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A new subgenus and four new species of *Gliricola* (Phthiraptera: Gyropidae) from Caribbean hutias (Rodentia: Capromyidae)

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Abstract.—A new subgenus, *Hutiaphilus* (Phthiraptera: Gyropidae), is described for five previously named species of *Gliricola* (*G. armatus, G. capromydis, G. cubanus, G. ewingi,* and *G. omahonyi*) and four new species (*G. rabbi,* with the type host *Geocapromys ingrahami*; and *G. pinei, G. schwartzi,* and *G. wernecki,* all with the type host *Mysateles melanurus melanurus*). We redescribe and illustrate the previously described species, and provide a key for the identification of these nine species. The nine species of *Hutiaphilus* are restricted to the caviomorph rodent family Capromyidae, the West Indian hutias. This chewing louse-host association is parallel to other louse-host associations we have documented for caviomorph rodents in that there are two (and in one case, three) species of lice on each host species and typically two even on single host individuals. *Hutiaphilus* is a derived clade well supported by several synapomorphic features. Its position within the genus *Gliricola* suggests that the family Capromyidae may be nested within what is now recognized as the Neotropical family Echimyidae.

Resumen.—Se describe *Hutiaphilus,* un nuevo subgénero de *Gliricola* (Phthiraptera: Gyropidae). Se incluyen en *Hutiaphilus* cinco especies de *Gliricola* ya descritas (*G. armatus, G. capromydis, G. cubanis, G. ewingi y G. omahonyi*) y quatro especies nuevas (*G. rabbi,* con el hospedero típico *Geocapromys ingrahami*; y *G. pinei, G. schwartzi* y *G. wernecki,* las tres con el hospedador típico *Mysateles melanurus melanurus*). Se redescriben las especies anteriormente descritas, incluyendo ilustraciones. Además se presenta una clave de identificación de las nueve especies, que se restringen a la familia de roedores caviomorfos Capromyidae, las jutías antillanas. Las relaciones piojo/hospedeador de estas especies se aproximan a las que hemos documentado de otros roedores caviomorfos, por tener dos (y en un caso hasta tes) especies de piojos en cada especie hospedeador, incluso en un solo individuo hospedeador. *Hutiaphilus* es un clado derivido bien apoyado por varios caracteres sinapomórficos. Su posición dentro del género *Gliricola* sugiere que la familia Capromyidae posiblemente se encuentre filogenéticamente dentro de lo que actualmente se reconoce como la familia neotropical Echimyidae.

The chewing louse genus *Gliricola* Mjöberg (Phthiraptera: Gyropidae) is restricted in its distribution to the New World rodent families Capromyidae, Caviidae, and Echimyidae—caviomorph rodents of the Caribbean islands and Central and South

America. Thirty-five species of *Gliricola* are now recognized (Price & Timm 1993). Emerson & Price (1975) and Price & Timm (1993) provide species descriptions, illustrations, brief reviews of species, host distributions, and literature citations for a number of these taxa. Of the 35 species of *Gliricola,* 5 are from 3 species of West Indian hutias (Rodentia: Capromyidae). Werneck (1944) described *Gliricola capromydis* and *G. cubanus* from the Cuban hutia, *Capromys pilorides* (Say). In the same paper, *G. ewingi* and a second subspecies of *G. capromydis, G. c. armatus* [herein considered a full species], were described from a second species of Cuban hutia, *Capromys prehensilis* [now *Mysateles prehensilis* (Poeppig)]. Werneck (1951) subsequently described the fifth and final species, *G. omahonyi* from the Bahamian hutia, *Geocapromys ingrahami* (J. A. Allen).

The hutias are a Caribbean radiation of mid-sized, terrestrial caviomorph rodents that occupied many of the larger and smaller islands of the Greater and Lesser Antilles and the Bahamas in the West Indies. The capromyids are a complex and poorly understood radiation of rodents that are in need of revision. Modern authors recognize from 20 to 40 Recent species in the family, grouped in 6 to 8 genera in 4 subfamilies (Hall 1981, Nowak 1991, Woods 1989, 1993). The majority of these species are now extinct, with many of the extinctions having taken place since the arrival of Europeans on these islands in the 16th century (Woods 1989).

We recently obtained a number of *Gliricola* lice from specimens of hutias collected in the 1950's by the late Albert Schwartz and his colleagues. These hutia specimens have only recently become available for study. This collection is extremely significant in that it contains a host, *Mysateles melanurus* (Poey), from which lice were unknown previously, and it provides additional collections of *Gliricola* from poorly represented hosts. This prompted us to re-examine as many specimens of *Gliricola* from capromyids that we could locate in collections and to collect additional material from specimens of hutias in the collections of the Field Museum and University of Kansas Natural History Museum.

The purposes of this paper are to: describe a new subgenus for the nine species of *Gliricola* we now recognize from West Indian capromyids; redescribe the five previously named species; describe four new species of *Gliricola*; provide a key for the identification of the nine species in the new subgenus; and discuss the host relationships and geographic distribution of the louse genus *Gliricola* on capromyids.

In the following descriptions, all measurements are in millimeters. The scientific names of the hosts follow Hall (1981), with updates by Woods (1993). The deposition of the holotypes is given in each new species description; as numbers allow, paratypes will be placed in the collections of the National Museum of Natural History (Washington, DC), the Field Museum (Chicago, IL), University of Minnesota (St. Paul, MN), and Oklahoma State University (Stillwater, OK). Acronyms designating museum collections where the hosts are deposited are: FMNH = Field Museum of Natural History; KU = University of Kansas Natural History Museum (Lawrence, KS); USNM = National Museum of Natural History.

Genus *Gliricola* Mjöberg

Micropus Denny, 1842:247 (nec Meyer & Wolf 1810:280). Type species: *Gyropus gracilis* Nitzsch.

Gliricola Mjöberg, 1910:292. Type species: *Gyropus gracilis* Nitzsch.

Paragliricola Ewing, 1924:29. Type species: *Paragliricola guadrisetosa* Ewing.

Clay (1970), in discussing supraspecific relationships within the suborder Amblycera, placed *Gliricola* as the principal component of the subfamily Gliricolinae (family Gyropidae). The only other members of this subfamily are two species of *Mono-*

thoracius Werneck described, respectively, from *Myoprocta acouchy* (Erxleben) and *Kerodon rupestris* (Wied) from Brazil and one species of *Pitrufguenia* Marelli from *Myocastor coypus* (Molina) from Chile (Werneck 1948). Werneck (1948) and Clay (1970) discuss these louse taxa and the characters distinguishing them.

Morphologically, members of *Gliricola* may be characterized by the following combination of features: grossly much as in Fig. 29, except for terminalia; antennae clubbed, mostly concealed beneath head, with third segment pedunculate; with two-segmented maxillary palps; without ventral spinous head processes; with only five pairs of abdominal spiracles, those on segment VIII absent; with single thin tarsal claw on each leg; prothorax distinctly separated from fused meso/metathorax; and little sexual dimorphism except that associated with terminalia and dimensions.

