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MAMMALS OF DINAGAT AND SIARGAO ISLANDS,
PHILIPPINES

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The terrestrial mammalian fauna of the Philippines has traditionally been divided into four major provinces, based on richness, composition, and degree of endemism (Darlington, 1957; see also Alcala, 1976). The first, the Palawan province (including Palawan, Balabac, Busuanga, Culion, and nearby small islands), is noteworthy for its rich fauna (relative to island size), including many groups (carnivores, pangolins, porcupines, and some insectivores) absent or poorly represented elsewhere in the Philippines. Although many of the species are endemic, nearly all genera are found in northern Borneo (Sanborn, 1952). The second, the Mindanao province (including Mindanao, Basilan, Bohol, Leyte, Samar, and many small islands), is also marked by a rich fauna; however, several generic endemics are present, and diversity at the familial level is much reduced relative to that of the Palawan province (Taylor, 1934). The third province, the Luzon province (including only Luzon and a few small islands), contains fewer families, but those present, especially the Muridae, have radiated into a wide variety of niches, and many endemic genera are present (Taylor, 1934). The fourth province, the Panay-Negros pro-

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vince (including Cebu, Negros, and Panay), is perhaps the most distinctive of all, in a negative sense: the non-chiropteran mammal fauna is depauperate, consisting mostly of a few shrews and murid rodents (see Rabor et al., 1970). Actual species richness, expressed in quantitative terms, is not given in this sketch because smaller islands in each group are poorly collected, and because more points along the island size continuum are necessary to define relative richness. Thus, the description is general and non-quantitative.

This paper describes a collection of mammals from Dinagat and Siargao islands that is especially helpful in defining the characteristics of the Mindanao mammalian province. The collecting on Dinagat was broad in taxonomic scope, persistent over time, and took place at several localities, yielding moderate to large series of nearly all species. Therefore, it seems sufficient to allow estimation of the minimum species carrying capacity for small islands in the Mindanao faunal province, the first time this has been possible. This allows testing of the hypothesis that islands in the Mindanao faunal province are species-poor.

The first specimens of mammals from Dinagat Island were reported by Günther (1879). He listed specimens of six species (*Acerodon jubatus*, *Pteropus vampyrus*, *P. hypomelanus*, *Hipposideros obscurus*, *Cynocephalus volans*, and *Rattus everetti*), and also mentioned that "deer, wild pigs, viverridae, *Sciurus*, (and) *Tarsius*" were present. The only other report of mammals from Dinagat was provided by Heaney (1979) who discussed two specimens of *Sundasciurus mindanensis* from Dinagat; these are part of the collection reported here.

In 1972 D. S. Rabor led a field crew of over 20 persons from Mindanao State University and the Delaware Museum of Natural History to Dinagat and the adjacent island of Siargao. Forty-six days (10 March to 24 April) were spent collecting birds and mammals on Dinagat, and ten days (26 April to 5 May) were spent on Siargao. Specimens from the 1972 expedition, housed in the Delaware Museum of Natural History, from Dinagat total 196, and from Siargao, 72. In 1975, Rabor returned to Dinagat and obtained 78 additional specimens; these are housed in the Division of Mammals, U. S. National Museum of Natural History, with six specimens remaining in the Philippines at the University of the Philippines at Los Banos. There are 14 species of bats and 17 of terrestrial mammals from Dinagat, and

six of bats and nine of terrestrial mammals from Siargao. This report thus deals with 346 specimens, and discusses 33 species.

Because recent publications on Philippine mammals have been brief (Alcasid, 1970; Rabor, 1977), and because the last synoptic volume on the mammals of the Philippines was published nearly fifty years ago and is badly out of date (Taylor, 1934), we have summarized here all available data on distributions of the species discussed, and provide measurements for samples not only from Dinagat and Siargao, but also from appropriate reference areas. We also refer to recent ecological data that are not readily available.

METHODS

Species are listed below in alphabetical order by family within orders. Distribution records for islands are cited only once, with reference given to the first report; Taylor (1934) is taken as the "first" available reference for records he cites, so that references before 1934 are not cited unless they were not included by Taylor.

External measurements except forearm were taken from the collectors' labels; forearms of bats were measured by Heaney on dry specimens. Cranial measurements of rodents are defined in Heaney (1979) and DeBlase and Martin (1974). Specimens referred to are housed in the American Museum of Natural History (AMNH), Delaware Museum of Natural History (DMNH), Field Museum of Natural History (FMNH), Museum of Comparative Zoology, Harvard University (MCZ), University of Michigan, Museum of Zoology (UMMZ), University of the Philippines at Los Banos (UPLB), and the United States National Museum of Natural History (USNM). Location of the reference specimens is given in the text, followed by the three or four letter designation for the museum that houses them.

Physiography and vegetation of Dinagat and Siargao

Dinagat and Siargao islands lie off the northeast coast of Mindanao, between Mindanao and Samar. A thorough description of these islands may be found in duPont and Rabor (1973); the following is a brief summary. Dinagat, centered at 10°N, 125°45'E, is the larger of the two islands with an area of 671 square km; it is a rugged,

mountainous island, with one peak (Mt. Redondo) reaching 929 m and a second (Mt. Kambinlio) reaching 770 m. Siargao, centered at 9°55'N, 126°10'E, is a smaller, more low-lying island, covering 347 square km and reaching only 274 m at the highest point. Since Dinagat and Siargao are separated from Mindanao by water only 64 and 26 m deep, respectively, it is likely that both were connected to Mindanao by broad land bridges during the late Pleistocene (i.e., up until about 14,000 years ago), when sea level was low due to the large volume of water held in continental glaciers. Dinagat and Siargao are 14 and 31 km from Mindanao at their closest points, respectively.

Proceeding from the sea to mountain peaks, one passes through the following sequence of original forest vegetation types: mangrove, beach, dipterocarp, scrub, and mossy forests. Mangrove forests are limited to tidal areas, especially on the western side of Dinagat; occasionally nipa palms (*Nyssa fruticans* Wurm.) are abundant. Beach forest grows on sandy soils extending up to one-half kilometer inland; trees of at least nine families are common. Dipterocarp forest, so named because of the predominance of species in the Dipterocarpaceae, were widespread at all elevations on the islands prior to human disturbance. Common genera of dipterocarps include *Anisoptera*, *Dipterocarpus*, *Hopea*, *Pentacme*, and *Shorea*; species in the following families, among others, are also important: Ebenaceae, Leguminosae, Myrtaceae, Moraceae, Sapotaceae, and Verbenaceae.

Scrub forest is found on the islands in hilly parts of the interior where the soil is dry and rocky; trees in this forest type grow only to 6–7m, and often occur on slopes above dipterocarp forest. Common trees here are in the genera *Ficus* (Moraceae), *Premna* and *Vitex* (Verbenaceae), and *Bauhinia* (Leguminosae). At higher elevations, scrub forest grades into mossy forest, characterized by dense growth of mosses, liverworts, and ferns, by a decrease in heights of the trees of 3–4 m, and by the irregular shape of the trees. This last forest type is nearly absent from Siargao, where the hills are comparatively low.

Large areas on both islands are covered by disturbed vegetation of three general types: secondary forest, parang, and grasslands. Disturbed areas are especially common near the shore, in lowlands, and in relatively flat areas. Secondary forest develops where slash-and-burn agricultural fields have been abandoned; often there is a repeated cycle of human use followed by regrowth. Vegetation consists of trees, shrubs, grasses and herbs growing to various heights, often at great density. Trees and shrubs of the following families are common,

among others: Leguminosae, Euphorbiaceae, Verbenaceae, Moraceae, Palmae, and Myrtaceae.

Parang vegetation, a mixture of forest and grassland, is found where burning occurs occasionally. Where burning is regular, open grassland develops, with grass sometimes reaching heights of 2-3 meters. The most abundant species of grasses are in the genera *Imperata* and *Saccharum*. The trees and shrubs found in parang are mostly in the families Leguminosae, Euphorbiaceae, and Myrtaceae.

Collecting localities

Mammal specimens were obtained at twelve localities, three on Siargao, eight on Dinagat, and one on a small island offshore of Dinagat. Reference is made in species accounts to the name of the Barrio or Municipality.

1. Antipolo, Numancia Munic., Siargao.
2. Balitbiton, Loreto Munic., Dinagat.
3. Esperanza, Loreto Munic., Dinagat (245m elev.).
4. Hagik-hikan, Loreto Munic., Dinagat (180-245m elev.).
5. Hinubasan, Loreto Munic., Dinagat (20-75m elev.).
6. Kambinlio, Loreto Munic., Dinagat.
7. Omasdang, Loreto Munic., Dinagat.
8. Osmeña, Dapa Munic., Siargao.
9. Paragua, Esperanza Barrio, Loreto Munic., Dinagat (245m elev.).
10. Plaridel, Albor Munic., Dinagat.
11. San Isidro, Siargao.
12. Pulo Island (near Dinagat).

ACCOUNTS OF SPECIES

Order Insectivora

Podogymnura sp.

Dinagat: Plaridel, 1 DMNH; Balitbiton, 1 UPLB; Kambinlio, 2 UPLB.

This undescribed species, known only from four specimens obtained by Rabor, is easily distinguished from *P. truei* on the basis of its

Table 1

SELECTED MEASUREMENTS¹ OF ADULT *PODOGYMNURA* FROM DINAGAT AND MINDANAO.

