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# THE CHEWING LOUSE GENUS *AOTIELLA* (PHTHIRAPTERA: GYROPIDAE) FROM SOUTH AMERICAN NIGHT MONKEYS, *AOTUS* (PRIMATES: CEBIDAE)

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*Abstract.*—The single previously recognized species of *Aotiella* Eichler, *A. aotophilus* (Ewing), and a second species, *A. hershkovitzi* new species, are described and illustrated. The type host for the former is a red-necked night monkey, *Aotus azarai* (Humboldt), from Bolivia and Argentina, and for the latter a gray-necked night monkey, *A. trivirgatus* (Humboldt), from Venezuela. The host and louse distributions are discussed.

*Key Words:* Phthiraptera, Gyropidae, *Aotiella,* Cebidae, *Aotus*

The only previously recognized species of the chewing louse genus *Aotiella* Eichler (Phthiraptera: Amblycera: Gyropidae) is *A. aotophilus* (Ewing), which was described by Ewing (1924:25) as a *Tetragyropus* Ewing from a single immature specimen collected off a monkey "*Aotes boliviensis* . . . taken in Bolivia by W. E. Moore some time before 1859." Not only was this species based on a single individual thought by Ewing to be the "last nymph," but that specimen subsequently was determined to be only a second-instar nymph. Ewing justified the new species description from a nymph because of the uniqueness of its being from a primate and the certainty of its breeding on that host.

Subsequent collecting from night monkeys (genus *Aotus* Illiger) has confirmed that they are indeed hosts for this louse genus. Werneck (1936) presented a detailed description of both sexes and of nymphal stages of what he presumed to be *Gyropus aotophilus* based on specimens from *Aotus trivirgatus* (Humboldt) from Brazil. Werneck even sent Ewing a nymph to compare with the holotype and Ewing replied that Werneck's lice were indeed *T.* (= *Gyropus*) *aotophilus.*

Eichler (1949) seized upon the uniqueness of this louse taxon and described the new genus *Aotiella* for it, although he almost certainly did not actually examine specimens. He was especially impressed with the characteristic chaetotaxy of the female and, no doubt, with the unusual primate host. Hopkins and Clay (1952) accepted the validity of the genus *Aotiella,* but erroneously listed *Gyropus* Nitzsch as the original genus instead of the correct one, *Tetragyropus.* Emerson and Price (1975) perpetuated the error of *Gyropus* as the original genus as given by Hopkins and Clay (1952). They did, however, provide excellent illustrations of both sexes of what they assumed to be *A. aotophilus* based on abundant material from seven specimens of *Aotus trivirgatus* captured in Venezuela.

All previous workers apparently had been so fixated on the existence of a single species of *Aotiella* on night monkeys of the genus

*Aotus* that they failed to examine critically the available material. Had they done so, they would perhaps have found what we have—mainly, that there are two distinctly different species of *Aotiella* on these hosts, one which occurs south of the Amazon and one north of the Amazon. For this reason, we are herewith describing the adult of *Aotiella aotophilus* for the first time and naming and describing a second species of this genus.

In the following descriptions, all measurements are in millimeters. The scientific names of the hosts follow those of Hershkovitz (1983) and updates by Groves (1993). The holotype of the new species will be deposited in the U.S. National Museum of Natural History (Washington, D.C.) and paratypes will be located in the collections of that museum and those of the University of Minnesota (St. Paul) and Oklahoma State University (Stillwater). Acronyms designating museum collections where specimens of the host are deposited are as follows: AMNH = American Museum of Natural History, New York; USNM = U.S. National Museum of Natural History.

