

RESULTS OF THE ARCHBOLD
EXPEDITIONS. NO. 66

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OF RAIN FOREST IN QUEENSLAND

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INTRODUCTION

SPECIAL INTEREST in the Cape York Peninsula arises from the fact that it has served as the main highway of communication between the faunas of Australia and New Guinea. Further investigation of the problems posed by the region was carried out in 1948 by the Archbold Cape York Expedition of the American Museum of Natural History, New York¹ The specimens listed were procured by the Archbold expedition, unless otherwise stated. In addition, a general reconnaissance trip through Queensland was made by the author. The results of that reconnaissance are inserted parenthetically. Through the kindness of the Curators of Mammals at the Museum of Comparative Zoölogy, the Chicago Natural History Museum, and the United States National Museum, I have been able to study and integrate into this report the collections made by Raven, Hoy, Darlington, and Mrs. Scott (née Neuhäuser).

The number of forms now demonstrable in the mammalian fauna of the Cape York Peninsula are approximately as follows: Monotremata, two (*Ornithorhynchus* and *Tachyglossus*); Marsupialia, 45; Rodentia, native rats and native mice, 15; Chiroptera, 27; there is also the dingo.

In the course of the general studies required for preparation of this report it has been necessary to describe a new *Taphozous*.

The following abbreviations refer to the museums in which specimens are deposited:

A.M.N.H., the American Museum of Natural History
C.N.H.M., Chicago Natural History Museum
M.C.Z., Museum of Comparative Zoölogy
U.S.N.M., the United States National Museum

A map showing the localities in the Cape York area is included (fig. 1).

PHYSIOGRAPHIC DESCRIPTION OF THE CAPE YORK AREA

A short description of the general environment is offered before an examination of the distributional patterns of the mammals of the Cape York Peninsula is made. The Cape York Peninsula can be delimited from the main mass of Australia by a line drawn from the southernmost shore line of the Gulf of Carpentaria eastward to the Pacific coast. This definition is arbitrary and conforms to no geological or biogeographical boundary. Thus the peninsula so described includes the northern part of the Atherton Tableland. The area is roughly triangular. It has two long sides converging northward to Cape York proper and stands on a shorter base—the east-west line described above. Its length from south to north is approximately 500 miles. Its width at the base may be taken as 400 miles. It lies between latitudes 11° and 17° S.

The physiography of Cape York Peninsula, sketched in broad terms, centers on a north-south divide placed relatively close to

the eastern side, the eastern run-off of which is short and steep, the western slope very long and forming an almost imperceptible gradient to the Gulf of Carpentaria. The main drainage consequently flows to the west, while to the east the rivers are comparatively small and rapid. The divide at the northern tip of the Peninsula reaches altitudes of only 200 to 300 feet, but becomes gradually higher, in the south rising to peaks of from 3000 to 5000 feet. This peninsular divide becomes increasingly complicated by the presence of lateral ranges and spurs. Many of the highest peaks stand on these side ranges instead of on the Great Dividing Range itself.

The climate of the Peninsula is monsoonal. During the period when the heat equator is north of the true equator (April to October) the dry season is generally effective, though often, as elsewhere in the tropics, there exists a lag both in the onset of the dry and in its termination. However, by May, the southeast trade wind controls the climate, dropping whatever moisture it carries when it reaches the mountains of the east coast

¹ A preliminary sketch of the travels of the party can be found in L. J. Brass, "Camps on Cape York" (1949, Nat. Hist., New York, vol. 58, no. 8, pp. 366-372).

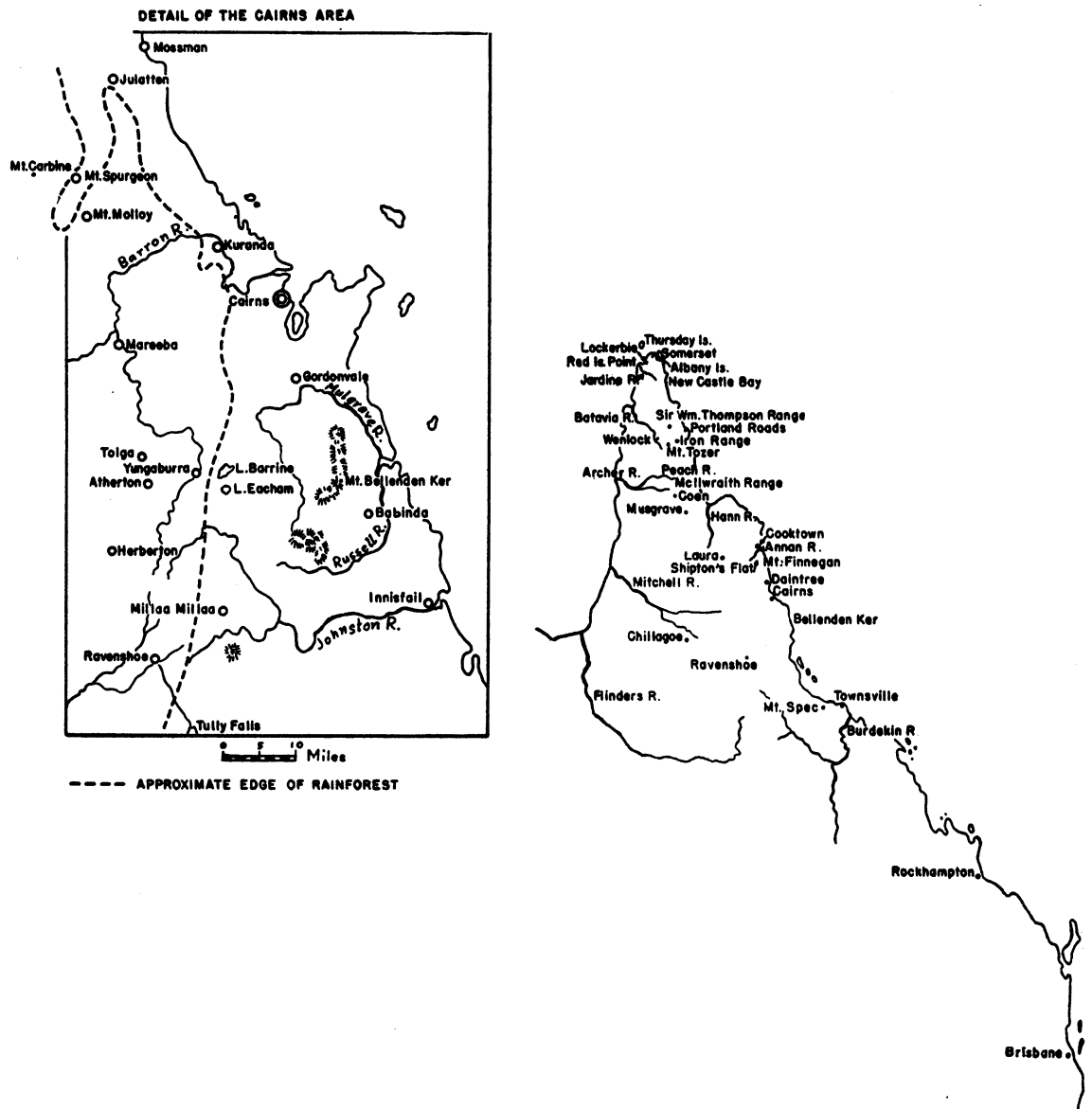


FIG. 1. Map of northeastern Australia, to show in particular the localities of the Cape York Peninsula. Details of the Cairns-Atherton Tableland area are in the inset.

and continuing across the Peninsula as a dry, though sometimes cloud-bearing, wind.

Though the heat equator moves south of the true equator during late September, the above-mentioned lag (perhaps occasioned by the momentum of the southeast wind) often prolongs the dry season into October and November. By late November, when the doldrums have passed still farther to the south, the effect of the rain-bearing north-

east trade wind, modified south of the equator into the northwest, is felt as a series of storms which herald the wet season in the northern parts of the Peninsula. The rains spread week by week farther south. Again the afore-mentioned lag operates, so that the wet may extend well into April. Actually the transition is far from uniform and may be complicated by cyclic weather phenomena, including hurricanes. Generally the rivers

run full and the great western plains of the Peninsula receive copious rain from December to April, whereas from May to November the rivers dry up and rain seldom falls west of the main divide.

Temperatures are generally fairly uniform, tropical at the northern tip. The coastal strip near the base of the Peninsula in winter (July–August) becomes agreeably cool, while in the dry interior the temperature sometimes falls to freezing just before sunrise. Some 30 miles south of Cooktown, at Shipton's Flat, 800 feet above sea level, the temperature at 6 A.M. in September fell almost to 50° F.

The geology of such an enormous area as the Cape York Peninsula can scarcely be touched upon in this article. Very large portions of the region are granite; other extensive portions are sandstone. The mineral belt, chiefly in the mountainous parts, is composed of greatly deformed sediments bearing valuable ores of iron, tin, gold, and wolfram. In the southwest are extensive deposits of limestone, and there also great sheets of basalt cover many square miles of country. By decomposition these rocks have produced a variety of soils, which are further modified by climatic factors into sands, clays, mucks, etc.

The geology and the climate of the Peninsula primarily control its vegetation. In the broadest sense there are but two main classes of vegetable cover: open forest and rain forest. Both have numerous subdivisions. Open forest, which covers most of the Peninsula, is found chiefly in areas where a pronounced water shortage exists for a number of months of the year. But it is also found locally in areas of ample rainfall. Its constituents vary widely: iron-bark forest, she-oak forest, stringy-bark and messmate forest, bloodwood forest, wattle forest, pandanus forest, even palm forest, according to the dominant types of trees. But most of these kinds of open forest agree in certain features: the trees are widely spaced, tall or short, with gray-green foliage throwing little shade. There is little or no undergrowth. Coarse grasses grow beneath the trees, and the intense light of the sun reaches the very roots of the grasses. Open forest, unfortunately, is easily set on fire, and each year hundreds of

miles of it are burned over in the name of the cattle industry so that dormant grasses, which in this way are given a "shot in the arm," put forth green sprouts somewhat in advance of the grass plants on unburned areas. At the same time all humus is destroyed, as well as most of the older, weaker trees and fallen hollow logs that may afford cover for animals. This ocean of open forest surrounds the islands of rain forest and isolates them from one another.

Rain forest depends for its continuance upon water, whether of aerial or seepage origin. It occurs where enough water is present through most of the year. It comprises mainly broad-leafed trees which form dense shade. In it vines and epiphytes are plentiful. It grows in varied form on stony hillsides, well-drained flats, or old flood plains margining rivers. It generally forms narrow belts from 10 to 25 miles in width, though as much as 100 miles in length, on the east-facing slopes of the ranges. Only the combination of fertile soil and adequately distributed rainfall will allow full development of these rich tropical jungles, which must not be confused with flood-plain forests, covered in the wet months by 10 to 15 feet of water, or with mangrove forests. Both the latter, though they may also receive copious rain, obtain much of their water by seepage. Rain forest is sometimes found continuous with flood forest or mangrove forest, the one type changing gradually or abruptly into the other. Its larger masses are important both as the nurseries of Australian timbers and because they act as reservoirs for the rich variety of animal life requiring their shelter.

The Cape York rain forests do not, as one might expect, form a continuous band along the north-south ranges, but are parted into several distinct masses, or islands, by stretches of open forest. The largest and most important island is the Cooktown-Cairns-Townsville mass at the eastern side of the base of the Peninsula, which partly covers the Atherton Tableland and includes the great mountains Bartle Frère and Bellenden Ker. This mass is nearly divided into two parts near Cairns, as is shown in Prescott's (1931) vegetation map, by invasion of the open forest from the west at the latitude of Mt. Molloy. The second and less well-known

island is the McIlwraith (Rocky Scrub)-Iron Range mass of rain forest. Separated from the first by 150 miles of open forest, it is nearly continuous for about 100 miles north and south, while its width varies from 5 to 10 miles. Both these big scrubs are the homes of important and distinct species of animals. As one nears the extreme tip of the Peninsula, scattered patches of rain forest occur, isolated from one another by narrow belts of open forest. These patches shelter a depauperized remnant of the Iron Range fauna. The intervening area, east and southeast of the Jardine River, though poorly known,

seems also to contain scattered stands of rain forest.

Throughout the eastern side of the Peninsula one observes the inter-fingering and the mosaic patterns made by open forest and rain forest. These irregular pictures can perhaps be explained on edaphic grounds. Besides these two primary types of vegetation there also occur here and there heath-like areas, including the ill-defined turkey brush; also swamps, sand dunes, rock outcrops, and mangroves. Most of those environments are strongly illuminated and without shade.

DISTRIBUTION OF RAIN FOREST IN QUEENSLAND

I have been urged to set down the areas in which I have observed rain forest, not only in the Cape York Peninsula but also farther to the south (fig. 2). Prescott (1931), in his rain-forest map, separates a patch of rain forest due west of Townsville from the Herbert River-Tully-Cairns patch of rain forest. It is my belief that these are almost continuous: that the northern rain forest, crossing the Herbert River Gorge, extends southeast along what on my map (fig. 2) is called the "Seaview Range" to join the rain forests of the Paluma Range and Mt. Spec, which I visited. The Paluma rain forest terminates at the point where the crest of the Paluma Range, losing altitude as it approaches the Burdekin River, drops below 2000 feet.

Some 40 miles southeast of the Burdekin, which traverses relatively dry country near its mouth, rain forest is again found behind Bowen. The coast from Bowen to Mackay is backed by the nearly isolated mountain mass known as the Clarke Range. Its upper slopes, at least, appear to carry rain forest.

Still farther south, near Rockhampton, the Ransby and Berserker ranges rise above surrounding country. These too are forest covered. Rainfall is quite heavy along the first, particularly near Byfield, but it is less extensive on the Berserker where periods of extremely dry weather sometimes prevail, so that this forest, though giving "total cover," is of somewhat more xerophytic character. I was told that there exists a little rain forest at Gogango, some 30 miles from Rockhampton

on the railroad line westward to Winton.

The forest on the hills west of Bundaberg appears to be chiefly gray-green eucalyptus forest, though there may be patches of evergreen forest in pockets or gullies. The hills stand far back from the railroad, and I could not see them well.

Prescott shows large masses of rain forest northwest of Brisbane, lying between Gympie and the northeast slopes of the Bunya Mountains. I can personally attest to the luxuriance of the growth of the forest on the upper slopes of the Bunyas, where fine stands of mixed hoop pines, Bunya pines, figs, nettletrees, and many other species are bathed almost daily with cloud and rain. These conditions are repeated among the mountains of the Lamington National Park area (not visited by me, but well known from photographs).

Thus from north to south along the east Australian coast there are a series of gaps containing open-forest or even plains conditions, which separate the several patches of rain forest. The first is the Coen-Cooktown gap (150 miles); next comes the Burdekin gap (125 miles); then the Mackay-Byfield gap, possibly less complete (150 miles); then the Rockhampton-Miriamvale gap (northwest of Bundaberg) where stand the town of Gladstone and the badly burned Mt. Larcom, which possibly has a little rain scrub on the seaward side (100 miles); and finally the Brisbane-Toowoomba gap (the extreme eastern part of the Darling Downs) separating

the Bunya scrubs from the Lamington scrubs (about 75 miles).

It will be noted from the map (fig. 2) that to pass around the drainage basins of the Burdekin and Fitzroy rivers the Great Dividing Range stands some 250 miles inland from the coast. At the point where it again turns east to reach the Bunya Mountains, it enlarges to become the Carnarvon Range. I have seen photographs of these last-men-

tioned mountains: strongly cliffed horizontal sediments between 2000 and 3000 feet above sea level, which appear to carry only open-forest vegetation. In many other places, notably at Charters Towers, the Great Dividing Range is imperceptible and reduced to a great expanse of plains. At Beta, on the Winton-Rockhampton railroad it is a rugged, intensely dissected mountain-scape, though very dry for much of the year.

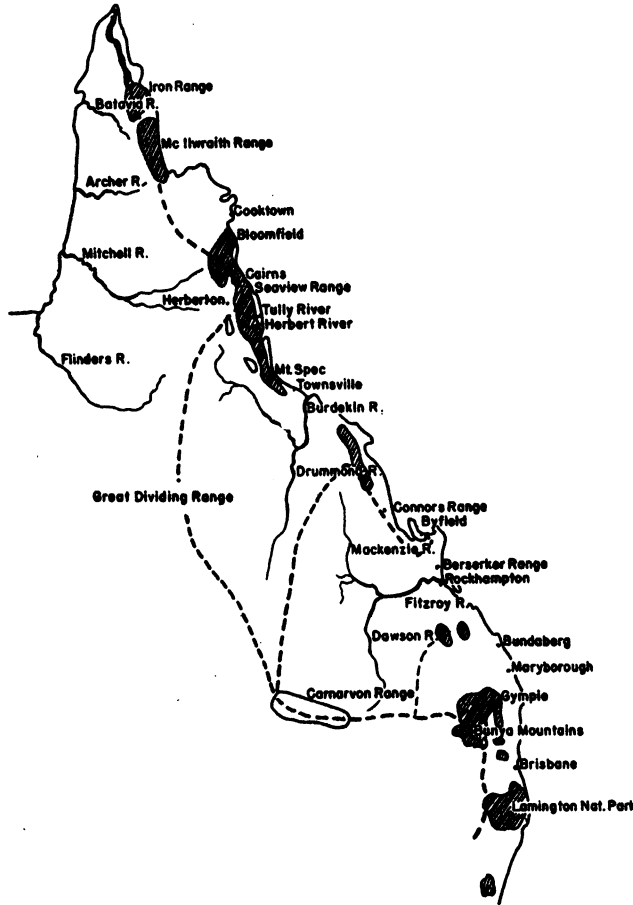


FIG. 2. Distribution of rain forest in Queensland. The purely tropical phase reaches its southern limit near Byfield. Dotted lines represent the great Central Range and other divides.

DISTRIBUTION OF MAMMALS

Ninety forms of mammals are now recorded from the Cape York Peninsula and near-by areas (including the Atherton Tableland). The distribution of these mammals is closely linked to their preferred environments and is also partly governed by their

place of origin, whether New Guinea or farther south, in Australia. They are listed in table 1.

It will be seen that the distributional data are incomplete in the case of the Chiroptera.

Three forms are associated primarily with

TABLE 1
 COMPLETE LIST OF THE MAMMALS OF THE CAPE YORK AREA
 (Records that are extraterritorial are given in brackets.)

<i>Ornithorhynchus a. phoxinus</i>	r ^a	aq	A	[<i>Myotis australis</i>]			
<i>Tachyglossus a. aculeatus</i>	r	o	t	A	<i>Pipistrellus papuanus</i>		P
<i>Antechinus f. adustus</i>	r		s	A	<i>Chalinolobus rogersi</i>		A
<i>Antechinus f. godmani</i>	r		s	A	[<i>Chalinolobus morio</i>]		A
<i>Sminthopsis r. lumholtzi</i>		o	t	A	<i>Chalinolobus picatus</i>		A
<i>Sminthopsis m. murina</i>	r		t	A	<i>Eptesicus p. caurinus</i>		A
<i>Satanellus h. predator</i>		o	s	P	<i>Scoteinus sanborni</i>		A
<i>Dasyurops m. gracilis</i>	r		s	A	[<i>Scoteinus greyii</i>]		
<i>Perameles n. pallescens</i>	r		t	A	<i>Nyctophilus bifax</i>		A
<i>Echimypera r. australis</i>	r		t	P	<i>Nyctophilus g. pallescens</i>		A
<i>Isoodon o. peninsulae</i>		o	t	A	<i>Miniopterus s. blepotis</i>		
<i>Isoodon m. torosus</i>		o	t	A	<i>Miniopterus australis</i>		
<i>Trichosurus v. vulpecula</i>		o	a	A	<i>Nyctinomus norfolcensis</i>		A
<i>Trichosurus v. eburacensis</i>		o	a	A	<i>Nyctinomus loriae</i>		P
<i>Trichosurus v. johnstoni</i>	r		a	A	[<i>Nyctinomus colonicus</i>]		A
<i>Phalanger o. peninsulae</i>	r		a	P	[<i>Nyctinomus a. atratus</i>]		A
<i>Phalanger m. nudicaudatus</i>	r		a	P	[<i>Taphozous flaviventris</i>]		A
<i>Dactylopsila t. picata</i>	r		a	P	<i>Taphozous nudicluniatus</i>		A
<i>Dactylopsila t. infumata</i>	r		a	P	<i>Taphozous mixtus</i>		
<i>Eudromicia macrura</i>	r		a	A P	<i>Taphozous australis</i>	o	A
<i>Petaurus a. reginae</i>	r		a	A	[<i>Taphozous georgianus</i>]		A
<i>Petaurus b. longicaudatus</i>	r	o	a	A P	[<i>Taphozous troughtoni</i>]		A
<i>Acrobates p. frontalis</i>		o	a	A	[<i>Macroderma gigas</i>]		A
<i>Pseudocheirus p. peregrinus</i>		o	a	A	<i>Rhinolophus m. megaphyllus</i>		A
<i>Pseudocheirus p. incanens</i>		o	a	A	<i>Rhinolophus m. ignifer</i>		A
<i>Pseudocheirus p. oralis</i>		o	a	A	<i>Hipposideros b. albanensis</i>		
[<i>Pseudocheirus rubidus</i>]	r		a	A	<i>Hipposideros g. cervinus</i>		
<i>Pseudocheirus h. herbertensis</i>	r		a	A	<i>Hipposideros m. semoni</i>		
<i>Pseudocheirus h. cinereus</i>	r	o	a	A	<i>Hipposideros d. reginae</i>		
<i>Pseudocheirus archeri</i>	r		a	P	<i>Pteropus a. gouldii</i>		
<i>Pseudocheirus lemuroides</i>	r		a	A	<i>Pteropus conspicillatus</i>	r	A
<i>Phascolarctos c. adustus</i>		o	a	A	<i>Pteropus scapulatus</i>	o	A
<i>Schoinobates minor</i>	r		a	A	<i>Dobsonia m. magna</i>	o	
[<i>Schoinobates volans</i>]		o	a	A	<i>Nyctimene robinsoni</i>		
<i>Hypsiprymnodon moschatus</i>	r		t	A	<i>Macroglossus l. nanus</i>		
<i>Bettongia penicillata</i>		o	t	A	<i>Canis f. dingo</i>		A
<i>Aepyprymnus rufescens</i>		o	t	A	<i>Hydromys c. reginae</i>	aq t	A
<i>Petrogale inornata godmani</i>		o	t	A	<i>Hydromys c. beccarii</i>	aq t	A
<i>Onychogalea unguifer</i>		o	t	A	<i>Leggadina d. delicatula</i>	o t	A
<i>Lagorchestes c. leichardti</i>		o	t	A	<i>Zyomys argurus</i>	o t	A
<i>Dendrolagus lumholtzi</i>	r		a	P	<i>Mesembriomys g. rattoides</i>	o	a A
<i>Dendrolagus bennettianus</i>	r		a	P	<i>Melomys c. capensis</i>	r s	P
<i>Thylogale s. stigmatica</i>	r		t	A	<i>Melomys c. eboreus</i>	r s a	P
<i>Thylogale s. coxeni</i>	r		t	A	<i>Melomys l. australis</i>	o s	P
<i>Protemnodon a. jardinei</i>		o	t	A	<i>Uromys c. caudimaculatus</i>	r a	P
<i>Protemnodon parryi</i>		o	t	A	<i>Rattus a. coraci</i>	r t	A P
<i>Protemnodon b. apicalis</i>	r		t	A	<i>Rattus l. leucopus</i>	r t	P
[<i>Protemnodon dorsalis</i>]		o	t	A	<i>Rattus l. mcilwraithi</i>	r t	P
<i>Macropus r. erubescens</i>		o	t	A	<i>Rattus l. cooktownensis</i>	r t	P
[<i>Macropus rufus</i>]		o	t	A	<i>Rattus lacus</i>	o t	A
<i>Macropus c. canguru</i>		o	t	A	<i>Rattus g. apex</i>	o t	A
<i>Myotis a. macropus</i>					<i>Rattus g. conatus</i>	o t	A

° Explanation of symbols:
 a, arboreal
 A, of Australian origin
 aq, aquatic
 o, open-forest habitat

P, of Papuan origin
 r, rain-forest habitat
 s, scandent (but not habitually arboreal)
 t, terrestrial

water courses and swamps. These are *Ornithorhynchus a. phoxinus* and the greater and lesser water rats, *Hydromys c. reginae* and *H. c. beccarii* (= *longmani*). *Tachyglossus a. acanthion* occurs indifferently in open forest and in rain forest.

