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Review of the chewing louse genus *Abrocomophaga* (Phthiraptera: Amblycera), with description of two new species

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Abstract.—The South American chewing louse *Abrocomophaga chilensis* Emerson & Price has, since its description, remained the sole known member of the amblyceran family Abrocomophagidae. We herein provide a redescription of the species as well as descriptions and illustrations for two new species of *Abrocomophaga*: *A. emmonsae* off *Cuscomys ashaninka* Emmons from Perú and *A. hellenthali* off the degu, *Octodon degus* (Molina), from Chile. After our reevaluation of the status of the family Abrocomophagidae, we consider it a synonym of the family Gyropidae.

Resumen.—Desde su descripción original, el piojo sudamericano *Abrocomophaga chilensis* Emerson & Price, ha permanecido como el único miembro conocido de la familia Abrocomophagidae, perteneciente a los amblíceros. En este trabajo presentamos una redescripción de dicha especie y además descripciones e ilustraciones de dos especies nuevas del género *Abrocomophaga: A. emmonsae* parásito de *Cuscomys ashaninka* Emmons proveniente del Perú y *A. hellenthali* parásito del degu, *Octodon degus* (Molina), de Chile. Después de reevaluar el status de la familia Abrocomophagidae, la consideramos como sinónimo de la familia Gyropidae.

Emerson & Price (1976) described a distinctive new taxon of South American chewing louse, *Abrocomophaga chilensis,* and placed it in a new monotypic family, the Abrocomophagidae. All known specimens of this louse were found on a single chinchilla rat, *Abrocoma bennetti* Waterhouse, from Chile. Since the original description, little has been written about this enigmatic and phylogenetically important amblyceran (Emerson & Price 1985), almost certainly because no new information was available. We recently obtained series of *Abrocomophaga* from two other South American rodent hosts; these lice represent two new species in this genus. With the addition of these two new species, we reevaluate the status of the family Abrocomophagidae and the genus *Abrocomophaga.* Our purpose here is to describe and illustrate these new species and to establish the synonymy for the family Abrocomophagidae.

Family Gyropidae Kellogg

Gyropidae Kellogg, 1896:68. Type genus: *Gyropus* Nitzsch.

Abrocomophagidae Emerson & Price, 1976:425. Type genus: *Abrocomophaga* Emerson & Price. New synonymy.

The features associated with the species of Gyropidae and the relationship of this family to other members of the suborder Amblycera have been accurately treated by Clay (1970) and will not be repeated here.

In her treatment of the amblyceran Phthiraptera, Clay (1970) followed the organization presented by Ewing (1924) in recognizing the Gyropidae as being divided into three subfamilies: (1) the Gyropinae with six pairs of abdominal spiracles (on III–VIII) and at least one pair of legs having a modified tarsal claw strongly adapted for clasping hair; (2) the Gliricolinae with only five pairs of abdominal spiracles (on III–VII) and legs with a single greatly reduced tarsal claw; and (3) the Protogyropinae with six pairs of abdominal spiracles (on III–VIII) and all legs having a single unmodified tarsal claw.

The establishment of the family Abrocomophagidae by Emerson & Price (1976) was based primarily on the fact that *Abrocomophaga chilensis,* the sole member of this new family, had an unmodified tarsal claw on each leg and only five pairs of abdominal spiracles, a combination of characters seen in no other gyropid louse. However, as our understanding of character evolution has matured over the years, we have come to the conclusion that these differences are of generic-level rather than familial-level significance. In fact, the main difference between the Abrocomophagidae and the monotypic Protogyropinae was that the former had only five pairs of abdominal spiracles (on III–VII), whereas the latter had six pairs (on III–VIII). Because the number of abdominal spiracles in the Gyropidae varies from the primitive six pairs to a reduced state of five pairs, it is our feeling now that this difference is not of familial significance and that the Abrocomophagidae should be considered a synonym of the family Gyropidae (subfamily Protogyropinae) as delineated by Clay (1970). A discussion of other features associated with the Abrocomophagidae and *Abrocomophaga* may be found in Emerson & Price (1976). Lakshminarayana (1976) presented a thorough review of the suprageneric classification of the Phthiraptera and gave a listing of the superfamily, family, subfamily, and tribe names proposed to that time.