Hutiaphilus, new subgenus

Type species.—*Gliricola capromydis* Werneck

Description.—The features that uniquely characterize species of *Hutiaphilus* are the male dorsal terminalia with a conspicuous bilobed plate (Fig. 4), and the male genitalia with variably complicated mesosomal features and large parameres each bearing two conspicuous subapical setae (Fig. 5). This separation is reinforced by the geographical distribution of the hosts, all of which are hutia species on the West Indies islands.

The remaining 30 *Gliricola* species, all herein considered to be in the nominate subgenus *Gliricola,* are found on the mainland of Central and South America, on a considerably different array of hosts. No males of these louse taxa have any suggestion of the bilobed plate on the dorsal terminalia. Their male genitalia are quite different, with the single exception of those of *G. mirandai* described by Werneck (1935) from *Isothrix bistriatus* Wagner in Bolivia. This genitalic similarity led Werneck (1951) to include his five taxa from hutias with *G. mirandai* as forming a well-defined group within *Gliricola.* We have studied specimens of *G. mirandai* and have concluded, in spite of this genitalic similarity, that this species is a member of the nominate subgenus. Both sexes of *G. mirandai* have a markedly different sternum II and sternal and pleural chaetotaxy; the male lacks the bilobed dorsal plate on the last segment; and the female terminalia are of a grossly different configuration.

Etymology.—The new subgenus proposed herein, *Hutiaphilus,* derives its name from the common name of the hosts, hutias, in combination with the substantive suffix *phila,* derivable from *philos* (φιλος), "loving." The gender is masculine.

In the following species descriptions, setal counts are provided only for selected abdominal terga and sterna, as the compromised quality of many of the available specimens and the large number of setae involved made quantification difficult; the counts are given only to reflect the overall pattern of abundance. The principal features for separation of males involve details of the genitalia and the dorsal and ventral terminalia; for females, the chaetotaxy associated with the terminalia, especially that of the subgenital plate and anus; and for both sexes, the shape and chaetotaxy of sternum II, the size of spiracles, and dimensions.

Abbreviations for dimensions are: POW, preocular width; TW, temple width; HL, head length; PW, prothorax width; MW, metathorax width; AWIV, abdomen width at segment IV; TL, total length; GW, male genitalia width at paramere base; GPL, male genitalia paramere length; GL, male genitalia length measured from anterior end of outer demarcated portion of basal apodeme to tip of paramere (see Fig. 5). Bracketed information under material examined are additions that we have made to the original data. For split drawings with a median

vertical line, dorsal is to the left and ventral to the right.

Gliricola (*Hutiaphilus*) *capromydis* Werneck
Figs. 1–5

Gliricola capromydis Werneck, 1944:394.
Type host: *Capromys pilorides* (Say).

Male.—Sternum II shaped as in Fig. 2, constricted and weakly pigmented medially. Setae on tergum IV, 45–73. Setae on sternum II, 4–7; IV, 10–15; V, 14–20; VII, 22–35. Spiracle diameter, 0.010–0.015. Dorsal terminalia as in Fig. 4; dorsal sclerite with prominent widely spaced lobes; short spiniform setae on each lobe, other setae fine. Ventral terminalia as in Fig. 3, with terminal portion bearing scattered small projections. Genitalia as in Fig. 5; prominent apically pointed triangular mesosome. Dimensions: POW, 0.18–0.20; TW, 0.23–0.26; HL, 0.23–0.27; PW, 0.17–0.19; MW, 0.22–0.24; AWIV, 0.35–0.40; TL, 0.96–1.12; GW, 0.13–0.16; GPL, 0.15–0.17; GL, 0.31–0.33.

Female.—Sternum II as for male. Setae on tergum V, 55. Setae on sternum II, 7; IV, 19; V, 25. Spiracle diameter, 0.020–0.025. Terminalia as in Fig. 1; dorsal anterior setae distributed across segments; subgenital plate with total of 32 setae, none of these very long; setae around anus as shown. Dimensions: POW, 0.21; TW, 0.28; HL, 0.28; PW, 0.20; MW, 0.28; AWIV, 0.52; TL, 1.42.

Type material.—Holotype male, allotype female, ex *Capromys pilorides*: Cuba: [Pinar del Río], San Diego de los Baños, coll. W. M. Mann #2202; in collection of the National Museum of Natural History (Washington, DC).

Other material examined.—3 males, ex *Capromys pilorides* [*pilorides*]: Cuba: Las Tunas, 29 km W of Victoria de las Tunas, Samalloa Farm, 15 Jun 1952, coll. E. T. Willis, Albert Schwartz #2327 ♀ (KU 147702); 1 male, same data, except Albert Schwartz #2328 ♀ (KU 147703); 1 male, same data, except Albert Schwartz #2329 ♀ (KU 147704). 1 male, ex *Capromys pilorides* [*pilorides*]: Cuba: [Camagüey], Camagüey, 10 Mar 1913, coll. C. Sheldon #10154X ♂ (USNM 181232).

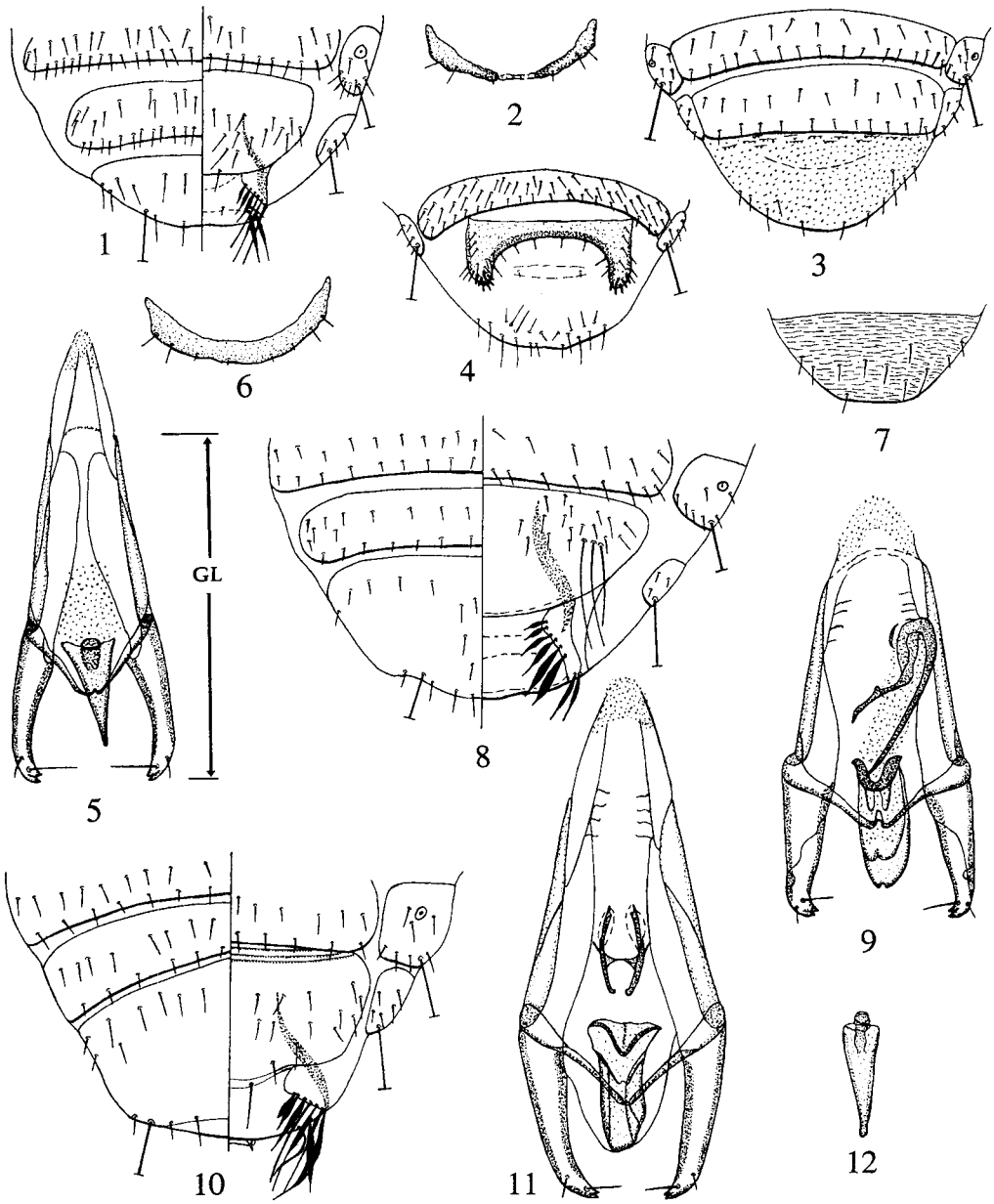
Remarks.—The male of this species is readily distinguished from all others of the subgenus by the details of the genitalia, especially the shape of the mesosome, in conjunction with the type of dorsal terminal plate, the sculpturing of the ventral terminal segment, and the structure of sternum II. The female is recognizable by the chaetotaxy of the terminalia and the chaetotaxy and shape of sternum II.

