



## A taxonomic catalog, including host and geographic distribution, of the species of the genus *Gyropus* Nitzsch (Phthiraptera: Amblycera: Gyropidae)

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### Abstract

This taxonomic catalog of the species of the genus *Gyropus* (Phthiraptera, Amblycera, Gyropidae) includes 27 species and subspecies listed in alphabetical order. The deposition of types, synonymies, collection data, geographical and host distribution are presented for each species. Relevant published taxonomic and biological references are provided. Cases of doubtful host records are discussed with some changes in host associations proposed based on current knowledge of host geographical distributions. The host of *Gyropus martini matthaeensis*, the only species without a known host, is proposed based on morphological features and distribution records.

**Key words:** Phthiraptera, taxonomy, chewing lice, *Gyropus*, Rodentia, Neotropical region, systematics

### Introduction

The family Gyropidae (Phthiraptera: Amblycera), the third most diverse in the suborder, contains three subfamilies: Gyropinae, Protogyropinae and Gliricolinae. Species are separated by the number of abdominal spiracles and tarsal claws on meso- and meta-thoracic legs (Ewing 1924; Clay 1970). There are 96 species described in this family (Price *et al.* 2003), all of them restricted to the Neotropics, except for two cosmopolitan species that have spread throughout the world on domesticated Neotropical hosts introduced by humans. Within the Gyropinae, *Gyropus* Nitzsch has the widest geographic distribution, the greatest number of species, and its type species, *G. ovalis* Burmeister, is of veterinary importance. This genus includes 27 species and subspecies, of which more than 50% were described by F.L. Werneck (1933 to 1948); only 13% were described by others in the last two decades.

Although hosts of the type species are Caviidae, only 7.5% (2) of *Gyropus* spp. are found on this family. Rodents of the family Echimyidae (Rodentia) are the primary hosts for *Gyropus*; *Proechimys*, *Thrichomys* and *Trinomys* are hosts for half of the 27 described species.

The purpose of this catalogue is to integrate all host, geographic and taxonomic information published about *Gyropus* (*sensu* Werneck 1948; Hopkins and Clay 1952; Price *et al.* 2003). Species accounts include comments and perspectives, with recommendations for future research.

## Material and methods

In preparing the taxonomic catalog, we consulted biological indices (e.g. Biological Abstracts<sup>®</sup>, Zoological Record, and Entomological Abstracts) and the available literature (e.g. Werneck 1948; Kéler 1960; Price *et al.* 2003) for information regarding of all the species in *Gyropus*.

Papers we could not consult are designated *apud* (Latin; in the work of, see in. When a secondary source is consulted), and only the consulted paper is included in the references. Except when mentioned (e.g. micrography, SEM, transversal section etc) all of figures mentioned in the list are line drawings.

One of us (MPV) had direct access to the F.L. Werneck collection at the Entomological Collection in the Oswaldo Cruz Institute, including Werneck's files and slides. This access was very useful to resolve some of the doubtful host records and species identifications. Therefore, for those species described or treated by Werneck in his publications (e.g. Werneck 1935a, b, 1936a, 1948), it was possible to undertake a thorough review. It would have been desirable to have this access to all type series and all collections where the species of *Gyropus* are housed, but unfortunately that was not possible, except for some types which have been received on loan.

*Gyropus ovalis*, the type of the genus, is frequently found on guinea-pigs, a common pet rodent; thus it spread together with its host throughout the world. Since the guinea-pig has economic importance to human beings, *G. ovalis* have been listed in many textbooks of veterinary parasitology and medical entomology in many places of the world (e.g. Denmark, England, Finland, Italy, Mexico, Poland, USA). These books do not generally include new information thus they have not been included in our references for this species. Similarly, papers with only lists of guinea-pig parasites (e.g. Eichler 1942; Sebesteny 1976; Sparrow 1980; Bourdeau and Guaguere, 1985) and lists of parasites of laboratory animals (e.g. Ismail and Ho 1989) are not included.

In the geographical distribution section, we list the country, followed by the major political division of each country (e.g. departments, states, provinces, etc). In Table 1, the original sources of the geographical and host data are cited.

Scientific names for hosts follow Wilson and Reeder (2005). When old taxonomic names were used for type hosts in the original description, the updated name is inserted in parentheses after the former one. For other host species, only the updated names are used. The symbol “+” before the host species name denotes a questionable record by straggling, dubious or erroneous hosts and, when possible, comments are provided.

Acronyms for museums and collections where types are located follow, when possible, Evenhuis (2008): BMNH—United Kingdom, London, The Natural History Museum, formerly British Museum (Natural History); BPBM—USA, Hawaii, Honolulu, Bernice P. Bishop Museum; EMEC—USA, California Berkeley, University of California, Essig Museum of Entomology; ENVY—France, Toulouse, National Veterinary School; FIOC—Brazil, Rio de Janeiro, Fundação Oswaldo Cruz, Instituto Oswaldo Cruz; FMNH—USA, Illinois, Chicago, Field Museum of Natural History; GML—Panama, Gorgas Memorial Laboratory; KCEC—USA, Stillwater, Oklahoma State University, K.C. Emerson Entomology Museum; MBUC—Venezuela, Caracas, Universidad Central de Venezuela; MLPA—Argentina, La Plata, Universidad Nacional de La Plata, Museo de la Plata; MZSP—Brazil, São Paulo, São Paulo, Museu de Zoologia da Universidade de São Paulo; PIPeR—USA, Utah, Salt Lake City, University of Utah, Price Institute of Phthirapteran Research; SEMC—USA, Kansas, Lawrence, University of Kansas, Snow Entomological Museum; USNM—USA, Washington D.C., National Museum of Natural History, formerly, United States National Museum.

## Results

Werneck (e.g. 1948: 70, 88) stressed that some species groups included in *Gyropus* could be elevated to generic status, but he did not make these changes. Although convinced that we are not using the most satisfactory generic classification for *Gyropus* (*sensu* Werneck 1948: 52), we continue to use it as it is the only existing classification. Choices made by Ewing (1924), such as morphological characters and type species for his new genera, in our opinion, were poor; therefore his generic criteria will not be used in this catalog. To clarify the morphological limits to this genus and to resolve these matters, a complete taxonomic revision is needed.

Though Castro *et al.* (2007) proposed two species, included by Price *et al.* (2003) in *Phtheiropoios* Eichler, would be better placed in *Gyropus*, they did not formally make this generic change (e.g. by designating “comb. n”). Therefore, these species are not included in this catalog. The first step in revising this genus was to compile all available literature. Here we bring together all available taxonomic information regarding these 27 species and subspecies.

### Order Phthiraptera Suborder Amblycera Gyropidae Kellogg, 1896 *Gyropus* Nitzsch, 1818

*Gyropus* Nitzsch 1818: 302 (diagnosis and synopsis of species). Burmeister 1838: 442 (key of the genera in ‘Liotheida’ family). Denny 1842: 244 (generic characteristics and synopsis of species). Gervais 1844: 315 (generic characteristics and synopsis of species). Gervais 1849: 102 (generic characteristics). Giebel 1874: 246 (generic characteristics and synopsis of species). Piaget 1880: 608 (generic characteristics and synopsis of species). Railliet 1895: *apud* Werneck (1948: 52). Kellogg 1896: 68 (generic characteristics). Kellogg 1908: 5 (key to genera and species of the suborder Amblycera), 52 (generic characteristics and synopsis of species). Mjöberg 1910: 20 (generic characteristics and synopsis of species). Neumann 1912b: 212 (generic characteristics, inclusion of all species of the Gyropidae in the genus *Gyropus*, and review of species of that family). Kellogg and Ferris 1915: 65 (generic characteristics and synopsis of the North American species). Ewing 1924: 12 (generic characteristics, and review of species of the family Gyropidae), 13 (key to *Gyropus* species). Séguy 1944: 52 (generic characteristics and synopsis of the French species). Hopkins and Clay 1952: 160 (checklist). Price *et al.* 2003: 27 (key for genera found on Rodentia), 76 (checklist). Type locality. According to Ewing (1924: 15): “*Cavia cobaya* probably living under conditions of domestication”. Type species. *Gyropus ovalis* Burmeister, 1838 (by subsequent designation of the International Commission of Zoological Nomenclature, see Hopkins (1951) for further explanation).

*Haemabarus* Nitzsch [in Giebel] 1874: 6 (new name for *Gyropus*, “*nomen nudum*”). Type species. *Gyropus ovalis* Burmeister. Hopkins and Clay 1952: 162 (junior synonym of *Gyropus*; checklist). Price *et al.* 2003: 77 (checklist; a junior synonym of *Gyropus*).

*Diplocerus* Nitzsch [in Giebel] 1874: 6 (new name for *Gyropus*, “*nomen nudum*”). Hopkins and Clay 1952: 117 (synonym of *Gyropus*; checklist). Price *et al.* 2003: 75 (checklist; a junior synonym of *Gyropus*).

*Monogyropus* Ewing 1924: 10. Type species. *Gyropus longus* Neumann (by original designation). Werneck 1936a: 394 (morphological arguments to reject this genus) and 419 (synonym of *Gyropus*). Werneck 1948: 52 (a junior synonym of *Gyropus*; morphological arguments to reject this genus). Hopkins and Clay 1952: 226 (checklist; a junior synonym of *Gyropus*). Price *et al.* 2003: 78 (checklist; a junior synonym of *Gyropus*).

*Tetragyropus* Ewing 1924: 21. Type species. *Gyropus lineatus* Neumann (by original designation). Werneck

1933: 153 (description of *T. cruzi*). Werneck 1934a: 167 (note about a drawing in original description of *T. cruzi*). Werneck 1934b: 277 (description of *T. martini*). Werneck 1936a: 394 (morphological arguments to reject this genus) and 419 (a junior synonym of *Gyropus*). Werneck 1948: 52 (a junior synonym of *Gyropus*; morphological arguments to reject this genus). Hopkins and Clay 1952: 348 (checklist; a junior synonym of *Gyropus*). Price *et al.* 2003: 79 (checklist; a junior synonym of *Gyropus*).

*Eogyropus* Eichler 1952: 76. Type species. *Gyropus lenti lenti* Werneck (by original designation). Hopkins and Clay 1953: 438 (a synonym of *Gyropus*; acceptance as a subgenus; checklist). Price *et al.* 2003: 75 (checklist; a junior synonym of *Gyropus*).

