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The Genus *Chalinolobus* (Chiroptera,  
Vespertilionidae) Taxonomic Review of  
*Chalinolobus picatus*, *C. nigrogriseus*, and  
*C. rogersi*

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## INTRODUCTION

Doubts have existed for many years about the presence in New Guinea of the vespertilionid genus *Chalinolobus*. The gift of an unidentified specimen of *Chalinolobus* from Fergusson Island, off the north coast of Papua, and, more recently, the discovery of a colony in Port Moresby on the Territory of Papua mainland led us to consider the identity of these New Guinea *Chalinolobus*. A search of the literature revealed considerable uncertainty about names and taxa within the genus, chiefly in Australia. We found that a review of three Australian species was necessary before the New Guinea taxon could be named. Our main discussion is confined to *Chalinolobus picatus*, *C. nigrogriseus*, and *C. rogersi*.

Three additional species of *Chalinolobus* are known from Australia: *C. dwyeri*, *C. gouldi*, and *C. morio*. However, the taxonomic position of

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these species is not in question; characters of these species are given in Ryan (1966) and Troughton (1967).

#### ABBREVIATIONS

AM,	The Australian Museum, Sydney
AMNH,	The American Museum of Natural History
AIB,	Animal Industry Bureau Collection, Darwin, Australia
BM,	British Museum (Natural History), London
CSIRO,	Commonwealth Scientific and Industrial Research Organisation, Division of Wildlife Research Collection, Canberra, Australia
FMNH,	Field Museum of Natural History, Chicago
NMV,	National Museum of Victoria, Melbourne
QM,	Queensland Museum, Brisbane
SAM,	South Australian Museum, Adelaide
USNM,	United States National Museum, Smithsonian Institution
WAM,	Western Australian Museum, Perth

#### RECORDS FROM NEW GUINEA

In the 1870s Kendal Broadbent collected mammals and birds in British New Guinea (now the Territory of Papua) for The Australian Museum. Ramsay (1879) recorded a specimen of *Scotophilus nigrogriseus* taken by Broadbent on his trip to southeastern New Guinea. Ellis Troughton (*in litt.*) informed us that "in the collection purchased from Kendal Broadbent there was a *Scotophilus* sp., registered as A. 3176 in the 'old collection', from East Cape, New Guinea, which would undoubtedly be the basis of Ramsay's recording of *S. nigrogriseus*; there is no trace of the specimen amongst the spirit or dried collection, and the remarks column of the register says, condition of the specimen 'not good', implying the grave risk that it may have been discarded in the earlier days."

The second known specimen of *Chalinolobus* from New Guinea (AMNH 160337, male; body in alcohol, skull removed and cleaned) was collected in 1891 on Fergusson Island in the D'Entrecasteaux Group by Albert C. English, Government Agent, stationed at Kappa Kappa in the Rigo District of British New Guinea (Papua). English accompanied the Administrator, William MacGregor (1893), on a trip to Fergusson Island (Moratau) in December, 1891. There are no details on the label other than the locality and date. In addition to the original label on the

alcoholic specimen there is a second label which we believe could have been attached by C. W. De Vis, then Curator at the Queensland Museum in Brisbane; this label gives the identification, *Chalinolobus nigrogriseus*, and repeats information on the original label. This specimen was presented to Van Deusen for the Archbold Collection in 1959 by George Mack, Director of the Queensland Museum. East Cape, on the north coast of New Guinea, is the easternmost point of the mainland of the Territory of Papua. Fergusson Island lies about 35 miles (56 km.) north of East Cape.

On November 4, 1969, a most interesting discovery was made by James I. Menzies of the Department of Biology, University of Papua and New Guinea. Menzies had been summoned to Champion House, on Goldie Street, in Port Moresby "to do something about the bats under the roof." He discovered a colony of about 200 *Chalinolobus*, comprised solely of lactating females. Two specimens were sent to J. E. Hill at the British Museum (Natural History) for identification. Koopman measured these specimens (see table 2) in London. In addition, Menzies presented four study skins and skulls (AMNH 193791-193794) and six specimens in alcohol (AMNH 193795-193800) to the Archbold Collections. We are deeply indebted to Menzies for his generosity, and to Hill for his kindness in giving up his plan to discuss the identification of the bats in this colony.

The range of *Chalinolobus nigrogriseus* included not only "northern and eastern Australia" but also "New Guinea," according to Troughton in Le Souef and Burrell (1926). Iredale and Troughton (1934) regarded *C. picatus* and *C. nigrogriseus* as conspecific, recognized the priority of the name *picatus*, and gave the range of *picatus* as "southern Queensland and northern New South Wales"; New Guinea was not included in the range of this or any other species of *Chalinolobus*. Laurie and Hill (1954) listed *C. picatus* from New Guinea. Ziegler and Lidicker (1968) listed *Chalinolobus* as possibly occurring in New Guinea. McKean (*in litt.*) advised us as a matter of interest that the Australian Museum in Sydney has a specimen of *Emballonura raffrayana* (M8069) from New Guinea erroneously labelled as *Chalinolobus picatus*. Marlow (*in litt.*) has confirmed this reidentification.

## SYNONYMIES AND TAXONOMIC HISTORY

### *Chalinolobus picatus* (Gould, 1852)

*Scotophilus picatus* GOULD, 1852 (holotype only, from Captain Sturt's depot, northwestern New South Wales).

*Chalinolobus nigrogriseus*: DOBSON, 1878 (not *Scotophilus nigrogriseus* Gould, 1856). OGILBY, 1892. LUCAS AND LE SOUEF, 1909. WOOD JONES, 1925. TROUGHTON,

1926. (All on grounds of synonymy with *picatus* and in disregard of priority of *picatus*.)

*Chalinolobus picatus*: IREDALE AND TROUGHTON, 1934 (in part). TATE, 1942 (part including holotype of *picatus*). TATE, 1952 (four from Craigmore Station, Queensland). RYAN, 1966 (specimen from Wyndham Homestead, west central New South Wales). TROUGHTON, 1967.

*Chalinolobus nigrogriseus nigrogriseus* (Gould, 1856)

*Scotophilus nigrogriseus* GOULD, 1856 (holotype only, from Moreton Bay, southeastern Queensland).

*Chalinolobus nigrogriseus*: DOBSON, 1875 (Gould's Moreton Bay specimen only). DOBSON, 1878 (Moreton Bay specimen only). THOMAS, 1909 (Moreton Bay specimen only). IREDALE AND TROUGHTON, 1934 (in part). RYAN, 1966 (four specimens from Clarence River district of coastal New South Wales).

*Chalinolobus picatus nigrogriseus*: TROUGHTON, 1941.

*Chalinolobus picatus*: TATE, 1942 (part including holotype of *nigrogriseus*).

*Chalinolobus rogersi*: TATE, 1952 (specimens from Cape York Peninsula). MCKEAN AND PRICE, 1967 (not *C. rogersi* Thomas, 1909, two specimens from Chillagoe, Cape York Peninsula, Queensland).

*Chalinolobus nigrogriseus rogersi* Thomas, 1909

*Chalinolobus nigrogriseus*: DOBSON, 1875 (Port Essington, N.T. material only, not Gould's specimen from Moreton Bay, Queensland). DOBSON, 1878 (Port Essington specimens only). THOMAS, 1909 (Port Essington specimens only).

*Chalinolobus rogersi* THOMAS, 1909 (holotype only, from Kimberly area in north-eastern Western Australia). IREDALE AND TROUGHTON, 1934, HAMILTON-SMITH, 1964 (gave range as "northwestern Australia and Cape York Peninsula.") MCKEAN AND PRICE, 1967 (four specimens from Sedan Dip, 55 miles northwest of Julia Creek, in northwestern Queensland).

*Chalinolobus picatus nigrogriseus*: JOHNSON, 1964.

*Chalinolobus nigrogriseus rogersi*: VAN DEUSEN, 1969.

Gould (1852) described and figured *Scotophilus picatus* from a specimen captured by Capt. Charles Sturt in his tent at his depot in northwestern New South Wales. This event took place during 1845 on Capt. Sturt's expedition into central Australia. Sturt commented on the deep black color of the specimen and on the fact that this bat was not uncommon at the site of the depot, which was near a lagoon bordered with trees. Unfortunately, neither the skull of this bat nor that of the following species, *nigrogriseus*, was described by Gould.

