29: 135.  
1914 *Ctenopsylla genalis* C. Fox, United States Public Health Ser. Hyg. Lab., Bull. 97, Pl. XV, fig. 25; Pl. XX, fig. 56.  
1923 *Ctenophthalmus genalis* Dunnam, Ent. News, 34: 219.

**MALE.** Front of head flattened and more or less vertical. Preantennal region with a row of five bristles extending obliquely anteriorly from the dorsal region of the antennal groove. Frons with a long bristle close to the anterior border and opposite the third genal spine. Genal ctenidium with five spatulate spines. First ctenidial spine shortest, the middle three longest; fifth spine truncate, the others more or less acuminate. Labial palpus extending to three-fourths the length of the anterior coxae. Postantennal region of the head with three rows of four to six bristles each. Pronotum armed with a single row of bristles and a pronotal ctenidium of thirteen or fourteen spines on a side. Meso- and metanotum each with one or two rows of bristles. Each abdominal tergite with a marginal row of long bristles. The anterior tergites may have, in addition, an anterior row consisting of a few short bristles. First four abdominal tergites further armed with one or two short, stout teeth on a side. One stout antepygial bristle mounted on a tubercle on each side. **MODIFIED SEGMENTS:** Clasper armed apically with a number of bristles of various sizes, and on the inside surface with many small setae. Movable finger armed on the posterior margin with four or five long bristles and a few short ones. Manubrium small, curved, tapering to a delicate point. Penis broad and heavy, curved distally and ending in a sharp point; spring long, not completing a turn. Sternite IX with a brush of seven or eight bristles on the posterior margin. For further details concerning the structure of the male genitalia, see Plate XXIII, fig. 121.

**FEMALE.** Chaetotaxy of the head essentially as in the male (Plate XXIII, fig. 116). Two long antepygial bristles present on a side. Sternite VII divided into two lobes by a wide sinus, the upper lobe more prominent than the lower. Tail of the receptaculum seminis very long and wide. For further details concerning the structure of the female genitalia, see Plate XXIII, fig. 120.

RECORDS. IOWA—Baxter, April, 1923, no host given, female (J. W. Preston). MASSACHUSETTS—Ashburnham, October 12, 1927, on *Blarina brevicauda talpoides* (Gapper), female (F. Harper). NEW HAMPSHIRE—Carroll County, October 4, 1926, on same host, female (F. Harper). MINNESOTA—No further data, September 28, 1933, on "*Blarina brevicauda*," male.

EASTERN HOSTS. Short-tailed Shrew (*Blarina brevicauda talpoides* (Gapper)), Pocket Gopher (*Geomys bursarius* (Shaw)), "Moles."

EASTERN LOCALITIES. Iowa, Massachusetts, Michigan, New Hampshire, Minnesota.

TYPE MATERIAL. Male holotype from Agricultural College, Michigan, on *Geomys bursarius* (Shaw) according to the literature on "*Scalops*" according to the slide, in the United States National Museum.

#### DORATOPSYLLA JORDAN AND ROTHSCILD

*Doratopsylla* Jordan and Rothschild, 1912, Nov. Zool., 19:62.

Genotype: *Typhlopsylla dasyncnemus* Rothschild

Frontal tubercle absent. Eye vestigial. Genal ctenidium consisting of four spines. Labial palpus composed of four segments. Frons rounded, armed with two rows of conspicuous bristles. Fifth tarsal segment of all tarsi armed with four pairs of lateral plantar bristles and a basal median pair. Three antepygidial bristles usually present on a side.

This genus is represented in the East by two shrew fleas which may be separated by the following key:

#### Key to the Eastern Species of *Doratopsylla*

Last genal spine more or less horizontal, closely appressed to the genal border .....*D. blarinae*  
 Last genal spine oblique, forming an angle with the genal border .....*D. curvata*

#### *Doratopsylla blarinae* C. Fox

(Plate XXVI, figs. 134, 135, 137)

1914 *Doratopsylla blarinae* C. Fox, United States Public Health Ser. Hyg. Lab., Bull. 97:11, Pl. IV, figs. 1-3.

1915 *Doratopsylla blarinae* Rothschild, Ectoparasites, 1:28.

1919 *Doratopsylla blarinae* Chapin, Bull. Brooklyn Ent. Soc., 14:54.

1925 *Doratopsylla blarinae* Ewing, Jour. Parasitology, 12:43.