### ***Gyropus cercomydis* Werneck, 1942**

*Gyropus cercomydis* Werneck 1942: 25, fig. 4 (female head, dorso-ventral view), fig. 8 (detail of the endomeres and mesomeral plate), fig. 21 (female terminalia, ventral view), fig. 22 (male genitalia, dorsal view), fig. 23 (female habitus, dorso-ventral view), fig. 24 (male habitus, dorso-ventral view). Type locality: Brazil, Bahia, Xiquexique, Rio São Francisco. Type host: *Cercomys laurentius* (= *Thrichomys a. laurentus* (Thomas)). Typology: Holotype male, 'allotype' female and two female paratypes held by FIOC. One male and one female paratype in alcohol, vial 209 in support 21, at FIOC.

Hopkins and Clay 1952: 160 (checklist). Emerson, and Price 1981: 44 (host-parasite checklist). Cicchino and Castro 1990: 322 (checklist of *Gyropus* species on Echimyidae). Cardoso-de-Almeida *et al.* 2003: 235 (list of type material in Instituto Oswaldo Cruz). Price *et al.* 2003: 76 (checklist).

*Eogyropus cercomydis*, Eichler 1952: 76 (replacement of genus).

Distribution. BRAZIL (Bahia).

Host. *Thrichomys apereoides laurentus* (Echimyidae).

### ***Gyropus cruzi* (Werneck, 1933)**

*Tetragyropus cruzi* Werneck 1933: 153, fig. 1 (female habitus, dorso-ventral view), fig. 2 (male habitus, dorso-ventral view), fig. 3 (detail of the antenna), fig. 4 (head, dorso-ventral view), fig. fig. 5 (sternal plates), fig. 6 (female terminalia, ventral view), fig. 7 (male genitalia, dorsal view), fig. 8 (exposed male genitalia, dorsal view), fig. 9 (third nymphal habitus, dorsal view). Type locality: Brazil, São Paulo. Type host: *Euryzgomatomys spinosus catellus* (= *Euryzgomatomys spinosus* Fischer) (after Werneck 1934b). Typology: Holotype female, 'allotype' male, six male, two female, and nine nymphal paratypes held by FIOC. One male and one female paratype were donated to BMNH.

Werneck 1934a: 281 (citation). Werneck 1934b: 167 (remark about a missed seta on the mesosternal plate lacking in original description).

*Gyropus cruzi*, Werneck 1936a: 431 (citation). Werneck 1948: 61 (notes on male genitalia), fig. 43 (male genitalia, dorsal view), fig. 44 (detail of the genital sclerite, dorsal view), fig. 45 (detail of the mesomeral plate). Hopkins and Clay 1952: 160 (checklist). Emerson and Price 1981: 44 (host-parasite checklist). Cicchino and Castro 1990: 322 (checklist of *Gyropus* species on Echimyidae). Cicchino and Castro 1998b: 99 (synopsis of Argentine species, assumption of geographical occurrence), 103 (host-parasite list of Argentine species). Cardoso-de-Almeida *et al.* 2003: 235 (list of type material in Instituto Oswaldo Cruz). Price *et al.* 2003: 76 (checklist).

Distribution. BRAZIL (São Paulo).

Host. *Euryzgomatomys spinosus* (Echimyidae).

***Gyropus diplomys* Méndez, 1967**

*Gyropus diplomys* Méndez 1967: 555. fig. 1 (male habitus, dorso-ventral view), fig. 2 (male genitalia, dorsal view). Type locality: Panama, Colón, Achiote. Type host: *Diplomys labilis* (Bangs). Typology: Holotype male, 'allotype' female, seven male, seven female, and seven nymphal paratypes held by USNM. Two paratypes held by BMNH, and some paratypes held by GML.

Cicchino and Castro 1990: 322 (checklist of *Gyropus* species on Echimyidae). Price *et al.* 2003: 77 (checklist).

Distribution. PANAMA (Colón).

Host. *Diplomys labilis* (Echimyidae).

***Gyropus distinctus* Castro and Cicchino, 2002**

*Gyropus distinctus* Castro and Cicchino 2002: 295, fig. 1A (male habitus, dorso-ventral view), fig. 1B (detail of the male genital sclerite, dorsal view), fig. 1C (detail of the male genital sclerite, ventral view), fig. 2A (male genitalia with detail of the pseudopenis, ventral view). Type locality. Chile, Valparaíso, Reserva Nacional Lago Peñuelas. Type host: *Octodon degus* (Molina). Typology: Holotype male, twelve male and twenty female paratypes held by MLPA.

Price *et al.* 2003: 77 (checklist). Gonzales-Acuña *et al.* 2005: 56 (prevalence and new geographical records). Abrahamovich *et al.* 2006: 44 (list of type material in Museo de La Plata).

*Gyropus parvus*, Werneck 1951: 311 (morphological comments on '*Gyropus parvus*' name), fig. 15 (male genitalia, ventral view), fig. 16 (exposed male genitalia, dorsal view). Castro and Cicchino 2002: 296 (remarks about Werneck's comments).

Distribution. CHILE (Coquimbo, Santiago, Valparaíso).

Hosts. *Octodon degus*, *O. lunatus* (Octodontidae).

***Gyropus elongatus* (Castro, Cicchino and Torres-Mura, 1987)**

*Gyropus parvus elongatus* Castro, Cicchino and Torres-Mura 1987: 43, fig. 1 (male habitus, dorso-ventral view), fig. 2 (female habitus, dorso-ventral view), fig. 3 (male genitalia, ventral view), fig. 4 (detail of the male genital sclerite), fig. 5 (on side of the female terminalia, ventral view). Type locality: Chile, Malleco. Type host: *Aconaemys fuscus* (Waterhouse). Typology: Holotype male, 'allotype' female, twenty male, eighteen female, and fourteen nymphal paratypes held by MLPA.

Cicchino and Castro 1998b: 99 (synopsis of Argentine species, assumption of geographical occurrence), 103 (host parasite list of Argentine species), fig. 8 (female habitus, dorsoventral view). Abrahamovich *et al.* 2006: 45 (list of type material in Museo de La Plata).

*Gyropus elongatus*, Castro and Cicchino 2002: 295 (new status, species, morphometrics and chaetotaxy data), fig. 2B (male genitalia with detail of the pseudopenis, ventral view). Price *et al.* 2003: 77 (checklist). Gonzales-Acuña *et al.* 2005: 56 (prevalence and new host and geographical records).

Distribution. CHILE (Cautín, Colchagua, Malleco, Talca).

Hosts. *Aconaemys fuscus*, *A. sagei* (Octodontidae).

***Gyropus emersoni* Méndez, 1969**

*Gyropus emersoni* Méndez 1969: 497, fig. 1 (male habitus, dorso-ventral view), fig. 2 (male genitalia, dorsal view), fig. 3 (female terminalia, dorso-ventral view). Type locality: Panama, Gamboa, Canal Zone. Type host: *Proechimys semispinosus* (Tomes). Typology: Holotype male, 'allotype' female, sixteen male, twenty-five female, and four nymphal paratypes held by USNM. Of these, some paratypes were distrib-



uted: four male and four female paratypes at BMNH, and two male and two female paratypes at BPBM. Additionally, some paratypes held by SEMC, GML and KCEC (Méndez 1969: 499).

Emerson and Price 1981: 44 (host-parasite checklist). Cicchino and Castro 1990: 322 (checklist of *Gyropus* species on Echimyidae). Price *et al.* 2003: 77 (checklist).

Distribution. PANAMA (Panamá).

Hosts. *Proechimys semispinosus* (Echimyidae), <sup>+</sup>*Zygodontomys brevicauda* (Allen and Chapman) (Cricetidae).

**Remarks.** Although Méndez (1969) collected a pair of lice from two different host individuals of *Zygodontomys cherriei* (= *Z. brevicauda*), we believe that these findings are the result of contamination. Without explanation, Price *et al.* (2003: 77) did not consider this cricetid species as a host of *G. emersoni*.

### ***Gyropus freitasi* Werneck, 1942**

*Gyropus freitasi* Werneck 1942: 21, fig. 2 (female head, dorso-ventral view), fig. 6 (detail of the endomeres and mesomeral plate), fig. 9 (female habitus, dorso-ventral view), fig. 10 (male habitus, dorso-ventral view), fig. 12 (female meso-metathorax, dorsal view), fig. 14 (female terminalia, ventral view), fig. 15 (male genitalia, dorsal view), fig. 16 (exposed male genitalia, dorsal view). Type locality: Brazil, Ceará, Pacoti, Serra do Ouro. Type host: *Cercomys cunicularius inermis* (= *Thrichomys inermis* (Pictet)). Typology: Holotype male, 'allotype' female, and three male paratypes held by FIOC. There are paratypes of both sexes in alcohol, vial 204 in support 21, at FIOC. One male and two female paratypes were donated to BMNH (former GHE Hopkins Collection).

Hopkins and Clay 1952: 161 (checklist). Emerson and Price 1981: 44 (host-parasite checklist). Cicchino and Castro 1990: 322 (checklist of *Gyropus* species on Echimyidae). Cardoso-de-Almeida *et al.* 2003: 235 (list of type material in Instituto Oswaldo Cruz). Price *et al.* 2003: 77 (checklist).

*Eogyropus freitasi*, Eichler 1952: 76 (replacement of genus).

Distribution. BRAZIL (Ceará, Pernambuco).

Hosts. *Thrichomys inermis*, <sup>+</sup>*T. a. laurenteus* (Echimyidae).

**Remarks.** Despite Werneck (1942: 21; 1948: 70) having cited *Cercomys cunicularius laurentius* (= *Thrichomys a. laurenteus*) as a host from which *G. freitasi* had been collected, both Hopkins and Clay (1952: 161) and Price *et al.* (2003: 77) overlooked the original data and did not consider this species as a host of *G. freitasi*. In Werneck's collection there are registries for 26 samples, all hosts identified by J. Moojen, recorded from *Cercomys cunicularius inermis* (= *Thrichomys inermis*) and only one louse sample from *Cercomys laurentius* (= *Thrichomys a. laurenteus*), identified by R.W. Hayman, named as *G. freitasi*. It is important to stress that of these 27 samples, only two of them are slide-mounted. The finding of *G. freitasi* on *T. apereoides* may be a case of host misidentification. Thus, the only known host for this chewing louse is *T. inermis*.