Gliricola (*Hutiaphilus*) *cubanus* Werneck
Figs. 6–9

Gliricola cubanus Werneck, 1944:397.
Type host: *Capromys pilorides* (Say).

Male.—Sternum II shaped as in Fig. 6, of fairly equal width throughout. Setae on tergum IV, 57–75. Setae on sternum II, 7–8, much shorter medially; IV, 16–24; V, 25–31; VII, 32–40. Spiracle diameter, 0.010–0.015. Dorsal terminalia near to Fig. 18; dorsal sclerite with prominent close-set lobes; short spiniform setae on each lobe, other setae fine. Ventral terminal segment as in Fig. 7, with terminal portion bearing weak transverse lines. Genitalia as in Fig. 9; with complex mesosomal structures, broad and rounded apically, with prominent elongate often convoluted sclerite anterior to these. Dimensions: POW, 0.17–0.19; TW, 0.23–0.25; HL, 0.22–0.24; PW, 0.17–0.19; MW, 0.20–0.22; AWIV, 0.36–0.40; TL, 0.96–1.10; GW, 0.15–0.18; GPL, 0.15–0.16; GL, 0.29–0.31.

Female.—Sternum II as for male. Setae on tergum V, 44–48. Setae on sternum II, 7–9; IV, 19–21; V, 25–26. Spiracle diameter, 0.013. Terminalia as in Fig. 8; dorsal anterior setae distributed across segments; subgenital plate with total of 27–32 short, 5–6 very long setae; broad setae around anus, as shown. Dimensions: POW, 0.19–0.20; TW, 0.24–0.26; HL, 0.23–0.25; PW,



Figs. 1–12. 1–5, *Gliricola capromydis:* (1) female terminalia; (2) sternum II; (3) male ventral terminalia; (4) male dorsal terminalia; (5) male genitalia (GL = genitalia length). 6–9, *Gliricola cubanus:* (6) sternum II; (7) male ventral terminalia; (8) female terminalia; (9) male genitalia. 10–11, *Gliricola ewingi:* (10) female terminalia; (11) male genitalia. 12, *Gliricola armatus:* male genitalic mesosome.

0.19–0.20; MW, 0.23–0.25; AWIV, 0.44–0.49; TL, 1.18–1.22.

Type material.—Paratype male, ex *Capromys pilorides* [*pilorides*]: Cuba: [Camagüey], Camagüey, 10 Mar 1913, coll. C. Sheldon #10154X ♂ (USNM 181232); in collection of University of California (Berkeley).

Other material examined.—1 male, 1 female, ex *Capromys pilorides* [*pilorides*]:

Cuba: Las Tunas, 29 km W of Victoria de las Tunas, Samalloa Farm, 15 Jun 1952, coll. E. T. Willis, Albert Schwartz #2327 ♀ (KU 147702); 4 males, 1 female, same data, except Albert Schwartz #2328 ♀ (KU 147703); 4 males, 2 females, same data, except Albert Schwartz #2329 ♀ (KU 147704).

Remarks.—There are considerable differences between this taxon and *Gliricola capromydis,* which co-occurs on individuals of *Capromys pilorides.* The male mesosomal sclerites are profoundly different, as well as the shape of sternum II, the close-set lobes of the dorsal terminal plate, and the sculpturing of the ventral male terminalia; the female, with 2–3 very long setae on each side of the subgenital plate, is easily separated from *G. capromydis.*

Gliricola (*Hutiaphilus*) *ewingi* Werneck
Figs. 10, 11

Gliricola ewingi Werneck, 1944:399. Type host: *Capromys* [=*Mysateles*] *prehensilis* [*prehensilis*] (Poeppig).

Male.—Sternum II as in Fig. 2, constricted and weakly pigmented medially. Setae on tergum IV, 83–86. Setae on sternum II, 7; IV, 22–24; V, 27; VII, 35–36. Spiracle diameter, 0.015. Dorsal terminalia near to Fig. 18; dorsal sclerite with prominent close-set lobes; short spiniform setae on each lobe, other setae fine. Ventral terminalia as in Fig. 7, with terminal portion bearing weak transverse lines. Genitalia as in Fig. 11; complex of mesosomal structures as shown, broadly rounded, with H-shaped anterior sclerite. Dimensions: POW, 0.17–0.18; TW, 0.23–0.24; HL, 0.22; PW, 0.19–0.20; MW, 0.21–0.23; AWIV, 0.43–0.44; TL, 1.14; GW, 0.20; GPL, 0.17–0.19; GL, 0.38–0.41.

Female.—Sternum II as for male. Setae on tergum V, 42–45. Setae on sternum II, 8; IV, 17–18; V, 20–23. Spiracle diameter, 0.018–0.025. Terminalia as in Fig. 10; dorsal anterior setae distributed across segments; subgenital plate with total of 28–32 setae, none of these very long; several uninterrupted transverse rows of projections across base of subgenital plate; setae around anus as shown. Dimensions: POW, 0.17–0.19; TW, 0.23–0.25; HL, 0.22–0.24; PW, 0.20; MW, 0.23; AWIV, 0.44; TL, 1.21.