Fifteen forms are apparently derived from Papuan rain forests:

Echimypera r. australis (t)
Phalanger o. peninsulae (a)
Phalanger m. nudicaudatus (a)
Dactylopsila l. picata (a)
Dactylopsila l. infumata (a)
Eudromicia macrura (a)
Pseudocheirus archeri (a)
Dendrolagus bennettianus (a)
Dendrolagus lumholtzi (a)
Melomys cervinipes capensis (a)
Melomys c. eboresus (a)
Uromys c. caudimaculatus (a)
Rattus l. leucopus (t)
Rattus l. mcilwraithi (t)
Rattus l. cooktownensis (t)

Fifteen forms are apparently indigenous to Queensland rain forests:

Antechinus f. adustus (t)
Antechinus f. godmani (t)
Sminthopsis murina (t)
Dasyurops m. gracilis (t)
Perameles n. pallescens (t)
Trichosurus v. johnstoni (a)
Petaurus a. reginae (a)
Pseudocheirus h. herbertensis (a)
Pseudocheirus h. cinereus (a)
Pseudocheirus lemuroides (a)
Schinobates minor (a)
Hypsiprymnodon moschatus (t)
Thylogale stigmaticus (t)
Protemnodon b. apicalis (t)
Rattus a. coraciis (t)

Trichosurus v. johnstoni of the above list is apparently a rain-forest form directly modified from its open-forest relatives.

Twenty-four forms are indigenous to open forest (25 to 40 inches of rain):

Sminthopsis r. lumholtzi (t)
Satanellus h. predator (t)
Isodon o. peninsulae (t)
Isodon m. torosus (t)
Trichosurus v. vulpecula (a)
Trichosurus v. eburacensis (a)
Petaurus b. longicaudatus (a)
Acrobates p. frontalis (a)
Pseudocheirus p. peregrinus (a)

Pseudocheirus p. incanens (a)
Phascogale c. adustus (a)
Bettongia penicillatus (t)
Aepyprymnus rufescens (t)
Onychogalea unguifer (t)
Lagorchestes c. leichardti (t)
Protemnodon a. jardinei (t)
Protemnodon parryi (t)
Macropus (M.) c. canguru (t)
Leggadina d. delicatula (t)
Mesembriomys g. rattoides (a)
Melomys l. australis (t)
Rattus lacus (t)
Rattus g. apex (t)
Rattus g. conatus (t)

Petaurus breviceps is found chiefly in open country, though in the mountains of New Guinea a rain-forest race occurs. *Dactylopsila*, though it is sometimes taken in open forest, is primarily a Papuan rain-forest animal. *Melomys lutillus* climbs freely about grasses and weeds but ascends trees only rarely.

Three forms of the open forest which prefer rocky hillsides are:

Petrogale i. godmani (t)
Macropus (O.) erubescens (t)
Zyomys argurus (t)

Twenty-five species and races of bats of the Cape York region can be grouped for convenience by their resting habits.

Six tree-roosting bats:

Pteropus a. gouldii
Pteropus conspicillatus
Pteropus scapulatus
Nyctimene robinsoni
Syconycteris australis
Odontonycteris pygmaeus

Nineteen cave (including hollow trees and houses) and crevice bats:

Myotis a. macropus
Pipistrellus papuanus
Chalinolobus rogersi
Eptesicus p. caurinus
Scoteinus sanborni
Nyctophilus bifax
Miniopterus blepotis
Miniopterus australis
Nyctinomus norfolcensis
Nyctinomus lorae
Taphozous mixtus
Taphozous australis
Rhinolophus m. megaphyllus

Rhinolophus m. ignifer
Hipposideros b. albanensis
Hipposideros g. cervinus
Hipposideros m. semoni
Hipposideros d. reginae
Dobsonia m. magna

The majority of these bats were taken in caves or mine tunnels in open-forest country. I suspect that a few, *Pipistrellus papuanus*, *Nyctophilus bifax*, *Nyctinomus norfolcensis*, and *Hipposideros diadema*, prefer rain-forest habitats.

Eleven mammals currently found to the south or southwest, which may in time be found in the Cape York area, are:

<i>Protemnodon dorsalis</i> (t)	Rockhampton area and south
<i>Macropus (M.) rufus</i> (t)	Hughendon and south
<i>Chalinolobus morio</i>	Bunya Mountains
<i>Scoteinus greyii</i>	Pentland and west
<i>Nyctophilus g. pallescens</i>	Pentland and west
<i>Nyctinomus colonicus</i>	Pentland
<i>Taphozous flaviventer</i>	Pentland
<i>Taphozous troughtoni</i>	Pentland
<i>Macroderma gigas</i>	Rockhampton
<i>Pteropus poliocephalus</i>	Rockhampton (winters there, according to Ratcliff)
<i>Rattus villosissimus</i>	Cloncurry

Taken by orders, the species and subspecies of the mammals of the Cape York Peninsula region comprise:

	SPECIES		SUBSPECIES
Monotremes	2	2%	2
Marsupials	37	50	45
Chiroptera	26	33	27
Rodents	10	15	15
	75	100%	89

It can be noted that there is virtually no local subspeciation in the Chiroptera.

Of the monotremes the spiny anteater is found both in open forest and in rain forest. The platypus is tied closely to the river systems.

Of the marsupials, eight are arboreal, rain-forest forms of Papuan origin, six are indigenous arboreal, rain-forest forms, seven are arboreal, open-forest forms, one is terrestrial and of Papuan origin (*Echimypera*), seven are indigenous, terrestrial, rain-forest forms, and 10 are native, terrestrial, open-forest animals.

Of the bats, almost all have wide trans-Torresian ranges. Obviously all can move about freely. The following are probably fairly recent immigrants from New Guinea: *Nyctimene robinsoni*, *Pipistrellus papuanus*, *Nyctinomus loriae*, *Taphozous mixtus*, *Hipposideros m. semoni*, and *Dobsonia magna*. I discussed the subject of chiropteran distribution recently (Tate, 1946).

Of the rodents, six are rain-forest forms derived from New Guinea. *Rattus a. coraci* is an Australian rain-forest form related to the Papuan rats, and seven are indigenous, open-forest forms.

Most of the non-volant mammals found on the Peninsula inhabit either the open forest or the rain forest, locally termed scrub. A very few, such as *Tachyglossus* (of Australian origin), the aquatic *Hydromys* (of ancient Papuan origin), and *Ornithorhynchus* (Australian), appear to be equally at home in either. *Dactylopsila*, the striped possum, also is found almost as often in open forest as in rain forest, though if one may judge by its New Guinea origin it probably belongs to the rain-forest assemblage.

The species of the uninterrupted open forest have extensive ranges. There appear to be few if any definable barriers limiting the spread of such species. Where such limiting factors seem to occur, as in the case of the northward limits of *Macropus*, *Petrogale*, *Trichosurus*, *Mesembriomys*, and *Leggadina* near Wenlock, about latitude 13° S., the controlling influences are certainly obscure and possibly complex. Also there is no certainty that the distributional limits of these mammals occur at the same place. The factors that limit any one species may have little to do with the factors limiting others.

The open-forest mammal fauna of Cape York Peninsula comprises 23 species, of which seven are arboreal and hide by day in holes in trees. Of the 13 remaining, 11 are definitely terrestrial, while two are good climbers. With the exception of *Melomys lutillus* and *Satanellus hallucatus*, all are positively Australian. *Melomys lutillus* is an open-country-inhabiting species of a mainly New Guinea rain-forest genus. *Satanellus hallucatus* occurs in Australia chiefly north of latitude 20° S., except in the southeast of its range, where it has been taken at Yeppoon

near Rockhampton and at Clermont. The nearest relative of *hallucatus* is *S. albopunctatus*, a rain-forest species of New Guinea, but *Satanellus* is wholly Australian from the standpoint of generic relationship.

Of the seven arboreal, open-forest species, one (*Phascolarctos*) has not been found north of the latitude of Cooktown; one (*Pseudocheirus peregrinus*) reaches its northern limit near Coen; two (*Trichosurus* and *Mesembriomys*) extend little beyond Wenlock on the Batavia River; one (*Acrobates*) attains the tip of Cape York; and one (*Petaurus breviceps*) extends across the Torres Strait to many parts of New Guinea.

Seven of the 11 terrestrial, open-forest species are Macropodidae (*Petrogale inornata*, *Aepyprymnus rufescens*, *Macropus canguru* and *Macropus robustus*, *Protemnodon parryi*, *Protemnodon bicolor*, and *Protemnodon agilis*); two (*Isodon obesula* and *Isodon macrourus*) are bandicoots; one (*Sminthopsis aruensis*) is a marsupial mouse; two (*Rattus gestri* and *Leggadina delicatula*) are rodents. Two of the Macropodidae (*Aepyprymnus rufescens* and *Protemnodon parryi*) reach their northern limits near Cooktown, three (*Petrogale inornata*, *Macropus canguru*, and *Macropus robustus*) near Wenlock, and the sand wallaby (*Protemnodon agilis*) crosses into the grass country of south New Guinea. *Sminthopsis rufigenis*, *Isodon macrourus*, and one of the rodents, *Rattus gestri*, have substantially the same range in New Guinea as *Protemnodon agilis*. The other rodent, *Leggadina*, extends north only to Wenlock. The ubiquitous *Tachyglossus*, it should be added, is also at home north of the Torres Strait in the same general area as the sand wallaby, but probably tends to penetrate a short way into the margining rain forests.

The mammals inhabiting the Cape York Peninsula rain forests present markedly different dispersal patterns. At least 21 species occur. Of these about half can be classed as truly Australian and half as truly Papuan. *Antechinus*, *Dasyurops*, *Perameles*, *Eudromicia*, *Pseudocheirus peregrinus*, *Pseudocheirus herbertensis*, *Pseudocheirus lemuroides*, *Hypsiprymnodon*, *Thylogale stigmatica*, and *Protemnodon bicolor* are Australian. *Echimypera*, *Dactylopsila*, *Phalanger orientalis*, *Phalanger maculatus*, *Pseudocheirus* (*Pseudochi-*

rops) *archeri*, *Dendrolagus bennettianus*, *Dendrolagus lumholtzi*, *Rattus leucopus*, the arboreal *Melomys*, and *Uromys* are Papuan.

Of the truly Australian rain-forest species, *Pseudocheirus peregrinus* goes north to Coen. *Pseudocheirus herbertensis*, *Pseudocheirus lemuroides*, and *Hypsiprymnodon* stop their northward spread near Cooktown, and *Protemnodon bicolor* reaches the tip of the Peninsula. *Dasyurops m. gracilis* is probably also there, but the evidence is inconclusive. The genus *Antechinus*, widely spread both in Australia and in the mountains of New Guinea, is represented in the McIlwraith scrubs east of Coen and at the Iron Range and on Atherton Tableland (eastern side), but was not discovered in the rain forests at the tip. The dormouse phalanger *Eudromicia* is found in the Cooktown-Townsville rain forest but has not yet been recorded farther north on the Cape. On the other hand it is well distributed in New Guinea. The genus *Eudromicia* is here held to be primarily Australian because of the presence of the very closely related but more specialized *Cercartetus* in the southern parts of Australia and in Tasmania. *Thylogale stigmatica* alone of the Australian rain-forest species extends to the tip of the Cape and across into the lowland scrubs of south New Guinea.

The dispersal southward of the New Guinea rain-forest species, all of which are truly arboreal except *Echimypera*, *Rattus*, and *Melomys lutillus*, present several differing patterns. On the one hand the mainly arboreal genus *Melomys*, represented by several local races, is found almost continuously along the humid coastal strip as far south as northern New South Wales. The *Rattus leucopus-assimilis* group displays a generally similar pattern. The other Papuan invaders of Australia, if not halted farther north, appear to have been stopped in their southward movements by the great open-forest break at Townsville and the lower Burdekin River area. Thus far southward have advanced *Dactylopsila*, *Pseudocheirus* (*Pseudochirops*) *archeri*, *Dendrolagus lumholtzi*, and *Uromys*. Negative evidence suggests that *Pseudochirops* and *Dendrolagus* were originally present in the scrubs of the tip, Iron Range, and the McIlwraith Range, but have since died out in these intervening

sets of rain forest. *Dactylopsila* and *Uromys* on the contrary were found in 1948 in all the large areas of rain forest. Bennett's tree-climbing kangaroo, *Dendrolagus bennettianus*, though at home in the northern part of the Cooktown-Townsville rain forest, seems not to have spread much to the south of the Daintree River, i.e., not to have reached the latitude of Cairns, south of which the species *Dendrolagus lumhotzi* is dominant.

The remainder of the New Guinea rain-forest species, *Echimypera*, *Phalanger orientalis*, and *Phalanger maculatus*, were stopped at the southern edge of the Iron Range-McIlwraith Range rain-forest mass, probably by the great 150-mile stretch of open forest between there and Cooktown. Of those species, only *Phalanger maculatus* can now be found in the forests at the tip. *Echimypera r. australis* is known only from Rocky Scrub on the east slopes of the McIlwraith Range in the latitude of Coen.

The absence of so many Papuan mammals from the rain forests through which they may once have passed in order to enter their present habitats indicates past changes of those environments. The successive passages of the tree kangaroos to the Cooktown-Townsville rain forests and of the phalangers to, but not beyond, the Iron Range-Rocky Scrub forests favor the view that more than one wave of invasion took place and that differing routes may have been followed. The changes of environment may have been fairly extensive, for the alterations in ocean level generally held by geologists to have taken place synchronously with the Pleistocene glaciations, coupled with the cooler world temperatures of that time, may have

had important repercussions on local climates. Increased rainfall may have partly closed some of the gaps between present rain-forest islands or effected the union of some forest-edged river systems (say, the Digul and other south New Guinea rivers) with those flowing from the Gulf of Carpentaria, which may have offered roundabout forested routes from New Guinea to the McIlwraith Atherton forests, letting certain mammals bypass the extreme tip.

The extensive open forest west of the Peninsular divide has apparently permitted appropriate Australian species to push towards or into New Guinea with varying degrees of success. The interrupted strip of rain forest along the eastern slopes of the divide or its outliers has likewise allowed the southward spread of species haunting the rain forest of New Guinea and offered them environmental harbors. The total number of Australian mammals that have invaded New Guinea is eight. Only one of these, *Petaurus breviceps*, is arboreal. Only one, terrestrial *Thylogale stigmatica*, lives in rain forest. The total number of New Guinea mammals that have invaded Australia is 11 (actually more because I am thinking of the arboreal *Melomys cervinipes* provisionally as a single unit). Of these, all but two groups, *Rattus leucopus* and allies, and *Echimypera*, are arboreal. It would seem then that Australian, terrestrial, open-forest mammals and New Guinea, arboreal, rain-forest mammals are both successful colonizers into essentially favorable environments. Such invasions have probably not taken place at one time but at various times in late Tertiary history.

CAPE YORK MAMMALS, WITH NOTES ON GENERA AND SPECIES FROM OTHER PARTS OF QUEENSLAND

ORNITHORHYNCHIDAE

ORNITHORHYNCHUS BLUMENBACH

Ornithorhynchus BLUMENBACH, 1800, Göttingische Gelehrte Anz., vol. 1, p. 609.

Ornithorhynchus anatinus phoxinus Thomas

Ornithorhynchus anatinus phoxinus THOMAS, 1923, Ann. Mag. Nat. Hist., ser. 9, vol. 11, p. 176.

MATERIAL: Evelyn (Neuhäuser), 2. Raven also found specimens at Evelyn and Ravenshoe in 1929. C.N.H.M.: Wongabel (Scott), 3, Ravenshoe (Scott), 1.

The northern limit of the platypus appears to be some 20 miles south of Cooktown. It was reported from "the Tableland," about 5 miles east of Helenvale, where it was sometimes caught in the sluices of tin miners. At Shipton's Flat at the western foot of Mt. Finnegan, through which a small tributary of the Annan River flows, platypus were seen occasionally by local people. We ourselves, though we looked for them assiduously, did not observe them. Farther south, on Ather-ton Tableland, they are still fairly common, though their habitat of forested streams is already much restricted by the deforestation activities of the local dairy and lumber interests.

TACHYGLOSSIDAE

TACHYGLOSSIUS ILLIGER

Tachyglossus ILLIGER, 1811, Prodr. syst. mammalium et avium, p. 114.

Tachyglossus aculeatus acanthion (Collett)

Echidna acanthion COLLETT, 1885, Forhandl. Vidensk.-Selsk. Christiania, for 1884, no. 13, pp. 1-11; 1885, Proc. Zool. Soc. London, p. 148.

MATERIAL: Iron Range, 7; Wenlock, Batavia River, 1; Mt. Finnegan, Rossville Creek, 1; Mt. Finnegan, Top Camp, 1. A.M.N.H.: Lake Barrine (Neuhäuser), 2. C.N.H.M.: Ravenshoe (Scott), 3. Besides the foregoing, the American Museum has specimens from the Dawson River and Mundubbera, farther south in Queensland, referable to true *aculeatus*.

Collett described the type of *acanthion* from Gracemere, near Rockhampton, and listed eight others from Coomoobooloo (80 miles farther south) collected by Lumholtz. He referred also to specimens from the Her-

bert River and Cape York Peninsula (1878, Jour. Linnaean Soc. London, vol. 14, p. 411).

"Porcupines" are apparently moderately common all down the eastern side of the Peninsula. They occur in both rain forest and open forest; at least they come out into open forest at night. We obtained them in both environments. I have no data on their presence on the west side of the Peninsula but would expect them to be present in areas not flooded annually. They are known to occur in the Northern Territory.

Collett compared *acanthion* with *lawesi*, the Papuan race, and with *aculeatus* of New South Wales.

The following notes made by H. C. Raven, though based upon the Tasmanian form rather than the Cape York form, are of interest:

"*Tachyglossus setosus* scratches itself with its elongated hind toe (hallux). With this toe nail it can scratch its thigh, tail, head, belly, sides. Only when frightened does it erect the spines and draw them forward so as to hide its head. A noise like the snapping of one's finger on matting is produced when the large hind toe is used to scratch the back. The animal does not crawl along or shuffle unless alarmed. Its usual gait is a walk, with its legs fully extended so that its belly is comparatively high off the ground. It reminded me of the gait of a giant tortoise. When walking, the hind toes are directed outwards and backwards. Thus the hallux becomes outermost.

"I picked up [a young captive specimen] while it was rolled up like a ball, placed it gently, back down, on the palm of my hand, and with the forefinger of my other hand gently rubbed the soles of its feet until it partly unrolled and seemed slightly less nervous. I then gently pushed a teaspoon containing warm milk beneath its snout. After a moment's hesitation it began thrusting out its smooth long slender pink tongue, thus licking up the milk. Later, I found that if the spoon was placed so its mouth came in contact with the milk, it would drink.

"When the animals are alarmed they start burrowing straight downward. It is remark-

able how quickly they can get beneath the surface of the ground. The earth is scratched loose with the powerful fore claws, and with the fore paws is thrust out, up, and just behind the elbow, or is passed backward for the curved, scraper-like hind claws to push out. This is done more when the animal is progressing forward as well as downward. During the whole of this burrowing process the head is infolded beneath a covering of sharp spines, which are continually pointed and twitched here and there towards the direction of contact, or the sound of, the pursuer."

DASYURIDAE

ANTECHINUS MACLEAY

Antechinus MACLEAY, 1841, Ann. Mag. Nat. Hist., vol. 8, p. 242.

This is a large genus, extensively distributed in Australia, Tasmania, and New Guinea. I reviewed it a few years ago (Tate, 1947b, pp. 126-133). Only one of its species, *A. flavipes*, enters the Cape York area. It seems to consist there of two races, the larger *godmani* and the smaller *adustus*, which meet and intermingle (or perhaps hybridize) near the latitude of Cairns. Farther south still other races of *flavipes* occur.

Antechinus flavipes Waterhouse

When Thomas described *Antechinus flavipes adustus* and *Antechinus godmani* from the same locality (Dinner Creek, 9 miles southeast of Ravenshoe, Atherton Tableland) there seemed to be little doubt of their specific distinctness. This seeming certainty existed despite the fact that their only distinguishing feature was one of size and also despite the fact that males are always much larger than females in *Antechinus*. The differences in the dental measurements of the types seemed then to require full specific separation.

But with the additional evidence provided by the large series collected by the recent Archbold expedition from Iron Range to Russell River and the Atherton Tableland (see beyond) doubts arise. The length of the molar tooth row, m^{1-4} , in *adustus* (type, adult male) is only 5.6 mm., while that of *godmani* (type, adult male) is 6.6 mm. Our

present series of some 80 specimens has tooth rows ranging in length from 6.0 to 6.9 mm. The northern examples (McIlwraith Range, Iron Range) include no example of either sex with tooth row less than 6.3 mm., and four of the examples reach 6.8 or 6.9 mm. In this same group of larger size belong four specimens from Speewah, upper Clohesy River, northern part of Atherton Tableland, and two from the Russell River lowlands, 10 miles south of Cairns. Animals with slightly smaller teeth, which might conceivably be referred to *adustus*, are: Julatten, a few miles west of Mossman, one female; Mt. Finnegan, 50 miles north of Mossman, three females; Ravenshoe, one male.

The mammary formula in this same large series of specimens is variable. In five females in nursing condition the mammary area shows a formula 5-5=10. But four others show 4-4=8; and there is one example (A.M.N.H. No. 154312) in which the formula is 4-1-4=9, the single unpaired mamma giving the appearance of being median and posterior to the others. I think that in the cases of 4-4=8, certain of the mammae remain un-everted and non-functional, and that the count in those should be interpreted as 5-5=10. All of the above formulas were observed and recorded on the fresh specimens in the field. In my paper on the Dasyuridae (Tate, 1947b, p. 149) I quoted Pocock, who gave the formula of *flavipes* as 2-2=4.

The upshot of this discussion is my conclusion that *godmani* should no longer be considered a full species but merely a part of the *flavipes* complex. *Antechinus godmani* certainly is larger than typical *A. flavipes* of the southern parts of eastern Australia, and apparently Thomas' small-sized race *adustus* represents virtually the northern extent (Mt. Finnegan is the ultimate northern record) of such small-sized *Antechinus*. Just what the relationship of *adustus* to true *flavipes* is I am not in a position to say, but the two are surely extremely close to each other.

The species occurs in suitable localities all down the eastern side of Australia, from Iron Range in the Cape York Peninsula to the south of Australia, and reappears in the southwest of Western Australia. We did not find it in the rain forest at the extreme tip of the Peninsula.

***Antechinus flavipes adustus* (Thomas)**

Phascogale flavipes adusta THOMAS, 1923, Ann. Mag. Nat. Hist., ser. 9, vol. 11, p. 175.

MATERIAL: Mt. Finnegan, at 1500 and 3000 feet, 3; Julatten, 10 miles west of Mossman, 1; Evelyn and Ravenshoe, Atherton Tableland, 5. U.S.N.M.: Nine miles south of Ravenshoe (Hoy), 2. A large series, the skulls lost, was collected at Dinner Creek, in rain forest, 9 miles southeast of Ravenshoe, by H. C. Raven in 1922.

These animals were not nearly so abundant as was the race *godmani* farther to the north. Van Deusen, who trapped the specimen from high on Mt. Finnegan, found that it was at least partly diurnal. He saw it come out of a hole at the base of a tree in the rain forest after bird meat, and he trapped it a few minutes later.