### ***Gyropus lenti distinctus* Werneck, 1948**

*Gyropus lenti distinctus* Werneck 1948: 68, fig. 67 (detail of the endomeres). Type locality: Brazil, Mato Grosso do Sul, Salobra. Type host: *Cercomys cunicularius forsteri* (= *Thrichomys pachyurus* (Wagner)). Typology: Holotype male, 'allotype' female, one male, and two female paratypes held by FIOC. There are paratypes of both sexes in alcohol, vial 249 in support 25, at FIOC.

Emerson and Price 1981: 44 (host-parasite checklist). Cicchino and Castro 1990: 322 (checklist of *Gyropus* species on Echimyidae). Cardoso-de-Almeida *et al.* 2003: 235 (list of type material in Instituto Oswaldo Cruz). Price *et al.* 2003: 77 (checklist).

*Gyropus distinctus*: Hopkins and Clay 1952: 160 (checklist).

Distribution. BRAZIL (Mato Grosso do Sul), PARAGUAY (Sapucay).

Host. *Thrichomys pachyurus* (Echimyidae).

### ***Gyropus lenti lenti* Werneck, 1936b**

*Gyropus lenti* Werneck 1936b: 845, fig. 1 (female habitus, dorso-ventral view), fig. 2 (male habitus, dorso-ventral view), fig. 3 (female head, dorso-ventral view), fig. 4 (sternal plates), fig. 5 (legs I–III, ventral view), fig. 6 (female terminalia, ventral view), fig. 7 (male genitalia, ventral view), fig. 8 (male genitalia, dorsal view). Type locality: Brazil, Ceará. Type host: *Cercomys laurentius* (= *Thrichomys a. apereoides* (Lund)). Typology: Holotype male, ‘allotype’ female, three male, and one female paratypes held by FIOC. There are paratypes of both sexes in alcohol, vial 235 in support 24, at FIOC.

Werneck 1942: 19 (geographical records), figs. 1 (female head, dorso-ventral view), 5 (detail of the endomeres and mesomeral plate), 11 (female meso-metathorax, dorsal view). Hopkins and Clay 1952: 161 (checklist).

*Gyropus lenti lenti* Werneck, 1948: 68 (new status, subspecies), fig. 66 (detail of the endomeres). Emerson and Price 1981: 44 (host-parasite checklist). Cicchino and Castro 1990: 322 (checklist of *Gyropus* species on Echimyidae). Cardoso-de-Almeida *et al.* 2003: 235 (list of type material in Instituto Oswaldo Cruz). Price *et al.* 2003: 77 (checklist). Cáceres *et al.* 2007: 1984 (supposed new host record and prevalence data).

*Eogyropus lenti lenti*, Eichler 1952: 76 (replacement of genus).

Distribution. BRAZIL (Bahia, Ceará, Goiás, Minas Gerais, Pernambuco).

Hosts. *Thrichomys a. apereoides*; *T. a. laurentius*; *T. inermis* (Echimyidae); *Thylamys macrurus* (Didelphidae).

**Remarks.** The opossum species cited as a host for *G. lenti lenti* is presumably the result of contamination during field collection. Although in the published results (Cáceres *et al.* 2007: 1984) there is no evidence of contamination (other than low prevalence), an abstract presented by the authors at a Brazilian national congress (Gazêta *et al.* 2005) showed that the same louse species also parasitized *T. apereoides*, which was collected during the same trip. During the same congress a poster presentation by the authors also reported *Rhipidomys macrurus* (Cricetidae) as a host for *G. lenti lenti*, another probable case of cross contamination.

### ***Gyropus limai* Werneck, 1948**

*Gyropus limai* Werneck 1948: 65, fig. 57 (female habitus, dorso-ventral view), fig. 58 (male habitus, dorso-ventral view), fig. 59 (female terminalia, ventral view), fig. 60 (male genitalia, dorsal view), fig. 61 (male genitalia, ventral view), fig. 62 (detail of the endomeres), fig. 63 (detail of the mesomeral plate), fig. 64 (detail of the male genital sclerite, dorsal view), fig. 65 (detail of the male genital sclerite, ventral view). Type locality: Brazil, Bahia, Ilhéus, Fortuna. Type host: *Proechimys setosus* (= *Trinomys setosus* (Desmarest)). Typology: Holotype male, ‘allotype’ female, four male, one female and two nymphal paratypes held by FIOC.

Hopkins and Clay 1952: 161 (checklist). Emerson and Price 1981: 44 (host-parasite checklist). Cicchino and Castro 1990: 322 (checklist of *Gyropus* species on Echimyidae). Cardoso-de-Almeida *et al.* 2003: 235 (list of type material in Instituto Oswaldo Cruz). Price *et al.* 2003: 77 (checklist).

Distribution. BRAZIL (Bahia, Espírito Santo).

Host. *Trinomys setosus* (Echimyidae).

### ***Gyropus lineatus* Neumann, 1912b**

*Gyropus lineatus* Neumann 1912b: 218, fig. 4 (female habitus, dorsal view), fig. 5 (sternal plates of female).

Type locality: Brazil, Pará. Type host: *Kerodon moco* (= *Kerodon rupestris*). Typology: “D’après une centaine d’individues ♂ et ♀, recueillis, en même temps que *G. porcelli perfoliatus*, sur le Moco (*Kerodon moco* Fr. Cuv.), au Para (Brésil), par Göldi (Muséum de Paris)” (see Neumann 1912b: 220), syntypes held by ENVT.

Harrison 1916: 31 (checklist). Werneck 1936a: 424 (male and female redescrptions), fig. 40 (female habitus, dorso-ventral view), fig. 41 (male habitus, dorso-ventral view), fig. 42 (female head, dorso-ventral view), fig. 43 (sternal plates), fig. 44 (female terminalia, ventral view), fig. 45 (male genitalia, dorsal view). Werneck 1948: 54 (citation). Hopkins and Clay 1952: 161 (checklist). Emerson and Price 1981: 40 (host-parasite checklist). Guitton *et al.* 1986: 233 (supposed new host record and geographical data). Price *et al.* 2003: 77 (checklist). Bittencourt and Rocha 2002: 422 (supposed new host record and spatial distribution on host) Bittencourt and Rocha 2003: 794 (supposed mean abundance data).

*Tetragyropus lineatus*, Ewing 1924: 21 (redescription and key to species included in *Tetragyropus*). Werneck 1934a: 176 (synoxenism with *Monothoracius penidoi*). Werneck 1934b: 281 (citation).

Distribution. BRAZIL (Ceará, Minas Gerais, Pernambuco).

Hosts. *Kerodon rupestris* Wied, <sup>+</sup>*Microcavia australis* (Caviidae), <sup>+</sup>*Proechimys mincae*, <sup>+</sup>*P. iheringi*, <sup>+</sup>*Proechimys* sp. (Echimyidae).

**Remarks.** The three species of Echimyidae cited as a host to *G. lineatus* are clearly either result of a misidentification of the lice (Guitton *et al.* 1986; Bittencourt and Rocha 2002, 2003) or contamination among museum skins (Ewing 1924). This is one of the only two species named in *Gyropus* found exclusively on Caviidae. The finding of an immature on a skin of *Microcavia australis* (Ewing 1924: 22) needs further investigation.

### ***Gyropus longus* Neumann, 1912b**

*Gyropus longus* Neumann 1912b: 222, fig. 9 T (male prothorax, dorsal view), fig. 9 G (male genitalia, dorsal view), fig. 10 (female legs I–III, ventral view). Type locality: Chile. Type host. *Abrocoma bennetti* Waterhouse, 1837. Typology: “D’après deux lots recueillis sur deux <Ratons>, à Peñaflor (Chili), par le professeur C.E. Porter, comprenant chacun 15 à 30 spécimens, la plupart ♀; –1 ♀ recueillie sur un *Abrocoma Benneti* [sic!] du Chili, par le professeur Trouessart.” (see Neumann 1912a: 224), syntypes held by ENVT.

Harrison 1916: 31 (checklist). Werneck 1936a: 456 (redescription), fig. 87 (female habitus, dorso-ventral view), fig. 88 (male habitus, dorso-ventral view), fig. 89 (female head, dorso-ventral view), fig. 90 (sternal plates), fig. 91 (female terminalia, ventral view), fig. 92 (male genitalia, dorsal view). Werneck 1948: 67 (citation). Hopkins and Clay 1952: 161 (checklist). Emerson and Price 1981: 43 (host-parasite checklist). Price *et al.* 2003: 77 (checklist).

*Monogyropus longus*, Ewing 1924: 10 (redescription and key to *Monogyropus* species), fig. 1 (leg II showing tarsus locked in the femoral tenaculum), fig. 4 (leg III, ventral view).

Distribution. CHILE (Talagante, Huasco).

Host. *Abrocoma bennetti* Waterhouse (Abrocomidae).

### ***Gyropus martini iheringi* Werneck, 1948**

*Gyropus martini iheringi* Werneck 1948: 64, fig. 53 (detail of the male genital sclerite, dorsal view), fig. 54 (detail of the male genital sclerite, ventral view). Type locality: Brazil, Espírito Santo, Santa Teresa, Floresta da Caixa d’água. Type host: *Proechimys iheringi* (= *Trinomys iheringi*). Typology: Holotype male,



'allotype' female, four male, and four female paratypes deposited at FIOC. There are paratypes of both sexes in alcohol, vial 259 in support 26, at FIOC.

Emerson and Price 1981: 43 (host-parasite checklist). Cicchino and Castro 1990: 322 (checklist of *Gyropus* species on Echimyidae). Cardoso-de-Almeida *et al.* 2003: 235 (list of type material in Instituto Oswaldo Cruz). Price *et al.* 2003: 77 (checklist).

*Gyropus iheringi*: Hopkins and Clay 1952: 161 (checklist).

Distribution. BRAZIL (Espírito Santo).

Hosts. *Trinomys iheringi*<sup>+</sup>, *Trinomys graciosus* (Moojen) (Echimyidae).