Locality	N	Condyl- basal length	Brain case breadth	Inter- orbital width	Rostral length	Post- palatal depth	Rostral width	Post- palatal length	Mastoid breadth
<i>Podogymnura</i> sp.									
Dinagat	1	53.5	18.9	11.5	22.5	14.8	7.5	19.7	21.0
<i>Podogymnura truei minima</i>									
Mindanao	3-5	38.1 (37.2-38.7)	15.7±0.06 (15.6-15.7)	9.3±0.27 (8.9-9.6)	16.4±0.59 (15.7-16.9)	10.1±0.43 (9.5-10.7)	5.5±0.21 (5.3-5.7)	14.4±0.53 (13.7-14.9)	15.0±0.27 (14.8-15.4)
<i>Podogymnura truei truei</i>									
Mindanao	5	40.1±1.31 (38.8-42.2)	16.5±0.57 (16.0-17.4)	9.5±0.23 (9.3-9.8)	17.0±0.26 (16.7-17.5)	10.6±0.26 (10.2-10.8)	5.6±0.11 (5.5-5.8)	14.4±0.48 (13.9-15.5)	16.3±0.77 (15.6-17.4)

¹For all tables, measurements are mean ± 1 standard deviation (and range).

Table 2

SELECTED MEASUREMENTS OF ADULT *UROGALE* FROM DINAGAT, SIARGAO, AND MINDANAO.

Locality	N	Condyl- basal length	Greatest length skull	Inter- orbital width	Brain- case width	Zygo- matic width	Rostral length	Orbital length	Post- orbital length
<i>Urogaie everetti</i>									
Dinagat	3-4	54.6±2.12 (51.5-56.2)	60.5±2.55 (56.7-62.3)	15.5±0.71 (14.5-16.0)	20.5±0.15 (20.3-20.6)	27.0±1.44 (24.9-28.1)	28.1±1.39 (26.0-29.0)	15.3±0.70 (14.3-15.9)	21.4±1.21 (19.8-22.7)
Siargao	3	56.1 (55.7-56.7)	61.9 (61.4-62.3)	16.1 (15.8-16.5)	20.8 (20.5-21.0)	27.6 (27.3-27.8)	27.8 (27.3-28.4)	16.3 (16.3-16.4)	22.1 (21.8-22.3)
Mindanao	5	58.6±1.32 (57.0-60.0)	65.1±1.42 (63.3-66.5)	17.3±0.42 (16.8-17.7)	21.5±0.37 (21.0-22.0)	29.9±0.56 (29.5-30.9)	31.2±0.87 (30.2-32.3)	16.2±0.48 (15.5-16.7)	23.4±0.49 (22.5-23.7)

Table 3

SELECTED MEASUREMENTS OF ADULT *CYNOCEPHALUS VOLANS* FROM DINAGAT, SIARGAO, AND MINDANAO.

Locality	N	Condyl- basal length	Zygo- matic breadth	Inter- orbital width	Post- orbital width	Mastoid breadth	Rostral length	Orbital length
<i>Cynocephalus volans</i>								
Dinagat	14-19	65.7±3.09 (62.4-74.2)	43.0±1.94 (41.0-49.8)	17.4±1.01 (15.9-20.4)	17.0±0.74 (15.5-18.5)	28.5±1.18 (26.9-31.5)	25.0±1.00 (22.9-26.5)	24.7±1.02 (23.2-27.4)
Siargao	3-4	64.4±2.16 (62.5-67.5)	42.1±0.65 (41.5-42.8)	17.2±0.78 (16.2-17.8)	16.3±0.81 (15.5-17.4)	28.3 (27.3-29.1)	24.3 (23.1-25.1)	23.6±1.02 (22.2-24.5)
Mindanao	8-11	69.0±1.96 (66.8-72.2)	44.4±1.79 (42.2-48.0)	17.3±1.18 (14.9-19.2)	17.1±1.02 (15.1-18.1)	30.3±1.37 (27.7-32.7)	24.9±2.00 (23.7-29.7)	25.7±0.87 (24.4-27.5)

I ¹ to M ³	P ⁴ to M ³	M ² to M ² (labial)	Palatal width (M ³)	Total	Head and body	Tail	Hind foot	Ear
<i>Podogymnura</i> sp.								
27.7	13.0	15.2	8.4	284	211	73	42	26
<i>Podogymnura truei minima</i>								
19.8±0.68 (19.1-20.7)	9.1±0.39 (8.8-9.8)	10.6±0.41 (10.1-11.2)	6.2±0.41 (5.7-6.8)	193±16.0 (179-216)	136±11.2 (124-151)	57.0±5.4 (53-65)	31.5±2.1 (29-34)	20.1±0.6 (19.5-21)
<i>Podogymnura truei truei</i>								
20.5±0.58 (19.9-21.3)	9.3±0.29 (9.1-9.7)	11.0±0.16 (10.8-11.2)	6.5±0.18 (6.3-6.7)	201.8±5.2 (196-210)	143.0±7.1 (134-154)	58.8±2.6 (56-62)	33.2±0.4 (33-34)	21.2±0.4 (21-22)

Post- palatal depth	Palatal length	Post- palatal length	I ¹ to M ³	P ⁴ to M ³	M ² to M ² labial	M ³ to M ³ lingual	Total	Tail	Hind foot
<i>Urogale everetti</i>									
13.0±0.51 (12.3-13.5)	31.0±1.35 (29.0-32.0)	18.9±0.82 (17.7-19.4)	32.3±1.32 (30.0-33.1)	12.3±0.13 (12.1-12.4)	16.3 (15.7-17.1)	10.1±0.56 (9.5-10.8)	361.9±7.3 (357-372.5)	160.3±10.2 (151-173)	47.8±1.19 (47-49.5)
13.2 (12.9-13.8)	31.2 (30.7-31.5)	19.7 (19.2-20.4)	32.4 (31.8-32.7)	12.6 (12.0-13.0)	16.3 (16.0-16.5)	9.8 (9.7-9.9)	387 (370-397)	180 (170-185)	49 (48-50)
13.1±0.66 (12.4-14.1)	33.0±0.65 (32.0-33.8)	20.3±0.63 (19.6-21.2)	33.6±0.50 (32.8-34.1)	12.4±0.15 (12.2-12.6)	17.0±0.80 (16.1-17.8)	10.6±0.80 (9.6-11.3)	363.6±12.4 (345-380)	152.8±12.5 (135-170)	50.4±1.52 (48-52)

Post- orbital length	C ¹ to last M	Molariform toothrow	Palatal breadth at last M	Palatal length	Total	Tail	Hind foot	Ear
<i>Cynocephalus volans</i>								
24.8±1.73 (22.8-29.5)	33.7±1.18 (32.0-36.7)	20.9±0.85 (19.7-22.9)	14.7±0.78 (13.5-16.9)	29.8±1.48 (28.1-32.9)	627.2±47.49 (480-680)	255.3±21.78 (196-283)	67.9±5.51 (56-79)	24.5±2.20 (21-29)
24.0±1.16 (22.9-25.1)	33.0±0.68 (32.6-34.0)	20.4±0.12 (20.3-20.5)	14.4±0.29 (14.0-14.7)	28.8±1.05 (27.5-30.0)	609.5±19.84 (590-629)	246.0±19.88 (217-262)	72.5±4.51 (66-67)	24.0±0.82 (23-25)
26.3±0.85 (25.4-28.0)	34.1±0.87 (32.3-35.5)	20.7±0.78 (18.8-22.0)	15.5±0.89 (13.8-16.7)	31.0±1.18 (28.9-33.3)	676.1±43.75 (600-746)	273.0±40.30 (225-353)	78.4±5.40 (67-83)	25.1±3.14 (21-30)

large size, spiny dorsal pelage, inflated frontals, and well-developed sagittal and temporal crests (Heaney and Morgan, 1982). This and the undescribed species of *Batomys* and *Crateromys* listed below apparently are endemic to Dinagat. Curiously, this insectivore has relatively large body size compared to its closest relatives, whereas the murids *Batomys* and *Crateromys* are reduced in size. External and cranial measurements are given in Table 1.

Urogale everetti (Thomas, 1892)

Dinagat: Plaridel, 8 DMNH.

Siargao: Osmeña, 3 DMNH.

The Philippine tree shrew is widely distributed in mountainous areas on Mindanao (Taylor, 1934; Sanborn, 1952), but has not been reported previously from any other island. The specimens from both Dinagat and Siargao are smaller (Table 2) and have more prominent shoulder stripes than those from Mindanao (reference specimens from Mt. Matutum, Cotabato Prov.; DMNH). Specimens from Dinagat are relatively light in color, with a metallic golden sheen dorsally; those from Siargao are much darker than Dinagat or Mindanao specimens, with the dorsum nearly black.

Order Dermoptera

Cynocephalus volans (Linnaeus, 1758)

Dinagat: Balitbiton, 2 USNM; Kambinlio, 5 DMNH, 2 USNM; Omasdang, 5 DMNH; Esperanza, 1 DMNH; Plaridel, 7 DMNH.

Siargao: Osmeña, 4 DMNH.