Genus *Abrocomophaga* Emerson & Price

Abrocomophaga Emerson & Price, 1976: 425. Type species: *Abrocomophaga chilensis* Emerson & Price.

This genus is separated from others in the family Gyropidae (and suborder Amblycera) in having known representatives with all legs having an unmodified tarsal claw and the abdomen with only five pairs of spiracles.

Abrocomophaga chilensis Emerson & Price

Abrocomophaga chilensis Emerson & Price, 1976:426. Type host: *Abrocoma bennetti bennetti* Waterhouse.

Male.—Emerson & Price (1976) provide a full illustration in Fig. 5 and two aspects of the male genitalia in Figs. 3 and 4. Head with numerous medium-length setae on dorsal and ventral surfaces; without heavy dorsal seta near antennal base. Pronotum with 10–14 setae; prosternum with 5–7 setae, mesosternum with 8–10. Metanotum with 10 setae, including 6 longer median setae and each side laterally with 1 long, 1 short seta; metasternal plate with 12–14 setae. Abdominal tergal setae: I, 4; II, 6–8; III, 8–10; IV, 10–12; V, 11–13; VI, 11–14; VII, 10–12; VIII, 6–9. Terga III–VII each with small faint median pigmentation; V–VIII each with median pair of shorter setae recessed posterior to main row. Posterior margin of each of pleura II–VIII with 1 very long and 1 adjacent short heavy seta. Last tergum with 2 short, 1 very long seta on each side. Abdominal sternal setae: II, 7–9; III, 9–12; IV, 11–15; V, 12–14; VI, 10–13; VII, 9–11. Sterna IV–VII each with small faint median pigmentation. Subgenital plate with 7 or 8 medium to short median setae. Genitalia with only ill-defined weak mesosomal sclerites associated with sac and with blunt apical tip of parameres. Dimensions (in mm): temple width, 0.19–0.20; head length, 0.16–0.18; prothorax width, 0.15–0.16; metathorax width, 0.18–

0.20; abdomen width at segment V, 0.30–0.31; genitalia width, 0.08; genitalia length, 0.17–0.20; genitalia paramere length, 0.06–0.07; total length, 0.94–0.98.

Female.—Emerson & Price (1976) provide a full illustration in Fig. 2 and one of the ventral terminalia in Fig. 1. Head and thorax as for male, abdomen differing as follows. Tergal setae: IV, 9–11; V, 10–12; VI, 10–13; VII, 9–12. All setae on terga V–VIII aligned in row. Last tergum with 2 very long setae on each side, in addition to 2 shorter setae. Sternal setae: II, 8–10; III, 10–13; IV, 11–13; V, 11–14; VI, 11–13; VII, 8–11. Subgenital plate with 9–11 medioanterior setae and convex posterior margin bearing median fringe of small spicules. Anal fringe ventrally of 5 + 5 and dorsally of 3 + 3 longer lateral setae, with few minute median setae in each row. Dimensions (in mm): temple width, 0.20–0.22; head length, 0.17–0.20; prothorax width, 0.16–0.17; metathorax width, 0.19–0.20; abdomen width at segment V, 0.32–0.35; anus width, 0.07–0.08; total length, 1.07–1.14.

Material.—10 male, 10 female paratypes of *Abrocomophaga chilensis,* ex *Abrocoma bennetti bennetti,* Chile.

Remarks.—This species is recognized by both sexes with consistently small dimensions, including narrow head and abdomen, and their abdominal tergal and sternal setal counts; the female with a narrow anus; and the male with unique genitalia and a small recessed pair of abdominal tergal setae on each of V–VIII. Type deposited in the NMNH.

Emerson & Price described *Abrocomophaga chilensis* on the basis of a large series of specimens from a single host individual of *Abrocoma bennetti bennetti* from Chile collected by Robert E. Martin. We can now provide more specific information on the type host and type locality. The type host collected by Robert E. Martin on 2 November 1974 bears his field number 1105 and is deposited in the Recent mammal collection at the Field Museum in Chicago as FMNH 119794 with locality information as follows: Chile: Santiago Province; 10 km W of Til Til [Tiltil; 1000 m]. The host was an adult female.