Gould (1856) described and figured *Scotophilus nigrogriseus* from a specimen collected by Frederick Strange, an English naturalist employed as a collector by Gould, in the vicinity of Moreton Bay, southeastern Queensland. Gould showed this bat to R. F. Tomes, a prominent authority on bats who had a particular interest in the genus *Scotophilus* (*sensu lato*). Tomes agreed with Gould that *picatus* and *nigrogriseus* were distinct species.

Peters (1866) proposed the genus *Chalinolobus* to receive *Scotophilus tuberculatus* from New Zealand. Dobson (1875) further defined this new genus, and added two Australian species to it: *gouldii* and *nigrogriseus*. Surprisingly, *picatus* was not mentioned. Later, however, Dobson (1878) put *picatus* into synonymy with *nigrogriseus*. Two specimens labeled "*Scotophilus picatus*, Gould" were then available to him: an adult, from "Yarrundi, N.S.W."; and an immature specimen, from "Australia." No reason was given for considering the two species conspecific. McKean (*in litt.*) has advised us that the Yarrundi specimen has been identified as *Chalinolobus dwyeri*.

Thomas (1909) described *Chalinolobus rogersi* from the Kimberley area in northeastern Western Australia. This small species was considered by Thomas as most nearly allied to *nigrogriseus*. Troughton (1941) regarded *C. picatus nigrogriseus* as a distinct subspecies confined to the coastal area of southeastern Queensland and northeastern New South Wales. Tate (1942), although he had measured the forearms and photographed the type skulls of *C. nigrogriseus* (BM 56.10.28.3), and *C. picatus* (BM 53.10.22.33) at the British Museum, regarded *picatus* and *nigrogriseus* as conspecific as had Iredale and Troughton (1934).

Johnson (1964) regarded his Arnhem Land, Northern Territory specimens from three localities and Hoy's two specimens from Brock's Creek, Northern Territory (all in the collection of the United States National Museum, Washington) as somewhat intermediate in the character of "frosting," or hoariness of pelage, between *rogersi* and typical *nigrogriseus* of eastern Queensland, but in general closer to the latter. Johnson concluded that *rogersi* was conspecific with *nigrogriseus* and therefore a subspecies of *picatus*. His specimens are identified as *C. picatus nigrogriseus*.

Ryan (1966) critically reviewed several species of *Chalinolobus* and described one new species, *C. dwyeri*. He compared a specimen of *C. picatus* from Wyndham Homestead in dry, west-central New South Wales with four specimens (only three with unbroken skulls) identified as *C. nigrogriseus* from the Clarence River district of coastal northeastern New South Wales, Ryan concluded that *picatus* and *nigrogriseus* are clearly distinct species.

McKean and Price (1967) identified four specimens of *Chalinolobus* from Sedan Dip (55 miles northwest of Julia Creek, in northwestern Queensland) and two specimens from Chillagoe, Queensland (near the eastern base of the Cape York Peninsula) as *rogersi*.

Van Deusen (1969) regarded *Chalinolobus rogersi* as a subspecies of *nigrogriseus*.

## DISCUSSION

*Chalinolobus picatus* AND *Chalinolobus nigrogriseus*

Gould, with only two specimens in hand (Sturt's small black bat from the interior of New South Wales, and Strange's specimen from Moreton Bay, Queensland) correctly, we believe, recognized these as distinct species. Hill (*in litt.*) kindly examined the type specimen of *picatus* at the British Museum, and sent us the following comments: "B.M. No. 53.10.22.33 is a dry skin with [the skull represented by] only the anterior part of the rostrum (mounted on a piece of wood) and the broken mandible. So far as I can determine it agrees exactly with the account of a single specimen published by Ryan (1966). It differs from both *rogersi* and *nigrogriseus* in smaller size, narrower rostrum, much smaller teeth and especially very much smaller molars. Examination of this specimen leaves me in no doubt that it must be considered to represent a species quite distinct from both *rogersi* and *nigrogriseus*, in contradiction to Johnson (1964) who treats *picatus*, *nigrogriseus* and *rogersi* as conspecific."

The confusion over the taxonomic status of these two species originated when Dobson (1878), on the basis of six specimens (including Gould's type of *nigrogriseus*, but with no mention of Gould's type of *picatus*), put *picatus* into synonymy with *nigrogriseus*.

Although Ryan (1966) studied only one specimen of *picatus* and four specimens of *nigrogriseus*, he concluded that the two species are valid. Troughton (1967) followed Ryan.

We have examined 12 specimens of *C. picatus*. Tate (1952) listed four specimens, identified by him as *C. picatus*, from Craigmores Station about 18 miles northwest of Springsure, Queensland. We have been permitted to remove the skull of one of these alcoholic specimens (FMNH 64402) for study. Skull measurements of this specimen and forearm measurements for the other three specimens (FMNH 64399-64401) are given in table 1. We agree with Tate's identification. These important specimens were collected in 1947 by Mrs. G. Scott (nee Gabrielle Neuhäuser), who earlier had collected mammals in many Queensland localities for the Archbold Collections. J. Lewis (*in litt.*), Postmaster at Springsure, adds these descriptive notes on this locality: "The Craigmores boundary is along the Nogoia River. This area is well timbered but over the years quite a lot has been cleared for grain growing. The annual mean rainfall is approximately 29 inches. Many bat caves are on Mt. Wandoo which is on Coorabelle Station and was previously part of Craigmores. Perhaps Mrs. Scott collected her specimens from this mountain." The range of *C. picatus* does not extend to the Queensland coast. Craigmores

is about 190 miles west of Port Alma. However, specimens are known from Peak Downs, Capella, Betro, and Millmerran, localities which lie from 100 to 120 miles inland from the coast, and whose mean annual rainfall is in the 20 to 30 inch belt.

The South Australian Museum has a series of *C. picatus* specimens from Razorback Ridge (3 miles north of Stephen's Creek Reservoir) near Broken Hill in New South Wales. A female (SAM M6684) with twin young was collected by Peter Aitken on September 27, 1962, in a disused mine tunnel. In March, 1963 K. Dansie collected seven females and one male at the same locality. We have examined six of these females (SAM M6623, M6624, M6715-M6718). Forearm measurements and notes on the dentition of these specimens are given in table 1. In addition Aitken has supplied us with forearm measurements and dentition notes for SAM M6684 female, M7269 male, and M7270 female; skull measurements are also given for SAM M7270. This locality is also represented by specimens in the CSIRO collection (McKean, *in litt.*).

The Archbold Collection, too, has a single specimen of *C. picatus* collected by L. MacMillan during the period May 17 to July 3, 1940 in the vicinity of Birdsville, southwestern Queensland. Measurements of this male specimen AMNH 153415 (skin and skull) are shown in table 1. Unfortunately the exact date and locality are unknown. We do know, however, that MacMillan collected not only in Birdsville and at Roseberth (18 miles northwest of Birdsville) but also at Dickaree waterhole in South Australia (10 miles south of Birdsville).

Ryan (1966) gave forearm and skull measurements of a male *C. picatus* collected in September, 1963 by J. Wheeldon at Wyndham Homestead, 53 miles north of Wentworth, New South Wales. These data are also shown in table 1. This specimen C4022 is in the National Museum of Victoria, Melbourne.

Through the kindness of John L. McKean (*in litt.*) we are able to list and map a number of additional locality records of *C. picatus* in Queensland and New South Wales. We have not attempted to draw a range map, preferring in the present state of knowledge to allow the specimen records to indicate the distribution (see fig. 1).

