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Results of the Alcoa Foundation-Suriname Expeditions. XIV. Mammals of Brownsberg Nature Park, Suriname

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RESULTS OF THE ALCOA FOUNDATION-SURINAME EXPEDITIONS. XIV.
MAMMALS OF BROWNSBERG NATURE PARK, SURINAME

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ABSTRACT

An inventory of mammals in the vicinity of Brownsberg Nature Park, Suriname, incorporated a number of different sampling methods including examining museum voucher specimens, an animal-rescue operation, transect surveys, camera photo-traps, and interviews with local inhabitants. We document a total of 125 mammal species present in the Park. These include ten opossums, five pilosans, four armadillos, 58 bats, eight monkeys, 13 carnivores, one tapir, four artiodactyls, and 22 rodents. Nine of these species are reported for the first time from Suriname: one mouse opossum (*Marmosops pinheiroi*); one naked-backed moustached bat (*Pteronotus gymnonotus*); four fruit-eating bats (*Artibeus bogotensis*, *A. gnomus*, *A. obscurus*, and *A. planirostris*); two evening bats (*Eptesicus chiriquinus* and *Myotis riparius*); and one arboreal rice rat (*Oecomys auyantepui*). There are 191 indigenous non-marine mammals presently known from Suriname.

KEY WORDS: biodiversity, inventory, Mammalia, Operation Gwamba, new country records, Suriname, transect survey

INTRODUCTION

From a biological perspective, ascertaining the species diversity of an area is important for several reasons. It forms the baseline data for monitoring faunal composition over time, estimating relative abundance, and comparing geographic similarity over regional landscapes. In turn, these measures of community structure have implications for sustainable management, including the conservation of biodiversity by identifying species vulnerable to extirpation, implementation of a national protected areas system, establishment of a research base for detailed study of ecological interactions, promotion of public education, and training of local wildlife experts. For the Guianas, mammal inventories at Iwokrama Forest in Guyana (Lim et al. 1999; Lim and Engstrom 2001a; 2001b; 2005), and at Nouragues (Bongers et al. 2001) and Paracou (Simmons and Voss 1998; Voss et al. 2001) in French Guiana, are examples of well-surveyed sites that are contributing to our understanding of Neotropical ecosystems. Although Suriname has

demarkated a comprehensive system of protected areas, it has lagged behind its neighboring countries in terms of biodiversity research and lacks a comparably studied field locality.

Brownsberg Nature Park is a good candidate for the establishment of a long-term study site in Suriname. It is accessible by road and located approximately 100 km south of the capital city of Paramaribo. Basic infrastructure such as lodgings, permanent park staff, and administrative support is established. To stimulate further research and facilitate the implementation of future management policies, we present a summary of the mammalian fauna found at Brownsberg and the surrounding area including, where available, information on local abundance, reproductive data, external and cranial measurements, identification features, distribution, and taxonomic notes. These baseline data were compiled from six main sources. (1) As the former colony of Dutch Guiana (independence in 1975), specimens resulting from early sci-

entific exploration of Suriname were deposited primarily at the Rijksmuseum van Natuurlijke Historie (RMNH) in Leiden, including miscellaneous collections from the Brownsberg area, and summarized in Husson (1978). (2) In 1964–1965, Walsh and Gannon (1967) compiled a list of animals rescued (Operation Gwamba) during the creation of Brokopondo Lake east of Brownsberg after the completion of Afobakka Dam for a hydroelectric project. (3) The Carnegie Museum of Natural History (CM) in Pittsburgh conducted fieldwork from 1977–1981 in Suriname for a research project on the mammals of the country and collected voucher specimens at Brownsberg on two occasions (Genoways and Williams 1979; Williams and Genoways 1980; Genoways et al. 1981; Genoways and McLaren 2003). (4) An ecological monitoring program was established at Brownsberg Nature Park in 2000, which included transect walking surveys of mammals larger than 1 kg and the establishment of camera photo-traps. The first 19 months of data from this program were analyzed by Fitzgerald (2003). (5) The Royal Ontario Museum (ROM) in Toronto conducted a small mammal survey at Brownsberg in April–May 2002, reported herein. (6) Interviews were made with eight local wildlife experts and hunters during the ROM survey to ascertain species of mammals commonly encountered in the surrounding forest.

MATERIALS AND METHODS

Study Site

Brownsberg Nature Park was created in 1970 and is the only national park in Suriname (Fitzgerald et al. 2002). It is managed by the Foundation for Nature Conservation in Suriname, STINASU (Stichting voor Natuurbehoud Suriname). At approximately 8,000 hectares, the Park incorporates the northern portion of the lateritic Brownsberg plateau at an elevation of 500 m. There is, however, a bauxite mining concession to the Suriname Aluminium Company (SURALCO) that exists within the Park boundaries, but is presently inactive. The Brownsberg mountain range forms the watershed separating the Saramacca River to the west and the Suriname River to the east. As part of a hydroelectric project, Afobakka Dam was constructed on the Suriname River about 20 km east of the northern most point of the Brownsberg plateau. It was completed in early 1964 and the subsequent flooding created the approximately 1,500 km² Brokopondo Lake in the eastern lowlands adjacent to Brownsberg Nature Park (Fig. 1).

In general, the habitat at Brownsberg is seasonal evergreen (mesophytic) forest; a more detailed habitat classification is being developed by STINASU. Several microhabitat forest types have been preliminarily identified by Fitzgerald et al. (2002) and are briefly described as follows: **1**, High Forest has a multi-layered relatively continuous canopy to 40 m in height on well-drained soil with high tree diversity; **2**, High Palm-dominated Forest is sim-

ilar to High Forest but has an increased density of palms in the understory; **3**, High Marsh Forest also is similar to High Forest except that it is confined to seasonally inundated areas associated with water courses on poorly drained soils; **4**, High Closed Forest is similar to High Forest but has a dense understory composed of plants other than palms; **5**, Dry Forest has a canopy to 40 m; however, the trees are relatively thinner with varying degrees of seasonal defoliation and are on dry, well-drained soils; **6**, Mountain Savanna Forest has a discontinuous canopy that is below 30 m in height with relatively thinner trees and a dense understory on exceedingly well-drained soils of the plateau; **7**, Moss-covered Mountain Savanna Forest is similar to Mountain Savanna Forest except that it has high humidity with an abundance of moss and is restricted to the eastern edge of the plateau; **8**, Lowland Forest is similar to Mountain Savanna Forest but with a lower canopy (< 20 m) and higher density of lianas on exceedingly well-drained lowland soils; **9**, Liana Forest is dominated by lianas and vines below 15 m in height with tall trees sparsely distributed and numerous tree falls situated on dry, shallow soils; **10**, Swamp Forest is composed of primarily stilt-rooted trees between 10–20 m in height in poorly-drained inundated areas; and **11**, Secondary Forest is found in disturbed areas near roads and mines with the canopy reaching 25 m and with a dense understory.

Data Sources

Specimens examined by Husson (1978) from the Brownsberg area were included in our checklist (Appendix 1) but we were unable to examine this material to confirm the identifications with current taxonomy. These specimens were collected prior to 1973 and are deposited primarily in the Rijksmuseum van Natuurlijke Historie (RMNH) in Leiden with some at the Zoölogische Museum Amsterdam (ZMA). The collections also include specimens from localities in the lowlands situated east of the Brownsberg plateau that were flooded in 1964 when Afobakka Dam was completed on the Suriname River. Where necessary, taxonomic decisions were based on descriptions and measurements provided in Husson (1978).

Operation Gwamba rescued and relocated to surrounding non-flooded areas in excess of 8,000 mammals over an 18-month period from mid-1964 to the end of 1965 (Appendix 1). It concentrated on medium- to large-sized species, but over 100 spiny rats also were saved. A species list with numbers rescued was presented in Walsh and Gannon (1967); however, no voucher specimens were collected so confirmations of identifications are not possible. With experience, most of the larger mammals can be confidently identified; Husson (1978) noted a few discrepancies in the list of Walsh and Gannon (1967).

The Carnegie Museum of Natural History (CM) conducted small mammal fieldwork in Brownsberg Nature

Park on two occasions: S.L. Williams and M.H. de la Fuente collected from 7–11 July 1977; and S.L. Williams, J.A. Groen, H.H. Genoways, R.L. Honeycutt, L. Roberts, and C.J. Phillips collected from 19–24 September 1979. Noteworthy taxonomic and distributional records for Suriname from Brownsberg were previously reported (Genoways and Williams 1979; Williams and Genoways 1980; Genoways et al. 1981). Their complete collection from Brownsberg (Appendix 1) is summarized herein with external (Appendix 2) and cranial measurements (Appendix 3). Descriptions of collecting sites were recently updated by Genoways and McLaren (2003). Detailed study of forest types had not yet been done at the time of the original collections so the habitat information was generalized to mature or secondary forest and does not conform to the descriptions or habitat types presented by Fitzgerald et al. (2002).

A wildlife monitoring program was established at Brownsberg in November 2000 and continued for 19 months to May 2002. The primary method for observing medium- to large-bodied mammals was a diurnal transect walking survey (Table 1) and is described in detail by Fitzgerald (2003). This technique was complemented with information from remote camera photo-trapping, which also documented nocturnal species (Table 2).

From 10–22 April 2002, a collaborative small mammal survey was coordinated by the Royal Ontario Museum (ROM) with the primary field personnel composed of M.D. Engstrom, B.K. Lim, S.L. Peters, F.M. Catzeflis, M. Djosetro, and S. Brandon. Supplemental collecting was continued by a reduced crew of F.M. Catzeflis and S. Brandon for ten days from 24 April to 4 May, and K.A. Fitzgerald and S. Mitro for four days from 6–12 May 2002. This collection (Appendix 1) is summarized in the species accounts with external (Appendix 2) and cranial measurements (Appendix 3). In addition, F.M. Catzeflis (Université de Montpellier II) conducted interviews with eight local inhabitants and hunters to assess game species and other mammals commonly encountered in the surrounding Brownsberg forest (Table 2). The collecting localities within Brownsberg Nature Park sampled during the CM and ROM surveys are listed in Appendix 4 with coordinates (latitude and longitude), elevation, and habitat type when known.

Field Methodology

Detailed methods are reported herein for the April 2002 small mammal survey by the ROM, as the other data sources have been previously documented elsewhere. The understory of the forest was sampled for bats with standard mist nets 2.6 m in height and 12 m or 6 m in length. The forest canopy and clearings at the forest edge were surveyed with a larger net measuring 10 m by 30 m that was set up to 20 m above the ground. On average, 11 long and eight short nets were typically opened at dusk for five

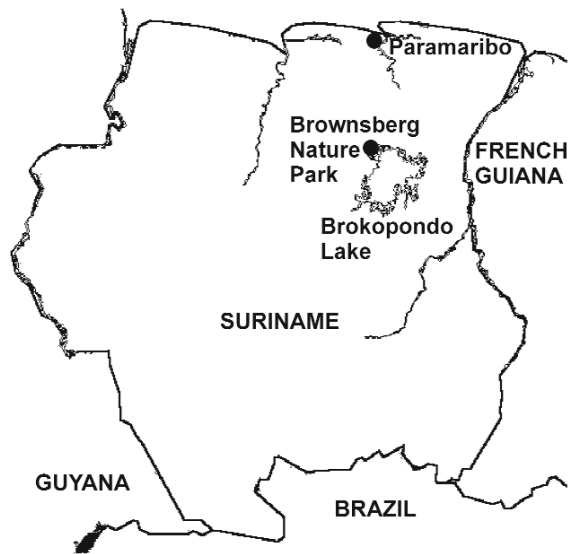


Fig. 1.—Brownsberg Nature Park is located on the northwestern edge of Brokopondo Lake and approximately 100 km south of Paramaribo, the capital of Suriname.

hours from 1830–2330 h and checked at approximately 30-minute intervals. Bats not kept as part of the representative collection were released unharmed at the point of capture after recording species identifications, reproductive data, and forearm length. Non-volant small mammals were caught with folding aluminum Sherman live-traps, folding wire Tomahawk live-traps, and folding wire Besancon Techniques Services (BTS) live-traps baited with seeds or fruit, and set on the ground and on low vines and branches. Most days had 100 Sherman traps, 34 BTS traps, and four Tomahawk traps set. Ten 20-liter bucket pitfall traps were set into the ground at 10-m intervals with a plastic drift fence as described by Voss et al. (2001), and as another method to target terrestrial foraging species.

The trails within Brownsberg Nature Park and collecting localities sampled during the 2002 ROM survey are mapped in Fig. 2. Our main efforts were concentrated in two areas (Rondwandeling and Jeep Trails) with less emphasis on other trails and sites. The loop trail, Rondwandeling, and clearings around the Headquarters area were sampled on a daily basis from 10–22 April. During this period, an average of seven long and five short understory nets were set and progressively moved to eventually sample along the complete Rondwandeling circuit trail and in the vicinity of the Headquarters. A canopy net was set in the Headquarters clearing at two locations. Most days had 40 Sherman and four Tomahawk traps set along the northeastern portion of the Rondwandeling Trail. The Jeep Trail began at the junction with Mazaroni Road, 2.6 km southwest of the Headquarters, and proceeded in a southeast direction towards Brokopondo Lake. The prima-

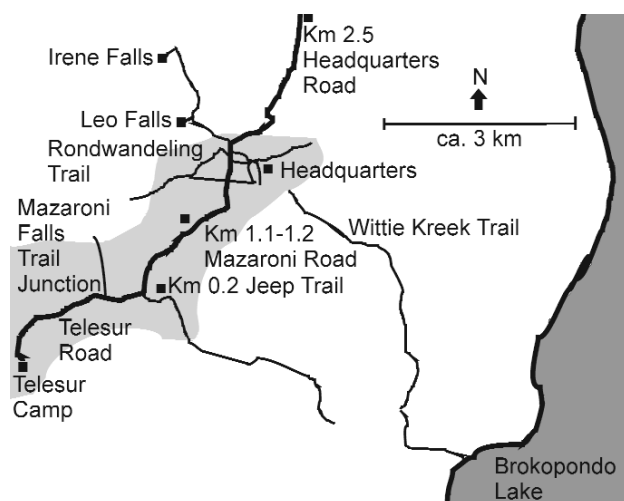


Fig. 2.—Map of the trail system at Brownsberg Nature Park in Suriname and general collecting localities from the Royal Ontario Museum small mammal survey in 2002. Black squares are identifiable single site collecting localities. A large proportion of Rondwandelings, Wittie Kreek, and Jeep Trails were extensively sampled with traps and nets during the survey. The approximate 450 m elevational contour of the plateau is light-shaded and Brokopondo Lake is dark-shaded. Map is not to scale.

rily moss-covered mountain savanna forest in the vicinity of Jeep Trail was sampled from 10–20 April with an average of seven long and five short understory nets, one canopy net set off of Mazaroni Road near the Jeep Trail junction, 60 Sherman traps, 20 BTS traps, and the ten-bucket pitfall trapline, which was set at Km 0.2 on the north side of the trail. Fourteen BTS traps also were set at Km 1.1–1.2 on the west side of Mazaroni Road in mountain savanna forest from 19–21 April. An old mine shaft in secondary forest near the trail to Leo Falls, and approximately 2 km northwest of the Headquarters, was entered and surveyed for bats on 18 April. Telesur Camp, a communications facility located in secondary forest at the end of the 1.5 km long Telesur Road, which began at Mazaroni Road near the junction with Mazaroni Falls Trail, was surveyed for bats on 20 April with three long and two short nets. Irene Falls, at 240 m elevation in high marsh forest, was a further 1.3 km northwest of the Leo Falls Trail junction and was surveyed for bats with four long and three short understory nets and one canopy net on 21 April. Wittie Kreek Trail began near the Headquarters and immediately descended steeply from the plateau in a southeast direction towards Brokopondo Lake. Seven long and six short nets were set in the vicinity of Km 1.5 along the trail at 400 m elevation in high palm-dominated forest on 20 April. On 21 April, the seven long and six short nets were moved to Km 2.4 at 300 m elevation in high palm-dominated forest. Km 3.6 at 150 m elevation was high marsh forest and was surveyed for bats on 22 April with two long and one short net.

Individuals kept as voucher specimens were typically prepared as skins, skulls, and skeletons or alcoholics initially fixed in formalin, and deposited with frozen tissues

at the Royal Ontario Museum. Standard external measurements recorded in the field to the nearest mm with a ruler included total length, length of tail, length of hindfoot (including claws), length of ear, and weight (in g). Mean values and ranges are summarized for each species in Appendix 2. For bats, length of forearm and length of tibia (for *Carollia* spp.) also were taken.

Analyses

After cleaning of cranial material, we recorded standard skull measurements with digital calipers within 0.1 mm, as described by Genoways and Williams (1979) including: greatest length of skull; condylobasal length; breadth across zygomatic arches; breadth across mastoid processes; postorbital breadth; length of maxillary tooth row; and breadth across upper molars. See Appendix 3 for mean values and ranges.

We analyzed faunal similarity for Neotropical mammal sites using Jaccard's coefficient and clustered by unweighted pair group method using arithmetic averages (UPGMA) as implemented in NTSYS-pc version 1.80 (Rohlf 1993). The clustering results are graphically presented as progressively inclusive groups on a map of the 13 localities, which have the most complete mammal inventories in the Neotropics (Fig. 3). The mammal checklist for Brownsberg was added to the data matrix of species per locality as derived from Simmons and Voss (1998) for bats (with modifications by Lim and Engstrom 2001), and from Voss et al. (2001) for non-volant mammals (with modifications by Lim and Engstrom 2005). The other 12 sites included Paracou and Arataye (Nouragues) in French Guiana; Iwokrama Forest in Guyana; Imataca Forest Reserve and Cunucunuma in Venezuela; Manaus and Rio Xingu in Brazil; Balta, Manu Biosphere Reserve, and Cuzco Amazonico in Peru; Barro Colorado Island in Panama; and La Selva Biological Reserve in Costa Rica.

Species Accounts

Data presented (when available) and summarized in the individual species accounts include collecting localities and voucher material at the Carnegie Museum of Natural History (CM) and Royal Ontario Museum (ROM); karyotypic data include diploid number ($2n$) and fundamental number (FN) as reported in Honeycutt et al. (1980); reproductive data include testes (T) length by width (in mm) or crown-rump (CR) measurement (in mm) of embryos; age (adults unless otherwise noted); habitat information related to site of capture; taxonomic notes; noteworthy distributional information for Suriname; field identification characters including forearm (FA) length (in mm) for bats and hindfoot (HF) length (in mm) for opossums and rodents. Shorter accounts are given for unverified specimens in the Rijksmuseum van Natuurlijke Historie (RMNH) as report-

ed by Husson (1978); numbers of mammals rescued during Operation Gwamba (Walsh and Gannon 1967); habitat affinity based on sightings on the walking transects (Fitzgerald 2003); photo-trapping records; and recognition by local interviewees.

In general, the taxonomy follows Wilson and Reeder (1993) with nomenclatural updates as implemented in Simmons and Voss (1998) for bats and Voss et al. (2001) for non-volant mammals based on their long-term study at Paracou, French Guiana. Exceptions include the separation of *Didelphis imperfecta* from *D. albiventris* (Ventura et al. 2002), the systematic revision of *Micronycteris* (Wetterer et al. 2000), the generic application of *Lophostoma* for *brasiliense*, *carrikeri*, *schulzi*, and *silvicolum* as opposed to *Tonatia* (Lee et al. 2002), the recognition of *Artibeus planirostris* as distinct from *A. jamaicensis* (Lim 1997; Lim et al. 2004), the separation of *A. bogotensis* from *A. glaucus* (Lim et al., in preparation a), the removal of *Alouatta macconnelli* from *A. seniculus* (Groves 2001), the taxonomy of the *Oryzomys* "capito" group (Musser et al. 1998), and the use of *Mesomys hispidus* for the spiny tree rat (Orlando et al. 2002).

RESULTS

The historical collections of the Rijksmuseum van Natuurlijke Historie and Zoölogische Museum Amsterdam documented 35 species of mammals with 224 specimens from the Brownsberg area (Husson 1978). This included two species of opossum, three pilosans, one armadillo, nine bats, four monkeys, five ungulates, and 11 rodents, but no carnivores (Appendix 1). These specimens were not part of a concerted inventory of the area, instead they were from miscellaneous collections from scattered localities in the vicinity of Brownsberg. Eight of the 34 species (24%) documented by Husson (1978) from Brownsberg were not recorded by any of the other six surveys we summarize in our study.

Operation Gwamba relocated 8,253 mammals representing 31 species rescued after the completion of Afobakka Dam and the subsequent flooding of the Suriname River in the lowlands east of the Brownsberg plateau (Walsh and Gannon 1967). Although not rescued, the common vampire bat (*Desmodus rotundus*) was noted on several occasions to have fed on dogs and humans in camp. All species saved were mammals larger than 100 g: four species of opossums, four pilosans, three armadillos, four monkeys, five carnivores, four ungulates, and seven rodents (Appendix 1). None were small mammals such as bats, smaller rodents (except *Echimyus chrysurus*), or the smaller species of opossums, which typically comprise about 80% of the total mammalian biodiversity in Neotropical lowland rainforest (e.g., Voss and Emmons 1996; Engstrom and Lim 2002). Only the woolly opossum and vampire bat (6% of the species) were documented solely by this method.

The small mammal surveys by the Carnegie Museum



Fig. 3.—Faunal similarity groupings for 13 Neotropical sites based on an unweighted pair group method with arithmetic mean (UPGMA) clustering of Jaccard's coefficient for presence or absence of mammal species. (1) Paracou, French Guiana; (2) Arataye, French Guiana; (3) Brownsberg Nature Park, Suriname; (4) Iwokrama Forest, Guyana; (5) Imataca, Venezuela; (6) Manaus, Brazil; (7) Cunucunuma, Venezuela; (8) Rio Xingu, Brazil; (9) Balta, Peru; (10) Manu, Peru; (11) Cuzco Amazonico, Peru; (12) Barro Colorado Island; (13) La Selva, Costa Rica. Brownsberg Nature Park in Suriname groups with two localities in French Guiana, then with others from the Guiana Shield, eastern Amazonia, western Amazonia, and finally Central America.

of Natural History collected 41 species and 249 specimens, which were represented by four species of opossums, 31 bats, and six rodents (Appendix 1). These were all small-sized mammals (< 2 kg). No pilosans, armadillos, monkeys, carnivores, or ungulates were represented. Earlier taxonomical and distributional notes were reported in Genoways and Williams, (1979), Williams and Genoways (1980), Genoways et al. (1981). The genera present at Brownsberg were reported in an annotated gazetteer for Suriname (Genoways and McLaren 2003). The Carnegie survey documented six species (15%), one opossum and five bats, not reported by the other survey methods.

The diurnal walking transect surveys, as part of the ecological monitoring program of STINASU, recorded 33 species of mammals during 689 encounters (Fitzgerald 2003). This method focused on larger mammals (>1 kg) and included two species of opossum, four pilosans, two armadillos, eight monkeys, eight carnivores, five ungulates, and four rodents (Appendix 1; Table 2). No small mammals, such as bats or small rodents, were observed. Remote camera photo-trapping documented 19 mammal species, which were represented by three armadillos, six carnivores, two opossum, four ungulates, and four rodents (Appendix 1). The cameras did not record any bats, small rodents, or rabbits. All of the species recorded by the tran-

sect surveys and photo-trapping also were documented by at least one of the other methods, but they were important in that they confirmed the presence of six large species of mammals noted by the interviewees (Table 1).

The small mammal survey by the Royal Ontario Museum documented 63 species by 451 voucher specimens while other records of 14 large species are based on sightings. An additional 464 bats representing five species (*Saccopteryx bilineata*, *Pteronotus parnellii*, *Carollia perspicillata*, *Artibeus planirostris*, and *Sturnira tildae*) were captured and released after examination. The representative collection included five species of opossums, 49 bats, and nine small rodents (Appendix 1). Large mammals observed were the giant armadillo (*Priodontes maximus*), golden-handed tamarin (*Saguinus midas*), red howler monkey (*Alouatta macconnelli*), brown capuchin monkey (*Cebus apella*), wedge-capped capuchin monkey (*Cebus olivaeus*), Guianan saki monkey (*Pithecia pithecia*), squirrel monkey (*Saimiri sciureus*), jaguar (*Panthera onca*), tayra (*Eira barbara*), coatimundi (*Nasua nasua*), red brocket deer (*Mazama americana*), pygmy squirrel (*Sciurillus pusillus*), Guianan squirrel (*Sciurus aestuans*), and red-rumped agouti (*Dasyprocta leporina*). Twenty nine of the species recorded by voucher specimens (three opossums, 21 bats, and five rodents), almost half of the 64, were not documented by any of the other surveys. The wildlife interviews conducted with eight local inhabitants documented 44 species as occurring in the Brownsberg area including five pilosans, four armadillos, eight monkeys, 13 carnivores, five ungulates, and nine rodents (Appendix 1). Five of these (11%) were only reported by the interviewees and were all carnivores including the bush dog (*Speothos venaticus*), little spotted cat (*Leopardus trigrinus*), grison (*Galictis vittata*), river otter (*Lontra longicaudus*), and giant otter (*Pteronura brasiliensis*).

We documented a total of 125 species of mammals from the Brownsberg area based on the six different data sources. The taxonomic composition included ten opossums, five pilosans, four armadillos, 58 bats, eight primates, 13 carnivores, five ungulates, and 22 rodents (Appendix 1). Nine of these species represent the first report from Suriname: one mouse opossum (*Marmosops pinheiroi*); seven bats (*Pteronotus gymnonotus*, *Artibeus bogotensis*, *A. gnomus*, *A. obscurus*, *A. planirostris*, *Eptesicus chiriquinus*, and *Myotis riparius*); and one rat (*Oecomys auyantepui*).

The faunal similarity analysis of Neotropical mammals grouped localities by geographic region (Fig. 3). The mammalian inventory list for Brownsberg was most similar to that of Arataye, which then grouped with Paracou (both sites are in French Guiana). The next major cluster included northern coastal lowland sites of the Guiana Shield (Iwokrama and Imataca). Other localities on the southern (Manaus) and western (Cunucunuma) extremes of the Guiana Shield were grouped as progressively dis-

similar faunas. The non-Guiana Shield but eastern Amazonian site of Rio Xingu clustered next. The western Amazonian localities of Peru grouped Manu and Balta as most similar, followed by Cuzco Amazonico. These sites clustered with eastern Amazonia, of which the Guiana Shield is a subgroup. And finally, the cluster of Central American localities (La Selva and Barro Colorado Island) grouped with the greater Amazonian sites.

