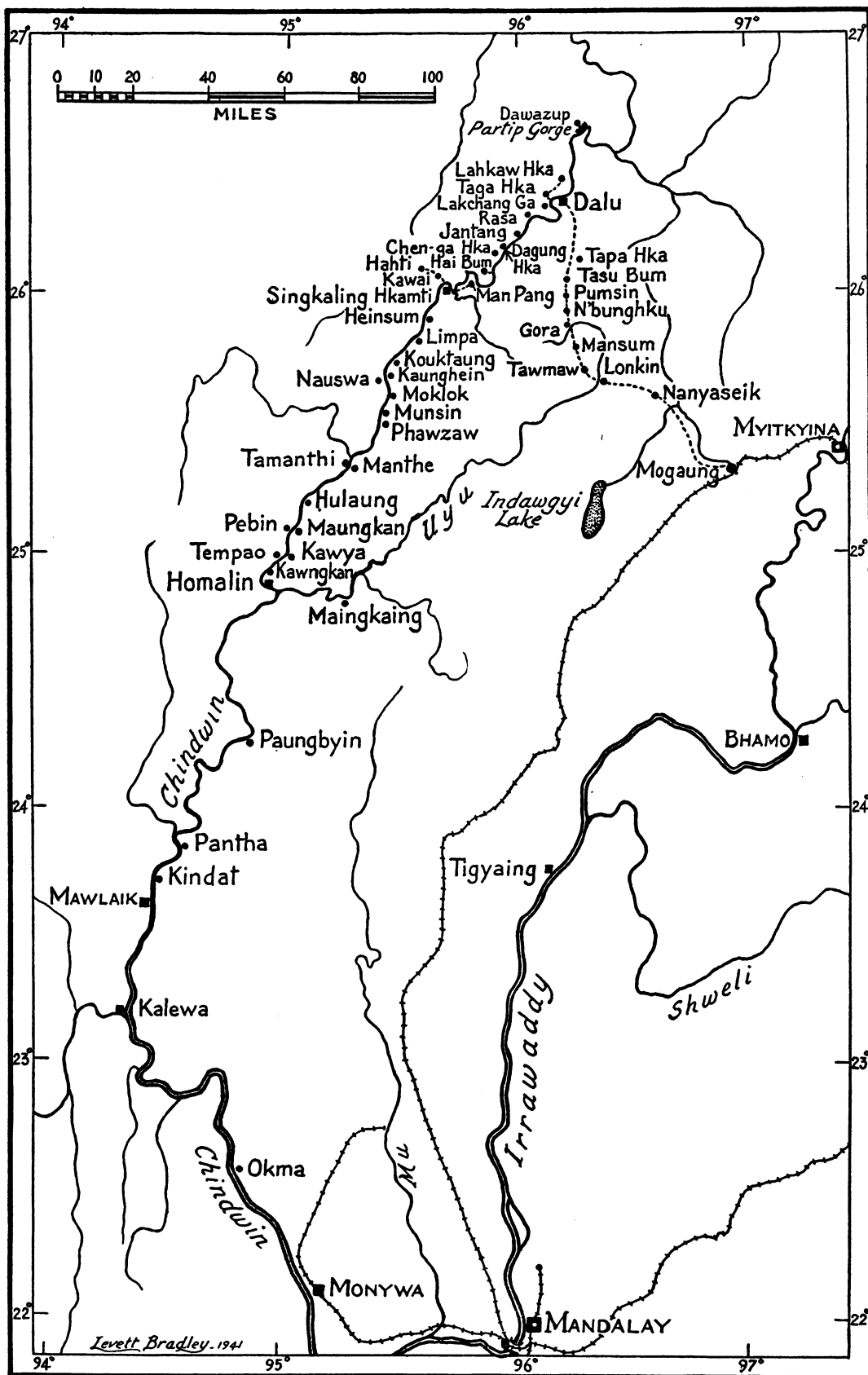


THE MAMMALS OF THE
VERNAY-HOPWOOD CHINDWIN
EXPEDITION, NORTHERN BURMA

T. DONALD CARTER

BULLETIN
OF THE
AMERICAN MUSEUM OF NATURAL HISTORY
VOLUME 82 : ARTICLE 4 NEW YORK : 1943

THE MAMMALS OF THE VERNAY-HOPWOOD CHINDWIN
EXPEDITION, NORTHERN BURMA



Map showing the principal collecting sites of the Vernay-Hopwood Chindwin Expedition

THE MAMMALS OF THE
VERNAY-HOPWOOD CHINDWIN
EXPEDITION, NORTHERN BURMA

T. DONALD CARTER
Assistant Curator, Department of Mammals

BULLETIN
OF THE
AMERICAN MUSEUM OF NATURAL HISTORY
VOLUME 82 : ARTICLE 4
NEW YORK : 1943

BULLETIN OF THE AMERICAN MUSEUM OF NATURAL HISTORY
Volume 82, article 4, pages 95–114, plates 26–32, 1 map

Issued December 30, 1943

INTRODUCTION

THE VERNAY-HOPWOOD CHINDWIN EXPEDITION was financed and headed by Mr. Arthur S. Vernay, a trustee of the American Museum of Natural History. Several years before the actual organizing of this expedition, Mr. S. F. Hopwood, Chief Conservator of Forests of Burma, brought to Mr. Vernay's attention the great possibilities of an expedition into this country of the upper Chindwin River. Other expeditions had explored the lower Chindwin with most gratifying results, but no collections from the upper river and the region to the northeast of the river had ever been made. Mr. Vernay's proposal that he undertake such an expedition was enthusiastically endorsed by the American Museum. As a result, the expedition set out from Rangoon early in January, 1935. Besides Mr. Vernay and Mr. Hopwood the personnel consisted of Mr. Randolph Morris, a plantation owner and one of the foremost authorities on the big game of southern India, Major Guy S. Rowley, a former officer in the Indian Army, Mr. Charles McCann, Assistant Curator of the Bombay Natural History Museum, and Mr. Henry C. Raven, Associate Curator of Comparative Anatomy of the American Museum of Natural History. Three skimmers, Mr. Stubbs (lent by Mr. J. K. Stanford, the District Commissioner of Myitkyina), Mr. Fernandez of the Bombay Natural History Museum, and Mr. Gabriel Joseph (lent to the expedition by Mr. Morris) also accompanied the expedition.

From Rangoon the party proceeded to Mogaung by train and continued to Nanyaseik by bus. At Nanyaseik collecting had been begun by McCann and Stanford; McCann had preceded the others to this point. Here a pack train of 110 mules was outfitted, and the party moved on to Lonkin, a distance of about 20 miles. At Lonkin the jade mines were visited. On January 19 a move was made to Tawmaw, 12 miles distant, and on the twentieth the start was made to Mansum, a 12-mile journey through dense forest, the path ascending to a height of 3000 feet. On January 26 the party continued to Gora, the trail crossing the upper Uyu River at an altitude of 1000 feet. On January 28 the expedi-

tion moved to Pumsin, passing through the village of N'bunghku. On January 30 they proceeded to Tasu Bum, 14 miles from Pumsin. Tasu Bum, 4200 feet, was the highest point reached throughout the expedition. On February 1 camp was pitched on the Tapa Hka at 800 feet. On February 3 a move of 20 miles was made to the Tumri Hka, where camp was pitched on a sand bank. On February 4 Dalu, a village on the upper Chindwin River, was reached. Dalu completed a 130-mile march from Nanyaseik. At Dalu a base camp was set up, and side trips were taken from here. On February 5 Rowley and Morris visited the Taga Hka at the foot of the Naga Hills, west of the Chindwin River. On February 7 Morris and McCann proceeded up the Taga Hka to Lahkaw Hka where a salt spring was located in the depth of the forest. Tracks of elephant, gaur, sambar, and tiger were in evidence. They returned to Dalu on February 11. On February 12 Vernay, Morris, Hopwood, and Rowley left in five dugouts for the Partip Gorge, about 30 miles up river. The gorge was reached that night, and the next day a trip was made through the gorge to Dawazup. The return trip to Dalu required but one day. On February 16 Hopwood returned to Rangoon, taking with him the specimens already collected and 58 of the mules. On February 18 the party left Dalu and made a short trip down river to Lakchang Ga. On February 19 the journey was continued 8 miles down the river to Rasa. On February 20 the expedition was divided, Vernay and Rowley continuing down stream in boats, while Morris, Raven, and McCann continued down the west bank of the Chindwin with the mules. Jantang was reached at noon and the Dagung Hka shortly after 3 p.m. A heavy rain fell that night. A march of 12 miles brought the party to Chen-ga Hka on February 23. Hai Bum, at an altitude of 2100 feet and 12 miles from Chen-ga Hka, was reached the next day. On March 3 the party reached Sailung on the Chindwin River. At this point the muleteers were paid off, and the journey was continued down the river in twin dugouts connected by bamboo platforms. Sinkaling Hkamti was reached after a day's travel,

Vernay and Rowley already having reached that town. On March 6 Vernay, Morris, Raven, and Rowley left for the village of Hahti for the purpose of visiting the Nagas head hunters. This village is situated in the Naga Hills, a day's journey from the river.

On March 10 the equipment was loaded onto twin dugouts and the party proceeded down the Chindwin. Collecting was carried on, on both sides of the river. Limpa was reached in the evening. On March 12 camp was pitched on the west side of the river at Kaunghein. Leaving Kaunghein the next day, the party spent the following night at Moklok and during the afternoon of the next day arrived at Munsin but continued on to Phawzaw, where camp was pitched on a sand bank. On the evening of March 17 Tamanthi was reached. Tamanthi had a post and telegraph office and was the first real link with civilization. The next morning the party continued down stream, collecting on both sides of the river. Sinnaing was reached that evening. After dinner the trip down river was continued with head lamps. At dawn on March 20 Hulaung was reached and that night camp was pitched at Maungkan. On March 21 Vernay and Raven left in small boats for a fast run to Homalin, while the rest of the party followed more leisurely, collecting on both sides of the river. That night camp was pitched on a sand bank at Kawya. The next evening found the party at Homalin, the most northern port of call for the river steamers. On March 28 the whole party left Homalin on a steamer for the last stage of the down-river journey. Mawlaik was reached that evening, and here the expedition transferred to another steamer. As this second, larger steamer was going up river to Pantha, stopping at Kindat on the way, Morris took this opportunity to do some collecting at that town, while McCann continued on to Pantha. From Mawlaik the steamer traveled south, stopping at Kalewa in mid-afternoon. The next morning the journey was continued down river and Okma was reached at 4:30 P.M. Leaving at 5:00 A.M. the next morning, the party disembarked at Monywa shortly after noon, and early the next morning they left by train for Rangoon where they arrived on the morning of April 5.