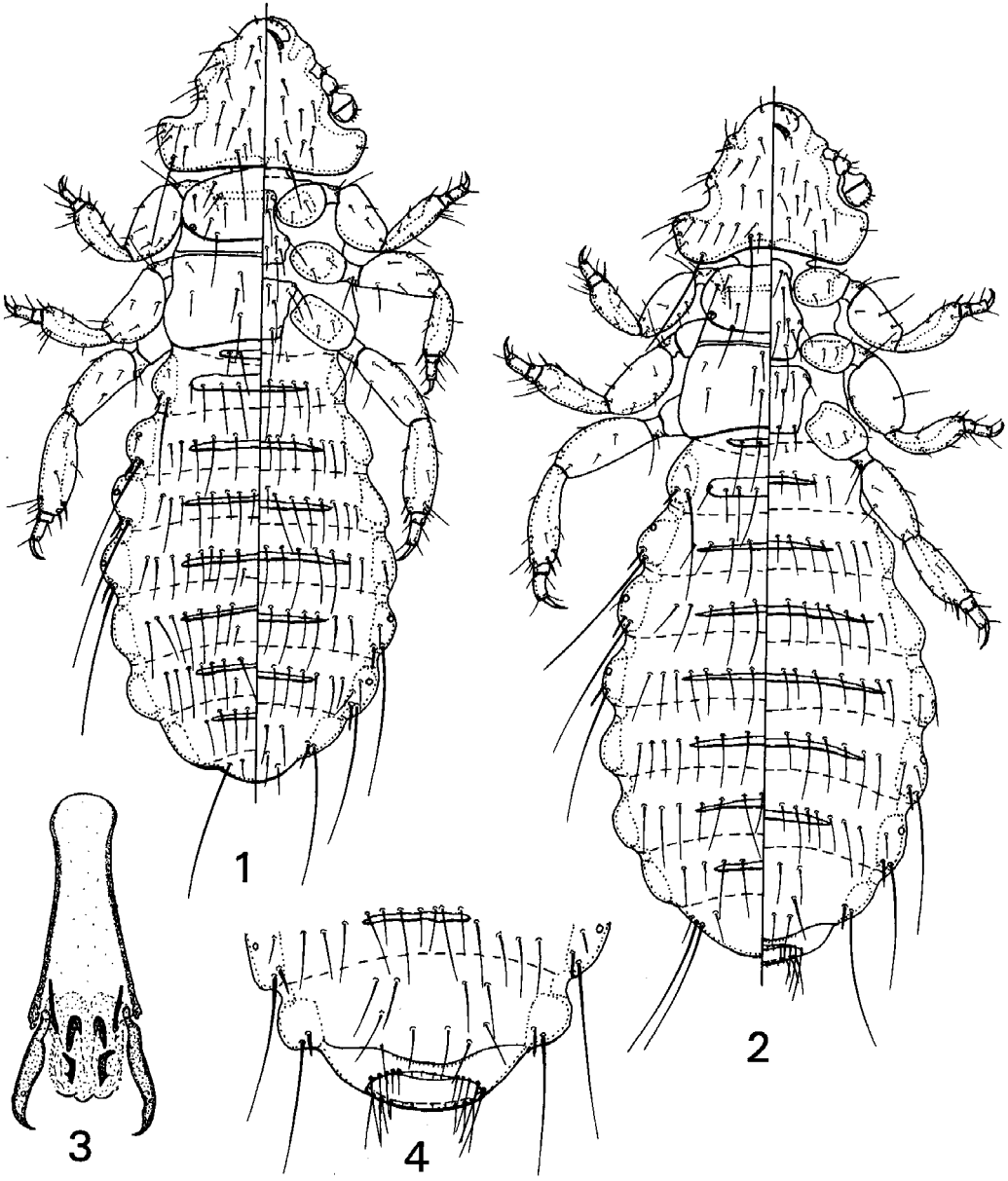
Abrocomophaga emmonsae, new species
Figs. 1–4

Type host.—*Cuscomys ashaninka* Emmons.