1928 *Doratopsylla blarinae* Jordan, Nov. Zool., 34:186.



1929 *Doratopsylla blarinae* Jordan, Nov. Zool., 35:177.

1933 *Doratopsylla blarinae* Jordan, Nov. Zool., 39:63.

1933 *Doratopsylla blarinae* Stewart, Jour. New York Ent. Soc., 41:260.

**MALE.** Preantennal region of the head with two rows of bristles; upper row with five bristles, lower row with three much longer bristles and two small setae. Genal ctenidium consisting of four spines of which the last two are the longest. Second antennal joint with three or four slender setae. Post-antennal region of the head with three rows of long bristles, of which the first consists of three bristles, the second of four, and the third of five or six. Pronotum with a single row of bristles and a ctenidium of about eight spines on a side. Meso- and metanotum each with two irregular rows of bristles. Each abdominal tergite armed with two irregular rows of bristles; the anterior tergites further armed with a single short, stout tooth on a side. Three antepygial bristles present on a side; of these the middle is by far the longest. **MODIFIED SEGMENTS:** Process of the clasper divided into two lobes, the anterior very small with three bristles, of which the most dorsal is longest and stoutest. Posterior lobe much more conspicuous, rather long and curved dorsad. Movable finger very long and slender, armed with several slender bristles on its posterior margin (Plate XXVI, fig. 137). Manubrium short and heavy, roughly triangular and ending in a curved point. Penis not much longer than the manubrium, curved and bladelike; spring long but not completing a turn. Posterior process of sternite IX expanded apically, the posterior margin with a short spinelike bristle, above which are several other more slender bristles.

**FEMALE.** Chaetotaxy of the head essentially as in the male (Plate XXVI, fig. 134). Sternite VII without a distinct sinus. Tail of the receptaculum seminis very short; head long and broad, more or less oval in outline. For further details concerning the structure of the female genitalia, see Plate XXVI, fig. 135.

**RECORDS.** CONNECTICUT—Woodstock, September 5, 1927, on *Blarina brevicauda talpoides* (Gapper), female (F. Harper). DISTRICT OF COLUMBIA—Washington, September 20, 1929, on "*Peromyscus leucopus*," male (J. C. Jones). MAINE—Toque Pond, August 21, 1928, on "*Sorex palustris albibarbis*," female (F. Harper). MARYLAND—Cabin John, June 1, 1932, on "*Blarina brevicauda*," two females; Chillum, May 19, 1932, on same host, two males; College Park, June 16, 1932, male; April, 1932, on same host, male and female; Silver Spring,

March 1, 1932, on same host, male, three females; Takoma Park, April 19, 1932, on same host, male, four females; Burnt Mills, March, 1932, on same host, numerous specimens (R. Greenfield). MASSACHUSETTS — Edgartown, June 10, 1936, on "*Microtus pennsylvanicus*," female (F. C. Bishopp).

EASTERN HOSTS. Short-tailed Shrew (*Blarina brevicauda talpoides* (Gapper), etc.), Meadow-mouse ("*Microtus pennsylvanicus*"), White-footed Mouse ("*Peromyscus leucopus*"), Water Shrew ("*Sorex palustris albibarbis*").

EASTERN LOCALITIES. Connecticut, District of Columbia, Maine, Maryland, Massachusetts, New York, Pennsylvania, Virginia.

TYPE MATERIAL. Male holotype from Washington, D. C., on "*Blarina brevicauda*" in the United States National Museum.

During spring and summer this species occurs abundantly on shrews in the East. In the Middle West, however, it is replaced by the following species:

***Doratopsylla curvata* Rothschild\***

(Plate XXVI, figs. 133, 136, 138)

1915 *Doratopsylla curvata* Rothschild, Ectoparasites, 1: 25, figs. 28, 29.

1925 *Doratopsylla curvata* Ewing, Jour. Parasitology, 12: 43.

1929 *Doratopsylla curvata* Ewing, Manual External Parasites, p. 158, fig. 89.

1929 *Doratopsylla* (*Corrodopsylla*) *curvata* Wagner, Konowia, 8: 317.

1929 *Doratopsylla curvata* Jordan, Nov. Zool., 35: 172.

1933 *Doratopsylla curvata* Stewart, Jour. New York Ent. Soc., 41: 260.