Queensland:

Augathella, Brygenno Station, AM

Barcaldine, QM

Barcarolle, Longreach, QM

Betro, near Capella, QM

Capella, AM

Cunnamulla, AM, BM

TABLE 1  
 FOREARM AND CRANIAL MEASUREMENTS (IN MILLIMETERS) AND DENTITION NOTES ON *Chalinolobus picatus*

Locality and specimen number	Sex	Forearm Length	Skull, Condylbasal Length	Zygomatic Breadth	Post-orbital Breadth	c-m <sup>3</sup> Length	Breadth Across Crowns of Upper Canines, Externally	Breadth Across Crowns of m <sup>3</sup> -m <sup>3</sup> , Externally	p <sup>2</sup>	i <sup>1</sup>
Queensland: Birdsville (vicinity) AMNH 153415 <sup>a</sup>	♂	31.5 <sup>b</sup>	11.2	8.3	4.1	4.2	4.0	5.5	PA	B
Craigmore Station (18 mi. N.W. Springsure)	♂	32.0 <sup>c</sup>	—	—	—	—	—	—	—	—
FMNH 64399	♂	33.0 <sup>c</sup>	—	—	—	—	—	—	—	—
FMNH 64400	♀	31.0 <sup>c</sup>	—	—	—	—	—	—	A	B
FMNH 64401	♀	34.0 <sup>c</sup>	10.9	8.0	3.9	4.2	3.8	5.3	P	B
FMNH 64402 <sup>a</sup>	—	—	—	—	—	—	—	—	—	—
Peak Downs BM 76.4.10.1	—	33.4	—	—	—	—	—	—	—	—
New South Wales: Capt. C. Sturt's Depot (Northwestern N.S.W.) BM 53.10.22.33	—	32.0	—	—	—	—	—	—	—	—
Type of <i>C. picatus</i> Gould, 1852	—	Hill, 32.3 <sup>b</sup>	—	—	—	Hill, 4.2	—	—	—	—



TABLE 1—(Continued)

Locality and Specimen Number	Sex	Forearm Length	Skull, Condylbasal Length	Zygomatic Breadth	Post-orbital Breadth	c-m <sup>3</sup> Length	Breadth across Crowns of Upper Canines, Externally	Breadth across Crowns of m <sup>3</sup> -m <sup>3</sup> , Externally	p <sup>2</sup>	i <sup>1</sup>
Wyndham Homestead (53 mi. N. Wentworth)										
NMV C4022	♂	32.6 <sup>b</sup>	10.6 <sup>a</sup>	8.0	4.0	4.1	3.7	5.2	P	B
Stephen's Creek Reservoir (3 mi. N.), near Broken Hill										
SAM M7269	♂	32.8 <sup>c</sup>	—	—	—	—	—	—	A	B
SAM M6623	♀	33.1 <sup>c</sup>	—	—	—	—	—	—	A	B
SAM M6624	♀	34.0 <sup>c</sup>	—	—	—	—	—	—	A	B
SAM M6684	♀	34.8 <sup>c</sup>	—	—	—	—	—	—	A	B
SAM M6715	♀	35.7 <sup>c</sup>	—	—	—	—	—	—	A	B
SAM M6716	♀	34.2 <sup>c</sup>	—	—	—	—	—	—	A	B
SAM M6717	♀	34.6 <sup>c</sup>	—	—	—	—	—	—	A	B
SAM M6718	♀	34.5 <sup>c</sup>	—	—	—	—	—	—	A	B
SAM M7270	♀	33.3 <sup>c</sup>	11.2	8.2	—	4.3	—	—	A	B

<sup>a</sup>Ryan (1966) gave three measurements not used in this table for specimen C4022: skull, total length, 11.7; interorbital breadth, 4.3; braincase breadth, 7.0. The same measurements for AMNH 153415 are: 11.2; 4.4; and 6.9. For FMNH 64402 they are: 10.9; 4.4; and 6.9.

<sup>b</sup>Indicates forearm measurement made on a dried study skin. Measurements taken by authors are to nearest 0.5 millimeter.

<sup>c</sup>Indicates forearm measurement made on a specimen in alcohol. Measurements taken by authors are to nearest 0.5 millimeter.

Symbols: A, p<sup>2</sup> absent on both sides; B, i<sup>1</sup> has a lateral cusp; P, p<sup>2</sup> present on both sides. PA, p<sup>2</sup> present on left side, absent on right.

Gilruth Plains, near Cunnamulla, CSIRO  
Millmerran, near Toowoomba, AM  
St. George, QM  
New South Wales  
Baradine (20 miles north), AM  
Girilambone, AM  
Mt. Murchison Station, near Wilcannia, CSIRO  
Popilta (83 miles south southeast of Broken Hill—latitude 33°10'S,  
longitude 141°45'E), AM  
Tyndarie Station, Bourke, AM

Hill (*in litt.*) advised us that, "a single specimen (B.M. 76.4.10.1, the skull not found) is apparently referable to *picatus*; it is from Peak Downs, Queensland. The length of the forearm is 33.4 mm."

In summary, *C. picatus* and *C. nigrogriseus* are valid species, easily separated by consistent external characters and by good skull characters (see Ryan's diagnoses for the two species, as well as table 1 of the present paper.) We have also noted an additional external character that differentiates *C. picatus* from *C. nigrogriseus*. The long (up to 10 mm.), black hair of the dorsum in the *picatus* specimens examined extends onto the basal third of the interfemoral membrane; this black pelage grades into a fringe of brownish black hairs. The tail pelage is particularly thick along and on both sides of the middorsal line. In *nigrogriseus* the hair on the basal area of the uropatagium is shorter, and the area covered is not as extensive as in *picatus*; the hair is the same color as on the rump. The contrast in this character between *picatus* and *nigrogriseus* is especially noticeable on dry study skins. Hill (*in litt.*) remarked, "a point not mentioned by Ryan (1966) is that *picatus* lacks any well-marked lobe at the base of the inner margin of the ear; instead, there is a small lobule, imperfectly separated from the main lobe." In *nigrogriseus* this basal lobe is well developed, and there is a marked separation from the main lobe.

*Chalinolobus nigrogriseus* AND *Chalinolobus rogersi*

Gould (1856) described *nigrogriseus* as follows: "fur soft and velvety to the touch, the general hue greyish-black, becoming somewhat paler on the posterior part of the upper surface; abdomen washed with brown, and fading into very light brown on the vent; wing- and tail-membranes purplish brown." Figure 44 in Gould shows a faintly grayish cast to the dorsal pelage of this bat, and Gould recognized this feature not only in the Latin name, *nigrogriseus*, but also in his common name "blackish-

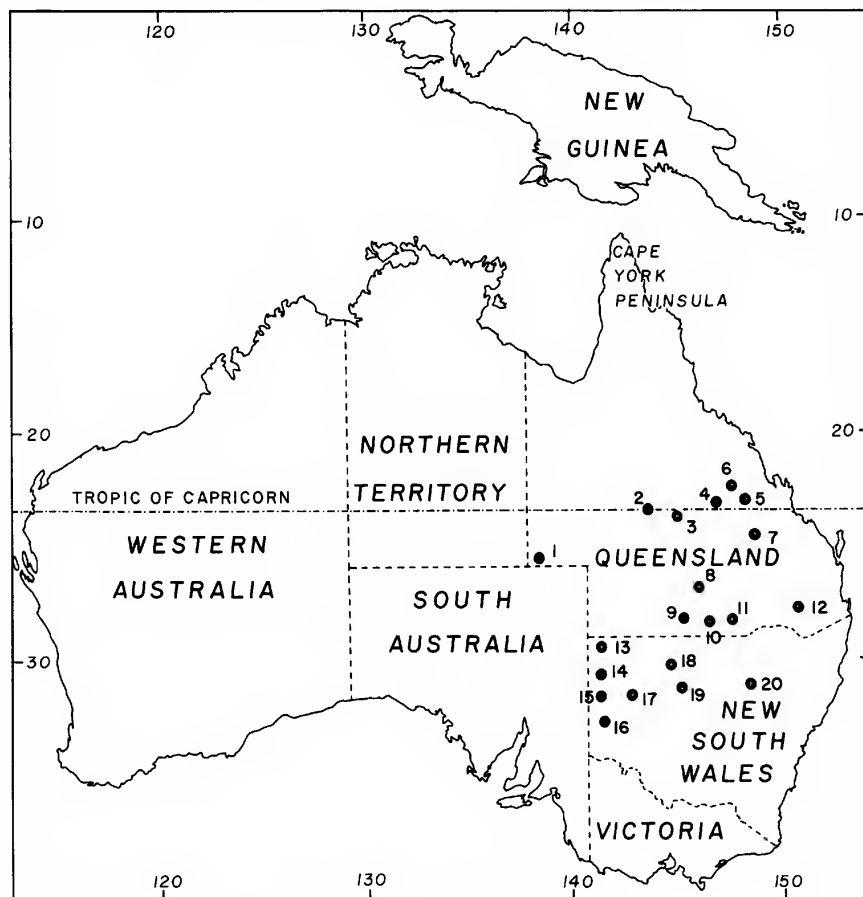


FIG. 1. Australia. Numbers represent localities where specimens of *Chalinoobus picatus* have been collected. Numbers 1-12 are in Queensland; 13-20 in New South Wales. (1) Birdsville, (2) Longreach (Barcarolle), (3) Barcaldine, (4) Betro (near Capella), (5) Capella, (6) Peak Downs, (7) Springsure (Craigmore Station), (8) Augathella (Brygenno Station), (9) Cunnamulla, (10) Cunnamulla (Gilruth Plains), (11) St. George, (12) Millmerran, (13) Capt. Sturt's depot, (14) Razorback Ridge—near Broken Hill (three miles north of Stephen's Creek Reservoir), (15) Popilta, (16) Wyndham Homestead (53 miles north of Wentworth), (17) Wilcannia (Mt. Murchison Station), (18) Bourke (Tyndarie Station), (19) Girilambone, (20) Baradine (20 miles north of).

grey *Scotophilus*." Gould did not describe the skull. Hill (*in litt.*) examined the type and sent us the following notes: "the skin of the type, B.M. 56.10.28.3, is battered (the head is torn and is nearly parted from the body) and the ears are so damaged that it is difficult to discern useful

features; the skull lacks the lower rear cranium." Hill also gave the length of forearm measurement and skull measurements of the type; these are shown in table 2. Koopman has since studied this type.