***Antechinus flavipes godmani* (Thomas)**

Phascogale godmani THOMAS, 1923, Ann. Mag. Nat. Hist., ser. 9, vol. 11, p. 174.

MATERIAL: Iron Range, 24; Mt. Tozer, 11; upper Nesbit River, McIlwraith Range, 22; Camp Oven Pocket, McIlwraith Range, 4; Mossman Gorge, 1; Speewah, upper Clohesy River, Barron River, 4; Russell River, 2. U.S.N.M.: Nine miles south of Ravenshoe (Hoy), 14.

The range of this large-sized form extends up through the Cape York Peninsula at least as far as the Iron Range (we failed to find it at Lockerbie near the tip). It was moderately plentiful at Iron Range and Mt. Tozer and extremely abundant (almost as plentiful as *Rattus*) at our camp on the upper Nesbit River in the McIlwraith Range. From Mt. Finnegan, 30 miles south of Cooktown, southward, it seems to interdigitate (perhaps even hybridize) with its smaller relative *adustus*, which was considerably rarer.

The first specimen of *godmani* we took was seen at night running up the trunk of a rain-forest tree. After that we began to find them in rat traps set at the bases of trees in rain forest.

SMINTHOPSIS THOMAS

Sminthopsis THOMAS, 1887, Ann. Mus. Civ. Genova, ser. 2, vol. 4, p. 503.

As in the case of *Antechinus*, *Sminthopsis* is a quite large genus of small phascogales, distinguished by several distinct characters (Tate, 1947b, pp. 119-125).

Only one species, *rufigenis*, a member of the less specialized *rufigenis* division, was found by us in Cape York Peninsula. A second species of this division, *murina*, occurs in the rain forests on the east side of Atherton Tableland, and this may be expected to extend nearly to Cooktown. As a species of the *crassicaudata* division is known from Malbon, near Cloncurry, it is possible that that division will also be demonstrated sooner or later in the Cape York region.

***Sminthopsis rufigenis lumholtzi* Iredale and Troughton**

Sminthopsis lumholtzi IREDALE AND TROUGHTON, 1934, Mem. Australian Mus., no. 6, p. 11.

MATERIAL: Iron Range, 7; Mt. Tozer, north foot, 3; Camp Oven Pocket, upper Peach River, 3; Shipton's Flat (Roberts), 1.

This *Sminthopsis* avoids the dense rain forest in which *Antechinus flavipes* is at home and favors open rocky forest and brushy places in full sunlight. There is little doubt that its nearest relative is *rufigenis* (= *rona*) of Aru Islands and the open country of southern New Guinea (the Oriomo and Port Moresby grasslands). It belongs to the Torresian group of *Sminthopsis* in which the tail never becomes incassated.

It seemed not to be a common animal anywhere, though with different conditions of trapping possibly more might have been taken. It inhabited the grassy, well-illuminated environment affected by *Melomys lutillus*, and once or twice I suspect it ate parts of the *Melomys* after the latter had been caught in a trap.

Only one specimen was a female. It had the pouch area in condition for the mammae to be counted. This female had a "circular drawstring pouch area" with the nipple formula 4-4=8. According to my observations made on dried skins, the formula of Papuan *rufigenis* is 3-3=6. However, our Australian specimens were observed freshly killed in the field, so that none of the structures were concealed.

The type locality of *virginiae* Collett (not Tarragon) (= *lumholtzi* Iredale and Troughton) was given as Herbert Vale, in the upper middle part of the Herbert River, doubtless where its headwater streams drain the grassy portions of the southern part of the

Atherton Tableland before cutting down into the rain forest. The distribution of the pattern of the species in that part of Australia then will correspond fairly closely to that of such other open-forest species as *Isoodon macrourus*, *Satanellus hallucatus*, and *Melomys lutillus*. In the case of *Sminthopsis rufigenis*, the south Papuan race has distinctly darker pelage and tail and more markedly russet hands and feet. The Australian race is definitely grayer. There is also the possibly different mammary count to be considered.

I pointed out earlier (Tate, 1947b, p. 120) that *virginiae* Tarragon, if ever supported by a type (and Paris museum types do sometimes reappear), will probably displace *rufigenis* as a specific name.

***Sminthopsis murina* (Waterhouse)**

Phascogale murina WATERHOUSE, 1838, Proc. Zool. Soc. London, p. 76.

MATERIAL: Atherton Tableland, 1. M.C.Z.: Lake Barrine (Darlington), 1.

SATANELLUS Pocock

Satanellus POCOCK, 1926, Proc. Zool. Soc. London, p. 1083.

The combination of retention of hallux, full striation of the pads, and retention of the minute p^4 (in *albopunctatus*) seems to indicate the primitiveness of this genus in comparison with related *Dasyurinus*, *Dasyurus*, and *Dasyurops* (Tate, 1947b).

The genus contains two distinct species: *albopunctatus* of New Guinea and *hallucatus* of the northern parts of Australia.

Four races, which are barely separable from one another, have been named, the one inhabiting the Cape York Peninsula being *S. h. predator*.

***Satanellus hallucatus predator* (Thomas)**

Dasyurus hallucatus predator THOMAS, 1926, Ann. Mag. Nat. Hist., ser. 9, vol. 18, p. 543.

MATERIAL: Red Island Point (near), 4; Mt. Tozer, 3; Brown's Creek, 3; Wenlock, Batavia River, 1; Coen River, 1; Croll Creek, near Coen, 1; Helenvale, 2; Shipton's Flat, 1, (Roberts), 7. A.M.N.H.: (All by Neuhäuser), Coen, 4; Port Stewart, 3; Rocky Scrub, McIlwraith Range, 2; U.S.N.M.: Nine miles southwest of Ravenshoe (Hoy), 3. M.C.Z.: McIlwraith Range (Darlington), 12.

This fine series indicates that the species is widely distributed in the open-forest areas of

the Cape York Peninsula. It is apparently absent from the rain-forest habitat of *gracilis* but extends around that area of woods on the west (i.e., to Torrens Creek and Clermont) and south. The most southerly record I have of it is at Yeppoon near Rockhampton.

In the wild, the species hides by day in fallen hollow tree trunks. Around developed areas it often conceals itself in disused houses—in stoves, for example. One was trapped in an abandoned barge on the beach at Red Island Point. Another was shot from the rafters of a native schoolhouse. A third, which hid by day among the girders of the Red Island wharf, was taken by having an overcoat thrown over it. The animals were rather easily trapped in meat sets prepared for dingoes.

DASYUOPS MATSCHIE

Dasyurops MATSCHIE, 1916, Mitt. Zool. Mus. Berlin, p. 262.

The characters of the skull and teeth have been previously discussed (Tate, 1947b, pp. 144–145). This is primarily an animal of the rain forest.

It becomes necessary to amend part of my definition of *Dasyurops* (Tate, 1947b, p. 145). The striations of the feet are not "wholly absent" but are confined to small, elongated areas at the center of each otherwise granular pad.

The number of species must also be changed from two to one. *Dasyurops gracilis* is now revealed as only a weak geographical race of *Dasyurops maculatus*. It is not even smaller in size; its seeming smallness was due to the youth of the specimen originally examined.

***Dasyurops maculatus gracilis* (Ramsay)**

Dasyurus gracilis RAMSAY, 1888, Proc. Linnean Soc. New South Wales, ser. 2, vol. 3, p. 1296.

MATERIAL: The tableland near Rossville, 20 miles south of Cooktown, 1 (no skull); Mt. Spurgeon, 1; Dinner Creek, 9 miles southwest of Townsville, 1. U.S.N.M.: Nine miles south of Ravenshoe (Hoy), 2; 6 miles south of Ravenshoe (Hoy), 1; Mt. Spec, 1. The type is from Mt. Belenden Ker.

Mr. Troughton arranged to have the skull of the type (Sydney, No. M.155) extracted and cleaned for me while I was in Australia in 1947. It proved to be that of a very young animal, in which m_4^4 were not yet erupted.

In m^1 , as compared with m^2 , the metacone and metastyle are confluent, and the tooth is correspondingly narrow. The paraconid of m_1 is obsolete, and the metaconid is much reduced.

The ventral surface of the skin is even more spotted with white than the dorsal surface, and the spots are larger. The pads are narrow, striated; the skin bordering the striated areas is granular. The tail is spotted.

This is a form native to the rain forests of north Queensland. Its southern limit appears to be near Townsville, beyond which the arid Burdekin River zone probably prevents its extension to the south or southeast. Northward it probably extends for a short distance beyond Mt. Finnegan, and possibly even northward into the McIlwraith Range. There one night, in a creek bed, I saw the shine of distant eyes that I thought were too large to be those of *Satanellus*.

Now that I have examined the type and have so many extra specimens for study it becomes possible to reevaluate the status of *gracilis*. The specimens present a growth series ranging from the type (a baby animal, though independent of the pouch) to the very large male collected by Raven at Evelyn. The large size of the teeth which I noted earlier in the case of the young female from Mt. Spurgeon fits perfectly when one recognizes that it is a juvenal female of the northern race of *maculatus*. The specimen, unsexed, from Mt. Spec near Townsville likewise appears to have large teeth, though even it is subadult. The skin without skull from 20 miles south of Cooktown serves only to extend the range that far to the north.

PERAMELIDAE

PERAMELES GEOFFROY

Perameles GEOFFROY, 1803, Bull. Soc. Philom., Paris, no. 80, p. 150.

Unspecialized bandicoots with a full complement of incisors and unspecialized audital bullae. The genus, which is confined to Australia and Tasmania, comprises two major sections, only one of which, *nasuta*, reaches northwest Queensland.

Perameles nasuta Geoffroy

Perameles nasuta GEOFFROY, 1804, Ann. Mus. d'Hist. Nat., Paris, vol. 4, p. 62.

This is the large, long-snouted species of

bandicoot described first from the neighborhood of Sydney. A weak race was proposed for representative of the species from the Atherton Tableland. Capture of additional specimens extends the range of the species northward almost to the tip of the Cape York Peninsula.

Perameles nasuta pallescens Thomas

Perameles nasuta pallescens THOMAS, 1923, Ann. Mag. Nat. Hist., ser. 9, vol. 11, p. 173.

MATERIAL: Mt. Tozer, 400 feet, 1; Helenvale, 1; Mt. Finnegan, Rossville Creek, 1 with 2 pouch young; Speewah, 1; Walter Hill Range, 2. M.C.Z.: (All by Darlington), Millaa Millaa, 1; Lake Barrine, 1; Mt. Spurgeon, 1; McIlwraith Range, 2. C.N.H.M.: (All by Scott), Vine Creek, Ravenshoe, 5; Wongabel, 1; Danbullan, 2; near Puzzle Creek, 7 miles southwest of Mt. Spec, 1. U.S.N.M.: Nine miles southeast of Ravenshoe (Hoy), 2.

Although the Archbold expedition did not take this rain-forest bandicoot in the McIlwraith Range, two specimens had been obtained there previously, as shown, by Darlington for the Museum of Comparative Zoölogy. Southward there is every reason to believe that it extends at least to Townsville. The typical race of *nasuta* is found in New South Wales and extreme southern Queensland.

It now seems certain that the large *Perameles nasuta* extends at least as far north as Iron Range and Mt. Tozer. I think it will be found eventually in the rain-forested patches at the tip of the Peninsula. Our specimens from Helenvale, Mt. Finnegan, and Speewah complete the connection with Atherton Tableland, type locality of the race *pallescens*.

ECHIMYPERA LESSON

Echimypera LESSON, 1842, Nouveau tableau du règne animal, p. 192.

A Papuan genus distinguished from *Perameles* and *Peroryctes* by the absence of the fifth upper incisors.

Recently I recorded it for the first time from Australia (Tate, 1948b, p. 334).

Echimypera rufescens australis Tate

Echimypera rufescens australis TATE, 1948, Bull. Amer. Mus. Nat. Hist., vol. 92, p. 334.

MATERIAL: None.

Despite intensive efforts in the rain forests around the type locality, the upper Nesbit

River, McIlwraith Range, made by members of the Archbold expedition, no second specimen of this unique species was discovered. In New Guinea *Echimypera* is a rain-forest genus. The same can be expected of the Australian race. Since our return from Cape York, Darlington has described for me exactly where the type was collected, in the dense rain forests of the upper Nesbit River on the east slopes of the McIlwraith Range.

ISOODON DESMAREST

Isoodon DESMAREST, 1817, Nouveau dictionnaire d'histoire naturelle, nouv. ed., vol. 16, p. 409.

Bandicoots with somewhat broader heads than the very similar appearing *Perameles* and readily distinguished by their greatly enlarged, pear-shaped bullae.

There are two main types of *Isoodon*: the large *macrourus* type and the small *obesulus* type. Both are now found to be present in open-forest country of Queensland, and both occur as far as the northern tip of the Cape York Peninsula.

Isoodon obesulus peninsulae Thomas

Isoodon peninsulae THOMAS, 1922, Ann. Mag. Nat. Hist., ser. 9, vol. 9, p. 679.

MATERIAL: Lockerbie, 2; Newcastle Bay, 1 (inside a carpet snake); Iron Range, 1.

Earlier (Tate, 1948b) I concluded that the nearest relatives of the type of *peninsulae* must be the races of *obesulus*. The capture of additional material of the species from the Peninsula, and the fact that it apparently associates freely with the larger and quite distinct *macrourus*, seem to indicate that the two species may range together wherever their distributional areas overlap, just as they seemingly do in New South Wales and southern Queensland.

One of the three specimens listed above (that from Iron Range) is distinctly reddish and thus suggests linkage with *auratus* Ramsay from the Northern Territory and Arnhemland.

Isoodon macrourus torosus (Ramsay)

Perameles macroura var. *torosus* RAMSAY, 1877. Proc. Linnean Soc. New South Wales, vol. 2, p. 12.

MATERIAL: Lockerbie, 3; Portland Roads, 2; Mt. Tozer, 1; Croll Creek, 1; Mossman, 1; Cairns,

4, and 1, skull only. M.C.Z.: Mt. Molloy (Darlington), 1; Shipton's Flat (Roberts), 2. C.N.H.M.: (All by Scott), Danbullan Road, Barron River, 2; Wongabel, 1; Cairns, 1. U.S.N.M.: Five miles southwest of Ravenshoe (Hoy), 3.

Isoodon macrourus is a denizen of the open and semi-open forest. Most of those secured at Lockerbie were found in the long grass of the region. The grass at Iron Range, Portland Roads, Mt. Tozer, and Coen was shorter, and the broad-headed bandicoots sheltered by day in holes in hollow logs. In the Cairns district they were at home in sugar-cane fields, and many were killed by cars on the highways. They are sometimes vectors of the mites carrying scrub typhus.

The range of this large-toothed species is now known to extend south to New South Wales. Besides those I listed before (Tate, 1948b, pp. 339-340) I have a skull from Chelmer, Brisbane, which was given me for *obesulus* but proves to be a juvenal *macrourus*.

PHALANGERIDAE

This family contains three subfamilies: the Phalangerinae, the Tarsipedinae, and the Phascolarctinae.

The Phalangerinae comprise several primary groups of genera:

1. *Trichosurus*, *Wyulda*, *Phalanger*, and probably the fossil *Wynyardia*
2. *Dactylopsila* and its specialized Papuan relative *Dactylonax*
3. *Eudromicia*, *Cercartetus*
4. *Petaurus*
5. *Distoechurus* of New Guinea
6. *Acrobates*

The position of the genus *Gymnobelideus* is not clear. It probably belongs near groups 3 and 4.

The Tarsipedinae contain only *Tarsipes* of Western Australia.

The Phascolarctinae contain *Pseudocheirus*, the specialized *Phascolarctos*, and the gliding *Schoinobates*.

PHALANGERINAE

TRICHOSURUS LESSON

Trichosurus LESSON, 1828, Dictionnaire classique d'histoire naturelle, vol. 13, p. 333.

The genus *Trichosurus* can well be considered the most generalized of the Phalangerinae. It appears to be nearest to *Phalanger*

and may be the Australian counterpart of that typically Papuan genus. Indeed the short-eared *Trichosurus caninus* and the Celebes phalanger, *Phalanger ursinus*, are much alike superficially. *Wyulda* is a direct modification of *Trichosurus*.

I discussed a number of the characteristics of the dentition of *Trichosurus* when writing on the Macropodidae (Tate, 1948a, pp. 242-250). It has advanced beyond that of *Phalanger* in having lost the lower, peg-like incisor, p_2 , and its upper p^2 is relatively smaller. The condition of i^3 in *Trichosurus* is not especially significant, since in *Phalanger ursinus* it is found quite unreduced, and in *P. orientalis* and *P. maculatus* much reduced. The third incisor is only slightly reduced in *Trichosurus* (all three species). The counterparts of the frontal and supra-squamosal inflations of *T. vulpecula* and *T. fuliginosus* can be observed in *Phalanger maculatus*. Frontal but not suprasquamosal enlargements occur in *P. ursinus*. All in all, *Trichosurus* and *Phalanger* must be thought very closely allied.

The character of the external ear, currently used to distinguish *Trichosurus caninus* from *Trichosurus vulpecula* (short and broad in the former, elongate and narrow in the latter), is so striking that one naturally looks for supporting characters in the skulls. There the distinction is far less obvious, apart from the greater size in *caninus* and *fuliginosus*. In the audital area of the skull the principal distinction lies in the mastoid-squamosal portion, particularly the superior surface of the squamosal inward from and behind the root of the zygoma. In the long-eared *vulpecula* and *fuliginosus* this area shows distinct to (in some males) marked inflation. In the short-eared *caninus* no inflation is appreciable. The inflation furthermore results in the fact that the mastoid width in *fuliginosus* and *vulpecula* is approximately equal to the width across the tips of the meatal tubes (49:48 and 38:40), whereas it is considerably less in *caninus* (44.5:49).

Elsewhere, one sees in *vulpecula* and *fuliginosus* a tendency for the base of the nasals together with the anterior part of the frontals to become elevated and even somewhat inflated, whereas this part in *caninus* remains flat. In *caninus* the frontal trough is usually

more pronounced. The measurements of *caninus* are generally greater than those of *vulpecula*.

I am inclined to agree with Troughton (1948, p. 126) in regarding the Tasmanian *fuliginosus* as a full species. It is larger than either *caninus* or *vulpecula*, very much larger than the latter. Its structure (the elongate ears, inflated nasals and squamosals) is, however, more nearly in agreement with that of the latter than of the former, and I would expect *fuliginosus* and *vulpecula* to be somewhat closer to each other than either is to *caninus*.

I am not familiar with *ruficollis* and *hypoleuca*, the races from Western Australia, nor with *arnhemensis*.

The almost unique *Wyulda* from Wyndham is a *Trichosurus*-like form in which enlargement of the mastoid area has advanced so much farther that the mastoid width approximately equals the zygomatic width.

Three rather similar species occur: *vulpecula*, very widely distributed in Australia, *fuliginosus* of Tasmania, and *caninus* of the eastern parts of northern New South Wales and southern Queensland.

Trichosurus vulpecula Kerr

This somewhat variable species apparently covers an enormous geographical range. It is therefore not surprising that a number of races have been set up. In the eastern parts of Australia there are four such: the typical one from New South Wales and southern Queensland; *mesurus* Thomas from Inkerman, southeast of Townsville; *eburacensis* from the Cape York Peninsula; and the deep brown *johnstonii* from the rain forests of the eastern side of the Atherton Tableland. I think Troughton (1948, pp. 120-121) is right in suggesting that *mesurus* is insufficiently distinct to warrant subspecific separation from southern *vulpecula*. Furthermore, the gray phase of *eburacensis* is in very nearly the same category; the only characters distinguishing it from *vulpecula* are the shorter, rather crisper body pelage and the shortness of the black hairs of the tail, which gives the tail a much more pronounced taper than the tail of *vulpecula*.

There remains the question of the line of geographical separation between *eburacensis*

and *vulpecula*. All our material from the latitude of Cooktown and northward to the Batavia River belongs unquestionably to *eburacensis*. One collected by G. Neuhäuser near Mt. Spurgeon and two by myself at McLeod Creek, a tributary of the upper Mitchell, just west of Mt. Spurgeon, are all referable to *eburacensis*. Yet the good series obtained by H. C. Raven at Snubby Creek, 6 miles southwest of Ravenshoe, which has fuller pelage and the tail much denser, should perhaps be referred to true *vulpecula*. Ravenshoe is less than 50 miles south-southwest of Mt. Spurgeon. Possibly *vulpecula* in northern and central Queensland remains in the relatively better-watered strip of open forest adjoining the Atherton rain forests and farther south nearer the coast (e.g., at Townsville and Inkerman), while *eburacensis* extends from Cape York Peninsula south along the next drier zone to the west, that is to say, south through the Mitchell and Flinders drainages to the western side of the upper Burdekin River.

The principal distinction between the race *vulpecula* (including *mesurus* and *eburacensis*) and *johnstonii* is in the ears. In *vulpecula* the back of the ear is marked by a large area of cream-colored hairs. This area occupies the posterior half of the pinna, the anterior half being gray like the head. There is a narrow terminal margin of fuscous around the cream area, which does not, however, extend down the posterior margin all the way to the base. In *johnstonii* the entire ear is fairly uniformly brown like the head and body. In a few individuals only, there is a small patch of yellowish, corresponding doubtless to the large creamy area in *vulpecula*.

The body coloring in *vulpecula* is predominantly gray, with rufescent wool hairs in some examples of *eburacensis*. The body color in *johnstonii* is strongly russet, modified in some examples by over-hairs of dark brown, in others not so modified.

***Trichosurus vulpecula vulpecula* (Kerr)**

Didelphis vulpecula KERR, 1792, The animal kingdom . . . of Linnaeus, p. 198.

MATERIAL: Snubby Creek, 6 miles southwest of Ravenshoe, 10; probably west of Evelyn, 1; also from farther south, i.e., Byfield, 35 miles northeast of Rockhampton, 1; Serpentine, 25 miles northeast of Rockhampton, 1. M.C.Z.: (All by

Darlington), Malanda, 2; Millaa Millaa, 2; Atherton Tableland, 2; Ravenshoe, 2; Flinders River, 32 miles below Hughendon, 1; Leichardt Range, offshoot of the Clarke Range, near McKay, 1. C.N.H.M.: Bluewater Creek, some 20 miles northwest of Townsville (Scott), 2.

One of the Bluewater animals shows the mixture of reddish in the under coat, described next in *eburacensis*, so may be annectant. They are also possibly referable to *T. v. mesurus* Thomas, a named race that seems virtually characterless.

Reference of this mid-Queensland material to true *vulpecula* is provisional and is done in deference to Troughton's opinion. We have only "zoo" specimens from New South Wales. These often have yellow under parts and much denser pelage than appears in specimens from farther north, but that condition may either be typical or represent a response to winter conditions. If *mesurus* Thomas were considered a good subspecies, our middle and north Queensland specimens would be referable to it instead of to *vulpecula* proper.

***Trichosurus vulpecula eburacensis* Lönnberg**

Trichosurus vulpecula eburacensis LÖNNBERG, 1916, in Lönnberg and Mjöberg, K. Svenska Vetensk. Akad. Handl., vol. 52, no. 2, p. 9.

MATERIAL: Wenlock, Batavia River, 6; Coen River, 1; Croll Creek, Coen, 4; Ebagoolah, south of Coen, 1; Cooktown, 1; Atherton Tableland, 1; Mt. Spurgeon, 1; McLeod Creek, Mitchell River, 2. M.C.Z.: (All by Darlington), Coen, 3; McIlwraith Range, 2.

This race is apparently absent from the extreme tip of the Peninsula and from Portland Roads. West of the Sir William Thompson Range at the Batavia River and southward through Coen and Ebagoolah it becomes abundant. At Cooktown it has taken up residence in the roofs of the houses, much as palm civets do in Malaya and *Didelphis marsupialis* does in Guayaquil, Ecuador.