MALE. Preantennal region of the head with two rows of bristles; upper row consisting of five short bristles, lower row consisting of three bristles, of which two are long and one is short. Between the two long bristles are four short setae. Fourth spine of the genal ctenidium separated from the genal border, extending obliquely backward. Genal process long and slender, very conspicuous, extending further posteriorly than the last genal spine. Postantennal region of the head armed with three rows of bristles, each row consisting of five or six bristles. Pronotal ctenidium consisting of about nine spines on a side. Each abdominal tergite armed with two rows of bristles. In addition, each of the first four tergites bears a long spinelike dorsal bristle. Tergite VII produced into an acuminate heavily sclerotized process which extends between the two sets of three antepygial bristles. MODIFIED SEGMENTS: Genitalia differing markedly from those of *D. blarinae*. Upper portion of the

\* Wagner (1929) is of the opinion that this species represents a distinct subgenus to which he has given the name, *Corrodopsylla*.

clasper divided into two conspicuous processes of about the same length, between which is a small lobe. Anterior process slender and with two long, stout bristles distally. Posterior process much wider and more or less triangular in shape, armed with two small bristles distally. Movable finger slightly wider basally than distally, strongly curved; the posterior margin with several slender bristles (Plate XXVI, fig. 138). Manubrium triangular, tapering to a point. Penis broad and heavy, blunt terminally; spring very short, extending only slightly beyond the penis.

**FEMALE.** Chaetotaxy of the head (Plate XXVI, fig. 133) and general structure essentially as in the male. Ventral portion of sternite VII divided by a deep sinus into two lobes, of which the upper is acuminate while the lower ends bluntly. Tail of the receptaculum seminis longer than in *D. Blarinae*; about one-half as long as the ovate head. For further details concerning the structure of the female genitalia, see Plate XXVI, fig. 136.

**RECORDS.** IOWA—Ames, July 4, 1936, "in short-tailed shrew nest," six females, three males (R. L. Roudabush); Ruthven, June-July, 1938, on "shrew," numerous specimens (E. R. Becker and P. C. Waters). MINNESOTA—Saint Paul, November 10, 1919, "in soil," male (H. E. Ewing). (MONTANA—Ravalli County, October 20, 1935, "in shrew nest," male and female (W. L. Jellison).)

**EASTERN HOST.** Short-tailed Shrew ("*Blarina brevicauda*").

**EASTERN LOCALITIES.** Iowa, Minnesota, New York, (Montana).

**TYPE MATERIAL.** Male and female from Iowa City, Iowa, on "*Blarina brevicauda*" in the N. C. Rothschild Collection (British Museum).

#### EPITEDIA JORDAN

*Epitedia* Jordan, 1938, Nov. Zool., 41: 124.

Genotype: *Ctenophthalmus wenmanni* Rothschild

Both a genal and a pronotal ctenidium present. Frontal notch prominent. Frons with two rows of bristles. Eye vestigial. Genal ctenidium consisting of two unequal spines, one overlapping the other. Fifth tarsal segment of the fore and middle legs with four pairs of lateral plantar bristles and a basal submedian pair; fifth tarsal segment of the hind legs with four pairs of lateral plantar bristles and without a basal submedian pair.

This genus is represented in the East by three species known

from various small mammals. Unfortunately, *E. faceta* and *E. testor* are very rare; in fact, only the female of the latter species has been described, while the former species is known from but one pair. The males of *E. faceta* and *E. wenmanni* may be separated by the following key:

- Movable finger longer than the distance from its base to the tip of the lower lobe of the clasper ..... *E. wenmanni*  
 Movable finger not longer than the distance from its base to the tip of the lower lobe of the clasper ..... *E. faceta*

***Epitedia wenmanni* (Rothschild)**

(Plate I; Plate XXVII, figs. 139, 142, 144)

- 1904 *Ctenophthalmus wenmanni* Rothschild, Nov. Zool., 11:642, Pl. XIV, figs. 75, 76, 77.  
 1919 *Neopsylla similis* Chapin, Bull. Brooklyn Ent. Soc., 14:50.  
 1919 *Neopsylla wenmanni* Chapin, Bull. Brooklyn Ent. Soc., 14:50.  
 1926 *Ctenophthalmus wenmanni* Stewart, Cornell Univ. Agric. Exp. Sta., Mem. 101, p. 869.  
 1929 *Neopsylla wenmanni* Jordan, Nov. Zool., 35:172.  
 1933 *Neopsylla wenmanni* Jordan, Nov. Zool., 39:62.  
 1937 *Neopsylla wenmanni* Jordan, Nov. Zool., 40:285. ✓  
 1938 *Epitedia wenmanni* Jordan, Nov. Zool., 41:124.