Mr. Raven has supplied me with the following brief resumé of the trip:

"During January, February and March, there was very little rain and the weather was generally clear. Between Nanyaseik and Dalu at night the temperature sometimes went as low as 39° or 40° F., and ranged between 70° and 85° during the day. Frequently heavy mists hung in the valleys for two or three hours after sunrise.

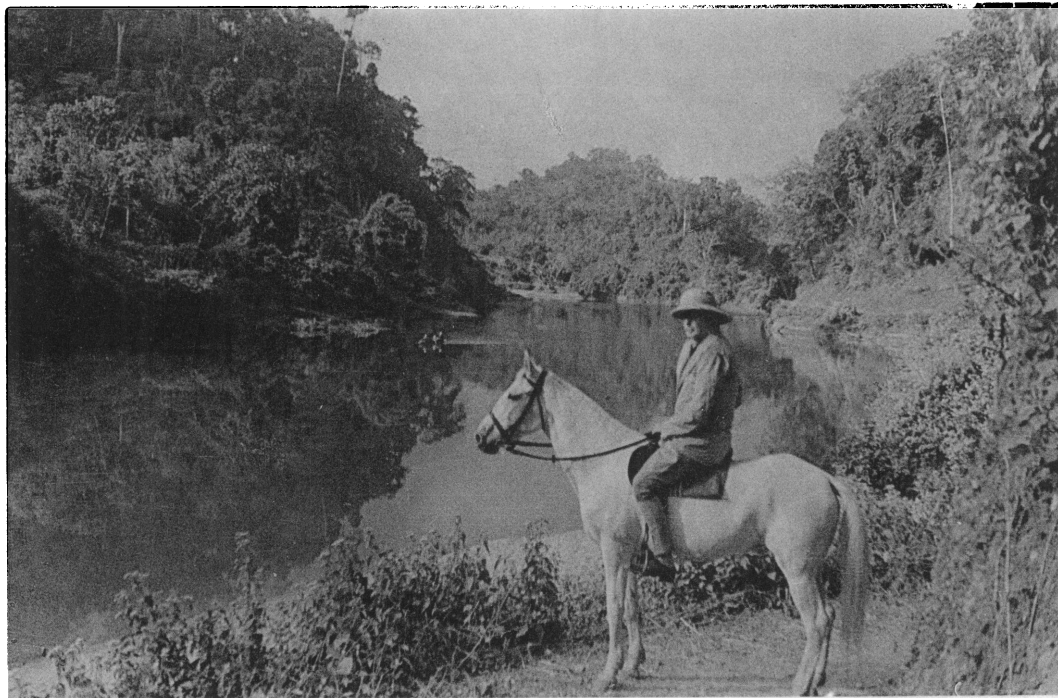
"The region between Nanyaseik (altitude about 600 feet) and Dalu is rolling country, all covered with rain forest except where cleared by human agency. Much that has been cleared has grown up with a pure culture of bamboo. The highest part visited was that about Tasu Bum, which was over 4000 feet. The altitude of Dalu, on the Chindwin River, is 626 feet; it gradually decreases as the Chindwin descends, until at Monywa, where we left the river, it was approximately 400 feet.

"As we came down the Chindwin, the character of the vegetation changed from that of a tropical rain forest to that of a savannah forest. Occasionally there were gallery forests along the streams or other patches of rain forest after we reached the area of predominance of the savannah forest.

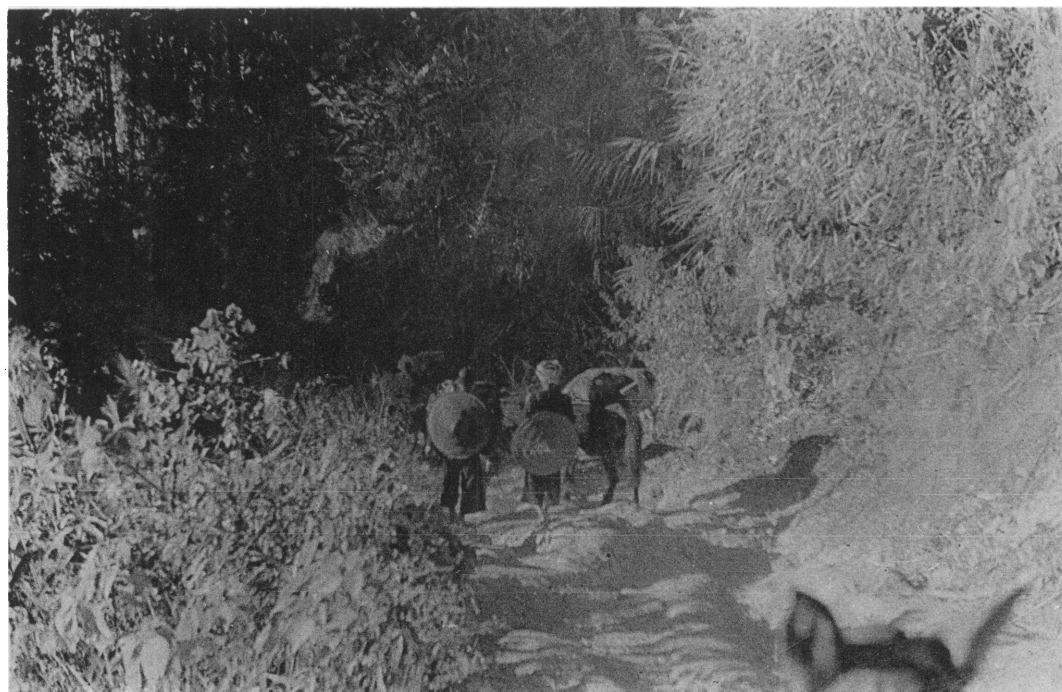
"The temperature increased as we went down stream until the diurnal temperature at Monywa was more than 100° F.

"The whole area of our explorations was in a part of Northern Burma which in the upper middle Tertiary was the upper part of the ancient Gulf of Burma. It is now covered by marine deposits, except where these have been overlaid by more recent deposits or where there are Cretaceous marine and intrusives of different ages."

Interesting accounts of this expedition have already been published. Mr. A. S. Vernay (1935, *Natural History*, vol. 36, pp. 36-42) gave an account of the visit to the Nagas head hunters at Hahti; Mr. R. C. Morris (1936, *Jour. Bombay Nat. Hist. Soc.*, vol. 38, pp. 647-671) wrote a very detailed account of the entire trip. I have made free use of information from Morris's article for my introductory notes and wish to thank him for the help it has rendered me. Dr. Ernst Mayr (1938, *Ibis*, April, pp. 277-320) published a



Arthur S. Vernay at the Uyu River near Lonkin



Road between Nanyaseik and Lonkin



Camp at Tapa Hka



Chindwin River near Dalu

paper on the birds collected by the expedition.

Once more the American Museum owes a great debt of gratitude to Mr. Arthur S. Vernay. It has been through his generosity and efforts in the numerous expeditions he has headed into India and Burma that the Museum now has a representative collection of mammals from this part of Asia. I wish to thank him for his contributions and interest and to congratulate him on the outstanding collection that was brought back by this expedition.

I wish to state my appreciation to Dr. Harold E. Anthony, Curator of Recent Mammals of the American Museum of Natural

History, for the opportunity he has given me to publish this paper and also for his helpful advice. To my colleagues, Dr. John Eric Hill, Dr. G. H. H. Tate, and Mr. Henry C. Raven, I owe a debt of gratitude for their cooperative aid. I also wish to thank Mr. Raven for the use of the pictures taken by him while he was a member of the expedition. Mr. Colin C. Sanborn kindly compared material with specimens in Field Museum of Natural History and at this time I wish to extend my appreciation to him.

Below is a list of all the localities visited, in chronological order with the date of arrival and departure:

ITINERARY OF VERNAY-HOPWOOD CHINDWIN EXPEDITION

	ARRIVAL	DE- PARTURE		ARRIVAL	DE- PARTURE
Mogaung	Jan. 10	Jan. 10	Heinsun = Heinsun	Mar. 10	Mar. 11
Nanyaseik	Jan. 10	Jan. 13	Limpa = Linhpa	Mar. 11	Mar. 12
Lonkin = Lonkhin	Jan. 13	Jan. 19	Kaunghein = Hunghein	Mar. 12	Mar. 15
Tawmaw	Jan. 19	Jan. 21	Nauswa = Nanswa	Mar. 13	
Mansum = Mansun	Jan. 21	Jan. 26	Moklok	Mar. 15	Mar. 16
Gora = Kora Gahtawng	Jan. 26	Jan. 28	Munsin = Minsun = Minsin	Mar. 16	Mar. 17
N'bungku = N'bung Hku			Phawzaw = Awthaw	Mar. 16	Mar. 17
= Nbawnhku	Jan. 28		Tamanthi = Tamanthe	Mar. 17	Mar. 19
Pumsin = Pumsim = Pum-			Manthe	Mar. 19	
sem	Jan. 28	Jan. 30	Hulaung	Mar. 20	
Zaulep Ga	Jan. 30		Maungkan = MOUNKAN	Mar. 20	Mar. 21
Tasu Bum	Jan. 30	Feb. 1	Pebin	Mar. 21	
Tapa Hka = Tampa Hka			Kawya	Mar. 21	
= Daba Hka	Feb. 1	Feb. 3	Tempao = Tampao = Tein-		
Dalu = Taro = Dalu Ga	Feb. 4	Feb. 18	pan	Mar. 22	
Taga Hka = Tagahku	Feb. 7		Kwangkan = Kaungkan		
Lahkaw Hka	Feb. 7	Feb. 11	= Kawngkankyun	Mar. 22	
Partip Gorge = Patip Gorge	Feb. 12	Feb. 14	Homalin	Mar. 21	Mar. 28
Dawazup	Feb. 14		Pantha	Mar. 31	Apr. 1
Lakchang Ga	Feb. 18	Feb. 19	Kindat	Mar. 31	
Rasa	Feb. 19	Feb. 20	Mawlaik	Mar. 29	Mar. 31
Jantang = Janhtang	Feb. 20		Kalewa	Apr. 1	Apr. 2
Dagung Hka = Tagung Hka			Okma = Okina	Apr. 2	Apr. 3
= Tagum Hka	Feb. 20	Feb. 23			
Mooktum	Feb. 21				
Chen-ga Hka = Chan-ga					
Hka	Feb. 23	Feb. 25			
Hai Bum	Feb. 25	Mar. 3			
Lachu Ga	Mar. 3				
Sailung = Sailong = Sailung					
Ga	Mar. 3	Mar. 4			
Singaling Hkamti = Hkamti	Mar. 4	Mar. 10			
Man Pang	Mar. 8				
Hahti = Harti	Mar. 6	Mar. 8			
Kawai	Mar. 8				