Type material.—Paratypes 2 males, 1 female, ex *Mysateles prehensilis* [*prehensilis*]: Cuba: [Pinar del Río], San Diego de los Bäños, 8 Apr 1900, Palmer and Riley #137 ♂ (USNM 103887); in collection of University of California (Berkeley).

Other material examined.—1 male, ex *Mysateles prehensilis* [*prehensilis*]: Cuba: Pinar del Río, 4 December 1940, coll. I. Perez Viqueras. 1 female, ex *M. p. prehensilis*: Cuba: Havana, Feb 1886, coll. C. B. Cory (FMNH 15021).

Remarks.—The male genitalia of *Gliricola ewingi* are unique in possessing the H-shaped anterior mesosomal sclerite and in being larger in all dimensions than for any of the other species of the subgenus. The female is separable on the basis of the structure and chaetotaxy of its terminalia; the rows of projections at the base of the subgenital plate are much as those of the first new species described below, but with much smaller spiracles and a different shape of sternum II.

Gliricola (*Hutiaphilus*) *armatus* Werneck
Figs. 12–15

Gliricola capromydis armatus Werneck, 1944:397. Type host: *Capromys* [=*Mysateles*] *prehensilis* [*prehensilis*] (Poeppig).

Male.—Sternum II apparently near Fig. 2, constricted and weakly pigmented medially, but difficult to discern. Setae on tergum IV, 54. Setae on sternum II, 8; IV, 19; V, 24; VII, 27. Spiracle diameter, 0.015. Dorsal terminalia as in Fig. 14; dorsal sclerite with prominent widely spaced lobes; short spiniform setae on each lobe and along medioposterior border. Ventral terminalia as in Fig. 15, with terminal portion bearing weak groups of projections basally,

transverse lines of fine projections apically. Genitalia close to Fig. 5; mesosomal structure as in Fig. 12, more slender and apically blunt. Dimensions: POW, 0.17; TW, 0.23; HL, 0.23; PW, distorted; MW, 0.23; AWIV, 0.38; TL, distorted; GW, 0.15; GPL, 0.14; GL, 0.28.

Female.—Sternum II as for male. Setae on tergum V, 43–51. Setae on sternum II, 8; IV, 22–24; V, 25–27. Spiracle diameter, 0.015. Terminalia as in Fig. 13; only lateral dorsal anterior setae on terminal segments; subgenital plate with total of 36–41 setae, none of these very long; setae around anus as shown. Dimensions: POW, 0.18–0.20; TW, 0.24–0.26; HL, 0.23–0.25; PW, 0.21; MW, 0.23–0.24; AWIV, 0.48–0.50; TL, 1.28–1.29.

Type material.—Holotype male, allotype female, ex *Mysateles prehensilis* [*prehensilis*]: Cuba: [Pinar del Río], San Diego de los Baños, 8 Apr 1900, coll. Palmer and Riley #137 ♂ (USNM 103887); in collection of University of California (Berkeley).

Other material examined.—1 female, ex *Mysateles prehensilis* [*prehensilis*]: Cuba: Pinar del Río, 4 December 1940, coll. I. Perez Viqueras. 1 female, ex *M. p. prehensilis*: Cuba: Havana, Feb 1886, coll. C. B. Cory (FMNH 15021).

Remarks.—This species co-occurs with *Gliricola ewingi* on individuals of *Mysateles prehensilis.* While the male genitalia are close to those of *G. capromydis,* the unique chaetotaxy of the dorsal terminal plate and the sculpturing of the ventral terminal segment will separate males of these species. The female, with the virtual absence of any median anterior setae on the last 2 abdominal terga, is unique; this is further supported by differences in the ventral terminalia chaetotaxy.

Gliricola (*Hutiaphilus*) *omahonyi* Werneck
Figs. 16–20

Gliricola o'mahonyi Werneck, 1951:309. Type host: *Geocapromys ingrahami* (J. A. Allen).

Male.—Sternum II as in Fig. 17, of equal width throughout, curve relatively flattened. Setae on tergum IV, 55–62. Setae on sternum II, 0–2; IV, 10–11; V, 15–16; VII, 21. Spiracle diameter, 0.010. Dorsal terminalia as in Fig. 18; dorsal sclerite with prominent closely-set lobes; short spiniform setae on each lobe, sparse fine setae elsewhere. Ventral terminalia as in Fig. 19, with terminal portion bearing weak transverse lines basally, weak transverse lines of fine projections apically. Genitalia as in Fig. 20; with ovoid mesosomal structure as shown, only small slender sclerite anterior to this; parameres with sharp barb on outer margin. Dimensions: POW, 0.16–0.17; TW, 0.22; HL, 0.19–0.20; PW, 0.15–0.16; MW, 0.18–0.19; AWIV, 0.32; TL, 0.84; GW, 0.11; GPL, 0.12; GL, 0.25–0.26.

Female.—Sternum II as for male. Setae on tergum V, 31–38. Setae on sternum II, 2; IV, 10–11; V, 15–17. Spiracle diameter, 0.010–0.013. Terminalia as in Fig. 16; dorsal anterior setae distributed across segments; subgenital plate with total of 24–30 setae, none of these very long; setae around anus as shown. Dimensions: POW, 0.15–0.18; TW, 0.21–0.24; HL, 0.19–0.21; PW, 0.16–0.18; MW, 0.19–0.22; AWIV, 0.37–0.40; TL, 0.91–0.99.

Material examined.—1 male, 3 females, ex *Geocapromys ingrahami*: Bahamas: Little Way Cay, 12 Dec 1985, coll. K. C. Jordan. 1 male, 1 female ex *Geocapromys ingrahami ingrahami*: Bahamas: [Plana Keys], East Plana Cay, 22°27′N, 73°32′W, 4 Mar 1953, coll. George B. Rabb and E. B. Hayden, Jr. #136 ♂ (KU 60655). 3 females, *G. i. ingrahami*: Bahamas: Plana Keys, East Plana Cay, Feb 1891, coll. D. P. Ingraham (FMNH 5624); 1 female, same data, except (FMNH 15022).

Remarks.—The reduced chaetotaxy of sternum II and the unique male genitalia, in conjunction with the close-set lobes of the male terminal dorsal plate and the chaetotaxy of the female terminalia, easily distinguish *Gliricola omahonyi* from the other species of *Hutiaphilus.* Even though we

were unable to study any type material of *G. omahonyi,* the description and illustrations furnished by Werneck (1951) left no doubt as to the correct identity of our material.

In his initial description, Werneck (1951) used the spelling *o'mahonyi* for this species. Under articles 27, 32(c)(vi), and 32(d) of the International Code of Zoological Nomenclature, no apostrophes are to be used in scientific names. Names containing apostrophes are now considered to be spelled incorrectly, and as such are to be changed to omit the apostrophe (ICZN 1985). We herein correct the spelling of the specific epithet to *omahonyi.*

Gliricola (*Hutiaphilus*) *rabbi,* new species
Figs. 21–23

Type host.—Geocapromys ingrahami (J. A. Allen)

Male.—Sternum II much as in Fig. 6. Setae on tergum IV, 63–64. Setae on sternum II, 6–8; IV, 13–14; V, 17–19; VII, 21–22. Spiracle diameter, 0.010. Dorsal terminalia as in Fig. 21; dorsal sclerite with prominent widely spaced lobes; short spiniform setae on each lobe, fine setae elsewhere. Ventral terminalia as in Fig. 22, with terminal portion bearing conspicuous uninterrupted transverse lines of projections basally, weak scattered heavier projections apically. Genitalia as in Fig. 23; with tapered blunt mesosomal structure as shown only small slender sclerites anterior to this. Dimensions: POW, 0.18–0.19; TW, 0.24–0.25; HL, 0.23; PW, 0.19; MW, 0.22; AWIV, 0.38; TL, 0.99–1.01; GW, 0.12; GPL, 0.12–0.13; GL, 0.27–0.28.