SPECIES ACCOUNTS

Order Didelphimorphia

Family Didelphidae (opossums)

Caluromys philander (Linnaeus, 1758)

The only report of the woolly opossum in the general vicinity of Brownsberg Nature Park was during the damming of the Suriname River in the eastern lowlands when 28 individuals were rescued during Operation Gwamba (Walsh and Gannon 1967). This species is almost strictly arboreal (Malcolm 1991; Voss et al. 2001), and failure to detect it in other surveys may reflect lack of concerted focus on trapping in the canopy rather than rarity of the species.

Didelphis imperfecta Mondolfi and Pérez-Hernández, 1984

Voucher material (1).—3 km S, 20 km W Afobakka (CM 52695).

This subadult male (tooth eruption and wear age class 3 of Gardner, 1973) was previously identified as *D. albiventris* during its report as a new country record for Suriname (Genoways et al. 1981). The subspecies (*D. a. imperfecta*) described by Mondolfi and Pérez-Hernández (1984) recently was elevated to species level, with feminine gender to agree with *Didelphis*, based on its morphometric discrimination of relatively smaller size from *D. pernigra* and *D. marsupialis* (Lemos and Cerqueira 2002; Ventura et al. 2002). Our specimen has black ears with white tips and the condylobasal length (79.0 mm), as recorded in Genoways et al. (1981), was near the lower end of the range (73.0–100.8 mm) for the older age classes 4 and 5 of *D. imperfecta* as given in Ventura et al. (2002). Although listed in the text, the table of measurements in Ventura et al. (2002) was missing values for most of the standard cranial characters that were presented in Genoways et al. (1981). This species, as presently known, occurs in both lowland and highland regions and is endemic to the Guiana Shield (Lim et al. 2005).

Didelphis marsupialis Linnaeus, 1758

Voucher material (9).—5 km S, 21.5 km W Afobakka (CM

TABLE 1. Habitat utilization (%) of large mammals observed (group sightings considered as a single contact) during transect surveys at Brownsberg Nature Park, Suriname (Adapted from Fitzgerald 2003). Habitats are described in the Materials and Methods section and abbreviations are: **DF**, dry forest; **HCF**, high closed forest; **HF**, high forest; **HMF**, high marsh forest; **SeF**, secondary forest; **LLF**, lowland forest; **Liana**, liana forest; **MSF**, mountain savanna forest; **HFP**, high palm-dominated forest.

Species	DF	HCF	HF	HMF	SeF	LLF	Liana	MSF	HFP	Total Raw No.
<i>Didelphis marsupialis</i>	0	33.3	66.7	0	0	0	0	0	0	3
<i>Bradypus tridactylus</i>	0	50.0	50.0	0	0	0	0	0	0	2
<i>Choloepus didactylus</i>	0	25.0	25.0	0	50.0	0	0	0	0	4
<i>Cyclopes didactylus</i>	0	0	0	0	0	0	0	0	100	1
<i>Tamandua tetradactyla</i>	0	0	0	0	0	0	0	100	0	4
<i>Dasybus kappleri</i>	0	0	0	0	0	0	0	0	100	1
<i>Dasybus novemcinctus</i>	0	20.0	20.0	0	0	0	0	60.0	0	5
<i>Alouatta macconnelli</i>	3.5	9.6	32.5	0.9	3.5	3.5	1.8	28.9	15.8	114
<i>Ateles paniscus</i>	5.1	5.1	12.8	2.6	12.8	10.3	0	12.8	38.5	39
<i>Cebus apella</i>	0	8.0	34.0	4.0	8.0	0	0	28.0	18.0	50
<i>Cebus olivaceus</i>	0	14.3	28.6	0	0	14.3	0	28.6	14.3	7
<i>Chiropotes satanas</i>	0	17.6	35.3	5.9	0	5.9	5.9	5.9	23.5	17
<i>Pithecia pithecia</i>	0	2.9	48.6	0	0	14.3	0	22.8	11.4	35
<i>Saguinus midas</i>	1.0	19.0	17.1	2.9	3.8	2.9	1.0	37.1	15.2	105
<i>Saimiri sciureus</i>	11.1	11.1	11.1	11.1	22.2	22.2	0	11.1	0	9
<i>Herpailurus yagouaroundi</i>	0	0	50.0	0	0	0	0	50.0	0	2
<i>Leopardus pardalis</i>	0	0	0	25.0	25.0	0	0	50.0	0	4
<i>Leopardus wiedii</i>	0	0	100	0	0	0	0	0	0	1
<i>Panthera onca</i>	0	19.0	14.3	4.8	0	0	0	47.6	14.3	21
<i>Puma concolor</i>	0	12.5	0	12.5	0	0	0	50.0	25.0	8
<i>Eira barbara</i>	0	9.1	27.3	0	9.1	0	0	54.5	0	11
<i>Nasua nasua</i>	0	40.0	0	0	0	0	0	60.0	0	5
<i>Potos flavus</i>	0	0	25.0	0	0	0	0	50.0	25.0	4
<i>Tapirus terrestris</i>	0	19.4	19.4	9.6	0	0	0	48.4	3.2	31
<i>Pecari tajacu</i>	6.7	26.7	6.7	0	0	0	0	46.6	13.3	15
<i>Tayassu pecari</i>	0	0	80.0	20.0	0	0	0	0	0	5
<i>Mazama americana</i>	4.3	13.1	17.4	4.3	13.1	0	0	39.1	8.7	23
<i>Mazama gouazoubira</i>	0	0	33.3	0	6.7	20.0	0	33.3	6.7	15
<i>Hydrochoeris hydrochaeris</i>	0	0	0	0	100	0	0	0	0	2
<i>Dasyprocta leporina</i>	1.9	12.2	16.8	1.9	3.7	0	0	41.1	22.4	107
<i>Myoprocta acouchy</i>	0	17.6	5.9	0	0	0	11.8	41.2	23.5	17
<i>Cuniculus paca</i>	0	18.2	36.4	4.5	18.2	0	0	22.7	0	22

52696); 7 km S, 18.5 km W Afobakka (CM 52697, 52698); 10 km S, 23 km W Afobakka (CM 52699, 52700); Headquarters (ROM 113908, 113974, 113996); Jeep Trail (ROM 113995).

The CM specimens were all adult females ranging from age class 4 to 6 with one individual lactating when captured on 8 July 1977. The ROM specimens include an adult (age class 5 of Gardner 1973) female with nine pouch young each approximately 185 mm in total length captured on 11 April 2002; a subadult (age class 3) female with five pouch young each measuring 112 mm in total length, captured on 12 April 2002; a juvenile (alcoholic specimen with teeth

not visible but younger than previous subadult based on smaller external measurements) male with testes scrotal ($T = 9$ by 4) captured on 13 April 2002; and adult (age class 5) male with scrotal testes ($T = 21$ by 14) captured on 13 April 2002. Our specimens had the characteristic completely black ears of *D. marsupialis* and the subadult was larger in all measurements (except length of ear) than the specimen of *D. imperfecta*, which was the same age class (Appendices 2 and 3). The juvenile (ROM 113995) was caught in a wire-mesh BTS trap set in moss-covered mountain savanna forest. The other three ROM specimens were captured in Tomahawk traps along the northeastern portion of Rondwandel Trail through mountain savanna forest

near the park headquarters. The specimens from 10 km S, 23 km W of Afobakka were trapped in National live traps baited with pineapple in an area with relatively open forest floor, but numerous fallen logs.

The common opossum was observed three times during the 19-month transect survey of Brownsberg Nature Park with two of those sightings in mountain savanna forest and the other in high closed forest (Fitzgerald 2003). This species also was recorded by photo-trapping. Operation Gwamba recovered 151 individuals of this species (Walsh and Gannon 1967), although it is possible that some of the specimens they reported were misidentified *D. imperfecta*.

Marmosa lepida (Thomas, 1888)

One adult male (RMNH 18081) was collected at Gansee on the Suriname River before it was flooded by the creation of Brokopondo Lake (Husson 1978).

Marmosa murina (Linnaeus, 1758)

Voucher material (1).—Km 1.2 Mazaroni Road (ROM 114321).

Although documented by several specimens in Suriname (Husson 1978), our non-reproductive adult female is the first record for Brownsberg and was captured on 28 April 2002. It was caught in a BTS trap set in secondary mountain savanna forest. Compared with the female topotype series from Suriname (Voss et al. 2001), our specimen is smaller in all cranial dimensions except one (minimum value from Voss et al. 2001/ROM 114321): condylobasal length, 31.9/29.5; molar length, 6.3/6.3; palatal breadth, 10.2/9.8; palatal length, 17.6/16.1; least interorbital breadth, 5.4/5.1; zygomatic breadth, 18.2/17.0. Based on phylogenetic analysis of cytochrome *b* variation, our Suriname specimen appeared in a monophyletic clade with other conspecifics from Guyana and French Guiana (Steiner and Catzeflis 2004).

This medium-sized brownish mouse opossum is typically larger (HF>18) than other species of *Marmosa* or *Marmosops* found in this area. However, age variation makes it difficult to quantify differences in size and color in the field for mouse opossums in general, so cranial material is necessary for positive identification. In addition to a more robust skull with longer length and breadth measurements (Appendix 3), *M. murina* has prominent postorbital processes, typical pointed lower canines distinctly different from the low-cusped premolars, and lacks an anteromedial tympanic strut (Voss et al. 2001).

Marmosops parvidens Tate, 1931

Voucher material (12).—Jeep Trail (ROM 113997,

114009, 114144, 114188, 114296, 114299, 114300, 114319, 114320, 114322, 114332, 114362).

This species was the most common mouse opossum found in Brownsberg. Prior to our work, there were only 2 other specimens of *M. parvidens* reported from Suriname (Pine 1981). Based on adults, our specimens fit the range of measurements for *M. parvidens* as restricted by Voss et al. (2001) with males averaging larger in size than the females for most cranial measurements (Appendix 3). *Marmosops* is distinguished from other genera of mouse opossums by the atypical lower canines, which are superficially undifferentiated in crown morphology from the premolars. In comparison with *M. pinheiroi*, *M. parvidens* has reddish-brown dorsal fur, more extensive white or cream color on the belly, and a shorter upper canine that is at most twice the height of the first upper premolar. Three of our specimens were used in a phylogenetic analysis of cytochrome *b* variation in *Marmosops*, and formed a monophyletic clade closely related to other specimens of *M. parvidens* from Guyana and French Guiana (Steiner and Catzeflis 2004).

None of the four subadult females (two of age class 2 and two of age class 3; Gardner 1973) captured on 13, 14, 25, and 29 April 2002 showed signs of reproductive activity; however, the only adult female (ROM 114362) captured on 11 May 2002 was lactating. Five of the males were adults captured from 19 to 28 April 2002, and two subadults were age class 2 captured on 20 and 20 April 2002. Most specimens were caught in pitfall traps in moss-covered mountain savanna forest, but one was caught on a fallen, horizontal moss-covered sapling, a meter off the ground. Other than one specimen from south of the Amazon River, this species is known from only the Guiana Shield (Voss et al. 2001).

Marmosops pinheiroi (Pine, 1981)

Voucher material (1).—Jeep Trail (ROM 114318).

One subadult male (age class 2 of Gardner 1973) was collected in a pitfall trap in mountain savanna forest with a high moss aspect on 28 April 2002. It had grayish brown dorsal fur, less extensive cream on the belly, and longer upper canines that were over twice the height of the first upper premolar. These diagnostic characters were outlined by Voss et al. (2001), who elevated *M. pinheiroi* to species level and noted its distinction from *M. parvidens*. The postorbital breadth of our *M. pinheiroi* was more constricted than that for the same sex and age class of *M. parvidens* (Appendix 2). In a phylogenetic analysis of cytochrome *b* variation, our specimen was closely related to other specimens from Guyana, French Guiana, and eastern Brazil in a well-supported monophyletic lineage for *M. pinheiroi* (Steiner and Catzeflis 2004). This is the first report of *M. pinheiroi* from Suriname and, as current-

ly known, this species occurs primarily in the Guiana Shield with one locality south of the Amazon River (Voss et al. 2001).

Metachirus nudicaudatus (Desmarest, 1817)

Voucher material (2).—Jeep Trail (ROM 114155); Km 1.1 Mazaroni Road (ROM 114356).

A subadult (age class 4), male with testes measuring 10 by 9 mm was caught on 10 April 2002 in a BTS trap set on a liana with a diameter of 3 cm and 1.2 m above the ground. The general habitat was secondary mountain savanna forest. A juvenile (age class 1) female was collected in a pit-fall trap set in mountain savanna forest with a high moss aspect on 6 May 2002. This medium-sized opossum has brownish dorsal fur, a yellowish spot above each eye, and a tail longer than its head-body. This species is thought to be almost wholly terrestrial and the capture on a liana is unusual.

Walsh and Gannon (1967) reportedly rescued 85 *M. nudicaudatus*. However, Husson (1978) re-identified a photograph of one individual from Operation Gwamba as *Philander opossum*. This species also was recorded by photo-trapping and was observed once during transect surveys.

Monodelphis breviceaudata (Erxleben, 1777)

Voucher material (1).—3 km S, 20 km W Afobakka (CM 52729).

A non-reproductive adult female was captured at Brownsberg on 7 July 1977 in mature forest with a Sherman trap baited with dry oatmeal and mixed grain. The short-tailed opossum has a tail length less than the head-body length and dark brown dorsum with reddish flanks. As restricted by Voss et al. (2001), *M. breviceaudata* is endemic to the Guiana Shield.

Two adult females (RMNH 23403 and 23404) also were reported from near the northwestern corner of Brokopondo Lake at an elevation of 475 m (Husson 1978), which would correspond to the Brownsberg plateau.

Philander opossum (Linnaeus, 1758)

Voucher material (1).—8 km S, 2 km W Brownsweg (CM 63512).

The only voucher specimen of the gray four-eyed opossum at Brownsberg was a juvenile (age class 2) female collected on 21 September 1979. The specimen was trapped along the Wittie Kreek Trail near the park headquarters. The area had dense ground cover augmented by debris from maintenance of the trail. In external comparison to *Metachirus nudicaudatus*, *Philander opossum* has

grayish dorsal fur, white instead of yellowish spots above the eyes, a tail approximately equal in length to the head-body, proportionately shorter limbs, and more generalized hind feet.

Husson (1978) reported *P. opossum* as common in coastal areas of Suriname but unknown from the interior. Husson (1978) also identified at least one *P. opossum* from Operation Gwamba that was originally reported as *Metachirus nudicaudatus* (Walsh and Gannon 1967).

Order Cingulata

Family Dasypodidae (armadillos)

Cabassous unicinctus (Linnaeus, 1758)

The presence of the naked-tailed armadillo in Brownsberg Nature Park was reported by two of the eight local residents experienced with the wildlife of the surrounding area (Table 2). This species is considered rare in Suriname (Husson 1978) and is everywhere seldom seen within its extensive geographic range (Voss and Emmons 1996). Three armadillos from Operation Gwamba were initially identified as *Euphractus sexcinctus*. However, they also were noted as possibility being *Cabassous unicinctus* (Walsh and Gannon 1967), a suggestion with which we concur. The only confirmed records of *Euphractus sexcinctus* in Suriname are all from the southern savannas (Wetzel 1985).

Dasypus kappleri Krauss, 1862

The long-nosed armadillo was observed once in high forest dominated with palm (Table 1). Its occurrence was documented by five of the local residents (Table 2) and also recorded by photo-trapping (Appendix 1).

Dasypus novemcinctus Linnaeus, 1758

The nine-banded armadillo was sighted three times in mountain savanna forest and once each in high closed forest and high forest (Table 1). Its presence in Brownsberg Nature Park also was noted by five of the local residents and recorded by photo-trapping (Table 2). At 1,051 individuals saved, *D. novemcinctus* was the second commonest mammal rescued during Operation Gwamba (Walsh and Gannon 1967). The only known voucher specimen (RMNH 18215) from the Brownsberg area was collected at the transmigration village of Brownsweg in the lowlands north of the Brownsberg plateau (Husson 1978).

Priodontes maximus (Kerr, 1792)

The giant armadillo was reported as present in Brownsberg Nature Park by six of the eight residents who were knowledgeable about the local fauna (Table 2) and recorded several times in photo-trapping. This species was considered

rare in the lowland forest east of Brownsberg because only seven individuals were rescued during Operation Gwamba (Walsh and Gannon 1967); however, Sanderson (1949) reported it as locally common in Suriname. The giant armadillo also was observed on Rondwandelng Trail during the ROM survey.

Order Pilosa

Family Bradypodidae (three-toed sloths)

Bradypus tridactylus Linnaeus, 1758

The three-toed sloth was observed on two occasions with one sighting each in high closed forest and high forest habitats (Table 1). It also was reported as present in Brownsberg Nature Park by seven of the eight local residents (Table 2). It was the most common mammal rescued during Operation Gwamba (Walsh and Gannon 1967) with 2,104 individuals saved.

Family Megalonychidae (two-toed sloths)

Choloepus didactylus (Linnaeus, 1758)

The two-toed sloth was seen twice in secondary forest and once each in high closed forest and high forest (Table 1). It also was reported by half of the local residents interviewed (Table 2). A total of 840 individuals of this species were rescued during Operation Gwamba (Walsh and Gannon 1967). A male (RMNH 18177) was documented in forest near Ganiakondre prior to the flooding of Brokopondo Lake (Husson 1978).

Family Cyclopeidae (pygmy anteaters)

Cyclopes didactylus (Linnaeus, 1758)

A pygmy anteater was seen once during the transect survey in high forest dominated with palm (Table 1) and is now a specimen in the National Zoological Collection of Suriname. It was reported by two of the local residents as being present in Brownsberg Nature Park (Table 2), and 161 individuals were rescued during Operation Gwamba (Walsh and Gannon 1967). Husson (1978) listed a female specimen (RMNH 22551) from Afobakka just north of Brokopondo Lake.

Family Myrmecophagidae (anteaters)

Myrmecophaga tridactyla Linnaeus, 1758

The giant anteater was confirmed in Brownsberg Nature Park by five of the eight local residents (Table 2). It has been reported from throughout Suriname (Husson 1978), however, it was not caught during Operation Gwamba (Walsh and Gannon 1967). Husson (1978) reported a tail obtained near Afobakka on the Suriname River just north of Brokopondo Lake.

Tamandua tetradactyla (Linnaeus, 1758)

The tamandua was observed four times, all in mountain savanna forest habitat during the transect survey (Table 1). It had been seen by five of the eight local residents familiar with the fauna (Table 2) and 261 individuals were rescued during Operation Gwamba (Walsh and Gannon 1967).

Order Chiroptera

Family Emballonuridae (sheath-tailed bats)

Diclidurus scutatus Peters, 1869

These elusive ghost bats are rare in museum collections. Husson (1978) reported a female specimen (RMNH 17843) from the northern shore of Brokopondo Lake at Afobakka on the Suriname River.

Rhynchonycteris naso (Wied-Neuwied, 1820)

We did not find *R. naso* during our studies mainly because we did not sample near substantive rivers or lakes, its typical habitat. The river bat, however, is considered common in Suriname with 18 specimens previously reported from present-day Brokopondo Lake near Brownsberg (Husson 1978): two (RMNH 25193 and 25194) collected on dead trees about 3 km south of the dam; seven (RMNH 25209–25215) collected from Bedoti on the Suriname River; two (RMNH 25191 and 25192) documented from Gran Creek; and seven (ZMA 9552–9555, 9645–9647) from between 18 and 31 km south of the dam on Sara Creek.

Saccopteryx bilineata (Temminck, 1838)

Voucher material (22).—3 km S, 20 km W Afobakka (CM 52744); 8 km S, 2 km W Brownsweg (CM 63532); Headquarters (ROM 113877, 113892, 113893, 114047, 114138, 114139, 114140, 114141, 114349); Jeep Trail (ROM 113980, 114046, 114081, 114082, 114083, 114084, 114085, 114086, 114087); Km 1.5 Wittie Kreek Trail (ROM 114157); Irene Falls (ROM 114222).

The CM specimens were both adults (a male and a female) captured in mature forest. For the ROM specimens, one adult female was caught in a canopy net set in moss-covered mountain savanna forest. The remaining 19 were adults, including eight females and 11 males, which were netted in the understory. All females were captured from 10 to 18 April 2002, and none showed evidence of reproduction; the 11 males, which were captured from 10 to 21 April 2002, had testes ranging in size from 2 by 1 to 4 by 3 mm. The captures in various habitats included nine in mountain savanna forest, one in moss-covered mountain savanna forest, seven in high

TABLE 2. Mammal species noted as occurring in the Brownsberg area by eight local inhabitants and hunters, and also species documented by remote camera photo-trapping.

Species ^a	Aniel	Rinaldo	Wee-Wee	Pukheti	Timo	Djemba ^b	Hunter #1	Hunter #2	Cameras
<i>Bradypus tridactylus</i>	+	+		+	+	+	+	+	
<i>Choloepus didactylus</i>	+	+		+				+	
<i>Cyclopes didactylus</i>	+							+	
<i>Myrmecophaga tridactyla</i>			+	+		+	+	+	
<i>Tamandua tetradactyla</i>		+		+		+	+	+	
<i>Cabassous unicinctus</i>						+	+		
<i>Dasybus kappleri</i>				+	+	+	+	+	+
<i>Dasybus novemcinctus</i>				+	+	+	+	+	+
<i>Prionotes maximus</i>			+	+	+	+	+	+	+
<i>Saguinus midas</i>	+	+	+	+	+	+	+	+	
<i>Alouatta macconnelli</i>	+	+	+	+	+	+	+	+	
<i>Ateles paniscus</i>	+	+	+	+	+	+	+	+	
<i>Cebus apella</i>	+	+	+	+	+	+	+	+	
<i>Cebus olivaceus</i>			+			+	+	+	
<i>Chiropotes satanas</i>			+	+	+	+	+		
<i>Pithecia pithecia</i>	+	+	+	+	+	+	+	+	
<i>Saimiri sciureus</i>		+	+	+	+	+	+	+	
<i>Speothos venaticus</i>						+	+		
<i>Nasua nasua</i>	+			+		+	+	+	+
<i>Potos flavus</i>			+	+		+	+		
<i>Eira barbara</i>	+			+		+		+	+
<i>Galictis vittata</i>						+ ^c			
<i>Lontra longicaudis</i>			+			+ ^d	+ ^d	+ ^d	
<i>Pteronura brasiliensis</i>						+ ^d	+ ^d		
<i>Herpailurus yagouaroundi</i>		+	+	+		+	+	+	
<i>Leopardus pardalis</i> ^e				+			+		+
<i>Leopardus tigrinus</i> ^e			+	+			+		
<i>Leopardus wiedii</i> ^e							+		+
<i>Panthera onca</i>	+	+	+	+	+	+	+	+	+
<i>Puma concolor</i>				+		+	+	+	+
<i>Tapirus terrestris</i>		+		+		+	+	+	+
<i>Pecari tajacu</i>	+	+		+		+	+	+	+
<i>Tayassu pecari</i>		+		+		+	+	+	
<i>Mazama americana</i>		+	+	+	+	+	+	+	+
<i>Mazama gouazoubira</i>		+	+	+		+	+	+	+
<i>Odocoileus cariacou</i>			? ^f						
<i>Sciurillus pusillus</i>	+		+	+		+	+		
<i>Sciurus aestuans</i>	+	+	+		+		+		+
<i>Coendou prehensilis</i>		+	+	+		+	+	+	
<i>Coendou melanurus</i>						+ ^(?)			
<i>Hydrochoeris hydrochaeris</i>					+ ^d	+ ^d			
<i>Dasyprocta leporine</i>	+		+	+	+	+	+	+	+
<i>Myoprocta acouchy</i>			+	+	+	+			+
<i>Cuniculus paca</i>	+		+	+	+	+	+	+	+
<i>Echimys chrysurus</i>						+ ^c			

^a *Chironectes* and *Monodelphis* were unknown to all interviewees; *Procyon* has not been seen at Brownsberg, whereas some interviewees knew the species from coastal places in Suriname; ^b Interviewee "Djemba" was experienced and prudent; he claimed a second species of porcupine was at BNP, but could not recognize *C. melanurus* as illustrated in Emmons and Feer (1997); ^c *Galictis* and *Echimys chrysurus* were positively recognized by interviewee "Djemba," who gave some details about their habits; trusted and experienced person; ^d Brokopondo Lake; interviewees stated that otters have been seen only at the lake; ^e for small felids (*Leopardus tigrina*, *wiedii*, *pardalis*), additional details were asked for discrimination; Hunter #1 apparently knew well the differences (in habits, coloration and shape) of the small spotted felids; ^f Interviewee "Wee-Wee" maintained the presence of bifurcated antlers for *Odocoileus*, whereas at least three other interviewees stated correctly that all large male deers have straight non-bifurcating antlers.

forest, one in high palm dominated forest, and one in high marsh forest. In addition, one juvenile male was caught in an understory net set in high marsh forest at Km 3.6 Wittie Kreek Trail on 22 April 2002 and released unharmed at the point of capture. *S. bilineata* is the largest (FA = 46–51) species of sac-winged bats with two prominent white lines on its black-furred back.

Saccopteryx leptura (Schreber, 1774)

Voucher material (4).—Headquarters (ROM 113878); Km 2.4 Wittie Kreek Trail (ROM 114190); Irene Falls (ROM 114223); Km 3.6 Wittie Kreek Trail (ROM 114240).

Two pregnant adult females (CR = 12 and 14) were netted in high marsh forest on 21 and 22 April 2002, one non-reproductive adult female was caught in high palm dominated forest on 21 April 2002, and one adult male (T = 2 by 1) was netted in mountain savanna forest on 10 April 2002. This is a small species (FA = 39–41) of sac-winged bat with two white lines on a brown-furred back. One female (ROM 114190) is slightly smaller in three cranial measurements (Appendix 3) than those reported from Guyana (Lim and Engstrom 2001). This individual was caught in a net at 1600 h when the sky suddenly darkened just prior to a heavy rainstorm.

Husson (1978) listed one female (ZMA 9558) and two males (ZMA 9559 and 9560) from the north shore of Brokopondo Lake at Afobakka on the Suriname River, and another female (RMNH 25242) from Njoenkodre on the Suriname River, which is now covered by Brokopondo Lake.

Family Mormoopidae (moustached bats)
Pteronotus gymnonotus Natterer, 1843

Voucher material (1).—Jeep Trail (ROM 113957).