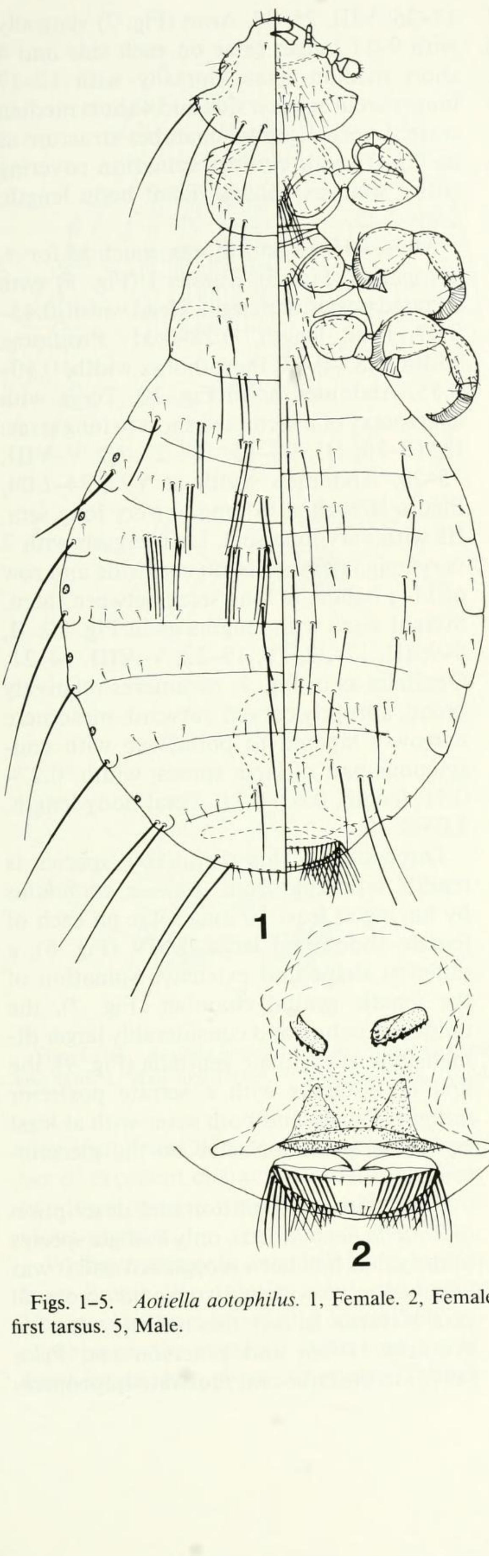
*Aotiella aotophilus* (Ewing 1924)
Figs. 1–5

*Tetragyropus aotophilus* Ewing 1924: 23. Type host: *Aotus boliviensis* Elliot = *A. azarai* (Humboldt).

Female.—As in Fig. 1. Head with dorsal temple having 8 long to very long setae; few minute to short dorsal setae, numerous ventral setae; head width, 0.39–0.41; head length, 0.28–0.31. Pronotum with 4 long setae posteriorly, no central setae; prosternal plate with 12 or so medium to long setae; prothorax width, 0.32–0.34. Pteronotum with 5–6 long posterior setae, 2 long median setae, and shorter setae as shown; mesosternal and metasternal plates with chaetotaxy as in Fig. 1; pteronotum width, 0.44–0.50. Legs with tarsus on I much smaller than those on II–III, with latter bearing receptacle on base of femur for insertion of tarsus. Abdomen with terga II–IV having clusters of long setae, with total number of long setae being: II, 4–7; III, 11–18; IV, 16–20. Terga V–VIII each with pair of median long setae. Total number of other setae on these segments: II, 5–14; III–IV, 5–10; V–VI, 7–12; VII, 6–8; VIII, 4–8. Pleura II–III each with single long seta, IV–VII each with single very long seta, and VIII with pair of very long setae, in addition to sparse short setae. Spiracles on segments III–VIII. Abdomen width at V, 1.01–1.05. Last segment dorsally with pair of very long setae on each side, row of short setae between them. Sternal setae, with lengths as shown: II, 7; III–IV, 12–18; V–VI, 11–15; VII, 14–16; VIII, 22–27. Anus (Fig. 2) ventrally with 5–10 longer setae on each side and 4 short median setae, dorsally with 8–14 longer setae on each side and 4 short median setae. Internal genital chamber structure as in Fig. 2, with evident spination on wall limited to posterior portion, as shown. Total body length, 2.06–2.15.