Female.—Sternum II as for male. Setae on tergum V, 51. Setae on sternum II, 7; IV, 12; V, 13. Spiracle diameter, 0.010. Terminalia distorted preventing adequate illustration, but grossly near Fig. 16; dorsal anterior setae extending across segments; subgenital plate with total of 25 setae, none of these very long, and basally with 4 uninterrupted transverse rows of projections, much as for male. Dimensions: POW, 0.18; TW, 0.25; HL, 0.23; PW & MW, distorted; AWIV, 0.47; TL, 1.20.

Type material.—Holotype male, ex *Geocapromys ingrahami*: Bahamas: Little Way Cay, 12 Dec 1985, coll. K. C. Jordan; in collection of Oklahoma State University (Stillwater, OK). Paratypes: 1 male, same data as holotype; 1 female, ex *Geocapromys ingrahami ingrahami*: Bahamas: [Plana Keys], East Plana Cay, 22°27′N, 73°32′W, 4 Mar 1953, coll. George B. Rabb and E. B. Hayden, Jr. #136 ♂ (KU 60655).

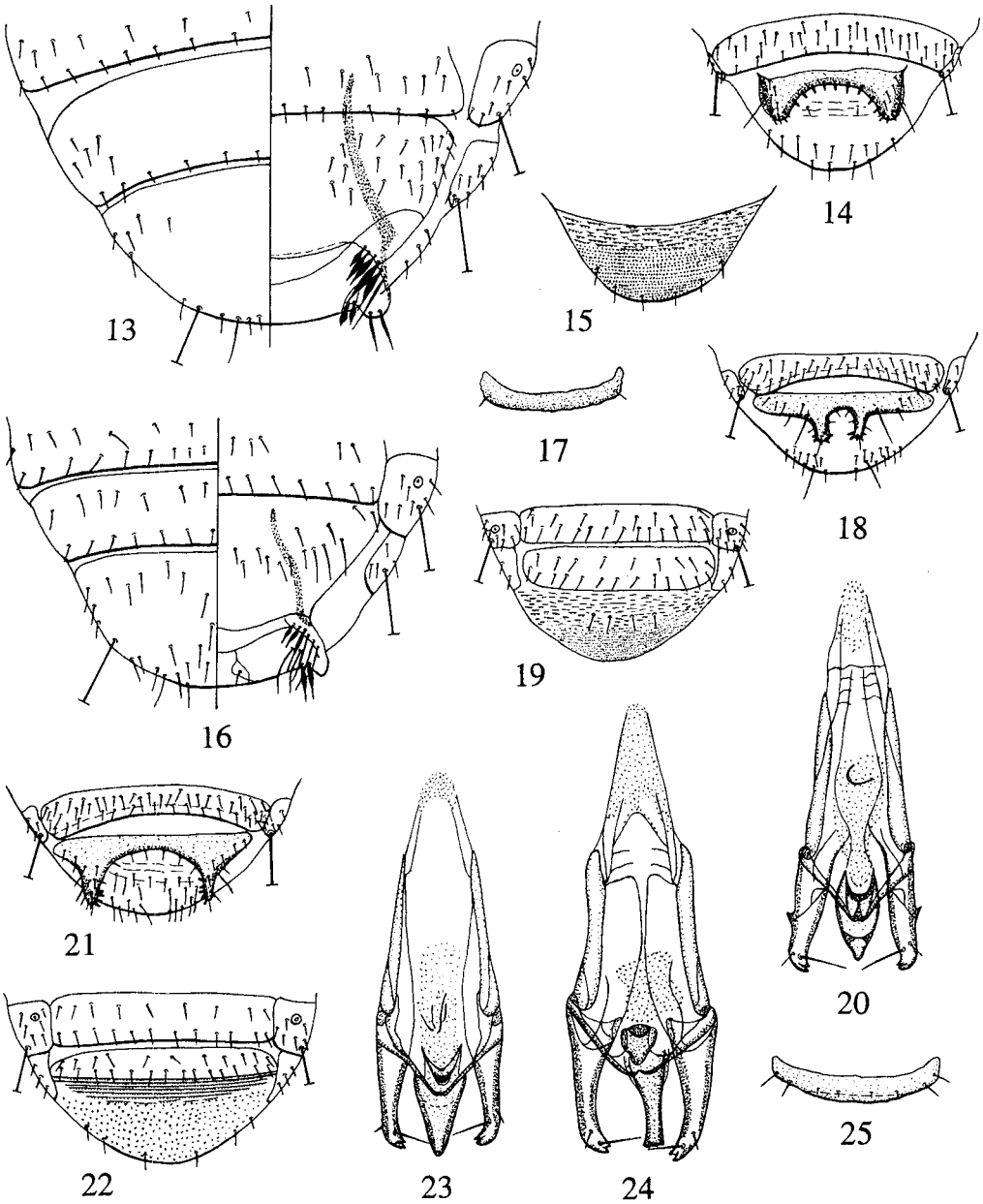
Etymology.—This species is named in honor of George B. Rabb, Director of the Chicago Zoological Society (Brookfield Zoo), and collector of the original host from which we recovered this species of louse over four decades later and in recognition of his long commitment to conservation and public education.

Remarks.—The presence in both sexes of *Gliricola rabbi* of uninterrupted transverse rows of small projections near the base of the ventral terminal segment sets this species apart from all other *Hutiaphilus* except the female of *G. ewingi.* Separation is further supported by the unique male genitalia. It is interesting that our entire series of lice from *Geocapromys ingrahami* bore the identification of *Gliricola omahonyi.* The fact that there were two easily separated species involved had escaped the identifier's attention. This represents the third instance of a pairing of species of *Hutiaphilus* on the same host individual.

Gliricola (*Hutiaphilus*) *schwartzi,*
new species
Figs. 24–29

Type host.—Mysateles melanurus melanurus (Poey)

Male.—As in Fig. 29. Sternum II as in Fig. 25. Setae on tergum IV, 53–62. Setae on sternum II, 7–8, shorter median setae recessed from posterior margin; IV, 15–17; V, 16–18; VII, 20–25. Spiracle diameter, 0.013–0.015. Dorsal terminalia as in Fig.



Figs. 13–25. 13–15, *Gliricola armatus:* (13) female terminalia; (14) male dorsal terminalia (15) male ventral terminalia. 16–20, *Gliricola omahonyi:* (16) female terminalia; (17) sternum II; (18) male dorsal terminalia; (19) male ventral terminalia; (20) male genitalia. 21–23, *Gliricola rabbi:* (21) male dorsal terminalia; (22) male ventral terminalia; (23) male genitalia. 24–25, *Gliricola schwartzi:* (24) male genitalia; (25) sternum II.