We netted an adult male (T = 3 by 2) in a ground level net set in moss-covered mountain savanna forest on 12 April 2002. This is the first record from Suriname of *P. gymnonotus* and completes its occurrence from the other countries of the Guiana Shield (Lim et al. 2005). It is distributed from southern Mexico to eastern Brazil. *P. gymnonotus* is a medium sized (FA = 54) naked-backed moustached bat and the species typically has orangish brown fur, but other shades of brown also are possible.

Pteronotus parnellii Gray, 1843

Voucher material (34).—3 km S, 20 km W Afobakka (CM 52752, 52753, 52754, 52755); 8 km S, 2 km W Brownsveg (CM 63555, 63963, 63964, 63965, 63966,

63967, 63968, 63969, 63970, 63971); Jeep Trail (ROM 113978, 113979, 114045, 114100, 114101, 114112); Headquarters (ROM 113998, 113999, 114000, 114060, 114061, 114151, 114152, 114347, 114348); Km 1.5 Wittie Kreek Trail (ROM 114156, 114158, 114159, 114160, 114161).

Four of the specimens (CM 52752–52755) were reported by Genoways and Williams (1979). The remaining ten CM specimens were netted in equal numbers in mature and secondary forest, and include three males and seven females; a female taken on 20 September 1979 was lactating, but not pregnant. One of the ROM specimens was an adult male (T = 3 by 2) caught in a canopy net set in moss-covered mountain savanna forest on 15 April 2002. There were 14 other adult males (T = 2 by 1 to 5 by 3) captured from 12 to 20 April 2002, four non-reproductive adult females captured from 13 to 20 April 2002, and one adult female captured on 16 April 2002 that was pregnant (CR = 14). Nine were netted in mountain savanna forest, two in moss-covered mountain savanna forest, three in high forest, and five in high palm dominated forest. An additional six individuals (five males and one pregnant female) were netted in high marsh forest at Irene Falls on 21 April 2002 and released. This species is the largest *Pteronotus* (FA = 61–68) with the wings attaching to the sides of the body and the fur typically a medium brown color, although grayish and reddish individuals also are present in the Brownsberg population.

Family Phyllostomidae
Subfamily Phyllostominae (spear-nosed bats)
Chrotopterus auritus (Peters, 1856)

Voucher material (2).—Jeep Trail (ROM 113966, 114103).

One pregnant (CR = 18) adult female was netted in moss-covered mountain savanna forest on 12 April 2002 and a non-reproductively active adult female was caught in high forest on 16 April 2002. This species previously was reported for the first time in Suriname by three specimens from 3 km SW Rudi Kappelvliegveid, Sipaliwini Airstrip, and Raleigh Falls (Williams and Genoways 1980). There are an additional three unreported specimens from Raleigh Falls (CM 68636), Zanderij (CM 76767), and Oelemarie (CM 77106). The New World phyllostomid bats are characterized by a fleshy noseleaf appendage on their faces. The phyllostomine bats are further characterized by relatively large ears and large interfemoral membrane extending below the knees. *Chrotopterus* is a large (FA = 78–82) and distinctive bat with long woolly gray fur and large ears (44–46 mm).

Glyphonycteris daviesi (Hill, 1964)

Voucher material (2).—Headquarters (ROM 114050); Jeep Trail (ROM 114114).

One non-reproductively active adult female was caught in mountain savanna forest on 15 April 2002 and a pregnant (CR = 23) adult female was netted in high forest on 17 April 2002. This relatively large bat (forearm 56–60 mm) has unicolor gray fur and dermal pads forming a V-shape on the chin and distinctively procumbent upper incisors. The only previous report of this species from Suriname was by Williams and Genoways (1980), who collected one from Raleigh Falls.

The traditionally recognized genus *Micronycteris* was recently determined to be polyphyletic based on a morphological analysis (Wetterer et al. 2000). As a result, several distinct monophyletic lineages were elevated to the generic level including *Glyphonycteris* with two species (*daviesi* and *sylvestris*), and the monotypic *Lampronnycteris brachyotis*, *Neonycteris pusilla*, and *Trinycteris nicefori*. Bats in all of these genera have thickened dermal pads on the chin arranged in the form of a V.

Glyphonycteris sylvestris (Thomas, 1896)

Voucher material (14).—8 km S, 2 km W Brownsveg (CM 63587, 63588, 63589, 63590, 63591, 63592, 63593, 63594, 63595, 63596, 63597, 63598, 64011, 64012).

These specimens came from a tree hollow in mature forest, and were the first records from Suriname (Williams and Genoways 1980). The first chromosomal data for *G. sylvestris* was from seven CM female specimens with $2n = 22$ and $FN = 36$ (Honeycutt et al. 1980). This small bat (FA = 37–43) has relatively large ears (20–22 mm), strong tricolored dorsal fur (white between dark brown bands) with faintly frosted tips.

Lophostoma brasiliense (Peters, 1866)

Voucher material (1).—7 km S, 18.5 km W Afobakka (CM 52777).

This male was reported from Brownsberg Nature Park and also represents the first record of *L. brasiliense* for Suriname (Genoways and Williams 1979; Genoways and Williams 1980). A second record was reported from Nieuwe Grond Plantation in Commewijne District (Williams and Genoways 1980). There are two unreported specimens from Sipalawini Airstrip (CM 77171) and 3 km SW Albina (CM 76775). It is the smallest species (FA = 33–36) in the genus, which has relatively long, round ears and a tail membrane that extends past its hindfeet. A recent molecular study (Lee et al. 2002) conclud-

ed that *Tonatia* was paraphyletic with a distinct lineage referable to *Lophostoma*, which includes the species *L. aequatorialis*, *L. brasiliense*, *L. carrikeri*, *L. evotis*, *L. schulzi*, and *L. silvicolum*.

Lophostoma carrikeri (Allen, 1910)

Voucher material (1).—Jeep Trail (ROM 114041).

A non-reproductive adult female was captured on 15 April 2002 in a canopy net set in moss-covered mountain savanna forest. This represents the fifth known specimen of *L. carrikeri* from Suriname with others from Voltzberg (Williams and Genoways, 1980), Zanderij (Genoways et al. 1981), Sipalawini Airstrip (CM 77172), and an unknown locality (Husson 1978). The combination of medium size (FA = 45–48), dark brown dorsal fur contrasting sharply with a white venter, and ungranulated skin characterize this species of *Lophostoma*.

Lophostoma schulzi (Williams and Genoways, 1980)

Voucher material (2).—Jeep Trail (ROM 114115); Km 2.4 Wittie Kreek Trail, (ROM 114191).

These two specimens from Brownsberg Nature Park represent the first report of *L. schulzi* from Suriname since the original description (Genoways and Williams 1980; Genoways et al. 1981). This is one of six species of bats endemic to the Guiana Shield (Lim et al. 2005). It is a medium-sized *Lophostoma* (FA = 42–45) characterized by wart-like granulations on the forearm, digits, hindlimbs, ears, and noseleaf. The dorsal fur is a pale brown and does not contrast sharply with a pale white venter. Our two adult females were non-reproductive and were netted in high forest and high palm-dominated forest on 17 and 21 April 2002.

Lophostoma silvicolum d'Orbigny, 1836

Voucher material (22).—7 km S, 18.5 km W Afobakka (CM 52778); 8 km S, 2 km W Brownsveg (CM 63669, 63670, 63671, 63672, 63673, 63674, 63675, 63676, 63677, 63678, 63679, 64044, 64045, 64046); Jeep Trail (ROM 113967, 114102); Headquarters (ROM 114126, 114137); Km 1.5 Wittie Kreek Trail (ROM 114162); Telesur Camp (ROM 114185); Km 3.6 Wittie Kreek Trail (ROM 114243).

Some of the CM specimens of *L. silvicolum* were used for comparative measurements during the type description of *L. schulzi* (Genoways and Williams 1980). The karyotype of these specimens is $2n = 34$ and $FN = 60$ (Honeycutt et al. 1980). The CM series included six

females and nine males netted in predominately secondary forest but also in mature forest and forest edge near a clearing. Two of the females taken on 21 and 22 September 1979 were lactating, but the other four females evinced no gross reproductive activity. Males taken between 20 to 22 September 1979 had testes measurements of 10 by 6 to 13 by 9. *L. silvicolom* also was caught in a variety of habitats during the ROM fieldwork. Two of the seven specimens were netted in mountain savanna forest. The others were captured in moss-covered mountain savanna forest, high forest, high marsh forest, high palm dominated forest, and secondary forest. Demographically, there was one adult male (T = 10 by 6) captured on 12 April 2002, one subadult male (T = 6 by 3) captured on 22 April 2002, one non-reproductive subadult female 20 April 2002, three non-reproductive adult females captured on 16 and 18 April 2002, and one adult pregnant female (CR = 9) was captured on 20 April 2002. One female (RMNH 24987) also was reported from Brownsberg near the west bank of Brokopondo Lake (Husson 1978). This species is a large *Lophostoma* (FA = 53–62) that has a nearly naked forearm. The dorsal fur is usually gray with paler hair tips imparting a silvery tinge, but some individuals also may be brown.

Macrophyllum macrophyllum (Schinz, 1821)

One male and 13 females (RMNH 19652) were collected from Brownsweg, a transmigration village established for people displaced by Brokopondo Lake, and located on the northwestern corner of the lake (Husson 1978).

Miconycteris hirsuta (Peters, 1869)

Voucher material. (1).—Jeep Trail (ROM 113969).

An adult male (T = 6 by 4) was netted in moss-covered mountain savanna forest on 12 April 2002. The only previous specimens reported from Suriname was one from Kabalebo and two from Zanderij (Genoways et al. 1981). As restricted by Wetterer et al. (2000), *Miconycteris* is characterized by a band of skin connecting relatively large ears. The band in *M. hirsuta* is low in height and has a faint notch on the top. This species has a forearm of 44–46 mm, bicolored dorsal fur with white bases and brown tips, and males have an elongated tuft of hair arising between the ears.

Miconycteris megalotis (Gray, 1842)

Voucher material (2).—3 km S, 20 km W Afobakka (CM 52758); Headquarters (ROM 114004).

The CM specimen was reported in Genoways and

Williams (1986). The ROM specimen was an adult male (T = 3 by 2) that was netted in mountain savanna forest on 14 April 2002. The species is characterized by a shallow notch in the band between the ears, brownish venter, long hairs on the leading edge of the ears, and small size (FA = 32–36).

Miconycteris minuta (Gervais, 1856)

Voucher material (2).—8 km S, 2 km W Brownsweg (CM 63579, 63580).

Genoways and Williams (1979; 1980; 1986) described these specimens, a male, and female, as widely distributed, but relatively uncommon in Suriname. The female was lactating when captured on 24 September 1979 and the male taken on the same date had testes that were 2 mm in length. The species is superficially similar to *M. megalotis*, but *M. minuta* has short hairs on the ears and a white venter.

Mimon crenulatum (E. Geoffroy, 1803)

Voucher material (7).—Km 1.5 Wittie Kreek Trail, 400 m (ROM 114165); Km 2.4 Wittie Kreek Trail, 300 m (ROM 114192, 114193, 114194, 114205); Km 3.6 Wittie Kreek Trail, 150 m (ROM 114241, 114242).

All specimens were caught in ground-level nets set along the slope of the Brownsberg plateau from 400 to 150 m elevation with two caught in marsh forest at the lower elevation and five were taken in high palm-dominated forest at the higher elevations. These included two non-reproductive adult females captured on 21 and 22 April 2002, and five adult males (T = 3 by 2 to 5 by 3) captured from 20 to 22 April 2002. This medium-sized (FA = 46–50) bat is characterized by a distinct middorsal tan line on an otherwise blackish-brown back, and a prominent noseleaf that is hairy and serrated on the edges.

Phylloderma stenops Peters, 1865

Voucher material (1).—8 km S, 2 km W Brownsweg (CM 63609).

An adult male was netted in mature forest at Brownsberg and was previously reported by Williams and Genoways (1980). Its karyotype is $2n = 32$ and $FN = 58$ (Honeycutt et al. 1980). This species is a relatively large (forearm 67–73 mm) bat with short, brown dorsal fur that is often marked with irregular white spots (although this specimen is not), noseleaf base is continuous with the upper lip, and pale face and wing tips.

Phyllostomus discolor Wagner, 1843

Voucher material (8).—8 km S, 2 km W Brownsveg (CM 63616); Headquarters (ROM 114116, 114127, 114128, 114329, 114334, 114344, 114353).

The CM specimen was a non-reproductive adult female netted on 24 September 1979 in mature forest. All of the ROM specimens were caught in mountain savanna forest including two lactating females captured on 29 April and 4 May 2002, and five adult males (T = 8 by 2 to 12 by 8) collected between 17 and 30 April 2002. This is the second smallest species (FA = 61–64) in the genus. *Phyllostomus* is distinguished from *Phylloderma* in having the base of the noseleaf free, instead of bound to or fused with the upper lip. The dorsal fur of *P. discolor* is pale brown and the venter is paler.

Phyllostomus elongatus (E. Geoffroy, 1810)

Voucher material (14).—8 km S, 2 km W Brownsveg (CM 63619, 64013, 64014, 64015, 64016, 64017); Headquarters (ROM 113881, 113940); Jeep Trail (ROM 113939, 114090); Km 1.5 Wittie Kreek Trail (ROM 114164); Telesur Camp (ROM 114184); Km 2.4 Wittie Kreek Trail (ROM 114204); Km 3.6 Wittie Kreek Trail (ROM 114248).

The CM specimens included four males and two females, which were caught in secondary and mature forest. A male taken on 21 September 1979 had testes that were 8 mm in length and a female taken on 24 September was not reproductively active. The ROM specimens were netted in a variety of habitats including mountain savanna forest, moss-covered mountains savanna forest, high forest, high marsh forest, high palm dominated forest, and secondary forest. Four adult males captured between 11 and 22 April 2002 had testes size ranging from 4 by 2 to 12 by 5 mm. Two non-reproductive adult females were captured on 12 and 16 April 2002 and two lactating females were captured on 10 and 21 April 2002. This species is dark brown and moderately large in size (FA = 65–70) for the genus.

Phyllostomus hastatus (Pallas, 1767)

Voucher material (10).—8 km S, 2 km W Brownsveg (CM 63628); Headquarters (ROM 113876, 113928, 114071, 114117); Jeep Trail (ROM 114015, 114034, 114113); Telesur Camp (ROM 114182, 114183).

The single CM specimen was a non-reproductive female captured on 19 September 1979. The ROM specimens included two adult males (T = 8 by 5 and 9 by 4) captured on 11 and 20 April 2002, four reproductively inactive adult females captured from 14 to 17 April 2002, and three lac-

tating adult females captured between 10 and 20 April 2002. One was caught in a canopy net and another in a ground-level net set in moss-covered mountain savanna forest. Four others were netted in mountain savanna forest, one in high forest, and two in secondary forest. This is the largest (FA = 80–86) species in the genus and is blackish to reddish brown.

Phyllostomus latifolius (Thomas, 1901)

Voucher material (6).—8 km S, 2 km W Brownsveg (CM 63638, 63639); Headquarters (ROM 114063, 114064); Leo Falls (ROM 114129, 114130).

The CM specimens were part of the first report of this species from Suriname (Williams and Genoways 1980), and the first karyotyped (2n = 2; FN = 60; Honeycutt et al. 1980). The ROM specimens include two females (one lactating) netted in mountain savanna forest on 16 April 2002 and two males (T = 5 by 3 and 5 by 4) caught while roosting in an old mine shaft situated in high marsh forest 18 April 2002. *P. latifolius* is the smallest (FA = 56–61) species in the genus and most similar in appearance to *P. elongatus* but fur color is a paler reddish brown.

Tonatia saurophila Koopman and Williams, 1951

Voucher material (21).—3 km S, 20 km W Afobakka (CM 52775); 8 km S, 2 km W Brownsveg (CM 63654, 64039, 64040, 64041, 64042); Headquarters (ROM 113895, 113929, 113930, 114032, 114051, 114062); Jeep Trail (ROM 113959, 113968, 113981, 113994, 114072); Km 1.5 Wittie Kreek Trail (ROM 114163); Telesur Camp (ROM 114186); Irene Falls (ROM 114220, 114221).

The CM specimens from Brownsberg, originally reported as *T. bidens* (Genoways and Williams 1979; Genoways and Williams 1980; Williams and Genoways 1980), were later recognized by Williams et al. (1995) as a species distinct from *T. bidens* and referable to *T. saurophila*. All specimens are males netted in secondary forest, with the exception of one caught in mature forest. A male taken on 21 September 1979 had testes that were 10 by 7 mm. The ROM specimens were all adults and represented by eight males (T = 4 by 2 to 9 by 7) and seven females, none of which showed evidence of reproduction when captured from 10 to 21 April 2002. Except for one caught in a canopy net set in moss-covered mountain savanna forest, all others were captured in understory nets: six in mountain savanna forest, four in moss-covered mountain savanna forest, two in marsh forest, one in high palm dominated forest, and one in secondary forest. *T. saurophila* is similar in size (FA = 52–57) to *L. silvicolum* but is distinguishable by a noticeably hairy forearm, a faint pale stripe on the forehead,

and ears that the bat cannot fold back in an accordion style.

Trachops cirrhosus (Spix, 1823)

Voucher material (9).—8 km S, 2 km W Brownsveg (CM 64047); Headquarters ROM 113888, 113889, 113890, 113931, 114001, 114002, 114052); Jeep Trail (ROM 114033).

The CM specimen is a male collected in secondary forest. Except for a male (T = 10 by 7) netted in moss-covered mountain savanna forest on 14 April 2002, the ROM specimens were caught in mountain savanna forest including four males (T = 6 by 4 to 10 by 8) captured from 10 to 15 April 2002 and three non-reproductive females captured between 10 and 14 April 2002. This large bat (FA = 62–67) has diagnostic papillae-like projections around its mouth, large ears (33–36 mm), and long grayish-brown fur with slightly frosted tips.

Trinycteris nicefori (Sanborn, 1949)

Voucher material (3).—Headquarters (ROM 114049, 114352); Jeep Trail (ROM 114073).

All three specimens are adult males (T = 2 by 1 to 4 by 2) captured on 15–16 April and 3 May 2002. One was caught in a canopy net set in moss-covered mountain savanna forest and the other two were captured in mountain savanna forest. This small species (FA = 35–38) is red or brown with two fleshy pads positioned in a V-shape on the chin, and usually has a faint pale mid-dorsal gray stripe on the lower back.

Subfamily Glossophaginae (nectar-feeding bats)

Anoura caudifer (E. Geoffroy, 1818)

Voucher material (4).—3 km S, 20 km W Afobakka (CM 52785); 7 km S, 18.5 km W Afobakka (CM 52786); Jeep Trail (ROM 113962, 114123).

The CM specimens are both females; one was netted in mature forest and the other at the edge of a forest clearing. The ROM specimens were both adult males (T = 3 by 2 and 4 by 3) captured on 12 and 18 April 2002. One was caught in a canopy net and the other was caught in a ground level net set in moss-covered mountain savanna forest. All glossophagines have morphological adaptations for feeding on nectar including elongated rostrums, extensible tongues, and smaller teeth. *Anoura* spp. have a reduced interfemoral membrane and lack lower incisors. *A. caudifer* is the smaller of the two species known from Brownsberg with a forearm less than 39 mm and the presence of a short tail.

Anoura geoffroyi Gray, 1838

Voucher material (2).—Irene Falls (ROM 114218, 114225).

One non-reproductive adult female and 1 adult male (T = 2 by 1) were netted in high marsh forest on 21 April 2002. *A. geoffroyi* does not have a tail and is larger (FA = 40–45) than *A. caudifer*.

Choeroniscus minor (Peters, 1868)

Voucher material (2).—Jeep Trail (ROM 113965, 114106).

Two non-reproductive adult females were netted in high forest on 16 April 2002 and moss-covered mountain savanna forest on 12 April 2002. This nectar-feeding bat has a well-developed interfemoral membrane, a forearm of approximately 35 mm, and lack lower incisors.

Glossophaga soricina (Pallas, 1766)

Voucher material (12).—6 km S, 20 km W Afobakka (CM 52787, 52788, 52789, 52790, 52791, 52792, 52793); 8 km S, 2 km W Brownsveg (CM 64049); Headquarters (ROM 113886, 113887, 113898); Irene Falls (ROM 114224).

Seven female CM specimens were collected in dense forest near a small abandoned mine and one male was caught in secondary forest. The four ROM specimens were non-reproductive adult females with three caught in mountain savanna forest on 10 April 2002 and one netted in high marsh forest on 21 April 2002. This nectar-feeding bat has lower incisors, inner upper incisors only a little larger than outer, dorsal fur bicolor with pale base and dark tips, and a forearm of 36–37 mm.

Husson (1978) reported five specimens (RMNH 16548–16651, 25283) from Brownsveg and two (RMNH 17381 and 17382) from Maripaheuvél near Dam on Sara Creek.

Lionycteris spurrelli Thomas, 1913

Voucher material (3).—Headquarters (ROM 114124); Irene Falls (ROM 114219, 114239).

Three adult males (T = 2 by 1 to 3 by 2) were collected: two netted in high marsh forest 18 April 2002 and one in mountain savanna forest on 21 April 2002. This nectar-feeding bat has lower incisors, upper inner incisors larger than outer, conspicuously trident lower premolars, unicolor brown dorsal fur, and a forearm of 34–35 mm.

Lonchophylla thomasi J.A. Allen, 1904

Voucher material (26).—8 km S, 2 km W Brownsweg (CM 63713, 63714, 63715, 64062, 64063, 64064, 64065, 64066, 64067); Headquarters (ROM 113885, 113941, 113992, 114003, 114125, 114136, 114345, 114346); Jeep Trail (ROM 113938, 113958, 113963, 113964, 114044, 114088, 114104, 114105); Telesur Camp (ROM 114187).

Of the CM specimens, one pregnant female (CR = 19) was netted in secondary forest on 21 September 1979, three females (one pregnant, CR = 23, collected on 22 September 1979) were caught in mature forest, and five males in mature forest. One female contributed the $2n = 32$ and FN = 38 cytotype for *L. thomasi* from Suriname (Honeycutt et al. 1980). The ROM specimens included nine adult males (T = 3 by 2 to 5 by 4) and eight reproductively inactive adult females captured from 10 to 20 April 2002. Eight of these were netted in mountain savanna forest, five in moss-covered mountain savanna forest (one caught in a canopy net), three in high forest, and one in secondary forest. *L. thomasi* is similar to *Lionycteris spurrelli*, but has more procumbent upper inner incisors, bicolored dorsal fur (rather than unicolor) with brown tips and white bases, and a forearm of 30–35 mm.

Subfamily Carollinae (small fruit bats)

Carollia brevicauda (Schinz, 1821)

Voucher material (20).—6 km S, 20 km W Afobakka (CM 52814); Headquarters (ROM 113922, 113932, 113993, 114048); Jeep Trail (ROM 114010, 114011, 114012, 114013, 114014, 114031, 114042, 114043, 114074, 114075, 114093, 114096, 114227); Irene Falls (ROM 114249); Km 3.6 Witte Kreek Trail (ROM 114298).

Genoways and Williams (1979) reported the CM male specimen as the first confirmation of this species in Suriname. We found it common during the ROM survey with 12 adult males (T = 3 by 2 to 9 by 7) captured between 11 and 24 April 2002, 1 subadult male (T = 2 by 2) captured on 14 April 2002, four non-reproductive females collected between 11 and 22 April 2002, and one pregnant adult female (CR = 21) captured on 16 April 2002. Ten were caught in moss-covered mountain savanna forest with nine of these in a canopy net, five were captured in mountain savanna forest, two in high forest, and two more in high marsh forest. *Carollia* spp. has a short tail (5–13 mm), a tri-banded dorsal fur pattern, and a distinctive central wart surrounded by small bumps on the chin. *C. brevicauda* is the smaller of the two species found in the Guianas with a forearm length of 36–38 mm and tibia length of 15–17 mm.

Carollia perspicillata (Linnaeus, 1758)

Voucher material (42).—7 km S, 18.5 km W Afobakka (CM 52815, 52816); 6 km S, 20 km W Afobakka (CM 52817); 8 km S, 2 km W Brownsweg (CM 64079, 64080, 64081, 64082, 64083, 64084, 64085, 64086, 64087, 64088, 64089, 64090); Headquarters (ROM 113871, 113872, 113873, 113874, 113875, 113942, 113943, 113944, 113945, 113946, 114297, 114330); Jeep Trail (ROM 113933, 113934, 113935, 113936, 113937, 113970, 113982, 113983, 113984, 113985, 113986, 114076, 114094, 114095, 114097).

One of the commonest bats in Suriname, *C. perspicillata* previously was documented by 32 specimens (RMNH 16512–16514, 16531–16546, 18278, 25277a–k) from Brownsweg and one (RMNH 17380) from Maripaheuvel near Dam on Sara Creek (Husson 1978). The CM specimens included two females netted in a clearing at the edge of the forest, another female caught near a small mine in dense forest, and six males and six females taken in secondary forest. The ROM specimens included 11 adult males (T = 2 by 1 to 7 by 5) captured from 11 to 16 and 24 April 2002, 13 non-reproductive adult females captured from 10 to 16 and 29 April 2002, two lactating adult females captured on 10 April 2002, and one pregnant adult female (CR = 20) captured on 10 April 2002. Twelve were caught in mountain savanna forest (one in a net set in the canopy), 12 in moss-covered mountain savanna forest (one in a canopy net), and three in high forest. During the ROM survey, *C. perspicillata* was the most abundant species of bat captured with an additional 325 individuals released unharmed at the point of capture. These included 191 males (three subadults) and 134 females (three subadults), of which 37 were pregnant and 32 were lactating, captured between 17 and 22 April 2002. In terms of habitat, 277 (two in a canopy net) of the released individuals were caught in mountain savanna forest near the Headquarters; 78 (20 in a canopy net) in moss-covered mountain savanna forest along Jeep Trail; 27 in secondary forest at Telesur Camp; 21 in high marsh forest at Irene Falls; five in high palm-dominated forest at Km 1.5 Wittie Kreek Trail; nine in high palm-dominated forest at Km 2.4 Wittie Kreek Trail; and two in high marsh forest at Km 3.6 Wittie Kreek Trail. Compared to *C. brevicauda*, *C. perspicillata* is larger with a forearm length of 39–43 mm and tibia length of 18–20 mm.