It appears in two phases, one with gray-based pelage and no trace of rufescent, the other with gray over-hairs, often russet on the nape, and rusty wool hairs. In both, the backs of the ears have a large area white or creamy. These two phases appear to be unconnected with differences of sex, age, or season. Both may be found in a given locality.

In my view *eburacensis* is but little removed from southern open-forest forms of *vulpecula*.

Its characters include short body pelage and short tail-hairs.

***Trichosurus vulpecula johnstonii* (Ramsay)**

Phalangista johnstonii RAMSAY, 1888, Proc. Linnæan Soc. New South Wales, ser. 2, vol. 3, p. 1297.

MATERIAL: Evelyn, 2; Lake Barrine, 1; Dinner Creek, 9 miles southeast of Ravenshoe, 7; Snubby Creek, 6 miles southwest of Ravenshoe, 1. C.N.H.M.: Upper Barron River (Scott), 2. U.S.N.M.: (All by Hoy), 9 miles south of Ravenshoe, 6; Mt. Bellenden Ker, 1.

These animals, with their long, coppery brown hair, give the appearance of being rain-forest dwellers. The type locality, Mt. Bellenden Ker, an exceedingly wet area, supports this view. Perhaps the race *johnstonii* has taken to the rain forest of the north just as the species *caninus* inhabits the southern rain forests.

However, it seems that *johnstonii* occasionally finds its way into open-forest country by way of the tongues of green gallery woods that often follow water courses. This would account for the specimen from Raven's Snubby Creek Camp, which was otherwise in open forest and provided many examples of the gray possums, *vulpecula*.

I suspect that the form *johnstonii* is derived from that phase of *eburacensis* that has the hair bases russet. The color of the present form varies from bright coppery rufous to rather dull brownish red. The white backs of the ears which characterize *eburacensis* are almost wholly obscured by dark color in *johnstonii*. The pelage varies from rather long and shaggy to short. This is probably connected with season in any given individual, but actually both long-haired and short-haired examples occurred at the same time.

PHALANGER STORR

Phalanger STORR, 1780, Prodrömus methodi mammalium, Tübingen, p. 33.

I showed some years ago (Tate, 1945a) that the genus *Phalanger* could be divided naturally into three main sections: the *orientalis* group (typical), the *maculatus* group, and the *ursinus* group. The *maculatus* group has long been known to inhabit the Cape York Peninsula. In the same paper, I recorded the presence there of a member of the *orientalis* group.

The Archbold expedition was fortunate in securing an adequate series of the former and some few additional specimens of the latter.

The southern limit of *Phalanger* now appears to be reached in the rain forests of the McIlwraith Range. Extensive grasslands, which stretch southward between that area and the Cooktown-Cairns-Townsville mass of rain forest, seem to have prevented its further spread to the south.

***Phalanger orientalis peninsulæ* Tate**

Phalanger orientalis peninsulæ TATE, 1945, Amer. Mus. Novitates, no. 1283, p. 2.

MATERIAL: Iron Range, 3; Peach River, McIlwraith Range, 4. M.C.Z.: Topotypical series (Darlington), 7.

A rain-forest and gallery-forest species. I described it originally from two specimens collected at Peach River by Darlington. We ourselves obtained more from the same place and others from the Iron Range farther north. Vernon shot one or two others for the collections of the Queensland Museum.

The coloring is found to be rather variable, as suggested by the type and paratype. Females are fairly uniform dark gray-brown. Males may be dark, or quite pale ashy brown. Their under parts are pale, often curiously mottled with a slightly darker tint.

***Phalanger maculatus nudicaudatus* (Gould)**

Phalangista nudicaudatus GOULD, 1850, Proc. Zool. Soc. London, for 1849, p. 110.

MATERIAL: Lockerbie, 4; Iron Range, 21. A very young specimen was seen in captivity at Coen. M.C.Z.: McIlwraith Range (Darlington), 1.

The Australian race of the spotted cuscus of New Guinea appears to reach greatest abundance at Iron Range. The forest continues nearly unbroken to the McIlwraith Range, whence comes a specimen in the British Museum. In the extreme north (Lockerbie) the animal seems to prefer the scattered stands of rain forest to the open forest. At Iron Range it inhabited the tallest rain forest and gallery forest.

The early growth stages (Tate, 1945a, p. 2, stages 1 to 5), which evince themselves so readily in the color and pattern of the juvenile spotted phalangers of New Guinea, are less obvious in the spotted phalangers of the Cape York Peninsula. Also the differences

of color between the sexes, so remarkable in such races as *P. m. chrysoirrhos* of southern New Guinea, are less apparent. In the Australian race both sexes are gray, the male being marked with roundish white spots. In many instances the white marks are confluent and so surround gray spots.

Usually these animals spend the day high in trees in rain forest, more or less concealed by foliage. At night they move about and feed on fruits and perhaps leaves. Then material can be heard dropping to the ground. Sometimes, however, they descend, because I found one early one morning on the ground in rather dense second growth.

DACTYLOPSILA GRAY

Dactylopsila GRAY, 1858, Proc. Zool. Soc. London, p. 109.

Two races of this primarily Papuan genus, the striped possums, occur in Australia (Tate, 1945c, pp. 4-5): *D. trivirgata picata* in the northern and central parts of the Cape York Peninsula, and *D. trivirgata infumata* in the southern parts and the Atherton Tableland and Cairns area. The most southerly record I have is from near Townsville. Other records are Mt. Bellenden Ker and Cardwell. The southern spread may well be limited by the almost unforested and relatively dry area between the lower Burdekin River and Charters Towers.

I have pointed out elsewhere (Tate, 1948a, pp. 241-243) the peculiar tusk-like character of the first upper incisors and the special type of incisive occlusion present in this genus; also the absence of any masseteric canal in the mandible and the lack of inflection of the angular process. These features, together with the striped pattern, combine to give *Dactylopsila* and its derivative *Dactyloxax* a somewhat isolated position in the Phalangerinae.

Dactylopsila trivirgata picata Thomas

Dactylopsila picata THOMAS, 1908, Ann. Mag. Nat. Hist., ser. 8, vol. 1, p. 123.

MATERIAL: Newcastle Bay, 1; Lockerbie, 8; Coen-Rocky Scrub, McIlwraith Range area, 4. M.C.Z.: (Both by Darlington), 1; Helenvale, 20 miles south of Cooktown, 1.

Most Lockerbie material was shot at night in small stands of low rain forest localized

in the midst of more extensive areas of open forest. One shot from a tree on the top of the McIlwraith Range was climbing in moderately tall, quite dense rain forest. The specimen from Helenvale was taken in fringe forest along the Annan River.

The color pattern of this large collection of *picata*, extending from the tip of Cape York to Cooktown, serves to emphasize its very close relationship to the south Papuan *kataui*.

Dactylopsila trivirgata infumata Tate

Dactylopsila trivirgata infumata TATE, 1945, Amer. Mus. Novitates, no. 1305, p. 4.

MATERIAL: Shipton's Flat, Mt. Finnegan, 1; Barron River, 1 (and young); Lake Barrine, 2 (the type and paratype); Evelyn, Atherton Tableland, 1.

The color distinctions between this form and *picata* from farther north, which I indicated when describing the type, are amply borne out by the additional material now in the collection. It is interesting to note that this rain-forest race extends north to Mt. Finnegan, yet is replaced a few miles beyond (at Helenvale in open forest) by perfectly typical *picata*. The character I suggested for distinguishing the dentitions of the two races (rotation of p^4) has not been found valid in practice.

EUDROMICIA MJÖBERG

Eudromicia MJÖBERG, 1916, in Lönnberg and Mjöberg, K. Svenska Vetensk. Akad. Handl., vol. 52, no. 2, p. 13.

These tiny "dormouse phalangers" may be fairly common in the rain scrubs (forests) of the Cairns region, and I suspect they will eventually be demonstrated in the Iron Range and McIlwraith Range rain forests. The Papuan species *caudata* is widely distributed in New Guinea, and in Tasmania another, *lepida*, is known. In the southern parts of Australia, both east and west, a second genus, *Cercartetus*, occurs, which is rather more specialized (Tate, 1945c, pp. 2-4).

Eudromicia macrura Mjöberg

Eudromicia macrura MJÖBERG, 1916, in Lönnberg and Mjöberg, K. Svenska Vetensk. Akad. Handl., vol. 52, no. 2, p. 14.

MATERIAL: West of Cairns (presented by Mr. George Brooks), 1 (A.M.N.H. No. 155090, in alcohol). There are two from this general area in the

Queensland Museum: Brisbane No. 6571 from near Jordan Creek, west Palmerston area, near Innisfail, and Brisbane No. 7011 from Mt. Spurgeon, 20 miles northwest of Cairns.

Mjöberg's typical collection consisted of four specimens found in "tropical jungle" near Cedar Creek.

PETAURUS SHAW AND NODDER

Petaurus SHAW AND NODDER, 1791, The naturalist's miscellany, vol. 2, pl. 60.

Petaurus comprises two primary species groups (Tate, 1945c, pp. 6-10): the *P. australis* group (large sized), and the *P. breviceps* group (small to medium sized), which includes *norfolcensis*. *Petaurus australis* is set off from the others chiefly by its very broad palate and its less reduced premolars. The distributional patterns differ markedly.

Petaurus australis Shaw and Nodder

This quite large glider is widespread in the southeast of Australia and occurs as the race *reginae* in southern Queensland. The species remains unrecorded, so far as I know, northward except for the colony discovered by Darlington and Neuhäuser on Mt. Spurgeon.

Petaurus australis reginae Thomas

Petaurus australis reginae THOMAS, 1923, Ann. Mag. Nat. Hist., ser. 9, vol. 11, p. 249.

MATERIAL: Mt. Spurgeon, 25 miles northwest of Cairns, 6. Darlington took 5 at the same place.

We were informed that large flying phalangers, living more or less gregariously, occur in the rain forests to the south of Cooktown. Those may, however, have been *Schoinobates*.

The type locality of *reginae* is Bundaberg, which is about 400 miles south-southeast of Mt. Spurgeon. The American Museum collection includes two from the Dawson River Valley, 150 miles west of Bundaberg. Though immense areas of open-forest country with very little rain forest intervene, no difference between Mt. Spurgeon and Bundaberg material is appreciable.

Petaurus breviceps Waterhouse

This species, much smaller than *P. australis*, has by far the widest range of any. It occurs through the whole of New Guinea below 8000 feet, on many outlying islands,

and in the greater part of Australia. It seems almost equally at home in rain forest and open forest. The Papuan race *tafa* probably never meets open country but inhabits markedly rainy tracts of mid-montane jungle forests. The Cape York race *longicaudatus* was generally found in open forest.

Petaurus breviceps longicaudatus Longman

Petaurus breviceps longicaudatus LONGMAN, 1924, Mem. Queensland Mus., vol. 8, abstr., p. ix.

MATERIAL: Newcastle Bay, 2; Lockerbie, 2; Portland Roads, 1; Wenlock, Batavia River, 1; Coen, 2; Alderbury, 2; Seagren's Farm, 1; Shipton's Flat, 1, and (Roberts), 1. (All by Neuhäuser): Somerset, 4; Rocky Scrub, 1; Mt. Spurgeon, 1; Lake Barrine, 1. M.C.Z.: (All by Darlington), Lake Barrine, 5; Ravenshoe, 1; Townsville, 1. C.N.H.M.: Ravenshoe (Scott), 2.

All our specimens were shot at night from trees, usually flowering trees, in open forest. Those from Alderbury and Seagren's Farm have the tips of the tails white.

All but two of the specimens taken by our expedition have quite long tails. The two short-tailed specimens have had the tip of the tail damaged.

We have also a specimen from Pentland, 140 miles west of Townsville, which differs very slightly from *longicaudatus*, in the direction of *norfolcensis*. It is slightly larger than *longicaudatus*, and the base of the tail is fuller; 75 mm. of its tip is white. But it is not nearly so large as *norfolcensis*, nor is its p_4 unreduced as in that species.

ACROBATES DESMAREST

Acrobates DESMAREST, 1818, Nouveau dictionnaire d'histoire naturelle, nouv. ed., vol. 25, p. 405.

This is the smallest of the gliding phalangers, resembling but not very closely related to *Petaurus* and to *Schoinobates* (the latter in a different subfamily). I showed (Tate, 1938; 1946, pp. 10-11) that on the basis of its dentition *Acrobates* stands as a somewhat isolated member of the Phalangerinae.

The genus is monotypic, comprising weakly distinguishable northern and southern races. It is probably confined to eastern Australia where it extends, in suitable local environments, from the extreme southern tip of Cape York Peninsula to Victoria. I am reasonably sure that it does not occur in New Guinea, as I explained in 1938.

The animals seem to inhabit chiefly open forest. The only one of ours not so found came from Peach River, and there the open forest was only some 50 yards away from the river forest.

***Acrobates pygmaeus frontalis* De Vis**

Acrobates pygmaeus frontalis DE VIS, 1887, Proc. Linnæan Soc. New South Wales, ser. 2, vol. 1, p. 1134.

MATERIAL: Newcastle Bay, 1. In Brisbane: Peach River, 1. M.C.Z.: Peach River (Darlington), 1. Ravenshoe, 2 in alcohol; Herberton (Raven), 1 in alcohol (A.M.N.H. No. 65653). Queensland Museum: Portland Roads, 1; Rollingstone, on railroad 30 miles northwest of Townsville, 1. "West Australia," 1 (M.C.Z. No. 6404).

The specimen from Newcastle Bay was obtained under peculiar conditions. One night Van Deusen had shot at some tiny creature among the blossoms of a bloodwood tree. He saw something fall in the darkness but despite protracted search with a flashlight he failed to find it. Returning in the morning, he continued to search and under a near-by fallen tree discovered a large carpet snake. On opening the stomach of the snake a small bandicoot and an *Acrobates* were found. It remains for X-rays to show whether or not the *Acrobates* contains lead pellets.

The Peach River specimen, a male, was taken in an ordinary rat trap placed at the foot of one of the giant trees standing on the flood plain of the river. Its measurements were: head and body, 80 mm., tail, 82; hind foot (s.u.), 14; ear (from notch), 12. I have trapped a flying squirrel in Virginia in just the same circumstances. The gliders apparently float down to the tree base and, very rarely, drop onto the trap.

The type locality of this northern race is the Herbert River, and the series from near Ravenshoe must be virtually topotypical.

The additional material listed now serves to outline the north-south range of this little form fairly completely, though its western limits have yet to be determined. The typical race, *A. p. pygmaeus*, is amply represented in southeastern Queensland. There are a few intervening localities including Clermont, and Banana, 90 miles south of Rockhampton. Whether the animals from those places are assignable to the northern or the southern race is still uncertain.

PHASCOLARCTINAE

PSEUDOCHÉIRUS OGILBY

Pseudocheirus OGILBY, 1837, Mag. Nat. Hist. (Charlesworth), new ser., vol. 1, p. 457.

I dealt with this genus in some detail seven years ago (Tate, 1945b). Of the several subgenera, three, *Pseudocheirus*, *Pseudochirops*, and *Hemibelideus*, are found in northeastern Queensland. The first has two species; the others have one each. *Hemibelideus* is endemic.

***Pseudocheirus peregrinus* (Boddaert)**

The races of this species have been discussed earlier (Tate, 1945b, p. 9). The present race is the most northerly and was the first of those races to be described.

***Pseudocheirus peregrinus peregrinus* (Boddaert)**

Didelphis peregrinus BODDAERT, 1785, Elenchus animalium, p. 78.

MATERIAL: Croll Creek, Coen, 5 and 5 young. (All by Neuhäuser): Coen, 2; Port Stewart, 1. M.C.Z.: Coen (Darlington), 1.

All the Croll Creek series was collected by "shining" in the late evening in open eucalyptus forest. The area appeared unpromising by day, because a ground fire had passed through it a short time before. But the *Pseudocheirus*, which apparently hid in holes in the trees, seemed to have been unaffected. Four of those collected were females. Two of them had one, and two had two, young in the pouch. Elsewhere we did not find a single specimen of this form, the type of which was collected by Captain Cook at Endeavour River (Cooktown).

The several young permit a study of the order of tooth eruption in this species. The youngest are pouch twins (A.M.N.H. Nos. 154382, 154383), in which the body hair is still short and straight. In them i^2 , p^3 , p^4 , and m^1 are fully erupted, while i^1 , i^3 , c , p^1 , and m^2 are partly through. In the lower jaw two vestigial teeth (incisors, canine or premolars) and m_1 are fully erupted, and the chisel-like incisor, p_4 , and m_2 are partly erupted. I have never been able to detect dp_4^4 in this genus. Probably if they develop at all, they are minute and are shed at a stage even younger than those mentioned above. Thomas (1887) reported them in *Phascolarctos*.

In slightly older individuals, with the body hair already elongated and woolly, all the previously mentioned upper anterior teeth except the canine are functional, though i^{1-1} have not yet become elongate as in adults, and m^2 is also in place. In the lower jaw the incisor has lengthened, and p_4 and m_2 are both fully erupted. These older individuals were in each case closely associated with the mother and probably still used the pouch.

Typical *peregrinus* is much darker than its geographically closest subspecies, *incanens*, from the upper Mitchell River country (latitude 17° S.) and southward along the Atherton Tableland west of the rain-forest edge. Its forearms and legs are dark gray like its body. Its hands and feet are nearly black, and the extent of the white tail tip is shorter (50 to 75 mm. only). The white patch on the ear is reduced, and the remaining part of the ear is blackish. The under parts are dull whitish, with the bases of the hairs gray.

Pseudocheirus peregrinus incanens
(Thomas)

Pseudocheirus laniginosus incanens THOMAS, 1923, Ann. Mag. Nat. Hist., ser. 9, vol. 11, p. 249.

MATERIAL: Junction of the McLeod and Escape creeks, upper Mitchell River, 2. H. C. Raven secured 17 at Snubby Creek, 6 miles southwest of Ravenshoe. Neuhäuser collected 8 at Mt. Spurgeon, which is just east of, and above, McLeod Junction. M.C.Z.: Mt. Spurgeon (Darlington), 2. C.N.H.M.: Ravenshoe (Scott), 1. U.S.N.M.: (All by Hoy), 5 miles southwest of Ravenshoe, 11; Mt. Bellenden Ker, 1.

Pseudocheirus laniginosus oralis Thomas

Pseudocheirus laniginosus oralis THOMAS, 1926, Ann. Mag. Nat. Hist., ser. 9, vol. 17, p. 631.

MATERIAL: Mt. Spec, Paluma Range, 20 miles west of Townsville, 1; Serpentine, tributary of Fitzroy River, 20 miles northeast of Rockhampton, 1. Raven collected 1 at Mundubbera, 150 miles north-northwest of Brisbane. The type locality is Bloomsbury, 50 miles northwest of Mackay and a few miles from Proserpine; it is rain-forest country.

The general impression one gets of *oralis* is that it is a coastal race living for the most part in a relatively moist environment. Mt. Spec was a particularly rainy place. The coloration is substantially like that of *incanens*, but the limbs are much more strongly colored, russet rather than light tan; the ear patches

are reduced to small buffy areas; and the body fur, particularly of the head, has a brownish cast. There is ample white on the tail; about two-fifths of its length is white. This form thus approaches true *laniginosus* of New South Wales in appearance, though the New South Wales race is even browner.

**[*Pseudocheirus rubidus* Troughton
and Le Souef]**

Pseudocheirus rubidus TROUGHTON AND LE SOUEF, 1929, Rec. Australian Mus., vol. 17, p. 294.

MATERIAL: Crest of Bunya Mountains, 3.

This animal is sometimes killed by owls. A number of parts of skulls and jaws were found among the casts of an owl among the roots of a giant *Ficus*. My specimens were all in the rain forest which margins the open areas at the crest of the range.

***Pseudocheirus herbertensis* (Collett)**

This is a thoroughly distinct species belonging in the subgenus *Pseudocheirus*, characterized by its elongate skull and palate and its brownish black or gray pelage accompanied by pure white under parts. Asymmetrical white markings, such as a white arm or leg, are also quite common.

The species is endemic to the rain-forest mass that reaches almost continuously from Townsville to Cooktown.

Pseudocheirus herbertensis herbertensis
(Collett)

Phalangista herbertensis COLLETT, 1884, Proc. Zool. Soc. London, p. 353.

MATERIAL: Evelyn, 1; 9 miles southeast of Ravenshoe (H. C. Raven), 6. (All by Neuhäuser): Evelyn, 7; Lake Barrine, 1; Danbullin, 1. M.C.Z.: Mt. Spurgeon (Darlington), 5; Millaa Millaa (Darlington), 4; Ravenshoe (Darlington), 3; Babinda Creek (Schevill), 1. C.N.H.M.: Ravenshoe (Scott), 3. U.S.N.M.: Nine miles south of Ravenshoe (Hoy), 4; Herberton District (Hoy), 1. We did not find this species, probably because of the short time we spent in the Walter Hill Range.

This blackish *Pseudocheirus* slightly resembles a short-haired *Pseudocheirus lemuroides*, but has pure white instead of smoky under parts.

The form from Boar Pocket which Waite named *colletti* seems to be virtually inseparable from typical *herbertensis*.

***Pseudocheirus herbertensis cinereus* Tate**

Pseudocheirus herbertensis cinereus TATE, 1945, Amer. Mus. Novitates, no. 1287, p. 17.

MATERIAL: Only the typical series from Mt. Spurgeon.

Sharply distinguished by its pale, brownish gray color from the blackish form of the coast rain belt. Its skull presents no distinguishing features and has the characteristic elongate narrow palate of the series.

SUBGENUS PSEUDOCHIROPS MATSCHIE

The subgenus can be recognized by its inflated mastoid region, uninflated inferior wall of the meatus, and compressed tail hairs. There is usually a striped color pattern. The body hair in the single Australian species *archeri* is greenish gray.

***Pseudocheirus (Pseudochirops) archeri* (Collett)**

Phalangista (Pseudochirus [sic]) archeri COLLETT, 1884, Proc. Zool. Soc. London, p. 381.

MATERIAL: Lake Eacham, 2. Lake Barrine (Neuhäuser), 5; Evelyn (Neuhäuser), 2. H. C. Raven collected at least 1 at Snubby Creek, 6 miles southwest of Ravenshoe. M.C.Z.: (All by Darlington), Cardwell, 1; Lake Barrine, 1; Millaa Millaa, 2; Mt. Spurgeon, 1. C.N.H.M.: (All by Scott), Danbullin Road, 2; Wongabel, 1; Ravenshoe, 1. U.S.N.M.: Six miles south of Ravenshoe (Hoy), 1; Mt. Bellenden Ker (Hoy), 1.

Those taken at Lake Eacham were living in a remnant of dense rain forest, and probably that is the true habitat of this species. However, it must occasionally travel along the gallery woods bordering streams, because Raven collected it at Snubby Creek in an environment most of which is open forest.

The species, the nearest relative of which is the Papuan *corinnae*, is endemic in the rain forests and radiating gallery woods of the Cairns-Atherton Tableland-Herbert River area.

SUBGENUS HEMIBELIDEUS COLLETT

Hemibelideus is a misnomer, there being no trace of a gliding membrane.

The short broad skull comes nearest to that of *Pseudochirops*. The inferior wall of the meatus is inflated and cellular. The pelage of the body is very soft and long, and that of the tail stands nearly erect.

There is one species, *lemuroides*.

***Pseudocheirus (Hemibelideus) lemuroides* (Collett)**

Phalangista (Hemibelideus) lemuroides COLLETT, 1884, Proc. Zool. Soc. London, p. 385.

Pseudocheirus (Hemibelideus) cervinus LONGMAN, 1915, Mem. Queensland Mus., vol. 3, p. 22.

MATERIAL: Walter Hill Range, 2. (All by Neuhäuser), Danbullin, 1; Lake Barrine, 6; Mt. Spurgeon, 4; Evelyn, 1. M.C.Z.: (All by Darlington), Mt. Spurgeon, 4; Millaa Millaa, 1; Ravenshoe, 1. C.N.H.M.: Ravenshoe (Scott), 4. U.S.N.M.: Nine miles south of Ravenshoe (Hoy), 10; Herberton District (Hoy), 2.