The Philippine flying lemur previously has been taken throughout the Mindanao mammalian province, i.e., on Basilan, Bohol, Leyte, Mindanao, and Samar (Taylor, 1934). Specimens from Dinagat and Siargao, especially males, are slightly darker on the average than specimens from Mindanao. Sexual dimorphism in color is obvious, with males being darker. Dinagat and Siargao specimens have smaller white nose-patches, to the extent of having the patch broken into a series of small white spots; they also average smaller overall than specimens from Mindanao (Table 3; Mindanao specimens are from Mt. Matutum, Cotabato Prov.; Iligan City, Lanao Norte Prov.; and Mt. Sugarloaf, Zamboanga del Sur Prov.; DMNH).

Order Chiroptera

Acerodon jubatus jubatus (Eschscholtz, 1831)

Dinagat: Kambinlio, 1 DMNH.

This species was first reported from Dinagat by Günther (1879). *A. j. jubatus* has been reported from Leyte, Luzon, Mindoro, Negros, Panay, Samar (Taylor, 1934), and *A. j. mindanensis* from Mindanao (Taylor, 1934) and Basilan (Lawrence, 1939). Taylor (1934) mentioned no source for his mapping of *A. jubatus* from Siargao, and we have been unable to locate any certain records. Allocation of the Dinagat record is made on the basis of size (Table 4) and geographic location; the two subspecies do not appear to be very distinct (Andersen, 1912; Taylor, 1934).

Cynopterus brachyotis luzoniensis Peters, 1862

Dinagat: Hinubasan, 2 USNM; Kambinlio, 28 DMNH, 8 USNM; Omasdang, 2 DMNH; Plaridel, 8 DMNH.

Siargao: Osmeña, 11 DMNH.

We follow Lawrence (1939) in referring Philippine specimens of this abundant bat to a single subspecies. Our specimens appear identical to a series from Luzon (Table 4); Luzon specimens are from Zambales Mt., Masinloc, and Bolitac, all in Zambales Prov. (USNM). Specimens have been obtained previously on Luzon, Mindanao, Palawan, Polillo (Taylor, 1934), Basilan, Mindoro (Lawrence, 1939), Balabac, Busuanga, Culion, Cuyo (Sanborn, 1952), Caluya, Carabao (Alcala and Alviola, 1970), and Negros islands (Rabor et al., 1970). Pregnant females have been taken on Negros in January through April, June, and August, with a peak frequency in February (Alcala, 1976).

Eonycteris robusta Miller, 1913

Siargao: Osmeña, 1 DMNH

This cave-bat has been reported previously from Luzon (Taylor, 1934), Lubang, and Mindanao islands (Lawrence, 1939). Our single specimen is larger in most measurements (Table 4) than three specimens from Luzon (San Juan, Abra Prov., and near Baguio, Mountain Prov.; MCZ).

Table 4

SELECTED CRANIAL MEASUREMENTS OF ADULT PTEROPODID BATS FROM DINAGAT, SIARGAO, AND SELECTED OTHER LOCALITIES.

Locality	N	Condylobasal length	Zygomatic breadth	Inter-orbital width	Post-orbital width	Mastoid breadth
<i>Acerodon jubatus jubatus</i>						
Dinagat	1	82.5	44.9	13.1	10.1	15.9
<i>Cynopterus brachyotis luzoniensis</i>						
Dinagat	8-10	28.1±0.43 (27.3-28.7)	18.8±0.22 (18.5-19.1)	6.4±0.38 (5.9-7.0)	6.4±0.33 (5.9-6.8)	12.1±0.48 (11.5-13.0)
Luzon	8	28.1±0.51 (27.5-29.0)	18.8±0.67 (17.2-19.4)	6.1±0.30 (5.6-6.6)	6.5±0.37 (6.0-7.1)	12.2±0.26 (11.7-12.6)
<i>Eonycteris robusta</i>						
Siargao	1	36.6	22.4	7.2	6.9	15.1
Luzon	1-3	32.5 (31.1-33.9)	19.8 (18.8-20.5)	7.1 (6.5-7.6)	8.2 (6.8-9.0)	13.4 (12.9-13.8)
<i>Eonycteris spelea glandifera</i>						
Siargao	1-2	34.3 (33.4-35.1)	19.8	6.6 (6.3-6.9)	7.6 (7.4-7.8)	13.6 (13.3-13.9)
Luzon	4-5	32.5±1.12 (31.2-33.9)	20.3±1.16 (18.8-22.0)	6.7±0.43 (6.3-7.3)	8.0±0.19 (7.8-8.3)	13.4±0.56 (12.7-14.1)
<i>Haplonycteris fischeri</i>						
Dinagat	11-12	24.0±0.63 (23.0-25.3)	16.4±0.30 (15.9-17.0)	6.1±0.29 (5.6-6.6)	6.1±0.30 (5.5-6.5)	11.1±0.37 (10.7-11.9)
Luzon	1	24.1	16.2	5.8	6.0	10.5
<i>Macroglossus minimus</i>						
Dinagat	5-9	23.5±0.44 (22.7-23.9)	14.4±0.84 (13.7-15.5)	4.6-0.17 (4.4-5.0)	7.1±0.16 (6.8-7.3)	9.9±0.39 (9.4-10.6)
Mindanao	3-4	24.7 (23.8-25.5)	14.0±0.88 (13.4-15.3)	4.7±0.34 (4.3-5.1)	7.2±0.13 (7.0-7.3)	10.1±0.10 (10.0-10.2)
<i>Ptenochirus jagori</i>						
Dinagat	3	35.8 (34.9-37.2)	25.0 (24.5-25.9)	7.1 (6.8-7.4)	6.5 (6.0-6.9)	15.8 (15.2-16.2)
Luzon	8-10	34.0±1.23 (32.5-36.5)	23.1±0.59 (21.8-23.7)	7.1±0.21 (6.7-7.4)	6.7±0.43 (6.1-7.3)	14.4±0.59 (13.4-15.4)
<i>Ptenochirus minor</i>						
Dinagat	6	31.3±0.36 (30.7-31.7)	21.2±0.82 (19.8-22.1)	6.2±0.38 (5.5-6.5)	6.0±0.61 (4.8-6.4)	13.1±0.09 (13.0-13.2)
<i>Pteropus hypomelanus cagayanus</i>						
Dinagat	3-4	63.2±0.88 (62.5-64.5)	35.4±0.62 (34.5-35.9)	9.0±0.65 (8.3-9.8)	7.3±0.24 (6.9-7.4)	20.9±0.38 (20.4-21.2)
Panay	3-6	63.5 (62.2-64.6)	34.1±2.86 (31.0-37.6)	8.9±0.61 (8.3-10.0)	7.4±0.81 (6.5-8.2)	20.8±0.76 (19.9-21.5)
<i>Pteropus leucopterus</i>						
Dinagat	2	58.0 (56.9-59.0)	35.0 (34.2-35.8)	9.4 (8.8-9.9)	7.6 (7.4-7.7)	20.5 (20.4-20.5)
Luzon	1-2	60.4 (59.5-61.3)	35.1	9.2 (8.9-9.5)	9.3 (8.9-9.6)	21.1
<i>Rousettus amplexicaudatus</i>						
Siargao	6-8	35.8±0.63 (35.1-37.1)	21.8±0.42 (21.2-22.5)	7.8±0.32 (7.2-8.0)	7.5±0.50 (6.8-8.4)	13.6±0.53 (12.6-14.3)
Mindanao	4-5	36.3±1.22 (35.0-37.9)	22.9±1.24 (21.4-24.3)	8.0±0.32 (7.5-8.3)	7.4±0.52 (6.6-7.9)	14.0±0.39 (13.8-14.7)