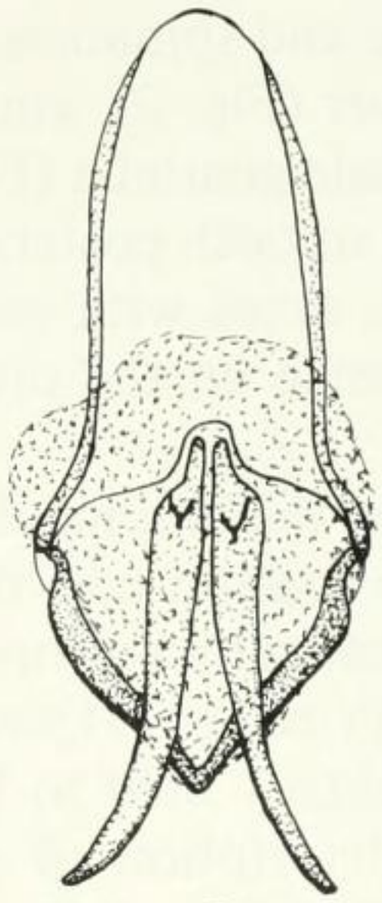
Male.—As in Fig. 5. Head and thorax much as for female. Tarsus I (Fig. 4) with smooth posterior margin. Head width, 0.40–0.41; head length, 0.26–0.29. Prothorax width, 0.29–0.33. Pterothorax width, 0.44–0.48. Abdominal terga with chaetotaxy of intermixed short to long setae: II, 11–17; III, 17–26; IV, 20–26; V–VIII, 14–22. Abdomen width at V, 0.81–0.85. Last tergum with 2 very long lateral setae on each side and row of 10–12 shorter setae between them. Sternal setae with lengths much as for female: II, 7–8; III, 12–15; IV, 15–16; V–VIII, 10–17. Last sternum with group of very long posterior setae on each side. Genitalia as in Fig. 3; parameres slender, gently curved outward; mesomere broadly tapered to point; sac without conspicuous larger spination; width, 0.19–0.22; length, 0.49–0.51. Total body length, 1.77–1.88.

Discussion.—This species is readily recognizable by the combination of only up to 20 long setae on each of female abdominal

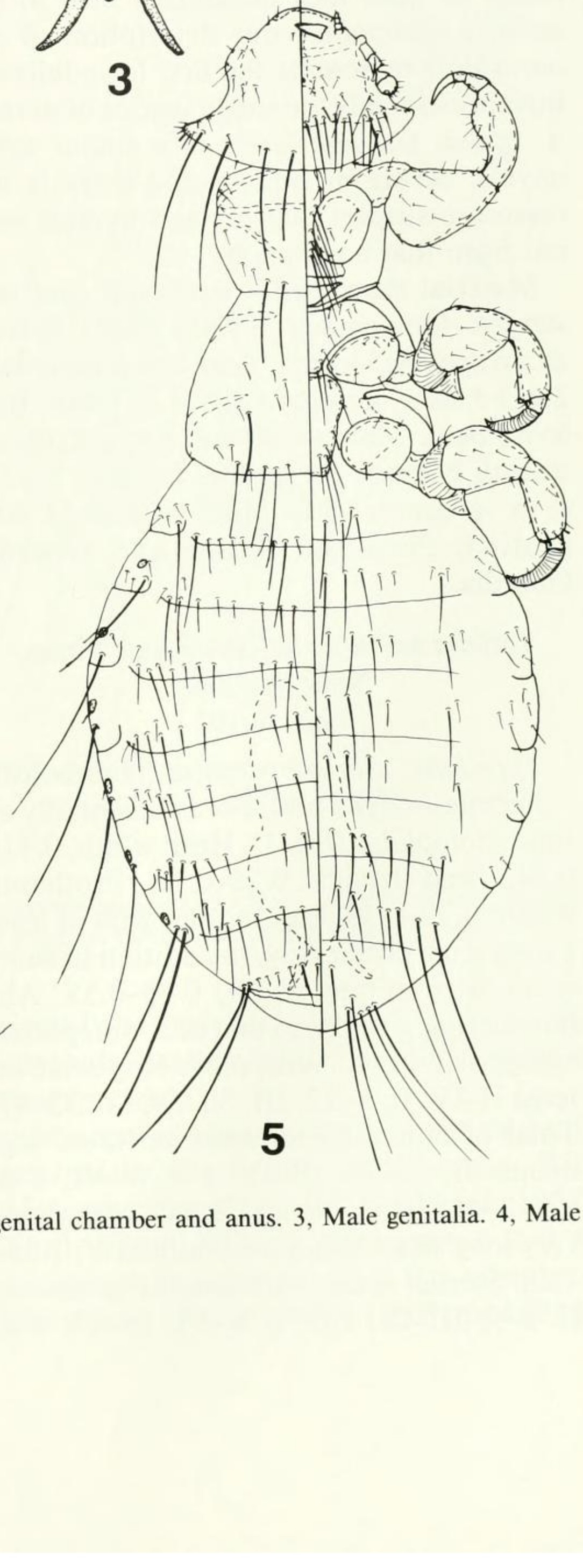













Figs. 1–5. *Aotiella aotophilus*. 1, Female. 2, Female genital chamber and anus. 3, Male genitalia. 4, Male first tarsus. 5, Male.

terga III–IV (Fig. 1), shape and spination of the female genital chamber (Fig. 2), small size and features of the male genitalia (Fig. 3), male first tarsus with a smooth posterior margin (Fig. 4), and both sexes with only up to six long posterior setae on the pteronotum.