The following are the more important collecting localities, with the maximum-minimum temperatures taken by the expedition, the elevation, and characters of the country:

Nanyaseik	76°-50°.
Lonkin	82°-44°, 850 feet altitude. Dense rain forest jungle. On the Uyu River and location of jade mines.
Tawmaw	76°-39°, 2700 feet altitude. Dense forest.

Mansum	78°-42°, 3200 feet altitude. Dense rain forest, bamboo.
Gora	74°-50°, 2600 feet altitude. Very dense jungle, chiefly bamboo.
N'bunghku	3150 feet altitude.
Pumsin	80°-50°, 3900 feet altitude. Steep hillsides. Chiefly bamboo, interspersed with patches of forest.
Tasu Bum	84°-51°, 4200 feet altitude. Highest point reached by expedition. Dense rain forest.
Tapa Hka	78°-54°, 800 feet altitude.
Tumri Hka	650 feet altitude.
Dalu	80°-54°, 626 feet altitude. Paddy fields bordered by dense rain forests.
Lakhaw Hka	Rain forest. Salt springs.
Lakchang Ga	Paddy fields surrounded by dense rain forest.
Jantang	750 feet altitude.
Dagung Hka	750 feet altitude.
Hai Bum	87°-56°, 1600 feet altitude. Forest.
Hahti	2200 feet altitude. Bare hilltop from which jungle had been cleared away.
Singkaling Hkamti	Extensive paddy cultivation extending east and south of village. Beyond mixed forest. Country about town hilly. Capital of Shan State, Hkamti.
Kaunghein	Paddy fields and rain forest.
Munsin	Hilly, forest.
Tamanthi	West bank. More open rain forest and is the beginning of the savannah forests.
Homalin	Forest on the east bank, composed of rather open, not very high, savannah forest with open stretches of grass country, flat and swampy. Extensive paddy fields about town. On west bank country hilly, similar to country about Tamanthi.
Kindat	Country hilly and broken, the jungle thicker near river than farther inland.

The total number of Burmese mammals collected was 889 of 70 species and subspecies. A new subgenus and species of flying squirrel, a new subspecies of squirrel, and a new subspecies of shrew were previously described by me from this collection (1942, Amer. Mus. Novitates, no. 1208). The most interesting result of this expedition was the large series of squirrels of the *Callosciurus sladeni* group. In 1914, an expedition headed

by Captain G. C. Shortridge and Captain S. A. Macmillan was sent out by the Bombay Natural History Society to make a collection of mammals from the valley of the Chindwin River. This expedition collected from Yin, near the junction of the Chindwin and Irrawaddy rivers, north as far as Singkaling Hkamti. A most interesting collection was brought out, the series of squirrels being most noteworthy. In the 250 miles traversed along this river, no less than 21 species and subspecies of squirrels were collected, 11 of which were described as new by Thomas and Wroughton (1916, Jour. Bombay Nat. Hist. Soc., vol. 24, pp. 224-239). It was here pointed out that the Chindwin River, below Singkaling Hkamti, formed a decided barrier for the different species of the genus *Callosciurus*. *Callosciurus sladeni* and its numerous subspecies were found to inhabit the east bank of the river exclusively, while *Callosciurus erythraeus* and its subspecies were found on the west bank. The same appears true of the genus *Tomeutes*. With the exception of Homalin, where *Tomeutes lokroides lokroides* has established itself on the east bank, *lokroides* is found only on the west bank, its range extending from Singkaling Hkamti south to Okma. *Tomeutes similis owensi* takes its place on the east bank from Singkaling Hkamti as far south as Tamanthi, and farther south, about Okma, *Tomeutes pygerythrus janetta* is the form inhabiting the east bank. Below Okma on the west side, according to the results of the Bombay expedition, *T. l. lokroides* is replaced by the subspecies *mearsi*. *Ratufa gigantea gigantea* was taken on both sides of the river at Singkaling Hkamti. At Tamanthi on the west side of the river and at Hulaung and Maungkan on the east side, a browner form with a lighter tail tip occurs which fits well with the description of *R. g. lutrina*, described from the west bank at Kindat. *R. fellii* is found on the east bank about Okma. *Dremomys rufigenis opimus* was taken west of the river at Chen-ga Hka but east of the river from Singkaling Hkamti south. *Tamiops macclellandi macclellandi* was taken on both sides of the river as far south as Nauswa and continued on the east side to Homalin, while the subspecies *manikurensis* is found on the east side at Mawlaik.

In the following table is a list of the collecting localities of the two expeditions, the forms of squirrels taken, and the side of the river from which they were secured. Asterisks denote forms collected in a locality by the Bombay Natural History Society Expedition not taken by the Vernay-Hopwood Chindwin Expedition. It will be noted that there are four forms included, namely, *Callosciurus sladeni millardi*, *Tomeutes lokroides mearsi*, *Dremomys rufigenis adamsoni*, and *Dremomys macmillani*, not represented in the Vernay-Hopwood Chindwin Expedition Collection.

LOCALITY	WEST SIDE OF RIVER	EAST SIDE OF RIVER
Nanyaseik		<i>C. s. rubex</i> <i>D. r. opimus</i> <i>T. m. maccllellandi</i>
Lonkin		<i>C. s. rubex</i> <i>R. g. gigantea</i> <i>T. s. owensi</i> <i>T. m. maccllellandi</i>
Tawmaw		<i>C. s. rubex</i>
Mansum		<i>C. s. rubex</i> <i>T. s. owensi</i> <i>T. m. maccllellandi</i>
N'bungku		<i>C. s. vernayi</i> <i>R. g. gigantea</i>
Pumsin		<i>C. s. vernayi</i> <i>R. g. gigantea</i> <i>T. s. owensi</i>
Zaulep Ga		<i>C. s. vernayi</i>
Tasu Bum		<i>D. r. opimus</i>
Tapa Hka		<i>C. s. vernayi</i>
Dalu		<i>C. s. vernayi</i> <i>T. s. stevensi</i> <i>T. m. maccllellandi</i>
Taga Hka	<i>C. e. crotalius</i> <i>T. m. maccllellandi</i>	
Lahkaw Hka	<i>C. e. crotalius</i> <i>D. r. opimus</i>	
Lakchang Ga	<i>T. m. maccllellandi</i>	
Jantang	<i>C. e. crotalius</i> <i>T. m. maccllellandi</i>	
Dagung Hka	<i>C. e. crotalius</i>	
Chen-ga Hka	<i>C. e. crotalius</i> <i>R. g. gigantea</i> <i>D. r. opimus</i>	
Hai Bum	<i>C. e. crotalius</i> <i>R. g. gigantea</i> <i>T. s. stevensi</i> <i>T. m. maccllellandi</i>	
Lachu Ga	<i>C. e. crotalius</i>	
Singkaling		
Hkamti	<i>C. e. crotalius</i> <i>*R. g. gigantea</i> <i>*R. l. lokroides</i>	<i>C. s. shortridgei</i> <i>R. g. gigantea</i> <i>*T. s. owensi</i>
LOCALITY	WEST SIDE OF RIVER	EAST SIDE OF RIVER
Hahti	<i>C. e. nagarum</i> <i>T. s. stevensi</i>	<i>*D. r. opimus</i> <i>T. m. maccllellandi</i>
Kawai	<i>T. m. maccllellandi</i>	
Heinsum	<i>C. e. nagarum</i> <i>R. g. gigantea</i>	<i>C. s. shortridgei</i>
Limpa	<i>C. e. nagarum</i> <i>R. g. gigantea</i> <i>T. s. stevensi</i>	<i>C. s. shortridgei</i> <i>T. s. owensi</i>
Kouktaung		<i>*C. s. shortridgei-fryanus</i> <i>*T. s. owensi</i> <i>C. s. fryanus</i> <i>T. s. owensi</i> <i>D. r. opimus</i> <i>T. m. maccllellandi</i>
Kaunghein	<i>C. e. nagarum</i>	
Nauswa	<i>C. e. nagarum</i> <i>T. m. maccllellandi</i>	
Moklok	<i>C. e. nagarum</i> <i>T. l. lokroides</i>	<i>C. s. fryanus</i> <i>T. s. owensi</i>
Munsin		<i>*C. s. fryanus</i> <i>*T. s. owensi</i>
Phawzaw	<i>T. l. lokroides</i>	<i>C. s. fryanus</i> <i>C. s. careyi</i> <i>T. s. owensi</i>
Tamanthi	<i>*C. e. nagarum</i> <i>R. g. lutrina</i> <i>T. l. lokroides</i>	<i>*C. s. careyi</i> <i>T. s. owensi</i> <i>*T. m. maccllellandi</i>
Manthe		<i>C. s. careyi</i>
Hulaung		<i>C. s. haringtoni</i> <i>R. g. lutrina</i>
Maungkan		<i>C. s. haringtoni</i> <i>R. g. lutrina</i> <i>*T. m. maccllellandi</i>
Pebin	<i>C. e. nagarum</i>	
Kawya		<i>C. s. haringtoni</i>
Tempao	<i>C. e. nagarum</i> <i>T. l. lokroides</i>	
Homalin	<i>C. e. nagarum</i> <i>T. l. lokroides</i>	<i>C. s. haringtoni</i> <i>*T. l. lokroides</i> <i>*T. m. maccllellandi</i> <i>*C. s. millardi</i>
Pyaungbyin		<i>*C. s. sladeni</i> <i>C. s. sladeni</i> <i>*D. r. adamsoni</i>
Tatkon	<i>*R. g. lutrina</i>	
Pantha		
Kindat	<i>C. e. kinneari</i> <i>R. g. lutrina</i> <i>T. l. lokroides</i> <i>*D. macmillani</i>	
Mawlaik	<i>T. l. lokroides</i>	<i>C. s. sladeni</i> <i>T. m. manikurensis</i> <i>C. s. sladeni</i> <i>R. fellii</i> <i>T. p. janetta</i> <i>*C. s. rubex</i> <i>*T. p. janetta</i> <i>*R. fellii</i>
Kalewa	<i>T. l. lokroides</i>	
Okma	<i>T. l. lokroides</i>	
Yin		
Kin	<i>*T. l. mearsi</i>	