Rostral length	Orbital length	Post-orbital length	C ¹ to last M	Molariform tooth row	Palatal breadth at last M	Palatal length
<i>Acerodon jubatus jubatus</i>						
28.9	31.7	26.5	32.7	22.9	17.2	47.2
<i>Cynopterus brachyotis luzoniensis</i>						
9.0±0.30	11.8±0.47	11.6±0.41	9.5±0.23	6.5±0.25	6.0±0.25	13.4±0.50
(8.6-9.5)	(10.6-12.3)	(11.2-12.3)	(9.0-9.7)	(6.0-6.8)	(5.5-6.3)	(12.5-14.3)
8.8±0.14	11.9±0.35	11.4±0.29	9.5±0.26	6.6±0.15	6.2±0.21	13.9±0.49
(8.7-9.0)	(11.4-12.6)	(11.0-11.9)	(9.2-9.9)	(6.3-6.8)	(5.8-6.4)	(13.2-14.6)
<i>Eonycteris robusta</i>						
13.9	13.2	15.4	13.6	9.4	7.7	19.7
13.1	12.4	13.8	12.6	8.9	7.8	18.2
(11.8-14.2)	(11.6-13.0)	(13.6-14.0)	(11.8-13.5)	(8.5-9.3)	(7.5-7.9)	
<i>Eonycteris spelea glandifera</i>						
12.9	12.6	13.3	12.5	8.6	7.6	18.4
(12.0-13.7)	(12.3-12.9)	(13.1-13.5)	(12.1-12.8)	(8.1-9.0)	(7.4-7.9)	(18.2-18.5)
12.0±0.53	12.3±0.36	13.1±0.43	11.9±0.39	8.3±0.53	7.6±0.41	17.4±0.92
(11.4-12.7)	(11.8-12.7)	(12.7-13.8)	(11.4-12.5)	(7.6-9.1)	(7.0-8.1)	(16.4-18.6)
<i>Haplonycteris fischeri</i>						
7.3±0.35	10.0±0.37	10.5±0.22	8.2±0.17	5.7±0.14	5.0±0.26	11.5±0.45
(6.7-7.8)	(9.3-10.6)	(10.2-11.0)	(8.0-8.5)	(5.5-6.0)	(4.6-5.5)	(10.8-12.5)
8.4	9.5	10.7	8.3	5.8	5.0	11.0
<i>Macroglossus minimus</i>						
9.0±0.20	7.5±0.30	10.0±0.27	8.0±0.30	4.9±0.28	4.9±0.19	12.3±0.32
(8.6-9.3)	(7.0-7.9)	(9.6-10.4)	(7.6-8.6)	(4.6-5.4)	(4.5-5.2)	(11.9-12.7)
9.4±0.50	7.8±0.37	10.4±0.45	8.7±0.05	5.5±0.05	4.9±0.08	12.6
(8.9-9.9)	(7.4-8.2)	(10.0-11.0)	(8.6-8.7)	(5.5-5.6)	(4.8-5.0)	(12.2-13.2)
<i>Ptenochirus jagori</i>						
11.0	15.8	15.4	12.4	8.8	8.1	17.6
(10.5-11.7)	(15.3-16.3)	(14.6-17.0)	(11.9-13.0)	(8.4-9.3)	(7.9-8.3)	(16.7-19.1)
10.4±0.57	14.9±0.48	13.9±0.46	11.9±0.58	8.4±0.40	7.4±0.37	16.6±0.54
(9.7-11.4)	(14.2-15.7)	(13.0-14.4)	(11.2-13.1)	(7.9-9.2)	(6.8-7.5)	(15.6-17.4)
<i>Ptenochirus minor</i>						
9.6±0.50	13.0±0.58	13.0±0.47	10.7±0.13	7.4±0.14	7.1±0.17	14.8±0.56
(8.8-10.3)	(12.2-13.9)	(12.3-13.5)	(10.5-10.9)	(7.2-7.6)	(6.9-7.4)	(14.1-15.5)
<i>Pteropus hypomelanus cagayanus</i>						
23.1±0.69	25.0±0.10	22.2±0.64	24.1	16.3	12.1	34.8±0.58
(22.5-24.0)	(24.9-25.1)	(21.3-22.8)	(23.9-24.5)	(15.9-17.0)	(11.4-12.7)	(34.2-35.6)
22.7±0.83	24.3±0.45	21.6±0.96	23.5±1.04	16.3-0.42	12.4±0.72	34.1±1.31
(21.7-23.8)	(23.8-25.0)	(20.5-22.6)	(21.7-24.3)	(15.5-16.6)	(11.6-13.2)	(32.6-36.0)
<i>Pteropus leucopterus</i>						
19.1	23.6	21.6	21.4	15.8	11.5	29.9
(19.0-19.2)	(23.0-24.1)	(21.1-22.1)	(21.0-21.7)	(15.6-16.0)	(11.4-11.6)	(29.8-30.0)
22.1	24.1	21.2	21.9	15.7	12.0	31.5
	(24.0-24.2)	(21.0-21.4)	(21.8-22.0)	(15.4-16.0)	(11.8-12.1)	(30.6-32.4)
<i>Roussettus amplexicaudatus</i>						
13.3±0.45	14.3±0.25	14.1±0.32	13.0±0.27	9.7±0.22	7.7±0.47	18.1±0.34
(12.5-14.0)	(14.0-14.7)	(13.7-14.5)	(12.6-13.5)	(9.3-9.9)	(7.2-8.5)	(17.5-18.4)
13.8±0.84	14.4±0.66	14.4±0.80	13.5±0.60	10.1±0.32	8.2±0.53	19.1±1.20
(13.2-15.2)	(13.3-15.1)	(13.5-15.5)	(12.8-14.4)	(9.7-10.6)	(7.5-8.7)	(17.8-20.6)

Eonycteris spelaea glandifera Lawrence, 1939

Siargao: Osmeña, 3 DMNH.

This widespread, cave-dwelling bat has been found previously on Luzon, Marinduque, Mindanao (Lawrence, 1939), Negros, Palawan (Sanborn, 1952), and Carabao islands (Alcala and Alviola, 1970). Our specimens are very similar to a series from Bucay, Abra Prov., Luzon; (MCZ; Table 4). Alcala (1976) noted pregnant females on Negros in February and March.

Haplonycteris fischeri Lawrence, 1939

Dinagat: Balitbiton, 9 DMNH, 3 USNM; Esperanza, 1 DMNH, 1 USNM; Hagik-hikan, 6 USNM; Kambinlio, 4 DMNH, 2 USNM; Plaridel, 10 DMNH.

These specimens are indistinguishable from the holotype from Mindoro and from a specimen from Mt. Tarlac, Tarlac Prov., Luzon (USNM; Table 4). The species is apparently widespread and fairly common, based on recent records from Luzon, Mindanao, Palawan (Kock, 1969a, b), and Negros (Rabor *et al.*, 1970). Alcala (1976) noted a single pregnant female taken on Negros in March.

Macroglossus minimus minimus (E. Geoffroy, 1810)

Dinagat: Kambinlio, 3 DMNH, 4 USNM; Plaridel, 5 DMNH.

Siargao: Osmeña, 3 DMNH.

This common species has been recorded previously on Cagayan Sulu, Cuyo, Mindanao, Negros, Panay, Samar, Tablas, (Taylor 1934), Mindoro, (Lawrence, 1939), Carabao, and Caluya islands (Alcala and Alviola, 1970), and specimens are available from Luzon (USNM 356628-629), Palawan (USNM 477588-589), and Busuanga (USNM 477590). We tentatively regard *M. fructivorus* Taylor 1934 as a synonym of *M. minimus* (see Sanborn, 1952), and follow Lekagul and McNealey (1977) in considering *lagochilus* to be a junior synonym of *minimus*. Our specimens are indistinguishable from a series from Mahayahay, Iligan City Munic., Lanao Norte Prov., Mindanao (DMNH; Table 4). Alcala (1976) found pregnant females on Negros in January and August.

Table 5

SELECTED EXTERNAL MEASUREMENTS OF ADULT PTEROPODID BATS FROM DINAGAT, SIARGAO, AND SELECTED OTHER LOCALITIES

Locality	N	Total	Tail	Hind foot	Ear	Forearm
<i>Acerodon jubatus jubatus</i>						
Dinagat	1	290	0	75	40	—
<i>Cynopterus brachyotis luzoniensis</i>						
Dinagat	9-10	99.8±4.21 (95-108)	9.2±3.65 (4-15)	16.5±0.85 (15-18)	14.8±0.79 (14-16)	62.1±2.57 (57-66)
Luzon	8	100.8±3.15 (95-105)	10.9±1.64 (9-14)	14.6±2.26 (11-18)	18.4±1.69 (15-20)	64.0±1.41 (62-67)
<i>Eonycteris robusta</i>						
Siargao	1	149	26	22	22	—
Luzon	3	134 (127-140)	22.7 (21-25)	23 (22-24)	21 (19-23)	71.3 (67-76)
<i>Eonycteris spelea glandifera</i>						
Siargao	2	133 (132-134)	16 (14-18)	21 (20-22)	19 (18-20)	74 (70-78)
Luzon	5	125±4.69 (118-130)	14.2±1.3 (13-16)	20.2±1.48 (18-22)	20.2±1.10 (19-21)	71.6±3.05 (68-75)
<i>Haplonycteris fischeri</i>						
Dinagat	6-12	74.9±3.70 (70-80)	0	12.0±1.21 (10-14)	11.8±0.75 (11-13)	46.5±1.90 (43-49)
Luzon	1	77	0	12	13	48
<i>Macroglossus minimus</i>						
Dinagat	10	69.0±1.70 (66-71)	0	13.1±2.42 (9-16)	13.0±1.56 (10-15)	—
Mindanao	4	71.0±2.71 (69-75)	0	13.3±0.96 (12-14)	10.8±0.96 (10-12)	—
<i>Ptenochirus jagori</i>						
Dinagat	1-3	126.0 (124-127)	13 (11-15)	19.3 (17-21)	20.0 (19-22)	80.3 (78.5-82)
Luzon	10	131.2±4.42 (127-140)	12.1±4.18 (6-17)	19.8±1.99 (17-23)	20.3±1.06 (18-21)	80.1±2.60 (76-85)
<i>Ptenochirus minor</i>						
Dinagat	6	109.0±4.25 (105-117)	11.5±2.07 (10-15)	19.2±0.75 (18-20)	16.0±0.89 (15-17)	66.2±2.99 (62-70)
<i>Pteropus hypomelanus cagayanus</i>						
Dinagat	4	201.0±17.67 (183-219)	0	50.0±3.74 (46-55)	29.5±1.0 (29-31)	142.3±11.93 (136-148)
Panay	6	—	0	—	—	135.0±4.20 (130-140)
<i>Pteropus leucopterus</i>						
Dinagat	2	187.5 (185-190)	0	45.5 (45-46)	26.5 (26-27)	—
Luzon	1-2	232.5 (225-240)	0	44.5 (44-45)	24 (20-28)	137 (136-138)
<i>Rousettus amplexicaudatus</i>						
Siargao	7-8	139.8±2.87 (136-143)	17.0±1.69 (15-19)	21.1±0.64 (20-22)	19.4±0.52 (19-20)	83.4±3.91 (77-87)
Mindanao	2-3	134.3 (131-137)	19.7 (19-20)	20.7 (20-21)	19.7 (19-20)	85.1 (84.4-85.7)

Ptenochirus jagori (Peters, 1861)

Dinagat: Esperanza, 2 USNM; Kambinlio, 1 DMNH.