Both our specimens were shot at night in dense rain forest. This locality (in the Walter Hill Range) is only some 40 miles north of Herbertvale, Herbert River, the type locality.

One pale brown variety from 6 miles south of Ravenshoe is apparently the form *cervinus*.

PHASCOLARCTOS BLAINVILLE

Phascolarctos BLAINVILLE, 1816, Nouv. Bull. Sci. Soc. Philom., Paris, p. 116.

This is a greatly specialized relative of the prehensile-tailed genus *Pseudocheirus*. Besides the thickening of the body and shortening of the tail to a rudiment, *Phascolarctos* shows many specializations of the skull. The posterior part of the palate, with the molars, the pterygoids, and the large, inflated bullae, is extended low in the skull, while, in compensation, the articular and coronoid processes of the mandible have been correspondingly deepened. This deepening is not carried through to the anterior part of the palate. Instead, the facial portion of the skull has undergone a quite different modification, namely, extreme shortening of the nasals and maxillaries in combination with great broadening of the rostrum as a whole. In the dentition the chief difference from *Pseudocheirus* lies in the total elimination of the upper and lower rudimentary teeth between the canine (incisors in the lower series) and the last premolars. This leaves upper and lower diastemata, which are relatively short owing to the above-mentioned shortness of the rostrum.

Corresponding to the lowering of the hind palate there is developed an ample system of post-narial sinuses, and the vomer is extraordinarily deepened. This is accompanied externally by inflation of the maxillaries be-

low the orbit and just above the third and fourth molars. The long paroccipital processes have undergone a separate specialization and flare so widely they are far wider across the tips than the greatest distance across the bullae (57:45). In *Pseudocheirus*, this ratio is 17:21. Finally the audital meatus, so conspicuous in *Pseudocheirus*, is reduced to almost nothing and withdrawn almost into the bulla. Probably most of the changes described can be interpreted in terms of function.

Phascolarctos is today monotypic; the species is *cinereus* Goldfuss.

***Phascolarctos cinereus adustus* Thomas ?**

Phascolarctos cinereus adustus THOMAS, 1923, Ann. Mag. Nat. Hist., ser. 9, vol. 11, p. 246.

The koalas are becoming increasingly rare. No specimen was collected by the Archbold expedition, but one was reported seen a few years earlier on the railroad line between Cooktown and Laura. If correct, this record would constitute the northernmost for the species.

We have one specimen taken at Pentland, west of Townsville.

SCHOINOBATES LESSON

Schoinobates LESSON, 1842, Nouveau tableau du règne animal, p. 190.

This is the only living representative of the Phascolarctinae possessing gliding parachutes substantially similar to those of *Acrobates* and *Petaurus*. The structure of the skull and the selenodont dentition furnish ample evidence of the true relationships of the genus and strongly resemble those of *Pseudocheirus* (*Hemibelideus*).

Schoinobates was long held to be monotypic. The northern form *minor* differs, however, so sharply from the southern and central *volans* that I think a better understanding of them can be had if they are treated as full species.

I pointed out a number of separating characters where I discussed the genus earlier (Tate, 1946, p. 11).

***Schoinobates minor* (Collett)**

Petaurista volans var. *minor* COLLETT, 1887, Zool. Jahrb., vol. 2, p. 926.

Petauroides cinereus RAMSAY, 1890, Rec. Australian Mus., vol. 1, p. 77.

MATERIAL: Mt. Spurgeon (Neuhäuser), 6; Danbullin (Neuhäuser), 1; Evelyn (Neuhäuser), 1, (Raven), 7; Dinner Creek, 9 miles southeast of Ravenshoe (Raven), 16. M.C.Z.: Ravenshoe (Darlington), 2; Lake Barrine (Darlington), 1; Mt. Spurgeon (Darlington), 1. C.N.H.M.: Ravenshoe (Scott), 2. U.S.N.M.: Five miles southwest of Ravenshoe (Hoy), 6.

Collett recorded only "northern Queensland" as type area, but Lumholtz, who collected the animals, alluded twice to them in his book, and on each occasion he was not far from Herbertvale.

As do many of the specimens of *Pseudocheirus*, this species of *Schoinobates* appears to be confined to the rain forests between Cooktown and Townsville. *Schoinobates volans* occurs at Rockhampton and southward to Victoria.

At Brisbane is one (No. 4738) from Kirrama, Herbert River, and Nos. 362 and 363 are the type series of *cinereus* Ramsay. Brisbane Nos. 3663 and 3664 are from 6 miles southwest of Ravenshoe. The last is open country but is crossed by gallery woods.

[*Schoinobates volans* (Kerr)]

Didelphis volans KERR, 1792, The animal kingdom . . . of Linnaeus, pt. 1, p. 199.

MATERIAL: The Serpentine, 10 miles north of Rockhampton, 1.

I shot this specimen by hunting light. It was at the top of a very tall gum tree that stood very close to a forest fire, and it must definitely have been threatened. The eyes glowed slightly reddish.

MACROPODIDAE

The kangaroos and wallabies comprise three living subfamilies: the Hypsiprymnodontinae, which include only the bandicoot-like *Hypsiprymnodon*; the Potoroinae, or hare wallabies, comprising several genera, some of which occur in the Cape York area; and the Macropodinae, which include all the remaining genera, quite a number of which are found on the Atherton Tableland and in the Cape York Territory. I have recently (Tate, 1948a) revised the entire family.

HYPSIPRYMNODONTINAE

Hypsiprymnodon is the only living genus of this division of the kangaroos. One or two related fossils are known.

HYPSIPRYMNODON RAMSAY

Hypsiprymnodon RAMSAY, 1876, Proc. Linnean Soc. New South Wales, vol. 1, p. 33.

***Hypsiprymnodon moschatus* Ramsay**

Hypsiprymnodon moschatus RAMSAY, 1876, Proc. Linnean Soc. New South Wales, vol. 1, p. 34.

Pleopus nudicaudatus OWEN, 1877, Ann. Mag. Nat. Hist., ser. 4, vol. 20, p. 542.

MATERIAL: The Tableland, 6 miles east of Helenvale, 1; Mt. Finnegan, Top Camp, 1; Julatten, west of Mossman, 1; 9 miles southeast of Ravenshoe (Raven), 4. M.C.Z.: Lake Barrine (Darlington), 3; Mt. Spurgeon (Darlington), 1. C.N.H.M.: Wongabel (Scott), 1.

Our record from The Tableland near Helenvale is apparently the extreme recorded limit to the north. The range seems to include the forests on the east side of the Atherton Tableland generally.

I saw, but failed to shoot, several of these tiny macropods at dusk in the rain forest at the upper Clohesy River, a tributary of the Barron River. They looked like small blackish bandicoots as they flashed across the abandoned lumber roads. I shot the Julatten specimen very early in the morning in a similar situation. At Mt. Spec I had a glimpse of one individual.

POTOROINAE

Only *Bettongia* and *Aepyprymnus* extend into the Cape York area, the former probably not beyond the Atherton Tableland, the latter perhaps to some few miles south of Cooktown.

BETTONGIA GRAY

Bettongia GRAY, 1837, Mag. Nat. Hist. (Charlesworth), vol. 1, p. 584.

***Bettongia penicillata* Gray**

Bettongia penicillata GRAY, 1837, Mag. Nat. Hist. (Charlesworth), vol. 1, p. 584.

MATERIAL: M.C.Z.: Mt. Spurgeon (Darlington), 3; U.S.N.M.: Nine miles south of Ravenshoe (Hoy), 3.

At Shipton's Flat a small wallaby, not seen by us, was said to inhabit areas of "blade grass" growing 2 to 3 feet tall in open spaces. This may have been *Bettongia*, or it may have been *Aepyprymnus*.

AEPYPRYMNUS GARROD

Aepyprymnus GARROD, 1875, Proc. Zool. Soc. London, p. 59.

***Aepyprymnus rufescens* (Gray)**

Bettongia rufescens GRAY, 1837, Mag. Nat. Hist. (Charlesworth), vol. 1, p. 584.

Hypsiprymnus melanotis OGILBY, 1838, Proc. Zool. Soc. London, p. 62.

MATERIAL: Near Evelyn, 1; Snubby Creek, 6 miles southwest of Ravenshoe (Raven), 6. M.C.Z.: Mt. Molloy (Darlington), 1; Yungaburra (Darlington), 1; Mt. Coolon (Darlington), 1. C.N.H.M.: Bluewater Creek, 20 miles northwest of Townsville (Scott), 1; Ravenshoe (Scott), 1. U.S.N.M.: Five miles south of Ravenshoe (Hoy), 8.

I saw a dead one on the road some miles northeast of Rockhampton. Raven collected two at Lochaber Station, Mundabbera District, in the Dawson River Valley.

MACROPODINAE

Comparatively few of the genera of this subfamily appear in the Cape York fauna, and some of the records are doubtful. They include *Onychogalea*, *Petrogale*, *Dendrolagus*, *Thylogale*, *Protemnodon*, and *Macropus*, with its subgenus *Osphranter*. *Lagorchestes* is in the doubtful list.

Petrogale is to be sought on the scrubby, rocky hills that crop out here and there on the Cape. *Dendrolagus* is strictly confined to rain forest. We did not find it north of Cooktown, though it should be looked for still in the McIlwraith and Iron ranges. *Thylogale* is a common, ground-living species in the rain-forest zone extending from the extreme tip of Cape York to New South Wales. *Protemnodon* is represented by *agilis*, *bicolor*, and *parryi* only.

PETROGALE GRAY

Petrogale GRAY, 1837, Mag. Nat. Hist. (Charlesworth), vol. 1, p. 583.

***Petrogale inornata godmani* Thomas**

Petrogale godmani THOMAS, 1923, Proc. Zool. Soc. London, Abstr., no. 235, p. 13; p. 177.

MATERIAL: Rocky cliffs near Annan River Falls, 2 miles west of type locality, 1, female with pouch young. M.C.Z.: Coen (Darlington), 4; Mt. Carbine (Darlington), 1. U.S.N.M.: Five miles southwest of Ravenshoe (Hoy), 2.

The female from the Annan Falls is a young adult in which m_4^4 are only just visible and p_3^3 and dp_4^4 have not yet been shed (their crown lengths are, respectively, 4.7 and 4.8 mm.).

The juvenal is so young that only the extreme tips of the first incisors are visible. There are no "milk incisors" such as I described in *Macropus* (Tate, 1947a, p. 399). The tympanic rings are large and widely separated from the alisphenoid and as yet give no indication of the swelling which in the adult forms the tympanic bulla.

Rock wallabies, presumed to be of the race *godmani*, had been common 150 miles farther north, among the sandstone scarps on the hills a mile or two to the east of Wenlock on the Batavia River. But just before our arrival fire had swept through the hills and the animals had been driven away, at least temporarily. Their droppings were still to be seen among the rocks.

A specimen from Rockhampton collected by Scott (C.N.H.M. No. 64360) is clearly a form of *inornata*.

[At Mt. Isa (Rifle Creek Dam in western Queensland) rock wallabies were fairly plentiful. Their eyes shone under a light, and they were caught rather easily with jump traps placed under overhanging rocks. They are referable to the race *purpureicollis*, the type locality of which is Dajarra, near Cloncurry.]

ONYCHOGALEA GRAY

Onchogalea GRAY, in Grey, 1841, Journals of two expeditions . . . in . . . Australia, vol. 2, App., p. 402.

Onychogalea unguifer (Gould)

Macropus unguifer GOULD, 1840, Proc. Zool. Soc. London, p. 93.

MATERIAL: M.C.Z.: Port Stewart (Darlington), 1.

This specimen, a female, is colored light brown, with a darker brown stripe extending from the middle of the back to the basal third of the tail. The face and head are grayish, and the area beneath and behind the eyes is white. The under parts and hip stripes are creamy white, the sides and under side of the tail buffy white. That the animal is young is shown by the fact that the m_4^4 are only partly erupted. The deciduous teeth, p_3^3 and dp_4^4 , are still in place. The slender upper canines characteristic of the genus are evident. The crown length of p^3 is 3.8 mm.; of dp^4 , 4.8.

This is a very important record, since the type locality was in the northwest of Australia.

LAGORCHESTES GOULD

Lagorchestes GOULD, 1841, A monograph of the Macropodidae, pt. 1, pl. 12 and text.

[*Lagorchestes conspicillatus leichardti* Gould]

Lagorchestes leichardti GOULD, 1853, The mammals of Australia, vol. 2, pl. 60 and text.

MATERIAL: M.C.Z.: Army Downs, 35 miles north of Richmond, central north Queensland (Schevill), 1.

This locality must be on the somewhat elevated basaltic formation on the north side of the Flinders River. I could see it from the train. The type locality of *leichardti* is reputed to have been between Normanton and Darwin.

DENDROLAGUS SCHLEGEL AND MÜLLER

Dendrolagus SCHLEGEL AND MÜLLER, in Temminck, 1839-1844, Verhandelingen over de Natuurlijke Geschiedenis du Nederlandsche overzeesche besittingen, Zoologie, vol., 1, p. 130.

Dendrolagus bennettianus De Vis

Dendrolagus bennettianus DE VIS, 1887, Proc. Roy. Soc. Queensland, vol. 3, p. 13.

MATERIAL: Mt. Finnegan, Top Camp, 1, (Roberts), 2.

This seems to be an Australian offshoot of *Dendrolagus dorianus* of Papua.

Our specimen was one of two animals found by two of our aboriginal "boys" in the dense rain forest near the top of Mt. Finnegan. The gray-brown skin shows a pallid area, near straw color, at the base of the tail. The dorsal surface of the extreme proximal part of the tail is worn bare of hairs as is usual in this genus. The under surface of the tail proximally and mesially is black.

The lengths of p^4 in two adult females are 10.0 mm. and 9.7, respectively; in adult female *dorianus*, 10.5 mm. In a young male p^3 (deciduous) is 5.7 mm. in length, compared with 6.1 in a young male *dorianus*. In an adult female of *lumpholtzi* (from Atherton Tableland) p^4 is only 9.4 mm. in length.

Dendrolagus lumholtzi Collett

Dendrolagus lumholtzi COLLETT, 1884, Proc. Zool. Soc. London, p. 387.

Dendrolagus fulvus DE VIS, 1888, Proc. Roy. Soc. Queensland, vol. 4, p. 132.

MATERIAL: I reported an ample series of this species earlier (Tate, 1948a). C.N.H.M.: Wongabel (Scott), 4; Ravenshoe (Scott), 1.

TABLE 2
DENTAL DIMENSIONS OF *Dendrolagus bennettianus*

	Sydney No. M.1818, Juv., Cooktown	A.M.N.H. No. 155115, ♀, Mt. Finnegan	A.M.N.H. No. 155114, Juv. ♂, Mt. Finnegan	A.M.N.H. No. 153630, ♀, Mt. Finnegan
p ⁴ , length	—	9.3	—	8.8
p ⁴ , breadth (greatest)	—	6.7	—	6.0
m ¹ , length	5.1	5.9	5.6	5.5
m ¹ , breadth	5.0	5.7	5.7	5.4
m ² , length	6.0	6.2	6.0	5.7
m ² , breadth	5.4	5.9	5.8	5.5
m ³ , length	6.3	6.7	—	6.4
m ³ , breadth	5.8	5.8	—	5.4
m ⁴ , length	6.5	6.9	—	6.9
m ⁴ , breadth	5.6	5.8	—	5.5
dp ³	4.6×3.4	—	5.5×3.8	—
dp ⁴	4.5×2.7	—	5.1×4.5	—

THYLOGALE GRAY

Thylogale GRAY, 1837, Mag. Nat. Hist. (Charlesworth), vol. 1, p. 583.

Thylogale stigmatica (Gray)

Our fairly ample collections from the tip of the Cape York Peninsula representing *coxenii* have made possible detailed comparisons with the Cardwell-Cairns race which is true *stigmatica*. Regarding the skins of these two races, both vary considerably, from more reddish on the sides and flanks to less reddish, and the overlap in this respect is complete. I do not believe that they can be distinguished on the basis of color alone.

But in the skulls there is a definite tendency

for the southern race *stigmatica* to be more heavily built, and this is supported by the fact that in it p₃³ are decidedly heavier teeth than in *coxenii*. To some degree i³ is also larger. I compare their dimensions in table 3 below.

It is reasonably apparent from table 3 that specimens taken near the middle of the Peninsula (at Mt. Tozer, Iron Range, and Portland Roads) partake of the light build of the form *coxenii*, and that the Papuan form *oriomo* is similarly lightly built. In the case of the latter, however, the skins appear to be consistently darker, and provisionally I think that race should be maintained. We can then say that the subspecies *stigmatica*

TABLE 3
COMPARATIVE DIMENSIONS OF P⁴

	Length	Anterior Width	Posterior Width
<i>stigmatica</i> from base of Cape York Peninsula			
3 adult males	7.3-7.8	3.2-3.6	4.0-4.6
1 adult female	7.4	3.0	3.9
<i>coxenii</i> from the tip of the Peninsula			
2 adult females	7.0-7.4	3.0-3.3	3.7-3.9
Specimen from the middle of Peninsula (Mt. Tozer, Portland Roads, etc.)			
1 adult male	7.5	2.8	3.7
<i>oriomo</i> from southern New Guinea			
Adult male	7.4	2.9	3.8

occurs throughout the Atherton-Cairns rain forests to Mossman and Mt. Finnegan, some 30 miles south of Cooktown. North of Cooktown comes the open-forest gap, mentioned in the Introduction to this paper. Beyond that there are again rain forests in the area of the McIlwraith and Iron ranges and the tip of the Peninsula, and this block of forest is seemingly the home of the small-toothed *coxenii*.

In a juvenal male (A.M.N.H. No. 154501), from the Iron Range, a pair of bead-like, minute, deciduous incisors, each about 1 mm. in length, can be seen in the position that later would have been occupied by i^2-i^3 (see also Tate, 1947a).

Thylogale stigmatica coxenii (Gray)

Halmaturus coxenii GRAY, 1866, Proc. Zool. Soc. London, p. 220.

Halmaturus gazella DE VIS, 1884, Proc. Roy. Soc. Queensland, vol. 1, p. 110.

MATERIAL: Lockerbie and localities near by, tip of Cape York Peninsula, 5 with 1 pouch young; Mt. Tozer, 1; Portland Roads, 3; Iron Range, 1.

As is its southern relative, true *stigmatica*, this race was closely confined to the rain forest.

Thylogale stigmatica stigmatica Gould

Thylogale stigmatica GOULD, 1860. The mammals of Australia, vol. 2, pls. 33, 34 and text.

MATERIAL: Mossman Gorge, 2; Mt. Finnegan, 2; Yungaburra, 21. M.C.Z.: (All Darlington), Mt. Spurgeon, 1; Lake Barrine, 2; Millaa Millaa, 2; Mt. Carbine, 1. Shipton's Flat (Roberts), 19. In addition, material reported before (Tate, 1948a).

PROTEMNODON OWEN

Protemnodon OWEN, 1874, Phil. Trans. Roy. Soc. London, vol. 164, p. 274.

For use of *Protemnodon* in place of *Wallabia*, see Tate (1948a, pp. 295-296).

Protemnodon agilis jardinei (De Vis)

Halmaturus jardinei DE VIS, 1884, Proc. Roy. Soc. Queensland, vol. 1, p. 109.

MATERIAL: Tip of Peninsula: Lockerbie, 4; Newcastle Bay, 1; Jardine River, 1 with pouch young; Red Island Point, 1. Friday Island, Torres Strait, 1 (a pick-up skull). Middle of Peninsula: Portland Roads, 4; Iron Range, 1; Wenlock, 2. The Cooktown-Coen area: Keating's Lagoon, 1; Ebagoolah, 1. C.N.H.M.: Bluewater Creek (Scott), 2. M.C.Z.: Coen (Darlington), 2.

It seems that the two specimens from Brooklyn Station near Mt. Carbine, formerly referred to *agilis*, should instead be placed with *jardinei*.

The likeness of the present series to the south Papuan race *papuanus*, of which we have many species, is very great. The latter has the hind back slightly more reddish, a feature that may be seasonal and transitory. I find no cranial or dental differences.

The general color of the race *jardinei* is a grayish brown, with little or no admixture of reddish. The hip stripes are as usual quite conspicuous.

The fourth molars are fully in place only in exceptionally old specimens. In our collection they are fully developed in three males (A.M.N.H. Nos. 153650, 153661, 153666) and one female (A.M.N.H. No. 153654).

A juvenal specimen (A.M.N.H. No. 154504) shows a deciduous tooth in the incisive row. This tooth, with its length 0.8 mm., is inclined slightly forward and, as it is located slightly behind the maxillo-premaxillary suture, may represent a canine. A similar deciduous incisor is mentioned under the heading *Thylogale stigmatica* above.

Protemnodon parryi (Bennett)

Macropus parryi BENNETT, 1835, Proc. Zool. Soc. London, for 1834, p. 151.

MATERIAL: Mt. Carbine (Neuhäuser), 2. Evelyn, Kaban, Ravenshoe, all on the western, open-forest side of the Atherton Tableland (Raven and Hoy), several specimens.

We did not obtain this species. Some 30 miles up the railroad west of Cooktown it was reported once common but becoming increasingly rare. We spent two days out from Seagren's Farm (Kilometer 10) hunting whip-tails and saw two that, from their long-tailed shape, appeared to be *parryi*, but we could not get near them.

Protemnodon bicolor apicalis (Gunther)

Halmaturus apicalis GUNTHER, 1874, Proc. Zool. Soc. London, p. 653.

MATERIAL: Somerseset (Neuhäuser), 1; Albany Island (Neuhäuser), 1; Lake Barrine (Neuhäuser), 1. M.C.Z.: Millaa Millaa (Darlington), 1. U.S.N.M.: Five miles southwest of Ravenshoe (Hoy), 2; Mt. Bellenden Ker (Hoy), 1. Darlington also took one at the Bunya Mountains near Toowoomba in southern Queensland.

Wallabies, called by the local hunters "swampers," are reported rarely from the Cooktown area. They are said to occur in swamps across the Endeavour River to the northwest of Cooktown.

[*Protemnodon dorsalis* (Gray)]

Halmaturus dorsalis GRAY, 1837, Mag. Nat. Hist. (Charlesworth), vol. 1, p. 583.

MATERIAL: The Serpentine, 25 miles southeast of Rockhampton (Tate), 1. M.C.Z.: Bunya Mountains (Darlington), 1.

This is a species of south and central Queensland and northern New South Wales.

MACROPUS SHAW AND NODDER

Macropus SHAW AND NODDER, 1790, The naturalist's miscellany, vol. 1, pl. 33 and text.

SUBGENUS **OSPHRANTER GOULD**

Osphranter GOULD, 1842, Proc. Zool. Soc. London, for 1841, p. 80.

Macropus (Osphranter) robustus erubescens
Slater

Macropus erubescens SCLATER, 1870, Proc. Zool. Soc. London, p. 126.

MATERIAL: Wenlock, Batavia River, 5 ♂, 1 ♀; Coen, 1 ♂, 1 ♀. M.C.Z.: Coen (Darlington), 2; Mt. Carbine (Darlington), 1. I have already reported (Tate, 1948a) those taken by Raven and by Neuhäuser. [Rifle Creek, Mt. Isa, northwest Queensland, 6 (skulls only).]

The wallaroos of the Batavia River area vary in color from dusky rufescent to quite bright rufous. They seem to prefer the rolling grassy hillsides of the Sir William Thompson Range a little to the east of Wenlock.

Hundreds of miles to the south, on the cliffed sandstones near Alderbury (Kilometer 25), west of Cooktown on the railroad to Laura, I saw three blackish brown wallaroos. I had two under observation for nearly 10 minutes. They were across a small canyon, browsing among the rocks. Once they stood up face to face and "boxed."