**Remarks.** The host used in the original description was identified by J. Moojen as *Proechimys iheringi* in 1945, that is, three years before his monograph about the Brazilian spiny rats of the genus *Proechimys s.l.* (Moojen 1948). In this monograph, J. Moojen included in *Proechimys (Trinomys) iheringi* five subspecies: *P. i. iheringi* Thomas, *P. i. denigratus* Moojen, *P. i. paratus* Moojen, *P. i. graciosus*, and *P. i. bonafidei* Moojen. Probably the material identified for Werneck was not classified to subspecies, after Moojen's classification, and species identification was used by Werneck (1948: 64) to describe *G. m. iheringi*: *Proechimys iheringi* (spp.). It is now known that the species which occurs in the type locality, Floresta da Caixa d'água in Santa Teresa (Espírito Santo state), is *Trinomys graciosus* (Jack-Ximenes 2005), namely, *Proechimys iheringi graciosus* after Moojen (1948) and Lara and Patton (2000). Therefore, the correct name for the type host of *G. m. iheringi* is *Trinomys graciosus* instead of *T. iheringi*.

#### ***Gyropus martini martini* (Werneck, 1934b)**

*Tetragyropus martini* Werneck 1934b: 277, fig. 3 (female habitus, dorso-ventral view), fig. 4 (male habitus, dorso-ventral view), fig. 5 (head, dorso-ventral view), fig. 6 (sternal plate), fig. 7 (female terminalia, ventral view), fig. 8 (male genitalia, ventral view), fig. 9 (male genitalia, dorsal view), fig. 10 (nymph, dorso-ventral view). Type locality: Brazil, Rio de Janeiro, Corcovado. Type host: *Proechimys albispinus* (= *Trinomys albispinus*) (see remarks below). Typology: Holotype female, 'allotype' male, two male, three female, and one nymphal paratypes held by FIOC. There are paratypes of both sexes in alcohol, vial 74 in support 8, at FIOC. One male and one female paratype were donated to BMNH.

*Gyropus martini*, Werneck 1936a: 431 (citation). Hopkins and Clay 1952: 161 (checklist).

*Gyropus martini martini*, Werneck 1948: 63 (new status, subspecies), fig. 49 (male genitalia, dorsal view), fig. 50 (male genitalia, ventral view), fig. 51 (detail of the endomeres), fig. 52 (detail of the mesomeral plate). Emerson and Price 1981: 43 (host-parasite checklist). Cicchino and Castro 1990: 322 (checklist of *Gyropus* species on Echimyidae). Cardoso-de-Almeida *et al.* 2003: 235 (list of type material in Instituto Oswaldo Cruz). Price *et al.* 2003: 77 (checklist).

Distribution. BRAZIL (Rio de Janeiro).

Hosts. <sup>+</sup>*Trinomys albispinus*, *T. dimidiatus* (Günther) (Echimyidae).

**Remarks.** The host specimen used by Werneck (1934b) in his description was identified by R.W. Haymann as *Proechimys albispinus*; later, the same host skin was identified as *Proechimys dimidiatus* (= *T. dimidiatus*) by J. Moojen (Werneck 1948: 63). There are in Werneck's collection six samples from differentes places of Rio de Janeiro state, all identified by J. Moojen as *Proechimys dimidiatus*. We believe that the name of the type host was result of misidentification, thus the only host species and the type host of *G. m. martini* is *T. dimidiatus*.

#### ***Gyropus martini matthaeensis* Werneck, 1948**

*Gyropus martini matthaeensis* Werneck 1948: 65, fig. 55 (detail of the male genital sclerite, dorsal view), fig.

56 (detail of the male genital sclerite, ventral view). Type locality: Brazil, Espírito Santo, São Mateus, vale do Rio Itaúnas, Ribeiro do Engano. Type host: Unknown. Typology: Holotype male, 'allotype' female and two male paratypes held by FIOC. There are male paratypes in alcohol, vial 260 in support 26, at FIOC.

Emerson and Price 1981: 44 (host-parasite checklist). Cicchino and Castro 1990: 322 (checklist of *Gyropus* species on Echimyidae). Cardoso-de-Almeida *et al.* 2003: 235 (list of type material in Instituto Oswaldo Cruz). Price *et al.* 2003: 77 (checklist).

*Gyropus matthaeensis*, Hopkins and Clay 1952: 161 (checklist and presumption of the host as a *Proechimys* sp.).

Distribution. BRAZIL (Espírito Santo).

Host. *Trinomys panema* (Moojen) (see remarks below).

**Remarks.** Based on morphological characters such as male genitalia and abdominal chaetotaxy (Werneck 1934, 1948), *G. martini matthaeensis* belongs to a group of species found infesting spiny-rats of the genus *Trinomys*. The assumption of Hopkins and Clay (1952) is valid because the species now included in *Trinomys* have often been considered as members of *Proechimys s.l.* (Wilson and Reeder 2005). Moreover, from its locality of collection, the type host could not be included within the geographic range of *Proechimys s.s.* (Gardner and Emmon 1984; Patton 1987; Lara and Patton 2000), based on such distribution the species in the genus *Trinomys* known in Espírito Santo state are *T. graciosus*, *T. panema*, *T. setosus*, and *T. paratus* (Moojen) (Lara and Patton 2000; Iack-Ximenes 2005). Based on the results obtained herein, (1) it is assumed that two *Gyropus* species are not found on the same *Trinomys* species, (2) that *T. graciosus* is probably the correct host name to *G. m. iheringi* (see note for this species), (3) that *T. setosus* is the host of *G. limai*, (4) *T. graciosus* and *T. panema* are morphologically close species (Iack-Ximenes 2005) (cryptic species by Iack-Ximenes, pers. comm.), which is confirmed by the close morphological similarity between *G. m. iheringi* and *G. m. matthaeensis* (Werneck 1948). It is possible that *Trinomys panema* should be the correct host for *G. m. matthaeensis*. However, further collections of lice from this host will prove or reject the present hypothesis.

### ***Gyropus mesoamericanus* Méndez, 1969**

*Gyropus mesoamericanus* Méndez 1969: 499, fig. 4 (male genitalia, dorsal view), fig. 5 (female terminalia, dorso-ventral view). Type locality: Nicaragua, El Rama, El Recreo, Rio Mico. Type host: *Hoplomys gymnurus truei* (= *Hoplomys gymnurus* (Thomas)). Typology: Holotype male, 'allotype' female, thirty-six male, thirty-four female, and six nymphal paratypes held by USNM. Of these, some paratypes were distributed: four male and four female paratypes to the BMNH, and two male and two female paratypes to the BPBM. Additionally, paratypes are also held by SEMC, GML, and in KCEC (see Méndez 1969: 501).

Emerson 1971: 332 (citation regarding Nicaraguan mammals). Emerson and Price 1981: 44 (host-parasite checklist). Cicchino and Castro 1990: 322 (checklist of *Gyropus* species on Echimyidae). Price *et al.* 2003: 77 (checklist).

Distribution. NICARAGUA (autonomous region of South Atlantic, former Zelaya region).

Host. *Hoplomys gymnurus* (Echimyidae).

**Remarks.** When described, *G. mesoamericanus* was compared only with *G. emersoni* (Méndez 1969: 499). That author did not compare his new species with *G. setifer*, already known from the same host species (*Hoplomys gymnurus*) (Ewing 1924: 22; Werneck 1948: 55). This species may be a junior synonym of *Gyropus setifer*, however this decision should be based on a future taxonomic revision.

***Gyropus ovalis* Burmeister, 1838**

*Gyropus ovalis* Nitzsch 1818: 304 (without a formal description of the species, *nomen nudum*).

*Gyropus ovalis* Burmeister 1838: 443 (diagnosis). Type locality: According to Ewing (1924): *Cavia cobaya* probably living under conditions of domestication. Type host: *Savia cobaya* [sic!] (= *Cavia porcellus*). Types unknown.

Denny 1842: 245 (diagnosis), fig. 1 (female habitus, dorsal view), fig. 1a (anterior leg), fig. 1b (posterior leg), fig. 1c (antenna). Gervais 1844: 317 (diagnosis). Gurlt 1857: 279 (*apud* Werneck 1948: 53). Giebel 1861: 89 (diagnosis), Plate 2, fig. 1–9. Giebel 1874: 246 (diagnosis). Gurlt 1878: 165 (*apud* Werneck 1948: 53). Piaget 1880: 609 (diagnosis), Plate 50, fig. 5 (female habitus, dorsal view), fig. 1a (antenna), fig. 1b (posterior tarsus locked in the femoral tenaculum), fig. 1c (tarsus I, detail), fig. 1d (male terminalia in dorsal view with exposed genitalia). Neumann 1892: 71, fig. 42 (*apud* Werneck 1948: 53). Railliet 1895: fig. 588 (*apud* Werneck 1948: 53). Mégnin 1880: 95 (description), figs. 41c (tibia and tarsus of first leg), 41d (tibia and tarsus of posterior leg). Osborn 1896: 216 (list of insects affecting animals), 249 (citation), fig. 140 (female habitus, dorsal view). Kellogg 1899: 79 (citation). Kellogg 1908: 52 (citation), plate 2, fig. 17 (female habitus, dorsal view). Mjöberg 1910: 20 (citation), 239 (description of male genitalia), 259 (egg description), fig. 1 (antenna), fig. 2 (second and third legs), fig. 3 (female terminalia, dorsal view), fig. 9 (hypopharynx), figs. 110 (first leg), 115 (spiracular opening in tracheal system), 130 (exposed male genitalia). Paine 1912: 441 (citation). Neumann 1912b: 228 (key to *Gyropus* species). Johnston and Harrison 1912: 22 (list of introduced animals in Australia). Stobbe 1914: 177 (citation and new host record). Kellogg and Ferris 1915: 65 (citation). Harrison 1916: 31 (checklist). Ewing 1924: 13, fig. 6 (head, dorsal view). Séguy 1924: 64, figs. 52 (male habitus, dorsal view); 53 (posterior leg); 54 (antenna). Ewing 1929: 107 (citation), fig. 63 (head, dorsal view). Blagoveshtchensky 1931: Plate I fig. A (male habitus, dorsal view), fig. B (female habitus, dorsal view), fig. C c1, c2, c3, c4 (part of buccal apparatus and hypopharynx). Plate II fig. A (transverse section of the head at level of anterior third of hypopharynx), fig. B (transverse section of the head at level of middle third of hypopharynx), fig. C (transverse section of the head at level of posterior third of hypopharynx). Table III fig. A (transverse section of the head at level of initial part of oesophagus), fig. B (transverse section of the head at level of first third of oesophagus), fig. C (transverse section of the head at level of temporal portion of oesophagus), fig. D (transverse section of the head at level of neck part of oesophagus). Plate IV figs. A, B, C (longitudinal section of the head at the area which is close to middle line), fig. D (longitudinal section of the head almost in middle line). Plate V fig. A (horizontal section of the head beneath the mandible level), figs. B, C, D (female digestive tract showing different forms of Malpighian tubes), fig. E (male digestive tract). Plate VI fig. A (male salivary glands), fig. B (central ganglion of the central nervous system, drawing after combination of sections), fig. C (transverse section of the sub-pharyngeal ganglion), fig. D (longitudinal section at level between 2<sup>nd</sup> and 3<sup>rd</sup> abdominal ganglion), fig. E (horizontal section of the respiratory stigma, with its opening closed), fig. F (female reproductive system, ovaries not entirely developed), fig. G (female reproductive system, ovaries developed). Plate VII fig. A (female genital apparatus, in contracted form after egg withdrawal), fig. B (transverse section of the final portion of the female abdomen), fig. C (transverse section of the female abdomen at level of the complementary ganglion chain), fig. D (longitudinal section nearly of middle line of female abdomen), fig. E (longitudinal section of the female genital chamber). Plate VIII fig. A (male genitalia, dorsal view), fig. B (detail of the male genitalia), fig. C (exposed male genitalia), figs. D, E, F (transverse section of the final portion of the male abdomen), fig. G (transverse section of the male abdomen at level of retal glands). Plate IX fig. A (transverse section of the abdomen at paired follicle line), fig. B (transverse section of the abdomen), fig. C (median longitudinal section of the male abdomen with genitalia in repose), fig. D (median longitudinal section of the male abdomen with half of genitalia exposed). Galliard 1934: 1316, figs. B, E (*apud* Werneck 1948: 53). Werneck 1936a: 419 (redescription), fig. 34