Siargao: Osmeña, 1 DMNH

Specimens of this species are very similar to a series from Clark Air Base, Pampanga Prov. and Mt. Tarlac, Tarlac Prov. (USNM; Table 4) on Luzon. There is considerable variation within the series and in specimens from other localities; additional study is needed. Other records are from Camiguin, Luzon, Mindanao, Mindoro, Tablas, (Taylor, 1934), Negros (Sanborn, 1952), and Carabao (Alcala and Alviola, 1970). Alcala (1976) noted pregnant females in January and March on Negros.

Ptenochirus minor Yoshiyuki, 1979

Dinagat: Balitbiton, 3 DMNH, 2 USNM; Kambinlio, 1 DMNH, 4 USNM.

Specimens of this species and the large *P. jagori* from adjacent localities on Dinagat confirm the distinctness of this recently recognized species. The only previous records are from Mindanao and Palawan (Yoshiyuki, 1979).

Pteropus hypomelanus cagayanus Mearns, 1905

Dinagat: Esperanza, 2 DMNH; Kambinlio, 7 DMNH, 1 USNM; Pulo Id, 18 DMNH.

This widespread species was first reported from Dinagat by Günther (1879); it is known from Cagayan Sulu, Cuyo, Guimaras, Leyte, Luzon, Mindanao, Panay, (Taylor, 1934), Marinduque (Lawrence, 1939), and Romblon islands (Timm and Birney, 1980); specimens from Sibutu have been referred to the Bornean subspecies, *P. h. tomesi*. Specimens from Dinagat are indistinguishable from a series from Concepcion, Panay (USNM: Table 4).

Pteropus leucopterus Temminck, 1853

Dinagat: Kimbinlio, 2 DMNH.

This rare bat has been reported previously from Luzon only (Taylor, 1934). Our two specimens are virtually identical to one from Real, Quezon Prov., Luzon (USNM 345508), and one from Dimalasud,

San Mariano, Sierra Madre Mts., Isabella Prov., Luzon (AMNH 187125; Table 4).

Pteropus vampyrus lanensis Mearns, 1905

This species was recorded by Günther (1879) from Dinagat Island, but no specimens were obtained in 1971 or 1975; it has also been taken on nearly all large islands in the Philippines (Taylor, 1934; Sanborn, 1952).

Rousettus amplexicaudatus amplexicaudatus (E. Geoffroy, 1810)

Dinagat: Kambinlio, 3 DMNH, 2 USNM.

Siargao: Osmeña, 22 DMNH.

Specimens of this species from Siargao average slightly smaller than a sample from Samal Island and Luangbay Caves, Davao Prov., Mindanao (FMNH: Table 4). This abundant bat has been reported previously from Guimaras, Jolo, Lubang, Luzon, Mindanao, Negros, Palawan, Panay, Polillo, Samar, (Taylor, 1934), Cebu, Mindoro, (Lawrence, 1939), Samal (Sanborn, 1952), Caluya, and Carabao (Alcala and Alviola, 1970). Alcala (1976) reported a peak in the frequency of pregnancy of adult females of this species on Negros in February, with some pregnancies noted from December through June.

Emballonura alecto alecto (Eydoux and Gervais, 1839)

Dinagat: Plaridel, 1 DMNH.

The single specimen from Dinagat has a damaged skull, but appears to fit well with a series from Guimaras (USNM: Table 6). This taxon has been recorded previously from Guimaras, Luzon, Mindanao (Taylor, 1934), Negros (Sanborn, 1952), and Caluya (Alcala and Alviola, 1970). Alcala (1976) noted that pregnant females of this species were taken on Negros in April.

Megaderma spasma spasma (Linnaeus, 1758)

Dinagat: Balitbiton, 1 DMNH.

The one specimen from Dinagat is slightly larger than specimens from Iligan and Mt. Malindang on Mindanao, and Montalban Caves in Rizal Prov., Luzon (USNM; Tables 6 and 7), but is undoubtedly

conspecific. This species has been recorded previously from Luzon, Mindanao (Taylor, 1934), Cebu (Lawrence, 1939), and Negros (Sanborn, 1952).

Hipposideros diadema griseus (Meyen, 1833)

Dinagat: Plaridel, 1 DMNH.

The one specimen of this species is represented by a skin only, but appears to be conspecific with a specimen from Guimaras (USMN 115700) on the basis of size, pelage, and nose-leaf and ear morphology. We follow Lawrence (1939) in recognizing only one subspecies in the Philippines. Previous records are from Catanduanes, Guimaras, Mindanao, Luzon (Taylor, 1934), Leyte (Andersen, 1905), Cebu, Mindoro (Lawrence, 1939), and Negros (Sanborn, 1952).

Hipposideros obscurus (Peters, 1861)

Dinagat: Balitbiton, 1 DMNH.

The species was first reported from Dinagat by Günther (1879). The one specimen at hand agrees with series from Clark Air Base, Pampanga Prov., and 1 mile west Bamban, Tarlac Prov., Luzon (USNM; Tables 6 and 7) in length of forearm and noseleaf structure, but is more brownish and less orange-brown than those from Luzon. The skull fits well into the variation seen in these series (Table 6). The species has been recorded previously from Luzon and Mindanao (Taylor, 1934; Sanborn, 1952).

Order Primates

Tarsius syrichta (Linnaeus, 1758)

Dinagat: Plaridel, 1 DMNH.

Although the Philippine tarsier was mentioned by Günther (1879) as occurring on Dinagat, we are not aware of any subsequent publication that cited the record. The specimen at hand is an exceptionally large male; nearly all measurements fall above the range of measurements for the two medium-sized subspecies, *T. s. syrichta* from Samar (UMMZ) and Leyte (Abuyog; AMNH), and *T. s. carbonarius* from Mindanao (Cotabato (AMNH) and Davao (USNM) Provs.), and differs as much from these two as they do from the smaller *T. s. fraterculus*

from Bohol (Sevilla; USNM); Table 8; see also Hill, 1955). The specimen is also remarkable for having shorter (both proportionately and absolutely) and broader fingers than any of the series examined from Mindanao. Likewise, the tail and hind legs appear short and stout, but this could be due to preparation techniques. The dorsal pelage is darker, more olivaceous, and slightly shorter and less wooly than on the Mindanao specimens.

Lawrence (1939) recorded a specimen from Basilan, in addition to records from islands cited above.

Order Rodentia

Exilisciurus concinnus surrutilus (Hollister, 1913)

Dinagat: Balitbiton, 6 DMNH, 1 USNM; Kambinlio, 3 DMNH; Plaridel, 1 DMNH.

Siargao: Osmeña, 3 DMNH.

Specimens from Siargao and Dinagat average slightly smaller than those from Mindanao (Saronayan, Piagayungan Mts., Lanao del Sur Prov.; DMNH), with the cline in body size positively correlated with island area (Table 9). This species, currently being revised by Heaney (in prep.), also has been recorded from Basilan, Mindanao, Leyte, and Samar (including the named forms *concinnus*, *samaricus*, *surrutilus*, and possibly *luncefordi*).

Sundasciurus mindanensis (Steere, 1890)

Dinagat: Balitbiton, 3 DMNH, 1 USNM; Kambinlio, 4 DMNH, 1 USNM; Omasdang, 1 DMNH; Plaridel, 4 DMNH.

Siargao: Antipolo, 1 DMNH; Osmeña, 3 DMNH; San Isidro, 1 DMNH.

Günther (1879) reported the presence of tree squirrels ("*Sciurus*") on Dinagat, but no specimen records were available before Heaney (1979) reported the two USNM specimens from Balitbiton and Kambinlio, Loreto Municipality cited here. Philippine members of this genus need taxonomic revision. Members of the *S. philippinensis* species-group (Heaney, 1979) have been reported from Basilan, Mindanao, and Samar (Taylor, 1934; Sanborn, 1952). Specimens from Dinagat are very similar to a series from Saronayan, Piagayungan Mts., Lanao del Sur Prov., Mindanao (DMNH; Table 9).

Table 6

SELECTED CRANIAL MEASUREMENTS OF ADULT MICROCHIROPTERAN BATS FROM DINAGAT AND SELECTED OTHER LOCALITIES.

Locality	N	Condylobasal length	Zygomatic breadth	Inter-orbital width	Mastoid breadth	Rostral length
<i>Emballonura alecto</i>						
Dinagat	1	—	—	2.5	7.1	3.4
Guimaras	1-5	13.2±0.07 (13.1-13.3)	8.8±0.15 (8.5-8.9)	2.9±0.07 (2.8-3.0)	7.5±0.07 (7.4-7.6)	3.4±0.25 (3.1-3.8)
<i>Megaderma spasma</i>						
Dinagat	1	23.2	—	3.6	12.2	5.4
Mindanao	2	21.6 (21.5-21.7)	14.4 (14.0-14.7)	3.6 (3.5-3.7)	11.5 (11.3-11.6)	5.0 (4.8-5.1)
<i>Hipposideros obscurus</i>						
Dinagat	1	16.1	10.5	2.2	9.6	5.0

Table 7

SELECTED EXTERNAL MEASUREMENTS OF ADULT MICROCHIROPTERAN BATS FROM DINAGAT.