In our series there appears to be an element of dichromatism such as we see in *Trichosurus v. erubescens*. Three males and a female which are fully adult have red mixed with their gray dorsal pelage. In specimens that are red-gray the backs of the ears are blackish; in really red specimens the backs of the ears are also red. From Wenlock two fully adult males are almost completely red.

It is this red that causes local hunters to confuse them with the true red kangaroo, *M. rufa*. Our male and female from Coen, both of which are rather younger, are predominantly gray. In a juvenal (A.M.N.H. No. 154508), a minute milk incisor, such as I described earlier in *Macropus* (Tate, 1947a) and above in this paper in *Thylogale* and *Protemnodon*, is present.

[SUBGENUS **MEGALEIA GISTEL**]

Megaleia GISTEL, 1848, Naturgeschichte Tierreichs höhere Schulen, Stuttgart, p. ix.

[***Macropus (Megaleia) rufus*** (Desmarest)]

Kangurus rufus DESMAREST, Mammalogie, suppl., vol. 2, p. 541.

I can find no evidence that the true red kangaroo (*Megaleia*) is present on the Cape York Peninsula. The nearest records I have are from the Flinders River area near Richmond and Hughendon, where Darlington shot a number. Possibly the species extends a short way up the west side of the Cape to the lower course of the Mitchell River. The so-called "red kangaroos" of the Batavia River, much farther north, are in reality red wallaroos.

SUBGENUS **MACROPUS SHAW AND NODDER**

Macropus (Macropus) canguru canguru
Müller

Mus canguru MÜLLER, 1776, Linné . . . vollständiges Natursystem . . . swölfter Lateinischen Ausgabe, p. 62.

MATERIAL: Sir William Thompson Range, near Wenlock, 1 (A.M.N.H. No. 153611); Ebagoolah, 30 miles south of Coen, 1; 5 miles west of Helenvale, 2 and 1 pouch young. C.N.H.M.: (All by Scott), Craigmore and Wongabel, Atherton Tableland, 2; Bluewater Creek, 20 miles northwest of Townsville, 1. [Mirrabooka, 60 miles south of Charleville, south Queensland, 1 with pouch young.]

The three examples from Helenvale are the specimens referred to by Morrison-Scott (1950) in his recent article on the identity of Captain Cook's kangaroo. It seems likely that Helenvale marks nearly the limit northward of this kangaroo on the east (lowlands) side of the divide, though the species may extend a considerable way northward behind the sand dunes that lie between Capes Bedford and Flattery in the Normandy River

country. West of the divide we have our actual records from Sir William Thompson Range and from Ebagoolah, and along the motor road from Ebagoolah, south to Laura, we saw several kangaroos that we considered to be great grays.

The Mirrabooka specimens represent the form of great gray kangaroo that occurs in the western parts of southern Queensland.

The animal from Sir William Thompson Range, a male weighing 58 pounds, constitutes the most northerly record of the great gray kangaroo.

Commenting on Morrison-Scott's paper, I should like to point out that since Cook and his men spent some months at Cooktown they are likely to have encountered at least four kinds of kangaroos: the great gray (*canguru*), the wallaroo (*robustus*), the very abundant sand wallaby (*agilis*) and the less plentiful whiptail or pretty-face wallaby (*parryi*). Sand wallabies (maximum weight in our records, 53 pounds) even today occasionally come right into Cooktown. I concur with Morrison-Scott's fixation of the name *canguru* on the great gray kangaroo. But I suggest that the expression "photo-lectotype" should be passed upon by the International Commission on Zoological Nomenclature. At present such an expression is non-existent under the Rules.

CHIROPTERA

Both suborders and six families of bats occur in Australia. Of the six families, Vespertilionidae, Molossidae, Emballonuridae, Rhinolophidae, Megadermatidae, and Pteropodidae, five are known from the Cape York Peninsula. Only the Megadermatidae remain so far unrecorded. *Macroderma*, its only Australian genus, is probably there, as Johnson found signs of its predatory activities in Arnhemland.

The Chiroptera must have been drifting continuously into Australia from Asia throughout the whole of Tertiary time, yet I am not aware that any fossils have been recorded in formations associated with such extinct Pleistocene genera as *Nototherium* and *Thylacoleo*.

VESPERTILIONIDAE

Three (possibly four) of the subfamilies of

this enormous family occur in Australia. They are the Vespertilioninae, the Nyctophilinae, and the Miniopterinae. The genus *Phoniscus*, representing the Kerivoulinae, is listed by Troughton from "Queensland," but may be an accidental visitor.

In an earlier paper (Tate, 1942a) I proposed certain tribal subdivisions of the Vespertilionidae: the Myotini, the Pipistrellini, the Nycticeini, and the Lasiurini. Of these only the last (American and Hawaiian) is absent from Australia. The genera present in the Cape York collection can be shown synoptically, as follows:

Myotini: *Myotis*

Pipistrellini: *Pipistrellus*, *Chalinolobus*, *Eptesicus*

Nycticeini: *Scoteinus*, with its subgenera

The subfamily Miniopterinae contains only *Miniopterus*; the Nyctophilinae, only *Nyctophilus*.

MYOTIS KAUP

Myotis KAUP, 1829, Skizzirte Entwicklungs-Geschichte und natürliches System der Europäischen Thierwelt, vol. 1, p. 106.

From the completeness of its dentition, this genus can be considered one of the least specialized of all the Vespertilioninae. I reviewed the Old World members of the genus in 1941e. Only two of the five subgenera reach Australia and New Guinea. Those two are *Leuconöe* and a species *australis*, which probably belongs in *Selysius*.

SUBGENUS LEUCONÖE BOIE

Leuconöe BOIE, 1830, Isis, p. 256.

A heavily built, large-footed *Myotis* with headquarters of the group in southeastern Asia. The subgenus reaches Europe (*daubentonii*, *capaccinii*) on the one hand and North America (*griseus*) on the other. Only one form is known in Australia—*macropus*.

Myotis (*Leuconöe*) *adversus macropus* (Gould)

Vespertilio macropus GOULD, 1855, The mammals of Australia, vol. 3, pl. 47 and text.

MATERIAL: Cairns, Freshwater Creek, 2, and 1 in alcohol (A.M.N.H. No. 155010).

These bats were found in crevices in and between floor joists in the house of Mr. Robert Hunter, near the "water intake" for Cairns, northern Queensland.

Compared with a series of *M. adversus moluccarum* from New Guinea, the present bats are somewhat darker colored. The forearms are 36.4 and 38 mm., against 38 to 42 mm. in *moluccarum*. The tooth rows, c-m⁴, are 5.9 to 6.0 mm. The large hind feet are characteristic of the subgenus *Leuconoe*.

SUBGENUS **SELYSIUS** BONAPARTE

[**Myotis australis** (Dobson)]

Vespertilio australis DOBSON, 1878, Catalogue of the Chiroptera in the . . . British Museum, p. 317.

The type, which is in the museum at Leiden, came from New South Wales. We did not collect this form.

PIPISTRELLUS KAUP

Pipistrellus KAUP, 1829, Skizzirte Entwicklungs-Geschichte und natürliches System der Europäischen Thierwelt, vol. 1, p. 98.

This large genus, distributed almost throughout the world, has hitherto been represented in Australia by three recorded species: *abramus*, *regulus* of Western Australia, and *tasmaniensis* of Tasmania and the southern parts of Australia. *Pipistrellus abramus* is characteristic of the Asiatic tropics and reaches well into China. The other two species are truly Australian, and Troughton (1948) has proposed generic rank for each of them.

I have to record the presence in the Cape York area of the small species *papuanus*. *Pipistrellus papuanus* is the southern representative of the *P. tenuis* group of India and the Malay region.

Pipistrellus papuanus (Peters and Doria)

Vesperugo papuanus PETERS AND DORIA, 1881, Ann. Mus. Civ. Genova, vol. 16, p. 696.

MATERIAL: Brown's Creek, 1; Wenlock, Bavia River, 1; Archer River, 1 (all males).

All these specimens were shot while flying at dusk. The forearms measure 30.0 to 30.5 mm.; c-m³, 4.3 mm. in each case.

At Haveri, inland from Port Moresby, British New Guinea, I found a colony of this little species secreted in the gables of a house. They were netted at dusk as they dived downward in flight.

CHALINOLOBUS PETERS

Chalinolobus PETERS, 1866, Monatsber. Akad. Wiss. Berlin, p. 680.

Peters distinguished *Chalinolobus* from "*Vesperugo*" and *Scotophilus* by its "short, rounded ears and the lobes of skin at the corners of the mouth." In most species the dental formula is the same as that of *Pipistrellus*. In *C. rogersi* p² is stated to be absent, though this is not always the case. Compared with *Pipistrellus*, the species of *Chalinolobus* have the frontal region abruptly elevated, and the braincase is relatively much deeper. In the species before me (*rogersi*) p² is extremely minute, less than one-third the diameter of i², and is crowded into the inner corner between c and p⁴. In two of the specimens p² is absent, though it is present in A.M.N.H. No. 154661. The tooth is apparently easily dislodged and lost when skulls are cleaned. In the incisors i² is quite small, its crown less than one-third of the depth of i¹. The last molar is not shortened in the tooth row. In the lower jaw the incisors overlap, as in *Pipistrellus*; p₂ is almost one-half as tall as p₄.

Chalinolobus rogersi Thomas

Chalinolobus rogersi THOMAS, 1909, Ann. Mag. Nat. Hist., ser. 8, vol. 3, p. 150.

MATERIAL: Cooktown-Laura Railroad (10 miles), Seagren's Farm, 3; Shipton's Flat (Roberts), 5 in alcohol. Shot at dusk.

These bats lack the postorbital process of the zygoma, and p² when present is exceedingly minute, its crown area very much less than that of i². Likewise p₂ is a much reduced tooth. Its single cusp is only half the height (about the cingulum) of the anterior cusp of p₄. Forearms measure 34 to 36.5 mm.; c-m³, 5.1. Groups of *Pipistrellus* that somewhat agree with the foregoing are the *kuhlii* and *savii* groups. The extreme degree of reduction of p² favors the latter. The higher and deeper braincase in the present species seems to rule out *Pipistrellus*, though the close relationship of *Chalinolobus* to *Pipistrellus* is very obvious. The three skins with frosted hair tips are identical in appearance. The retention of p²⁻² in one of the skulls merely shows that total obsolescence of these teeth, contrary to the usual understanding of *C. rogersi*, is not invariable. There is a slight difference in the profiles of the skulls at the frontal region, but this I regard as not beyond the limits of individual variation.

[Chalinolobus morio (Gray)]

Scotophilus morio GRAY, in Grey, 1841, Journals of two expeditions . . . in . . . Australia, vol. 2, App., pp. 400, 405.

MATERIAL: Bunya Mountains, 4.

Chalinolobus picatus (Gould)

Scotophilus picatus GOULD, 1852, The mammals of Australia, vol. 3, pl. 43 and text.

MATERIAL: C.N.H.M.: Craigmore (Scott), 4, in April, 1947.

EPTESICUS RAFINESQUE

Eptesicus RAFINESQUE, 1820, Animals of nature, p. 2.

The Australian group of *Eptesicus*, the *pumilus* group, has been treated by Troughton as a distinct genus, *Vespadellus*. Structurally, however, it is still an *Eptesicus*, and, if it is correct to promote this one group to generic rank, then the many other groups (Tate, 1942a) should also be so promoted. Such a subdivision of the genus would tend to make one lose sight of the essential unity of the bats of the genus *Eptesicus*. Several races are known, which depend for their distinctness chiefly upon size differences.

***Eptesicus pumilus caurinus* Thomas**

Eptesicus pumilus caurinus THOMAS, 1914, Ann. Mag. Nat. Hist., ser. 8, vol. 13, p. 439.

MATERIAL: Iron Range, 3; Black Mountain, 20 miles south of Cooktown, 2; Alderbury, 25 miles out on Cooktown-Laura Railway, 1. Also in alcohol, Pink Cave, Chillagoe, 3; Submarine Mine, Irvine Bank, 3; Mt. Isa, near Cloncurry, 4.

Glover M. Allen, when describing *Eptesicus darlingtoni*, identified specimens from Millaa Millaa on the Atherton Tableland as *caurinus*, even though that race is typical of Kimberley, north Western Australia. The forearm of *caurinus* is ± 30 mm., and the tooth row, $c-m^3$, ± 3.9 mm.

We have numerous specimens of this race from Pentland and Quamby, and I myself collected some in the tunnels of Mt. Isa mine clustering in small groups in depressions in the rock roof. All three of these localities are on the Townsville-Cloncurry railroad. The distribution then would seem to be all across the northern portions of Australia.

SCOTEINUS DOBSON

Scoteinus DOBSON, 1875, Proc. Zool. Soc. London, p. 371.

I discussed this genus rather fully a number of years ago (Tate, 1942a, pp. 280-283), pointing out its anomalous situation in view of the fact that the skull and teeth of the type species, *emarginatus* Dobson from India, have never been fully studied. I also pointed out that the Australian species are divisible into two groups: the large-sized *rüppellii*, and the several smaller forms. On the basis of this, Troughton (1948, pp. 135-359) set up the two full genera *Scoteanax* and *Scotorepens*, with types, respectively, *rupellii* and *orion*. This action, in view of the uncertainty relating to the status of *emarginatus*, was perhaps rather premature, and, pending ultimate clarification of the real status of *Scoteinus*, I think it better to hold the two new genera to subgeneric rank.

The closeness of the relationship of *Scoteinus* to the North American *Nycticeius* is remarkable. The two dentitions, including loss of i^2 and shifting of the enlarged, stout i^1 to make contact with the canine, are almost alike. One of the chief distinctions of the several small Australian species from *Nycticeius* lies in the greater degree of reduction in size of the anterior of the two lower premolars.

SUBGENUS SCOTOREPENS TROUGHTON

Scotorepens TROUGHTON, 1948, Furred animals of Australia, ed. 3, reprinted, p. 357.

In this group of quite small bats there are seven named forms. The general distribution of the subgenus *Scotorepens* is very wide and is shown below by the type localities. We took it also in south New Guinea at Mabaduane and Wassi Kussa, and we also have it from Pentland (Neuhäuser), west of Townsville, and from Cooktown.

The type localities of the six very small and the seventh somewhat larger species are shown:

<i>sanborni</i>	East Cape, New Guinea
<i>greyii</i>	Port Essington, Northern Territory
<i>caprenus</i>	Roebuck Bay, north Western Australia
<i>balstoni</i>	Laverton, Western Australia
<i>aquilo</i>	Between Bowen and Rockhampton
<i>orion</i>	Sydney
<i>influatus</i>	Prairie, southwest of Hughenden

Our series from southern New Guinea and from Cooktown (*sanborni*) appear to be exactly alike. In both the upper premolar

TABLE 4
COMPARATIVE MEASUREMENTS IN *Scoteinus* (*Scotorepens*)

	Fore-arm	Skull: Total Length	Zygo-matic Breadth	Inter-orbital Breadth	Breadth of Brain-case	Mastoid Breadth	Palatilar Length (Without Spine)	Width Inside m^1 - m^1	Crowns of c - m^3
<i>sanborni</i> , type and others	32-33	13.6	—	3.6	7.1	8.1	4.2	—	4.8
<i>sanborni</i> female, A.M.N.H. No. 105062, Mabaduane	31	14	10.1	3.5	7.5	8.4	4.5	2.6	5.3
<i>sanborni</i> male, A.M.N.H. No. 105334, Wassi Kussa	36	13.7	9.7	3.6	7.4	8.5	4.2	2.9	5.1-5.2
<i>sanborni</i> female, A.M.N.H. No. 154660, Cooktown	34.5	13.4	—	—	6.8	—	4.1	2.8	5.1
<i>greyii</i> , type	34	—	—	—	—	—	—	2.7	5.2
<i>greyii</i> female, A.M.N.H. No. 107796, Pentland	33	13.5-14	9.8	3.6	7.2	8.2	4.2	2.7	5.0
<i>caprenus</i> , type and others	32.5-34	14.2	—	3.5	6.8	8.5	4.7	—	5.1
<i>aquilo</i> , type and others	32.5-34.5	13.8	10.4	3.7	7.4	8.6	4.8	—	5.1
<i>orion</i> , type and others	34.5-36.3	14.9-15	10.8-11.1	4.1-4.4	7.5-7.8	9.0-9.2	5.1-5.3	—	5.6-5.8
<i>influatius</i> , type	39	16.7	11.3	3.8	7.9	9.2	5.6	—	5.0

has a relatively low crown, measuring 7 mm. below the edge of the cingulum. Our Pentland specimens (*greyii*) have the same tooth larger, 1.1 mm., a character constantly present.

Of the foregoing species I have studied, measured, and photographed the skulls of three: *greyii*, *balstoni*, and *influatius*. I have also photographed Troughton's form *caprenus*. None of the specimens in the Archbold series is large enough to be equal to *influatius*. All zygomatic widths are less than 10 mm. (11.3 mm. in *influatius*); all tooth row lengths, c - m^3 , are less than 5.5 mm. (6.0 in *influatius*); in all cases m_{1-3} is less than 4.0 mm. (4.5 in *influatius*). This leaves a choice between *sanborni*, *greyii*, *caprenus*, and *aquilo*.

In table 4 the measurements of the types and of representatives taken from our series are compared.

A considerable degree of variation in size appears in different strains. For example, in the six specimens taken by us at Tarara, Wassi Kussa, the length of c - m^3 varies from 5.0 to 5.4 mm. Neuhäuser's series of four specimens from Pentland (*greyii*) varies from

4.6 to 5.0 mm. These two species of *Scoteinus* not only show considerable size difference, but they look different. The Papuan and Cooktown bats are reddish tawny.

Gould's plate of *greyii* makes its pelage appear fairly strongly rufescent—not dusty tawny or grayish tawny as in our material from Pentland. But Gray's plate (1875, pl. 20, fig. 2) is more like our material.

Scoteinus balstoni Thomas is "bicolor,"¹ the hairs tawny at their tips, smoky at their bases. *Scoteinus orion* Troughton has evidently also bicolored fur, since the author described the tips as "washed with cinnamon to clay color," and the "basal fur being almost Prout's Brown." Troughton's *aquilo*, which he made a subspecies of *orion*, was dorsally "apparently similar to the typical race above [*orion*], but somewhat lighter tipped and therefore more bicolored below." His *caprenus* was "apparently a duller drab [than *balstoni*] and more olivaceous brown through-

¹ It must be borne in mind that in "bicolor" Thomas referred to the contrasting colors of the tips and bases of the body hairs, not, as Troughton (1948) seems to imply, to contrasting dorsal and ventral colors.

out . . . fur of underparts paler throughout, therefore less bicolored . . ." (Gray, 1875, p. 30).

Our series from Pentland and the single bat from Malbon near Cloncurry have truly bicolored (in Thomas' sense) pelage. The hair tips as mentioned are light dusty or grayish tawny, but the roots of the hairs of this specimen are quite definitely smoky. The forearms measure from 30 to 32 mm. This species of bat I have previously referred to as *greyii*.

The remainder of our material (from south New Guinea and Cooktown) has the hairs of the anterior half of the back completely self-colored to the roots, a rather bright tawny brown, though there is a trace of darker coloring at the roots at the hind portion of the back. Ventrally the hairs of the throat tend to be unicolored, but posteriorly a degree of bicolouration (light tips and darker roots) can be perceived. This applies to all our south Papuan specimens. In the case of our specimen from near Cooktown the dorsal surface is completely unicolored, the hairs being clear pale russet to their bases. The under surface, much matted, shows traces of bicolored hair. It is slightly smaller than the Papuan examples.

In character of the dorsal fur of the larger form *influatatus* was not made clear. Thomas merely stated that the under parts were lighter than the upper parts, which he described as "brown," not "uniformly brown," as Troughton has it. But *influatatus* is considerably larger than our material from farther north and consequently can scarcely be considered exactly the same. The forearms of the south Papuan and Cooktown animals vary from 31 to 35 mm. The forearm of *influatatus* is about 39 mm. Of *sanborni* from eastern New Guinea Troughton stated that its fur was bicolored, though less markedly so than that of *greyii*.

The measurements of the various forms compared in table 4 suggest that the northern reddish bats of Cape York and south New Guinea are a single race, and I am disposed to refer them all to the Papuan race *sanborni*.

Scoteinus sanborni Troughton

Scoteinus sanborni TROUGHTON, 1937, Australian Zool., vol. 8, p. 280.

The type specimen from East Cape, Papua, is in the Australian Museum, Sydney No. A3176.

MATERIAL: Mabaduane, south Papua, 1; Wassi Kussa, south Papua, 5; Cooktown, 1 (A.M.N.H. No. 154775); Seagren's Farm, 10 miles west of Cooktown, 1 (A.M.N.H., No. 154660). C.N.H.M.: Port Moresby, 2.

NYCTOPHILINAE NYCTOPHILUS LEACH

Nyctophilus Leach, 1822, Trans. Linnaean Soc. London, vol. 13, p. 78.

I discussed this genus briefly in an earlier paper (Tate, 1941e). A classification of the known species had been proposed earlier (Thomas, 1915b), using the forms of the nose leaf and baculum as principal criteria.

The dentition, with but one upper incisor and one upper premolar, is in approximately the same stage of reduction as in the Nycticeini of the Vespertilioninae.

I am now inclined to the view that the large forms, *major*, *timoriensis*, and *sherrini*, should be thrown together as races of a single species, distributed over Timor (if this can be demonstrated) and Australia generally. In them the nose leaf is little specialized (Thomas' first group). The species *gouldi*, which has somewhat smaller teeth, is closely related.

As regards the two species *daedalus* and *bifax*, I find very little difference, apart from the difference in the bacula indicated by Thomas. The zygomatic width is nearly 1 mm. greater in *daedalus* than in *bifax*.

We now have a number of specimens of *bifax*, and the zygomatic breadth, ± 10.5 mm., holds very consistently.

Bacula of *bifax* and *geoffroyi* extracted and cleaned by Van Deusen confirm the characteristics given for them by Thomas.

Nyctophilus bifax Thomas

Nyctophilus bifax THOMAS, 1915, Ann. Mag. Nat. Hist., ser. 8, vol. 15, p. 496.

MATERIAL: Shipton's Flat, 30 miles south of Cooktown, 3, and (Roberts), 3 in alcohol; upper Parrot Creek, about 2 miles east of Shipton's Flat, 1; rain forest on summit of McIlwraith Range, upper Nesbit River-Rocky Scrub, 1. [At a camp 10 kilometers southwest of Bernhard Camp, Idenburg River, Netherlands New Guinea, at 1500 meters (W. B. Richardson), 1, which I am un-

able to distinguish from *bifax* of the Cape York Peninsula.]

The forearms in the Cape York series (and in Thomas' original 20 specimens) range from 39.5 to 43 mm. The forearm of the Idenburg River specimen is 43 mm.

The pelage is light brown, only the tips having this color; the bases are fuscous. The under parts are light grayish brown, also with gray bases. The ears are moderately large, about 20 mm. from the crown of the head when freshly caught, and are therefore proportionately somewhat smaller than the ears of the little species *geoffroyi*. They are distinctly larger ears than those of the Papuan species *microtis*.

At Shipton's Flat these bats used to fly back and forth under the roof of an abandoned sawmill at dusk. They spent the daylight hours concealed among the rafters. The specimen at the McIlwraith Range was netted in a path in the forest at a height of about 4 feet above the ground.

***Nyctophilus geoffroyi pallescens* Thomas**

Nyctophilus geoffroyi pallescens THOMAS, 1913, Ann. Mag. Nat. Hist., ser. 8, vol. 11, p. 79.

MATERIAL: Pentland, 1 ♀ (Neuhäuser); Ravenshoe, 1 ♂ (H. C. Raven).