28; dorsal sclerite with prominent widely spaced lobes; short spiniform setae on each lobe, sparse fine setae elsewhere. Ventral terminalia as in Fig. 27, with terminal portion bearing weak short transverse lines basally, weak short transverse lines of fine projections apically. Genitalia as in Fig. 24; with slender, apically truncate mesosomal structure as shown. Dimensions: POW, 0.17–0.18; TW, 0.24–0.25; HL, 0.19–0.20;

PW, 0.17–0.18; MW, 0.19–0.21; AWIV, 0.36–0.37; TL, 0.92–0.96; GW, 0.13–0.14; GPL, 0.14; GL, 0.28–0.30.

Female.—Sternum II as for male. Setae on tergum V, 44–57. Setae on sternum II, 7–9; IV, 12–16; V, 16–20. Spiracle diameter, 0.015–0.025. Terminalia as in Fig. 26; dorsal anterior setae extending across segments; subgenital plate with total of 28–35 setae, none of these very long, but with short row of 5–8 longer submarginal setae associated with U-shaped pigmentation; setae around anus as shown. Dimensions: POW, 0.18–0.21; TW, 0.26–0.28; HL, 0.21–0.24; PW, 0.19–0.22; MW, 0.23–0.26; AWIV, 0.44–0.52; TL, 1.13–1.34.

Type material.—Holotype male, ex *Mysateles melanurus melanurus*: Cuba: Holguín; Santa María, Gibara, 24 August 1951, coll. M. Díaz-Piferrer, Albert Schwartz #3500 ♂ (KU 147709); in collection of the National Museum of Natural History (Washington, DC). Paratypes: 4 males, 3 females, same data as holotype; 3 females, Cuba: [Santiago de Cuba], 22 km S of Bueycito, 26 Dec 1954, coll. Ventura, Albert Schwartz #3026 ♂ (KU 147707); 4 females, Cuba: Holguín, Cueto, Guira River, 11 Jul 1949, coll. M. Díaz-Piferrer, Albert Schwartz #3499 ♂ (KU 147708).

Etymology.—This species is named after the late Albert Schwartz in honor of his career in documenting the fauna of the Caribbean islands and in recognition of his assembling the exceedingly valuable collection of hutias, which made this study possible. Schwartz's efforts in training and supporting students, his foresight in assembling zoological collections, and his written works are an irreplaceable contribution to our knowledge of the evolution of this fauna and its conservation.

Remarks.—The unique male genitalic mesosome, with its slender shape and truncate apical margin, the female ventral terminalia with the longer submarginal setae, and the anal setae as shown, along with details of the shape and chaetotaxy of sternum II and the male terminalia, afford separation from the other taxa. This species represents the first of three new species reported here from the host taxon *Mysateles melanurus.*

Gliricola (Hutiaphilus) pinei, new species
Fig. 35

Type host.—*Mysateles melanurus melanurus* (Poey)

Male.—Unknown.

Female.—Sternum II close to Fig. 2. Setae on tergum V, 38–44. Setae on sternum II, 7–8; IV, 20–27; V, 26–29. Spiracle diameter, 0.010. Terminalia as in Fig. 35; dorsal anterior setae extending across segments; subgenital plate with total of 25–28 short, 6 very long setae; setae around anus as shown. Dimensions: POW, 0.16; TW, 0.21–0.22; HL, 0.19–0.20; PW, 0.18–0.19; MW, 0.20–0.21; AWIV, 0.41–0.42; TL, 0.97–1.06.

Type material.—Holotype female, ex *Mysateles melanurus melanurus*: Cuba: Holguín; Sarta María, Gibara, 24 Aug 1951, coll. M. Díaz-Piferrer, Albert Schwartz #3500 ♂ (KU 147709); in collection of the National Museum of Natural History (Washington, DC). Paratypes: 2 females, same data as holotype.

Etymology.—This species is named for Ronald H. Pine in honor of his long commitment to the study of biodiversity through both field collections and published works. His efforts have greatly increased our understanding of Central and South American mammals.

Remarks.—Although the male is unknown for *Gliricola pinei,* the female is sufficiently different with its three very long setae on each side of the subgenital plate and the unusual anal chaetotaxy to justify its recognition as a distinct species. Its dimensions also are consistently smaller than either of the other two species of *Mysateles melanurus.* This species co-occurred with *G. schwartzi* on the same host individual.

Gliricola (Hutiaphilus) wernecki, new species
Figs. 30–34

Type host.—*Mysateles melanurus melanurus* (Poey)

Male.—Sternum II as in Fig. 30, of equal width throughout, but with fainter median area. Setae on tergum IV, 65. Setae on sternum II, 8, all prominent; IV, 19; V, 23; VII, 29. Spiracle diameter, 0.023. Dorsal terminalia as in Fig. 32; dorsal sclerite with prominent slender widely spaced lobes; short spiniform setae on each lobe, sparse fine setae elsewhere. Ventral terminalia as in Fig. 31, with terminal portion bearing weak interrupted transverse lines basally, weak short transverse lines of fine projections apically. Genitalia as in Fig. 34; with broad, parallel-sided mesosomal structure as shown, apically rounded with median indentation. Dimensions: POW, 0.18; TW, 0.24; HL, 0.23; PW, 0.18; MW, 0.19; AWIV, 0.37; TL, 1.09; GW, 0.14; GPL, 0.15; GL, 0.31.

Female.—Sternum II as for male. Setae on tergum V, 43–47. Setae on sternum II, 8, lengths as for male; IV, 15–16; V, 22–24. Spiracle diameter, 0.025–0.028. Terminalia as in Fig. 33; dorsal anterior setae extending across segments; subgenital plate with total of 29–32 short, 9–11 very long setae; setae around anus as shown. Dimensions: POW, 0.20–0.21; TW, 0.27–0.28; HL, 0.26–0.28; PW, 0.22–0.23; MW, 0.24–0.26; AWIV, 0.48–0.50; TL, 1.35–1.36.

Type material.—Holotype male, ex *Mysateles melanurus melanurus*: Cuba: [Santiago de Cuba], 22 km S of Bueycito, 26 December 1954, coll. Ventura, Albert Schwartz #3026 ♂ (KU 147707); in collection of the National Museum of Natural History (Washington, DC). Paratypes: 3 females, same data as holotype.