**MALE.** Frontal tubercle roughly triangular, not extending beyond the margin of the head. Preantennal region of the head with two rows of bristles; upper row with five bristles, lower row with four, of which three are very long. Genal ctenidium consisting of two spines, of which one is slightly more than one-half as long as the other which is much more slender. Genal process long but not heavily pigmented. Labial palpus slightly more than one-half as long as the anterior coxa. Second antennal segment with seven or eight short bristles. A series of eight or nine short setae present along the posterior edge of the antennal groove. Postantennal bristles arranged in three rows each consisting of five or six bristles. Pronotum armed with a row of bristles of various sizes and a ctenidium of six or seven spines on a side. Meso- and metanotum each with three or four rows of irregularly arranged bristles. Each abdominal tergite with two rows of bristles, the posterior row consisting of alternating long bristles and short setae. In addition, some of the abdominal tergites armed with one tooth on a side. Three antepygial bristles present on a side. **MODIFIED SEGMENTS:** Process of the clasper bilobed, the upper lobe longer than the lower lobe. Both the upper and lower lobe with a long bristle distally and a number of shorter bristles. Movable finger

roughly triangular, rounded ventrally, the posterior margin with a number of bristles of various sizes. Manubrium long, distally slender, and in some specimens extending slightly more distad than the penis. Penis broad, ending in a curved point; spring not completing a single turn. Posterior arm of sternite IX wider basally than apically where it is armed with about nine spinelike bristles of various sizes. For further details concerning the structure of the male genitalia, see Plate XXVII, fig. 144.

**FEMALE.** General structure including chaetotaxy of the head as in the male (Plate XXVII, fig. 139). Sternite VII divided by a wide sinus into two lobes of which the upper is more acuminate and extends further distad than the rounded lower one. Head of the receptaculum seminis about twice as long as wide. For further details concerning the structure of the female genitalia, see Plate XXVII, fig. 142.

**RECORDS.** DISTRICT OF COLUMBIA—February 5, 1930, on *Peromyscus leucopus noveboracensis* (Fischer), two males (A. H. Howell). GEORGIA—Lumpkin County, October 21, 1935, on "*Neotoma floridana*," male, two females (F. Harper). IOWA—Osceola, March 18, 1936, on "field mouse," female (G. S. Cantonwine); Ames, March 15, 1938, on "white-footed mouse," male; February 5, 1938, male; December 5, 1937, male; March 3, 1938, male (I. Fox); July, 1933, on "thirteen-striped ground squirrel," five females (R. L. Roudabush); Luxemburg, November 23, 1937, on *Glaucomys volans volans* (Linnaeus), five females; Dubuque, November 2, 1937, on *Peromyscus leucopus noveboracensis* (Fischer), male; Dyersville, November 4, 1937, on same host, female; Luxemburg, November 23, 1937, on same host, female (T. Scott). KENTUCKY—Mammoth Cave, July 3, 1929, on "*Neotoma* species," female; Dixon Cave, July 20, 1929, male, three females (L. Giovannoli). MAINE—Lucerne-in-Maine, November 1, 1928, on *Blarina brevicauda talpoides* (Gapper), male (F. Harper). MARYLAND—Bell, July 8, 1927, on "*starling*," female; Bladensburg, March 31, 1901, in nest of "*Peromyscus leucopus*," male (H. S. Barber); College Park, February, 1932, on same host, three males, three females; Takoma Park, April 28, 1932, on same host, male and female (R. Greenfield). MASSACHUSETTS—Ashburnham, October 12, 1927, on "*Evotomys gapperi*," female; Muskegeti, June 18, 1926, on *Microtus breweri* (Baird), female. NEW HAMPSHIRE—Kinsman's Notch, August 22, 1927, on *Peromyscus maniculatus gracilis* (LeConte), male; Carroll

County, October 4, 1926, on "*Evotomys gapperi*," male (F. Harper). NEW YORK — Elma, Erie County, December 16, 1925, on "*Mustela cicognanii*," female (A. Hardy). TENNESSEE—Greenbriar, April 18, 1931, on *Blarina brevicauda talpoides* (Gapper), female, two males (R. L. Boke). VIRGINIA — Great Falls, February 17, 1907, in nest of "*Peromyscus leucopus*," numerous specimens (D. H. Clemons); East Falls Church, January 7, 1927, on *Peromyscus leucopus noveboracensis* (Fischer), two males (E. A. Chapin).