Since Ewing (1924) based the original description only on a single nymph and the adults described and illustrated by Werneck (1936) and Emerson and Price (1975) were based on what they mistakenly held to be *Aotiella aotophilus,* our description of *A. aotophilus* represents the first for adults of this species. Only the single species of *Aotus, A. azarai* (*A. boliviensis* is a junior synonym), occurs in Bolivia and there is no reason to suspect that Ewing's nymph was not from that host taxon.

Material examined.—Holotype, 2nd instar, ex *Aotus azarai* (USNM 3335), Bolivia: no specific locality. Additional material: 2 ♀, 3 ♂, ex *A. azarai* (AMNH 211460), Bolivia: Beni, Mamore River; 3 ♀, 2 ♂, ex *A. azarai,* Bolivia: no specific locality; 2 ♀, 2 ♂, ex *A. azarai* (Brit. Mus. 1976-263), Argentina: Formosa: Pirané and Grande Guardia.

### *Aotiella hershkovitzi* Price and Timm, New Species

Figs. 6–10

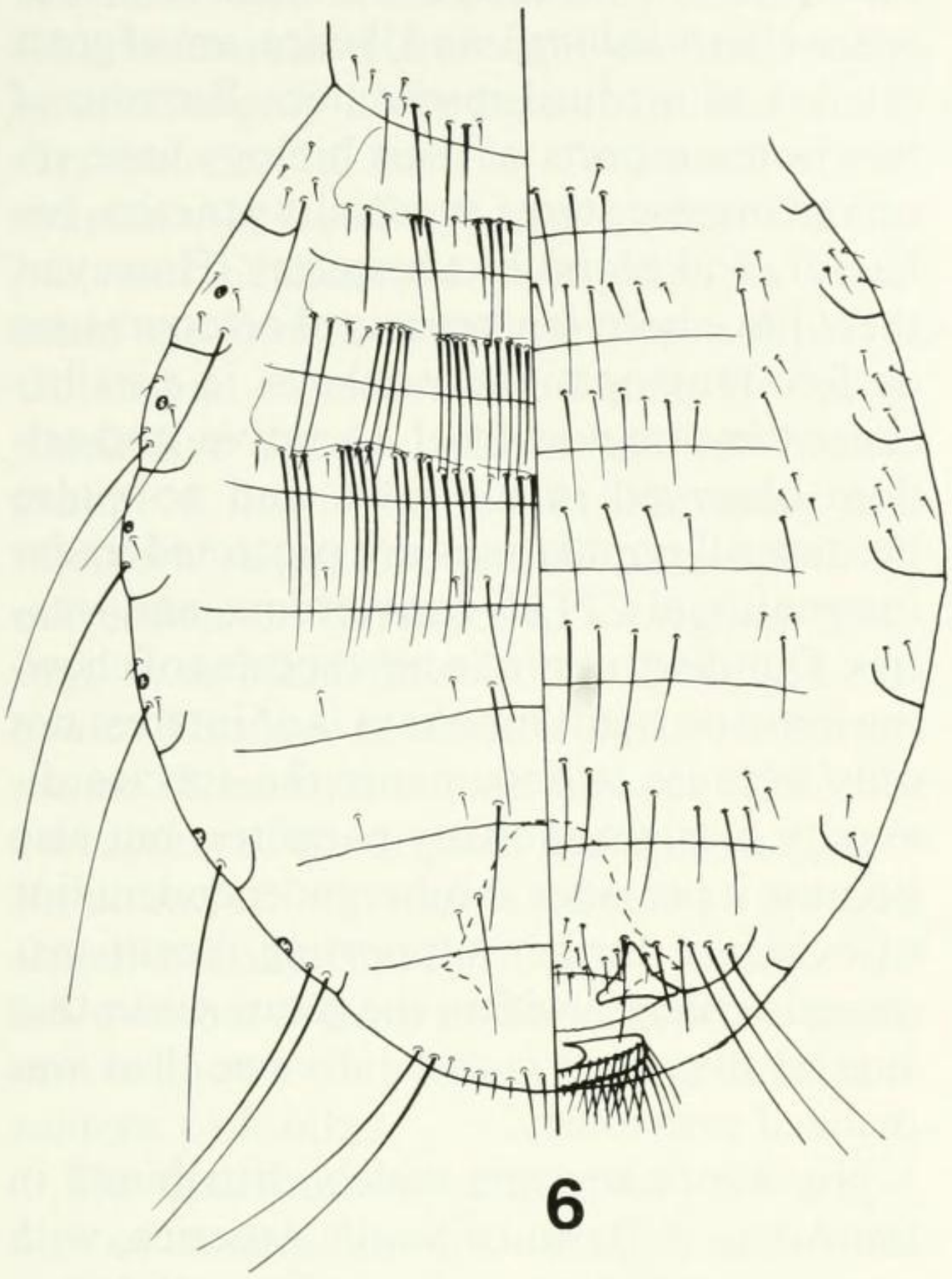
*Type host: Aotus trivirgatus* (Humboldt).