Rhinophylla pumilio Peters, 1865

Voucher material (21).—3 km S, 20 km W Afobakka (CM 53343); 7 km S, 18.5 km W Afobakka (CM 53344, 53345, 53346, 53347, 53348); 8 km S, 2 km W Brownsweg (CM 63744, 63745, 63746, 63747, 64156, 64157); Headquarters (ROM 113923, 114135, 114154); Jeep Trail (ROM 113971, 114030, 114035); Km 2.4

Wittie Kreek Trail (ROM 114209); Irene Falls (ROM 114210, 114226).

The CM specimens were reported by Williams and Genoways (1980), and some contributed a new cytotype ($2n = 34$; $FN = 64$) for *R. pumilio* (Honeycutt et al. 1980). The ROM specimens included three adult males ($T = 2$ by 2 to 5 by 4) captured between 12 and 18 April 2002, two non-reproductive adult females captured on 11 and 21 April 2002, one lactating adult female captured on 21 April 2002, one pregnant adult female with $CR = 20$ mm captured on 19 April 2002, and two non-reproductive subadult females captured on 15 and 21 April 2002. Three were caught in moss-covered mountain savanna forest, three in mountain savanna forest, one in high palm-dominated forest, and two in high marsh forest. This little fruit bat lacks a tail, has a forearm length of 32–36 mm, and gray-brown unicolor fur.

Subfamily Stenodermatinae (fruit-eating bats)
Ametrida centurio Gray, 1847

Voucher material (1).—Headquarters (ROM 114056).

One non-breeding adult female was caught in a canopy net set in mountain savanna forest on 15 April 2002. This small bat ($FA = 32$ mm) has a white patch of fur on each shoulder, distinctively flattened face, and brownish fur.

Artibeus bogotensis Anderson, 1906

Voucher material (15).—7 km S, 18.5 km W Afobakka (CM 53378); Headquarters (ROM 113921, 114153, 114065, 114118, 114250); Jeep Trail (ROM 114019, 114038); Km 2.4 Wittie Kreek Trail (ROM 114196, 114197); Irene Falls (ROM 114215, 114216, 114229, 114230, 114232).

The CM specimen is a male netted at the forest edge in a clearing. Two of the ROM specimens were caught in canopy nets with one pregnant adult female ($CR = 15$) captured in moss-covered mountain savanna forest on 14 April 2002 and an adult male ($T = 4$ by 3) caught in a clearing on 22 April 2002. One subadult male ($T = 2$ by 1) was netted in the understory of mountain savanna forest on 19 April 2002. The other ROM specimens were caught in ground level nets: one in moss-covered mountain savanna forest, three in mountain savanna forest, two in high palm-dominated forest, and five in high marsh forest. These included five adult males ($T = 4$ by 3) captured on 11 and 21 April 2002, one non-reproductive adult female captured on 21 April 2002, two lactating females captured on 16 and 21 April 2002, one pregnant ($CR = 9$) female captured on 17 April 2002, and two non-reproductive subadult females captured on 15 and 21 April 2002.

Species in the genus *Artibeus* are fruit-eating bats that have white lines of varying intensity on the face, bifid inner upper incisors, and lack a dorsal stripe. There are eight species of *Artibeus* known from Suriname and they have a wide range of forearm size (36–78 mm; Lim et al., in preparation *b*). Of the smaller species, *A. bogotensis* was recently separated from the allopatrically occurring western Amazonian *A. glaucus* based on morphological and molecular differences. Compared to *A. glaucus*, *A. bogotensis* has more prominent white facial stripes, distinct white edging on the ears, and no small lower third molar (Lim et al., in preparation *a*). *A. bogotensis* is not reliably distinguishable in the field from *A. cinereus*, which also occurs in Suriname, but has not been documented at Brownsberg. Both are small species ($FA < 44$) usually with white or pale edging on the ears and lateral base of the noseleaf. Cranially, *A. bogotensis* has supraorbital ridges nearly parallel sided and moderately swollen, whereas the supraorbital ridges converge posteriorly and are not as developed or inflated in *A. cinereus*. Although widely distributed in the lowlands of the Guianan subregion, *A. cinereus* typically is more abundant in coastal areas and drier regions adjacent to savanna (Lim et al., in preparation *a*). *A. bogotensis* is usually found deep within rainforest such as in Brownsberg and this represents the first report of the species from Suriname, although it also is found throughout most parts of the country. Species verification in the field or re-identification of specimens in the literature, however, is still problematic, which has contributed to misapplication and confusion in the taxonomy of *A. bogotensis*.

Artibeus concolor Peters, 1865

Voucher material (3).—Headquarters (ROM 113949, 114069); Jeep Trail (ROM 114018).

All three individuals were captured in canopy nets set in mountain savanna forest (one lactating female), moss-covered mountain savanna forest (one non-breeding adult female), and mountain savanna forest (one adult male; $T = 5$ by 4). Although most accounts report *A. concolor* as having no facial stripes, we observe faint stripes that are not immediately noticeable as in other species of *Artibeus*. This species is medium-sized with forearm ranging from 47–49 mm.

Artibeus gnomus Handley, 1987

Voucher material (4).—8 km S, 2 km W Brownsweg (CM 63775, 63776); Headquarters (ROM 113904, 113905).

The CM specimens were represented by one male ($T = 4$) and one non-reproductive female caught on 20 September 1979. The two ROM specimens, an adult male ($T = 3$ by 2) and a lactating adult female, were

caught in a canopy net set in mountain savanna forest on 11 April 2002. *A. gnomus* is slightly smaller (FA = 36–38) than *A. cinereus* and *A. bogotensis*, but can also be distinguished externally by conspicuous yellow edging on the rims of the ears and outside margins of the noseleaf base. This is the first confirmed report of *A. gnomus* from Suriname (Lim et al., in preparation *b*), a species that previously was confused with other small-sized *Artibeus*. Cranially, *A. gnomus* is relatively small, has swollen supraorbital processes, and a small third upper molar (Handley 1987; Lim et al., in preparation *b*).

Artibeus lituratus (Olfers, 1818)

Voucher material (24).—8 km S, 2 km W Brownsweg (CM 63819, 63820, 63821, 64184); Headquarters (ROM 113883, 113910, 113924, 114005, 114006, 114131); Jeep Trail (ROM 114028, 114080, 114110); Km 1.5 Wittie Kreek Trail (ROM 114166, 114167, 114168); Km 2.4 Wittie Kreek Trail (ROM 114198, 114199, 114200, 114201, 114202, 114203); Km 3.6 Wittie Kreek Trail (ROM 114244, 114245).

The CM specimens are all males; those taken on 19–20 September 1979 had testes length of 7 and 9. The ROM specimens include ten adult males (T = 7 by 4 to 10 by 7) captured between 11 and 21 April 2002, one subadult male (T = 4 by 3) captured on 21 April 2002, and eight reproductive adult females captured between 10 and 22 April 2002, and one lactating adult female captured on 21 April 2002. Six were caught in mountain savanna forest, two in moss-covered mountain savanna forest (one in a canopy net), one in high forest, nine in high palm-dominated forest, and two in high marsh forest. *A. lituratus* is one of the most distinctive and largest (FA = 63–78) species of *Artibeus*, and has well-defined white facial stripes, medium-brown fur lacking silver frosting on the ventral pelage, and has a hairy dorsal surface on the inter-femoral membrane. Husson (1962; 1978) reported several specimens as *A. lituratus fallax* from Suriname that Simmons and Voss (1998) recognized as a composite of two species, *A. lituratus* and *A. planirostris* (sensu Lim et al. 2004).

Artibeus obscurus Schinz, 1821

Voucher material (19).—8 km S, 2 km W Brownsweg (CM 63794, 63795); Headquarters (ROM 113884, 113911, 113912, 113913, 113914, 113927, 113990, 114068, 114119); Jeep Trail (ROM 114029, 114039, 114111); Km 1.5 Wittie Kreek Trail (ROM 114169); Km 2.4 Wittie Kreek Trail (ROM 114208); Irene Falls (ROM 114217, 114231); Km 3.6 Wittie Kreek Trail (ROM 114246).

The two CM specimens were non-reproductive females

when taken on 24 September 1979. The ROM specimens include ten adult males (T = 6 by 4 to 10 by 7) captured between 10 and 22 April 2002, one non-reproductive subadult female captured on 21 April 2002, four reproductive adult females captured from 16 to 21 April 2002, and two pregnant (CR = 35 and 36) females captured on 15 and 16 April 2002. Nine were collected in mountain savanna forest, two in moss-covered mountain savanna forest, one in high forest, two in high palm-dominated forest, and three in high marsh forest. This species has long, dark brown fur, indistinct pale facial stripes, and forearm lengths ranging from 59 to 63 mm. This is the first report of *A. obscurus* from Suriname. Although this species is common and widely distributed in the country, there were no specimens as part of the composite "*A. lituratus fallax*" reported by Husson (1962; 1978) that could be unambiguously identified as *A. obscurus*.

Artibeus planirostris (Spix, 1823)

Voucher material (35).—3 km S, 20 km W Afobakka (CM 53480, 53481); 7 km S, 18.5 km W Afobakka (CM 53482, 53483, 53484, 53485, 53763, 53764, 53765, 53766); 8 km S, 2 km W Brownsweg (CM 63809, 63810, 64183); Headquarters (ROM 113894, 113915, 113926, 113988, 113989, 114067, 114020, 114133, 114134); Jeep Trail (ROM 113960, 113961, 114021, 114027, 114040, 114091, 114092, 114107, 114108, 114109, 114120, 114132); Km 3.6 Wittie Kreek Trail (ROM 114247).

The CM specimens included eight males and five females. A female taken on 21 September 1979 was pregnant (CR = 22) and a male taken on 20 September had testes 6 mm in length. The ROM specimens include 13 adult males (T = 4 by 3 to 10 by 8) captured from 11 to 18 April 2002, seven reproductive females captured from 10 to 18 April 2002, one lactating female captured on 22 April 2002, and one pregnant (CR = 32) female captured on 16 April 2002. Nine were caught in mountain savanna forest, seven in moss-covered mountain savanna forest (one with a canopy net), five in high forest, and one in high marsh forest. An additional 27 individuals were released, which included 14 males (one subadult) and 13 females (one subadult, one pregnant, and six lactating) captured from 19 to 22 April 2002. Of these released bats, five were caught in mountain savanna forest near the Headquarters, four in moss-covered mountain savanna forest along Jeep Trail, one in secondary forest at Telesur Camp, four in high marsh forest at Irene Falls, seven in high palm-dominated forest at Km 1.5 Wittie Kreek Trail, and six in high palm-dominated forest at Km 2.4 Wittie Kreek Trail. This species is large (FA = 64–71) and has grayish brown dorsal fur and silvery frosting on the hair tips on the ventral fur. This is the first confirmed report of *A. planirostris* from Suriname although Simmons and Voss (1998) correctly suspected that the taxon

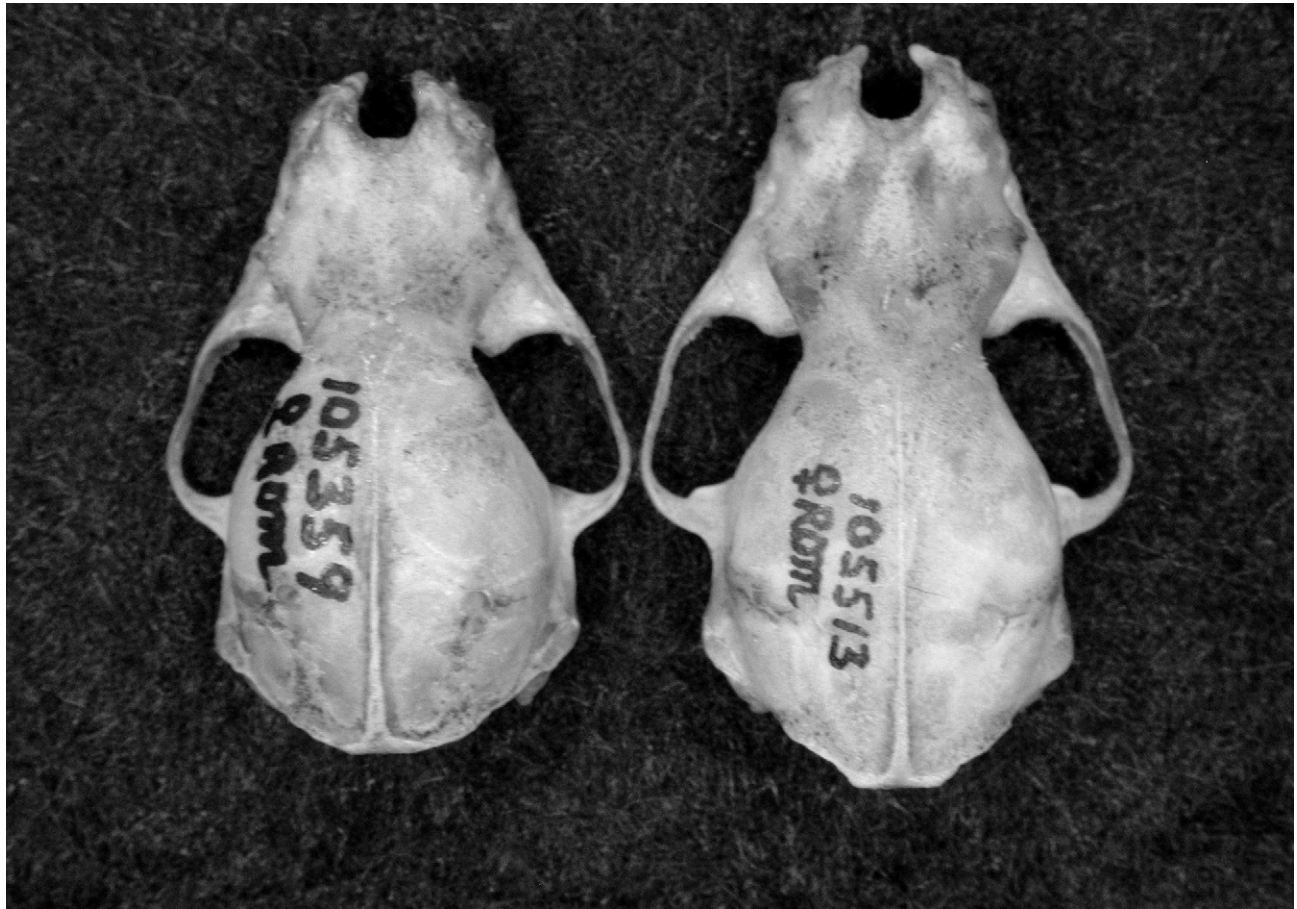


Fig. 4.—Dorsal view of the skulls of *Eptesicus furinalis* (ROM 105359, ♀) on the left and *E. brasiliensis* (ROM 105513, ♀) on the right. Both specimens are from Onkone Gare, 38 km S Pompeya Sur, Napo Province, Ecuador. Note the larger overall size of the skull and well-developed sagitto-occipital crest, which projects posteriorly, in *E. brasiliensis*.

A. lituratus fallax of Husson (1962; 1978) included both *A. lituratus* and *A. planirostris*.

Chiroderma trinitatum Goodwin, 1958

Voucher material (4).—Km 1.5 Wittie Kreek Trail (ROM 1141700); Irene Falls (ROM 114213, 114233, 114234).

Three individuals were caught in high marsh forest on 21 April 2002, including one subadult male (T = 2 by 1) and two adult males (T = 4 by 3 and 5 by 3). One non-breeding female was netted in high palm-dominated forest captured on 20 April 2002. *Chiroderma* is characterized by unicuspid inner upper incisors, which are much longer than the outer incisors, well-furred interfemoral membrane, and relatively large eyes. *C. trinitatum* has distinct white facial stripes, a median white stripe on the medium-brown to grayish brown dorsum, and is the smaller (FA = 38–41) of the two species in this genus found in Suriname.

Chiroderma villosum Peters, 1860

Voucher material (2).—Irene Falls (ROM 114212, 114228).

A lactating female and a male (T = 2 by 1) were collected in high marsh forest on 21 April 2002. This species has indistinct white facial stripes, a faint pale line on its lower back (sometimes difficult to see), and a forearm of 44 to 48 mm.

Platyrrhinus helleri (Peters, 1866)

Voucher material (12).—7 km S, 18.5 km W Afobakka (CM 53834); 8 km S, 2 km W Brownsweg (CM 63877, 63878); Headquarters (ROM 113919, 113991, 114070); Jeep Trail (ROM 113976, 113977, 114089); Km 2.4 Wittie Kreek Trail (ROM 114195, 114206); Irene Falls (ROM 114211).

The CM specimens include three females, two of which

were pregnant (CR = 13 and 19) when taken on 22 September 1979. The ROM specimen include four adult males (T = 4 by 2 to 5 by 3) captured from 11 to 21 April 2002, two non-reproductive adult females on 12 and 21 April 2002, and three pregnant (CR = 13–23) females captured from 12 to 21 April 2002. Three were netted in mountain savanna forest, two in moss-covered mountain savanna forest, one in high forest, two in high palm-dominated forest, and one in high marsh forest. This brightly colored species has a fringe of fine, pale hairs along the edge of the interfemoral membrane, white facial stripes, white line from the head to the lower back, dark brown dorsal fur, and a forearm length from 37 to 40 mm.

Sturnira lilium (E. Geoffroy, 1810)

Voucher material (51).—7 km S, 18.5 km W Afobakka (CM 53795, 53796); 8 km S, 2 km W Brownsweg (CM 64306, 64307, 64308, 64309, 64310, 64311, 64312, 64313, 64314, 64315, 64316, 64317, 64318, 64319, 64320, 64321, 64322, 64323, 64324, 64325, 64326, 64327, 64328, 64329, 64330, 64331, 64332, 64333, 64334, 64335, 64336, 64337, 64338); Headquarters (ROM 114066); Jeep Trail (ROM 114078, 114079); Telesur Camp (ROM 114171, 114172, 114173, 114174, 114175, 114176, 114177, 114178, 114179, 114180, 114181); Km 2.4 Wittie Kreek Trail (ROM 114207); Irene Falls (ROM 114214).

The CM specimens include 12 males and 23 females, including two females that were noted as being pregnant when captured on 22 September 1979. The ROM specimens include eight adult males (T = 4 by 3 to 7 by 5) captured from 16 to 21 April 2002, one non-reproductive adult female captured on 16 April 2002, and seven pregnant (CR = 24–32) females captured on 20 April 2002. Three were caught in canopy nets set in mountain savanna forest and moss-covered mountain savanna forest. The others were caught in ground level nets set in secondary forest, with the exception of one captured in high, palm-dominated forest and another in high marsh forest. *Sturnira* is characterized by the absence of an interfemoral membrane, giving the appearance of hairy legs, and yellowish or reddish staining on the shoulders from a scent gland. *S. lilium* is the smaller (FA = 40–44) of the two species found in the Guianas, has bicolor dorsal fur with pale base and brown tips, and tapered or bluntly pointed inner upper incisors.

Sturnira tildae de la Torre, 1959

Voucher material (27).—3 km S, 20 km W Afobakka (CM 53823, 53824, 53825, 53826, 53827); 8 km S, 2 km W Brownsweg (CM 63842); Headquarters (ROM 113882, 113896, 113897, 113906, 113907, 113916, 113917, 113947, 113948, 114053, 114054, 114055); Jeep

Trail (ROM 113972, 113973, 114016, 114017, 114036, 114037, 114077, 114098, 114099).

Genoways and William (1979) reported on some of the CM specimens from Brownsberg as the second occurrence of the species in Suriname. Since then, *S. tildae* has been found widely distributed and common throughout the country. The ROM specimens include one subadult male (T = 3 by 1) captured on 12 April 2002, nine adult males (T = 3 by 2 to 8 by 3) captured from 10 to 15 April 2002, six non-reproductive females captured from 10 to 15 April 2002, one lactating female captured on 16 April 2002, one lactating and pregnant (CR = 7) female captured on 16 April 2002, and three pregnant (CR = 15–24) females captured between 10 and 16 April 2002. Twelve were caught in mountain savanna forest (four with canopy nets), seven in moss-covered mountain savanna forest (three with canopy nets), and two in high forest. An additional 12 individuals were released, which included six males and six females (one pregnant and one lactating) between 17 and 22 April 2002. Of these released bats, nine were caught in mountain savanna forest near the Headquarters, one in moss-covered mountain savanna forest along Jeep Trail, and two in high marsh forest at Irene Falls. *S. tildae* is larger (FA = 45–48) than *S. lilium*, has tricolored dorsal fur, and rectangular inner upper incisors with a straight cutting edge.

Uroderma bilobatum Peterson, 1968

Voucher material (8).—8 km S, 2 km W Brownsweg (CM 63860, 63861, 63862, 63863, 63864, 63865); Headquarters (ROM 113920); Jeep Trail (ROM 113987).

The CM specimens include four males (T = 4 to 5) and two pregnant females (CR = 10 and 22, captured on 23 and 20 September 1979, respectively). Honeycutt et al. (1980) reported the karyotype as $2n = 42$ and $FN = 50$. The two ROM specimens are males (T = 5 by 4) netted in mountain savanna forest on 11 April 2002, and moss-covered mountain savanna forest on 13 April 2002. *U. bilobatum* has relatively smaller bifid inner upper incisors than do species in *Artibeus*, white facial stripes, pale mid-dorsal line on a brown back, and a forearm length ranging from 39–45 mm.

Vampyressa brocki Peterson, 1968

Voucher material (1).—Irene Falls (ROM 114235).

One non-breeding adult female was netted in high marsh forest on 21 April 2002. This small species (FA = 34) has white facial stripes and a faint mid-dorsal line on the grayish brown back. A recent molecular study by Porter and Baker (2004) proposed taxonomic changes to the genus

Vampyressa because *V. pusilla* and *V. thyone* formed the sister clade to *Mesophylla macconnelli*, and not to a clade of *V. brocki* and *V. bidens*. They recommended the use of the genus *Vampyriscus* for *V. brocki* and *V. bidens*. However, the branch support values for these clade relationships were low, and the traditionally recognized species in *Vampyressa* were monophyletic in a parsimony analysis tree that was one step longer than their shortest tree. Until a more definitive conclusion is reached, we retain *V. brocki* and *V. bidens* in *Vampyressa* as reported by Lim et al. (2003) in an earlier molecular study.

Vampyrodes caraccioli (Thomas, 1889)

Voucher material (1).—Headquarters (ROM 113918).

An adult male (T = 7 by 5) was caught in mountain savanna forest on 11 April 2002. This large species (FA = 55) has bright facial stripes, distinct dorsal white line from its head to rump, pale brown dorsal fur, and a fringe of pale hairs on the margin of the interfemoral membrane.

Subfamily Desmodontinae (vampire bats)

Desmodus rotundus (E. Geoffroy, 1810)

Although not collected as a voucher specimen, the presence of the common vampire bat in the Brownsberg area was noted on numerous occasions during Operation Gwamba because there was evidence of its feeding on dogs and humans in camp (Walsh and Gannon 1967).

Family Thyropteridae (disc-winged bats)

Thyroptera tricolor Spix, 1823

Voucher material (20).—Headquarters (ROM 113925, 113951, 113952, 113953, 113954, 113955, 113956); Km 2.5 Headquarters road (ROM 114301, 114302, 114303, 114304, 114305, 114306, 114307, 114308, 114309, 114310, 114311, 114312, 114313).

A non-breeding adult female was collected on 11 April 2002, and five adult males (T = 2 by 1 to 3 by 2) and another non-reproductive adult female were collected on 12 April 2002 from a furred heliconia leaf in the Headquarters clearing within mountain savanna forest. Thirteen individuals, including five non-reproductive adult females and eight adult males, were collected from rolled platanillo leaves near the road leading to the Headquarters on 25 April 2002. This disc-winged bat has a white or pale venter, brown or grayish-brown dorsum, and forearm length of 34–39 mm.

Family Vespertilionidae (evening bats)
Eptesicus brasiliensis (Desmarest, 1819)

Voucher material (1).—8 km S, 2 km W Brownsweg (CM 63897).

A lactating female was collected at Brownsberg Nature Park on 20 September 1979. *E. brasiliensis* is larger (FA > 42) than *E. furinalis* (FA < 41) and has short, dark brown dorsal fur.

The taxonomy of large-sized *Eptesicus* in northeastern South America was greatly clarified by Simmons and Voss (1998) who recognized the long, black haired *E. chiriquinus* as a species distinct from the short and dark-brown haired *E. brasiliensis*. They did not, however, thoroughly re-evaluate the taxonomic status of *E. brasiliensis* because this species was not collected at Paracou, French Guiana. Based on a partially damaged skull, the holotype of *E. melanopterus* from Paramaribo was regarded as a smaller subspecies of *E. brasiliensis* in northeastern South America (Davis 1966). But this decision was made without comparison to a definitive specimen of true *E. brasiliensis* from the Guianas and with a limited sample of comparative material for the smaller *E. furinalis*. Although adequate sample size is still a problem for these difficult to catch, high-flying aerial insectivores, our specimens from Brownsberg include two size classes. CM 63897, referable to *E. brasiliensis*, is larger than the other sympatric specimens (CM 53858, CM 63895, CM 63896, ROM 113880), referable to *E. furinalis*, for all measurements except postorbital breadth (Table 3). Size differences due to secondary sexual dimorphism can be ruled out because all of these samples are female except ROM 113880. The few measurements available for the damaged holotype of *E. melanopterus* (RMNH 120992), as presented in Davis (1966), are all smaller than CM 63897 and fall within the range of the other Brownsberg material except for a larger breadth across upper molars (Table 3). These comparisons suggest that *E. melanopterus* is referable to the smaller *E. furinalis* and not to the larger *E. brasiliensis* as originally proposed by Davis (1966) and Husson (1978). A previous discriminant functions analysis aligned *E. melanopterus* with *E. furinalis*, but further study was recommended before a formal taxonomic change was proposed (Williams 1978).

Two size classes also were found sympatrically at another locality, Onkone Gare in Amazonian Ecuador. Both specimens are female and compare favorably with the Brownsberg material (Table 3). ROM 105513 is larger with a well-developed sagitto-occipital crest projecting posteriorly and referable to *E. brasiliensis* (Fig. 4). In contrast, ROM 105359 is smaller, has a moderately developed sagitto-occipital crest that does not project posteriorly and is referable to *E. furinalis*. By increasing the geographic scope to the Guianas, *E. brasiliensis* still averages larger than *E. furinalis* in all measurements (Table 3). Although there is now overlap in some of the measurements with the increase

TABLE 3. Six cranial measurements and forearm length for specimens of *Eptesicus* from Brownsberg Nature Park in Suriname and other comparative samples. Mean values with range in parentheses are given for samples greater than one and bolded for species. Sample size may not be correct for all measurements due to damaged skulls. Refer to Simmons and Voss (1998) for specimens listed as AMNH*.