(female habitus, dorsoventral view), fig. 35 (male habitus, dorsoventral view), fig. 36 (female head, dorsoventral view), fig. 37 (female terminalia, ventral view), fig. 38 (male genitalia, dorsal view), fig. 39 (exposed male genitalia, dorsal view). Maltbaek 1937: 21 (list of lice on exotic mammals in Denmark). Torres 1938: fig. 1B (exposed male genitalia, dorsal view). Costa-Lima 1939: 372 (citation). Conci 1940: 80 (citation on the chewing lice in Italy). Whitehead 1942: 14, plate 5, fig. 3 (*apud* Werneck 1948: 53). Séguy 1944: 52 (diagnosis), fig. 37 (female habitus, dorsal view), fig. 38 (male genitalia, dorsal view), fig. 39 (posterior tarsus extremity). Merisuo 1944: 209 (citation in Finland), fig. 6C (male microphotograph). Blagoveshtchensky 1949: 231 (description of morphology of digestive system), plate II, fig. 1 (female whole digestive tract), fig. 2 (detail of anterior part of female digestive tract), fig. 3 (detail of female crop, lateral view), fig. 4 (detail of female crop, front view). Hopkins 1951: 57 (designation as type species of the genus). Hopkins and Clay 1952: 161 (checklist). Symmons 1952: 379 (tentorium description), fig. 20 (head with some internal structures, ventral view), fig. 21 (two drawings of transverse sections of the head, at antennae level), fig. 22 (two drawings of transverse sections of the head, at occipital level), fig. 23A–C (longitudinal sections of the head), fig. 23D (sagittal section of the head), fig. 24 (reconstruction from longitudinal sections of the head, lateral view). Kéler 1957: 97, fig. 3 E (antenna, lateral view), fig. 29 A (head, prothorax and mesothorax, ventral view), fig. 42 B (left leg I, ventral and dorsal views), fig. 42 C (left leg III, ventral and dorsal views). Emerson 1962: 7 (list of North American chewing lice). Blagoveshtchensky 1959: 60 (longitudinal section of a female ovariolus). Eichler 1963: 14, fig. 5 (longitudinal section of a female ovariolus, redrawn from Blagoveshtchensky 1959). Merdivenci 1966: 98 (list of Turkey species of parasites). Emerson 1966: 268 (checklist of Panama species and geographical distribution). Złotorzycka 1972: 36 (synopsis of Polish species of *Gyropus*), fig. 25 (leg structure for clasping), fig. 52 (male habitus, dorsal view), fig. 53 (female habitus, dorsal view), fig. 54 (head, dorsal view), fig. 55 (male genitalia, dorsal view). Emerson 1972a,b: 13 (parasite-host and a host-parasite lists of North American species). Eichler and Hackman 1973: 85 (citation in Finnish species of chewing lice). Emerson *et al.* 1973: 382 (data on morphology, lice cycle, pathogenic effects, diagnosis, and control). Fig. 13.7 (female habitus, dorsal view). Złotorzycka *et al.* 1974: 19 (key of central Europe species), 72 (citation) fig. 32a (male habitus, dorsal view), 32b (female habitus dorsal view), 32c (female head, dorsal view), 32d (female posterior leg), 32e (male genitalia, dorsal view), 32f (egg, lateral view). Martin-Mateo 1975: 179 (female re-descriptions and morphometric data), fig. 4 (middle tarsus locked in the femoral tenaculum), fig. 5 (female dorsal head, dorso-ventral view), fig. 6 (female terminalia, ventral view). Emerson and Price 1975: 4 (key to Venezuelan species), 28 (geographical record, infestation data), fig. 71 (female habitus, dorsoventral view), fig. 72 (male habitus, dorsoventral view), fig. 73 (female terminalia, ventral view), 74 (male genitalia, dorsal view). Martin 1979: 327 (short list of lice in Canada). Emerson and Price 1981: 40 (host-parasite checklist). Emerson *et al.* 1984: 155 (geographical record for North America). Silfverberg 1986: 133 (citation on the chewing lice in Finland). Guitton *et al.* 1986: 233 (new geographical data). Linardi *et al.* 1987: 137 (new geographical record for the host-parasite association), 139 (specific index of infestation). Złotorzycka and Modrzejewska 1988: 42 (citation), 148 (host-parasite list), 160 (Polish geographical distribution). Mey 1988: 115 (list of lice on domestic animals in Europe). Ziomko and Cencek 1992: 71 (data on prevalence and chemical control). Castro *et al.* 1996: 213 (chorionic morphology of the egg in SEM), fig. 2 (egg, lateral view), fig. 16 (operculum and amphora, lateral view), fig. 17 (operculum, polar view), fig. 18 (aeriferous chamber, polar view), fig. 19 (section of an aeriferous chamber), fig. 20 (medium part of the amphora), fig. 21 (internal face of the exo and endocorion in the amphora), fig. 22 (internal face of the exocorion at level of the aeriferous chambers), fig. 23 (section of the exo and endocorion at level basal pole). Price and Graham 1997: 12 (citation), fig. 10A (female habitus modified from Emerson and Price (1975), ventral view), fig. 10B (male habitus modified from Emerson and Price (1975), dorsal view), fig. 10C (female terminalia from Emerson and Price (1975), ventral view), fig. 10D (male genitalia from Emerson and Price (1975), dorsal view). Cicchino and Castro 1998b:



99 (synopsis of Argentine species, geographic distribution), 103 (host parasite list of Argentine species). Valim *et al.* 2004: 243 (data on prevalence, abundance and parasitic burden).

*Gyropus turbinatus*, Piaget 1880: 612, plate 50, fig. 7 (male habitus, dorsal view), fig. 7a (posterior tarsus locked in the femoral tenaculum). Kellogg 1908: 52 (citation). Harrison 1916: 32 (checklist). Werneck 1936a: 424 (synonymization in *Gyropus ovalis*).

*Allogyropus turbinatus*, Ewing 1924: 20 (inclusion in a new genus).

*Gyropus recifensis*, Torres 1938: 280, fig. 1A (exposed male genitalia, dorsal view), fig. 2 (micrograph of the male habitus), fig. 3 (micrograph of the tip of right paramere), fig. 4 (micrograph of the whole male genitalia). Werneck 1948: 54 (synonymization in *Gyropus ovalis*).

*Macroglyropus mexicanus*, Zavaleta 1945: 438, fig. 2 (female habitus, ventro-dorsal view), fig. G (female antenna), fig. H (female terminalia, ventral view), fig. I (male terminalia, dorsal view), fig. J (male genitalia, ventral view), fig. K (tarsus I of the male), fig. L (tarsus I of the female). Werneck 1948: 54 (a junior synonym of *Gyropus ovalis*).

Distribution: ARGENTINA (Chaco, Corrientes, Entre Rios, Buenos Aires), BRAZIL (Espírito Santo, Mato Grosso, Minas Gerais, Rio de Janeiro, São Paulo), COLOMBIA (Cristalina), GUIANA (Georgetown), PARAGUAY (Villarica), PERU (Arequipa), VENEZUELA (Carabobo, Monagas).

Hosts. *Cavia porcellus* Linnaeus, *C. a. aperea* Erxleben, *C. a. pamparum* Thomas, *C. fulgida* Wagler, *C. tschudii* Fitzinger (Caviidae).

**Remarks.** Although today the type host is domesticated and distributed worldwide, possibly it lives as feral populations in South America (Wilson and Reeder, 2005). Thus, only the records from this continent were included for this species. This species was found on a dragon fly (*Agriogomphus jessei*, Odonata, Gomphidae) in Cristalina, Colombia (Ewing 1924: 15). Of course that this find was a typical case of an accidental phoresis, nevertheless its geographical record is included in the distribution of *G. ovalis* (Table 1).

### ***Gyropus parasetosus* Werneck, 1935a**

*Gyropus parasetosus* Werneck 1935a: 598 (brief description). Type locality: Brazil, Mato Grosso, Tapirapoã. Type host: *Proechimys spinosus* (= *Proechimys longicaudatus* (Rengger)). Typology: Holotype male, 'allotype' female, three female, and fourteen nymphal paratypes held by FIOC. One female paratype was donated to BMNH.