Ryan (1966) brought attention to four important specimens of *nigrogriseus* from the Clarence River in northeastern New South Wales. These specimens date from 1868; three (NMV C5162–C5164) are in the collection of the National Museum of Victoria, and one (AMNH 194250) is in the Archbold Collection, the American Museum of Natural History. The skulls have been extracted and cleaned (C5164 is damaged but still partially useful). The skins are in alcohol and badly faded; however, when the pelage of a portion of the dorsum is dried and blown with a compressed air jet, one can easily see that the distal tips of the hairs are lighter in color than the basal section of the hairs. Of interest are the many scattered hairs, which instead of being two-toned brownish in color, are gray from base to tip. Ryan gave the average and the minimum and maximum measurements of two females and one male in this series. For comparative purposes in table 2 we have remeasured the forearms and skulls of the four specimens. Miss Joan Dixon of the National Museum of Victoria kindly lent us this material for study, and arranged the exchange of AMNH 194250 (formerly C5165).

According to Hill (*in litt.*) there are no other specimens at the British Museum "referable to *nigrogriseus* as it is represented by the type." Only five specimens of *nigrogriseus* from southeastern Queensland and northeastern New South Wales are available for study.

The first specimen identified as *Chalinolobus rogersi* from the Cape York Peninsula was collected by C. M. Hoy on October 4, 1921, at a locality 5 miles southwest of Ravenshoe on the Atherton Tableland (USNM 238619). In alcohol this specimen appears almost uniformly brownish black; however, upon drying, the pelage is seen to be lightly tipped with gray ("frosted"). On September 26 and 27, 1948, Van Deusen shot three *Chalinolobus* at dusk at G. A. Seagren's farm about 10 miles west of Cooktown (AMNH 154661–154663). These specimens (dried study skins and cleaned skulls) are closely comparable in pelage coloration to the Ravenshoe specimen. On October 11, 24, 27, and December 29, 1949, Jack Roberts collected four specimens of *Chalinolobus* (AMNH 155230, 155232–155234) at Shipton's Flat (a 1948 Archbold Expedition collecting locality), about 30 miles south of Cooktown. Tate (1952) identified the Seagren's Farm and Shipton's Flat material as *Chalinolobus rogersi*. Tate listed five specimens (in alcohol) from Shipton's Flat, but only four of these are *Chalinolobus*; the other is a *Miniopterus* (AMNH 155231).

There are two Queensland specimens from the vicinity of the southern

extremity of the Gulf of Carpentaria in the American Museum: AMNH 160243 (skin in alcohol, skull cleaned) collected by G. Powlowski at Karumba in 1961; and AMNH 183431 (study skin and skull) collected by R. F. Peterson near the Gregory River, 24 miles south of Burketown, on June 23, 1959. The pelage of the Karumba specimen is very close to that of the eastern Cape York specimens, while that of the Gregory River specimen, in contrast, is heavily "frosted."

McKean and Price (1967) listed several additional Queensland records. Two males (CSIRO MH214-215) were collected in a house at Chillagoe on May 20 and August 7, 1964 by P. Freney. The forearm measurements are given in table 2. The authors commented, "these two specimens suggest that *C. rogersi* and *C. picatus* are sympatric and thus the claim of Johnson (1964) that the two species are conspecific cannot be accepted. Johnson evidently overlooked the specimens of *C. rogersi* collected in the Cape York region and mentioned by Tate (1952) when proposing that a cline existed between *C. picatus* in the east and *C. rogersi* in the west." Johnson examined the Cape York material in the Archbold Collections, but did not specifically mention these specimens in his 1964 paper.

McKean and Price also mentioned having seen one of four specimens of *rogersi* collected at Sedan Dip, 55 miles northwest of Julia Creek; this material is in the Australian Museum, Sydney. No notes on pelage color are included, but we assume that as these specimens are called *rogersi* some "frothing" of the pelage is present. The Australian Museum also has specimens from Burketown, and the Barclay River, 30 miles south of Burketown: the CSIRO collection also has a specimen from "north of Camooweal" (McKean, *in litt.*).

Hill (*in litt.*) informed us that the British Museum has three Queensland specimens: BM 15.3.5.10, a young female from Skull Creek, Cape York; BM 15.3.5.11 and 12, an adult female and young female from Normanton [20 miles inland from the Gulf of Carpentaria]. Hill commented, "they are identified as *nigrogriseus*; however, in almost all respects they agree with the Northern Territory specimens, the adult differing only in being very slightly larger, and from the type specimen of *rogersi* in the same respect and in less emphatically hoary appearance. I consider these specimens to be referable to the form represented by *rogersi*, although the Queensland population may be subspecifically distinct from that in the Northern Territory by virtue of greater size. In its turn the population in the Northern Territory may be subspecifically distinct from the population in northwest Australia by virtue of the colour difference." Measurements by Hill of BM 15.3.5.11 are given in table 2.

TABLE 2  
 FOREARM AND CRANIAL MEASUREMENTS (IN MILLIMETERS) AND DENTITION NOTES ON *Chalinobius nigrigriseus*  
 (Numbers in parentheses indicate "best possible measurement" on broken skull)

Locality and Specimen Number	Sex	Forearm Length	Skull, Condylbasal Length	Zygomatic Breadth	Post-orbital Breadth	c-m <sup>3</sup> Length	Breadth across Crowns of Upper Canines, Externally	Breadth across Crowns of m <sup>3</sup> -m <sup>3</sup> , Externally	P <sup>2</sup>	i <sup>1</sup>
New Guinea: Territory of Papua;										
Fergusson Island										
AMNH 160337	♀	37.0 <sup>a</sup>	12.4	9.3	4.1	5.0	4.5	6.1	P	B
Port Moresby										
AMNH 193791	♀	37.0 <sup>b</sup>	12.4	9.3	4.1	4.8	4.4	6.2	P	B(worn)
AMNH 193792	♀	36.0 <sup>b</sup>	12.7	—	4.2	4.8	4.5	6.2	P	U
AMNH 193793	♀	39.0 <sup>b</sup>	13.4	9.5	4.2	5.0	4.7	6.3	AP	B(worn)
AMNH 193794	♀	36.0 <sup>b</sup>	12.6	9.3	4.1	4.8	4.3	6.2	P	B
AMNH 193795	♀	36.0 <sup>a</sup>	—	—	—	—	—	—	P	BW(worn)
AMNH 193796	♀	36.5 <sup>a</sup>	—	—	—	—	—	—	A	U
AMNH 193797	♀	37.0 <sup>a</sup>	—	—	—	—	—	—	P	BW
AMNH 193798	♀	38.0 <sup>a</sup>	—	—	—	—	—	—	P	U

TABLE 2—(Continued)

Locality and Specimen Number	Sex	Forearm Length	Skull, Condylbasal Length	Zygomatic Breadth	Post-orbital Breadth	c-m <sup>3</sup> Length	Breadth across Crowns of Upper Canines, Externally	Breadth across Crowns of m <sup>3</sup> -m <sup>3</sup> , Externally	P <sup>2</sup>	I <sup>1</sup>
AMNH 193799	♂	36.0 <sup>a</sup>	—	—	—	—	—	—	P	B
AMNH 193800	♂	34.5 <sup>a</sup>	—	—	—	—	—	—	P	BW(worn)
BM 69.330	♂	35.0 <sup>a</sup>	12.1	—	—	4.7	—	6.0	P	B
BM 69.331	♂	37.0 <sup>a</sup>	12.2	—	—	4.6	—	6.0	P	B
Australia: New South Wales; Clarence River										
NMV C5162	♀	36.0 <sup>a</sup>	12.5	9.1	4.1	4.8	4.3	6.1	P	U
NMV C5163	♀	37.0 <sup>a</sup>	12.6	9.1	4.2	4.8	4.4	6.1	P	U
NMV C5164	♂	38.0 <sup>a</sup>	—	—	—	4.8	—	—	P	U
AMNH 194250	♂	37.0 <sup>a</sup>	12.5	—	4.0	4.8	4.4	6.1	P? A (alveolus)	U
Australia: Queensland; Moreton Bay										
BM 56.10.28.3 <sup>c</sup> (Type)		36.5	—	—	4.0	4.9	4.3	6.1	—	—
Ravenshoe (5 mi. S.W.) USNM 238619	♂	(35.0) <sup>a</sup> Tate, 36.0	(12.7)	(9.6)	(4.3)	4.9	4.3	6.2	P P? (alveolus)	U