Specimen	Country	Sample Size	Greatest Length of Skull	Zygomatic Breadth	Mastoid Breadth	Postorbital Breadth	Maxillary Tooth Row	Breadth across Molars	Forearm Length
<i>E. chiriquinus</i>									
ROM 113891	Suriname	1♀	18.0 (17.9–18.1)	12.1 (11.6–12.5)	9.2 (8.9–9.4)	4.0 (3.9–4.1)	6.8 (6.7–6.9)	7.5 (7.4–7.7)	47 (45–50)
AMNH*	French Guiana	2♀♀	18.1	12.0	9.2	4.0	6.8	7.6	50
				12.0 (11.6–12.5)	9.3 (9.2–9.4)	3.9 (3.9–4.0)	6.9 (6.8–6.9)	7.6 (7.4–7.7)	48 (47–48)
ROM 100811	Guyana	1♂	17.9	12.2	9.3	4.1	6.7	7.7	46
AMNH*	French Guiana	2♂♂		12.2 (12.0–12.4)	9.1 (8.9–9.2)	4.1 (4.0–4.2)	6.9 (6.9–6.9)	7.5 (7.4–7.5)	47 (45–48)
<i>E. brasiliensis</i>									
ROM 105513	Ecuador	1♀	17.8 (17.6–18.0)	11.6 (11.2–11.9)	9.0 (8.8–9.2)	3.9 (3.7–4.2)	6.3 (6.2–6.4)	7.2 (7.0–7.4)	43 (42–44)
ROM 100921	Guyana	1♀	18.0	11.9	8.9	4.2	6.2	7.3	44
CM 63897	Suriname	1♀	17.6	11.2	8.8	3.7	6.2	7.0	43
				11.7	9.2	3.8	6.4	7.4	42
<i>E. furioides</i>									
ROM 105359	Ecuador	1♀	16.5 (15.9–17.2)	11.0 (10.4–11.5)	8.5 (8.0–8.9)	3.8 (3.6–3.9)	5.8 (5.5–6.1)	6.7 (6.4–7.1)	41 (39–43)
AMNH*	French Guiana	4♀♀	16.7	11.1	8.7	3.9	6.1	6.8	43
ROM 57518	Guyana	1♀	16.1	10.8 (10.5–11.1)	8.5 (8.2–8.8)	3.8	5.8 (5.5–5.9)	6.7 (6.5–7.0)	41 (40–42)
ROM 103132	Guyana	1♀	16.6	11.1	8.2	3.8	5.8	6.7	39
ROM 112641	Guyana	1♀	16.6	11.1	8.7	3.8	6.0	6.8	42
CM 53858	Suriname	1♀	16.3	10.9	8.1	3.7	5.7	6.9	42
CM 63895	Suriname	1♀	16.1	11.2	8.5	3.6	5.9	6.8	41
CM 63896	Suriname	1♀	15.9	10.7	8.9	3.9	6.0	6.7	41
RMNH 12092	Suriname	1♀		10.7	8.2	3.6	5.9	6.7	40
							6.0	7.1	41
<i>E. furioides</i>									
AMNH*	French Guiana	4♂♂		10.8 (10.4–11.3)	8.4 (8.0–8.9)		5.7 (5.6–5.8)	6.6 (6.4–6.8)	40 (39–42)
ROM 97826	Guyana	1♂	16.3	10.7	8.0	3.6	5.8	6.5	41
ROM 98114	Guyana	1♂	17.2	11.1	8.6	3.7	6.0	6.8	42
ROM 98715	Guyana	1♂	16.3	10.9	8.4	3.8	5.9	6.9	40
ROM 103003	Guyana	1♂	16.9	11.5	8.5	3.9	5.9	6.9	41
ROM 112691	Guyana	1♂	16.7	11.0	8.6	3.9	5.9	6.7	40
ROM 113815	Guyana	1♂	15.9	10.9	8.5	3.8	5.7	6.6	40
ROM 113880	Suriname	1♂	16.8	11.3	8.9	3.8	6.0	6.7	40

in sample size, greatest length of skull and maxillary tooth row length continue to separate these two taxa on size.

Eptesicus chiriquinus Thomas, 1920

Voucher material (1).—Headquarters (ROM 113891).

A non-breeding adult female was netted in mountain savanna forest on 10 April 2002. This species has long black fur and a forearm of 50 mm. Simmons and Voss (1998) distinguished *E. chiriquinus* from *E. brasiliensis* on the basis of length and color of the dorsal fur and on cranial characters. Based on material from the Guianas, *E. chiriquinus* averages larger than *E. brasiliensis* for forearm length and for all cranial measurements. This was true at Brownsberg where they are sympatric. This also was true at Baramita in northwestern Guyana, where a male *E. chiriquinus* was larger for all measurements than a female *E. brasiliensis* (Table 3). However, with a more complete geographic sampling of its distribution, *E. chiriquinus* appears to be smaller in other regions (Simmons and Voss 1998). This is the first report of *E. chiriquinus* from Suriname and with the recent report from Guyana (Lim and Engstrom 2001) completes its occurrence throughout the Guianas.

Eptesicus furinalis (d'Orbigny, 1847)

Voucher material (4).—3 km S, 20 km W Afobakka (CM 53858); 8 km S, 2 km W Brownsweg (CM 63895, 63896); Headquarters (ROM 113880).

The CM specimens included three females with one pregnant (CR = 9) when captured on 20 September 1979. The ROM specimen was an adult male (T = 7 by 3) captured in mountain savanna forest on 10 April 2002. *E. furinalis* has relatively short dark brown fur and is smaller than *E. brasiliensis* (Table 3). Based on measurements and descriptions, the specimens previously reported as *E. b. melanopterus* in Husson (1978), and presumably including one female (RMNH 24842) from Brownsberg, would therefore represent *E. furinalis* as discussed herein. After the Imataca Forest Reserve in Venezuela (Ochoa 2000), the Brownsberg material of *Eptesicus* represents the second known locality where *E. brasiliensis*, *E. chiriquinus*, and *E. furinalis* are found to be sympatric.

Myotis riparius Handley, 1960

Voucher material (3).—Headquarters (ROM 113879, 114007, 114142).

Three individuals were caught in mountain savanna forest including two adult males (T = 5 by 4 and 9 by 6) on 10 and 18 April 2002, and one pregnant female (CR = 4) captured on 14 April 2002. This species is small (FA = 35–37)

with reddish to grayish brown unicolor fur. This represents the first report of *M. riparius* from Suriname and completes its occurrence in the Guiana Shield (Lim et al. 2005). The measurements compare favorably with specimens Lim et al. (1999) reported as the first records for Guyana.

Family Molossidae (free-tailed bats)

Molossus molossus (Pallas, 1766)

Voucher material (5).—Headquarters (ROM 113899, 113900, 113901, 113902, 113950).

All individuals were caught in canopy nets set in mountain savanna forest, including three adult males (T = 2 by 1 to 6 by 4) captured on 11 and 12 April 2002, one non-reproductive female captured on 11 April 2002, and one pregnant (CR = 12) female captured on 11 April 2002. This species of free-tailed bat has medium-brown bicolored fur with a white base, and a forearm length of 38–41 mm.

Previous reports of this species in the Brownsberg area include 17 specimens (RMNH 18287, 25226–25241) from Afobakka on the north shore of Brokopondo Lake and 10 (RMNH 25216–25225) from the now inundated Mamacdam Falls on the Suriname River (Husson 1978).

Molossus rufus (E. Geoffroy, 1805)

Voucher material (1).—Headquarters (ROM 113903).

A pregnant female was caught in a canopy net set in mountain savanna forest on 11 April 2002. This species has black unicolor fur and a forearm length of 50 mm.

Order Primates

Family Callithricidae (marmosets)

Saguinus midas (Linnaeus, 1758)

In terms of density, number of individuals, and groups encountered during the transect survey, the commonest primate at Brownsberg was the golden-handed tamarin with 612 individuals seen in 96 troops and a density of 29 per km². All habitats were utilized, but it was most often found in mountain savanna forest (Table 1). This species was noted by all but one of the local wildlife experts (Table 2) and was recovered 14 times during Operation Gwamba (Walsh and Gannon 1967). Two individuals were seen at Km 1.1 Mazaroni Road by Park staff during the ROM survey.

Family Cebidae (New World monkeys)

Alouatta macconnelli Elliot, 1910

Troops of Guianan red howler monkeys were encoun-

tered 93 times during the 19-month transect survey. The total number of individuals observed was 465, for an average group size of five and a density estimated at 16 per km². They were found in all nine habitat types with the highest occurrence in high forest and mountain savanna forest (Table 1). The presence of *A. macconnelli* was confirmed by all eight local wildlife experts (Table 2) and with 479 individuals saved was the most common primate rescued during Operation Gwamba (Walsh and Gannon 1967). Husson (1978) reported a female (RMNH 18246) collected in forest along Gran Creek near Brokopondo Lake. During the ROM survey, howler monkeys were heard almost on a daily basis, and seen on two occasions along the Jeep Trail and near the Headquarters.

We follow the taxonomy of Groves (2001) in recognizing *A. macconnelli* as distinct from *A. seniculus* based on karyological differences in diploid numbers and sex chromosome systems (Lima and Seuánez 1991; Vassart 1996), and divergent molecular lineages (Cortés-Ortiz et al. 2003). However, distributional limits and taxonomy needs further clarification (Rylands and Brandon-Jones 1998).

Ateles paniscus (Linnaeus, 1758)

Thirty troops for a total of 113 black spider monkeys were recorded during the transect survey. Their density was calculated at 5 individuals per km². Seen most often in high forest with palms, *A. paniscus* were not encountered in liana forest (Table 1). All interviewees reported this species in the Brownsberg area (Table 2). *A. paniscus* is endemic to the lowland regions of the Guiana Shield (Lim et al. 2005).

Cebus apella (Linnaeus, 1758)

Based on the observation of 325 individuals in 44 groups, the average troop size for brown capuchin monkeys was seven and the density was estimated at 17 per km². Never encountered in dry forest, liana forest, or lowland forest, they were most commonly found in high forest and high marsh forest (Table 1). This species was noted by all local residents interviewed (Table 2). During the ROM survey, eight individuals (of which 2 were females carrying offspring) were observed at Km 0.2 on the Headquarters-Brownsveg Road. During Operation Gwamba (Walsh and Gannon 1967), three capuchin monkeys rescued were listed as *C. capucinus*, which is a species found only in northwestern South America and Central America. Husson (1978) thought that these individuals were most likely referable to *C. apella*.

Cebus olivaceus Schomburgk, 1848

The wedge-capped capuchin had the lowest density (4

per km²) for primates at Brownsberg Nature Park with 36 individuals seen in seven troops. The habitat where it was seen most often was high forest and mountain savanna forest (Table 1). Three or four individuals were observed by Park staff during the ROM survey at Km 2.0 on Mazaroni Road. It was reported as occurring in the area by half of the local wildlife experts consulted (Table 2) and Husson (1978) reported a male (RMNH 20627) from near Brownsberg and Kabel on the railway line.

Chiropotes satanas (Hoffmannsegg, 1807)

One hundred and fifty-nine brown saki monkeys were seen in 16 groups, which were most often encountered in high forest (Table 1). Five of the local wildlife experts had seen it previously in Brownsberg Nature Park (Table 2).

Pithecia pithecia (Linnaeus, 1766)

The Guianan saki had the lowest average group size (two individuals), based on 76 individuals seen during 34 contacts. The density for these monkeys was 8 per km². It regularly was observed in high forest at Brownsberg Nature Park (Table 1). This species was known to all local wildlife experts consulted (Table 2). During the ROM survey, two males were sighted at Km 0.4 on the Headquarters-Brownsveg Road. Husson (1978) reported the only voucher specimen (RMNH 20609) from the Brownsberg area as from Ganiakondre on the Suriname River, a place now submerged by Brokopondo Lake. *P. pithecia* is endemic to the lowland regions of the Guiana Shield (Lim et al. 2005).

Saimiri sciureus (Linnaeus, 1758)

Squirrel monkeys had the largest average troop size (18); 7 troops comprised of 123 individuals. Their densities were estimated at 26 per km². These were relatively evenly sighted in all habitats except in liana forest and high forest dominated with palm (Table 1). Its presence also was confirmed by all but one of the local wildlife experts (Table 2) and was rescued 32 times during Operation Gwamba (Walsh and Gannon 1967). Husson (1978) reported five voucher specimens from the Brownsberg area: male (RMNH 17809) and female (RMNH 20565) from Brownsberg near Brownsveg; two females (RMNH 17790 and 20566) collected in forest near Lombé on the Suriname River; and one specimen (RMNH 18210) from between Kabel and Abontjima. During the ROM survey, a large group of approximately 30 individuals was seen after dusk (1845 h) in a locally flooded area near the main road midway between Jeep Trail and Headquarters.

Order Carnivora
 Family Canidae (dogs)
Speothos venaticus (Lund, 1842)

Two of the local wildlife experts interviewed reported the bushdog as present in Brownsberg Nature Park (Table 2). This species was not recovered during Operation Gwamba (Walsh and Gannon 1967). Other than anecdotal reports, the only specimens from Suriname include two males and one female obtained by Sanderson (1949) and deposited at the British Museum of Natural History. Husson (1978), however, could not locate them. *S. venaticus* is rare in Suriname.

Family Felidae (cats)
Herpailurus yagouaroundi (E. Geoffroy, 1803)

The jaguarundi was observed once in high forest and once in mountain savanna forest during the walking transect survey. It was reported as occurring in Brownsberg Nature Park by six of the local wildlife experts (Table 2).

Leopardus pardalis (Linnaeus, 1758)

The ocelot was observed twice in mountain savanna forest and once each in high marsh forest and secondary forest during the walking transect survey. It also was documented by photo-trapping and from tracks but the occurrence of this species in Brownsberg Nature Park was noted by only two of the local wildlife experts (Table 2). *L. pardalis* was rescued 13 times during Operation Gwamba (Walsh and Gannon 1967).

Leopardus tigrinus (Schreber, 1775)

Three of the local wildlife experts claimed that the tigri-
 na occurred in Brownsberg Nature Park (Table 2). It is documented by only a few specimens from Suriname (Husson 1978), but was not recovered during Operation Gwamba (Walsh and Gannon 1967). The three species of small spotted cats can be difficult to differentiate by observation alone so confirmation of its existence in Brownsberg Nature Park requires a clear photograph or specimen.

Leopardus wiedii (Schinz, 1821)

The margay was seen once during the transect survey in high forest habitat. It was noted as occurring in Brownsberg Nature Park by only 1 of the local wildlife experts but was documented by photo-trapping (Table 2). One *L. wiedii* also was recovered during Operation Gwamba (1967).

Puma concolor (Linnaeus, 1771)

Puma tracks were seen eight times during the transect survey with mountain savanna forest the most common habitat (Table 3). This species also was recorded in Brownsberg Nature Park by photo-trapping and tracks, and confirmed by half of the local wildlife experts consulted (Table 2).

Panthera onca (Linnaeus, 1758)

The occurrence of jaguar was documented 21 times over the course of the transect survey with almost half of the observations in mountain savanna forest (Table 3). Twelve of the occurrences were sightings, which included three sightings of jaguar pairs, and nine were tracks. This large spotted cat had been seen by all local wildlife experts interviewed, and its presence in Brownsberg Nature Park was documented by photo-trapping (Table 2). Three individuals were recovered during Operation Gwamba (1967). During the ROM survey, one was seen near the Jeep Trail.

Family Mustelidae (weasels and allies)
Eira barbara (Linnaeus, 1758)

The tayra was observed 11 times during the transect survey with the highest occurrence in mountain savanna forest (Table 1). Its presence in Brownsberg Nature Park was confirmed by four of the local wildlife experts, documented by photo-trapping (Table 2), and was rescued twice during Operation Gwamba (Walsh and Gannon 1967). One was observed climbing a tree at Headquarters during the ROM survey.

Galictis vittata (Schreber, 1776)

The grison was identified by only one of the local wildlife experts as occurring in Brownsberg Nature Park (Table 2). It was not recovered during Operation Gwamba (Walsh and Gannon 1967) and is not considered common in Suriname (Husson 1978). A photograph or voucher specimen is needed to verify the occurrence of *G. vittata* in Brownsberg.

Lontra longicaudis (Olfers, 1818)

Half of the local wildlife experts had seen the river otter in Brokopondo Lake (Table 2). It is considered common and usually found near small streams in Suriname (Husson 1978).

Pteronura brasiliensis (Gmelin, 1788)

The giant otter was reported by only two of the local

wildlife experts as being in Brokopondo Lake (Table 2). This species is more common than the smaller river otter and is found in larger rivers in Suriname (Husson 1978).

Family Procyonidae (raccoons and allies)
Nasua nasua (Linnaeus, 1766)

The coatimundi was seen on three occasions in mountain savanna forest and twice in high closed forest during the transect survey. It was reported by five of the local wildlife experts and was recorded by photo-trapping (Table 2). During the ROM survey, it was observed on three separate occasions: one individual at Km 0.2 on Jeep Trail; one at Km 1.1 on Mazaroni Road; and twelve individuals at Km 2.6 on Mazaroni Road.

Potos flavus (Schreber, 1774)

The kinkajou was observed twice in mountain savanna forest and once each in high forest and high forest dominated with palms. Its presence was verified by half of the local wildlife experts (Table 2) and recovered 67 times during Operation Gwamba (Walsh and Gannon 1967).

Order Perrisodactyla
Family Tapiridae (tapirs)
Tapirus terrestris (Linnaeus, 1758)

The presence of tapir was noted on 31 occasions during the transect survey with the highest occurrence in mountain savanna forest (Table 1). Three occurrences were sightings with the remainder being tracks or feces. Its presence in Brownsberg Nature Park also was confirmed by five of the local wildlife experts and documented by photo-trapping (Table 2). *T. terrestris* was recovered 36 times during Operation Gwamba (Walsh and Gannon 1967). There are two specimens from the Brownsberg area: 1 (RMNH 17659) from forest near Afobakka and the other (RMNH 19731) at the mouth of the Sara Creek (Husson 1978).

Order Artiodactyla
Family Tayassuidae (peccaries)
Pecari tajacu (Linnaeus, 1758)

The collared peccary was observed 15 times with the highest occurrence in mountain savanna forest (Table 1). Six of the interviewees noted it in Brownsberg and this species also was recorded by photo-trapping (Table 2). It was rescued 71 times during Operation Gwamba (1967). Husson (1978) cited a specimen (RMNH 20987) from Ganiakondre.

Tayassu pecari (Link, 1795)

The white-lipped peccary was seen four times in high forest and once in high marsh forest during the transect survey. Five interviewees had noted its occurrence in Brownsberg (Table 2). Husson (1978) cited two specimens (RMNH 20978 and 20979) from Afobakka, near the northern shore of Brokopondo Lake.

Family Cervidae (deer)
Mazama americana (Erxleben, 1777)

The red brocket deer was observed 25 times with one sighting of a pair. The density was calculated as 1 per km² (Fitzgerald 2003). It was most often seen in mountain savanna forest but not in lowland forest or liana forest (Table 1). All but one of the eight interviewees noted its presence in Brownsberg, and confirmed by photo-trapping (Table 2). The red brocket was seen on three occasions during the ROM survey: one individual near Headquarters; one large female at Km 0.5 on Mazaroni Road; and one at Km 1.5 on Mazaroni Road. Husson (1978) mentioned two (RMNH 19663, 19667) from Afobakka, just north of Brokopondo Lake. Both species of *Mazama* were recovered 671 times but number of captures for each species were not reported (Walsh and Gannon 1967).

Mazama gouazoubira (Fischer, 1814)

The smaller gray brocket was observed half as many times as the larger red brocket and all 12 sightings were of lone individuals. Its density also was calculated as 1 per km² (Fitzgerald 2003) and was found equally in high forest and mountain savanna forest (Table 1). Six of the local wildlife experts confirmed the presence of the gray brocket in Brownsberg, as did photo-trapping (Table 2). This species represented some of the 671 brockets rescued during Operation Gwamba but there were no individual counts for each of the two species of *Mazama* captured (Walsh and Gannon 1967). Husson (1978) recorded a juvenile (RMNH 19682) from Afobakka, just north of Brokopondo Lake.

Order Rodentia
Family Sciuridae (squirrels)
Sciurillus pusillus (Desmarest, 1817)

The elusive pygmy squirrel was noted in Brownsberg by five of the interviewees (Table 5). One was observed at Headquarters during the ROM survey. We are aware of only one voucher specimen reported from Suriname (Husson 1978).

Sciurus aestuans Linnaeus, 1766

The Guianan squirrel was identified as present in Brownsberg by five of the interviewees, and confirmed

by photo-trapping (Table 2). During the ROM survey, 1 was noted at Km 0.7 on Jeep Trail and another at Km 0.3 on the Headquarters-Brownsveg road. Husson (1978) mentioned the only voucher specimen from the Brownsberg area. It is from the former village of Lombé, which is now submerged under Brokopondo Lake.

Order Muridae
Family Murinae (Old World rats)
Rattus norvegicus (Berkenhout, 1769)

Husson (1978) cited one specimen (RMNH 18249) of the introduced *R. norvegicus* collected from the Brokopondo Lake area, about 5 km south of the dam.

Rattus rattus (Linnaeus, 1758)

This introduced commensal was previously known by five specimens from Afobakka, six from Brownsveg, seven from Ganiakondre, and 61 from Gansee in the Brownsberg region (Husson 1978). Based on these numbers, *R. rattus* appears more successful in colonizing rural interior areas than does *R. norvegicus*.

Neacomys paracou Voss, Lunde and
Simmons, 2001

Voucher material (26).—7 km S, 18.5 km W Afobakka (CM 54015, 54016, 54018, 54019, 54020, 54021, 54022); 8 km S, 2 km W Brownsveg (CM 64468, 64469, 64470, 64471, 64472); Headquarters (ROM 114023, 114024, 114150); Jeep Trail (ROM 114143, 114315, 114317, 114324, 114325, 114333, 114339, 114340, 114341, 114361, 114363).

Genoways et al. (1981) reported the CM specimens as *N. guianae* (Genoways et al. 1981) but these specimens have been re-identified as *N. paracou* based on the description by Voss et al. (2001). This material includes an adult male with testes length of 10 mm, a nonreproductive juvenile female, and three subadult females caught on 8 July 1977; a subadult male caught on 10 July 1977; two subadult males each with testes length of 6 mm caught on 19–20 July 1979; two adult males with testes lengths ranging from 6–7 mm caught on 23–24 September 1979; and one subadult female with three embryos measuring 5 mm CR caught on 24 September 1979. Of the ROM specimens, one subadult male with nonsrotal testes (6 by 3 mm) and two adult males with scrotal testes (9 by 5 mm; 6 by 4 mm) were caught in Sherman traps set in mountain savanna forest on 14 and 19 April 2002. The other specimens were captured in pitfalls set in moss-covered mountain savanna forest including a non-pregnant, lactating subadult female caught on 27 April 2002; three adult males with scrotal testes ranging from 7 by 4 mm to

8 by 4 mm captured from 19 to 29 April 2002; and seven subadult males (basisphenoid-basioccipital suture not ossified) caught from 29 April to 12 May 2002 with testes ranging in size from 7 by 4 mm to 6 by 3 mm.

Neacomys are small (HF < 21 mm in our Suriname material) spiny mice with a white venter and stiff dorsal hairs, which usually vary from reddish to yellowish brown. With the recent description of *N. dubosti* and *N. paracou* as distinct from and sympatric with *N. guianae*, there are three species recorded on the Guiana Shield (Voss et al. 2001). We have found, however, that the characters used for diagnoses are variable. For example, the number of rows of scales per cm on the tail and depth of zygomatic notch seem to vary with age. The most consistent character distinguishing *N. paracou* is the short fifth digit of the hindfoot that does not extend much past the base of the first phalange of the fourth digit but this distinction can be subjective depending on the state of specimen preservation. For the identification of *N. paracou*, we use a molecular analysis based on a 800 bp fragment of mitochondrial cytochrome *b* gene. All twelve individuals of *Neacomys* caught in 2004 were sequenced and unambiguously cluster tightly with sequences of *Neacomys paracou* specimens from French Guiana, whereas cytochrome *b* sequences of *Neacomys dubosti* and *Neacomys guianae* are very divergent from each other and from *N. paracou* (unpublished data). We also used a combination of characters that include a short fifth digit of the hindfoot, large scales on the tail, a deep zygomatic notch, and long incisive foramina as described by Voss et al. (2001). However, we found individual variation in the appearance of these characters and rely mostly on our unpublished molecular analysis.

Oecomys auyantepui Tate, 1939

Voucher material (19).—7 km S, 18.5 km W Afobakka (CM 54055); Headquarters (ROM 113975, 114342); Jeep Trail (ROM 114008, 114022, 114059, 114121, 114122, 114146, 114314, 114316, 114323, 114331, 114338, 114357, 114358, 114364, 114365, 114366).

One specimen was caught in a Sherman trap set in mountain savanna forest and another caught in a BTS trap set in secondary mountain savanna forest. In addition, thirteen were collected in pitfalls, two in Sherman traps, and one in BTS trap set in moss-covered mountain savanna forest. Four *O. auyantepui* were caught in traps set on vines, branches, or treefalls approximately 1 m above the ground. Two subadult (all teeth fully erupted but basisphenoid-basioccipital suture not completely ossified and pelage a drab shade of brown) females were pregnant with one having four fetuses (CR = 28) captured on 17 April 2002, and the other with three embryos (CR = 9) caught on 1 May 2002. Two non-reproductively active juvenile (third upper molar not fully erupted) females were obtained on 27 and

29 April 2002. One juvenile male with non-scrotal testes (2 by 1 mm) was captured on 18 April 2002 and three juvenile males were obtained on 12 May 2002. Nine subadult males with scrotal testes ranging from 5 by 3 to 7 by 4 mm were captured from 12 April to 6 May 2002, and 1 adult (basisphenoid-basioccipital suture ossified and pelage reddish or orangish brown) male with scrotal testes was caught on 17 April 2002. Measurements of all individuals with fully erupted teeth (Appendix 3) compare favorably with those published by Voss et al. (2001); however, some of our younger specimens are slightly below the range of variation that they reported. Although there is considerable age variation, the reddish brown dorsal fur is relatively long (ca. 10 mm) and fluffy, whereas the ventral fur is predominantly creamy-white but occasionally with gray underfur. The tail is noticeable hairy with some hairs extending 9 mm beyond the tip. This genus has a typical arboreally adapted hindfoot that is relatively broad and short with the fifth digit reaching nearly the full length of the first phalange of the three middle toes.