The forearm length in the Pentland female is 36.8 mm., that in the male from Ravenshoe, 37.5 mm., that of the type specimen, also a male, was only 33 mm. The forearms in the types of the other races are as follows: *pacificus*, 37 mm.; *unicolor* (Tasmania), 40 mm.; a near topotype of true *geoffroyi* from King George Sound (B.M. No. 7.1.1.338), 35 mm.

MINIOPTERINAE

MINIOPTERUS BONAPARTE

Miniopterus BONAPARTE, 1837, Fauna Italica, fasc. 21.

I discussed this genus briefly in 1941f. It appeared to me then that there were three main groups of forms, differing from one another chiefly by size. These were the large *tristis* group, the medium-sized *schreibersii* group, and the small *australis* group. Besides the difference in absolute size, there were relative differences in the form of the sagittal crest and in the teeth.

In Australia one finds only two species:

schreibersii (with *oriana*), the local member of the *schreibersii* group, and *australis*, the small species. In the future the large *tristis* type may be reported there as well, since I found *magnater* in caves in New Guinea, near Port Moresby.

Typically the forearm length of *australis* is 38 mm., that of *s. blepotis*, 46 mm., and of *magnater*, 48 to 51 mm.

At Thursday Island a variety, living in the same colony with normal specimens of *M. s. blepotis*, has the whole of the head, nape, and the sides and under parts of the neck bright rufescent, in contrast to the prevailing fuscous of the back. It thus presents a mantled appearance like a miniature *Pteropus*. The rufescent color also appears on the under side from the base of the wing to the base of the hind leg. Strongly marked individuals offer a strikingly different appearance from normally colored specimens. But intermediates occur, in some cases with only a trace of the reddish coloring. I do not believe that this variation indicates even a subspecific value, for there is no indication of any geographical or genetic segregation. In addition, I shot a single one similarly colored south of Cairns at Walter Hill Range camp.

***Miniopterus schreibersii blepotis*
(Temminck)**

Vespertilio blepotis TEMMINCK, 1841, Monographies de mammalogie, vol. 2, p. 212.

MATERIAL: Thursday Island, 14 and 51 in alcohol; Possession, 4 and 12 in alcohol; Shipton's Flat (Roberts), 1; Cairns, hydroelectric tunnel, 2; Walter Hill Range, 1; Chillagoe Cave, 8 in alcohol; Mt. Spurgeon, 27. M.C.Z.: McIlwraith Range (Darlington), 2. [Glen Ferneigh, northeast New South Wales (Raven), 6.]

The length of the forearm throughout this series varies only from 46 to 48 mm. This includes the peculiar red-naped variety from Thursday Island.

***Miniopterus australis* Tomes**

Miniopterus [sic] australis TOMES, 1858, Proc. Zool. Soc. London, p. 125.

MATERIAL: Upper Peach River, Camp Oven Pocket, 1; Shipton's Flat, 1; Tommy Burns Mine, 4 miles south of Lappa, on the Atherton-Chillagoe road, 9 in alcohol. M.C.Z.: McIlwraith Range (Darlington), 17. [Pilkington's Cave, Mt. Etna, 10 miles south of Rockhampton, 5 skins and skulls

and 19 in alcohol.] Both the first two specimens listed were shot at dusk.

This very tiny species can at once be recognized by the shortness of the forearm, only 38 mm. It does not seem to offer the variety in coloration that was seen in the larger *blepotis*.

MOLOSSIDAE

In the Australian area only two genera of molossid bats need to be considered. These are *Nyctinomus* and *Chaerephon*. I discussed (Tate, 1941c) the genus *Chaerephon* in relation to *Nyctinomus* and *Tadarida*. For some time it has been usual to place the large, gray-brown Australian *colonicus* Thomas in *Chaerephon*, while retaining the other species in *Nyctinomus*. I conclude that the generic status of *colonicus* should be reëxamined.

Dobson defined *Chaerephon* as having "Ears connected in front by a deep band produced upward, and posteriorly by a second band enclosing a hollow naked space between, on the crown of the head; tragus small, quadrate." The character of the audital area in *Chaerephon* is thus obviously more specialized than that of *Nyctinomus*. I have been able to find no such second band or hollow naked space in any of the Australian species. I therefore feel obliged to keep all of them in *Nyctinomus*. In Africa *Chaerephon* is very well represented.

NYCTINOMUS GEOFFROY

Nyctinomus GEOFFROY, 1813, Description de l'Égypte, ed. 1, vol. 2, p. 114.

As I have pointed out (Tate, 1941d), *Nyctinomus* and *Chaerephon* were distinguished originally from each other by the absence or presence of the second band connecting the ears and the space between the two bands. The type species of each is, respectively, *Nyctinomus aegyptiacus* Geoffroy and *Chaerephon johorensis* Dobson.

In some species, notably in the European *Nyctinomus taeniotes*, there are three lower incisors on each side. More commonly this number is reduced to two. The type species has but two pairs as have all the Australian forms I have seen.

The ears of *aegyptiacus* (Geoffroy, 1828) were described as "united to each other by their internal margins, at the same time

attached to the midline of the head, they extend onto the forehead and prolong themselves to the region of the intermaxillaries . . ."

This description seems to imply only a very slight degree of union of the ears, and there is certainly no such deep pocket formed by them as appears in *Chaerephon*. In fact, the degree of fusion seems to be similar to that in *Nyctinomus australis* and slightly less than in *C. plicatus colonicus* of Australia. The Australian species of very small size, on the other hand, have their ears rather widely separated and show almost no connecting band.

Troughton has applied the generic terms *Austronomus* to *N. australis*, and *Micro-nomus* to *N. norfolcensis* and *N. planiceps*. It does not seem to me that the distinction between these various species belongs truly on the generic level, and I would prefer to see the new names used to indicate "groups" or subgenera. The basic pattern of the skull and teeth is the same throughout.

On almost every count we must consider the small-sized Australian species of *Nyctinomus* as the less specialized, the large ones as more specialized, organisms. Thus it happens that the type species, *aegyptiacus*, falls into the more specialized group. As between *colonicus* and *australis* I would treat the latter as more extreme, partly because of the very large chest glands present, but also on account of its peculiar color pattern.

In the large-sized Australian species of this genus the ears are united across the forehead by a broad, fleshy band. This is the case both in *australis* and in *colonicus*. In the little species, on the contrary, the ears are more separated, and there is hardly a trace of a connecting band. Two small species, *norfolcensis* and *loriae*, in our collection have ears of this type. In the large-sized species the lower canines are closely approximated to one another, whereas in the small-sized species the lower canines remain relatively far apart, as much as, or more than, the thickness of one canine at its base. In consequence of these conditions the two pairs of lower incisors of the large species are very much reduced in size and are displaced downward and forward, well below the cingula of the canines. In the smaller, less

specialized species this reduction in size and displacement of the lower incisors is less pronounced; they stand little if any below the canine cingula.

The forward projection of the bullae, tending to align each with one of the pterygoids in an almost continuous bony plate, is remarkably advanced in development in the large species, but only incipient in the small ones. The palate is domed, and the tooth rows form slight arcs in the small species.

Several very small species of bats of the genus *Nyctinomus* have been named from the Australian region. They are:

	FOREARM LENGTH
<i>norfolcensis</i> Gray, 1839. Gray gave no locality; corrected to Sydney	37 mm.
<i>planiceps</i> Peters, 1866. Southern and western Australia	35
<i>petersi</i> Leche, 1884. "Adelaide," on type label	36
<i>loriae</i> Thomas, 1897. Kemp Welch River, Papua	31-32
<i>astrolabiensis</i> Mayer, 1889. Bongu, Astrolabe Bay, New Guinea	36
<i>wilcoxi</i> Krefft, 1871	—

The ear is more acute in *loriae*, more rounded in *norfolcensis*.

SUBGENUS MICRONOMUS TROUGHTON

Micronomus TROUGHTON, 1948, Furred animals of Australia, ed. 3, reprinted, p. 364.

Nyctinomys norfolcensis Gray

Nyctinomus norfolcensis GRAY, 1837, Ann. Nat. Hist., vol. 4, p. 7.

MATERIAL: Shipton's Flat (Roberts), 8; Mossman, 4; Cairns, 5.

The following redescription was drawn up from the type specimen (B.M. No. 38.10.11.56), an adult, marked "Norfolk Island." A small species, dark brown above and slightly paler beneath. Ears triangular, round-pointed, not obviously united across the front. Hind feet with combs of hairs on outer faces of outer digits.

Skull of type rather low and flat. Palate distinctly domed. Upper incisors one on each side, three-fourths the height of the canine; p^4 one-half the height of the canine; p^2 quite small, with cusp, one-third of the height of p^4 . Lower premolars two, p_4 about two-thirds of the height of c , p_2 one-half of

the height of p_4 . Back of skull broken.

The forearm was 37 mm.; the length of head and body (dry), 55; tail, 38; hind foot, 7. Interorbital width, 4.0, width of brain-case, 7.1; width inside m^{1-1} , 2.7; $c-m^3$, 5.9; m^{1-3} , 3.6.

This species is apparently common in eastern Australia. Iredale and Troughton have indicated its presence at Sydney. It is a cave bat. The five from Cairns were hiding by day between the rafters and roof of an occupied house. The Mossman specimens were found in a crack in a telephone pole.

Nyctinomus loriae Thomas

Nyctinomus loriae THOMAS, 1897, Ann. Mus. Civ. Genova, ser. 2, vol. 18, p. 609.

MATERIAL: Helenvale on the Annan River, 20 miles south of Cooktown, 3; Shipton's Flat (Roberts), 9.

"Closely allied to *Nyctinomus norfolcensis* . . . size rather smaller, judged by the forearm Fur very short, close and velvety, only 2 to 3 mm. in length on the back. Color above fulvous or chestnut brown, the extreme bases of the hairs whitish; below the hairs are yellowish or whitish buff, sometimes tipped with brown on the sides"

To this I have added, after seeing the type, an adult female, "ears tall, not meeting across the brow." Thomas did not describe the skull. In it the frontal depression is almost absent. A slight sagittal crest developed at the back. Upper incisors on each side long, simple. The anterior upper premolar minute, peg-like, contained in the tooth row, the posterior premolar compressed from front to back, molariform. Lower incisors two on each side; i_1 forked, the inner branch of the fork longer than the outer. Lower premolars two, p_4 slightly compressed from front to back and one-fourth as high again as p_2 .

Forearm, 31 to 32 mm.

The appearance of this little Papuan species in the Cape York Peninsula furnishes one more example of the invasion by the Papuan fauna of the northern parts of Australia. The bats were shot in flight at dusk above the nearly dry bed of the Annan River.

It will be noted that the type specimen is very slightly larger in all its measurements than any of our three animals from the An-

TABLE 5
COMPARATIVE MEASUREMENTS OF FEMALES OF *Nyctinomus loriae*

	A.M.N.H. No. 154756	A.M.N.H. No. 154757	A.M.N.H. No. 154758	Type
Length of forearm	30	31	30	32
Length of head and body	53.5	55.0	52.0	54
Length of tail	28.5	27.0	26.0	26
Length of hind foot	6.5	6.0	6.0	7.0
Length of ear from crown	9.0	8.5	9.0	—
Skull				
Condylobasal length	14	14	13.9	14
Zygomatic width	—	8.8	8.8	10.2
Palato-sinual length	5.2	5.4	5.1	5.6
Length of bulla	2.75	2.9	2.8	3.0
c-m ³	5.3	5.5	5.5	5.9
m ¹⁻³	3.5	3.7	3.7	3.9

nan River. The most significant difference appears in the zygomatic width, but I do not think sufficient difference occurs to warrant the naming of a separate race.

[*Nyctinomus colonicus* Thomas]

Nyctinomus plicatus colonicus THOMAS, 1906, Proc. Zool. Soc. London, vol. 2, p. 537.

Originally described from Alexandria in the eastern part of Northern Territory, this bat is represented in our collection by a series of seven taken by Gabrielle Neuhäuser at Malbon near Cloncurry and one at Pentland. Jones has suggested that it is probably a full species. It has been recorded from Burketown and Darwin and is found generally in the Gulf country.

Molossus plicatus was described by Fischer (1829 [1830], Synopsis mammalium, p. 91).

I have carefully read Buchanan Hamilton's account of "*Vespertilio*" *plicatus* and examined his plate. There are specimens from Hainan Island, China, in our collection which apparently represent *plicatus*. These have the "sooty" wings of the description, and slightly ashy tips to the black upper pelage. Beneath, the brownish black hairs have well-developed buffy tips. This form, despite considerable similarity of the skull, is very different from the Australian *colonicus*. In that bat, while the wings are generally fuscous, each finger traverses a light, translucent area, and the wing tip is generally quite translucent. The body fur, too, is different,

being dark brown above and gray-brown beneath, without the dark hair bases present in our Hainan *plicatus*. The ears in *colonicus* appear thinner and to a great extent lack the internal tufts of hair which characterize the ears of *plicatus*. Taking all this into consideration I am disposed, even though the skulls are almost indistinguishable one from another, to treat *colonicus* as a full species.

SUBGENUS AUSTRONOMUS TROUGHTON

Austronomus TROUGHTON, 1948, Furred animals of Australia, ed. 3, reprinted, p. 363.

Molossus australis GRAY, 1839, Mag. Zool. Bot., vol. 2, p. 501.

The type locality of this species is New South Wales, according to Iredale and Troughton, 1934.

[*Nyctinomus australis atratus* Thomas]

Nyctinomus australis atratus THOMAS, 1924, Ann. Mag. Nat. Hist., ser. 9, vol. 14, p. 456.

MATERIAL: Birdsville, southwest Queensland (L. Macmillan), 2, in June, 1940.

Macmillan found both animals clinging to the base of a windmill and surmised that they had been crippled by the moving vanes of the mill.

EMBALLONURIDAE

TAPHOZOUS GEOFFROY

Taphozous GEOFFROY, 1813, Description de l'Egypte, vol. 2, p. 113.

Dobson (1872 and 1875) published a synop-

sis and a monograph on *Taphozous*. Hollister (1913) showed differences in the bullae of different groups. Thomas (1915a, 1922) and Troughton (1925) wrote on the classification. Troughton (1925) also revised the genus, and Tate (1941c) offered a few notes on it, suggesting that *Saccolaimus* and *Liponycteris* be held as subgenera of *Taphozous*.

Temminck (1841) based his term *Saccolaimus* squarely on the throat pouch, present in the male but not in the female in that species. The presence or absence of wing pouches did not enter into his conception in any way. The genus *Saccolaimus* Lesson was formed tautonymically. Attention was first called to the character of the audital bullae (complete in *Saccolaimus*, incomplete in *Taphozous*) by Hollister (1914) with regard to *Taphonycteris*. The radio-metacarpal pouch, usually absent in *Saccolaimus*, was pointed out in *Taphozous* by Dobson (1878).

The forms in Australia and New Guinea referable to the subgenus *Saccolaimus* are *flaviventris* (= *hargravei* = *affinis* var. *insignis*), *nudicluniatus*, *granti*, and *mixtus*. Troughton (1925) has shown with a degree of success that *granti* and *nudicluniatus* are alike. Of those listed above *mixtus* has well-developed wing pouches similar to the wing pouches in true *Taphozous*, so seems to constitute an annectant species.

SUBGENUS SACCOLAIMUS TEMMINCK

Saccolaimus TEMMINCK, 1841, Monographies de mammalogie, vol. 2, p. 277.

[*Taphozous flaviventris* Peters]

Taphozous (Saccolaimus) flaviventris PETERS, 1867, Proc. Zool. Soc. London, for 1866, p. 430.

MATERIAL: Pentland, 130 miles west of Townsville, north Queensland, 6; Malbon, near Cloncurry, 1.

These large handsome bats have the dorsum velvety brownish black, the under parts clear yellowish white. All the six specimens from Pentland are females without throat pouches, a fact that seems to indicate a degree of segregation of the sexes. The Malbon specimen is a male and shows a distinct throat pouch.

Taphozous (Saccolaimus) nudicluniatus De Vis

Taphozous nudicluniatus DE VIS, 1905, Ann. Queensland Mus., no. 6, pp. 39-40.

Taphozous granti THOMAS, 1911, Ann. Mag. Nat. Hist., ser. 8, vol. 8, pp. 378-379.

I have seen the type series of *T. (S.) nudicluniatus* at the Queensland Museum and the type of *granti* at the British Museum. It may well be that, as Troughton says, they are synonymous.

The forearm length given by De Vis was 75 mm., while the forearm of A.M.N.H. No. 66144 from Babinda Creek, not many miles north of Cardwell, the type locality, measures 74 mm.

The skull of our specimen has the complete bullae of *Saccolaimus*. In the tooth row, c-m³ measures 11.2 mm.; m¹⁻³, 7.6.

In the case of *granti* the length of the forearm is 69 mm., of c-m³, 10.0, and of m¹⁻³, 5.7. It is therefore a somewhat smaller bat than *nudicluniatus*.

Taphozous (Saccolaimus) mixtus (Troughton)

Saccolaimus mixtus TROUGHTON, 1925, Rec. Australian Mus., vol. 14, p. 322.

MATERIAL: Brown's Creek, Pascoe River, 3. Also 1 I reported in 1941 from Dogwa, Oriomo River, southern New Guinea.

Dorsal color dark grayish brown, with a sprinkling of whitish or white-tipped hairs. Under parts creamy white to the bases of the hairs. Throat pouch strongly developed in both males, only slightly less so in the females. Wing pouches are definitely present in both sexes. The entrance to the pouch is beset with buffy white hairs. The forearm length in the two males is 62.7 mm. and 63.8, and in the female, 62.5. Troughton gave 61.5 mm. for the type from Port Moresby. Our specimen from Papua has 61.0 mm. In the tooth rows, c-m³ are 9.5 and 9.8 in the two males, 10.0 in the female, 9.0 in Troughton's type, and 9.7 in the Dogwa male.

The three bats from Brown's Creek were shot at dusk flying over open forest near a gully filled with fringe forest.

SUBGENUS TAPHOZOUS GEOFFROY

Taphozous australis Gould

Taphozous australis GOULD, 1854, The mammals of Australia, vol. 3, pl. 32 and text.

Taphozous fumosus DE VIS, 1905, Ann. Queensland Mus., no. 6, p. 37.

The situation regarding the types of *aus-*

tralis is rather mixed. Dobson (1878) listed four specimens, one from New Guinea, two from Albany Island, Cape York, and one from King George Sound, southern Western Australia, the last (evidently in mistake) marked "type." In 1905 De Vis proposed the name *fumosus* for a specimen from near Cardwell. Thomas (1915a) had described his new subspecies *georgianus* from King George Sound. In 1937, in London, I found the two Albany Island specimens labeled "cotypes" but could discover no trace of any "type" of *australis* from King George Sound. Gould's original description reads ". . . forearm, 2.5 inches . . . habitat: the maritime caves in the sandstone cliffs of Albany Island, Cape York. In great numbers in three of the caves. Specimens obtained October, 1948." This at any rate seems to settle the type locality of *australis* as Albany Island. It is still questionable whether or not *australis georgianus* Thomas differs in any substantial way from true *australis*.

MATERIAL: Albany Island (Neuhäuser), 3, topotypes; Quamby, near Cloncurry (Neuhäuser), 2. All five formerly misidentified as *georgianus*. Newcastle Bay, close to Albany Island, 1, virtual topotype; Possession Island, west of tip of Cape York Peninsula, 2; Wenlock, Batavia River, 6; Portland Roads, 3; Coen, 7; Chillagoe Caves, 3; Cairns-Mossman Road, 2. M.C.Z.: Coen (Darlington), 3.

The approximate measurements of the tooth row are c-m³, 9.8; m¹⁻³, 5.2 mm. De Vis gave the length of the forearm of *fumosus* as 63.5 mm.

[*Taphozous georgianus* Thomas]

Taphozous australis georgianus THOMAS, 1915, Journ. Bombay Nat. Hist. Soc., vol. 24, p. 62.

The type specimen, a female (B.M. No. 44.2.27.59), which I examined in London, is much smaller than are most of the animals referred to by Troughton (1925) under "*georgianus*." In fact, I find no distinctively differing measurements. This brings up the question whether or not the type of *georgianus* really differs from *australis*. That there actually exists a second, much larger, species is not to be denied. I myself collected specimens of it near Mt. Isa. But when we consider that Dobson (1878) listed a specimen of "*australis*" from King George Sound (mis-

takenly indicating it as the type) and when we consider also that Thomas' specimen, which he merely indicated as a subspecies of *australis*, is very old and bears a registration number showing that it was already catalogued in 1844 (and both Thomas and Dobson were eminent in the study of bats), we may be justified in believing that both Dobson and Thomas alluded to the same specimen. If this animal is truly a specimen of the northern species *australis*, would that fact prove that *australis* extends into the extreme south of Western Australia, or imply an error in labeling? In any case we are then left without a name for the large species of north central Australia. Lacking any synonyms that can be revived, I now propose for this species the name:

[*Taphozous troughtoni*, new species]

TYPE: A.M.N.H. No. 162708, adult female, from Rifle Creek, Mt. Isa, northwest Queensland, collected October 13, 1948, by G. H. H. Tate.

GENERAL CHARACTERS: Similar to *Taphozous australis* but differs by its much larger size (forearm 72 to 76 mm.) and by the less whitish bases of the hairs.

DESCRIPTION OF TYPE SKIN: Dorsal color near Clove Brown (Ridgway); under parts slightly grayer.

Skull with extremely long postorbital processes, and sharply edged lambdoidal and sagittal crests. At the back of the palate the reentrant is very narrowly wedge shaped (more open in *australis*). The bullae are large and show the internal opening characteristic of the subgenus *Taphozous*. The teeth are much larger than those of *australis*.

MEASUREMENTS OF TYPE: (Skin measured in field): head and body, 93 mm.; tail, 35; hind foot (s.u.), 15; ear from crown, 19; forearm, 76. Skull: condylobasal length, 24.1; zygomatic width, 15.0; interorbital width, 6.7; intertemporal width, 4.4; width of braincase, 11.0; width between m¹⁻¹, 4.6; length of bulla, 5.7; palate, sinus to posterior notch, 7.9; c-m³, 11.0; m¹⁻³, 5.8; m¹, 2.8 by 2.4 (maximum); m², 2.4 by 2.6; m³, 1.2 by 2.3.

Besides the type, I took a paratype, a male. Both were caught in small caves in the laterite along the sides of the lake formed

by the dammed-up waters of Rifle Creek. The forearm of the male measured 73 mm.

I suspect that most of the large-sized material written about by Troughton (1925) under the heading *georgianus* can be referred to the present species. A number of animals from Pentland previously marked "*georgianus*" belong here also.

An only slightly smaller male found at Olsen's Cave, Mt. Etna, Rockhampton, seems to be in general agreement with the foregoing. The bases of the hairs, however, are almost as white as those of *australis*. The length of its forearm is 72 mm. The forearm in true *australis* from the north is ± 64 mm.

MEGADERMATIDAE

This family has the single representative *Macroderma* in Australia.

[MACRODERMA MILLER]

Macroderma MILLER, 1906, Proc. Biol. Soc. Washington, vol. 19, p. 84.

When I discussed the Megadermatidae (Tate, 1941b) I had no examples of *Macroderma* of Australia before me.

[*Macroderma gigas* (Dobson)]

Megaderma gigas DOBSON, 1880, Proc. Zool. Soc. London, p. 461.

MATERIAL: Johannsen's Cave, Mt. Etna, Rockhampton, 4, and 2 more in alcohol.

These great bats were nervous. Their eyes shone dull reddish under the hunting light. They were shot in the cave. The type locality is "Mount Margaret, Wilson's River, central Queensland."

RHINOLOPHIDAE

Very extensive revisions of this family have been published by Dobson (1878) and by Andersen (1912). In 1939 and 1941 (Tate and Archbold, 1939; Tate, 1941b) I went over the group once more, suggesting that the Rhinolophidae be treated in three subfamilies: Rhinolophinae, Hipposiderinae, and Coelopsinae (Coelopinae, by error). The Rhinolophinae and Coelopsinae are monotypic; the subfamily Hipposiderinae contains a number of genera, the characters of which were reviewed in the latter paper.