Male.—As in Fig. 1. Differing from *Abrocomophaga chilensis* as follows. Abdominal tergal setae: IV, 14; V, 18; VI, 14; VII, 16. Terga I–VIII each with small median faintly pigmented area; V–VII each with median pair of shorter setae recessed posterior to main row. Abdominal sternal setae: II, 10; III, 14; IV, 16; V, 15; VI–VII, 12. Sterna II–VII each with lightly pigmented median area. Genitalia (Fig. 3) with prominent inwardly curved sharply pointed parameres and conspicuous associated mesosomal sclerites as shown. Dimensions (in mm): temple width, 0.26; head length, 0.20; prothorax width, 0.19; metathorax width, 0.26; abdomen width at segment V, 0.40; genitalia width, 0.09; genitalia length, 0.20; genitalia paramere length, 0.06; total length, 0.98.

Female.—As in Fig. 2. Differing from *Abrocomophaga chilensis* as follows. Abdominal tergal setae: IV, 12–13; V, 12–16; VI, 13–18; VII, 13–16. Abdominal sternal setae: II, 8–11; III, 11–15; IV, 13–17; V, 13–16; VI, 12–18; VII, 11–14. Ventral terminalia as in Fig. 4. Dimensions (in mm): temple width, 0.26–0.27; head length, 0.20–0.22; prothorax width, 0.19–0.20; metathorax width, 0.23–0.26; abdomen width at segment V, 0.41–0.47; anus width, 0.09–0.10; total length, 1.06–1.16.

Type material.—Holotype male, ex *Cuscomys ashaninka,* Perú: Cuzco, Cordillera Vilcabamba (11°39′36″S, 73°38′31″W) el. 3350 m, 15 June 1997, coll. Louise H. Emmons #1359; in collection of the Museo de Historia Natural, Universidad Nacional de San Marcos, Lima, Perú, MUSM 12715 ♀. Paratypes: 6 females, same data as holotype; in collections of the Universidad Na-



Figs. 1–4. *Abrocomophaga emmonsae:* (1) Dorsal-ventral male; (2) Dorsal-ventral female; (3) Male genitalia; (4) Ventral female terminalia.

cional de San Marcos and the National Museum of Natural History, Washington, D.C.

Etymology.—This new species is named in honor of Louise H. Emmons, National Museum of Natural History, Smithsonian Institution, who collected the host and enthusiastically encouraged the junior author to examine it for ectoparasites. Her survey efforts in South America have greatly contributed to our understanding of this fauna and her field guides to Neotropical mammals have created a broader understanding

of the rainforest for both the public and students of all ages, and have certainly contributed to conservation efforts.

Remarks.—Although this new species is close to *Abrocomophaga chilensis,* both sexes are readily separable by their consistently larger dimensions, including broader head and abdomen, and their larger number of abdominal tergal and sternal setae; the female with the broader anus; and the male with the recessed pair of setae on only abdominal terga V–VII and with unique genitalia that have the distinctive mesosomal sclerites and acutely pointed parameres.

Abrocomophaga hellenthali, new species
Figs. 5–8

Type host.—*Octodon degus* (Molina).

Male.—As for *Abrocomophaga chilensis* except as follows. Head (Fig. 6) with heavy dorsal seta near antennal base. Abdomen (Fig. 5) with tergal setae: II, 5–6; III, 6–7; IV–V, 7–8; VI–VII, 8; VIII, 5–6. Terga I–VII each with small faint median pigmentation; V and VII each with median pair of shorter setae recessed posterior to main row. Posterior margin of each of pleura II–VIII with short slender seta adjacent to very long seta. Last tergum with 1 long, 3–4 short setae on each side. Abdominal sternal setae: II, 6; III, 8–9; IV, 9–10; V, 8–10; VI, 7–8; VII, 6. Sterna II–VII each with small faint median pigmentation. Genitalia (Fig. 7) with numerous conspicuous spinelike mesosomal sclerites associated with sac and with sharply pointed apical tip of parameres.

Dimensions (in mm): temple width, 0.23–0.26; head length, 0.18–0.20; prothorax width, 0.17–0.18; metathorax width, 0.22–0.23; abdomen width at segment V, 0.38–0.41; genitalia width, 0.08–0.09; genitalia length, 0.19–0.21; genitalia paramere length, 0.07; total length, 0.83–0.88.