Female.—Head and thorax essentially as for *A. aotophilus* (Fig. 1). Head width, 0.41–0.44; head length, 0.28–0.32. Prothorax width, 0.32–0.38. Pteronotum with at least 8 long setae posteriorly, in addition to short setae; pteronotum width, 0.48–0.55. Abdomen (Fig. 6) close to that of *A. aotophilus,* except as follows. With more long setae on terga II–IV: II, 8–12; III, 30–39; IV, 33–47. Total of other shorter setae on these segments: II, 12–18; III–IV, 5–9; V–VI, 4–8; VII, 2–4; VIII, 2. Pleura III each with single very long seta. Abdomen width at V, 1.09–1.20. Sternal setae, with lengths as shown: II, 6–9; III–IV, 15–19; V–VI, 14–17; VII, 17–26; VIII, 25–37. Anus (Fig. 7) ventrally with 9–11 longer setae on each side and 4 short median setae, dorsally with 12–17 longer setae on each side and 4 short median setae. Internal genital chamber structure as in Fig. 7, with evident spination covering entire wall, as shown. Total body length, 2.09–2.25.

Male.—Head and thorax much as for *A. aotophilus* (Fig. 5). Tarsus I (Fig. 8) with serrated posterior margin. Head width, 0.45–0.47; head length, 0.28–0.31. Prothorax width, 0.35–0.43. Pterothorax width, 0.50–0.55. Abdomen as in Fig. 10. Terga with chaetotaxy of intermixed short to long setae: II, 19–23; III, 28–35; IV, 27–32; V–VIII, 15–20. Abdomen width at V, 0.94–1.04. Pleura II each with long to very long seta, III with very long seta. Last tergum with 2 very long lateral setae on each side and row of 11–17 short to long setae between them. Sternal setae with lengths as in Fig. 10: II, 8–9; III, 17–22; IV, 19–22; V–VIII, 14–21. Genitalia as in Fig. 9; parameres relatively broad, abruptly curved outward; mesomere narrowly tapered to point; sac with conspicuous pair of large spines; width, 0.27–0.31; length, 0.63–0.71. Total body length, 2.05–2.19.

Discussion.—This distinctive species is readily separable from *Aotiella aotophilus* by having at least 30 long setae on each of female abdominal terga III–IV (Fig. 6), a different shape and extensive spination of the female genital chamber (Fig. 7), the unique structure and considerably larger dimensions of the male genitalia (Fig. 9), the first male tarsus with a serrate posterior margin (Fig. 8), and both sexes with at least eight long posterior setae on the pteronotum.