RHINOLOPHINAE

RHINOLOPHUS LACÉPÈDE

Rhinolophus LACÉPÈDE, 1799, Tableau des divisions, sous-divisions, ordres et genres des mammifères, p. 15.

A brief review of this large genus (Tate and Archbold, 1939), together with a key suggesting a classification, was largely based upon the work of Andersen.

Of the numerous groups indicated, only the *simplex* group, promoted to generic rank as *Rhinophyllotis* Troughton, reaches Australia. The single species *megaphyllus* is exceedingly common there.

It is a remarkable thing that with all our large collections from New Guinea not a single example of *Rhinolophus megaphyllus* is recorded.

Rhinolophus megaphyllus megaphyllus Gray

Rhinolophus megaphyllus GRAY, 1834, Proc. Zool. Soc. London, p. 52.

MATERIAL: Portland Roads, 5; Gordon and other mines, Iron Range, 15, and 43 more in alcohol; Brown's Creek, 1; Tunnel Gully, Wenlock, 6 in alcohol; McIlwraith Range, Camp Oven Pocket, upper Peach River, 4; McIlwraith Range, crest forest, 4; Coen (Neuhäuser), 8; Laura, 1; Shipton's Flat, 2, and 2 in alcohol; Mt. Finnegan, Rossville Creek, 4, and 2 in alcohol; Mt. Carbine, 1; Cooktown-Laura Railroad, 3 in alcohol; Julatten, 2; Cairns (hydroelectric tunnel), 2; Walter Hill Range, 1; Perseverance Mine, Julatten-Mossman Road, 2, and 5 in alcohol; Queen Mine, Irvine Bank, 3 in alcohol; Valetta Mine, Irvine Bank, 3 in alcohol; Townsville, 2; Olsen's Cave, 10 miles north of Rockhampton, 2, and 2 more in alcohol.

As in other species of *Rhinolophus*, both red and gray forms of an individual race may occur living together in single caves or mine tunnels. At Jack Gordon's Mine, Iron Range, the red and gray forms were found mixed. At Rothwell Mine, 5 miles southwest of Coen, there appeared to be only the red bats named by Allen *ignifer*.

The type locality is caves along the Murrumbidgee River, southern New South Wales. It is usually this species one hears fluttering outside one's mosquito net at night in Australia. Often they hang up under bed springs in darkened rooms during the day (at Laura).

Rhinolophus megaphyllus ignifer G. M. Allen

Rhinolophus megaphyllus ignifer, G. M. ALLEN, 1933, Jour. Mammal., vol. 9, p. 149.

MATERIAL: Rothwell Mine, Stewart River, 5 miles southwest of Coen, 1 skin and skull, and 38 in alcohol.

Considering the well-known fact that colonies of *Rhinolophus* and *Hipposideros* and other genera are frequently found to contain both red and gray and intermediately colored individuals, I feel that not much value can be placed upon the red phase designated *ignifer*. It is true that in the Rothwell Mine a preponderance of the specimens were red, but in the mines at Iron Range and Irvine Bank we also took red specimens together with the usual gray ones and a number of intermediates.

HIPPOSIDERINAE**HIPPOSIDEROS GRAY**

Hipposideros GRAY, 1831, Zoological miscellany, p. 37.

This genus was reviewed fairly extensively several years ago (Tate, 1941a). Four of the principal groups, the *bicolor*, *galeritus*, *diadema*, and *muscinus* groups, occur in Australia. They are readily distinguished from one another:

1. Ears broadly rounded, without hooked tip; size very small *bicolor*
Ears pointed, tip more or less hooked; size larger 2
2. Ears very long, pointed, attenuate; nose leaf with specialized, club-like structures *muscinus*
Ears not very long or very pointed; nose leaf normal for the genus 3
3. Size rather small, slightly larger than *bicolor*; forearm, ± 45 mm. *galeritus*
Size very large; forearm 70 to 80 mm. *diadema*

These groups are represented in Australia by *H. bicolor albanensis*, *H. galeritus cervinus*, *H. muscinus semoni*, and *H. diadema reginae*.

Hipposideros bicolor albanensis Gray

Hipposideros albanensis GRAY, 1866, Proc. Zool. Soc. London, p. 220.

MATERIAL: Lockerbie, 3.

These little bats were caught in the evenings after they had flown into the small canvas tent used by our native helpers.

Though *H. bicolor* has an immense range through the East Indian archipelago and is common in New Guinea, it would appear to be restricted in Australia to the northern portion of the Cape York Peninsula.

Hipposideros galeritus cervinus (Gould)

Rhinolophus cervinus GOULD, 1854, The mammals of Australia, vol. 3, pl. 34 and text.

MATERIAL: Somerset (across the strait from the type locality, i.e., 1 mile), 16, and 24 more in alcohol; Thursday Island, 2; Newcastle Bay, a few miles south of Somerset, 1; Iron Range, 7, and 6 more in alcohol; Rothwell Mine, 6 miles southwest of Coen, 8 in alcohol.

As in *Rhinolophus*, both red and gray (and also intermediately colored) examples of *H. cervinus* are found. In the boarded-up dining room of the old Jardine house at Somerset we found gray, rufous gray, and brilliantly colored orange-rufous specimens flying or hanging together. The Thursday Island and Newcastle Bay specimens are gray. Six of the seven Iron Range specimens are intermediately colored reddish gray; the seventh is gray. Several from Rothwell Mine are strongly reddish.

Hipposideros muscinus semoni Matschie

Hipposideros semoni MATSCHIE, in Semon, 1903, Zoologische Forschungsreisen in Australien und dem Malayischen Archipel, vol. 5, art. 6, p. 774.

MATERIAL: Iron Range, 1; McIlwraith Range, Rocky Scrub, 4; Coen, 1; Cooktown, 1 in alcohol.

This peculiar bat was taken in small nets placed about 4 feet above the ground in flyways in the tall rain forest on the McIlwraith Range. The one from Coen was found by day hanging in an empty clothes closet in a house.

Hipposideros diadema reginae Troughton

Hipposideros diadema reginae TROUGHTON, 1937, Australian Zool., vol. 8, p. 275.

MATERIAL: Cairns, 1; Jack Gordon's Mine, Iron Range, 13, and 3 more in alcohol; Coen (Neuhäuser), 1, skull only.

The single individual from Cairns is gray and in full agreement with Troughton's description of the type from the Bloomfield River. All specimens from Iron Range are tinged with russet, and three are quite strongly rufescent. The Cairns specimen was shot at dusk; the bats from the Iron Range

were taken hanging from the ceiling and walls of the mine tunnel.

PTEROPODIDAE

Both the principal subfamilies of fruit bats, the Pteropodinae and the Macroglossinae, are represented in Australia, the first by *Pteropus*, *Dobsonia*, and *Nyctimene*, the second by *Odontonycteris* and *Syconycteris*. All but *Syconycteris* were obtained by the Archbold party.

PTEROPODINAE

Relatively unspecialized fruit bats, in which the lower incisors are not unusually proödont; the symphyseal portion of the mandible is not provided with a lingual groove, and the tongue is not unusually lengthened or protrusible.

PTEROPUS BRISSON

Pteropus BRISSON, 1762, *Regnum animale*, ed. 2, pp. 13, 153-155.

Representatives of four species of *Pteropus* occur in Australia. Three of these, *alecto*, *conspicillatus*, and *scapulatus*, are common on the Cape York Peninsula. *Pteropus poliocephalus* is probably there in migration time, when it leaves New South Wales.

Pteropus alecto is a species widely distributed in the East Indies, at least as far west as Sumba and Celebes. Its Australian representative is *gouldii*. *Pteropus conspicillatus* is more closely confined to the New Guinea-Australian land mass. It is represented in the Moluccas by *chrysauchen* and on Ceram by *ocularis*. *Pteropus scapulatus* is characteristically Australian, with relatives only in the the Solomon Islands (*woodfordi* and *mahaganus*). *Pteropus poliocephalus* was placed by Andersen in a group with *epularius* from south New Guinea and *macrotis* from Aru.

I reviewed the Pteropodidae briefly in 1942b.

Pteropus alecto gouldii Peters

Pteropus gouldii PETERS, 1867, *Monatsber. Akad. Wiss. Berlin*, p. 703.

MATERIAL: Lockerbie, 1; Portland Roads, 2; Brown's Creek, 3; M.C.Z.: McIlwraith Range (Darlington), 3; Coen (Darlington), 9.

The specimens from Portland Roads were collected from a "camp" in the mangroves that line the shore of the bay. Those from

Lockerbie and Brown's Creek were shot in the evening while feeding on the flowers of bloodwood trees. In general it can be stated that the preferred roosting place of this species is among mangroves, whence it sallies forth at night in search of fruit and flowering trees. If such is the case, the specimens taken at Brown's Creek must have flown nearly 30 miles inland to feed. In 1937 I collected what was apparently the identical race at Bugi, on the southern coast of New Guinea.

Pteropus conspicillatus Gould

Pteropus conspicillatus GOULD, 1849, *Proc. Zool. Soc. London*, p. 109.

MATERIAL: Julatten, 5; Cairns, 1; Clohesy River, 2; Peach River, 5. M.C.Z.: McIlwraith Range (Darlington), 8; Shipton's Flat (Roberts), 20 in alcohol. C.N.H.M.: (All by Scott), Danbullan Road, 5; Wongabel, 2; Ravenshoe, 1.

At Julatten, Cairns, and the Clohesy River specimens were shot by day from "camps" containing perhaps several hundred specimens. Those from Peach River were shot by "shining" their eyes at night as they fed on the flowers of bloodwood trees and other kinds of eucalyptus.

In Australia the preferred roosting places are in patches of rain forest within the Cooktown-Townville mass of rain forest. We did not find any camps in the Coen area, although the fact that we collected feeding bats implied that camps were fairly near.

Pteropus scapulatus Peters

Pteropus scapulatus PETERS, 1862, *Monatsber. Akad. Wiss. Berlin*, p. 574.

MATERIAL: Wenlock, Batavia River, 8; Peach River, 1; Coen, 1; Hann River, 5; above Annan River gorge, 7; Shipton's Flat, 1. C.N.H.M.: Ravenshoe (Scott), 6. M.C.Z.: Coen (Darlington), 3; McIlwraith Range (Darlington), 8.

Ratcliff (1931) gives the impression that this little species mixes into the camps of other species such as *gouldii* by day. No doubt it does, but the Archbold expedition was so fortunate as to discover two large camps containing only *scapulatus*. Each camp was confined to the only moderately tall, and often quite low, trees bordering a river. The one at the Hann River contained several hundred specimens, or perhaps many more, as I could follow only a short distance up and down stream. The camp close above the An-

nan waterfalls near Helenvale must have numbered several thousands of bats. The small trees margining the river were literally loaded with them. The examples taken at Wenlock, Peach River, Coen, and Shipton's Flat were shot at night as they fed on eucalyptus flowers.

[Much farther south, at Byfield near Rockhampton, I collected two examples of this species which were feeding on the flowers of a bloodwood tree.]

A NOTE ON *Pteropus brunneus* DOBSON

During a recent visit to London I reexamined the unique specimen representing this bat. I have already studied all other Australian *Pteropus*: *gouldii*, *conspicillatus*, and *scapulatus*, from numerous freshly collected specimens and their later cleaned skulls, and *poliocephalus* from ample study specimens. The type of *brunneus* is positively unlike any one of the four. The head and mantle are now colored dull light brown. The forearm measures 117 mm. The back of the skull, including the audital bullae, has been sheared off. The rostrum is not "long," in Andersen's sense. The palatal length is 34.8 mm.; the zygomatic width, 34; the tooth row, c-m³, 23.3.

Though I am sure that *P. brunneus* is not truly Australian, I have not yet succeeded in pinning it with certainty to any described form. It seems more than likely that the animal was a waif, carried to Percy Island by storm.

DOBSONIA PALMER

Dobsonia PALMER, 1898, Proc. Biol. Soc. Washington, vol. 12, p. 114.

TYPE: *Cephalotis peroni* E. Geoffroy.

Specialized fruit bats with the hinder part of the back naked and the incisors reduced to a single pair of upper and lower teeth in each jaw.

Dobsonia moluccensis magna Thomas

Dobsonia magna THOMAS, 1905, Ann. Mag. Nat. Hist., ser. 7, vol. 16, p. 423.

MATERIAL: Iron Range, 3; Coen, 1; Peach River, 2. M.C.Z.: Coen (Darlington), 2.

I found this to be a cave bat in New Guinea, and again at Coen it was discovered hiding by day in a mine tunnel. Apparently it does not hang up by day in the open as *Pteropus* does. The specimens from Iron Range and Peach River were collected at night while feeding on flowering bloodwood trees.

NYCTIMENE BORKHAUSEN

Nyctimene BORKHAUSEN, 1797, Deutsch Fauna, vol. 1, p. 86.

TYPE: *Vespertilio cephalotes* Pallas.

Distinguished by its tubular nostrils, broadly fused premaxillae, and obsolescence of the lower incisors.

Nyctimene robinsoni Thomas

Nyctimene robinsoni THOMAS, 1904, Ann. Mag. Nat. Hist., ser. 7, vol. 14, p. 196.

Nyctimene tryoni LONGMAN, 1921, Mem. Queensland Mus., vol. 7, p. 179.

MATERIAL: Portland Roads, 1.

TABLE 6

COMPARISON OF THE MEASUREMENTS OF *Pteropus brunneus* WITH THOSE OF *Pteropus hypomelanus* AND *Pteropus cognatus*

	<i>brunneus</i>		<i>h. luteus</i>	<i>cognatus</i>
	Actual Type	Photograph of Type		
Palatal length	34.8	38	37.5	32
Zygomatic breadth	34	36	34	33.7
c-m ³	23.3	25	25	21.3
m ³	5.1×3.0	6×3.2	5.0×3.1	4.8×2.9
Nasal to front of orbit	21	22.5	21	17
Width of m ²⁻³	11	11.9	12	10.8
Lacrimal foramina to premaxillary recess	13±	14.2	13.7	10.1
Length of forearm	117	—	130	120

The capture of this specimen was peculiarly interesting. Previously we had seen the brilliantly shining golden eyes of several as they flew past our hunting lights at Lockerbie. At Portland Roads Van Deusen and I were hunting together in mixed eucalyptus and open grassy country. Suddenly the bat fluttered into the illuminated area and actually alighted for a moment on my chest. Before I could seize it, it flapped off down into the grass where Van Deusen and I pounced upon it.

This bat is quite unlike the much larger *Nyctimene celaeno* which we took abundantly in the upper Fly River in 1937. Instead it presents a rather close agreement with *N. cephalotes* of Celebes (Peleng Island), but its last upper and lower molars are considerably smaller than in that species. Possibly it should be treated as a race of *cephalotes*.

MACROGLOSSINAE

Specialized fruit bats of small to medium size, their lower incisors markedly proödont, the symphyseal part of the mandible with a lingual groove, the tongue strongly protrusible.

MACROGLOSSUS F. CUVIER

Macroglossus F. CUVIER, 1824, Des dents des mammifères, p. 248 (referring to p. 40).

Kiodotus BLYTHE, 1840, Cuvier's animal kingdom, p. 69 (footnote).

Odontonycteris JENTINK, 1902, Notes Leyden Mus., vol. 23, p. 140.

I discussed the status of *Odontonycteris* in 1942b (p. 345).

Macroglossus lagochilus nanus Matschie

Macroglossus lagochilus nanus MATSCHIE, 1899, Die Fledermäuse des Berliner Museums für Naturkunde, vol. 1, Megachiroptera, pp. 96, 98.

MATERIAL: Seagren's Farm, 3.

Two of these little long-tongued flying foxes were collected flying about the flowers of century plants, *Agave*, at about nine o'clock at night by Van Deusen. A third one was picked up off the ground beneath the *Agave*, dried, stiff, and partly mummified. It had apparently been dead for a day or two.

The same form is not uncommon at Maba-duane on the south coast of New Guinea.

CANIDAE

Canis dingo MEYER, 1793, Systematisch-sum-

marische Uebersicht der neuesten zoologischen Entdeckungen in Heuholland und Afrika, p. 33.

Iredale (1947) has discovered that the dingo was in 1792 named *Canis antarticus* Kerr. This will do away with the well-known name *dingo* and calls for fiat ruling by the International Commission. Meanwhile I continue to use *Canis dingo*.

Two rather recent papers on the dingo are of special importance, one by Jones (1921), the other by Tichota (1937). Jones, after summarizing the literature, concluded that the dingo was positively introduced by early Australian man and suggested that it was derived from the "northern wolves." It conforms, according to him, in the character of the cingulum of the first upper molar, with the wolves and the domestic dogs.

Tichota attempted to trace the phlogeny of the dingo. He found a very close resemblance to a prehistoric domestic dog from Germany and Austria, *Canis familiaris matris optimae* Jeitteles (1877, p. 19), and he published photographs comparing the two skulls, together with comparative tables. His conclusions were based upon three dingo skulls.

Jeitteles compared his "Hund der Bronzeperiode," which he named *Canis matris optimae*, with a number of wild forms and (p. 55) reached the conclusion that the Indian wolf, *C. lupus pallipes*, was the most probable ancestor.

Sykes (1831) described *pallipes* as "dull rufescent whitish; back varied with blackish and ferruginous; feet completely pallid, ferruginous; tail longish, pendent." He continued: "This is the wolf of Dukhun. Its head is elongated, and its muzzle acuminate: a groove exists between the nostrils. Eyes oblique; irides yellowish bright brown. Ears narrow, ovate, erect; small for the length of the head. Tail pendent, thin but bushy, extending for the length of the head. General colour of the fur a dirty reddish white or whitish brown. Along the back and tail very many of the hairs are tipped with black, mixed with others tipped ferruginous. The tail ends in a black tip. Inner sides of limbs, throat, breast and belly dirty white. Legs pale . . . Fur from occiput to insertion of tail is two to three inches long, gradually shortening as it approaches the sides. . . .

"Length from tip of nose to insertion of

tail 35 to 37 inches; tail 11 to 12 inches" (a somewhat young specimen).

We have no example of *Canis pallipes*.

No one can pretend to explain how *pallipes*, after being domesticated by man into *C. matris optimae*, was transported to Australia. Jones (1921, p. 261) probably goes near the mark with his imaginative description of the arrival of Talgai man with his wife and his dog and his dog's wife.

On continental Asia there are three main types of canids that might conceivably have been ancestral to the dingo. They are the Indian red dogs, *Cuon*; the jackals, *Thos*; and the wolves, *Lupus*. The first can be absolutely ruled out on structural grounds. *Cuon* has one fewer lower molars than the dingo, and its remaining posteriorly terminal molars in both upper and lower jaws are relatively much smaller. There are other distinctive characters. Jackals, according to Jones (pp. 257-258), also differ in the character of the cingulum of the first upper molar, which is quite strongly developed, while in wolves and dogs it is nearly obsolete. Jones states of a series of dingoes that they "fall in line with all the other races of dogs in being of the true northern wolf type." Yet, one of our dingoes (A.M.N.H. No. 65845), collected by Raven at Ravenshoe, shows the external cingulum of m^1 almost as fully developed as that of any jackal, and others show it in more incipient form.

MATERIAL: Lockerbie, 1 (large ♂, skull only, with cingulum obsolete at middle of m^1); Wenlock, 3 (one old ♀ with skin, and two pick-up skulls, their cingula as above); Ravenshoe, 1 (♂, cingulum almost like that of a jackal); Mundubbera District, 1 (cingulum moderately developed). I saw two others alive, one near Atherton, the other near Townsville.

This intermediate condition of the cingulum of m^1 leaves room for the possibility of an introduction of jackal blood into the dingo in the remote past. The dingo's reputed intractability might support this view. That they are not wholly intractable was demonstrated by Lumholtz (1890, pp. 178-179) who showed that "dingoes" were kept tame around the camps of natives in the Herbert River region of Queensland. Etheridge (1916, p. 43) confirmed this relationship between natives and dingoes.

That jackals can be domesticated and will readily hybridize with dogs has been attested by Jeitteles (1877, pp. 42-50) and others. Jeitteles was of the opinion that jackals may have been ancestral to some of the smaller races of dogs, in particular the prehistoric "Torfhund," *Canis familiaris palustris*, of Switzerland and the Rhine Valley and certain dogs of ancient Egypt.

In such case it follows that jackal blood may be present in the dingoes of Australia.

Jones (1921, p. 259) showed that in 22 specimens of dingoes the basicondylar length was 177.3 mm. and the length of the upper carnassial 20.0 mm. In our skulls the basicondylar length is: males, 178, 179, 184; females, 163, 176, 195; the length of the upper carnassial: males, 19.0 18.6, 18.0; females, 17.6, 20.3, 19.2. The length of the carnassial thus is usually more than 10 per cent of the basicondylar length. In an example of *Thos*, the jackal of India, these measurements are 147 and 16.6 mm. Such large carnassials are interpreted by Jones as an attribute of wild canids.

A NOTE ON NEW GUINEA DOGS

The Papuan wild dog collected by MacGregor on Mt. Scratchley at 7000 feet and described by De Vis (1911, pl. 1) was black and white, the white appearing on the nape and throat and under parts as shown in the illustration. The absence of dew claws was mentioned. The same is true both of the Papuan dogs and of the dingoes in our collections. De Vis suggested that the Papuan dog might well be feral.

Longman (1928, p. 154) mentioned two specimens and two skeletons of Papuan dogs from Mt. Scratchley, doubtless including De Vis' specimen. The second skin is Russet (Ridgway), which is a much darker brown than the normal dingo color, and thus approaches some of the skins from the Idenburg River described below.

Jones (1929) studied the two skulls recorded by Longman, finding in them a "relatively large upper carnassial tooth, the maximum length of which is nearly ten per cent of the condylobasal length." He was convinced that the Papuan dogs represented a primitive race.

Mr. W. B. Richardson of the 1939 Arch-

bold expedition obtained five Papuan dogs at the Idenburg River, one at 75-Meter Camp, the others at 850-Meter Camp. All were brought into camp by natives. Presumably they were domestic, not wild, animals.

The colors are tan (the shade seen in the Australian dingoes) and white. In two of the animals the tan predominates, only the face, throat, under parts, a nape line, and the under side and tip of the tail being white. In the second of these two the nape mark is asymmetrical and spreads to the right around the neck to join the white of the throat. In the remaining three skins white is predominant, the tan being isolated in large head, shoulder, and rump blotches.

The length of the upper carnassial and condylobasal lengths in our Idenburg skulls are shown below:

A.M.N.H. No. and Sex	Carnassial Length	Condylobasal Length
151841, ♂	16.0	139
151839, ♂	17.0	155
151803, ♀	14.3	131
151842, ♀	14.7	143

In every instance the carnassial length is more than 10 per cent of the condylobasal length. A trace of a cingulum on m^1 can be seen in No. 151839. In the others the cingulum is absent.

MURIDAE

The species of rodents found in the Cape York Peninsula and adjoining territory are included in Tate (1951). These are:

Hydromyinae

- Hydromys chrysogaster reginae*
- Hydromys chrysogaster beccarii*

Murinae

- Leggadina delicatula delicatula*
- Zyzomys argurus*
- Mesembriomys gouldii rattoides*
- Melomys cervinipes capensis*
- Melomys cervinipes eboreus*
- Melomys lutillus australis*
- Uromys caudimaculatus caudimaculatus*
- Rattus assimilis coracius*
- Rattus leucopus leucopus*
- Rattus leucopus mcilwraithi*
- Rattus leucopus cooktownensis*
- Rattus lacus*
- Rattus lacus*
- Rattus gestri apex*
- Rattus gestri conatus*

In addition to these, I think that *Conilurus* can be expected eventually to appear in the Cape York collections, since it occurs in both Arnhemland and south New Guinea. I have omitted *Notomys*, because the type locality of *N. aquilo* seems to be in doubt; the center of distribution of the genus is south central Australia.

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