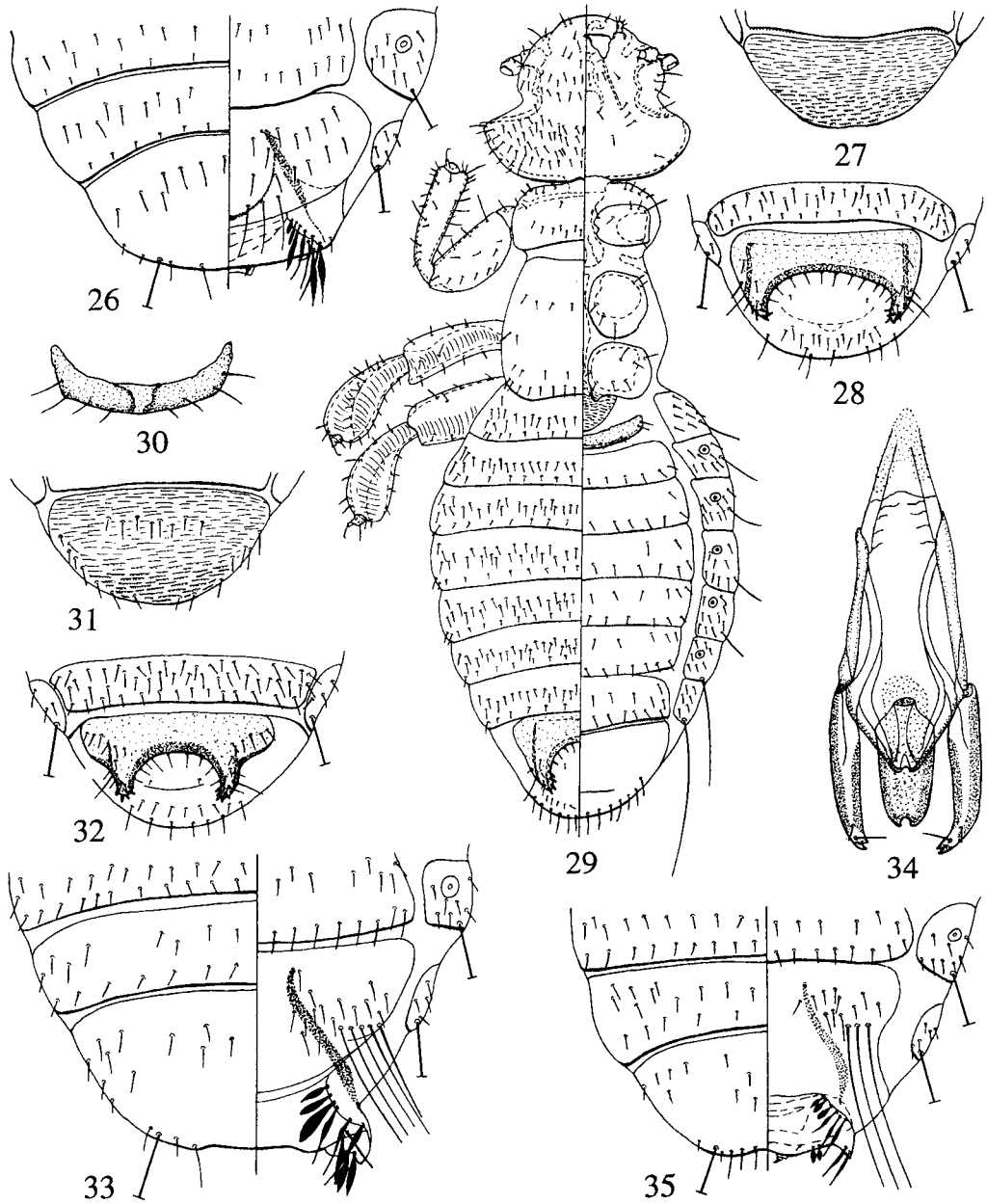
Etymology.—This species is named in honor of Fabio Leoni Werneck in recognition of his pioneering work on the taxonomy of chewing lice of mammals, including extensive studies on the taxa of *Gliricola.*

Remarks.—The female of *Gliricola wernecki,* with its 4–6 very long setae on each side of the subgenital plate, its anal chaetotaxy, its large dimensions, and other minor features, is separable from that of *G. pinei* and others of the subgenus. As has proven to be the case with all species for which male genitalia are known, the genitalic details of *G. wernecki* are unique. This louse species also co-occurred with *G. schwartzi* on the same individual of *Mysateles melanurus,* but from a different locality than that with the pairing of *G. schwartzi* and *G. pinei.* We cannot comment further on this now, but it may be an indication of a potential problem with contamination or host identifications.

Discussion

The amblyceran family Gyropidae is restricted to the Neotropics and contains eight genera, which are found on an array of rodents (primarily caviomorphs), as well as on night monkeys (Primates: Cebidae) (Price & Timm 1995). Clay (1970) recognized three subfamilies within the Gyropidae: Gyropinae, Protogyropinae, and Gliricolinae. The Gliricolinae contains the currently known 39 species of *Gliricola,* including 30 in the nominate subgenus and 9 in the new subgenus *Hutiaphilus.* The *Hutiaphilus* are found only on the Caribbean hutias of the family Capromyidae; they are absent from all other families of New World caviomorph rodents.

Where accurate records are available, gyropids appear to be extremely host specific (Price & Timm 1993, 1995). The older literature, especially for South American rodents, provides numerous examples where several species of lice have been described from a single host species. Most of these have been difficult for us to evaluate when host individuals were collected in different parts of a species range, hosts have not been preserved for confirmation of identifications, and workers in different time periods and in different countries had different no-



Figs. 26–35. 26–29, *Gliricola schwartzi:* (26) female terminalia; (27) male ventral terminalia; (28) male dorsal terminalia; (29) male. 30–34, *Gliricola wernecki:* (30) sternum II; (31) male ventral terminalia; (32) male dorsal terminalia; (33) female terminalia; (34) male genitalia. 35, *Gliricola pinei:* female terminalia.

tions as to species limits. An extreme example of this is the complex array of names for *Gliricola* found on the spiny rats of the genus *Proechimys* (Emerson & Price 1981). There is little doubt that some of the named species of *Gliricola* are associated with hosts whose names have been applied erroneously.

Recently, however, we have shown that two, and even three, species of chewing lice

co-occur on two other groups of caviomorph rodents. Individuals of the spiny tree rat, *Mesomys hispidus* (Desmarest), in Peru have two species of *Gliricola,* a situation parallel to our findings on hutias presented herein (Price & Timm 1993). In the New World porcupines (Erethizontidae), we documented that two, and on occasion three, species of chewing lice of the genus *Eutrichophilus* Mjöberg occur on several of the South American porcupine species (Timm & Price 1994). These parallel findings are remarkable in that *Gliricola* and *Eutrichophilus* are not closely related, with the former belonging to the suborder Amblycera and the latter to the suborder Ischnocera. Historically, it was considered rare to find multiple species of chewing lice on a single mammal host species (Hopkins 1957), whereas on birds it is typical to find chewing lice of several species belonging to two, three, or more genera on a single host species.

We herein confirm that each species of *Gliricola* (subgenus *Hutiaphilus*) is restricted to a single host species (high host specificity). Additionally, each host species has two (and in one case, three) species of lice, and two species of *Hutiaphilus* are typically found on single host individuals, confirming that these chewing lice can be truly sympatric.