Previously synonymized with *O. concolor*, *O. trinitatis*, or *O. paricola*, *O. auyantepui* was recently reinstated as a valid species endemic to the Guiana Shield and diagnosable by several morphological characters as discussed by Voss et al. (2001). Our specimens, as presently known, represent the first confirmed records of *O. auyantepui* in Suriname, although it has been found in all other Guiana Shield countries (Lim et al. 2005). The specimens reported by Husson (1978) need to be re-examined in light of recent taxonomic changes. The measurements Husson (1978) gave for *Oryzomys concolor* speciosus seem larger than expected for *Oecomys auyantepui* and the RMNH specimens may correspond to *Oecomys rex*.

Oecomys bicolor (Tomes, 1860)

Husson (1978) listed a female (RMNH 23402) collected in Brownsberg.

Oryzomys macconnelli Thomas, 1910

Voucher material (6).—3 km S, 20 km W Afobakka (CM 54056, 54057, 54058); 10 km S, 23 km W Afobakka (CM 54059); Jeep Trail (ROM 114337, 114355).

The ROM specimens consist of a subadult male (basisphenoid-basioccipital suture not completely ossified) captured on 1 May 2002 and an adult male caught in a pitfall trap in moss-covered mountain savanna forest on 6 May 2002. This is a large terrestrial rat (hindfoot > 33 mm) with a reddish brown dorsal pelage and a grayish venter. Measurements (Appendix 3) conform to those reported by Voss et al. (2001), although the interorbital breadth of our adult (ROM 114355) is slightly wider.

The four Carnegie Museum specimens, two males and

two females, were included in a recent systematic study of oryzomine rodents (Musser et al. 1998). One female trapped on 7 July 1977 was pregnant with two embryos (CR = 10 mm) and a male taken on that same date had testes that were 4 mm long. Another female taken on 9 July 1977, was lactating. The specimen (RMNH 20539) Husson (1978) reported from Brownsberg is an adult male.

Oryzomys megagephalus (Fischer, 1814)

Voucher material (13).—3 km S, 20 km W Afobakka (CM 54026, 54027, 54028, 54029, 54030); 5 km S, 21.5 km W Afobakka (CM 54031); 7 km S, 18.5 km W Afobakka (CM 54032, 54033, 54034, 54035); 10 km S, 23 km W Afobakka (CM 54036); 8 km S, 2 km W Brownsberg (CM 64543); Jeep Trail (ROM 114359).

We caught one subadult male (all molars fully erupted but basisphenoid-basioccipital suture not completely ossified) in a pitfall trap set in moss-covered mountain savanna forest on 7 May 2002. This is a medium-sized terrestrial rat with a relatively long (27 mm) and narrow hindfoot that has the three middle toes elongated to the point where the fifth toe only reaches the end of the metatarsals. The dorsal pelage is usually a drab grayish brown, the ventral pelage is gray, and the tail appears hairless to the naked eye. Differentiation from the superficially similar sympatric species *O. yunganus* requires examination of the dentition. *O. megagephalus* has a molar occlusal pattern consisting of a long paraflexus and the lack of a labial fossette in the second upper molar and an elongated hypoflexid that bisects the lower second molar (Musser et al. 1998).

Prior to the systematic revision of Musser et al. (1998), some CM specimens from the Brownsberg area were reported as *O. capito* by Genoways et al. (1981). Of the CM specimens, seven were males and five were females. A female trapped on 7 July 1977 was found to be carrying 3 embryos (CR = 12) and a female taken on 19 September 1979 was noted as reproductively inactive. Six of the males taken between 7 to 9 July 1977 had an average testes length of 7.3 (2–11). Husson (1978) listed a male specimen from Brownsberg on the western shore of Brokopondo Lake (ZMA 15.455) as *Oryzomys capito velutinus*. We did not examine this individual, but its measurements are similar to those reported for both *O. megagephalus* and *O. yunganus* by Musser et al. (1998) and Voss et al. (2001).

Oryzomys yunganus Thomas, 1902

Voucher material (1).—Jeep Trail (ROM 114189).

One subadult female (molars fully erupted, with an incompletely ossified basisphenoid-occipital suture) was caught in a Sherman trap set on the ground in moss-covered mountain savanna forest on 20 April 2002. It was pregnant

with four fetuses of CR = 27 mm. The hindfoot length recorded in the field was 32 mm but this measurement is beyond the range of 26–30 mm reported for specimens from the Guianas (Musser et al. 1998). The hindfoot in the dried voucher specimen was re-measured as 27 mm suggesting that the field measurement is incorrect. Our specimen has six plantar pads on the hindfoot, which is typical for *O. yunganus*; however, populations in French Guiana usually have five plantar pads (Musser et al. 1998; Voss et al. 2001). Although we caught only one *O. yunganus*, the number of plantar pads is unreliable for field identification in Suriname because *O. megacephalus* also has six plantar pads (Musser et al. 1998). Tooth morphology must be examined for positive identification as our specimen had a dental occlusal pattern typical for *O. yunganus*, including a short paraflexus in combination with a medial and lateral fossette in the second upper molar and a hypoflexid that extends only halfway across the second lower molar with an entoflexid or fossettid on the labial side (Musser et al. 1998). The length of the molar tooth row (4.8 mm) and breadth of the incisive foramina (2.4 mm) of our subadult female are slightly larger than French Guiana specimens (4.3–4.6 mm and 1.7–2.2 mm, respectively), which were reported as relatively smaller compared to other Amazonian populations (Voss et al. 2001).

***Rhipidomys nitela* Thomas, 1901**

Voucher material (1).—Headquarters (ROM 114147).

Our specimen of climbing rat was caught in a Sherman trap set in the rafters of a house in the Headquarters clearing in mountain savanna forest on 18 April 2002. It was a pregnant female with two fetuses (CR = 20 mm) and had three pairs of mammae positioned inguinally, abdominally, and postaxially. This is a small species (HF = 26 mm) with short (5 mm) dorsal pelage, a pure white venter, a tail longer than head-body, and a noticeable tuft of hair at the tip of the tail (10 mm). The external and cranial measurements (Appendices 2 and 3) conform to those published by Voss et al. (2001).

Family Erethizontidae (porcupines)
***Coendou melanurus* (Wagner, 1842)**

Based on recent taxonomic reviews of Neotropical porcupines, Voss and Angermann, 1997 and Voss et al., 2001 concluded that Husson (1978) misapplied the name *Sphiggurus insidiosus*, which represents a species restricted to Atlantic Forest of Brazil, to the short bicolor-quilled *Coendou melanurus* found in Suriname and endemic to the Guiana Shield. Similarly misidentified, *C. melanurus* was rescued 518 times during Operation Gwamba (Walsh and Gannon 1967). One of the interviewees noted a species of porcupine other than *C. prehensilis* in the Brownsberg area, but

did not recognize it as *C. melanurus* (Table 2). Husson (1978) listed one male (ZMA 9076) from around Brokopondo Lake and another male (RMNH 18218) from Afobakka.

***Coendou prehensilis* (Linnaeus, 1758)**

Six of the interviewees noted this porcupine in the Brownsberg area (Table 2). With 927 individuals saved, *C. prehensilis* was the third most common mammal recovered during Operation Gwamba (Walsh and Gannon 1967).

Family Hydrochaeridae (capybaras)
***Hydrochoeris hydrochaeris* (Linnaeus, 1766)**

The capybara was seen twice in secondary forest near creeks and marshy areas during the walking transect survey. It was noted as present in Brokopondo Lake by two interviewees (Table 2) and also recovered once during Operation Gwamba (1967).

Family Dasyproctidae (agoutis)
***Dasyprocta leporina* (Linnaeus, 1758)**

The red-rumped agouti was observed on 103 occasions during transect surveys with 15 of those sightings including two individuals. Their density was calculated as 5 per km² in Brownsberg Nature Park. It was commonly sighted in mountain savanna forest but was not seen in lowland forest and liana forest (Table 1). *D. leporina* was noted by seven of the interviewees and recorded by photo-trapping (Table 2). It was recovered 226 times during Operation Gwamba (Walsh and Gannon 1967). Husson (1978) listed a specimen (ZMA 9849) from Sara Creek, about 15 km south of Afobakka Dam. During the ROM survey, red-rumped agoutis were seen on four separate occasions (once with two individuals together) along Mazaroni Road from Km 1.4 to the Headquarters, and once at Km 0.3 on the Headquarters-Brownsberg Road.

***Myoprocta acouchy* (Erxleben, 1777)**

Voucher material (1).—10 km S, 23 km W Afobakka (CM 54099).

This species was observed on 17 occasions during the transect surveys. CM 54099 is the only voucher specimen of an acouchy from Brownsberg and was a non-reproductive subadult (third upper and lower molars beginning to erupt) female obtained on 9 July 1977. This species was noted as occurring in the area by 4 of the local wildlife experts and documented by photo-trapping (Table 2). It was rescued 247 times during Operation Gwamba (Walsh and Gannon 1967). Husson (1978) listed a male (RMNH 20731) from

Ganiakondre and a female (RMNH 20732) from the summit of Mazaroni Mountain near Brownsberg under the name *M. exilis*.

Family Cuniculidae (pacas)
Cuniculus paca (Linnaeus, 1766)

The presence of paca was noted on 22 occasions (five sightings and 17 sets of tracks) during the transect survey with the highest occurrence in high forest (Table 1). This species also was noted by seven of the interviewees and recorded by photo-trapping (Table 2). It was recovered 147 times during Operation Gwamba (Walsh and Gannon 1967).

Family Echimyidae
Echymys chrysurus (Zimmermann, 1780)

The white-faced tree rat was noted as occurring in Brownsberg by only one of the interviewees; however, the white streak on its head would be unmistakable to an experienced person such as Djemba, who was one of the interviewees (Table 2). This species was listed as rescued 104 times during Operation Gwamba, although considerable variation in white external markings was noted (Walsh and Gannon 1967).

Makalata didelphoides (Desmarest, 1817)

Husson (1978) listed a female (RMNH 18285) from Gansee on the Suriname River, which is now covered by Brokopondo Lake, under the name *Makalata armata*.

Mesomys hispidus (Desmarest, 1817)

Voucher material (2).—Jeep Trail (ROM 114354, 114360).

One juvenile female (age class 4 of Patton and Rogers, 1983) and one adult male were collected in pitfall traps in moss-covered mountain savanna forest on 6 and 7 May 2002, respectively. The measurements of our adult compare favorably with those reported in Voss et al. (2001), although a few are slightly smaller including condyloincisive length, breadth of first upper molar, length of zygoma, and breadth across zygomatic arches (Appendix 3). This primarily-arboreal rat is of medium size (HF=25–26 mm) and has relatively thick, spiny fur with an orangish brown color and white venter. Orlando et al. (2002) recently reviewed the systematics and taxonomy of this species.

Proechimys cuvieri Petter, 1978

Voucher material (16).—7 km S, 18.5 km W Afobakka

(CM 54104); 8 km S, 2 km W Brownsweg (CM 64574, 64576, 64577, 64579, 64580, 64583, 64584, 64586); Headquarters (ROM 114026, 114058, 114148, 114326, 114350); Km 1.1 Mazaroni Road (ROM 114237, 114238).

All of the ROM specimens were captured in Sherman traps set on the ground with five caught in mountain savanna forest (one of which was collected in a house) and two in secondary mountain savanna forest. Three adult females (age class 9 of Patton and Rogers 1983) were pregnant with four fetuses each (CR ranging from 30 to 39 mm) when captured between 19 and 29 April 2002; one juvenile (age class 4) female caught on 14 April 2002 was non-reproductive; one adult (age class 10) male had testes measuring 36 by 20 mm when caught on 3 May 2002; and one juvenile male captured on 21 April 2002 had testes 5 by 3 mm. Of the CM specimens, six are females taken between 19 and 24 September 1979, with five non-reproductive and one taken on 19 September containing a single fetus (CR = 10) and two of the three were males taken on 22 and 24 September 1979 had testes lengths of 3 and 5 mm.

There are two species of terrestrial spiny rats found at Brownsberg, both of which have stiff, flattened dorsal fur. The most reliable external field character for identification is the relative hairiness of the tail (Malcolm 1992; Voss et al. 2001); the tail is hairier in *P. cuvieri*, partially obscuring the scales; whereas the tail is sparsely haired in *P. guyannensis* and tail scales are more obvious, especially when seen under magnification. This character, however, may be difficult to observe in the field with the naked eye and we found overlap in the degree of hairiness, especially when examining between age classes. Positive confirmation requires examination of the skull. *P. cuvieri* usually has a complete incisive septum; the mesopterygoid fossa is broad and shallow, rarely reaching anteriorly beyond the third upper molar; and the bottom of the infra-orbital foramen is flat or with a low ridge canal. In contrast, *P. guyannensis* usually has an incomplete incisive septum; the mesopterygoid fossa is narrow and often extends anterior to the third upper molar; and the infra-orbital nerve canal is well developed, usually with a lateral flange. As noted by Voss et al. (2001), these characters also vary and must be used in combination. *P. cuvieri* is typically larger with adults having a molar tooth row greater than 8.1 mm, in contrast with *P. guyannensis* with a tooth row less than 8.1 mm (Appendix 3). One individual, ROM 114058, is a juvenile female of age class 4 that was tentatively identified as *P. cuvieri* based on length of the two erupted upper molars (4.2 mm). For this age class, this measurement typically ranges from 3.6 to 4.0 mm for *P. guyannensis* and from 4.2 to 4.7 mm for *P. cuvieri* (Catzeffli and Steiner 2000). However, several qualitative characters seemed more similar to *P. guyannensis* including an incomplete incisive septum, lateral flange on the infraorbital nerve canal, and a sparsely haired tail. This

individual would be a good candidate for future molecular study in delineating identification characters among the species and age classes of *Proechimys*.

As outlined in Voss et al. (2001), *P. cuvieri* is the correct name for the larger terrestrial spiny rat in the Guianas and was erroneously referred to as *P. guyannensis* by Husson (1978). Based on this information, *P. cuvieri* was previously documented at Brokopondo (ZMA 10480) and Brownsberg (RMNH 23928, 23932–23934) by Husson (1978).

Proechimys guyannensis (E. Geoffroy, 1803)

Voucher material (35).—3 km S, 20 km W Afobakka (CM 54100, 54101, 54102, 54103); 7 km S, 18.5 km W Afobakka (CM 54105, 54106); 8.8 km S, 19.3 km W Afobakka (CM 54107); 8 km S, 2 km W Brownsweg (CM 64566, 64567, 64568, 64569, 64570, 64571, 64572, 64573, 64575, 64578, 64581, 64582, 64585, 64587, 64650, 64651); Headquarters (ROM 113909, 114025, 114057, 114149, 114236, 114327, 114328, 114335, 114336, 114343, 114351); Jeep Trail (ROM 114145).

All of the ROM specimens were captured in Sherman traps set on the ground except one that was on a fallen tree approximately 1 m off the ground. In terms of habitat, ten were caught in mountain savanna forest with one of these in a house, one in moss-covered mountain savanna forest, and another in secondary mountain savanna forest. For females, there were three pregnant adults (all age class 9) with one having four fetuses (CR = 30) when captured on 18 April 2002, one with five fetuses caught on 29 April 2002, and another was lactating and contained three fetuses when obtained on 29 April 2002; one pregnant subadult (age class 5) with two fetuses (CR = 12) was caught on 14 April 2002; and one non-reproductive subadult (age class 7) was captured on 3 May 2002. For males, there were two adults with one (age class 9) having testes measuring 25 by 12 mm captured on 30 April 2002 and the other caught on 1 May 2002; one subadult (age class 5) with testes 16 by 9 mm was caught on 15 April 2002; and four juvenile males (age class 3) with testes ranging from 3 by 1 mm to 8 by 6 mm obtained between 11 and 30 April 2002. There are 12 males and 11 females in the Carnegie material. Two of these females taken on 7 July 1977 and four females taken between 21 and 23 September 1979 were reproductively inactive. Two males taken on 7 July 1977 had testes lengths of 3 and 21 mm and 4 trapped between 19 and 24 September 1979 had an average testes length of 9.5 (4–15) mm.

The smaller terrestrial spiny rat listed by Husson (1978) as *P. warreni* is referable to *P. guyannensis* as stated by Voss et al. (2001). See the previous species account of *P. cuvieri* for comparison with *P. guyannensis*, and Appendix 3 for measurements. Husson (1978) reported one male (RMNH 23920) from Brownsberg.

DISCUSSION

Mammalian Biodiversity

Excluding two commensal rats (*Rattus norvegicus* and *R. rattus*), the 123 mammal species reported from the Brownsberg area represent approximately two-thirds of the 191 indigenous non-marine mammals known from Suriname (Lim et al. 2005). Of the 68 undocumented species from Suriname, only ten would not be expected to occur in Brownsberg because they are restricted to habitats not found in the area such as savannas, tepui mountains, or large rivers (Appendix 5). Although the Brownsberg range is the dominant topographic feature in the region, the plateau is low in elevation (500 m) and relatively small in area (<15,000 ha). Thus, the mammalian fauna at Brownsberg is typical of that found in Guianan lowland rainforest. There are eight other species known from Guyana and French Guiana but undocumented in Suriname that may also occur in Brownsberg.

All eight primates known to occur in Suriname have been documented at Brownsberg. Likewise, all five expected ungulates, five expected pilosans, and four expected armadillos are found in the area. Carnivores are relatively well-surveyed (13 of 15 species) with only the crab-eating fox (*Cerdocyon thous*), a savanna species, and crab-eating raccoon (*Procyon cancrivorus*) presently unrecorded. The inventory of small mammals, however, is not as complete (Appendix 5). Four of the 14 species of opossums known from Suriname have not been recorded in Brownsberg. For rodents, there are six species of 27 that are still expected in the area; all are small sigmodontine rats and mice. Bats are the group of mammals inadequately sampled at Brownsberg. Although the recent ROM survey increased the local bat inventory to 58 species from 32, almost half (46 of 104) of the expected species diversity remains unrecorded.

Regional Comparisons

With the inclusion of the species inventory from Brownsberg, the faunal similarity analysis of Neotropical mammal sites was relatively consistent with previous studies derived from bats (Simmons and Voss 1998; Lim and Engstrom 2001), non-volant mammals (Voss et al. 2001), and all mammals (Lim and Engstrom 2005). Interestingly, Arataye in French Guiana clusters with Brownsberg and not with the nearer Paracou, French Guiana (Fig. 3). This might be an artifact of the more complete inventory at Paracou where 141 species of mammals have been documented. The similarity between Arataye (129 species documented) and Brownsberg (125 species) is probably influenced more by the similarity in total species recorded as opposed to actual affinity in species composition. Notwithstanding this methodological discrepancy, Brownsberg groups within other north-coast lowland sites of the

Guiana Shield. Six of the nine species considered widespread endemics in both the lowlands and highlands of the Guiana Shield (Lim et al. 2005) have been documented at Brownsberg (*Didelphis imperfecta*, *Monodelphis brevicaudata*, *Lophostoma schulzi*, *Neacomys paracou*, *Oecomys auyantepui*, and *Coendou melanurus*). Likewise, two of the five species considered widespread endemics restricted to the lowlands of the Guiana Shield have been recorded at Brownsberg (*Ateles paniscus* and *Pithecia pithecia*).

Research Recommendations

The documentation of large mammals at Brownsberg is nearly complete with only two probable species presently unknown from the area. As initiated by the wildlife monitoring program of Fitzgerald (2003), continued long-term study of the relative abundance and habitat preference of Brownsberg mammals, through diurnal walking transect surveys, should provide valuable data for management and planning for sustainable use of natural resources in the park. A walking transect nocturnal survey with spotlights would enhance and complement the data from diurnal surveys. The primate populations appear to be healthy and viable and would be an ideal group for detailed studies of autecology in collaboration with outside institutions. The remote camera photo-trapping pilot project has proven successful with 17 species of mammals documented. A commitment of resources to increase camera coverage within the park boundaries will give information on seasonal and daily activity patterns of the larger species.

Further baseline surveying is required for small mammals because less than two-thirds (88 of 145) of the expected species are presently known from Brownsberg. Except for two of the larger opossums, the other nine non-volant species can potentially be collected by pitfall traps. The original ten-bucket pitfall line with plastic drift fence set in moss-covered mountain savanna forest near Jeep Trail is still operational but inactive (lids placed over buckets), because there is presently nobody to monitor it. Two additional lines have been installed on the Wittie Kreek Trail, and more are planned in other habitat types. Pitfalls (effort was 290 bucket-nights) caught a total of 43 specimens representing seven species; four of these species were not captured with Sherman or wire traps, including one species of mouse opossum (*Marmosops pinheiroi*), one tree rat (*Mesomys hispidus*), and two terrestrial rice rats (*Oryzomys macconnelli* and *O. megacephalus*).

As at other Neotropical lowland forest sites, bats account for over half of the mammalian biodiversity at Brownsberg, but this total is presently at least 40% short of expectations. Bats pose several methodological challenges to their study including the ability to fly and nocturnal activity that contribute to their secretiveness. Catching bats requires specialized equipment such as nets, and expertise is required to identify them. A more concerted effort must

be made to place nets in the canopy because, of the 46 additional species of bats expected at Brownsberg, 35 are aerial insectivores that usually fly high in the forest or in open areas where they are difficult to capture. The 1 large canopy net used during the ROM survey caught 19 species of bats, of which 6 (*Ametrida centurio*, *Artibeus concolor*, *A. gnomus*, *Molossus molossus*, *M. rufus*, and *Lophostoma carrikeri*) were not caught in ground-level nets. Although basic field techniques can be taught, a large commitment in time and personnel is needed to properly survey the bat fauna. In addition, specimen vouchers are required for groups difficult to identify in the hand (e.g., *Micronycteris*, *Artibeus*, some of the nectar-feeding bats, and free-tailed bats). Bat surveys are best done as collaborations with specialists knowledgeable in the Neotropical bat fauna.

Conservation Considerations

Two important events occurred in 2002 that will profoundly impact Brownsberg Nature Park in the immediate future. Firstly, SURALCO has indicated an interest in reactivating their bauxite mines within the park boundaries. Some consider this to be a tactic being used as leverage in mineral negotiations with the government in other parts of Suriname. For the long-term welfare of Brownsberg, it is imperative to have these concession rights transferred to STINASU, which should have complete control of all aspects of the park. Research initiatives, such as the recent forest plots established by Tropenbos and our mammal inventory reported herein, will provide a firm baseline of biological data necessary for the sustainable management of Brownsberg. Other floral and faunal surveys should be encouraged to build on this scientific foundation.

The second development was the transfer of the 4,000 ha southern portion of the Brownsberg plateau to STINASU by the Ministry of Natural Resources in 2002. The administration and management of this area is in the planning stage but work has begun on re-opening an old road to the southern part of the plateau. This would be an excellent opportunity to establish a conservation reserve to complement the multi-use purpose of the original park, which includes tourism, education, and research. We suggest connecting these two areas by annexing the ecologically important slopes of the plateau and surrounding lowland regions, where feasible. At present, the 12,000 ha area of Brownsberg is not sufficient to maintain a healthy and viable population for many of the larger species of mammals, and probably many other animals. A concerted regional conservation strategy is fundamental to the long-term survival of the Brownsberg Nature Park if the area is to be ecologically sustainable. Comprehensive biological surveys and ongoing ecological monitoring will create the solid knowledge-based foundation required to develop long-term conservation and management plans.

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APPENDIX 1. Species checklist of mammals in the vicinity of Brownsberg Nature Park, Suriname. Data sources include specimens deposited at the Rijksmuseum van Natuurlijke Historie (RMNH) and the Zoologische Museum Amsterdam (ZMA), animals rescued during the flooding of the Suriname River (Operation Gwamba), specimens deposited at the Carnegie Museum of Natural History (CM), observations during the diurnal walking transect surveys, documentation by remote camera photo trapping, specimens deposited at the Royal Ontario Museum with released individuals in parentheses, and the number of interviewees from a total of eight local inhabitants who acknowledged the occurrence of species in the surrounding area.

Asterisk (*) indicates the first record of a species in Suriname and an "X" represents a species recorded on film.

Species	RMNH/ ZMA	Operation Gwamba	CM	Transect Survey	Photo- Trapping	ROM	Interviews
Order Didelphimorphia							
Family Didelphidae							
<i>Caluromys philander</i>		28					
<i>Didelphis imperfecta</i>			1				
<i>Didelphis marupialis</i>		151	5	3	X	4	
<i>Marmosa lepida</i>	1						
<i>Marmosa murina</i>						1	
<i>Marmosops parvidens</i>						12	
<i>Marmosops pinheiroi</i>						1*	
<i>Metachirus nudicaudatus</i>		84 ¹			X	2	
<i>Monodelphis brevicaudata</i>	2		1				
<i>Philander opossum</i>		1 ²	1	1			
Order Pilosa							
Family Bradypodidae							
<i>Bradypus tridactylus</i>		2104		2			7
Family Megalonychidae							
<i>Choloepus didactylus</i>	1	840		4			4
Family Cyclopeidae							
<i>Cyclopes didactylus</i>	1	161		1			2
Family Myrmecophagidae							
<i>Myrmecophaga tridactyla</i>	1						5
<i>Tamandua tetradactyla</i>		261		4			5
Order Cingulata							
Family Dasypodidae							
<i>Cabassous unicinctus</i>		3 ²					2
<i>Dasypus kappleri</i>				1	X		5
<i>Dasypus novemcinctus</i>	1	1051		5	X		5
<i>Priodontes maximus</i>		7			X	X	6
Order Chiroptera							
Family Emballonuridae							
<i>Diclidurus scutatus</i>	1						
<i>Rhynchonycteris naso</i>	18						
<i>Saccopteryx bilineata</i>			2			20 (1)	
<i>Saccopteryx leptura</i>	4					4	
Family Mormoopidae							
<i>Pteronotus gymnonotus</i>						1*	
<i>Pteronotus parnellii</i>			14			20 (6)	

APPENDIX 1. Cont.