Locality	N	Total	Tail	Hindfoot	Ear	Forearm
<i>Emballonura alecto</i>						
Dinagat	1	65	13	8	15	45.4
<i>Megaderma spasma</i>						
Dinagat	1	81	0	17	40	58.1
<i>Hipposideros obscurus</i>						
Dinagat	1	78	20	12	18	41.2

Petinomys crinitus (Hollister, 1911)

Dinagat: Balitbiton, 1 DMNH.

Siargao: Osmeña, 1 DMNH.

This rare flying squirrel has previously been reported only from Basilan (Taylor, 1934; Lawrence, 1939), and Mindanao (Sanborn, 1953). The specimens from Dinagat and Siargao are nearly indistinguishable from two from Kibawalan, Malalag, Davao Prov., Mindanao (DMNH; Table 9).

Orbital length	Postorbital length	C ¹ to last M	Molariform toothrow	Palatal breadth at last M	Palatal length
<i>Emballonura alecto</i>					
6.3	7.3	5.3	4.0	3.4	5.6
5.7±0.22 (5.5-6.0)	7.5±0.19 (7.3-7.8)	5.2±0.15 (5.0-5.4)	3.9±0.04 (3.8-3.9)	3.3±0.28 (2.8-3.5)	5.2
<i>Megaderma spasma</i>					
8.2	13.8	9.2	7.1	4.0	6.8
7.6 (7.5-7.7)	13.0 (12.4-13.5)	9.0 (8.9-9.0)	7.0 (6.9-7.0)	4.0 (3.9-4.1)	6.1 (5.9-6.3)
<i>Hipposideros obscurus</i>					
6.3	9.5	5.9	4.8	5.0	5.7

Apomys insignis

Dinagat: Esperanza, 2 UPLB.

The genus *Apomys* is one of the most widespread and diverse of the endemic murid genera in the Philippines, with nine species named from the Luzon and Mindanao faunal provinces (Alcasid, 1970; Johnson, 1962). Our two specimens are tentatively referred to this species, pending revision of this complex group. Measurements of an adult male are given in Table 10.

Batomys sp.

Dinagat: Plaridel, 2 DMNH.

Our two specimens of bush rat, easily distinguished from their closest relative, *B. salamonseni* Sanborn, 1953, on the basis of their small size and reddish color (reference sample from Malaybalay, Mt. Katanglad, Bukidnon Prov., Mindanao; FMNH; Table 10), will be described as a new species elsewhere. We follow Misonne (1969) in regarding *Mindanaomys* Sanborn, 1953 as congeneric with *Batomys*. *Batomys salamonseni* is known only from Mindanao; *B. dentatus* and *B. granti* are both known only from Luzon (Taylor, 1934; Sanborn, 1952).

Table 8

SELECTED MEASUREMENTS OF ADULT TARSIERS FROM DINAGAT AND SELECTED OTHER LOCALITIES.

Locality	N	Condyl- basal length	Greatest length of skull	Zygomatic breadth	Braincase breadth	Orbital breadth	Inter- orbital breadth	Rostral length	I ¹ to M ³
<i>Tarsius syrichta carbonarius</i>									
Dinagat	1	34.4	42.0	31.0	23.6	34.3	1.7	8.9	17.5
Mindanao	5-6	30.5±1.12 (29.1-32.2)	38.5±1.32 (37.0-40.1)	27.2±0.98 (26.0-28.1)	23.0±0.77 (22.2-23.9)	31.7±0.86 (30.5-32.5)	1.6±0.34 (1.2-2.0)	8.2±0.64 (7.5-9.0)	16.2±0.28 (15.9-16.5)
<i>Tarsius syrichta syrichta</i>									
Leyte and Samar	1-2	31.2 (31.0-31.3)	39.4 (39.3-39.4)	27.6 (26.9-28.2)	22.8 (22.7-22.9)	32.0 (31.9-32.0)	1.6 (1.5-1.7)	8.0 (7.2-8.7)	16.8 (16.7-16.8)
<i>Tarsius syrichta fraterculus</i>									
Bohol	1	30.5	38.2	26.3	22.1	31.2	1.2	7.9	16.3

Table 9

SELECTED MEASUREMENTS OF ADULT SCIURIDS FROM DINAGAT, SIARGAO, AND MINDANAO.

Locality	N	Basio- cipital length	Inter- orbital breadth	Zygomatic breadth	Mastoid breadth	Nasal length	Anterior nasal breadth	Rostral depth	Rostral length
<i>Exilisciurus concinnus surrutilus</i>									
Dinagat	1-10	23.6±0.38 (23.0-24.1)	10.5±0.34 (10.1-11.0)	16.8±0.48 (16.1-17.5)	12.1±0.18 (11.8-12.3)	7.9±0.32 (7.4-8.3)	3.6±0.15 (3.4-3.9)	5.6±0.31 (5.0-6.1)	12.7±0.16 (12.5-12.9)
Siargao	2-3	23.0 (22.6-23.4)	10.3 (9.9-11.0)	16.7 (16.4-17.0)	12.4 (12.2-12.5)	8.0 (7.6-8.6)	3.8 (3.4-4.0)	5.2 (5.1-5.2)	12.2 (11.6-12.8)
Mindanao	6-9	24.9±0.33 (24.4-25.5)	10.6±0.30 (10.4-11.3)	17.4±0.31 (16.9-17.9)	12.3±0.34 (11.5-12.6)	8.3±0.36 (7.6-8.7)	3.6±0.16 (3.3-3.8)	6.0±0.21 (5.5-6.3)	14.0±0.34 (13.5-14.4)
<i>Sundasciurus mindanensis</i>									
Dinagat	1-6	45.9±0.41 (45.5-46.5)	17.7±0.29 (17.3-18.1)	30.5±0.63 (29.8-31.3)	21.6±0.55 (20.9-22.3)	15.6±0.94 (14.5-16.5)	7.1±0.22 (6.7-7.3)	10.5±0.16 (10.3-10.7)	20.5±0.83 (19.2-21.4)
Mindanao	3-5	46.2±0.58 (45.5-46.9)	17.3±0.85 (16.4-18.5)	30.8±0.75 (29.8-31.6)	21.4 (20.7-22.5)	15.2±0.58 (14.5-15.9)	7.3±0.34 (6.9-7.7)	10.6±0.29 (10.3-11.0)	21.5±0.77 (21.0-22.6)
<i>Petinomys crinitus</i>									
Dinagat	1	52.5	11.4	34.0	25.4	16.8	10.9	12.2	18.1
Siargao	1	53.7	11.0	35.1	24.1	18.4	10.4	12.1	18.3
Mindanao	2	52.5 (50.9-54.1)	11.2 (11.1-11.2)	34.6 (34.5-34.7)	24.7 (24.6-24.7)	17.3 (17.1-17.4)	10.6 (10.1-11.1)	12.2 (11.7-12.6)	17.9 (17.3-18.5)

C ¹ to M ³	M ¹ to M ³	Palatal breadth	M ² breadth	Greatest length mandible	Breadth M ₂	Depth mandible M ₁ -M ₂	Total	Tail	Hind foot
<i>Tarsius syrichta carbonarius</i>									
14.1	7.4	—	4.4	28.3	2.7	4.4	325	196	66
13.6±0.32 (13.2-13.9)	7.2±0.24 (6.8-7.5)	9.3±0.16 (9.0-9.4)	4.0±0.15 (3.7-4.1)	24.9±1.00 (23.5-26.4)	2.6±0.08 (2.4-2.6)	3.6±0.12 (3.5-3.8)	360±21.8 (336-394)	233.2±16.0 (217-254)	63.0±4.1 (58-69)
<i>Tarsius syrichta syrichta</i>									
14.0	7.4 (7.2-7.6)	9.0 (8.6-9.4)	4.3 (4.1-4.4)	25.9 (25.7-26.0)	2.6	3.8 (3.7-3.9)	357	245	61 (60-62)
<i>Tarsius syrichta fraterculus</i>									
13.8	7.5	8.5	4.2	25.1	2.5	3.4	327	195	58

Orbital length	Maxillary molariform toothrow	Palatal breadth at P ⁴	Diastema length	Total	Tail	Hind foot	Ear	Weight
<i>Exilisciurus concinnus surrutilus</i>								
6.3±0.18 (6.0-6.6)	3.6±0.16 (3.3-3.8)	4.8±0.17 (4.6-5.1)	6.4±0.21 (6.1-6.7)	151.6±6.7 (138-161)	66.3±3.9 (60-71)	25.5±1.2 (24-27)	11.2±0.6 (10-12)	25.5
6.2 (6.0-6.3)	3.4 (3.3-3.5)	4.7 (4.5-4.9)	6.0 (5.7-6.2)	142.5 (141-144)	59.5 (59-60)	25.3 (24-26)	11	25.0 (24-26)
6.3±0.14 (6.1-6.5)	3.7±0.09 (3.6-3.8)	5.0±0.15 (4.8-5.2)	6.9±0.25 (6.5-7.3)	160±4.7 (155-170)	70.8±3.1 (68-76)	26.3±1.3 (24-28)	11.3±0.6 (10.5-12)	—
<i>Sundasciurus mindanensis</i>								
15.6±0.45 (14.9-16.2)	8.5±0.21 (8.3-8.8)	10.4±0.48 (9.9-11.0)	11.6±0.76 (10.2-12.4)	358.8±6.8 (350-368)	170±5.5 (165-176)	40.8±16.7 (45-50)	18.8±1.9 (17-22)	285
15.5±0.18 (15.2-15.7)	9.1±0.23 (8.8-9.4)	6.4±0.26 (6.1-6.8)	11.8±0.30 (11.4-12.2)	373±20.5 (352-405)	183.8±9.3 (174-198)	46.4±4.3 (42-53)	21.5±2.1 (18.5-24)	—
<i>Petinomys crinitus</i>								
20.2	11.6	13.8	11.6	581	293	59	24	—
21.7	11.5	13.4	11.0	589	315	40	24	—
20.0 (18.9-21.0)	11.1 (11.0-11.2)	13.5 (13.1-13.8)	10.9 (10.2-11.6)	585 (570-600)	287.5 (280-295)	57.5 (55-60)	21.5 (20-23)	—

Table 10

SELECTED MEASUREMENTS OF ADULT MURIDS FROM DINAGAT, SIARGAO, AND MINDANAO.