TABLE 2—(Continued)

Locality and Specimen Number	Sex	Forearm Length	Skull, Condylbasal Length	Zygomatic Breadth	Post-orbital Breadth	c-m <sup>3</sup> Length	Breadth across Crowns of Upper Canines, Externally	Breadth across Crowns of m <sup>3</sup> -m <sup>3</sup> , Externally	P <sup>2</sup>	i <sup>1</sup>
Chillagoe										
CSIRO MH214		34.7	—	—	—	—	—	—	—	—
CSIRO MH215		36.2	—	—	—	—	—	—	—	—
Shipton's Flat (30 mi. S. Cooktown)										
AMNH 155230	♀	37.5 <sup>a</sup>	12.7	(9.5)	3.9	5.1	4.6	6.4	P	U
AMNH 155232	?	35.5 <sup>a</sup>	—	—	—	—	—	—	—	U
AMNH 155233	♀	37.5 <sup>a</sup>	—	—	—	—	—	—	—	—
AMNH 155234	♀	35.5 <sup>a</sup>	13.0	9.3	3.8	5.1	4.8	6.2	A	BW
Seagren's Farm (10 mi. W. Cooktown)										
AMNH 154661	♀	35.0 <sup>b</sup>	12.8	—	4.1	5.0	4.6	6.1	A	U(worn)
AMNH 154662	♂	34.0 <sup>b</sup>	12.6	(9.2)	3.8	5.0	4.4	6.2	P	U
AMNH 154663	♀	35.5 <sup>b</sup>	13.0	(9.5)	4.2	5.1	4.6	6.4	A	U(worn)
Normanton										
BM 15.3.5.11	♀	35.8	13.0	9.0	3.9	5.0	4.5	6.1	—	—
Karumba										
AMNH 160243	♀	35.0 <sup>a</sup>	12.9	9.4	4.2	4.8	4.5	6.2	P	BW
Gregory River (24 mi. S. Burketown)										
AMNH 183431	♂	31.5 <sup>b</sup>	—	(8.6)	4.0	4.7	4.2	—	P	U



TABLE 2—(Continued)

Locality and Specimen Number	Sex	Forearm Length	Skull, Condylbasal Length	Zygomatic Breadth	Post-orbital Breadth	c-m <sup>3</sup> Length	Breadth across Crowns of Upper Canines, Externally	Breadth across Crowns of m <sup>3</sup> -m <sup>3</sup> , Externally	P <sup>2</sup>	i <sup>1</sup>
Australia: Northern Territory;										
Red Bank Mine (18 mi. W. Wologorang)										
AMNH 183432	♂	33.0 <sup>b</sup>	12.0	(9.3)	3.8	4.8	4.3	6.0	P	U
AMNH 183579	♂	31.6 <sup>a</sup>	11.4	8.3	3.6	4.6	3.9	5.5	P	U
Port Langdon, Groote Eylandt										
USNM 284189	♀	32.0	—	—	3.6	4.6	—	—	?A	U(worn)
Yirrkalla										
USNM 284190	♂	35.0	12.3	8.8	3.9	4.6	4.3	6.1	A	BW
USNM 284191	♂	35.0	12.6	—	3.9	4.7	4.5	6.1	A	U
USNM 284192	♂	35.0	—	9.2	3.8	4.6	4.3	6.0	P	U
USNM 284193	♂	—	—	—	—	—	—	—	A	U
USNM 284194	♂	—	—	—	—	—	—	—	A	U(worn)
USNM 284195	♂	36.0	12.2	8.6	3.8	4.6	4.2	5.9	AP	U(worn)
USNM 284196	♂	33.0	12.6	8.7	3.8	4.6	4.4	5.9	PA	BW
USNM 284197	♂	35.0	12.4	8.5	3.7	4.6	4.0	5.9	AP	U(worn)
Brock's Creek										
USNM 237953	♂	35.0	12.0	8.6	3.8	4.7	4.2	5.8	A	U(worn)
USNM 237955	♂	33.0	—	—	—	—	—	—	A	U(worn)

TABLE 2—(Continued)

Locality and Specimen Number	Sex	Forearm Length	Skull, Condylbasal Length	Zygomatic Breadth	Post-orbital Breadth	C-m <sup>3</sup> Length	Breadth across Crowns of Upper Canines, Externally	Breadth across Crowns of m <sup>3</sup> -m <sup>3</sup> , Externally	P <sup>2</sup>	i <sup>1</sup>
Coolibah Homestead (12 mi. E.), Victoria River (old crossing) AMNH 216194	♀	34.5 <sup>a</sup>	11.7	8.3	3.7	4.7	4.1	5.7	P	BW
Australia: Western Australia; Parry's Creek (S. of Wyndham) BM 9.4.32.1	♂	34.5	12.2	8.6	—	4.5	—	—	—	—
WAM M7608	♂	33.0	12.5	9.0	3.6	4.7	4.3	5.8	PA	BW
WAM M7602	♂	33.0 <sup>a</sup>	—	—	—	—	—	—	—	—
WAM M7603	♀	—	—	—	—	—	—	—	—	—
WAM M7609	♀	33.0 <sup>b</sup>	11.9	8.9	3.7	4.5	4.1	5.9	P	BW
AMNH 196710	♀	34.0 <sup>b</sup>	11.9	8.7	4.0	4.6	4.2	6.0	PA	U
Ninbing										
WAM M7605	♂	33.0	12.0	9.0	3.8	4.7	4.3	5.9	P	U(worn)
WAM M7607	♂	34.0 <sup>b</sup>	12.2	9.1	3.8	4.8	4.5	6.0	P	U
WAM M7604	♀	33.0 <sup>a</sup>	—	—	—	—	—	—	—	—
WAM M7606	♀	34.0 <sup>b</sup>	11.9	8.8	3.4	4.6	4.4	6.1	AP	U(worn)
AMNH 196711	♀	33.0 <sup>b</sup>	11.7	8.8	3.8	4.6	4.3	6.0	A	?(worn)
AMNH 196712	♀	34.0 <sup>a</sup>	—	—	—	—	—	—	—	—

TABLE 2—(Continued)

Locality and Specimen Number	Sex	Forearm Length	Skull, Condylbasal Length	Zygomatic Breadth	Post-orbital Breadth	c-m <sup>3</sup> Length	Breadth across Crowns of Upper Canines, Externally	Breadth across Crowns of m <sup>3</sup> -m <sup>3</sup> , Externally	P <sup>2</sup>	i <sup>1</sup>
North Creek, trib. of Gibb River, on road to Drysdale River crossing										
AMNH 216195	♂	33.2 <sup>a</sup>	12.0	(8.6)	3.8	4.7	4.0	5.6	P	U
AMNH 216196	♂	33.0 <sup>a</sup>	—	—	—	—	—	—	—	—
Derby (32 mi. S.E.)										
USNM 237822	♂	33.5 <sup>b</sup>	11.9	8.7	3.8	4.6	4.1	5.8	A	BW
USNM 237962	♂	33.5 <sup>a</sup>	11.9	8.8	3.7	4.4	4.0	5.6	A	BW
USNM 237963	♂	34.0 <sup>a</sup>	(12.2)	—	3.6	4.7	4.2	5.8	P	BW
BM 9.4.23.1	♂	34.5	12.2	8.6	—	4.5	—	—	—	—
Roebuck Bay										
Oslo Museum (30.11.1895)	♂	34.2 <sup>a</sup>	—	—	—	—	—	—	—	—

<sup>a</sup> Indicates forearm measurement made on a specimen in alcohol. Measurements taken by authors are to nearest 0.5 millimeter.

<sup>b</sup> Indicates forearm measurement made on a dried study skin. Measurements taken by authors are to nearest 0.5 millimeter.