EASTERN HOSTS. Short-tailed Shrew (*Blarina brevicauda talpoides* (Gapper)), Wood-rat (*Neotoma floridana* (Ord), etc.), "Field-mouse," White-footed Mouse (*Peromyscus leucopus noveboracensis* (Fischer), etc.), "Thirteen-striped Ground Squirrel," Flying Squirrel (*Glaucomys volans volans* (Linnaeus)), Red-backed Mouse ("*Evotomys gapperi*"), Meadow-mouse (*Microtus breweri* (Baird)), Weasel ("*Mustela cicognanii*," etc.), Hairy-tailed Mole (*Parascalops breweri* (Bachman)), House-rat (*Rattus norvegicus* (Erxleben)).

EASTERN LOCALITIES. District of Columbia, Georgia, Iowa, Kentucky, Maine, Maryland, Massachusetts, Minnesota, New Hampshire, New York, North Dakota, Tennessee, Virginia, (New Brunswick).

TYPE MATERIAL. One male from British Columbia on "*Peromyscus leucopus*," and one female from the same locality on "*Neotoma cinerea*" in the N. C. Rothschild Collection (British Museum).

This species seems to be pre-eminently a flea of the white-footed mouse, but is abundant on many other small mammals. It occurs as an adult in some part of our territory during every season of the year; indeed the above records show that it has been found in this stage during practically every month. Its hardihood is attested by the fact that it has been taken in great numbers from white-footed mice in the midst of a rigorous Iowa winter and that it is known from as far north as New Brunswick.

#### *Epitedia faceta* (Rothschild)

(Plate XXVII, figs. 141, 143)

1915 *Neopsylla faceta* Rothschild, Ectoparasites, 1: 32.

1929 *Neopsylla faceta* Jordan, Nov. Zool., 35: 176.

1938 *Epitedia faceta* Jordan, Nov. Zool., 41: 124.

No specimen of this species or of *E. testor* has been available for study. The following descriptions are based on Rothschild's

original descriptions and the accompanying figures are redrawn from his illustrations.

**MALE.** Chaetotaxy of the head as in *E. wenmanni* except that the middle row of the postantennal region consists of but two or three bristles. Labial palpus reaching almost to the apex of the fore coxa. Other details of general structure essentially as in *E. wenmanni*. **MODIFIED SEGMENTS:** Process of the clasper bilobed, each lobe with numerous bristles. Movable finger with the posterior margin obtusely angulate in the middle and with two stout curved bristles at this place; posterior margin further armed with numerous slender setae. Posterior arm of sternite IX with a row of four spiniforms at the apex near which are three smaller spiniforms and some setae. For further details concerning the structure of the male genitalia, see Plate XXVII, fig. 141.

**FEMALE.** General structure and chaetotaxy essentially as in the male. Sternite VII with a wide but shallow sinus, the two lobes of approximately the same size. Head of the receptaculum seminis long and sausage-shaped, much longer than the tail. For further details of the structure of the female genitalia, see Plate XXVII, fig. 143.

**EASTERN HOST.** Red Squirrel ("*Sciurus hudsonicus*").

**EASTERN LOCALITY.** Massachusetts.

**TYPE MATERIAL.** Male and female from Wilbraham, Massachusetts, on "*Sciurus hudsonicus*" in the N. C. Rothschild Collection (British Museum).

#### ***Epitedia testor* (Rothschild)**

(Plate XXVII, fig. 140)

1915 *Neopsylla testor* Rothschild, Ectoparasites, 1: 34, fig. 36.

1926 *Neopsylla testor* Stewart, Cornell Univ. Agric. Exp. Sta., Mem. 101, p. 869.

1929 *Neopsylla testor* Jordan, Nov. Zool., 35: 177.

1933 *Neopsylla testor* Stewart, Jour. New York Ent. Soc., 41: 261.

1938 *Epitedia testor* Jordan, Nov. Zool., 41: 124.