Locality	N	Basio- c- cipital length	Inter- orbital breadth	Zygomatic breadth	Mastoid breadth	Nasal length	Anterior nasal breadth	Rostral depth
<i>Apomys insignis</i>								
Dinagat	1	27.0	5.1	—	11.7	10.6	3.5	6.2
<i>Batomys salamonsemi</i>								
Mindanao	5-7	38.4±0.79 (37.5-39.4)	6.0±0.14 (5.8-6.2)	20.5±0.75 (19.5-21.9)	14.9±0.33 (14.3-15.2)	17.6±0.69 (16.8-18.8)	4.9±0.16 (4.7-5.1)	9.0±0.29 (8.6-9.4)
<i>Batomys</i> sp.								
Dinagat	1	30.8	5.2	17.4	13.8	13.3	4.0	7.8
<i>Bullimus bagobus</i>								
Dinagat	11-13	56.9±1.47 (54.9-59.8)	8.0±0.42 (7.4-8.7)	29.5±0.72 (28.4-30.7)	22.1±0.71 (21.0-23.5)	25.6±1.44 (23.3-28.2)	6.1±0.33 (5.6-6.9)	13.1±0.48 (12.5-14.0)
Siargao	1	56.5	8.2	29.1	20.7	24.6	5.8	12.7
Mindanao	2-3	62.3 (59.0-67.3)	8.9 (8.8-8.9)	32.0 (31.0-32.6)	24.8 (23.6-26.0)	26.9 (25.2-29.1)	6.7 (6.4-7.0)	14.5 (14.0-15.3)
<i>Crateromys</i> sp.								
Dinagat	1	54.9	6.6	31.2	21.0	24.8	7.9	12.9
<i>Rattus everetti</i>								
Dinagat	12-13	53.8±2.26 (49.9-58.2)	8.0±0.55 (6.9-9.2)	27.9±1.43 (25.6-30.4)	20.1±1.50 (15.5-21.5)	21.6±1.37 (19.4-24.2)	6.3±0.40 (5.7-7.0)	12.4±0.72 (11.1-13.6)
Siargao	2	53.7 (53.4-53.9)	7.8	27.6 (27.3-28.0)	21.0 (20.7-21.3)	21.2 (21.1-21.3)	6.6 (6.1-7.0)	12.3 (12.2-12.3)
Mindanao	6-8	50.8±1.98 (48.4-53.3)	7.4±0.41 (6.8-7.9)	25.7±0.70 (25.0-27.3)	19.4±0.53 (18.3-19.9)	20.6±0.75 (19.5-22.0)	5.4±0.21 (5.0-5.6)	11.5±0.45 (10.7-12.0)
<i>Rattus exulans</i>								
Dinagat	2-8	31.6±0.89 (30.6-32.8)	5.3±0.27 (5.0-5.8)	15.9±0.54 (15.1-16.6)	13.5±0.28 (12.9-13.8)	12.4±0.44 (11.9-13.0)	3.6±0.14 (3.3-3.7)	7.0±0.24 (6.7-7.3)
Mindanao	4-6	30.9±1.44 (28.6-32.5)	5.1±0.09 (5.0-5.2)	15.6±0.28 (15.2-15.8)	13.1±0.44 (12.4-13.7)	12.0±0.79 (10.6-12.8)	3.2±0.18 (3.0-3.5)	7.2±0.34 (6.7-7.7)
<i>Rattus rattus mindanensis</i>								
Dinagat	3-11	41.5±1.67 (39.3-44.0)	6.4±0.33 (5.9-6.8)	20.6±0.94 (19.0-22.2)	16.3±0.88 (14.4-17.5)	15.7±0.88 (14.4-17.0)	4.9±0.62 (4.2-6.3)	9.2±0.65 (8.5-10.5)
Mindanao	2-9	43.5 (43.4-43.9)	6.6±0.38 (6.1-7.0)	21.4±0.64 (20.5-22.4)	17.3 (16.8-17.7)	16.5±0.52 (15.9-17.3)	4.7±0.26 (4.2-5.0)	9.9±0.27 (9.5-10.2)

Rostral length	Orbital length	Maxillary molariform toothrow	Palatal breadth at M ¹	Diastema length	Total	Tail	Hind foot	Ear
<i>Apomys insignis</i>								
11.2	—	5.5	6.0	7.4	228	128	28	18
<i>Batomys salamonseni</i>								
18.0±0.52 (17.4-18.9)	13.0±0.42 (12.7-13.6)	7.9±0.33 (7.3-8.2)	6.8±0.29 (6.5-7.3)	11.5±0.40 (11.0-12.1)	305.4±7.8 (300-317)	128.0±11.2 (110-138)	36.3±0.8 (35-37)	22.8±1.6 (21-25)
<i>Batomys</i> sp.								
12.7	11.2	5.9	5.5	8.3	265	129	30	18
<i>Bullimus bagobus</i>								
26.7±1.18 (24.8-29.3)	20.1±0.65 (19.2-21.3)	9.5±0.29 (9.0-10.0)	10.0±0.37 (9.1-10.5)	17.0±0.88 (15.9-18.8)	427.1±14.7 (404-446)	173.2±9.5 (155-187)	54.0±2.9 (49-58)	27.4±1.29 (25-29)
26.4	20.6	10.3	10.4	16.3	400	170	54	25
29.4 (27.9-28.4)	21.3 (20.6-22.4)	10.6 (10.3-11.0)	10.6 (10.5-10.8)	18.4 (17.0-20.9)	—	—	—	—
<i>Crateromys</i> sp.								
23.0	19.0	12.1	9.8	16.6	346	281	54	24
<i>Rattus everetti</i>								
21.2±1.24 (18.7-23.2)	19.5±0.76 (18.8-21.2)	9.8±0.34 (9.2-10.3)	9.7±0.47 (9.1-10.7)	15.6±0.97 (14.0-17.6)	475.7±25.25 (429-526)	235.8±15.7 (197-255)	47.2±3.7 (40-52)	25.1±1.9 (20-27)
21.3 (21.2-21.3)	19.3 (19.2-19.3)	9.6 (9.5-9.7)	9.6 (9.4-9.8)	15.7 (15.4-15.9)	486 (471-500)	256 (254-257)	50 (49-51)	25
20.2±1.03 (18.3-21.6)	19.2±0.52 (18.5-20.0)	9.9±0.38 (9.2-10.3)	9.3±0.23 (9.0-9.6)	14.2±0.65 (13.4-15.0)	451.0±18.6 (436-484)	231.8±11.1 (216-247)	48.3±2.9 (46-53)	24.5±1.4 (23-26)
<i>Rattus exulans</i>								
12.2±0.41 (11.7-12.8)	12.0±0.28 (11.6-12.5)	5.4±0.18 (5.2-5.7)	6.1±0.14 (5.9-6.3)	9.0±0.37 (8.7-9.7)	268.0±11.1 (257-284)	137.9±9.3 (125-150)	27.4±4.0 (25-37)	17.4±0.7 (16-18)
11.7±0.63 (10.7-12.5)	11.6±0.41 (11.1-12.1)	5.3±0.29 (5.0-5.8)	6.1±0.25 (5.9-6.5)	8.8±0.55 (7.9-9.5)	265.4±13.5 (251-285)	131.8±8.1 (121-140)	28.3±2.9 (25-30)	17.6±0.6 (17-18)
<i>Rattus rattus mindanensis</i>								
15.8±0.58 (15.4-16.7)	15.0±0.72 (13.8-16.2)	7.0±0.33 (6.2-7.4)	7.8±0.27 (7.4-8.2)	11.7±0.70 (10.8-13.2)	382.0±23.2 (335-410)	192.5±15.0 (170-212)	38.0±2.7 (32-41)	21.9±1.1 (21-24)
16.3±0.39 (15.5-16.8)	16.1±0.45 (15.4-16.7)	7.5±0.29 (6.9-7.8)	8.0±0.28 (7.6-8.5)	12.3±0.60 (11.4-13.4)	413.7±25.0 (395-474)	201.9±7.6 (186-210)	38.9±2.2 (36-43)	22.3±1.4 (20-24)

Bullimus bagobus bagobus (Mearns, 1905)

Dinagat: Balitbiton, 3 DMNH, 2 USNM; Hinubasan, 6 USNM; Kambinlio, 1 DMNH, 2 USNM; Paragua, 1 DMNH.