Female.—Head and thorax as for male, abdomen (Fig. 8) differing as follows. Tergal setae: VIII, 6–7. All setae on terga V and VII aligned in row. Last tergum with 2 very long setae on each side, in addition to 2 shorter setae. Sternal setae: II, 6–8; VI, 8–9; VII, 6–7. Subgenital plate with 9–11 medioanterior setae and convex posterior margin bearing median fringe of small spicules. Anal fringe as for *Abrocomophaga chilensis.* Dimensions (in mm): temple width, 0.24–0.26; head length, 0.19–0.20; prothorax width, 0.17–0.19; metathorax width, 0.22–0.26; abdomen width at segment V, 0.43–0.47; anus width, 0.09–0.10; total length, 0.94–0.98.

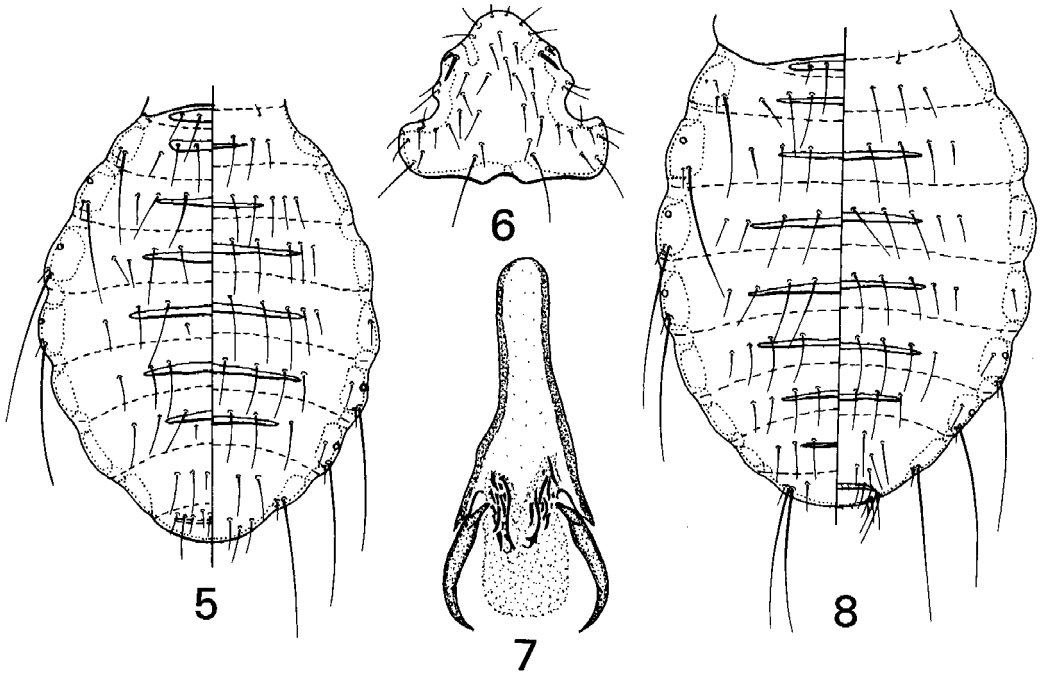
Type material.—Holotype male, ex *Octodon degus,* Chile: Santiago, Santiago, 2.5 km NE of Cerro Manquehue, Trappist Monastery, 9 July 1975, coll. Robert E. Martin #1222 (FMNH 119614 ♀); in collection of the K. C. Emerson Entomology Museum, Oklahoma State University, Stillwater. Paratypes: 2 males, 3 females, same data as holotype; 1 female, same except 1 August 1975, Robert E. Martin #1235 (FMNH 119756 ♂); 1 male, 1 female, same except 27 April 1976, Robert E. Martin #1432 (FMNH 119639 ♂); all in same collection as holotype.

Etymology.—This species is named for Ronald A. Hellenthal, University of Notre Dame, in recognition of his strong interest in chewing louse taxonomy and his many years of cooperative studies with RDP.