DESCRIPTION OF THE MATERIAL

Tupaia belangeri versurae Thomas

Tupaia belangeri versurae THOMAS, 1922, Jour. Bombay Nat. Hist. Soc., vol. 28, p. 428.

TYPE LOCALITY: Dening, Mishmi Hills.

SPECIMENS COLLECTED: Twenty-three: Nanyaseik, 4; Lonkin, 6 (3 preserved entire); Mansum-Gora, 4; Gora, 1; Pumsin, 2; Tasu Bum, 1 (preserved entire); Dalu, 3 (1 preserved entire); Hai Bum, 2.

REMARKS: This series, although taken much nearer the type locality of *assamensis*, fits Thomas's description of *versurae* in having longer fur, indistinct shoulder stripes, and ochraceous underparts. The hairs of the inguinal region have slaty bases. As pointed out by Osgood (1932, Publ. Field Mus. Nat. Hist., zool. ser., vol. 18, p. 240), some of the differences of coloration may be due to the seasonal change of the pelage, and without a series taken at different times of the year the status of many of the subspecies is difficult to determine.

Suncus caeruleus (Kerr)

Sorex caeruleus KERR, 1792, Animal kingdom of Linnaeus, vol. 1, Mammalia, p. 207.

TYPE LOCALITY: Java.

SPECIMENS COLLECTED: Two: Lonkin, 1; Hai Bum, 1 (preserved entire).

REMARKS: On account of inadequate material, it is difficult to identify the subspecies of these specimens. They do not agree with any of the forms in the synopsis of the group by Lindsay (1929, Jour. Bombay Nat. Hist. Soc., vol. 33, pp. 326-340), although specimens from Assam are included. In the American Museum of Natural History there is a large series from Fukien Province, China, which averages lighter in color, although there are individuals in this series which match closely. However, the feet of the specimens under consideration are of light color, while those from Fukien are dark. In this they agree with the plate in Pallas's description of *myosurus* (1832, Gray and Hardwicke, Illus. Indian zool., vol. 1, pl. 9). The measurements of the Lonkin specimen are as follows: total length, 195 mm.; tail, 80; hind foot, 20. Skull: greatest length, 32.1; basal length,

29.5; palatal length, 15.1; greatest width of braincase, 13.3; width across molars, 10; upper tooth row, including incisor, 14.3; lower tooth row, including incisor, 13.

Crocidura rubricosa Anderson

Crocidura rubricosa ANDERSON, 1877, Jour. Asiatic Soc. Bengal, vol. 46, pt. 2, p. 280.

TYPE LOCALITY: Sibsagar, Assam.

SPECIMEN COLLECTED: Dalu, 1.

REMARKS: Blanford and subsequent authors regarded *rubricosa* as a synonym of *fuliginosa*, and Blanford evidently described a specimen of *rubricosa* under his heading of *fuliginosa* (1891, Fauna of British India). His drawing, taken from Dobson (1890, Monograph of the Insectivora, pl. 28, no. 13), was labeled *rubricosa* by Dobson. Lindsay (1929, Jour. Bombay Nat. Hist. Soc., vol. 33, p. 335) concludes that *fuliginosa* is a *Suncus*. Both Anderson's original description and Blanford refer to an animal with but 16 teeth. The specimen on hand fits Anderson's description so well that even without comparative material I have no hesitancy in giving it Anderson's name.

MEASUREMENTS: Skin: total length, 130 mm.; tail, 61; hind foot, 14. Skull: greatest length, 20; basal length, 18.6; palatal length, 8.5; greatest length of braincase, 8.5; width across molars, 6.1; upper tooth row, including incisor, 8.7; lower tooth row, including incisor, 8.

Crocidura dracula mansumensis Carter

Crocidura dracula mansumensis CARTER, 1942, Amer. Mus. Novitates, no. 1208, p. 1.

TYPE LOCALITY: Mansum, upper Burma.

SPECIMEN COLLECTED: Mansum, 1.

REMARKS: A dark form of *Crocidura dracula* with dark ears and feet. The tail is but faintly bicolored.

Cynopterus sphinx sphinx (Vahl)

Vespertilio sphinx VAHL, 1897, Skrift. Naturh. Selsk. Copenhagen, vol. 4, pt. 1, p. 123.

TYPE LOCALITY: Tranquebar, India.

SPECIMENS COLLECTED: Two: Pumsin, 1; Tsu Bum, 1 (preserved entire).



Village of Hahti.



Forest-clad mountains near Hai Bum



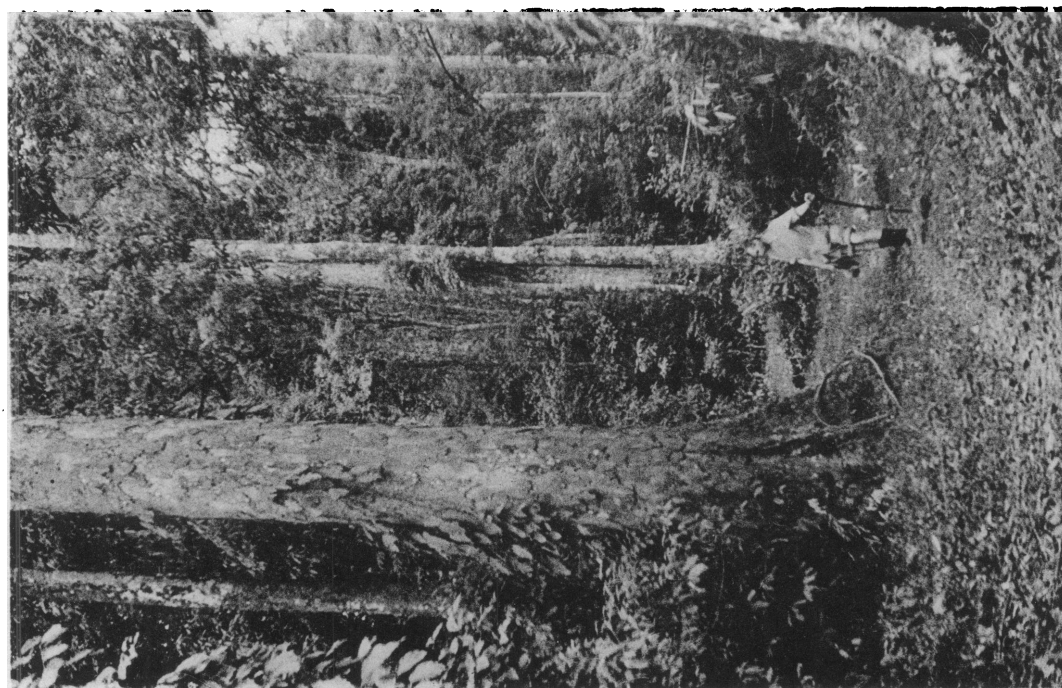
Camp at Hai Bum



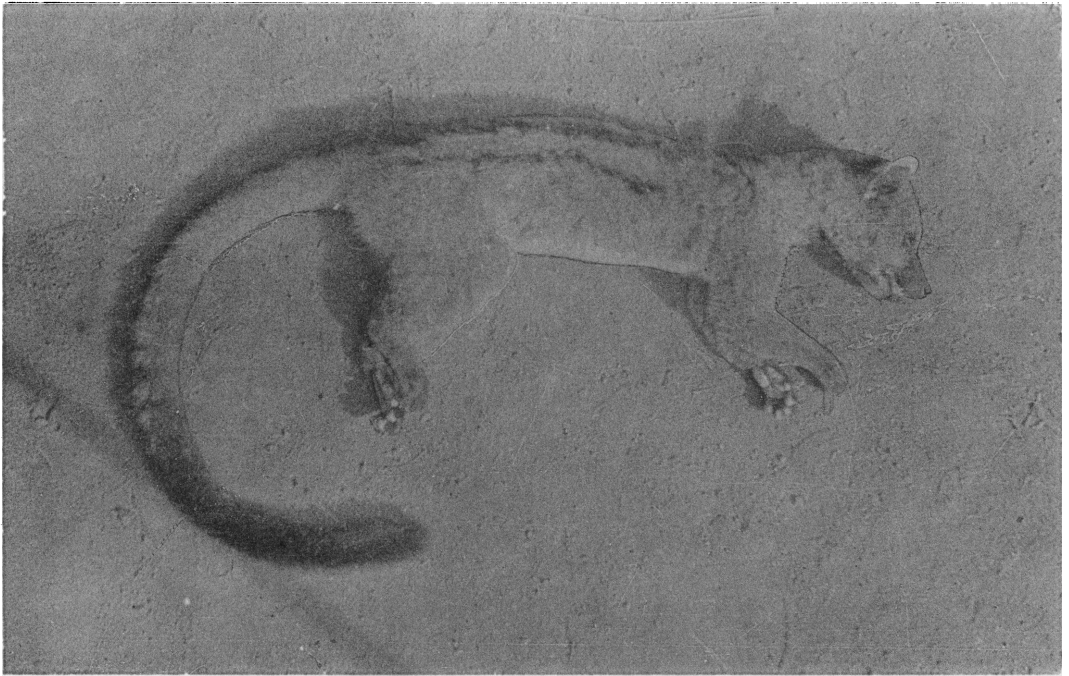
Type specimen of *Crocidura dracula mansumensis*, Mansum



Ratufa gigantea gigantea, N'bungku



Forest at Tasu Bum



Arctogalidia trivirgata millsii, Tawmaw



Atherurus macrourus assamensis, Pumsin

Rosettus leschenaultii (Desmarest)

Pteropus leschenaultii DESMAREST, 1820, Encyclop. method. Mamm., vol. 1, p. 110.