**FEMALE.** General structure and chaetotaxy essentially as in *E. faceta*, the difference between the species being in the structure of the genitalia. Sternite VII bearing on both sides together six long and seven short bristles; divided into two lobes by a shallow sinus, the upper lobe slightly narrower than in *faceta*. For further details of the structure of the female genitalia, see Plate XXVII, fig. 140.

**MALE.** Undescribed.

EASTERN HOST. "Nest (of mouse?)."

EASTERN LOCALITY. New York.

TYPE MATERIAL. Female holotype collected at Lansingburgh, near Troy, New York, in the N. C. Rothschild Collection (British Museum).

#### TAMIOPHILA JORDAN

*Tamiophila* Jordan, 1938, Nov. Zool., 41:124.

Genotype: *Typhlopsylla grandis* Rothschild

Genal spines as in *Epitedia* Jordan. Eye vestigial. Pronotal ctenidium consisting of about eleven spines on a side. Each abdominal sternite armed with a row of six or seven bristles anterior to which are numerous slender setae. Fifth tarsal segment of the fore and middle legs armed with five pairs of lateral plantar bristles, without a basal submedian pair. Fifth tarsal segment of the hind legs armed with four pairs of lateral plantar bristles, without a basal submedian pair. Size large, four or five millimeters in length.

This genus is represented in the East by a single giant species which occurs on various rodents.

#### *Tamiophila grandis* (Rothschild)

(Plate XXV, figs. 127, 129, 131)

- 1902 *Typhlopsylla grandis* Rothschild, Ent. Rec., 14:62, Pl. II, fig. 3.
- 1895 *Pulex gigas* Baker, Can. Ent., 27:163 (not *Pulex gigas* Kirby).
- 1896 *Pulex gigas* Osborn, United States Dept. Agric. Div. Ent., Bull. 5 (new ser.), p. 152 (not *Pulex gigas* Kirby).
- 1904 *Ctenophthalmus gigas* Baker, Proc. United States Nat. Mus., 27:421 (not *Pulex gigas* Kirby).
- 1905 *Ctenophthalmus gigas* Baker, Proc. United States Nat. Mus., 29:135 (not *Pulex gigas* Kirby).
- 1926 *Neopsylla striata* Stewart, Insec. Insc. Menst., 14:124.
- 1928 *Ctenophthalmus gigas* Stewart, Cornell Univ. Agric. Exp. Sta., Mem. 101, p. 869 (not *Pulex gigas* Kirby).
- 1928 *Neopsylla striata* Stewart, Cornell Univ. Agric. Exp. Sta., Mem. 101, p. 869.
- 1929 *Neopsylla grandis* Jordan, Nov. Zool., 35:172.
- 1933 *Neopsylla grandis* Stewart, Jour. New York Ent. Soc., 41:260.
- 1937 *Neopsylla grandis* Jordan, Nov. Zool., 40:285.
- 1938 *Tamiophila grandis* Jordan, Nov. Zool., 41:124.

FEMALE. Frontal tubercle minute. Preantennal region of the head with two oblique rows of bristles; the upper row consisting of seven or eight, the lower of three much more robust ones.



First genal spine much shorter and broader than the other. Postantennal region of the head with three oblique rows of bristles, the first row consisting of five or six, the second of seven or eight, and the third of about seven. Posterior to the antenna along the antennal groove are numerous long hairlike setae (Plate XXV, fig. 131). Pronotum with two rows of bristles, and a ctenidium of about ten or eleven spines on a side. Meso- and metanotum each with numerous irregularly arranged bristles in addition to the marginal row. Each abdominal tergite armed with three rows of bristles; in addition, the anterior tergites may be armed with one to several short, stout dorsal teeth on a side. Three long, antepygial bristles present on a side. Head of the receptaculum seminis broad and long, more or less oval in shape. Sternite VII without a sinus, the posterior margin truncate. For further details concerning the female genitalia, see Plate XXV, fig. 129, which was drawn from a specimen taken off "*Tamias striatus*" at Branchtown, Ontario, Canada, (G. F. Dippie), loaned through the courtesy of Dr. Karl Jordan.

MALE. In the absence of a specimen for study, the following description and the accompanying illustration are taken from Rothschild's original description. Frontal and dorsal portions of the head covered with numerous hairlike setae. First four abdominal tergites with two or three teeth on a side dorsally. Sternites with hairlike setae ventrally, the hairy area extending basally beyond the middle of each segment. MODIFIED SEGMENTS: Process of the clasper tongue-shaped with numerous setae on the margins. Movable finger more or less boot-shaped with the apex truncate, its ventro-distal margin compressed carniform and clothed with setae. Manubrium long and slender, curved distally. Sternite IX boomerang-shaped, bearing numerous setae of various sizes ventrally, the more apical ones spiniform. For further details concerning the structure of the male genitalia, see Plate XXV, fig. 127.