Remarks.—This species is separated from the other two of the genus by both sexes having large dimensions, including a broad head and abdomen, a heavy dorsal preantennal head spine, a short slender seta adjacent to the very long seta on each of pleura II–VIII, and a consistently small number of abdominal tergal and sternal setae; the female with a broad anus; and the male with a recessed pair of setae only on abdominal terga V and VII and with unique genitalia that have a distinctive assemblage of spinous mesosomal sclerites and acutely pointed parameres.

Discussion

The caviomorph rodent family Octodontidae contains 6 genera and 11 living spe-



Figs. 5–8. *Abrocomophaga hellenthali:* (5) Dorsal-ventral male abdomen; (6) Dorsal male head; (7) Male genitalia; (8) Dorsal-ventral female abdomen.

cies, all with very restricted Andean or pre-Andean ranges; *Octodon degus* is the most widely distributed species. With the discovery of *Cuscomys ashaninka,* the caviomorph family Abrocomidae now contains two Recent genera and a total of five species (Emmons 1999). Both families occupy a diverse array of high-elevation habitats, and their geographic ranges overlap broadly in southern South America. The relationships between the Abrocomidae and Octodontidae have been the subject of debate. The abrocomids were historically treated as a subfamily of the Echimyidae and more recently as either a subfamily of the Octodontidae or as a closely related family in the superfamily Octodontoidea following Reig (1986) and Carleton (1984). However, Glanz & Anderson (1990) suggested that the abrocomids are more closely aligned with the chinchillas and may belong in the superfamily Chinchilloidea.

Where accurate records are available, we have found gyropid lice to be extremely host-specific ectoparasites (Price & Timm 1997), with speciation of lice closely paralleling speciation in their mammalian hosts. The various species in a louse genus are almost always restricted to the various species of a host genus or to very closely related genera of hosts. Our discovery of the two new species of *Abrocomophaga* described herein, although clearly supporting the host specificity we observe in gyropids, is odd in that closely related species of lice are found on different families of rodents. Two of the species of *Abrocomophaga* now known—*A. chilensis* and *A. emmonsae*—are apparently host-specific parasites of abrocomid rodents (*Abrocoma bennetti* and *Cuscomys ashaninka,* respectively) and one species—*A. hellenthali*—is apparently a host-specific parasite of an octodontid rodent (*Octodon degus*). Because only three species are known in the genus *Abrocomophaga* and the genus is only known from five separate host individuals in three sep-

arate genera, it is premature to attempt to reconstruct a phylogeny for the group.

Naturally occurring transfers (host switching) of parasitic lice between nonrelated hosts is not common, but has been documented in both mammals and birds (Paterson et al. 1999). Nest sharing between different species of mammals is rare in nature; however, sequential use of tree hole nests by birds is widespread. Timm (1983) postulated that the broad host distributions of species and genera seen in many lineages of bird lice are in part due to host transfers that might occurred during the evolutionary history of the groups. Mammal lice exhibit greater host specificity because opportunities for lice to colonize new host taxa are rare. Although nest sharing by different species of rodents is exceedingly rare, it has been well documented for *Octodon degus* and *Abrocoma bennetti* in Chile. In a field study with marked individuals, Fulk (1976) found *O. degus* and *A. bennetti* regularly to share burrows and even the same nests. In excavating nests, he found female *A. bennetti* with their own infants as well as infant degus. Correspondingly, female *O. degus* also had both species of young in their nests. Fulk (1976:504) considered nest sharing a common behavior in these two species, and suggested "This practice may be mutualistic, each animal contributing to the survival of the other's young."

Although we don't know that nest sharing occurs between *Octodon degus* and *Abrocoma bennetti* throughout their range, the fact that it does occur demonstrates how an ancestral *Abrocomophaga* could be transferred from one host family to another. With only three species of *Abrocomophaga* known to date, we cannot differentiate between the hypotheses that the current distribution of species we see on the rodent families Abrocomidae and Octodontidae are historically shared or relatively recent host transfers. When additional species of *Abrocomophaga* from other abrocomid and octodontid hosts are known, we may be able to address whether the Abrocomidae or the Octodontidae, or perhaps a common ancestor, represent the ancestral host for this enigmatic and poorly known group of lice.

Acknowledgments

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