<sup>c</sup> BM 56.10.28.3 (type): Greatest length of skull, 13.4 mm.; interorbital breadth, 5.0 mm.

*Symbols:* A, p<sup>2</sup> absent on both sides. AP, p<sup>2</sup> absent on left side, present on right. B, i<sup>1</sup> has a lateral cusp; BW, only weakly developed lateral cusp; P, p<sup>2</sup> present on both sides; PA, p<sup>2</sup> present on left side, absent on right. U, i<sup>1</sup> is without accessory cusp.

The *Chalinolobus nigrogriseus-rogersi* complex in the Northern Territory is well represented in the combined collections of the CSIRO, Canberra, the United States National Museum, and the British Museum (Natural History). Two specimens (AMNH 183432, 183579) in the American Museum were collected by R. F. Peterson, June 27, 1959; measurements of these and several of the Washington and London specimens are given in table 2.

The following specimen localities in the Northern Territory are mapped in figure 2.

Biro, Apsley Strait, Melville Island, BM

Block Waterhole, latitude 17°57'S, longitude 137°9'E, CSIRO

Bow Hill, via Victoria Downs, CSIRO

Brock's Creek, USNM

Buchanan's Islet, Shoal Bay, Melville Island, BM

China Wall (north of Block Waterhole) latitude 17°48'S, longitude 137°12'E, CSIRO

Coolibah Homestead (12 miles east of), Victoria River, "old crossing," AMNH

Daly Waters (47 miles north of), AIB

Port Essington, Cobourg Peninsula, BM and USNM

Port Langdon, Groote Eylandt, USNM

Red Bank Mine, 12 miles west of Wollgorang, AMNH

Smith Point, Cobourg Peninsula, CSIRO

South West Island, Sir Edward Pellew Group, CSIRO

Yirrkalla, USNM

Hill (*in litt.*) commented on the British Museum (Natural History) specimens from the Northern Territory: "specimens from Port Essington are said by Thomas (1909) to be *nigrogriseus*, a view quoted by Johnson (1964), but in size these agree exactly with *rogersi*, a view evidently adopted at some time by Thomas, who has relabelled the specimens accordingly. Cranially, all agree closely with the type of *rogersi*, but none are so heavily frosted with white tipping either dorsally or ventrally but instead are predominantly brownish with a slight, less conspicuous grizzling."

Thomas (1909) described *Chalinolobus rogersi* from a single male specimen (BM 9.4.32.1) collected by J. P. Rogers September 4, 1908 at Parry's Creek, near Wyndham, in the northeastern part of the Kimberley district of Western Australia. Bannister (*in litt.*) informed us that Rogers collected two additional male specimens of *rogersi* (WAM 10192, skin and skull; WAM 10194, dried skin with skull still inside). The date on the labels (which according to Bannister are not the originals) is October

29, 1909, and the locality is "7 miles S. of Wyndham, W.A." The Western Australian Museum also has: WAM 10478 (skin in alcohol, skull removed and cleaned) collected by G. F. Hill, August 29, 1910, Drysdale River, Western Australia; a male, (skin in alcohol, skull removed and cleaned) on loan from the Oslo Museum, collected by K. Dahl at Roebuck Bay, Western Australia (date of accession, November 30, 1895). As a result of the joint Western Australian Museum-American Museum of Natural History expedition 11 additional specimens of *C. rogersi* were collected. W. H. Butler obtained five specimens (WAM 7602, 7603, in alcohol; WAM 7608, 7609 and AMNH 196710, dried skins and skulls) from Parry's Creek in July and August 1965, and six specimens (WAM 7604, AMNH 196712, in alcohol; WAM 7605-7607, AMNH 196711 dried skins and skulls) at Ninbing, about 15 miles northeast of Wyndham, in August, 1965. It is unlikely that Butler collected at the exact locality where Rogers collected the specimen that became Thomas's type of *rogersi*, but the Butler specimens from Parry Creek and Rogers's specimens from "seven miles south of Wyndham" are virtual topotypes.

During the course of the American Museum's 1969 Ichthyological Expedition to Australia, three specimens of *rogersi* were collected by W. H. Butler, G. J. Nelson, and D. E. Rosen: AMNH 216194 female (Northern Territory); 216195 male, 216196 male (Western Australia). The skulls of AMNH 216194 and 216195 have been removed and cleaned; measurements are included in table 2.

In addition to the above specimens, the United States National Museum has three examples of *rogersi* (USNM 237822, 237962, 237963) collected by C. M. Hoy in August 1920, 32 miles southeast of Derby, Western Australia (see fig. 2 for this and other Western Australia localities).

Thomas (1909) made the following comments on *rogersi*: "a small species, black, with hoary tips to the hairs, most nearly allied to *Ch. nigrogriseus*, Gould. Ears and tragus about as in *Ch. nigrogriseus*. General colour grey, resulting from the hairs being deep brownish black, with their tips (0.5 mm.) dull whitish, the whole giving a rather striking and unusual hoary appearance to the bat. Colour below similar, but the light tips are broader and more drab in tone, at least on the body. On the wing membrane, however, which is thickly hairy outwards to a line joining the elbow and knee, the hairs are prominently whitish for their terminal halves, as are those edging the interfemoral membrane. —Skull smaller than in *Ch. nigrogriseus* and its brain-case rather more inflated; other characters and relative size of teeth as in that species. This well-marked little species, which I have named after its discoverer,