Werneck 1935b: 428 (full description), fig. 21 (female habitus, dorso-ventral view), fig. 22 (female head, dorso-ventral view), fig. 23 (female sternal plates), fig. 24 (female terminalia, ventral view), fig. 25 (male genitalia, dorsal view). Werneck 1936a: 430 (citation). Werneck 1948: 57 (hosts records), fig. 34 (male habitus, dorso-ventral view), fig. 35 (male genitalia, dorsal view). Hopkins and Clay 1952: 161 (checklist). Emerson and Price 1981: 43 (host-parasite checklist). Cicchino and Castro 1990: 322 (checklist of *Gyropus* species on Echimyidae). Cardoso-de-Almeida *et al.* 2003: 235 (list of type material in Instituto Oswaldo Cruz). Price *et al.* 2003: 77 (checklist).

Distribution. BRAZIL (Mato Grosso).

Hosts. *Proechimys longicaudatus*, <sup>+</sup>*P. brevicauda*, <sup>+</sup>*P. guyannensis*, <sup>+</sup>*P. trinitatus*, <sup>+</sup>*P. oris* (Echimyidae), <sup>+</sup>*Oryzomys laticeps* (Cricetidae).

**Remarks.** The type host of *G. parasetosus* is a member of the family Echimyidae. Werneck (1948: 58) included a cricetid as its host, *Oryzomys laticeps*, in Pará state, Brazil. However, in Werneck's collection there is one male from this host and locality, and other unpublished records include: three males from *Metachirus nudicaudatus* (Didelphidae) and one female from *Sciurus aestuans* (Sciuridae), all from Pará,



Brazil. These unpublished stragglers or contaminants from Werneck's material reinforce our opinion that *Oryzomys laticeps* is the wrong host for *G. parasetosus*. Although Werneck (1948: 57) had said that he examined many individuals collected from two *P. oris* there is only one slide with one immature in his collection. This leads us to reject this species as a regular host until adults can be collected from this spiny-rat species. Two species of hosts for *G. parasetosus*, *P. guyannensis* and *P. trinitatus*, were cited only in checklists without mentioning the former material examined (Emerson and Price 1981: 43; Price *et al.* 2003: 77, respectively). The latter host species is represented in Werneck's collection by two samples from Trinidad and Tobago and Venezuela, composed of males and females (unpublished data). However, these specimens belong, probably, to an undescribed species. Therefore, we believe it is prudent to consider the type host as the only valid host for this louse species.

### ***Gyropus parvus* (Ewing, 1924)**

*Monogyropus parvus* Ewing 1924: 10 (key to *Monogyropus* species), 11 (description), fig. 5 (male genitalia, dorsal view). Type locality: Argentina, Rio Negro, Hunuluan. Type host: *Ctenomys colburni* Allen. Typology: Holotype male deposited at USNM.

*Gyropus parvus*, Werneck 1936a: 454 (redescription, host and geographical records), fig. 85 (male habitus, dorso-ventral view), fig. 86 (male genitalia, dorsal view). Werneck 1948: 70 (female description), fig. 68 (female habitus, dorso-ventral view), fig. 69 (female terminalia, ventral view). Hopkins and Clay 1952: 161 (checklist). Cicchino 1978: 154 (new host records). Emerson and Price 1981: 42 (host-parasite checklist). Cicchino *et al.* 2000: 201, 205, 209 (new host and geographical records). Castro and Cicchino 2002: 294 (morphometrics and chaetotaxy data). Price *et al.* 2003: 77 (checklist). Gonzales-Acuña *et al.* 2005: 57 (prevalence and new geographical records).

*Gyropus parvus parvus*, Castro *et al.* 1987: 41 (new host and geographical records, and morphometric data). Cicchino and Castro 1994: 4 (redescription of male genitalia, egg and embryo description, host and geographical records, wrong citation of type host, and synoxenism with *Phtheiropoios* and *Eulinognathus* species), fig. 1 (male genitalia, dorsal view), fig. 2 (pseudopenis, ventral view), fig. 3 (endomeres (= paramera) and mesomeral (= ventral) plate), fig. 14 (upper portion of the amphora on the egg, lateral view), fig. 15 (hatching organ of the embryo, frontal view), fig. 16 (hatching organ of the embryo, lateral view), fig. 17 (hatching organ of the embryo, frontal view), fig. 18 (hatching organ of the embryo, frontal view), fig. 19 (egg in scanning electronic microscopy, lateral view), fig. 20 (upper portion of the amphora and lower part of the operculum, lateral view), fig. 21 (opercular tips and rugose surface of the operculum), fig. 22 (operculum and upper portion of the amphora, polar view), fig. 23 (lower portion of the operculum, polar view), fig. 24 (lower portion of the operculum, detail), fig. 31 (sites of oviposition on body of *Ctenomys haigi*), fig. 32 (sites of oviposition on body of *Ctenomys porteousi*), fig. 33 (sites of oviposition on body of *Ctenomys australis*), fig. 34 (sites of oviposition on body of *Ctenomys talarum talarum*), fig. 35 (map of host and geographical distribution in Argentina). Cicchino and Castro 1998a: 200 (egg morphology comparison with *Phtheiropoios*), fig. 1 (general aspect of egg), fig. 2 (distal part of amphora and adjacent part of the egg operculum, lateral view), fig. 3 (egg operculum, polar view), fig. 4 (operculum surface, detail). Cicchino and Castro 1998b: 99 (synopsis of Argentine species, geographic distribution), 103 (host parasite list of Argentine species). Contreras *et al.* 1999: 15 (host and geographical records in Argentina), fig. 1 (map of the geographical distribution in Argentina).

Distribution. ARGENTINA (Buenos Aires, Chubut, Jujuy, La Pampa, Mendoza, Ro Negro, Santa Cruz, San Luis); CHILE (Magalhães, Talca).

Hosts. *Ctenomys colburni*, *C. australis* Rusconi, *C. azarae* Thomas, *C. chasiquensis* Contreras, Manceñido &

Ripas Alsina, *C. haigi* Thomas, *C. magellanicus* Bennett, *C. maulinus* Philippi, *C. mendocinus* Philippi, *C. opimus* Wagner, *C. porteousi* Thomas, *C. sericeus* Allen, *C. talarum* Thomas (Ctenomyidae).

### ***Gyropus persetosus* Cicchino and Castro, 1990**

*Gyropus persetosus* Cicchino and Castro 1990: 319, fig. 1a (male habitus, dorso-ventral view), fig. 1b (male head, dorsal view), fig. 1c (female habitus, dorso-ventral view), fig. 1d (one side of the female terminalia, ventral view), fig. 1e (female ventral subgenital sclerite). Type locality: Brazil, Bahia. Type host: *Proechimys albispinus* (= *Trinomys albispinus* (Geoffroy)). Typology: Holotype male and 'allotype' female held by MLPA.

Price and Graham 1997: 12 (citation). Price *et al.* 2003: 77 (checklist).

Distribution. BRAZIL (Bahia).

Host. *Trinomys albispinus* (Echimyidae).

**Remarks.** Although Cicchino and Castro (1990: 322) stated that the type series of this species is in the collection of MLPA, Abrahamovich *et al.* (2006) did not refer to it in either their list of Phthiraptera types housed in that institution, or in the list of types not found there.

### ***Gyropus ribeiroi* Werneck, 1935a**

*Gyropus ribeiroi* Werneck 1935a: 598 (brief description). Type locality: Brazil, Mato Grosso, Campo Novo do Parecis (= Campos Novos da Serra do Norte). Type host: *Scapteromys gnambiquarae* (= *Kunsia tomentosus* (Lichtenstein)). Typology: Holotype male, 'allotype' female, eleven male, seven female, and twenty nymphal paratypes held by FIOC. Two paratypes were donated to BMNH.

Werneck 1935b: 424 (full description), fig. 14 (female habitus, dorso-ventral view), fig. 15 (male habitus, dorso-ventral view), fig. 16 (female head, dorso-ventral view), fig. 17 (female sternal plates), fig. 18 (female terminalia, ventral view), fig. 19 (male genitalia, dorsal view), fig. 20 (detail of the genital sclerite, ventral view). Hopkins and Clay 1952: 161 (checklist). Emerson and Price 1981: 39 (host-parasite checklist). Cardoso-de-Almeida *et al.* 2003: 235 (list of type material in Instituto Oswaldo Cruz). Price *et al.* 2003: 77 (checklist).

Distribution. BRAZIL (Mato Grosso).

Host. *Kunsia tomentosus* (Cricetidae).

**Remarks.** This is the only species of *Gyropus* that parasitizes a cricetid rodent (see Table 1). Its original description was based upon a set of ten pairs from two host individuals; in addition, its genitalia, head and body chaetotaxy are distinct from the other morphotypes in the genus (Werneck 1935a:598, b:424, 1948: 62). The host associations of *Zygodontomys brevicauda* (Méndez 1969: 499) and *Oryzomys laticeps* (Werneck 1948: 58) were based on few specimens. Therefore, we regard these associations as the result of contamination. We stress that in both cases the morphotypes (including male and female genitalia and general chaetotaxy) in question were typically from species found on *Proechimys* spp.

### ***Gyropus scalaris* Werneck, 1942**

*Gyropus scalaris* Werneck 1942: 23, fig. 3 (female head, dorso-ventral view), fig. 7 (detail of the endomeres and mesomerale plate), fig. 13 (female meso-metathorax, dorsal view), fig. 17 (female habitus, dorso-ventral view), fig. 18 (male habitus, dorso-ventral view), fig. 19 (female terminalia, ventral view), fig. 20 (male genitalia, dorsal view). Type locality: Brazil, Bahia, Xiquexique. Type host: *Cercomys laurentius*

**TABLE 1.** Host and geographic distribution of the species included in the genus *Gyropus* Nitzsch (Phthiraptera, Amblycera, Gyropidae) based on data presented in the literature.