TYPE LOCALITY: "Les environs de Pondichery," India.

SPECIMEN COLLECTED: Kawya, east bank, 1.

REMARKS: This specimen, a young female, I am placing tentatively under this northern species, chiefly because of its range. In measurements of the maxillary tooth row, 13.2 mm., and in the length of the forearm, 71.9, it appears to be nearer the smaller southern species, *R. amplexicaudatus*, but m_3 is elliptical in shape and not subcircular, as given by Anderson as a distinguishing factor between the two species.

Rhinolophus blythi szechwanus Anderson

Rhinolophus blythi szechwanus ANDERSON, 1918, Ann. Mag. Nat. Hist., ser. 9, vol. 2, p. 376.

TYPE LOCALITY: Chungking, Szechwan.

SPECIMENS COLLECTED: Hai Bum, 62 (60 preserved entire).

REMARKS: These bats were collected from a cave 6 miles west of Hai Bum. From this same cave specimens of *Rhinolophus affinis macrurus*, *Hipposideros armiger armiger*, *Hipposideros gentilis gentilis*, *Hipposideros larvatus grandis*, and *Myotis siligorensis alticraniatus* were taken. Both color phases are represented in the series.

Rhinolophus affinis macrurus Anderson

Rhinolophus affinis macrurus ANDERSON, 1905, Proc. Zool. Soc. London, vol. 2, p. 103.

TYPE LOCALITY: Taho, Karennee, Burma.

SPECIMENS COLLECTED: Hai Bum, 42 (33 preserved entire).

REMARKS: The average forearm measurement of the nine made-up skins is 50.4 mm. Two color phases are represented.

Rhinolophus pearsonii pearsonii Horsfield

Rhinolophus pearsonii HORSFIELD, 1851, Cat. Mammalia, Mus. East India Co., p. 33.

TYPE LOCALITY: Darjiling.

SPECIMENS COLLECTED: Tasu Bum, 2.

Hipposideros armiger armiger (Hodgson)

Rhinolophus armiger HODGSON, 1835, Jour. Asiatic Soc. Bengal, vol. 4, p. 699.

TYPE LOCALITY: Nepal.

SPECIMENS COLLECTED: Hai Bum, 4 (3 preserved entire).

Hipposideros gentilis gentilis Anderson

Hipposideros gentilis gentilis ANDERSON, 1918, Ann. Mag. Nat. Hist., ser. 9, vol. 2, p. 380.

TYPE LOCALITY: Thayetmyo, Burma.

SPECIMENS COLLECTED: Hai Bum, 86 (75 preserved entire).

REMARKS: Two color phases are represented.

Hipposideros larvatus grandis Allen

Hipposideros larvatus grandis ALLEN, 1936, Rec. Indian Mus., vol. 38, p. 345.

TYPE LOCALITY: Akanti, upper Chindwin, 500 feet.

SPECIMENS COLLECTED: Hai Bum, 12 (9 preserved entire).

REMARKS: These specimens are all of the rufous phase but their measurements agree with Allen's. According to Tate, *grandis* may prove to be a synonym of *leptophylla*.

Pipistrellus babu Thomas

Pipistrellus babu THOMAS, 1915, Jour. Bombay Nat. Hist. Soc., vol. 24, p. 30.

TYPE LOCALITY: Murree, 8000 feet, India.

SPECIMENS COLLECTED: Dalu, 4 (all preserved entire).

REMARKS: From point of size these bats appear to be nearest to *babu*. They do differ from the description of this species in having a slight secondary posterior cusp on the first upper incisor. Unfortunately they are all females. In length of forearm they range from 33.2–34.5 mm. Skull measurements: greatest length, 12–13.4; basal length, 10–10.4; palatal length, 5–5.3; zygomatic breadth, 8.4–8.9; mastoid breadth, 7.5–7.7; breadth of upper molars, 6–6.2; upper tooth row, front of canines to back of molars, 5–5.1; lower tooth row, front of canines to back of molars, 5.2–5.5.

Pipistrellus mimus Wroughton

Pipistrellus mimus WROUGHTON, 1899, Jour. Bombay Nat. Hist. Soc., vol. 12, p. 722, pl. fig. 3, 3a.

TYPE LOCALITY: Mheskatri, Surat Dangs, India.

SPECIMENS COLLECTED: Five: Nanyaseik, 1; Dalu, 2; Phawzaw, 1; Maungkan, 1. (All preserved entire.)

REMARKS: These specimens average slightly larger than the type series, forearm, 27.7–30 mm. against 27–28, and the greatest skull length of 11.6–11.8 as compared with 11.5.

***Myotis siligorensis alticraniatus* Osgood**

Myotis siligorensis alticraniatus OSGOOD, 1932, Publ. Field Mus. Nat. Hist., zool. ser., vol. 18, p. 232.

TYPE LOCALITY: Muong Moun, Tonkin.

SPECIMEN COLLECTED: Hai Bum, 1 (preserved entire).

REMARKS: The skull was removed from this specimen, but unfortunately it was so badly crushed that positive identification was difficult. Mr. Colin C. Sanborn kindly compared this specimen with the type in Field Museum, Chicago, and substantiated my identification.

***Miniopterus schreibersii fuliginosus* (Hodgson)**

Vespertilio fuliginosa HODGSON, 1835, Jour. Asiatic Soc. Bengal, vol. 4, p. 700.

TYPE LOCALITY: Nepal.

SPECIMENS COLLECTED: Lonkin, 2 (preserved entire).

REMARKS: These specimens agree with three *Miniopterus* collected by the Vernay-Cutting Burma Expedition and tentatively identified by H. E. Anthony as *fuliginosus*.

***Scotophilus kuhlii* Leach**

Scotophilus kuhlii LEACH, 1821, Trans. Linn. Soc. London, vol. 13, p. 72.

TYPE LOCALITY: Unknown.

SPECIMENS COLLECTED: Eight: Singkaling Hkamti, west bank, 1; Maungkan, west bank, 3 (1 preserved entire); Homalin, 4 (1 preserved entire).

***Scotophilus temminckii* subsp.**

SPECIMEN COLLECTED: Homalin, east bank, 1.

REMARKS: Comparison has been made with the large series of *S. t. consobrinus* from Hainan in the American Museum collection and also with *S. wroughtoni*. This specimen is intermediate between the two in coloration, approaching the darker *consobrinus*, one very light specimen of the series agreeing well with it. No specimen of *S. gairdneri* is available for comparison; however, this specimen lacks the white hairs bordering the forearms mentioned

in Kloss's description. Without more specimens it is difficult to come to a definite conclusion as to the form this specimen represents. From material on hand it appears to me that *wroughtoni*, *consobrinus*, and *gairdneri* are all forms of *temminckii*.

***Kerivoula hardwickii* (Horsfield)**

Vespertilio hardwickii HORSFIELD, 1824, Zool. researches in Java, no. 8.

TYPE LOCALITY: "Java."

SPECIMEN COLLECTED: Indefinite locality, 1 (preserved entire).

REMARKS: Comparing this individual with specimens from Fukien Province, China, identified as *depressa* by G. M. Allen (1938, Mammals of China and Mongolia, pt. 1, p. 269) and placed by this author as a subspecies of *hardwickii*, one is led to believe that Allen was mistaken in so doing and *depressa* should be a full species as originally described by Miller.

***Macaca mulatta mulatta* (Zimmermann)**

Cercopithecus mulatta ZIMMERMANN, 1780, Geogr. Gesch. Mensch, vol. 2, p. 195.

TYPE LOCALITY: East India.

SPECIMENS COLLECTED: Thirteen: Nanya-seik, 4; Dalu, 2; Taga Hka, west bank, 2; Singkaling Hkamti, west bank, 1; Heinsum, east bank, 2; Moklok, east bank, 1; Maungkan, east bank, 1.

***Macaca assamensis assamensis* (McClelland)**

Macacus assamensis MCCLELLAND, 1839, Proc. Zool. Soc. London, p. 148.

TYPE LOCALITY: Garo Hills, Assam.

SPECIMENS COLLECTED: Four: Jantang-Dagung Hka, 2; Hai Bum, 1; Nampuk, west bank, 1.

***Macaca speciosa speciosa* (Cuvier)**

Macacus speciosus F. CUVIER, 1825, Hist. nat. Mamm., no. 46.

TYPE LOCALITY: (East Indies).

SPECIMENS COLLECTED: Eleven: Mansum, 1; Gora, 9 (2 preserved entire); Chen-ga Hka, 1.

***Hylobates hoolock* (Harlan)**

Simia hoolock HARLAN, 1834, Trans. Amer. Phil. Soc., new ser., vol. 4, p. 52, pl. 2.

TYPE LOCALITY: Garrow (Garo) Hills, Assam.