EASTERN HOSTS. Chipmunk (*Tamias striatus lysteri* (Richardson)), "Cottontail Rabbit," Red Squirrel (*Sciurus hudsonicus loquax* Bangs), Weasel (*Mustela noveboracensis noveboracensis* (Emmons)).

EASTERN LOCALITIES. Massachusetts, New York, Michigan, (Canada).

TYPE MATERIAL. Several specimens from Branchtown, Ontario, Canada, on "*Tamias striatus*" in the N. C. Rothschild Collection (British Museum).

## CATALLAGIA ROTHSCILD

*Catallagia* Rothschild, 1915, Ectoparasites, 1:41.

Genotype: *Pulex charlottensis* Baker

Frontal tubercle prominent, peglike, and acuminate. Eye vestigial. Pronotal ctenidium consisting of about seven spines on a side. Inner surface of the hind coxa with a patch of short spines. Fifth segment of the fore and middle tarsi with four lateral pairs of plantar bristles and a basal ventral pair; fifth segment of the hind tarsi with four lateral pairs, the ventral pair absent.

This genus is represented in the East by two rare species which occur on wild mice. Each is known from one sex only. In the absence of adequate material it is best to leave them as originally described, although it is not unlikely that they are the two sexes of a single species. If this should prove to be the case, then *C. borealis* Ewing (March, 1929) would have priority over *C. onaga* Jordan (September, 1929).

*Catallagia borealis* Ewing

(Plate XXVIII, figs. 146, 147)

1929 *Catallagia borealis* Ewing, Proc. Bio. Soc. Washington, 42:125.

**FEMALE.** Preantennal region of the head with two oblique rows of bristles; the upper row consisting of five or six bristles, the lower row of four, with the second from the antenna the smallest. Postantennal region with three rows of four to six bristles each (Plate XXVIII, fig. 146). Pronotum armed with a single row of bristles. Meso- and metanotum each armed with three or four irregular rows of bristles. Each abdominal tergite armed with two rows of bristles; the anterior tergites further armed with one to three stout dorsal teeth on a side. Three antepygial bristles present on a side, of which the middle is the longest. Sternite VII divided by a deep sinus into two lobes, of which the upper is more sharply defined than the lower (Plate XXVIII, fig. 147). Unfortunately, the receptaculum seminis has been destroyed in the single specimen known.

**MALE.** Undescribed.

**EASTERN HOST.** Meadow-mouse (*Microtus pennsylvanicus pennsylvanicus* (Ord)).

**EASTERN LOCALITY.** Maine.

**TYPE MATERIAL.** Female holotype from *Microtus pennsylv-*

*vanicus pennsylvanicus* (Ord) at Basin Pond, Mount Katahdin, Maine, in the United States National Museum.

***Catallagia onaga* Jordan**

(Plate XXVIII, fig. 145)

1929 *Catallagia onaga* Jordan, Nov. Zool., 35:172, fig. 7.

1933 *Catallagia onaga* Stewart, Jour. New York Ent. Soc., 41:255.

MALE. Chaetotaxy of the head and general structure essentially as in *C. borealis*. MODIFIED SEGMENTS: Process of the clasper large and broad, the outer margins with a number of slender setae. Manubrium long, expanded distad and turned up. Movable finger large, the upper portion produced over the process of the clasper into a broad triangular "nose"; the posterior margin armed with numerous slender setae. Penis broad and bladelike, ending in a short process; spring not completing a turn. For further details concerning the structure of the male genitalia, see Plate XXVIII, fig. 145.

FEMALE. Undescribed.

The above description and the accompanying illustration are based upon a single specimen from "*Blarina brevicauda*" at Adirondack Lodge, Essex County, New York, loaned through the courtesy of Dr. Karl Jordan.

EASTERN HOST. Short-tailed Shrew ("*Blarina brevicauda*").

EASTERN LOCALITY. New York.

TYPE MATERIAL. Two males from "*Blarina brevicauda*" at New York in the N. C. Rothschild Collection (British Museum).