Species	RMNH/ ZMA	Operation Gwamba	CM	Transect Survey	Photo Trapping	ROM	Interviews
Family Phyllostomidae							
Subfamily Phyllostominae							
<i>Chrotopterus auritus</i>						2	
<i>Glyphonycteris daviesi</i>						2	
<i>Glyphonycteris sylvestris</i>			14				
<i>Lophostoma brasiliense</i>			1				
<i>Lophostoma carrikeri</i>						1	
<i>Lophostoma schulzi</i>						2	
<i>Lophostoma silvicolum</i>	1		15			7	
<i>Macrophyllum macrophyllum</i>	14						
<i>Micronycteris hirsuta</i>						1	
<i>Micronycteris megalotis</i>			1			1	
<i>Micronycteris minuta</i>			2				
<i>Mimon crenulatum</i>						7	
<i>Phylloderma stenops</i>			1				
<i>Phyllostomus discolor</i>			1			7	
<i>Phyllostomus elongatus</i>			6			8	
<i>Phyllostomus hastatus</i>			1			9	
<i>Phyllostomus latifolius</i>			2			4	
<i>Tonatia saurophila</i>			6			15	
<i>Trachops cirrhosus</i>			1			8	
<i>Trinycteris nicefori</i>						3	
Subfamily Glossophaginae							
<i>Anoura caudifer</i>			2			2	
<i>Anoura geoffroyi</i>						2	
<i>Choeroniscus minor</i>						2	
<i>Glossophaga soricina</i>	7		8			4	
<i>Lionycteris spurrelli</i>						3	
<i>Lonchophylla thomasi</i>			9			17	
Subfamily Carolliinae							
<i>Carollia brevicauda</i>			1			19	
<i>Carollia perspicillata</i>	33		15			27 (325)	
<i>Rhinophylla pumilio</i>			12			9	
Subfamily Stenodermatinae							
<i>Ametrida centurio</i>						1	
<i>Artibeus bogotensis</i>			1*			14*	
<i>Artibeus concolor</i>						3	
<i>Artibeus gnomus</i>			2*			2*	
<i>Artibeus lituratus</i>			4			20	
<i>Artibeus obscurus</i>			2*			17*	
<i>Artibeus planirostris</i>			12*			22* (27)	
<i>Chiroderma trinitatum</i>						4	
<i>Chiroderma villosum</i>						2	
<i>Platyrrhinus helleri</i>			3			9	
<i>Sturnira lilium</i>			35			16	
<i>Sturnira tildae</i>			6			21 (12)	
<i>Uroderma bilobatum</i>			6			2	

APPENDIX 1. Cont.

Species	RMNH/ ZMA	Operation Gwamba	CM	Transect Survey	Photo Trapping	ROM	Interviews
<i>Vampyressa brocki</i>						1	
<i>Vampyrodes caraccioli</i>						1	
Subfamily Desmodontinae							
<i>Desmodus rotundus</i>		X ³					
Family Thyropteridae							
<i>Thyroptera tricolor</i>						20	
Family Vespertilionidae							
<i>Eptesicus brasiliensis</i>			1				
<i>Eptesicus chiriquinus</i>						1*	
<i>Eptesicus furinalis</i>	1		3			1	
<i>Myotis riparius</i>						3*	
Family Molossidae							
<i>Molossus molossus</i>	27					5	
<i>Molossus rufus</i>						1	
Order Primates							
Family Callitrichidae							
<i>Saguinus midas</i>		14		105		X	7
Family Cebidae							
<i>Alouatta macconnelli</i>	1	479		114		X	8
<i>Ateles paniscus</i>				39			8
<i>Cebus apella</i>		3		50		X	8
<i>Cebus olivaceus</i>	1			7		X	4
<i>Chiropotes satanas</i>				17			5
<i>Pithecia pithecia</i>	1			35		X	8
<i>Saimiri sciureus</i>	5	32		9		X	7
Order Carnivora							
Family Canidae							
<i>Speothos venaticus</i>							2
Family Felidae							
<i>Herpailurus yagouaroundi</i>				2			6
<i>Leopardus pardalis</i>		13		4	X		2
<i>Leopardus tigrinus</i>							3
<i>Leopardus wiedii</i>		1		1	X		1
<i>Puma concolor</i>				8 ⁵	X		4
<i>Panthera onca</i>		3		21 ⁶	X	X	8
Family Mustelidae							
<i>Eira barbara</i>		2		11	X	X	4
<i>Galictis vittata</i>							1
<i>Lontra longicaudus</i>							4
<i>Pteronura brasiliensis</i>							2

APPENDIX 1. Cont.

Species	RMNH/ ZMA	Operation Gwamba	CM	Transect Survey	Photo Trapping	ROM	Interviews
Family Procyonidae							
<i>Nasua nasua</i>				5	X	X	5
<i>Potos flavus</i>		67		4			4
Order Perissodactyla							
Family Tapiridae							
<i>Tapirus terrestris</i>	2	36		31 ⁷	X		5
Order Artiodactyla							
Family Tayassuidae							
<i>Pecari tajacu</i>	1	71		15	X		6
<i>Tayassu pecari</i>	2			5			5
Family Cervidae							
<i>Mazama americana</i>	2	671 ³		23	X	X	7
<i>Mazama gouazoubira</i>	1	671 ³		15	X		6
Order Rodentia							
Family Sciuridae							
<i>Sciurillus pusillus</i>						X	5
<i>Sciurus aestuans</i>	1				X	X	5
Family Muridae							
Subfamily Murinae							
<i>Rattus norvegicus</i>	1						
<i>Rattus rattus</i>	79						
Subfamily Sigmodontinae							
<i>Neacomys paracou</i>			1			14	
<i>Oecomys auyantepui</i>						18*	
<i>Oecomys bicolor</i>	1						
<i>Oryzomys macconnelli</i>	1		4			2	
<i>Oryzomys megacephalus</i>			12			1	
<i>Oryzomys yunganus</i>						1	
<i>Rhipidomys nitela</i>						1	
Family Erethizontidae							
<i>Coendou melanurus</i>	2	518					1
<i>Coendou prehensilis</i>		927					6
Family Hydrochaeridae							
<i>Hydrochaeris hydrochaeris</i>		1		2			2
Family Dasyproctidae							
<i>Dasyprocta leporina</i>	1	226		107	X	X	7
<i>Myoprocta acouchy</i>	2	247	1	17	X		4
Family Cuniculidae							
<i>Cuniculus paca</i>		147		22 ⁸	X		7

APPENDIX 1. Cont.

Species	RMNH/ ZMA	Operation Gwamba	CM	Transect Survey	Photo Trapping	ROM	Interviews
Family Echimyidae							
<i>Echimyys chrysurus</i>		104					1
<i>Makalata didelphoides</i>	1						
<i>Mesomys hispidus</i>						2	
<i>Proechimys cuvieri</i>	5		9			7	
<i>Proechimys guyannensis</i>	1		23			12	
TOTAL INDIVIDUALS	224	8253	249	689	-	451 (464)	-
TOTAL SPECIES	35	32	41	33	17	77	44

¹ At least one of the 85 *Metachirus nudicaudatus* rescued during Operation Gwamba was re-identified as *Philander opossum* by Husson (1978).

² Listed as possibly *Cabassous unicinctus* but originally as *Euphractus sexcinctus*, which in Suriname is only known from the savannas in the south (Wetzel 1985).

³ *Desmodus rotundus* was not rescued, but there were numerous signs of vampire bats feeding on dogs and humans in camp.

⁴ Includes both *Mazama americana* and *M. gouazoubira*.

⁵ All records are tracks.

⁶ Nine records are tracks.

⁷ Three sightings with the remainder tracks or feces.

⁸ Five sightings and 17 tracks.

APPENDIX 2. External Measurements and Weights. External measurements (in mm) and weight (in g) for species of mammals collected by Carnegie Museum of Natural History and Royal Ontario Museum at Brownsberg Nature Park in Suriname. Specimens measured are adults unless noted as subadult (S) or juvenile (J) under sample size and * indicates a sample size one less than reported. If sample size is greater than one then the first measurement is the mean value with the range in parentheses.

Species	Sample size	Total length	Tail length	Hindfoot length	Ear length	Tragus length	Forearm length	Weight
Order Didelphimorphia								
Family Didelphidae								
<i>Didelphis imperfecta</i>	1S♂	690	368	53	56			564
<i>Didelphis marsupialis</i>	5♀♀	833 (773–888)	435 (413–463)	62 (55–68)	60 (53–67)			1220 (1000–1300)
	1♂	770	390	60	53			1000
	1S♀	755	387	60	52			980
<i>Marmosa murina</i>	1♀	267	159	19	22.5			20
<i>Marmosops parvidens</i>	1♀	229	137	14	15			24 (22–26)
	5♂♂	252	150	16	22			20
		(240–269)	(141–161)	(15–17)	(21–23)			24 (22–26)
	2S♂♂	174	103	13	19			10
		(174–175)	(103–103)	(13–13)	(19–19)			(9.5–10.0)
<i>Marmosops pinheiroi</i>	1S♂	176	101	15	20			9
<i>Metachirus nudicaudatus</i>	1S♂	541	302	41	34			235
	1J♀	352	204	32	30			65
<i>Monodelphis brevicaudata</i>	1♀	218	81	22	19			55
<i>Philander opossum</i>	1J♀	380	203	30	34			96
Order Chiroptera								
Family Emballonuridae								
<i>Saccopteryx bilineata</i>	9♀♀	78 (73–82)	22 (19–24)	11 (10–12)	15 (14–16)	5 (4–6)	50 (49–51)	8 (7–9)
	12♂♂	73	19	11	16	5	48	7 (7–8)
		(68–79)	(16–22)	(10–12)	(15–17)	(4–7)	(46–50)	5
<i>Saccopteryx leptura</i>	3♀♀	62	14	9	14	5	41	5
		(58–66)	(10–16)	(8–9)	(13–14)	(5–6)	(40–41)	(5–5)
	1♂	59	13	7	12	5	39	4
Family Mormoopidae								
<i>Pteronotus gymnotus</i>	1♂	88	26	12	18	6	54	13
<i>Pteronotus parnellii</i>	9♀♀	104 (95–117)	27 (22–32)	16 (13–17)	25 (22–28)	8 (7–9)	65 (62–68)	25 (20–34)
		101	29	16	25	8	65	24
	16♂♂	(91–108)	(24–35)	(14–17)	(22–30)	(6–9)	(61–67)	(21–27)

APPENDIX 2. Cont.

Species	Sample size	Total length	Tail length	Hindfoot length	Ear length	Tragus length	Forearm length	Weight
Family Phyllostomidae								
Subfamily Phyllostominae								
<i>Chrotopterus auritus</i>	2♀♀	113 (106-121)	12 (11-14)	26 (26-26)	45 (44-46)	11 (11-12)	80 (78-82)	69 (67-71)
<i>Glyphonycteris daviesi</i>	2♀♀	82 (82-83)	9 (7-12)	17 (17-18)	29 (28-30)	10 (10-11)	58 (56-60)	25 (23-28)
<i>Glyphonycteris sylvestris</i>	8♀♀	65 (55-73)	12 (9-16)	11 (10-12)	21 (20-22)		41 (39-42)	9 (7-11)
	3♂♂	62 (60-63)	12 (11-12)	11 (10-12)	21 (20-22)		38 (37-39)	7 (6-7)
	1♀	77	13	15	28	11	48	20
<i>Lophostoma carrikeri</i>	2♀♀	71 (71-72)	10 (9-11)	15 (15-15)	28 (28-29)	11 (11-12)	44 (44-45)	17 (16-18)
<i>Lophostoma schulzi</i>	9♀♀	100 (90-110)	22 (16-28)	18 (16-20)	37 (34-40)	14 (13-14)	58 (56-62)	30 (25-37)
<i>Lophostoma silvicolum</i>	6♂♂	103 (99-107)	22 (16-26)	18 (18-19)	37 (34-39)	13	56 (55-59)	33 (27-38)
	1♀	72	10	12	24	9	46	14
<i>Micronycteris hirsuta</i>	2♂♂	58 (52-64)	10 (9-11)	9 (9-10)	21 (20-22)	7	33	5 (5-5)
<i>Micronycteris megalotis</i>	1♀	62	15	10	19		32	5
<i>Micronycteris minuta</i>	1♂	55	7	9	20		32	5
<i>Mimon crenulatum</i>	2♀♀	83 (81-86)	20 (19-22)	11 (11-12)	24 (24-25)	10 (9-11)	48 (46-50)	10 (10-11)
	5♂♂	80 (77-84)	23 (22-28)	12 (11-13)	25 (24-26)	10 (8-11)	48 (46-50)	11 (11-11)
<i>Phylloderma stenops</i>	1♂	116	21	20	22		71	44
<i>Phyllostomus discolor</i>	3♀♀	100 (97-105)	17 (14-19)	17 (16-17)	23 (22-24)	9 (9-10)	63 (62-64)	33 (30-39)
	5♂♂	94 (86-97)	16 (12-21)	16 (13-17)	22 (21-24)	9 (8-10)	62 (61-63)	35 (33-38)
<i>Phyllostomus elongatus</i>	4♀♀	98 (94-104)	20 (17-22)	18 (17-19)	30 (28-31)	12 (11-12)	68 (66-70)	41 (40-41)
	6♂♂	106 (98-113)	20 (17-25)	18 (16-19)	29 (28-30)	11 (11-12)	67 (65-69)	40 (37-41)
<i>Phyllostomus hastatus</i>	6♀♀	126 (121-130)	19 (15-22)	22 (22-23)	31 (29-32)	12 (11-13)	83 (80-86)	82 (68-88)
	2♀♀	136 (135-137)	19 (18-20)	23 (22-24)	31 (31-31)	11 (11-12)	83 (83-84)	90 (84-96)
<i>Phyllostomus latifolius</i>	3♀♀	95 (92-98)	16 (16-17)	16 (16-17)	27 (27-27)	10 (10-11)	59 (56-61)	28 (25-30)
	3♂♂	89 (86-91)	15 (14-16)	16 (15-17)	26 (24-28)	10 (10-11)	60 (60-60)	30 (30-31)
<i>Tonatia saurophila</i>	7♀♀	90 (88-92)	19 (15-21)	15 (14-17)	29 (28-31)	11 (10-12)	56 (55-58)	25 (23-29)
	9♂♂	92 (87-97)	20 (18-23)	16 (13-17)	31 (29-32)	11 (10-12)	56 (54-58)	24 (23-26)
<i>Trachops cirrhosus</i>	3♀♀	96 (94-97)	17 (16-18)	21 (20-21)	35 (34-36)	13 (13-14)	64 (62-65)	34 (31-38)
	2♂♂	95 (91-100)	16 (12-20)	20 (20-21)	34 (33-35)	13 (12-14)	65 (63-67)	38 (34-42)
<i>Trinycteris nicefori</i>	3♂♂	62 (60-64)	9 (7-11)	12 (12-13)	18 (18-19)	6 (6-7)	37 (35-38)	7 (7-8)
Subfamily Glossophaginae								
<i>Anoura caudifer</i>	2♀♀	53 (52-54)		10 (10-10)	15 (14-17)			9 (8-11)
	2♂♂	62 (58-66)	5 (5-5)	10 (10-11)	12 (11-14)	6 (5-7)	37 (37-37)	9 (9-10)
<i>Anoura geoffroyi</i>	1♀	63		12	14	6	40	11
	1♂	64		10	15	6	45	13
<i>Choeroneiscus minor</i>	2♀♀	66 (64-69)	8 (8-8)	10 (10-11)	11 (11-12)	5 (5-5)	35 (35-35)	8 (7-9)

APPENDIX 2. Cont.

Species	Sample size	Total length	Tail length	Hindfoot length	Ear length	Tragus length	Forearm length	Weight
<i>Glossophaga soricina</i>	4♀♀	57 (56–58)	8 (8–9)	11 (11–12)	14 (14–15)	5 (5–5)	36 (36–37)	8 (8–9)
<i>Lionycteris spurrelli</i>	3♂♂	58 (56–62)	8 (8–9)	10 (10–11)	12 (12–12)	5 (5–5)	34 (34–35)	8 (7–8)
<i>Lonchophylla thomasi</i>	11♀♀	57 (55–64)	8 (6–10)	9 (8–11)	14 (11–16)	6 (5–6)	33 (32–35)	7 (6–16)
	9♂♂	56 (53–59)	7 (6–9)	9 (9–10)	14 (12–15)	5 (5–6)	32 (30–34)	6 (5–7)
Subfamily Carollinae								
<i>Carollia brevicauda</i>	4♀♀	60 (58–61)	7 (5–8)	12 (11–13)	19 (18–20)	7 (7–8)	37 (36–38)	12 (11–13)
	13♂♂	61 (58–64)	7 (6–9)	13 (11–15)	19 (17–20)	8 (7–8)	38 (36–39)	12 (11–13)
<i>Carollia perspicillata</i>	15♀♀	66 (63–72)	8 (5–13)	14 (13–14)	18 (17–20)	7 (7–8)	41 (40–43)	15 (13–18)
	10♂♂	66 (62–70)	8 (6–12)	14 (13–15)	20 (19–21)	8 (7–8)	41 (39–42)	16 (14–18)
<i>Rhinophylla pumilio</i>	10♀♀	49 (45–52)		9 (8–10)	15 (14–19)	6 (5–6)	34 (33–36)	9 (7–13)
	4♂♂	46 (43–49)		9 (8–10)	13 (13–14)	6 (5–6)	33 (32–34)	9 (6–14)
Subfamily Stenodermatinae								
<i>Ametrida centurio</i>	1♀	46		10	15	6	32	8
<i>Artibeus bogotensis</i>	5♀♀	54 (52–57)		11 (10–12)	16 (15–17)	6 (6–7)	41 (40–42)	12 (11–13)
	6♂♂	52 (50–53)		11 (10–12)	16 (15–17)	6 (6–7)	40 (39–41)	11 (10–12)
<i>Artibeus concolor</i>	2♀♀	61 (60–62)		13 (13–13)	18 (18–19)	7 (7–7)	48 (47–49)	19 (18–20)
	1♂	60		11	18	6	49	18
<i>Artibeus gnomus</i>	1♀	49		10	16	7	36	9
	1♂	50		11	16	7	38	10
<i>Artibeus lituratus</i>	9♀♀	96 (93–101)		21 (20–22)	24 (24–25)	8 (7–9)	72 (69–75)	69 (64–74)
	10♂♂	94 (89–100)		20 (19–22)	24 (22–25)	8 (8–9)	72 (68–73)	67 (61–78)
<i>Artibeus obscurus</i>	6♀♀	77 (70–83)		16 (15–17)	21 (18–22)	8 (7–9)	60 (58–62)	40 (32–50)
	10♂♂	74 (72–76)		16 (16–17)	21 (20–24)	8 (7–9)	59 (57–61)	34 (33–37)
<i>Artibeus planirostris</i>	9♀♀	91 (86–100)		19 (18–21)	24 (22–25)	8 (7–9)	68 (67–71)	56 (50–71)
	13♂♂	88 (82–97)		20 (19–21)	23 (21–25)	8 (8–9)	67 (64–70)	54 (47–62)
<i>Chiroderma trinitatum</i>	1♀	57		11	16	6	40	14
	2♂♂	56 (56–56)		11 (11–11)	16 (16–16)	6 (6–6)	39 (38–41)	12 (11–13)
<i>Chiroderma villosum</i>	1♀	73		13	19	7	48	25
	1♂	61		12	18	7	44	17
<i>Platyrrhinus helleri</i>	7♀♀	60 (55–67)		12 (11–13)	17 (16–18)	6 (6–7)	39 (38–40)	14 (13–16)
	4♂♂	56 (54–60)		11 (10–12)	17 (16–18)	6 (6–7)	38 (37–39)	11 (8–13)
<i>Sturnira lilium</i>	8♀♀	61 (58–64)		14 (14–15)	16 (15–16)	6 (5–7)	42 (40–43)	22 (17–24)
	8♂♂	64 (62–67)		15 (14–16)	17 (15–19)	6 (5–7)	42 (41–44)	21 (20–23)
<i>Sturnira tildae</i>	11♀♀	68 (59–74)		15 (14–16)	19 (17–20)	7 (6–8)	46 (45–48)	21 (16–26)
	11♂♂	69 (66–76)		15 (14–16)	18 (17–19)	7 (7–8)	46 (44–48)	23 (18–26)
<i>Uroderma bilobatum</i>	2♀♀	70 (70–71)		12 (12–13)	18 (17–19)		44 (44–45)	19 (18–20)
	6♂♂	64 (62–65)		12 (9–13)	18 (17–19)	7 (7–7)	43 (39–45)	14 (13–16)

APPENDIX 2. Cont.

Species	Sample size	Total length	Tail length	Hindfoot length	Ear length	Tragus length	Forearm length	Weight
<i>Vampyressa brocki</i>	1♀	52		9	16	6	34	9
<i>Vampyroides caraccioli</i>	1♂	77		16	20	8	55	31
Family Thyropteridae								
<i>Thyroptera tricolor</i>	7♀♀ 13♂♂	72 (70-73) 72 (68-74)	29 (24-32) 29 (26-32)	4 (2-5) 3 (2-5)	12 (11-12) 12 (11-14)	4 (4-5) 4 (4-5)	36 (34-37) 36 (35-39)	4 (3-5) 4 (3-5)
Family Vespertilionidae								
<i>Eptesicus brasiliensis</i>	1♀	105	48	10	15		42	11
<i>Eptesicus chiriquinus</i>	1♀	105	47	11	17	8	50	12
<i>Eptesicus furiinalis</i>	3♀♀	101 (100-103)	41 (34-45)	9 (7-10)	15 (13-17)		40 (39-41)	9 (8-10)
	1♂	93	41	9	14	8	40	9
<i>Myotis riparius</i>	1♀	82	37	8	13	7	37	6
	2♂♂	82 (82-83)	38 (38-39)	7 (7-8)	12 (12-13)	7 (7-7)	36 (35-37)	5 (5-5)
Family Molossidae								
<i>Molossus molossus</i>	2♀♀	106 (104-108)	38 (35-41)	10 (10-10)	12 (12-13)	3 (3-4)	40 (39-41)	12 (12-12)
	3♂♂	106 (105-106)	37 (36-39)	10 (9-10)	13 (13-13)	4 (3-4)	39 (38-41)	15 (14-15)
<i>Molossus rufus</i>	1♀	137	56	15	17	5	50	34
Order Rodentia								
Subfamily Sigmodontinae								
<i>Neacomys paracou</i>	5♂♂	144 (137-150)	69 (67-73)	18 (16-19)	13 (13-14)			15 (14-16)
<i>Oecomys ayanantepui</i>	2♀♀	219 (219-220)	112 (112-113)	22 (22-22)	14 (14-15)			41 (39-44)
	10♂♂	220 (206-242)	114 (105-123)	23 (22-25)	15 (14-16)			35 (25-46)
<i>Oryzomys macconnelli</i>	2♂♂	278 (252-305)	150 (132-168)	34 (34-35)	23 (22-25)			78 (57-90)
<i>Oryzomys megacephalus</i>	3♀♀	224 (212-231)	110 (100-115)	24 (21-28)	19 (18-20)			43 (30-56)
	3♂♂	231 (224-242)	110 (100-115)	28 (27-29)	22 (18-28)			35 (17-54)
<i>Oryzomys yunganus</i>	1♀	270	138	32	21			77
<i>Rhipidomys nitela</i>	1♀	253	141	26	24			48
Family Echimyidae								
<i>Mesomys hispidus</i>	1♀	242	121	26	12			65
	1♂	274	144	25	27			10
<i>Proechimys cuivieri</i>	3♀♀	408 (390-428)	173 (166-180)	51 (49-53)	25 (24-28)			327 (290-385)
	1♂	451	185	52	27			520
<i>Proechimys guyannensis</i>	3♀♀	363 (363-363)	158 (155-161)	45 (44-45)	23 (23-24)			268 (225-320)
	2♂♂	408 (398-418)	183 (180-186)	47 (47-48)	23 (22-24)			285 (260-310)

APPENDIX 3. Cranial Measurements. Cranial measurements (in mm) for species of mammals collected by Carnegie Museum of Natural History and Royal Ontario Museum at Brownsberg Nature Park in Suriname. Specimens measured are adults unless noted as subadult (S) or juvenile (J) under sample size, however, for rodents the sample size includes adults and subadults with fully erupted molars. * indicates a sample size one less than reported. If sample size is greater than 1 then the first measurement is the mean value with the range in parentheses.

Species	Sample size	Greatest length of skull	Condylobasal length	Zygomatic breadth	Mastoid breadth	Postorbital Breadth	Maxillary tooth-row length	Breadth across upper molars
Order Didelphimorphia								
Family Didelphidae								
<i>Didelphis imperfecta</i>	1S♂	79.8	79.0	41.0	23.7	10.1	31.1	26.8
<i>Didelphis marsupialis</i>	5♀♀	97.7 (90.5–102.5)	95.8 (90.1–98.1)	47.7 (45.5–49.8)	29.0 (27.6–30.5)	11.6 (11.0–12.0)	41.1 (39.7–42.6)	30.6 (29.9–31.6)
	1♂	92.6	92.5	48.6	27.3	11.0	40.6	28.8
<i>Marmosa murina</i>	1S♀	88.3	87.3	41.6	25.2	10.8	37.8	28.9
<i>Marmosops parvidens</i>	1♀	30.5	29.5	16.9	11.7	6.2	12.4	9.8
	1♀	26.7	25.8	13.6	9.9	5.5	10.4	8.1
	5♂♂	28.7 (27.5–29.4)	27.9 (26.6–28.9)	14.2 (13.9–14.5)	10.0 (9.8–10.3)	5.5 (5.4–5.6)	10.9 (10.6–11.3)	8.1 (7.6–8.3)
	2S♂♂	22.8 (22.4–23.2)	21.7 (21.2–22.2)	11.9 (11.8–12.0)	9.1 (8.9–9.4)	5.3 (5.2–5.4)	9.1 (8.9–9.3)	6.7 (6.4–7.1)
<i>Marmosops pinheiroi</i>	1S♂	22.4	21.5	11.8	9.1	4.6	8.9	7.1
<i>Metachirus nudicaudatus</i>	1S♂	52.8	52.3	24.3	15.7	9.1	22.5	17.3
	1J♀	39.6	38.0	18.5	13.0	8.6	16.4	13.5
<i>Monodelphis breviceaudata</i>	1♀	35.1	35.1	18.5	13.9	5.9	14.3	11.4
<i>Philander opossum</i>	1J♀	48.7	47.2	23.2	14.9	8.4	19.6	16.2
Order Chiroptera								
Family Emballonuridae								
<i>Saccopteryx bilineata</i>	5♀♀	17.9 (17.7–18.3)	16.0 (15.8–16.1)	11.3 (11.1–11.5)	8.8 (8.7–8.9)	2.7 (2.4–3.1)	7.3 (7.1–7.5)	7.6 (7.5–7.8)
	6♂♂	17.6 (17.4–17.8)	15.7 (14.8–16.0)	10.9 (10.5–11.1)	8.7 (8.6–8.8)	2.6 (2.4–2.9)	7.1 (7.0–7.2)	7.5 (7.3–7.7)
<i>Saccopteryx leptura</i>	1♀	14.0	12.5	8.7	7.2	2.2	5.3	6.1
	1♂	14.0	12.8	8.9	7.3	2.5	5.4	5.9
Family Mormoopidae								
<i>Pteronotus gymnotus</i>	1♂	17.5	16.5	10.2	9.7	4.1	7.4	7.2
<i>Pteronotus parnellii</i>	3♀♀	23.1 (22.9–23.3)	21.6 (21.2–21.8)	13.1 (12.6–13.4)	12.1 (12.0–12.3)	4.4 (4.3–4.6)	9.8 (9.8–9.9)	8.6 (8.3–8.9)
	7♂♂	23.4 (22.8–23.8)	21.7 (21.0–22.3)	13.3 (12.6–13.8)	12.5 (12.2–13.0)	4.5 (4.3–4.7)	9.8 (9.4–10.1)	8.6 (8.3–8.8)
Family Phyllostomidae								
Subfamily Phyllostominae								
<i>Chiropterus auritus</i>	1♀	36.5	31.3	18.3	16.9	5.6	13.1	11.3
<i>Glyptonycteris daviesi</i>	1♀	26.7	23.2	13.3	11.1	6.5	10.3	9.5
<i>Glyptonycteris sylvestrus</i>	8♀♀	20.0 (19.5–20.5)	17.7 (17.0–18.4)	10.1 (9.8–10.2)	9.0 (8.8–9.1)	4.6 (4.4–4.7)	7.7 (7.4–8.0)	6.9 (6.7–7.0)
	3♂♂	19.7 (19.4–20.1)	17.4 (17.3–17.7)	9.8 (9.7–10.0)	8.6 (8.5–8.9)	4.6 (4.5–4.7)	7.8 (7.6–7.9)	6.8 (6.7–7.0)

APPENDIX 3. Cont.