Siargao: Osmeña, 2 DMNH.

This large, relatively short-tailed terrestrial rat has been recorded previously from Mindanao (Taylor, 1934); *B. b. barkeri* is recorded from Calicoan and Samar (Johnson, 1946). We concur with Sanborn (1953) that the species is allied to *B. luzonicus*. Specimens from Dinagat and Siargao are dwarfed relative to a sample from Duminagat, Mt. Malindag, Mindanao (DMNH; Table 10).

Crateromys sp.

Dinagat: Balitbiton, 1 UPLB.

The single specimen is the first record of this genus from the southern Philippines. It is easily distinguished from the two named species in the genus (Musser and Gordon, 1981) on the basis of size and pelage characteristics (see Table 10). A complete description will be published elsewhere.

Rattus everetti (Günther, 1879)

Dinagat: Balitbiton, 6 DMNH; Hagik-hikan, 1 USNM; Kambinlio, 1 DMNH, 1 USNM; Paragua, 2 DMNH; Plaridel, 7 DMNH.

Siargao: Osmeña, 4 DMNH.

This large, long-tailed rat was named by Günther on the basis of a single specimen from either Dinagat or northern Mindanao; recent authors generally have regarded northern Mindanao as more likely. Sanborn (1952) placed *R. albigularis* Mearns, 1905 and *R. tagulayensis* Mearns, 1905 from Mindanao in synonymy with this species. Examination of *R. everetti*, *R. gala* (from Mindoro), *R. rabori* (from Mindanao), and *R. tyrannus* (from Ticao Island, near southern Luzon; see Johnson, 1946) has led us to believe that all are closely related; all are easily identified as members of this group by their large size, usually rough pelage, long tail usually tipped with white skin, large molars, very heavy supraorbital and temporal crests, and globose

bullae. As currently defined, *R. everetti* is known only from Luzon, Mindanao (Taylor, 1934; Sanborn, 1952), Samar (Johnson, 1946), Dinagat, and Siargao. Specimens from Dinagat and Siargao average slightly larger than a reference sample of *R. "rabori"* from Malaybalay, Mt. Kantanglad, Bukidnon Prov., Mindanao (DMNH; Table 10).

Rattus exulans (Peale, 1848)

Dinagat: Hinubasan, 1 USNM; Kambinlio, 2 DMNH, 11 USNM; Omasdang, 2 DMNH.

We follow Musser (1977) in recognizing all populations of this small, spiny commensal rat in the Philippines as conspecific. No subspecies name is given here because selection of such a name would be arbitrary; this group is also in need of revision. Specimens from Dinagat average slightly larger than a series from Mt. Apo, Davao Prov., Mindanao (DMNH; Table 10).

Rattus rattus mindanensis (Mearns, 1905)

Dinagat: Balitbiton, 2 USNM; Hagik-hikan, 1 USNM; Kambinlio, 7 DMNH, 1 USNM; Omasdang, 6 DMNH; Plaridel, 2 DMNH.

Siargao: Osmeña, 8 DMNH.

We follow Johnson (1945) and Musser (1977) in considering *mindanensis* a subspecies of the common commensal rat, *Rattus rattus*. These series show substantial variation in pelage color and texture and in tail scale size, but are cranially less variable. This species probably has been introduced by man onto all inhabited islands in the Philippines. Specimens from Dinagat average slightly smaller than a series from Mt. Apo, Davao Prov., Mindanao (DMNH; Table 10).

Order Carnivora

The report of a viverrid from Dinagat by Günther (1879) was based on sight records only. The species may have been either *Paradoxurus hermaphroditus* or *Viverra tangalunga*, both of which are widespread.

Order Artiodactyla

Sus sp.

Günther's (1879) report of "wild pigs" on Dinagat based on sight records may have been based on *Sus celebensis*, a native species, or *S. scrofa*, the domestic pig which is sometimes feral.

Cervus unicolor Kerr, 1792

The deer reported by Günther (1879) were undoubtedly of this species, since all of the many named forms in the Philippines are now recognized as subspecies of *C. unicolor* (excluding *Axis calamianensis* from the Calamian islands; Whitehead, 1972).

DISCUSSION

The mammals of Dinagat and Siargao may be divided into five groupings based on their geographic affinities. The first group includes the three endemic species in the genera *Batomys*, *Crateromys*, and *Podogymnura*; the first is related to species found on Luzon and Mindanao, the second on Luzon and a small island near Mindoro, and the third on Mindanao only. The second group is composed of eight species restricted to the Mindanao faunal province, as defined above; they are *Urogale everetti*, *Cynocephalus volans*, *Tarsius syrichta*, *Exilisciurus concinnus*, *Petinomys crinitus*, *Sundasciurus mindanensis*, *Apomys insignis*, and *Bullimus bagobus*. This and the preceding group are composed of non-volant mammals only. The third group occurs throughout the Philippines excluding the Palawan chain; the species are *Acerodon jubatus*, *Eonycteris robusta*, *Ptenochirus jagori*, *Pteropus leucopterus*, *Hipposideros obscurus*, and *Rattus everetti*. To these might be added *Haplonycteris fischeri* and *Ptenochirus minor*, which have been found on Palawan, but otherwise are found only in the Philippines "proper". This group is heavily biased toward bats, since only a non-volant species is among them.

The fourth group is composed of species widely distributed in the Oriental faunal region, and often Wallacea as well. The twelve species are *Cynopterus brachyotis*, *Eonycteris spelaea*, *Macroglossus minimus*, *Pteropus hypomelanus*, *P. vampyrus*, *Rousettus amplexicaudatus*,

Emballonura alecto, *Megaderma spasma*, *Hipposideros diadema*, a "civet", *Sus* sp., and *Cervus unicolor*. These, too, are heavily biased toward bats, with only three non-chiropteran species represented.

The fifth and final group is composed of two extremely widespread species of commensal rodents, *Rattus exulans* and *R. rattus*. These are almost certainly introduced by man (Musser, 1977). One or more of the three large terrestrial species listed in the fourth group above may be introduced as well.

It is apparent that the species of non-volant mammals from Dinagat and Siargao are nearly all restricted to the Mindanao province; other than *Rattus everetti*, the few exceptions are either endemics, commensals, or are large, strong dispersers. This faunal relationship is not surprising since Dinagat was almost certainly connected to Mindanao during the late Pleistocene (i.e., up until 14,000 years ago), as discussed above. The volant species, however, which might be expected to have higher vagility, are approximately evenly divided between species restricted to the Philippines (seven) and those widely distributed in the Orient, *sensu lato* (nine species); none is restricted to the Mindanao province. The microchiropterans tend to be more widely distributed than the megachiropterans, indicating that size alone does not determine the colonization ability of these bats.

It might be hypothesized that Dinagat and Siargao (as well as Mindanao and other major Philippine islands) are species-poor because of their geographic isolation, relative to islands on the nearby Sunda Shelf that were connected to continental Asia during the Pleistocene. Dinagat, which was fairly thoroughly surveyed by Rabor and his co-fieldworkers, as discussed above, has 17 species of terrestrial mammals recorded; Siargao was not thoroughly collected and may be disregarded. Islands in the Palawan chain were connected to Borneo during the Pleistocene, and so are suitable for comparison. Palawan, Busuanga, Culion, and Balabac have 24, 17, 12, and 10 species of terrestrial mammals, respectively, and areas of 11,650, 938, 400, and 306 km, respectively (Sanborn, 1952, and Heaney, unpub. data). The following equation describes the island area/species richness relationship for these data: species number = $8.467(\log \text{ area}) - 9.926$ ($r = .979$, $p < 0.05$). For Dinagat, with an area of 671 km, fourteen species are to be expected based on this regression. Because Dinagat has three more than this, we can reject the hypothesis that Dinagat is species-poor. No comparable data are available for bats, so that the equivalent hypothesis that the bat fauna is species-poor can not be tested.

It might be asked whether small land-bridge islands, such as Dinagat, have a fauna similar in composition to their source area, i.e., if the percentage of species falling into major groups is the same, indicating that the fauna is ecologically balanced or "harmonic" with respect to its source area. Mindanao (the source area for Dinagat with 30 species) and Dinagat have the following faunal compositions, based on records cited by Taylor (1934), Sanborn (1952), Musser (1977), this study, and unpublished data, for the two islands respectively: insectivores, 13.3%, 12.5%; primates, 6.7%, 6.3%; dermopterans, 3.3%, 6.3%; rodents, 63.3%, 56.3%; carnivores, 6.7%, 6.3%; ungulates, 6.7%, 12.5%. The composition is strikingly similar within the range of accuracy possible given our present knowledge of the faunas of these two islands.

In summary, the terrestrial mammalian fauna of Dinagat and Siargao islands is made up of 17 species, most of which are limited to the Mindanao faunal province. The bats, however, are more widespread, about half having affinities to the main part of the Philippines, and half having affinities to the Oriental region in general. It appears that, although Dinagat Island has only about half the number of terrestrial mammals found on Mindanao, it cannot be said to be species-poor relative to islands of comparable size on the Asian continental shelf. Additionally, it is apparent that the mammalian fauna that remains on Dinagat has roughly the same proportional composition as that on Mindanao.

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