Four subfamilies are recognized in the West Indian rodent family Capromyidae. We now have lice from only one of the four subfamilies, the Capromyinae, which includes three extant genera: *Capromys, Geocapromys,* and *Mysateles.* Woods (1989) hypothesized that the Capromyidae almost certainly evolved from South American echimyid rodents in the central Antilles (Hispaniola) and that the subfamily Capromyinae is a derived clade that originated on Cuba and secondarily dispersed to other islands in the Greater Antilles as well as to islands in the Bahamas. Although the fossil record for the capromyids goes back only to the Pleistocene, Woods dates the origin of the Capromyinae as "after the early Miocene" or "as late as the Pliocene" (Woods 1989:760).

Our discovery of lice of the subgenus *Hutiaphilus* on all species of capromyines that we have studied to date (four species, representing the three extant genera of the Capromyinae) suggests that these lice are broadly distributed on these rodents and differentiated as their hosts dispersed and speciated on the various islands of the western Antilles. We herein recognize the subgenera *Gliricola* and *Hutiaphilus* as sister clades within the genus *Gliricola.* Lice of the subgenus *Gliricola* are broadly distributed on the Central and South American rodents of the family Echimyidae, and as we now recognize the subgenus, it is restricted to the echimyids. Thus, the relationships of the lice fully support Woods's hypothesis that capromyids evolved from echimyids. Although at present we are recognizing the subgenera *Gliricola* and *Hutiaphilus* as sister clades, further resolution of the relationships of these species within the genus *Gliricola* may suggest that the family Capromyidae is nested within what is now recognized as the Neotropical family Echimyidae.

The South American nutria or coypu, *Myocastor coypus,* has been included as a member of the family Capromyidae (see Hall 1981, Nowak 1991). To date only a single species of chewing louse, *Pitrufguenia coypus* Marelli, is known to parasitize *M. coypus.* Based upon the morphology and relationships of this louse in the distinctive genus *Pitrufguenia,* we concur with recent classifications that treat nutria as a separate lineage (family Myocastoridae) of caviomorph rodents.

The host family Capromyidae is a Caribbean endemic, being found throughout many of the islands of the Lesser and Greater Antilles, as well as the Bahamas. The family contains 20 to 40 Recent species, although at least 70% of these are extinct. The causes of extinctions are complex and certainly involve overhunting by the Amerindian civilizations, who utilized hu-

tias as a major portion of their diet (Wing 1989). The introduction of feral cats to the islands by Europeans also contributed significantly to the extinction of hutias (Morgan 1985).

Although we have much to learn about the chewing louse genus *Gliricola,* our recognition of one clade, *Hutiaphilus,* restricted to the rodent family Capromyidae (subfamily Capromyinae), is an important step towards clarifying host-distributional relationships. Given that chewing lice have now been found on only 4 of the 20 to 40 capromyid species, we strongly suspect that numerous new species of *Gliricola* await discovery. Unfortunately, a number of the species of capromyids are now extinct. Although teeth and/or skeletal remains for all of the species of extinct hutias are known from the fossil record, we will never be able to reconstruct the true diversity of the parasitic chewing lice from these interesting Caribbean endemic rodents.

Key to the Species of *Gliricola* (*Hutiaphiluxs*)

Males
(excluding *G. pinei*)

1. Dorsal plate of terminalia with close-set lobes (Fig. 18) 2
– Dorsal plate of terminalia with widely spaced lobes (Figs. 4, 14, 21, 28, 32) 4
2. Genitalia (Fig. 20) without conspicuous anterior mesomeral sclerites, with barb on outer margin of each paramere. Ex *Geocapromys ingrahami* .... *G. (H.) omahonyi* Werneck
– Genitalia otherwise (Figs. 9, 11) 3
3. Genitalia with long slender often convoluted anterior mesosomal sclerite (Fig. 9). Ex *Capromys pilorides* .... *G. (H.) cubanus* Werneck
– Genitalia with H-shaped anterior mesosomal sclerite (Fig. 11). Ex *Mysateles prehensilis.* ..... *G. (H.) ewingi* Werneck
4. Dorsal plate of terminalia with short spiniform setae along medioposterior margin (Fig. 14). Ex *Mysateles prehensilis* ..... *G. (H.) armatus* Werneck
– Dorsal plate of terminalia with fine setae along medioposterior margin (Figs. 4, 21, 28, 32) 5
5. Genitalia with mesosome triangular, either pointed (Fig. 5) or blunt (Fig. 23) 6
– Genitalia with mesosome either slender and apically truncate (Fig. 24) or broad and apically rounded (Figs. 34) 7
6. Genitalia as in Fig. 23; ventral terminal segment basally with uninterrupted rows of close-set projections (Fig. 22). Ex *Geocapromys ingrahami* .... *G. (H.) rabbi* n. sp.
– Genitalia as in Fig. 5; ventral terminal segment without such rows of projections (Fig. 3). Ex *Capromys pilorides* .... *G. (H.) capromydis* Werneck
7. Genitalia with mesosome slender, apically truncate (Fig. 24). Ex *Mysateles melanurus* ..... *G. (H.) schwartzi* n. sp.
– Genitalia with mesosome broad, apically rounded, with indentation (Fig. 34). Ex *Mysateles melanurus* .... *G. (H.) wernecki* n. sp.

Females

1. Subgenital plate laterally with 2–6 very long prominent setae (Figs. 8, 33, 35) .. 2
– Subgenital plate without such setae .. 4
2. Subgenital plate laterally with 4–6 very long setae (Fig. 33); spiracle diameter greater than 0.020. Ex *Mysateles melanurus* ..... *G. (H.) wernecki* n. sp.
– Subgenital plate laterally with only 2–3 very long setae (Figs. 8, 35); spiracle diameter less than 0.015 3
3. Anterior anal setae (Fig. 8) long, prominent; temple width more than 0.23; total length greater than 1.15. Ex *Capromys pilorides* ..... *G. (H.) cubanus* Werneck
– Anterior anal setae (Fig. 35) short, less conspicuous; temple width less than 0.23; total length less than 1.10. Ex *Mysateles melanurus* .... *G. (H.) pinei* n. sp.
4. Without median anterior setae on last 2 terga (Fig. 13). Ex *Mysateles prehensilis.* ..... *G. (H.) armatus* Werneck
– With median anterior setae on last 2 terga 5
5. Basal portion of subgenital plate with several uninterrupted rows of small projections (Fig. 10) 6

– Without such rows of small projections 7
6. Sternum II as in Fig. 2; spiracle diameter greater than 0.015. Ex *Mysateles prehensilis* ..... *G. (H.) ewingi* Werneck
– Sternum II as in Fig. 6; spiracle diameter less than 0.015. Ex *Geocapromys ingrahami* ..... *G. (H.) rabbi* n. sp.
7. Sternum II (Fig. 17) with total of 2 or less setae. Ex *Geocapromys ingrahami* ..... *G. (H.) omahonyi* Werneck
– Sternum II (Figs. 2, 25) with at least 6 setae 8
8. Subgenital plate with medioposterior row of 5–8 longer submarginal setae associated with U-shaped pigmentation (Fig. 26); sternum II as in Fig. 25. Ex *Mysateles melanurus* ..... *G. (H.) schwartzi* n. sp.
– Subgenital plate without such row of longer setae (Fig. 1); sternum II much as in Fig 2. Ex *Capromys pilorides* ..... *G. (H.) capromydis* Werneck

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