Prior to our recognition and description of *Aotiella hershkovitzi,* only a single species of the genus had been recognized and it was believed to be widely distributed across all taxa of *Aotus.* In fact, this is likely what led Werneck (1936) and Emerson and Price (1975) to describe and illustrate improperly



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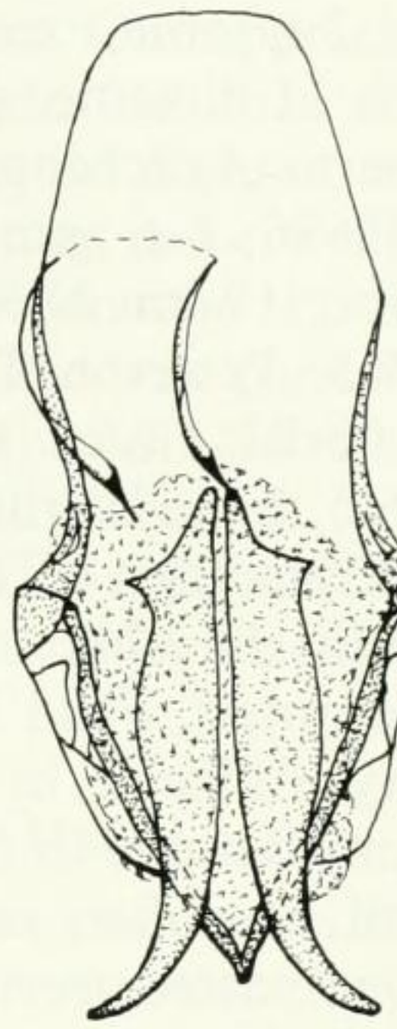

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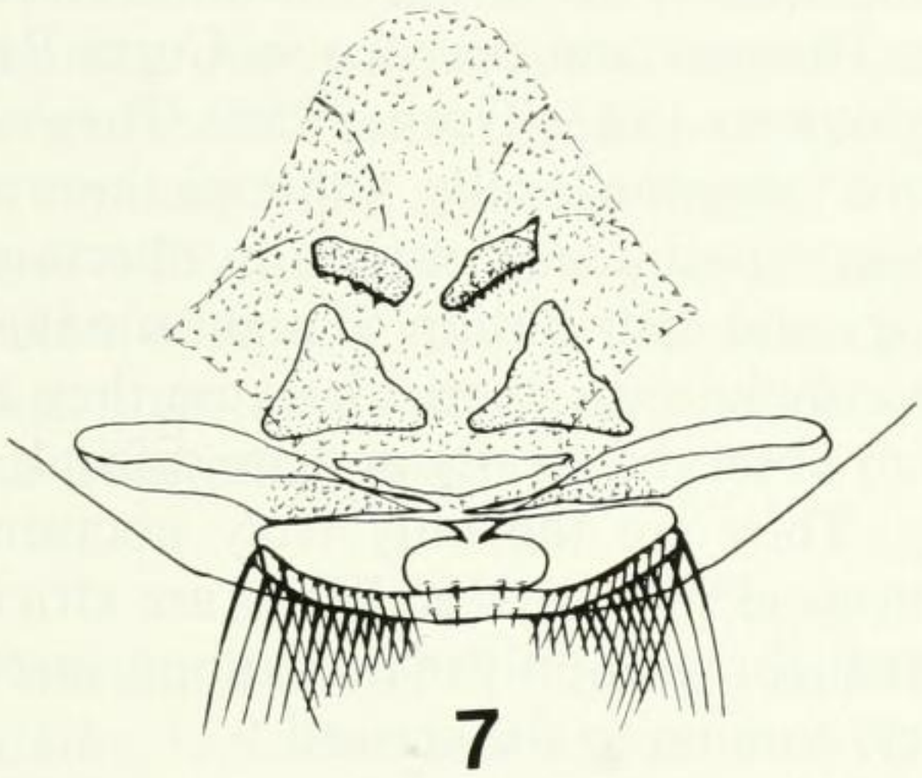