SPECIMENS COLLECTED: Seventy-six: Nan-yaseik, 2; Lonkin, 5 (3 preserved entire); Taw-maw, 2; Mansum, 5; Gora, 1; N'bungku, 2; Pumsin, 1; Zaulep Ga, 1; Tasu Bum 2 (1 preserved entire); Tapa Hka, 2; Dalu, 9 (2 preserved entire); Jantang-Dagung Hka, 2; Dagung Hka, 2; Dagung Hka-Chen-ga Hka, 2 (preserved entire); Chen-ga Hka, 5; Chen-ga Hka-Hai Bum, 4; Hai Bum, 9 (1 preserved entire); Singkaling Hkamti, 2; 4 miles south-east of Singkaling Kkamti, 2; Kawai, west bank, 1; Limpa, east bank, 1, west bank, 2; Kaunghein, east bank, 2; Phawzaw, east bank, 1; Maungkan, east bank, 4; Kawya, east bank, 1; Homalin, east bank, 4 (1 preserved entire).

***Semnopithecus (Trachypithecus) pileatus pileatus* Blyth**

Semnopithecus pileatus BLYTH, 1843, Jour. Asiatic Soc. Bengal, vol. 12, p. 174.

TYPE LOCALITY: Unknown.

SPECIMEN COLLECTED: Hai Bum, 1.

REMARKS: A second specimen, also marked Hai Bum, I have included under the subspecies *durga*. It has the buffy underparts of that form but to a less degree than the specimens taken along the river. Unfortunately the altitudes at which these specimens were taken are not given. It is conceivable that this specimen may have been taken at a lower level.

***Semnopithecus (Trachypithecus) pileatus durga* (Wroughton)**

Pithecus durga WROUGHTON, 1916, Jour. Bombay Nat. Hist. Soc., vol. 24, p. 655.

TYPE LOCALITY: Upper Assam.

SPECIMENS COLLECTED: Seven: Rasa, west bank, 1; Jantang-Dagung Hka, 3; Dagung Hka, 1; Chen-ga Hka-Hai Bum, 1; Hai Bum, 1.

REMARKS: These specimens vary from the type description of *durga* and show an approach to *brahma* from north Lakhimpur. The upperparts are mouse gray instead of the clear gray of *shortridgei*. The whiskers and throat show an ochraceous wash hardly discernible on some specimens. There is a sharp contrast between the color of the upper and the undersides of body and the outer and inner surfaces of the limbs.

As mentioned under *pileatus*, a specimen

from Hai Bum shows an approach to that form. The Chindwin River forms a barrier between *durga* and *shortridgei*.

***Semnopithecus (Trachypithecus) pileatus shortridgei* (Wroughton)**

Presbytis shortridgei WROUGHTON, 1915, Jour. Bombay Nat. Hist. Soc., vol. 24, p. 56.

TYPE LOCALITY: Homalin, upper Chindwin, Burma.

SPECIMENS COLLECTED: Thirty-five: Nan-yaseik, 9; Lonkin, 1 (preserved entire); Taw-maw-Mansum, 3; Pumsin, 3; Tasu Bum, 3; Tapa Hka, 3 (1 preserved entire); Saikaung-mong, east bank, 1; Mooktum, east bank, 2; Moklok, east bank, 1; Phawzaw, east bank, 7; Kawngkan, east bank, 2.

***Nycticebus coucang bengalensis* (Fischer)**

Loris bengalensis FISCHER, 1804, Anat. Maki, p. 30.

TYPE LOCALITY: Bengal.

SPECIMENS COLLECTED: Two: Hai Bum, west bank, 1; Singkaling Hkamti, east bank, 1.

***Charronia flavigula flavigula* (Boddaert)**

Mustela flavigula BODDAERT, 1785, Elenchus animalium, vol. 1, p. 88.

TYPE LOCALITY: Nepal?

SPECIMEN COLLECTED: Limpa, 1.

***Paradoxurus hermaphroditus pallasii* Gray**

Paradoxurus pallasii GRAY, 1832, Proc. Zool. Soc. London, p. 67.

TYPE LOCALITY: India.

SPECIMENS COLLECTED: Four: Pumsin, 1; Dalu, 1; Limpa, 1; Kaunghein, 1.

REMARKS: There is considerable difference in the ground color of these skins, the specimen from Dalu being decidedly more buffy. The tip of the tail of the animal from Limpa is buffy white.

***Paradoxurus hermaphroditus laotum* Gyldenstolpe**

Paradoxurus hermaphroditus laotum GYLDENSTOLPE, 1917, K. Svenska Vet. Akad. Handl., vol. 57, no. 2, p. 26.

TYPE LOCALITY: Chieng Hai, upper Siam.

SPECIMEN COLLECTED: Kindat, 1. A native skin without skull.

REMARKS: A much grayer animal than the specimens collected along the upper Chind-

win. The white brow band is more extensive, reaching well up over the forehead.

***Arctogalidia trivirgata millsii* Wroughton**

Arctogalidia millsii WROUGHTON, 1921, Jour. Bombay Nat. Hist. Soc., vol. 27, p. 600.

TYPE LOCALITY: Naga Hills, Mokokchung, 5000 feet.

SPECIMENS COLLECTED: Tawmaw, 3.

REMARKS: This series represents a female and her two half-grown young.

***Viverra zibetha picta* Wroughton**

Viverra zibetha picta WROUGHTON, 1915, Jour. Bombay Nat. Hist. Soc., vol. 24, p. 64.

TYPE LOCALITY: Hkamti, upper Chindwin River.

SPECIMENS COLLECTED: Five: Lonkin, 1; Dalu, 2; Man Pang, 1; Homalin, 1.

REMARKS: This series I have provisionally placed in this questionable subspecies, as the specimen from Man Pang is practically a topotype. They are in winter pelage with heavy hair. Only two are fully adult. Even in this small series there is a great variance in color and markings, and they are indistinguishable from certain skins from southern China in the large series of the American Museum collection.

***Viverricula indica thai* (Kloss)**

Viverricula malaccensis thai KLOSS, 1919, Jour. Nat. Hist. Soc. Siam, vol. 3, p. 352.

TYPE LOCALITY: Prapatom, central Siam.

SPECIMENS COLLECTED: Two: Tawmaw, 1; Homalin, 1.

***Herpestes urva* (Hodgson)**

Gula urva HODGSON, 1836, Jour. Asiatic Soc. Bengal, vol. 5, p. 238.

TYPE LOCALITY: Nepal.

SPECIMENS COLLECTED: Six: Lonkin, 3; Dalu, 1; Nauswa, 1; Manthe, 1.

***Felis (Prionailurus) bengalensis bengalensis* Kerr**

Felis bengalensis KERR, 1792, Animal kingdom of Linnaeus, vol. 1, Mammalia, p. 151.

TYPE LOCALITY: Bengal.

SPECIMENS COLLECTED: Two: Dalu, 1; Gora, 1.

***Felis (Prionailurus) viverrinus* Bennett**

Felis viverrinus BENNETT, 1833, Proc. Zool. Soc. London, p. 68.

TYPE LOCALITY: India.

SPECIMEN COLLECTED: Dawazup, west bank, 1.

REMARKS: According to Pocock (1939, Fauna of British India, vol. 1, p. 284), there are no records of this cat ever having been collected in Burma.

***Callosciurus sladeni rubex* (Thomas)**

Sciurus sladeni rubex THOMAS, 1914, Jour. Bombay Nat. Hist. Soc., vol. 23, p. 198.

TYPE LOCALITY: Lonkin.

SPECIMENS COLLECTED: Nineteen: Nanyaseik, 10; Lonkin, 4 (2 preserved entire); Tawmaw, 3; Tawmaw-Mansum, 1; Mansum, 1.

REMARKS: There is a great variation in this series. The specimens from Nanyaseik have a tendency to be darker with a greater extent of the Ferruginous (Ridgway) coloring on the tail; on some of the specimens this extends to the base. This is also the case of one of the Lonkin specimens. There is great variation in the ferruginous coloring on the muzzle, some individuals having a slight wash on the nose, while in others this color extends well behind the eyes.

***Callosciurus sladeni vernayi* Carter**

Callosciurus sladeni vernayi CARTER, 1942, Amer. Mus. Novitates, no. 1208, p. 1.

TYPE LOCALITY: Tapa Hka, northern Burma, 700 feet.

SPECIMENS COLLECTED: Thirteen: N'bung-hku, 2; Pumsin, 4; Zaulep Ga, 1; Tapa Hka, 4; Dalu, 2.

REMARKS: A squirrel resembling *Callosciurus sladeni rubex* but lacking the rich ferruginous coloration. The tail is colored similar to the body throughout its entire length.

***Callosciurus sladeni shortridgei* Thomas and Wroughton**

Callosciurus sladeni shortridgei THOMAS AND WROUGHTON, 1916, Jour. Bombay Nat. Hist. Soc., vol. 24, p. 232, pl. fig. 1.

TYPE LOCALITY: Hkamti.

SPECIMENS COLLECTED: Forty-seven: Singkaling Hkamti, east bank, 40; Heinsum, east bank, 4; Limpas, east bank, 3.

REMARKS: This series, including the 40 from Singkaling Hkamti, which are topo-



Hylobates hoolock, young male



Macaca speciosa speciosa, male, Gora

types, vary greatly in color. The basic color is Dresden Brown (Ridgway). Many of the specimens are washed over the back, and to a less extent along the sides, with Amber Brown (Ridgway). The same wash extends along the tail. The tail tip varies from white to Ferruginous (Ridgway). The amount of color on the tail varies considerably from the extreme tip alone having color, to a completely ferruginous tail with few annulations. The belly varies from Ochraceous-Orange (Ridgway) to ferruginous. The color of the face markings range from a light buff to an Ochraceous-Buff (Ridgway). In some specimens there is but a slight wash on the nose and cheeks, while in others the color extends well up on the forehead. The fore and hind feet as well as the forearms are of the same color as the face.

***Callosciurus sladeni fryanus* Thomas and Wroughton**

Callosciurus sladeni fryanus THOMAS AND WROUGHTON, 1916, Jour. Bombay Nat. Hist. Soc., vol. 24, p. 232, pl. fig. 2.

TYPE LOCALITY: Minsin, upper Chindwin.