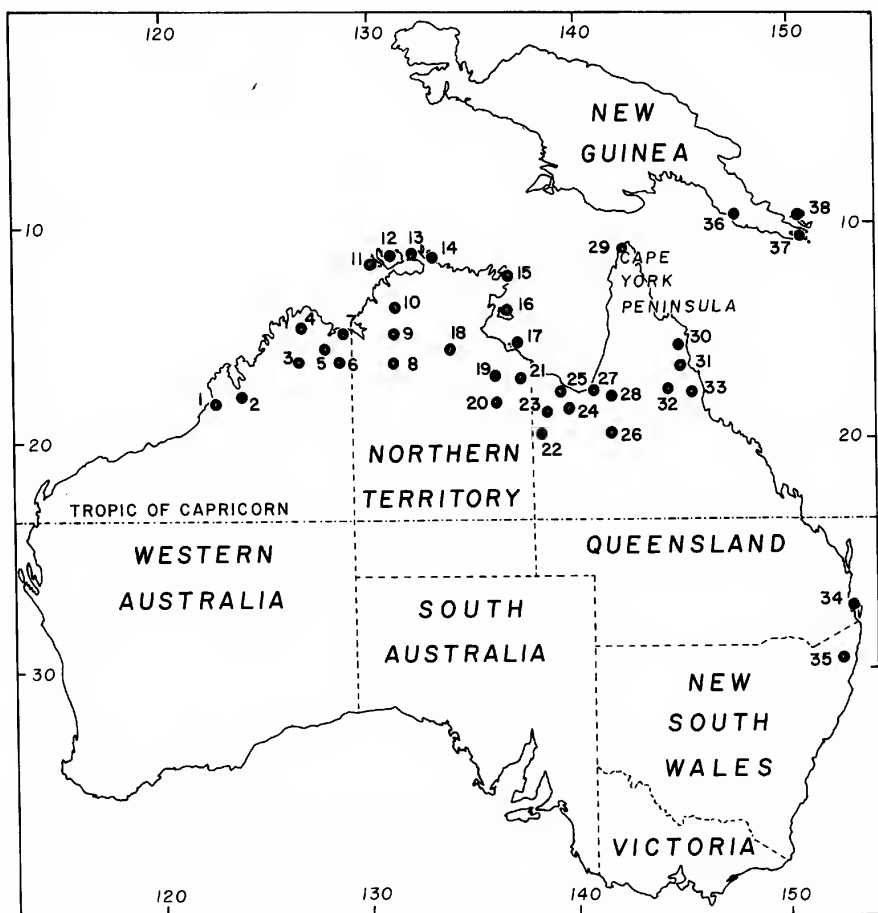


FIG. 2. Australia and New Guinea. Numbers represent localities where specimens of *Chalimolobus nigrogriseus* have been collected. Numbers 1-7 are in Western Australia; 8-21 in the Northern Territory; 22-34 in Queensland (27-33 are on the Cape York Peninsula); 35 in New South Wales; 36-38 in New Guinea (Territory of Papua). (1) Roebuck Bay (near Broome), (2) Derby (32 mi. S. of), (3) North Creek (Gibb's River tributary), on road to Drysdale River crossing, (4) Drysdale River, (5) Wyndham (7 mi. S. of), (6) Parry's Creek (S. of Wyndham), (7) Ninbing (15 mi. N.E. of Wyndham), (8) Bow Hill, via Victoria Downs, (9) Coolibah Homestead (12 mi. E. of), Victoria River ("old crossing"), (10) Brock's Creek, (11) Biro, Apsley Strait, Melville Island, (12) Buchanan's Islet, Shoal Bay, Melville Island, (13) Port Essington, Cobourg Peninsula, (14) Smith Point (Cobourg Peninsula), (15) Yirrkalla, Arnhem Land, (16) Port Langdon, Groote Eylandt, (17) South West Island, Sir Edward Pellew Group, (18) Daly Waters (47 mi. N. of), (19) China Wall, 17°48'S, 137°12'E, (20) Block Waterhole, 17°57'S, 137°9'E, (21) Red Bank Mine (12 mi. W. of Wollongorang), (22) Camooweal ("north of"), (23) Gregory River (24 mi. S. of Burketown), (24) Barclay River (30 mi. S. of Burketown), (25) Burketown, (26) Sedan Dip (55 mi. N.W. of Julia Creek), (27) Karumba, (28) Normanton (20 mi. S.E. of Karumba), (29) Skull Creek (15 mi. S. of tip of Cape York on Gulf side), (30) Cooktown (10 mi. W. of), (31) Shipton's Flat (30 mi. S. of Cooktown), (32) Chillagoe, (33) Ravenshoe, (34) Moreton Bay (near Brisbane), (35) Clarence River, (36) Port Moresby, (37) East Cape, (38) Fergusson Island.

may be readily distinguished from its only near ally *Ch. nigrogriseus* by its hoary color and the smaller size of its skull." Measurements of the type skin and skull are given in table 2.

Hill (*in litt.*) has given us his diagnosis based on Thomas's type: "the dorsal surface is brownish black, the hairs with whitish tips, giving an overall hoary appearance. The ventral surface is greyish brown, the hairs tipped with whitish, with a white band bordering the plagiopatagium and forming a whitish V at the base of the uropatagium. The ear has a posteriorly directed lobule at the base of its inner margin but no downwardly directed lobule at the base of the outer margin. The skull is small with an inflated brain case which has low sagittal and lambdoidal crests. The rostrum is short, with a shallow median sulcus, the intertemporal region constricted, the supraorbital swellings markedly inflated, and with a V-shaped narial emargination, its apex rounded. The palate is domed, with a U-shaped anterior emargination. The inner upper incisor has no posterior cusp and  $i^2$  reaches to or above its cingulum, while  $pm^4$  has no definite antero-internal cusp." Hill associates the Northern Territory specimens in the British Museum from Biro, Port Essington, and Buchanan's Islet (a skull only) with Thomas's *C. rogersi*.

Ride (1970) recognized the species *C. rogersi* from "north Kimberley" and "northern N.T." In a footnote he remarked, "another bat called *Chalinolobus nigrogriseus* is known from eastern Qld and north-eastern N.S.W. Its status is very uncertain. Some authors place it with the Chocolate Bat [*C. morio*], but it may represent the eastern end of the range of the Hoary Bat [*C. rogersi*]." Ride's suggestion about *C. nigrogriseus* is in line with our conclusions, except that we consider *rogersi* of Western Australia and the Northern Territory a subspecies of *nigrogriseus*. *C. morio* and *C. nigrogriseus* are quite distinct species.

The recent discovery of a large colony of *Chalinolobus* in the Territory of Papua gives us a good series for comparison with Australian *C. nigrogriseus* material. The pelage of the New Guinea specimens shows an almost complete lack of frosting. However, just as in the Australian specimens, there are many all-gray hairs interspersed with the much more abundant brownish black hairs. Skull and forearm measurements agree closely with those of the Queensland and New South Wales specimens. The inner upper incisor of the Papuan material shows a strong tendency to develop an accessory latero-posterior cusp. However, this bifid character is absent in one of the four skulls examined (AMNH 193792) from Port Moresby. This character is weakly developed in several of the Australian specimens. Tooth wear occasionally makes it difficult to decide whether the incisor was unicuspid or bifid when the

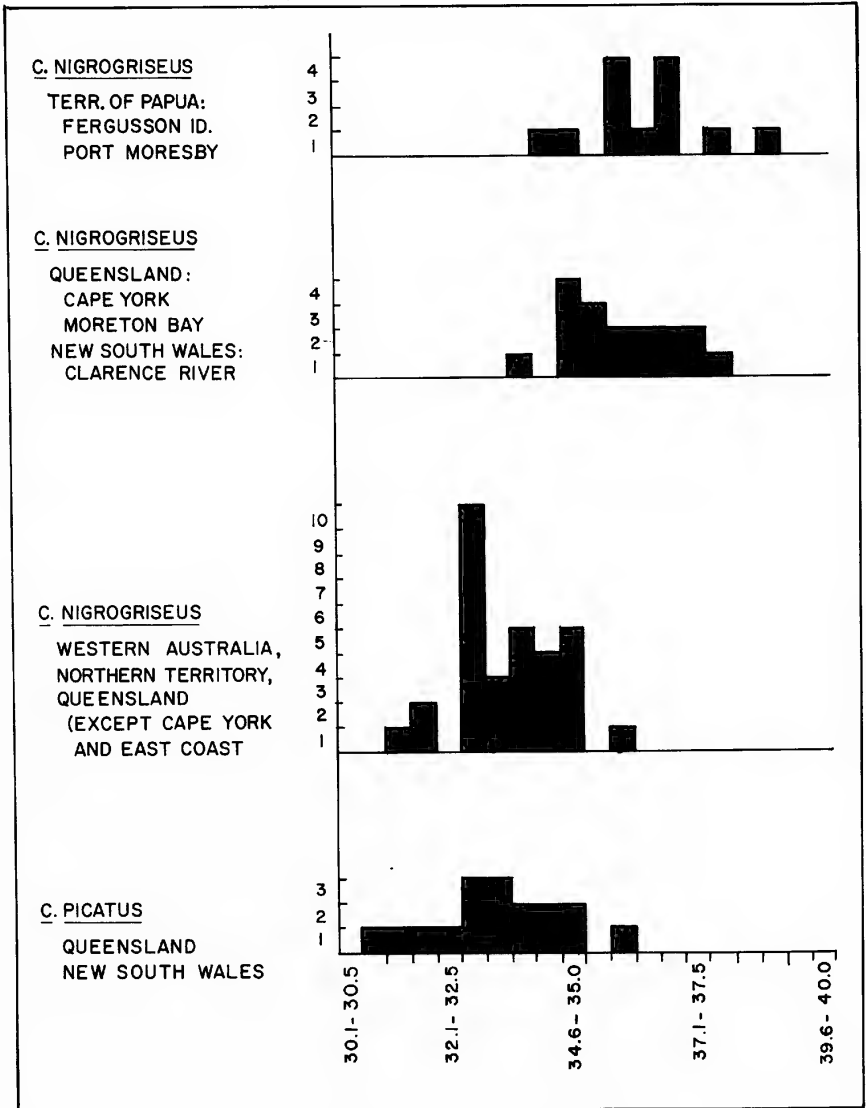


FIG. 3. *Chalinolobus picatus* and *Chalinolobus nigrogriseus* samples, showing variation of length of forearm. Measurements are in millimeters.

individual was younger. The presence or absence of this character is noted in table 2. The degree of development of the antero-internal cingulum cusp on the posterior upper premolar has been suggested as a



TABLE 3

CRANIAL MEASUREMENTS (IN MILLIMETERS) FROM SAMPLES OF *Chaitmolobus nigrogriseus*

(The mean and standard deviation, 95 per cent confidence limits of the mean, extremes [in parentheses], and size of sample are listed, in that order, for each character)

	Western Australia, Northern Territory, Queensland (except Cape York and east coast)	P <sub>1</sub> <sup>a</sup>	Queensland: Cape York Moreton Bay New South Wales: Clarence River	P <sub>2</sub> <sup>b</sup>	Territory of Papua: Fergusson Island Port Moresby
Condylobasal length	12.1 ± 0.3 12.0 - 12.2 (11.4 - 12.6) 22	< 0.001	12.8 ± 0.2 12.7 - 12.9 (12.5 - 13.0) 11	0.05-0.1	12.5 ± 0.4 12.1 - 12.9 (12.1 - 13.4) 7
Zygomatic breadth	8.8 ± 0.3 8.7 - 8.9 (8.3 - 9.3) 22	< 0.001	9.3 ± 0.2 9.2 - 9.5 (9.0 - 9.6) 9	0.4	9.4 ± 0.1 9.3 - 9.5 (9.3 - 9.5) 4
Breadth across crowns of M <sup>3</sup> - M <sup>3</sup> , externally	5.9 ± 0.2 5.8 - 6.0 (5.5 - 6.1) 21	< 0.001	6.2 ± 0.1 6.1 - 6.3 (6.1 - 6.4) 12	0.05-0.1	6.1 ± 0.1 6.0 - 6.2 (6.0 - 6.3) 7
Crown length of C - M <sup>3</sup>	4.6 ± 0.1 4.56 - 4.64 (4.4 - 4.8) 25	< 0.001	4.9 ± 0.1 4.8 - 5.0 (4.8 - 5.1) 13	0.1	4.8 ± 0.15 4.7 - 4.9 (4.6 - 5.0) 7

<sup>a</sup> P<sub>1</sub> Probability that the means of Western Australia, Northern Territory, and western Queensland represent the same population as Cape York, Moreton Bay, and Clarence River.