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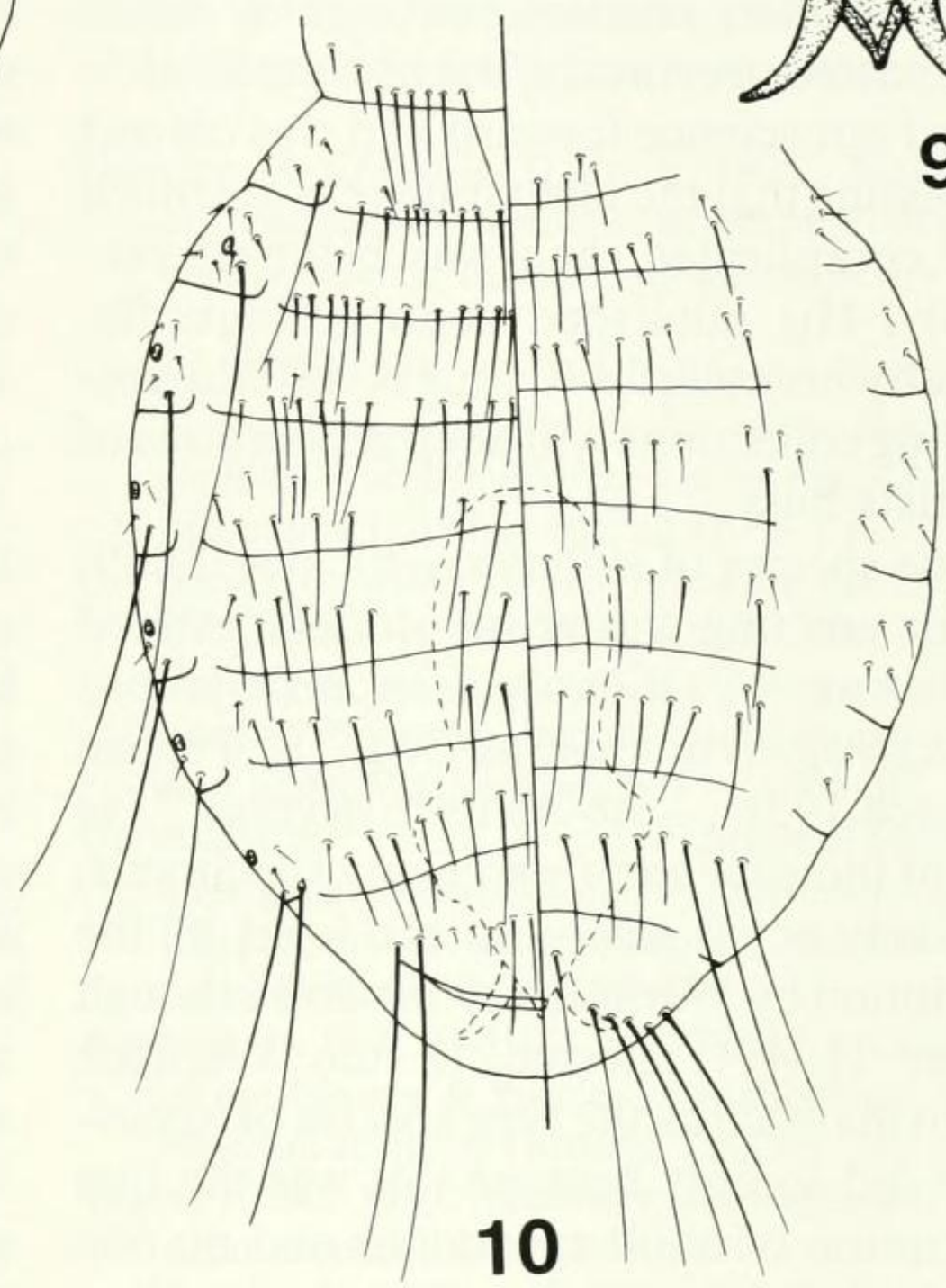

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Figs. 6–10. *Aotiella hershkovitzi.* 6, Female posterior pteronotum and abdomen. 7, Female genital chamber and anus. 8, Male first tarsus. 9, Male genitalia. 10, Male posterior pteronotum and abdomen.

identified lice as *A. aotophilus*. A large number of excellent characters separating these two louse species were overlooked by previous workers.

We have seen only a single female *Aotiella* from Brazil. We note its similarity to our Venezuelan type series and tentatively include it in the material examined for *A. hershkovitzi,* but, given the potential diversity of the host taxa, we are reluctant to conclude that it is definitely conspecific with that species.

Material examined.—Holotype ♀, ex *Aotus trivirgatus,* Venezuela: Amazonas, Río Manapiare, San Juan, 155 m, 24 July 1967, Tuttle Team, #28550. Paratypes: 6 ♀, 2 ♂, same data as holotype; 18 ♀, 9 ♂, same, except 5 July 1967, #19989, 19990, or 19966;

1 ♀, 2 ♂, same, except 12 July 1967, #26214; 4 ♀, 11 ♂, same, except Raya, 32 km SSE Puerto Ayacucho, 135 m, 11 Oct 1967, #31686; 2 ♂, same, except Yaracuy, Carabobo, 19 km NW Urama, 525 m, 27 Oct 1965, Peterson Team, #1998. Additional material: 1 ♀, ex *A. trivirgatus,* Brazil: Pará, 1935, F. L. Werneck.