SPECIMENS COLLECTED: Thirty: Kaunghein, east bank, 26 (2 preserved entire); Moklok, east bank, 2; Phawzaw, east bank, 2.

REMARKS: The large series from Kaunghein average an intermediate coloring between *shortridgei* and *fryanus*. A few are indistinguishable from the former, while others are of a much lighter coloration and fit the type description of *fryanus*, even more closely than do the two specimens from Moklok, a few miles north of Munsin, the type locality. Two specimens from Phawzaw, just south of Munsin, are quite typical. One other specimen collected at Phawzaw on the same day agrees with *careyi* in coloration, while a fourth is intermediate. I have included these last two specimens under *careyi*.

***Callosciurus sladeni careyi* Thomas and Wroughton**

Callosciurus sladeni careyi THOMAS AND WROUGHTON, 1916, Jour. Bombay Nat. Hist. Soc., vol. 24, p. 233, pl. fig. 3.

TYPE LOCALITY: Tamarthe, upper Chindwin.

SPECIMENS COLLECTED: Three: Phawzaw, east bank, 2; Manthe, east bank, 1.

REMARKS: The specimen from Manthe is a topotype and agrees well with the type description. One of the specimens from Phawzaw is intermediate in coloration between this form and *fryanus*, while the other is typical.

***Callosciurus sladeni haringtoni* (Thomas)**

Sciurus haringtoni haringtoni THOMAS, 1905, Ann. Mag. Nat. Hist., ser. 7, vol. 16, p. 314.

TYPE LOCALITY: Mounghan.

SPECIMENS COLLECTED: Forty-seven: Hulaung, east bank, 4; Maungkan, east bank, 20; Kawya east bank, 12; Homalin, east bank, 11.

REMARKS: There is a great contrast between the extremes of this series, the color ranging from creamy white with dark tips on only a few of the hairs and with a faint Apricot Buff (Ridgway) wash on the belly, to an animal with numerous dark-tipped hairs, black fore and hind legs, and a black lateral line connecting the black of the fore leg to that of the hind leg. In many cases the dark tipping of the hair extends halfway along the tail. The belly is much darker in this form. Both extremes and intermediates are found among the specimens from all four localities. The darker form with the black line of demarcation has been described by Thomas under the name *solutus*, but Thomas and Wroughton have pointed out, and our series also show, that this name will not stand. The Uyu River forms a barrier to this subspecies on the south.

***Callosciurus sladeni sladeni* (Anderson)**

Sciurus sladeni sladeni ANDERSON, 1871, Proc. Zool. Soc. London, p. 139.

TYPE LOCALITY: Thizyain.

SPECIMENS COLLECTED: Eleven: Mawlaik, east bank, 4; Pantha, east bank, 1; Kalewa, east bank, 6.

REMARKS: The six specimens from Kalewa agree with the description of true *sladeni* in having the darker (described by Anderson as rich chestnut red) coloration on the face, forearms, and fore and hind feet. The color is Ferruginous (Ridgway) in the above specimens. This coloring averages much lighter, being Ochraceous-Orange (Ridgway) in the specimens from Mawlaik and Pantha, although one from Mawlaik is indistinguishable

from the Kalewa series. The specimen from Pantha has a black line of demarcation diagnostic of *bartoni*. This line is also faintly discernible in two of the Kalewa specimens. Thomas and Wroughton question the validity of *bartoni*, and our series would also raise this question. Without specimens from neighboring localities it is impossible to be certain.

***Callosciurus erythraeus crotalius* Thomas and Wroughton**

Callosciurus erythraeus crotalius THOMAS AND WROUGHTON, 1916, Jour. Bombay Nat. Hist. Soc., vol. 24, p. 229.

TYPE LOCALITY: Hkamti, upper Chindwin.

SPECIMENS COLLECTED: Forty-eight: Taga Hka, west bank, 1; Lahkaw Hka, west bank, 1; Jantang-Dagung Hka, west bank, 2; Dagung Hka-Chen-ga Hka, west bank, 2; Chen-ga Hka, 11; Hai Bum, 29 (2 preserved entire); Lachu Ga, 1; Singkaling Hkamti, 1.

REMARKS: This form is characterized by the white-tipped tail. The specimens from Tapa Hka, Lahkaw Hka, and Jantang-Dagung Hka show the white patch on the tail which characterizes *kinneari*. However, they differ from *kinneari* in having the white tail tips. This patch appears to a less degree in four specimens of the Hai Bum series. It is possible that the northern specimens represent a new form separating it from *crotalius* in the same way that *kinneari* is separated from *nagarum*. A more adequate series from the northern part of the range would be necessary before any conclusion could be reached.

The specimen from Singkaling Hkamti approaches *nagarum* in the fact that the tail tip contains but few white hairs.

***Callosciurus erythraeus nagarum* Thomas and Wroughton**

Callosciurus erythraeus nagarum THOMAS AND WROUGHTON, 1916, Jour. Bombay Nat. Hist. Soc., vol. 24, p. 228.

TYPE LOCALITY: Sadiya, Assam.

SPECIMENS COLLECTED: Thirty-five: Hahti, 1; 4 miles east of Hahti, 1; Heinsum, west bank, 5; Limpa, west bank, 2; Kaunghein, west bank, 19 (2 preserved entire); Nauswa, west bank, 3; Moklok, west bank, 1; Pebin, west bank, 1; Tempao, west bank, 1; Homalin, west bank, 1.

REMARKS: This series agree well with the

description of the type from Manipur, south-eastern Assam. The large series from Kaunghein show an intergradation into the more southern form, *kinneari*, two specimens having the large white patch on the tail diagnostic of that form, while three others show indications of it. Specimens collected at the five localities farther south show no intergradation in color. The two specimens from Hahti agree well with the specimens of *nagarum* from farther down the river, while a single specimen from Singkaling Hkamti shows some white hairs in the tail tip; consequently I have placed it with *crotalius*.

***Callosciurus erythraeus kinneari* Thomas and Wroughton**

Callosciurus erythraeus kinneari THOMAS AND WROUGHTON, 1916, Jour. Bombay Nat. Hist. Soc., vol. 24, p. 229.

TYPE LOCALITY: Tatkon, upper Chindwin.

SPECIMEN COLLECTED: Kindat, west bank, 1.

REMARKS: This specimen is a topotype and fits the description of the type specimen in having the large white patch on the tail. As stated under *nagarum*, two specimens from Kaunghein display this same patch, while others show it slightly. Thomas and Wroughton had a series of 14 from the type locality; all but two of these had this conspicuous patch, and it was discernible in the remaining two.

***Ratufa gigantea gigantea* (MacClelland)**

Sciurus giganteus MACCLELLAND'S MS, 1839, Proc. Zool. Soc. London, p. 150.

TYPE LOCALITY: Assam.

SPECIMENS COLLECTED: Sixteen: Lonkin, 3; N'bunghku, 1; Pumsin, 1; Chen-ga Hka-Hai Bum, 1; Hai Bum, 5 (2 preserved entire); Singkaling Hkamti, east bank, 3; Heinsum, west bank, 1; Limpa, west bank, 1.

REMARKS: These specimens from the heavily forested districts agree well with specimens of *gigantea* from Assam and Yunnan in the American Museum collection.

***Ratufa gigantea lutrina* Thomas and Wroughton**

Ratufa gigantea lutrina THOMAS AND WROUGHTON, 1916, Jour. Bombay Nat. Hist. Soc., vol. 24, p. 226.

TYPE LOCALITY: Tatkon, upper Chindwin.

SPECIMENS COLLECTED: Ten: Tamanthi, west bank, 1; Hulaung, east bank, 2; Maungkan, east bank, 6; Kindat, west bank, 1.

REMARKS: The Kindat specimen is a topotype. The series from Hulaung and Maungkan, with their browner coloration and lighter tail tips, fit the description of *lutrina* to a much better degree than does the single specimen from the type locality. The Tamanthi specimen is indistinguishable from the one from Kindat. It is evident that this subspecies is influenced by its environment, the savannah forest, and that the river does not form a barrier, as is the case for some of the smaller squirrels.

***Ratufa fellii* Thomas and Wroughton**

Ratufa fellii THOMAS AND WROUGHTON, 1916, Jour. Bombay Nat. Hist. Soc., vol. 24, p. 226.

TYPE LOCALITY: Yin, Chindwin River.

SPECIMENS COLLECTED: Okma, east bank, 2.

REMARKS: These specimens were collected but a few miles north of the type locality.

***Tomeutes similis owensi* Thomas and Wroughton**

Tomeutes similis owensi THOMAS AND WROUGHTON, 1916, Jour. Bombay Nat. Hist. Soc., vol. 24, p. 236.

TYPE LOCALITY: Minsin, upper Chindwin.

SPECIMENS COLLECTED: Seventeen: Lonkin, 1; Mansum, 2; Pumsin, 1; Limpa, east bank, 2; Kaunghein, east bank, 3; Moklok, east bank, 4; Phawzaw, east bank, 2; Tamanthi, east bank, 2.

REMARKS: The Moklok and Phawzaw specimens were taken within a few miles of Minsin (Munsin), the type locality.

Ellerman, in "The families and genera of living rodents," 1940, p. 373, has placed *owensi* as a subspecies of *lokroides*, and *stevensi* is considered a full species. From the material on hand it appears that *owensi* and *stevensi* intergrade in the region around Dalu. As Thomas and Wroughton state that specimens of true *lokroides* were taken on the west bank as far north as Hkamti and as there is a specimen of *owensi* in this collection taken on the west bank at Limpa, the ranges of these forms overlap. It, therefore, seems advisable to return *owensi* to where Thomas and Wroughton first placed it, as a subspecies of *similis*.

***Tomeutes similis stevensi* (Thomas)**

Sciurus stevensi THOMAS, 1908, Jour. Bombay Nat. Hist. Soc., vol. 18, p. 246.

TYPE LOCALITY: Beni-Chang, Abor-miri Hills, upper Assam.

SPECIMENS COLLECTED: Eleven: Dalu, 1; Hai Bum, 7 (1 preserved entire); Hahti, north bank, 2; Limpa, west bank, 1.