Species of <i>Gyropus</i>	Hosts	Distribution	References
<i>G. cercomydis</i>	<i>Thrichomys a. laurenteus</i> <sup>1</sup>	Brazil	Werneck (1942)
<i>G. cruzi</i>	<i>Euryzgomatomys spinosus</i> <sup>1</sup>	Brazil	Werneck (1933)
<i>G. diplomys</i>	<i>Diplomys labilis</i> <sup>1</sup>	Panama	Méndez (1967)
<i>G. distinctus</i>	<i>Octodon degus</i> <sup>2</sup>	Chile	Castro and Cicchino (2002); Gonzales-Acuña <i>et al.</i> (2005)
	<i>Octodon lunatus</i>	Chile	Castro and Cicchino (2002); Gonzales-Acuña <i>et al.</i> (2005)
<i>G. elongatus</i>	<i>Aconaemys fuscus</i> <sup>2</sup>	Chile	Castro <i>et al.</i> (1987); Gonzales-Acuña <i>et al.</i> (2005)
	<i>Aconaemys sagei</i>	Chile	Gonzales-Acuña <i>et al.</i> (2005)
<i>G. emersoni</i>	<i>Proechimys semispinosus</i> <sup>1</sup>	Panama	Méndez (1969)
<i>G. freitasi</i>	<i>Thrichomys inermis</i>	Brazil	Werneck (1942, 1948)
<i>G. lenti distinctus</i>	<i>Thrichomys pachyurus</i>	Brazil	Werneck (1948)
		Paraguay	Werneck (1948)
<i>G. lenti lenti</i>	<i>Thrichomys a. apereoides</i>	Brazil	Werneck (1942, 1948)
	<i>Thrichomys a. laurenteus</i>	Brazil	Werneck (1936b, 1942, 1948)
	<i>Thrichomys inermis</i>	Brazil	Werneck (1942, 1948)
<i>G. limai</i>	<i>Trinomys setosus</i> <sup>1</sup>	Brazil	Werneck (1948)
<i>G. lineatus</i>	<i>Kerodon rupestris</i> <sup>3</sup>	Argentina	Ewing (1924)
		Brazil	Ewing (1924); Werneck (1936, 1948)
<i>G. longus</i>	<i>Abrocoma bennetti</i> <sup>4</sup>	Chile	Neumann (1912b)
<i>G. martini iheringi</i>	<i>Trinomys graciosus</i>	Brazil	Werneck (1948)
<i>G. martini martini</i>	<i>Trinomys dimidiatus</i>	Brazil	Werneck (1948)
<i>G. martini matthaensis</i>	<i>Trinomys paratus</i> (?)	Brazil	Werneck (1948)
<i>G. mesoamericanus</i>	<i>Hoplomys gymnurus</i> <sup>1</sup>	Nicaragua	Méndez (1969); Emerson (1971)
<i>G. ovalis</i>	<i>Cavia porcellus</i> <sup>3</sup>	Argentina	Ewing (1924); Werneck (1948)
		Peru	Ewing (1924); Werneck (1948)
		Brazil	Werneck (1936, 1948); Valim <i>et al.</i> (2004)
		Guiana	Werneck (1936)
		Mexico	Zavaleta (1946)
		Panama	Werneck (1948)
		Venezuela	Emerson and Price (1975)
	<i>Cavia a. aperea</i>	Paraguay	Stobbe (1914)
		Brazil	Werneck (1936, 1948); Linardi <i>et al.</i> (1987)
	<i>Cavia a. pamparum</i>	Argentina	Werneck (1936); Castro <i>et al.</i> (1996)
	<i>Cavia fulgida</i>	Brazil	Werneck (1948); Guitton <i>et al.</i> (1986)
	<i>Cavia tschudii</i>	Peru	Ewing (1924)
	* Odonata	Colombia	Ewing (1924)
<i>G. parasetosus</i>	<i>Proechimys longicaudatus</i>	Brazil	Werneck (1935, 1948)
<i>G. parvus</i>	<i>Ctenomys colburni</i> <sup>5</sup>	Argentina	Ewing (1924)
	<i>Ctenomys australis</i>	Argentina	Cicchino and Castro (1994)
	<i>Ctenomys azarae</i>	Argentina	Cicchino <i>et al.</i> (2000)
	<i>Ctenomys chasiquensis</i>	Argentina	Cicchino and Castro (1998a)
	<i>Ctenomys haigi</i>	Argentina	Cicchino (1978); Cicchino and Castro (1994)
	<i>Ctenomys magellanicus</i>	Chile	Werneck (1936)
	<i>Ctenomys maulinus</i>	Chile	Gonzales-Acuña <i>et al.</i> (2005)
	<i>Ctenomys mendocinus</i>	Argentina	Cicchino (1978); Cicchino and Castro (1994)
	<i>Ctenomys opimus</i>	Argentina	Cicchino and Castro (1994); Cicchino <i>et al.</i> (2000)
	<i>Ctenomys porteousi</i>	Argentina	Cicchino and Castro (1994)
	<i>Ctenomys sericeus</i>	Argentina	Ewing (1924); Werneck (1936); Emerson and Price (1981)
	<i>Ctenomys talarum</i>	Argentina	Cicchino (1978); Cicchino and Castro (1994)
<i>G. persetosus</i>	<i>Trinomys albispinus</i>	Brazil	Cicchino and Castro (1990)
<i>G. ribeiroi</i>	<i>Kunsia tomentosus</i> <sup>6</sup>	Brazil	Werneck (1935b)
<i>G. scalaris</i>	<i>Thrichomys a. apereoides</i>	Brazil	Werneck (1948)
	<i>Thrichomys a. laurenteus</i>	Brazil	Werneck (1942, 1948)
<i>G. setifer</i>	<i>Hoplomys gymnurus</i>	Ecuador	Ewing (1924)
<i>G. setosus</i>	<i>Proechimys brevicauda</i>	Bolivia	Neumann (1912a)
		Colombia	Werneck (1936a)
<i>G. thompsoni</i>	<i>Isothrix bistrata</i> <sup>1</sup>	Brazil	Werneck (1935b)
		Bolivia	Werneck (1935b)
		Venezuela	Emerson and Price (1975)
<i>G. travassosi</i>	<i>Callistomys pictus</i> <sup>1</sup>	Brazil	Werneck (1948)
<i>G. wernecki</i>	<i>Proechimys guarae</i>	Venezuela	Emerson and Price (1975)

<sup>1</sup> Echimyidae; <sup>2</sup> Octodontidae; <sup>3</sup> Caviidae; <sup>4</sup> Abrocomidae; <sup>5</sup> Ctenomyidae; <sup>6</sup> Cricetidae; \*this wrong host is retained in the list because of its particular geographic distribution; (?) probable host.

(= *Thrichomys a. laurenteus*). Typology: Holotype male, 'allotype' female, three male, and three female paratypes held by FIOC. Two pairs of paratypes were donated to BMNH (former GHE Hopkins Collection)

Werneck 1948: 69 (citation). Hopkins and Clay 1952: 161 (checklist). Emerson and Price 1981: 44 (host-parasite checklist). Cicchino and Castro 1990: 322 (checklist of *Gyropus* species on Echimyidae). Cardoso-Almeida *et al.* 2003: 235 (list of type material in Instituto Oswaldo Cruz). Price *et al.* 2003: 77 (checklist).

*Eogyropus scalaris*, Eichler 1952: 76 (replacement of genus).

Distribution. BRAZIL (Bahia).

Hosts. *Thrichomys a. apereoides*; *T. a. laurenteus* (Echimyidae).

### ***Gyropus setifer* (Ewing, 1924)**

*Tetragyropus setifer* Ewing 1924: 22, fig. 10 (tenaculum femoral III, ventral view). Type locality: Ecuador, San Javier. Type host: *Hopломys gymnurus*. Typology: Holotype female held by USNM.

Werneck 1934b: 281 (citation).

*Gyropus setifer*, Werneck 1936a: 427 (citation). Werneck 1948: 55 (redescription of female and male description), fig. 26 (female habitus, dorso-ventral view), fig. 27 (male habitus, dorso-ventral view), fig. 28 (female head, dorso-ventral view), fig. 29 (female terminalia, ventral view), fig. 30 (male genitalia, dorsal view), fig. 31 (detail of the genital sclerite, dorsal view), fig. 32 (detail of the mesomeral plate). Emerson 1966: 269 (checklist of Panama species and geographical distribution). Méndez 1967: 556, fig. 3 (male genitalia, dorsal view). Hopkins and Clay 1952: 161 (checklist). Emerson and Price 1981: 44 (host-parasite checklist). Price 1987: 216, fig. 22.4 (tibia and tarsus of posterior leg, from an immature form), fig. 22.19 (first nymphal stage habitus, dorso-ventral view). Cicchino and Castro 1990: 322 (checklist of *Gyropus* species on Echimyidae). Price *et al.* 2003: 77 (checklist).

Distribution. ECUADOR (Quito).

Hosts. *Hopломys gymnurus*, <sup>+</sup>*Proechimys semispinosus* (Echimyidae).

**Remarks.** The record from *P. semispinosus* needs further investigation, as pointed out by Werneck (1948: 56).

This doubtful record, although rejected by Hopkins and Clay (1952: 162), has been accepted in subsequent checklists (Emerson and Price 1981: 44; Price *et al.* 2003: 77, 399).

### ***Gyropus setosus* Neumann, 1912a**

*Gyropus setosus* Neumann 1912a: 372, fig. 18 (female habitus, dorsal view), fig. 19 (female habitus, ventral view, legs omitted). Type locality: Bolivia, Charuplaya. Type host: *Proechimys securus* (= *Proechimys brevicauda* (Gunther)). Typology: one male and four female syntypes (see Neumann 1912a: 375) held by ENVT.

Harrison 1916: 32 (checklist). Werneck 1936a: 427 (redescription), fig. 46 (female habitus, dorso-ventral view), fig. 47 (male habitus, dorso-ventral view), fig. 48 (female head, dorso-ventral view), fig. 49 (sternal plates), fig. 50 (female terminalia, ventral view), fig. 51 (male genitalia, dorsal view). Werneck 1948: 54 (citation). Hopkins and Clay 1952: 161 (checklist). Emerson and Price 1981: 43 (host-parasite checklist). Cicchino and Castro 1990: 322 (checklist of *Gyropus* species on Echimyidae). Price *et al.* 2003: 77 (checklist).

*Allogyropus setosus*, Ewing 1924: 20 (replacement of genus, key to *Allogyropus* species).

*Tetragyropus setosus*, Werneck 1934a: 281 (replacement of genus, citation).