Etymology.—This species is named for Philip Hershkovitz, Curator Emeritus of Mammals, Field Museum of Natural History, Chicago, in recognition of his many contributions to Neotropical mammalogy. Phil has often created controversy when none existed previously, but he certainly has pushed our science forward and was correct in assessing that the night monkeys are much more complicated than was believed previously. His published contributions, flavored by his colorful writing style, and outstanding collections will keep generations of scientists busy.

Type species of *Aotiella.*—Eichler (1949: 11), in erecting the genus *Aotiella,* stated that it was ". . . monotypisch auf *Gyropus* (*Tetragyropus*) *aotophilus* Ewg. 1924 sensu Werneck 1936 . . . ab *Aotus trivirgatus.*" He did not indicate having seen any specimens, but likely acted solely on the basis of the description by Werneck (1936). Even though Eichler (1949) referred to the Werneck (1936) material as the type species of *Aotiella,* he did so only because this was the first description of adult specimens and no one suspected that they were anything other than true *A. aotophilus.* By emphazing the monotypical nature of the new genus and by his belief that he was referring to *A. aotophilus,* we see no reason not to regard this species as the type species of *Aotiella.* This action is consistent with all citations in the literature and to do otherwise would needlessly confuse matters. If Eichler had any suspicion that it was anything other than *A. aotophilus,* he most certainly would have described the new species himself.

Host/louse discussion.—Night monkeys are the only cebid primates not naturally susceptible to infection by malaria protozoans (*Plasmodium*), and, hence, are of great interest to medical researchers. Because of this, some aspects of their biology have received intense study, especially genetics, behavior, and blood biochemistry. However, there have been few reports of ectoparasites on free-ranging night monkeys, in part because they are nocturnal, secretive, and seldom observed in the wild, and now also because all populations are protected under international CITES conventions and treaties. Our discovery of a new species of chewing louse on night monkeys is of interest not only because it documents the species diversity of night monkey parasites, but also because it provides another independent line of evidence further supporting recent taxonomic changes within the genus *Aotus* that suggest the genus is more diverse than was realized previously.

Night monkeys are widely distributed in the Amazon Basin of South America, with one species also occurring in Central America in Panama and perhaps in Costa Rica (Hershkovitz 1983, Timm 1989). They can be quite common locally, although there are not many specimens in museum collections. Ecology and distribution of night monkeys are poorly known, in part because they are seldom observed clearly and are difficult to study. They are the only truly nocturnal Neotropical monkeys and they are strictly arboreal, foraging only in the canopy, rarely, if ever, coming to the ground.

Traditionally, most authors regarded all populations of night monkeys as the single widespread species *Aotus trivirgatus.* However, in a recent revision, Hershkovitz (1983) recognized nine allopatric species of *Aotus,* based on differences in chromosome numbers and in pelage coloration. Subsequently, a tenth species, *A. hershkovitzi* Ramirez-Cerquera, has been described.

Hershkovitz (1983) divided the genus *Aotus* into two species groups, the gray-necked species, which occur primarily north of the Rio Amazonas, and the red-necked

species, which occur primarily south of the Rio Amazonas. He recognized four species within the gray-necked group: *A. brumbacki* Hershkovitz in eastern Colombia; *A. lemurinus* (I. Geoffroy) in Panama, Colombia, and Ecuador; *A. trivirgatus* in Venezuela and Brazil; and *A. vociferans* (Spix) in Colombia, Ecuador, and Brazil. He recognized five species within the red-necked group: *A. azarai* in Bolivia, Paraguay, and northern Argentina (see Groves 1993 for correction of Hershkovitz's original spelling), *A. infulatus* in southern Brazil; *A. miconax* Thomas in eastern Peru; *A. nancymaae* Hershkovitz (see Groves 1993 for correction of the original spelling) in eastern Peru; and *A. nigriceps* Dollman in western Brazil and adjacent Peru. *Aotus hershkovitzi* is a member of the gray-necked species group and is known only from the type locality in eastern Colombia.

The distributions of the two known species of *Aotiella* are such that *A. aotophilus* is found on the red-necked night monkey species group in Bolivia and Argentina, and *A. hershkovitzi* is on the gray-necked group in Venezuela and possibly Brazil. Whether these will ultimately prove to be the only species of *Aotiella* or whether other species exist must await additional collections of lice from other *Aotus*.

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