<sup>b</sup> P<sub>2</sub> Probability that the means of Cape York, Moreton Bay, and Clarence River represent the same population as Fergusson Island and Port Moresby.

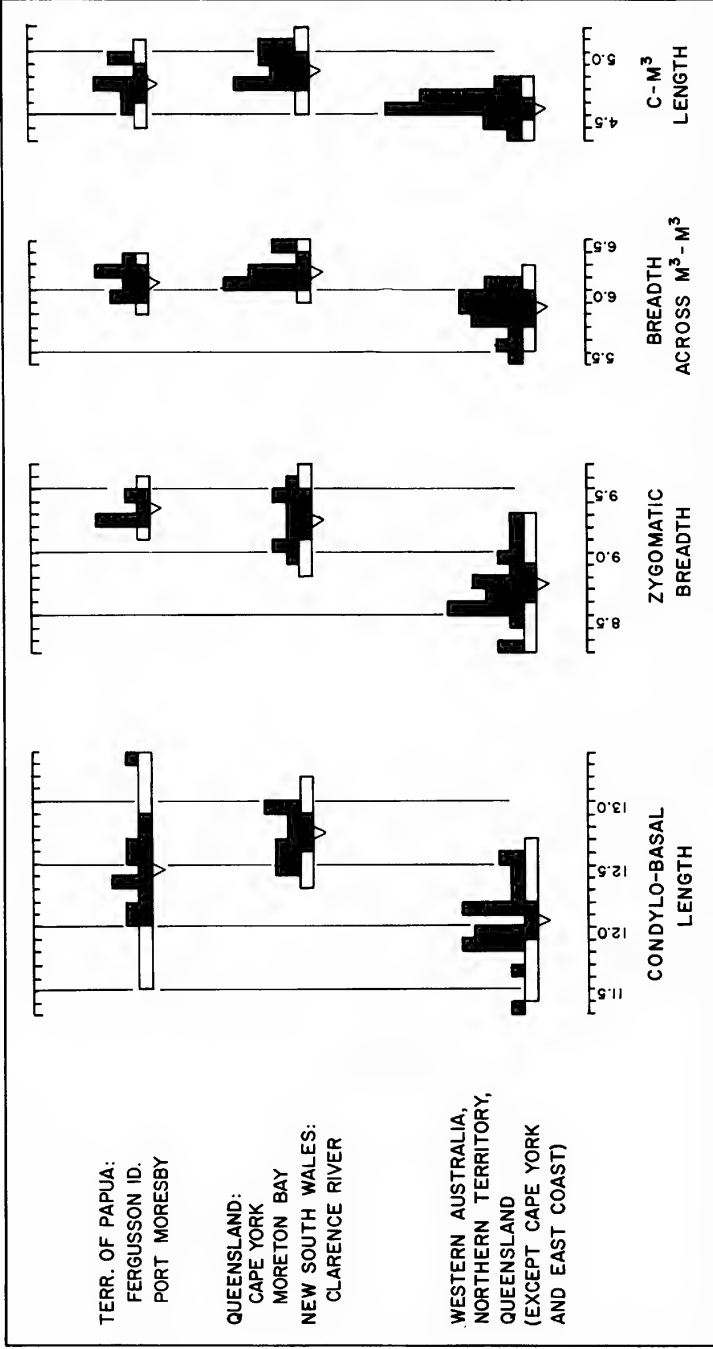


FIG. 4. *Chalimolobus nigrogriseus* samples, showing variation of cranial features. In each sample the mean is marked by an inverted triangle; two standard deviations on each side of the mean are shown by hollow rectangles; the 95 per cent confidence limits of the mean are indicated by black rectangles. Each square equals one specimen. The size of each sample is indicated in table 3.

useful character. However, now that more specimens are available, we have found this character to be highly variable.

### SUMMARY AND CONCLUSIONS

1. The evidence clearly indicates that *Chalinolobus nigrogriseus* is a species distinct from *Chalinolobus picatus*.

2. The many specimens of the *C. rogersi*-*C. nigrogriseus* complex now available from Western Australia, the Northern Territory, and Queensland plainly show that an east-west cline in size and amount of "frosting" of the pelage exists. Skulls from Western Australia are relatively small; those from Queensland are consistently larger. Reference to table 2 and figures 3 and 4 shows this size trend in various skull measurements and in the forearm measurement. The amount of pelage frosting is a variable and somewhat subjective character, but, when the specimens are laid out side by side, it is apparent that specimens from Western Australia are heavily frosted, those from the Northern Territory are less so, and those from Cape York, Queensland, have still less gray tipping of the pelage. We believe, therefore, that *C. rogersi* should be considered a subspecies of *C. nigrogriseus*.

The evidence indicates that this *Chalinolobus* complex is distributed across the tropical north of Australia. In cases where there is such a series of intergrading populations it is often difficult to say just where one subspecies ends and a second begins. As one goes west from the Great Dividing Range on Cape York to the Gulf of Carpentaria the annual mean rainfall decreases rapidly. The zone of intergradation between *C. n. nigrogriseus* and *C. nigrogriseus rogersi* is, in our opinion, to be found in this belt of increasing aridity west of the Dividing Range and south of the Gulf.

In compiling the data for the histograms (see figs. 3, 4) we have considered the Queensland specimens from Cape York as representing *C. n. nigrogriseus*; Queensland specimens from Sedan Dip, Camooweal, and the Burketown area as eastern representatives of *C. n. rogersi*.

3. We also believe that the nominate subspecies (type locality, Moreton Bay, southeastern Queensland) includes not only the Clarence River, New South Wales specimens, but also the populations on Cape York in northern Queensland. We think that intensive collecting along the central Queensland coast will one day uncover specimens from the wide gap (see fig. 2) now existing between records in northeastern Queensland and those in southeastern Queensland and northeastern New South Wales. This *Chalinolobus* complex was poorly represented in museums until collecting activity was renewed after World War II. Although

we have very few specimens from this southeastern portion of the range, the skull and forearm measurements are closely comparable with those of specimens from northeastern Queensland.

4. While differences can be found between the New Guinea and Australian populations (for example, the strong tendency for New Guinea specimens to have a bifid inner upper incisor, and very little frosting of the pelage), we believe that the basic resemblances (especially size characters) are more important taxonomically. In our opinion the known specimens from New Guinea are referable to *Chalinolobus nigrogriseus nigrogriseus*.

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## ADDENDUM

Since the completion of this manuscript the administrative name, "Territory of Papua and New Guinea," used by Australia for the eastern half of the island of New Guinea, has been changed to "Papua New Guinea," effective July 1, 1971. In the present paper the usage of the names "Territory of Papua" and "Territory of New Guinea" is continued to avoid further reader confusion and to conform to map and document usage since 1949.

"New Guinea," in the sense of the new administrative name, Papua New Guinea, refers to the former Territory of New Guinea. Synonyms for the latter (past usage) are: German New Guinea; Mandated Territory; Trust Territory; North East New Guinea.

The use of the word "Papua" in the new name is less confusing than "New Guinea." Synonyms for Papua (past usage) are: British New Guinea; South East New Guinea. However, in some countries Papua refers to the entire island.

The western half of the island of New Guinea is now administered by Indonesia. In English language references the name is rendered as "West Irian." Under the former Dutch administration the name was Netherlands New Guinea.

New Guinea, to the casual reader, means the entire island.