Species	Sample size	Greatest length of skull	Condylobasal length	Zygomatic breadth	Mastoid breadth	Postorbital Breadth	Maxillary tooth-row length	Breadth across upper molars
<i>Lophostoma brasiliense</i>	1♂	19.6	16.6	9.2	8.8	3.0	7.9	6.1
<i>Lophostoma carrikeri</i>	1♀	25.3	20.3	11.6	12.4	3.7	8.4	7.6
<i>Lophostoma schulzi</i>	1♀	23.3	18.9	11	11.8	3.6	7.8	7.3
<i>Lophostoma silvicolum</i>	5♀♀	28.4 (27.9–29.0)	23.6 (23.3–24.1)	13.6 (13.2–13.9)	13.7 (13.5–14.0)	4.2 (3.9–4.4)	9.8 (9.3–10.3)	9.0 (8.6–9.3)
	4♂♂	29.1 (28.3–29.8)	23.9 (23.4–24.7)	14.1 (13.8–14.5)	14.4 (14.0–14.8)	4.2 (3.9–4.4)	9.9 (9.7–10.3)	9.4 (9.2–9.6)
<i>Micronycteris hirsuta</i>	1	24.5	21	12	10.3	5.1	9.3	7.5
<i>Micronycteris megalotis</i>	1♂	17.8	14.7	8.4	7.8	3.7	6.6	5.4
<i>Micronycteris minuta</i>	1♀	17.6		8.3	8	4.1	6.7	5.4
	1♂	17.3	15.3	8.5	8.1	4	6.5	5.7
<i>Mimon crenulatum</i>	3♂♂	21.8 (21.3–22.4)	18.7 (18.2–19.0)	12.1 (12.3–12.0)	11.7 (11.4–11.8)	4.1 (4.1–4.2)	7.6 (7.5–7.7)	8.2 (8.1–8.3)
<i>Phyloderma stenops</i>	1♂	31.1	27.0	15.4	14.4	9.3	9.9	9.8
<i>Phyllostomus discolor</i>	1♀	29.3	25.9	15.3	13.7	6.5	9.5	10.1
	2♂♂	29.6	25.3 (24.5–26.2)	15.4	14.9 (14.6–15.3)	6.2 (6.1–6.3)	9.5 (9.5–9.6)	10.1 (10.1–10.2)
<i>Phyllostomus elongatus</i>	3♀♀	29.9 (29.1–30.4)	25.2 (24.8–25.5)	16.1 (16.0–16.3)	14.2 (13.9–14.5)	5.5 (5.4–5.6)	10.8 (10.6–11.0)	11.2 (11.0–11.3)
	2♂♂	29.9 (29.9–30.0)	25.3 (25.2–25.4)	16.3 (16.0–16.6)	14.8 (14.6–15.1)	5.4 (5.4–5.4)	10.8 (10.7–10.9)	11.1 (11.1–11.1)
<i>Phyllostomus hastatus</i>	6♀♀	37.1 (36.1–38.2)	31.5 (30.6–32.2)	20.0 (19.2–20.5)	18.8 (18.3–19.4)	6.9 (6.6–7.1)	12.8 (12.6–13.1)	13.4 (12.9–13.6)
<i>Phyllostomus latifolius</i>	1♀	28.9	24.1	15.4	13.8	4.9	10.5	10.8
	1♂	28.2	23.9	16	14.3	4.8	10.2	10.9
<i>Tonatia saurophila</i>	4♀♀	27.2 (26.9–27.6)	22.7 (22.5–22.9)	13.6 (13.5–13.7)	12.5 (12.3–12.9)	5.4 (5.3–5.6)	9.2 (9.1–9.4)	8.1 (7.8–8.4)
	3♂♂	27.5 (27.4–27.7)	22.9 (22.8–23.1)	13.5 (13.1–13.9)	12.4 (12.3–12.5)	5.2 (5.1–5.3)	9.2 (9.1–9.3)	8.5 (8.2–8.7)
<i>Trachops cirrhosus</i>	3♀♀	30.0 (29.9–30.3)	26.2 (25.9–26.3)	14.8 (14.4–15.0)	14.2 (14.2–14.2)	5.2 (5.0–5.5)	11.0 (10.8–11.2)	10.3 (10.0–10.7)
	2♂♂	29.9 (28.8–31.1)	26.0 (24.9–27.1)	14.7 (14.5–15.2)	14.0 (13.5–14.5)	5.2 (5.2–5.3)	10.8 (10.6–11.1)	10.7 (10.7–10.8)
<i>Trinycteris nicefori</i>	1♂	20.7	18.1	9	8.8	4.3	7.5	6
Subfamily Glossophaginae								
<i>Anoura caudifer</i>	2♀♀	23.0 (23.0–23.0)	22.0 (22.0–22.1)	9.6 (9.5–9.7)	9.3 (9.3–9.4)	4.6 (4.6–4.6)	8.5 (8.4–8.7)	5.6 (5.6–5.6)
	2♂♂	22.8 (22.5–23.2)	22.0 (21.6–22.4)	9.4 (9.3–9.5)	9.3 (9.1–9.6)	4.5 (4.4–4.7)	8.4 (8.4–8.5)	5.5 (5.5–5.6)
<i>Anoura geoffroyi</i>	1♀	23.9	23	10.2	10.3	4.8	9.3	6.3
	1♂	25.3	24.5	10.7	10.4	5.1	9.3	6.4
<i>Choeronycteris minor</i>	2♀♀	23.4 (23.3–23.5)	2.8 (2.7–2.9)	8.3 (8.3–8.4)	8.6 (8.6–8.6)	4.0 (4.0–4.1)	8.1 (8.0–8.3)	4.2 (4.2–4.3)
<i>Glossophaga soricina</i>	2♀♀	20.9 (20.7–21.1)	19.1 (19.1–19.2)	9.2 (8.9–9.6)	9.0 (8.8–9.2)	4.7 (4.6–4.8)	7.1 (6.9–7.4)	5.4 (5.2–5.6)
<i>Lionycteris spurrelli</i>	2♂♂	20.0 (19.9–20.2)	18.1 (18.0–18.2)	8.5 (8.4–8.6)	8.5 (8.5–8.5)	4.1 (4.1–4.2)	6.3 (6.3–6.3)	5.2 (5.1–5.3)
<i>Lonchophylla thomasi</i>	6♀♀	20.5 (20.0–21.0)	18.7 (18.4–19.1)	8.7 (8.6–8.9)	8.6 (8.4–9.0)	4.1 (4.0–4.3)	6.4 (6.0–6.7)	5.0 (4.8–5.1)
	5♂♂	20.5 (20.3–20.8)	18.5 (18.3–18.8)	8.8 (8.7–8.9)	8.6 (8.4–8.8)	4.1 (4.0–4.3)	6.4 (6.2–6.6)	5.0 (4.9–5.2)
Subfamily Carollinae								
<i>Carollia brevicauda</i>	4♀♀	20.6 (20.2–20.7)	17.7 (17.6–18.2)	10.5 (10.3–10.9)	10.3 (10.2–10.4)	5.4 (5.3–5.4)	6.5 (6.3–6.7)	7.5 (7.1–7.7)

APPENDIX 3. Cont.

Species	Sample size	Greatest length of skull	Condylobasal length	Zygomatic breadth	Mastoid breadth	Postorbital Breadth	Maxillary tooth-row length	Breadth across upper molars
<i>Carollia perspicillata</i>	7♂♂	21.3 (20.6–21.6)	18.4 (17.7–18.7)	10.6 (10.0–11.2)	10.4 (10.1–10.7)	5.4 (4.9–5.6)	6.7 (6.5–6.8)	7.4 (7.2–7.7)
	6♀♀	22.4 (21.7–22.9)	19.4 (18.9–19.9)	10.6 (10.3–11.0)	10.6 (10.5–10.8)	5.2 (5.0–5.4)	7.5 (7.2–7.7)	7.5 (7.2–7.7)
	3♂♂	23.0 (22.9–23.3)	19.8 (19.6–20.0)	11.2 (10.9–11.4)	11.2 (10.8–11.6)	5.3 (5.2–5.5)	7.5 (7.4–7.6)	7.7 (7.3–8.0)
<i>Rhinophylla pumilio</i>	1♀	18.7	15.9	9.6	9.2	5.3	5.1	6.4
	2♂♂	18.2 (18.1–18.4)	15.5 (15.3–15.8)	9.4 (8.9–9.9)	8.9 (8.5–9.3)	5.3 (5.2–5.5)	5.1 (5.0–5.2)	6.1 (5.8–6.4)
Subfamily Stenodermatinae								
<i>Ametrida centurio</i>	1♀	16.4	13.1	11.6	9.9	4.4	4.7	8
<i>Artibeus bogotensis</i>	5♀♀	20.1 (19.6–20.3)		11.7 (11.3–12.2)	10.3 (10.1–10.5)	5.0 (4.8–5.2)	6.3 (6.1–6.5)	8.1 (8.0–8.3)
	7♂♂	19.9 (19.5–20.3)		11.3 (10.7–11.6)	10.2 (9.7–10.5)	4.9 (4.7–5.2)	6.3 (6.1–6.6)	8.0 (7.7–8.4)
<i>Artibeus concolor</i>	2♀♀	21.8 (21.8–21.9)		13.3 (13.2–13.5)	11.6 (11.6–11.7)	5.5 (5.4–5.6)	6.9 (6.8–7.0)	9.3 (9.1–9.5)
	1♂	22.2		13.3	11.7	5.3	7.1	9.3
<i>Artibeus gnomus</i>	2♀♀	18.3 (18.2–18.5)		10.4 (10.3–10.6)	9.5 (9.5–9.5)	4.6 (4.4–4.8)	5.6 (5.5–5.7)	7.3 (7.2–7.4)
	2♂♂	18.5 (18.4–18.7)		10.7 (10.5–11.0)	9.9 (9.8–10.0)	4.6 (4.6–4.7)	5.6 (5.6–5.7)	7.5 (7.4–7.6)
<i>Artibeus lituratus</i>	4♀♀	31.5 (30.7–32.1)		19.1 (18.8–19.5)	17.1 (16.8–17.4)	6.8 (6.5–7.2)	11.0 (10.8–11.3)	13.8 (13.7–14.0)
	6♂♂	31.7 (30.6–32.6)		19.3 (18.6–19.8)	16.7 (16.6–16.9)	6.5 (6.0–7.0)	11.0 (10.9–11.2)	13.5 (13.0–14.1)
<i>Artibeus obscurus</i>	5♀♀	28.0 (27.6–28.7)		16.7 (16.2–17.2)	14.5 (14.1–15.0)	6.4 (6.1–6.7)	9.9 (9.5–10.1)	12.1 (11.9–12.2)
	8♂♂	27.3 (26.7–27.8)		16.7 (16.5–17.0)	14.6 (14.1–14.9)	6.4 (6.1–6.9)	9.7 (9.5–10.1)	12.2 (11.8–12.4)
<i>Artibeus planirostris</i>	6♀♀	31.2 (30.4–32.1)		18.9 (18.5–19.4)	16.4 (16.0–17.1)	7.4 (7.2–8.0)	11.5 (10.7–13.2)	14.0 (13.5–14.6)
	8♂♂	31.3 (30.5–32.1)		19.3 (18.7–20.0)	16.9 (16.4–17.5)	7.6 (7.4–8.0)	11.6 (10.9–12.8)	14.1 (13.6–14.4)
<i>Chiroderma trinitatum</i>	1♀	21.4	18.6	12.9	10.7	5.6	7.2	9.4
	1♂	20.8 (20.8–20.9)	18.3 (18.2–18.5)	12.4 (12.3–12.5)	10.2 (10.2–10.2)	5.2 (5.2–5.2)	6.9 (6.7–7.1)	20.8 (20.8–20.9)
<i>Chiroderma villosus</i>	1♀	25.5	22.7	16.1	12.6	6	9.1	11.4
<i>Platyrrhinus helleri</i>	7♀♀	22.2 (21.4–23.9)	19.7 (19.1–20.5)	12.4 (12.1–12.7)	10.7 (10.5–11.0)	5.3 (5.0–5.6)	7.8 (7.6–8.1)	8.8 (8.3–9.1)
	3♂♂	21.5 (21.2–21.7)	19.1 (18.7–19.5)	11.9 (11.3–12.4)	10.5 (10.4–10.6)	5.2 (5.0–5.4)	7.5 (7.3–7.8)	8.5 (8.3–8.7)
	3♀♀	22.2 (21.7–22.8)	19.9 (19.4–20.6)	13.2 (12.8–13.6)	11.7 (11.2–12.0)	5.8 (5.5–6.1)	6.3 (6.0–6.6)	7.7 (7.4–8.1)
	3♂♂	22.8 (22.3–23.1)	20.5 (20.3–20.8)	14.0 (13.8–14.4)	12.2 (12.0–12.4)	6.0 (5.8–6.2)	6.5 (6.5–6.5)	8.1 (8.0–8.1)
<i>Sturnira tildae</i>	7♀♀	23.1 (22.7–23.3)	20.6 (20.2–21.1)	14.1 (14.0–14.1)	12.3 (12.1–12.4)	6.1 (5.9–6.4)	6.6 (6.5–6.8)	7.9 (7.6–8.1)
	5♂♂	24.0 (23.4–24.6)	21.3 (20.6–22.0)	14.5 (14.2–14.9)	12.7 (12.1–13.3)	6.3 (6.1–6.5)	6.9 (6.7–7.1)	8.2 (8.0–8.4)
<i>Uroderma bilobatum</i>	4♀♀	24.0 (23.8–24.2)	21.7 (21.3–22.1)	13.2 (13.2–13.2)	11.1 (11.0–11.3)	5.7 (5.5–5.9)	8.3 (8.0–8.7)	9.3 (9.2–9.4)
	4♂♂	23.1 (22.6–24.0)	20.8 (20.3–21.6)	12.8 (12.3–13.3)	11.0 (10.8–11.3)	5.6 (5.4–6.0)	8.0 (7.7–8.5)	9.0 (8.8–9.3)
<i>Vampyressa brocki</i>	1♀	18.5	16.0	10.9	9.5	5.1	5.8	7.6
<i>Vampyroides caraccioli</i>	1♂	27.8	24.4	17.4	13.4	6.7	9.7	12.4
Family Thyropteridae								
<i>Thyroptera tricolor</i>	1♀	15.0	13.7	7.7	7.4	2.7	5.8	5.2
	3♂	15.0 (14.9–15.1)	13.5 (13.4–13.6)	7.4 (7.3–7.5)	7.3 (7.3–7.3)	2.6 (2.6–2.7)	5.9 (5.8–5.9)	5.0 (4.8–5.1)

APPENDIX 3. Cont.

Species	Sample size	Greatest length of skull	Condylobasal length	Zygomatic breadth	Mastoid breadth	Postorbital Breadth	Maxillary tooth-row length	Breadth across upper molars
Family Vespertilionidae								
<i>Eptesicus brasiliensis</i>	1♀	17.6	15.9	11.7	9.2	3.8	6.4	7.4
<i>Eptesicus chiriquinus</i>	1♀	18.1	16.4	12.0	9.2	4.0	6.8	7.6
<i>Eptesicus furinialis</i>	3♀♀	16.1 (15.9-16.3)	15.1 (15.0-15.2)	10.9 (10.7-11.2)	8.5 (8.2-8.9)	3.7 (3.6-3.9)	5.9 (5.9-6.0)	6.7 (6.7-6.8)
	1♂	16.8	15.2	11.3	8.9	3.8	6.0	6.7
<i>Myotis riparius</i>	1♀	13.8	13.0	8.9	7.3	3.3	5.2	5.5
	2♂♂	14.3 (14.3-14.3)	13.2 (13.1-13.3)	8.9 (8.9-8.9)	7.3 (7.3-7.3)	3.4 (3.4-3.4)	5.2 (5.2-5.3)	5.7 (5.6-5.9)
Family Molossidae								
<i>Molossus molossus</i>	1♀	17.3	14.9	10.1	10.1	3.4	6.0	7.4
	2♂♂	18.0 (17.7-18.4)	15.5 (15.3-15.8)	10.8 (10.7-10.9)	10.1 (10.1-10.2)	3.5 (3.5-3.6)	6.2 (6.1-6.4)	7.6 (7.6-7.6)
<i>Molossus rufus</i>	1♀	21.8	19.3	13.5	13.1	4.2	7.9	9.8
Order Rodentia								
Subfamily Sigmodontinae								
<i>Neacomys dubosti</i>	1♂	20.9	18.0	10.6	9.2	4.4	2.7	
<i>Neacomys paracou</i>	5♂♂	20.4 (19.4-21.3)	17.8 (17.0-18.5)	10.6 (10.3-11.1)	9.1 (8.8-9.2)	4.5 (4.3-4.9)	2.5 (2.4-2.7)	
<i>Oecomys auyantepui</i>	2S♀♀	26.5 (26.5-26.5)	24.0 (23.8-24.2)	13.4 (13.0-13.8)	10.8 (10.6-11.1)	5.1 (5.0-5.2)	4.2 (4.1-4.3)	
	9♂♂	26.8 (24.7-29.7)	24.5 (22.4-27.2)	14.3 (13.4-15.4)	11.3 (10.8-11.9)	5.3 (4.9-5.7)	4.1 (3.7-4.4)	
<i>Oryzomys macconnelli</i>	2♂♂	32.3 (30.5-34.1)	29.1 (27.7-30.6)	15.3 (14.1-16.3)	11.8 (11.5-12.2)	5.3 (4.7-5.9)	4.7 (4.5-4.8)	
<i>Oryzomys megacephalus</i>	1S♂	29.2	26.3	13.5	10.4	4.8	4.2	
<i>Oryzomys yunganus</i>	1S♀	29.8	26.6	14.6	11.3	5.0	4.8	
<i>Rhipidomys nitella</i>	1S♀	29.0	26.8	14.8	11.9	5.3	4.1	
Family Echimyidae								
<i>Mesomys hispidus</i>	1♂	35.5	31.2	19.7	16.8	9.6	6.1	
<i>Proechimys cuvieri</i>	2♀♀	58.4 (56.9-59.9)	46.4 (45.4-47.4)	26.5 (25.1-27.9)	21.3 (20.4-22.2)	12.3 (11.9-12.7)	8.6 (8.5-8.7)	
	1♂	63.8	50.2	28.4	24.5	13.7	8.3	
<i>Proechimys guyanensis</i>	3♀♀	50.8 (49.5-51.9)	41.8 (40.3-43.3)	24.3 (23.6-24.9)	19.3 (18.4-20.6)	10.9 (10.5-11.1)	7.4 (7.3-7.5)	
	2♂♂	52.5 (50.9-54.1)	43.2 (41.6-44.8)	24.5 (24.1-24.9)	19.2 (19.1-19.4)	10.9 (10.2-11.6)	7.1 (6.9-7.3)	

APPENDIX 4. Gazetteer of collecting localities in Brownsberg Nature Park with coordinates and habitat, if available.

3 km S, 20 km W Afobakka, 4°59'N, 55°10'W, mature forest
 5 km S, 21.5 km W Afobakka, 4°57.5'N, 55°12'W, secondary forest
 6 km S, 20 km W Afobakka, 4°57'N, 55°10'W, near small mine in dense forest
 7 km S, 18.5 km W Afobakka, 4°56'N, 55°9'W, forest edge near the headquarters
 8.8 km S, 19.3 km W Afobakka, 4°55.5'N, 55°10'W, secondary forest
 10 km S, 23 km W Afobakka, 4°54'N, 55°11'W, mature forest
 8 km S, 2 km W Brownsweg, 4°55'N, 55°10'W, mature forest and secondary forest
 Headquarters, 500 m, 4°57'N, 55°11'W, mountain savanna forest
 Km 2.5 Headquarters road, 4°59'N, 55°11'W, platanillos by side of road
 Irene Falls, 240 m, 4°55'N, 55°10'W, high marsh forest
 Jeep Trail, 500 m, 4°56'N, 55°12'W, moss-covered mountain savanna forest
 Leo Falls, 500 m, 4°57'N, 55°11'W, old mine shaft in high marsh forest
 Km 1.1 Mazaroni Trail, 500 m, 4°56'N, 55°11'W, secondary mountain savanna forest
 Km 1.2 Mazaroni Trail, 500 m, 4°56'N, 55°11'W, secondary mountain savanna forest
 Telesur Camp, 500 m, 4°56'N, 55°13'W, secondary forest
 Km 1.5 Wittie Kreek Trail, 400 m, 4°56'N, 55°10'W, high palm-dominated forest
 Km 2.4 Wittie Kreek Trail, 300 m, 4°56'N, 55°10'W, high palm-dominated forest
 Km 3.6 Wittie Kreek Trail, 150 m, 4°56'N, 55°10'W, high marsh forest

APPENDIX 5. Other species of mammals recorded from Suriname that may occur at Brownsberg Nature Park. Sixty-eight of the 191 species of indigenous non-marine mammals known from Suriname but presently undocumented at Brownsberg Nature Park (Lim et al. 2005). Fifty-eight species are typical of lowland rainforest of the Guiana Shield and would be expected to occur in Brownsberg, whereas ten species (*) are found in habitats not present in Brownsberg. Also listed are eight probable species (**) that are presently unrecorded from Suriname but known from both Guyana and French Guiana.

Order Didelphimorphia

Family Didelphidae (opossums)

Chironectes minimus
Gracilinanus emiliae
Lutreolina crassicaudata
*Hyladelphys kalinowskii***
Micoureus demerarae

Order Cingulata

Family Dasypodidae (armadillos)

*Euphractus sexcinctus**

Order Chiroptera

Family Emballonuridae (sheath-tailed bats)

Centronycteris maximiliani
Cormura brevirostris
*Cyttarops alecto***
Diclidurus albus
Peropteryx kappleri
Peropteryx leucoptera
Peropteryx macrotis
Saccopteryx canescens
*Saccopteryx gymnura***

Family Noctilionidae (bull-dog bats)

Noctilio albiventris

Noctilio leporinus

Family Mormoopidae (moustached bats)

Pteronotus personatus

Family Phyllostomidae (New World leaf-nosed bats)

Subfamily Phyllostominae (spear-nosed bats)

Lampronnycteris brachyotis
Lonchorhina aurita
Lonchorhina inusitata
*Micronycteris brosseti***
Micronycteris microtis
Mimon bennettii
Vampyrum spectrum

Subfamily Glossophaginae (nectar-feeding bats)

Choeroniscus godmani
Lichonycteris obscura

Subfamily Stenodermatinae (fruit-eating bats)

Artibeus amplus
Artibeus cinereus
Mesophylla macconnelli
*Platyrrhinus aurarius**
Platyrrhinus brachycephalus
Vampyressa bidens

APPENDIX 5. Cont.

Subfamily Desmodontinae (vampire bats)*Diaemus youngi*****Family Natalidae (funnel-eared bats)***Natalus tumidirostris***Family Furipteridae (thumb-less bats)***Furipterus horrens***Family Thyropteridae (disc-winged bats)***Thyroptera discifera***Family Vespertilionidae (evening bats)***Lasiurus atratus**Lasiurus blossevillii**Lasiurus ega**Myotis albescens**Myotis nigricans**Rhogeessa hussoni***Family Molossidae (free-tailed bats)***Cynomops abrasus**Cynomops greenhalli**Cynomops paranus**Cynomops planirostris**Eumops auripendulus**Eumops glaucinus**Eumops hansae****Eumops maurus**Eumops trumbulli**Molossops neglectus**Molossus sinaloae**Nyctinomops laticaudatus**Nyctinomops macrotis**Promops centralis**Promops nasutus***Order Carnivora****Family Canidae (dogs)***Cerdocyon thous***Family Procyonidae (raccoons)***Procyon cancrivorus****Order Cetacea****Family Delphinidae (estuarine dolphins)***Sotalia fluviatilis****Order Sirenia****Family Trichechidae (manatees)***Trichechus manatus****Order Artiodactyla****Family Cervidae (deer)***Odocoileus cariacou****Order Rodentia****Family Muridae (rats and mice)***Holochilus sciureus**Neacomys dubosti**Neacomys guianae**Nectomys melanius**Oecomys rex**Oecomys rutilus**Oligoryzomys fulvescens**Rhipidomys leucodactylus****Sigmodon alstoni***Zygodontomys brevicauda****Family Caviidae (cavies)***Cavia aperea****Family Echimyidae (spiny and tree rats)***Isothrix sinnamariensis*****Order Lagomorpha****Family Leporidae (rabbits)***Sylvilagus brasiliensis**