REMARKS: The specimen from Dalu is intermediate in color between this form and *owensi*. While the underparts approach the bluish gray of *stevensi*, the under arms, and to some extent the lower thighs, are buff. There is a slight buffy wash over the entire underparts. With this specimen as an intermediate it seems advisable to consider *stevensi* a form of *similis*, as it intergrades with *owensi* in the vicinity of Dalu, where the river ceases to be a barrier.

***Tomeutes lokroides lokroides* (Hodgson)**

Sciurus lokroides HODGSON, 1836, Jour. Asiatic Soc. Bengal, vol. 5, p. 232.

TYPE LOCALITY: Nepal.

SPECIMENS COLLECTED: Fifty-three: Moklok, west bank, 1; Phawzaw, west bank, 1; Tamanthi-Sinnaing, west bank, 1; Tempao, west bank, 8; Homalin, west bank, 20; Kindat, west bank, 2; Mawlaik, west bank, 3; Kalewa, west bank, 11; Okma, west bank, 6.

REMARKS: This form ranges along the west bank of the Chindwin from Singkaling Hkamti (according to Thomas and Wroughton) to Okma. Thomas and Wroughton also state that at Homalin it is found on the east bank of the river.

A specimen collected at Kindat contained four fetuses.

***Tomeutes pygerythrus janetta* (Thomas)**

Sciurus pygerythrus janetta THOMAS, 1914, Jour. Bombay Nat. Hist. Soc., vol. 23, p. 203.

TYPE LOCALITY: Mandalay.

SPECIMENS COLLECTED: Okma, east bank, 7.

***Dremomys rufigenis opimus* Thomas and Wroughton**

Dremomys rufigenis opimus THOMAS AND WROUGHTON, 1916, Jour. Bombay Nat. Hist. Soc., vol. 24, p. 237.

TYPE LOCALITY: Hkamti.

SPECIMENS COLLECTED: Five: Nanyaseik,

1; Tasu Bum, 1; Lahkaw Hka, 1; Ching-ga Hka, 1; Kaunghein, 1.

***Tamiops maclellandi maclellandi* (Horsfield)**

Sciurus McClellandii HORSFIELD, 1839, Proc. Zool. Soc. London, p. 152.

TYPE LOCALITY: Assam.

SPECIMENS COLLECTED: Twenty-eight: Nanyaseik, 3; Lonkin, 2 (1 preserved entire); Mansum, 1; Dalu, 4; Taga Hka, 5; Lakchang Ga, 1; Jantang-Dagung Hka, 1; Hai Bum, 4; Singkaling Hkamti, east bank, 1; Kowai, west bank, 1; Kaunghein, east bank, 4; Nauswa, west bank, 1.

***Tamiops maclellandi manipurensis* (Bonhote)**

Sciurus MacClellandii manipurensis BONHOTE, 1900, Ann. Mag. Nat. Hist., ser. 7, vol. 5, p. 51.

TYPE LOCALITY: Manipur.

SPECIMEN COLLECTED: Mawlaik, east bank, 1.

***Petaurista candidulus* Wroughton**

Petaurista candidulus WROUGHTON, 1911, Jour. Bombay Nat. Hist. Soc., vol. 20, p. 1021.

TYPE LOCALITY: Kindat.

SPECIMENS COLLECTED: Three: Tawmaw, 1; Pumsin, 1; Kawya, east bank, 1.

REMARKS: The specimen from Kawya fits the type description and agrees with two specimens from Lakhuni, Assam. The two from Tawmaw and Pumsin are darker in coloration and show an approach toward *yunnanensis*.

***Pteromys (Olisthomys) morrisi* Carter**

Pteromys (Olisthomys) morrisi CARTER, 1942, Amer. Mus. Novitates, no. 1208, p. 2.

TYPE LOCALITY: Dalu.

SPECIMEN COLLECTED: Dalu, 1.

REMARKS: A small flying squirrel resembling *Pteromys (Hylopetes) sagitta* in appearance, but it lacks the golden brown coloring, and the skull has the low spreading bullae of *Petinomys*.

***Rhizomys pruinosus pruinosus* Blyth**

Rhizomys pruinosus BLYTH, 1851, Jour. Asiatic Soc. Bengal, vol. 20, p. 519.

TYPE LOCALITY: Cherra Punji, Khasi Hills, Assam.

SPECIMENS COLLECTED: Nine: Mansum, 1; Gora, 5 (1 preserved entire); Pumsin, 2; Tasu Bum, 1.

REMARKS: As there are no available measurements of the type specimen, I am including them for the three adult specimens of this collection: A.M.N.H. No. 112994, male; No. 112998, female; No. 113477, female. Total length, 455 mm., 463, 510; tail, 119, 123, 145; hind foot, 55, 54, 59. Skull measurements: greatest length, 72.5, 67.4, 75.8; basal length, 69, 64.5, 71.3; length of nasals, 28.8, 25.5, 27.7; palatal length, 40, 37.5, 42.8; zygomatic width, 51.8, 50.8, 55.8; mastoid breadth, 38.9, 36.8, 39; breadth of upper molars, 17.5, 17, 18; length of upper tooth row, 15, 14.2, 15; length of lower tooth row, 15.2, 15.2, 15.2.

***Leggada cookii cookii* (Riley)**

Mus cookii RILEY, 1914, Jour. Bombay Nat. Hist. Soc., vol. 22, p. 663.

TYPE LOCALITY: Gokteik, Northern Shan States, Burma; altitude 2133 feet.

SPECIMEN COLLECTED: Tapa Hka, 1.

***Rattus* sp.**

SPECIMEN COLLECTED: Sinkaling Hkamti, 1.

REMARKS: A single specimen of the *rattus* group with white underparts, the white extending to the base of the hairs; upperparts Ochraceous-Tawny (Ridgway) in general color with numerous black guard hairs, brighter on the rump. Sides gray. Gray patch from eye to nose. Fore and hind feet buffy. In skull characters this specimen appears intermediate between true *rattus* and *flavipectus*. Total length, 388 mm.; length of tail, 205; length of hind foot, 34. Skull: greatest length, 41.7; basal length, 39.6; length of nasals, 15.8; palatal length, 25; zygomatic width, 19.3; mastoid breadth, 15.8; length of upper tooth row, 7; length of lower tooth row, 6.8.

***Rattus flavipectus* (Milne-Edwards)**

Mus flavipectus MILNE-EDWARDS, 1871, Nouv. Arch. Mus. Hist. Nat. Paris, vol. 7, bull., p. 93.

TYPE LOCALITY: Moupin.

SPECIMENS COLLECTED: Twenty-six: Gora, 3; Pumsin, 2; Dalu, 14; Tawmaw, 1; Taga Hka, 1; Hai Bum, 5.

REMARKS: Under this heading I am including a heterogeneous series of rats, no two of which are identical. The majority are of lighter color than specimens of *flavipectus*.

from southern China in the American Museum. Hinton's description of *Rattus rattus tistae* from Sikkim (1918, Jour. Bombay Nat. Hist. Soc., vol. 26, p. 68) appears best to fit this series as a whole. Osgood (1932, Publ. Field Mus. Nat. Hist., zool. ser., vol. 18, p. 302) states that *tistae* may be a synonym of *R. f. yunnanensis*. Comparing the above series with specimens of *yunnanensis* in the American Museum collection, there are certain specimens which could easily be placed in this form, both in color and skull characters, but the majority of the series are intermediate in color between true *flavipectus* and *yunnanensis*. It is difficult to come to any definite conclusions with the material on hand.

***Rattus rattus sladeni* (Anderson)**

Mus sladeni ANDERSON, 1878, Anat. and zool. researches western Yunnan, vol. 1, p. 305.

TYPE LOCALITY: Western Yunnan.

SPECIMENS COLLECTED: Seven: Lonkin, 6; Hai Bum, 1.

REMARKS: These specimens agree with a series from Yunnan in the American Museum collection.

***Rattus fulvescens fulvescens* (Gray)**

Mus fulvescens GRAY, 1846, Cat. Mamm. Nepal and Thibet, 1st ed., p. 18.

TYPE LOCALITY: Nepal.

SPECIMENS COLLECTED: Thirteen: Lonkin, 1; Tawmaw, 1; Mansum, 5; Gora, 2; Pumsin, 1; Tasu Bum, 1; Dalu, 1; Lahkaw Hka, 1.

***Rattus mentosus* Thomas**

Rattus mentosus THOMAS, 1916, Jour. Bombay Nat. Hist. Soc., vol. 24, p. 643.

TYPE LOCALITY: Hkampti, upper Chindwin.

SPECIMENS COLLECTED: Two: Lonkin, 1; Dalu, 1.

***Chiropodomys gliroides* (Blyth)**

Mus gliroides BLYTH, 1855, Jour. Asiatic Soc. Bengal, vol. 24, p. 721.

TYPE LOCALITY: Cherra.

SPECIMENS COLLECTED: Four: Dalu, 3; Gora, 1.

***Atherurus macrourus assamensis* Thomas**

Atherurus assamensis THOMAS, 1921, Jour. Bombay Nat. Hist. Soc., vol. 27, p. 598.

TYPE LOCALITY: Cherrapunje, Assam, altitude 4500 feet.

SPECIMENS COLLECTED: Seven: Lonkin, 1 (preserved entire); Pumsin, 1; Dalu, 1; Hai Bum, 4.

***Muntiacus muntjak vaginalis* (Boddaert)**

Cervus vaginalis BODDAERT, 1785, Elenchus animalium, vol. 1, p. 136.

TYPE LOCALITY: Bengal.

SPECIMENS COLLECTED: Nanyaseik, 2.

***Capra hircus* Linnaeus**

Capra hircus LINNAEUS, 1758, Syst. nat., ed. 10, p. 68.

SPECIMENS COLLECTED: Four: Hai Bum, 3; Hahti, 1.

REMARKS: According to Raven, the hill tribes appear to breed a pure culture of goats. All the animals noted at Hahti were white with black head, neck, and fore legs, and this was the only place that such a type was noted. At Hai Bum a brown goat occurs which breeds very true to type.