Distribution. BOLIVIA (Charuplaya).

Host. *Proechimys brevicauda* (Echimyidae).

### ***Gyropus thompsoni* Werneck, 1935a**

*Gyropus thompsoni* Werneck 1935a: 597 (brief description). Type locality: Brazil, Rondônia, Rio Manoel Correia, Bacia do Rio São Miguel. Type host: *Isothrix bistrriata* Wagner. Typology: Holotype female, 'allotype' male, four male, seven female, and six nymphal paratypes held by FIOC. One male and one female paratype were donated to BMNH.

Werneck 1935b: 420 (full description), fig. 7 (female habitus, dorso-ventral view), fig. 8 (male habitus, dorso-ventral view), fig. 9 (female head, dorso-ventral view) fig. 10 (female sternal plates), fig. 11 (female terminalia, ventral view), fig. 12 (male genitalia, dorsal view), fig. 13 (exposed male genitalia, dorsal view). Werneck 1936a: 431 (citation and geographic record). Werneck, 1948: 61 (notes on male genitalia), fig. 46 (male genitalia, dorso-ventral view), fig. 47 (detail of the genital sclerite). Hopkins and Clay 1952: 161 (checklist). Emerson and Price 1975: 4 (key to Venezuelan species), 31 (geographical record, infestation data), fig. 79 (female habitus, dorso-ventral view), fig. 80 (male habitus, dorso-ventral view), fig. 81 (female terminalia, ventral view), fig. 82 (male genitalia and detail of the genital sclerite, dorsal view). Emerson and Price 1981: 44 (host-parasite checklist). Cicchino and Castro 1990: 322 (checklist of *Gyropus* species on Echimyidae). Cardoso-de-Almeida *et al.* 2003: 235 (list of type material in Instituto Oswaldo Cruz). Price *et al.* 2003: 77 (checklist).

Distribution. BOLIVIA (no data), BRAZIL (Rondônia), VENEZUELA (Amazonas).

Host. *Isothrix bistrriata* (Echimyidae).

### ***Gyropus travassosi* Werneck, 1948**

*Gyropus travassosi* Werneck 1948: 58, fig. 36 (female habitus, dorso-ventral view), fig. 37 (male habitus, dorso-ventral view), fig. 38 (female terminalia, ventral view), fig. 39 (male genitalia, dorsal view), fig. 40 (articulation of endomera and basal plate, dorsal view), fig. 41 (detail of the genital sclerite, dorsal view), fig. 42 (detail of the mesomerall plate). Type locality: Brazil, Bahia, Ilhéus, Fazenda Almada. Type host: *Isothrix pictus* (= *Callistomys pictus* (Pictet)). Typology: Holotype male, 'allotype' female, two female, and four male paratypes held by FIOC. There are paratypes of both sexes in alcohol, vial 257 in support 26, at FIOC. Two pairs of paratypes were donated to BMNH (former GHE Hopkins Collection).

Hopkins and Clay 1952: 161 (checklist). Emerson and Price 1981: 44 (host-parasite checklist). Cicchino and Castro 1990: 322 (checklist of *Gyropus* species on Echimyidae). Cardoso-de-Almeida *et al.* 2003: 235 (list of type material in Instituto Oswaldo Cruz). Price *et al.* 2003: 77 (checklist).

Distribution. BRAZIL (Bahia).

Host. *Callistomys pictus* (Echimyidae).

### ***Gyropus wernecki* Emerson and Price, 1975**

*Gyropus wernecki* Emerson and Price 1975: 4 (key to Venezuelan species), 31 (description and infestation data), fig. 75 (female habitus, dorso-ventral view and detail of the antenna), fig. 76 (male habitus, dorso-ventral view), fig. 77 (female terminalia, ventral view), fig. 78 (male genitalia, dorsal view). Type locality: Venezuela, Trujillo, Santa Apolônia. Type host: *Proechimys semispinosus*. Holotype male, 'allotype' female, and several paratypes held by USNM. There are paratypes held by MBUC (see Emerson and Price 1975: 1), and we were able to find two female paratypes at MZSP, four female paratypes at FMNH, one male and one female paratype at PIPeR, three males and three females paratypes at EMEC, and one male and one female paratype at BMNH.



Emerson and Price 1981: 43, 44 (host-parasite checklist). Emerson and Price 1985: 248, figs. 6.5 A (female habitus, dorso-ventral view redrawn from Emerson and Price (1975), fig. 75), 6.5 B (male habitus, dorso-ventral view redrawn from Emerson and Price (1975), fig. 76). Cicchino and Castro 1990: 322 (checklist of *Gyropus* species on Echimyidae). Price *et al.* 2003: 29, fig. 31 (female habitus, dorso-ventral view and male genitalia, dorsal view both redrawn from Emerson and Price (1975) figs. 75 and 78), 77 (checklist). Distribution. VENEZUELA (Apure, Barinas, Carabobo, Falcón, Lara, Monagas, Sucre, Trujillo, Yaracuy, Zulia).

Hosts. *Proechimys semispinosus*<sup>+</sup>, *P. canicollis*<sup>+</sup>, *P. guyannensis*<sup>+</sup>, *Proechimys guairae* Thomas (Echimyidae).

**Remarks.** In the original description, Emerson and Price (1975: 31) cited *Proechimys semispinosus* from Santa Apolonia in Trujillo (Venezuela) as the type host for *G. wernecki*, and designated paratypes collected on two other host species from La Paz in Zulia (*Proechimys canicollis*), Capibara in Amazonas and El Manaco in Bolívar (*Proechimys guyannensis*). The geographic range of *Proechimys semispinosus* (Gardner 1983: 142; Gardner and Emmon 1984: 23) does not include localities presented by Emerson and Price (1975), and later published by Handley (1976) for Venezuelan rodents. It is likely that the rodent species found in almost all localities indicated by Emerson and Price (1975) is *Proechimys guairae* instead of *Proechimys semispinosus*. On the other hand, the individuals identified as *Proechimys canicollis* and *Proechimys guyannensis* could occur in the localities cited in Venezuela (Patton 1987). We think it prudent to consider the type host, with its corrected name, as the only valid host species for *Gyropus wernecki*. It is important to stress out that: (1) there are not two species of *Gyropus* on the same *Proechimys* host species; (2) there is a species of *Gyropus* (*G. emersoni*), morphologically distinct from *G. wernecki*, on *P. semispinosus* in its recognized geographic area; and (3) *Proechimys semispinosus* does not occur in the type locality of *Gyropus wernecki*. Based on these aspects, it is plausible that the correct name for the type host of *Gyropus wernecki* is *P. guairae*. It is possible that *P. canicollis* and *P. guyannensis* could harbor undescribed species of *Gyropus*, which were equivocally considered as the same one as that found on *P. guairae* by Emerson and Price (1975). The detailed analysis of the male genitalia as well as the internal genital sclerites in females on samples from these two host species would test this hypothesis, since these are the main characters used to distinguish *Gyropus* spp. found on Amazonian *Proechimys* (M.P. Valim, obs. pers.).

## Discussion

The host genera *Proechimys* and *Hoplomys* constitute a monophyletic group (Lara *et al.* 1996). With the exception of *Hoplomys* (see remarks in *G. mesomaricanus*) which is parasitized by *G. setifer* and *G. mesomae-ricanus*, no *Proechimys* hosts two species of *Gyropus*. On the other hand, *G. parvus* is the louse species that infests the greatest number of hosts (12), followed by *G. ovalis* (5). The latter species, despite its greater geographical distribution, is restricted to hosts of the genus *Cavia* (Caviidae). Other 19 species of *Gyropus* are found exclusively on one species of host, though many potential host species from polytypic genera (e.g., *Diplomys*, *Isothrix*) have not been searched for lice. This high degree of specificity might reflect a coevolutionary process between chewing lice and their mammal hosts. According to Brooks (1979), coevolution comprises the phenomena of co-accommodation and co-speciation, with the former referring to the mutual adaptation between parasites species and its hosts, including host specificity. On other hand, co-speciation involves cladogenesis of parasites as a result of host cladogenesis. Since that more than one host harbors the same lice species for *G. distinctus*, *G. elongatus*, *G. lenti lenti*, *G. ovalis*, *G. parvus*, these associations might be categorized as broad co-accommodation, independently of co-speciation (Table 1). Where more than one lice

species infests the same host species, as observed for *G. cercomydis*, *G. lenti lenti*, *G. scalaris* on *T. a. laurentus* or *G. freitasi* and *G. lenti lenti* on *T. inermis*, represents an extremely narrow co-accommodation. Consequently, some of the 19 other associations in which each host species harbored only one lice species would represent co-speciation process.

Among the 42 host species parasitized by *Gyropus*, 18 (42,9%) are Echimyidae, 12 (28,6%) Ctenomyidae. Another 12 (28,6%) are represented by Caviidae, Octodontidae, Cricetidae and Abrocomidae. *Trinomys* and *Thrichomys* both harbor five different species of *Gyropus*; *Proechimys* spp. are infested by four different lice. Twelve species of *Ctenomys* are parasitized exclusively by only one species, *Gyropus parvus*.

We considered 66 locality records in several countries (see text above) for species of *Gyropus*. Chile had the greatest number of records (21.2%) followed by Brazil with 12 records (18.1%). However, for Chile, where there are two of three species which are endemic, in Brazil, 12 of 17 species (70.6%) are endemic. Brazilian *Gyropus* species were recorded in 11 different States, especially in Bahia and Espírito Santo, which are mainly forested areas. Since more than 50% of the species collected in these regions are endemics, these geographic areas might be important targets for future taxonomic surveys.

Many new species of *Gyropus* are undoubtedly waiting to be discovered and described. *Gyropus* spp. should be studied under a modern systematic view, with classifiable and standardized morphological characters. Additionally, fresh material should be collected and provided for molecular analysis as well as for classical taxonomic treatment. To contribute to this goal, after three major world checklists (Harrison 1916; Hopkins and Clay 1952; Price *et al.* 2003), we present an up dated list of the current species in *Gyropus* with its valid and corrected host names (Table 1). In the future, a phylogenetic study of these species would allow the rearrangement of species in nearest natural groups. We are doing a taxonomic review with a cladistic analysis based on morphology to better organize these 27 currently recognized species.

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