# THE MAMMALS OF JAVA

## I. RODENTIA

(Leporidae, Hystricidae, Sciuridae)

By

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## PREFACE.

A new survey of the Java mammals seems to be not a superfluous task. The last work on this group, and not at all an exhaustive one, was that by Koningsberger in 1902, now already nearly thirty years old and therefore out of date. Moreover, this and other publications, even the fundamental works by the older authors, being written in Dutch are often unavailable to many foreign students or misinterpreted by those who have no thorough knowledge of the language. For these reasons a new survey taking into account both the older writings and the newest investigations may be welcome; at the same time it may serve as a basis for future treatises on mammals from other parts of the Indo-Australian Archipelago. As the material of Java mammals in the Buitenzorg Museum is more complete than that from any other part of the region covered by this Institute it seems reasonable to begin with the mammal fauna of this island.

Before giving our descriptions some information about the lines along which the work is carried out may be not out of place here. In distinction to many modern systematic workers I still consider the species as the most important taxonomic unit, the more so as so many of the newly described subspecies are of very doubtful value often based on individual variation only, the subspecific constancy being seldom ascertained. I also prefer to give the synonyma mainly under the species unless the author had a clear notion of the described form being distinct from its nearest allies now considered as subspecies.

As to the names used I followed as strictly as possible the nomenclatural rules but these having not brought us the much desired finality I chose the names used in Trouessart's Catalogue Supplement 1904 for making the newest nomenclatural novelties understandable for the general reader. These names, so far as they can be considered synonymous, have been printed in heavier type, and I should like to advise all anatomists, physiologists and even those zoologists who are not nomenclatorists by profession to use these names; or always give, at least, these names in addition to the newest ones.

The references are far from complete as only those works or papers dealing with Java mammals or giving Java as a locality where the species occurs have been quoted. For abbreviations and literature see list below.

In using the following paper one should always bear in mind that the keys are only made for the identification of Java species and the description of the species is based on Java material.

In describing the more delicate tinges I followed RIDGWAY's "Color standards and color nomenclature" 1912.

Finally I wish to express my grateful thanks to Mr. C. BODEN KLOSS, Director of Museums Straits Settlements and Federated Malay States, for reading the manuscript. I owe to him the opportunity of examining the collection of Java rodents present in the Raffles Museum, Singapore: this important material has been a great help in accomplishing the work.

### LIST OF ABBREVIATIONS OF THE MORE OFTEN QUOTED PERIODICALS.

A.M.N.H. — Annals and Magazine of Natural History, London.
J.A.S.B. — Journal of the Asiatic Society of Bengal.
J.B.N.H.S. — Journal of the Bombay Natural History Society.
J.F.M.S.Mus. — Journal of the Federated Malay States Museums.
J.M.Br.A.S. — Journal of the Malayan Branch of the Royal Asiatic Society (continuation of the J. Straits Br.R.A.S.).
N.L.M. — Notes from the Leyden Museum.
N.T.N.I. — Natuurkundig Tijdschrift voor Nederlandsch-Indië.
P.Z.S. — Proceedings of the Zoological Society of London.
Z.M.L. — Zoologische Mededeelingen van 's Rijks Museum van Natuurlijke Historie te Leiden (continuation of the Notes Leyden Museum).

### LIST OF LITERATURE.

Between square brackets the abbreviations by which the more frequently mentioned works are quoted. The works or papers marked with an asterisk are those which deal with the Java fauna generally or Java mammals specially.

v. BALEN [Zoogd.] — De Dierenwereld van Insulinde, I. Zoogdieren, 1914.
* BARTELS, Iets over de fauna in het gebergte-wildhoutbosch van Java, Tectona X, 1917, p. 261.
BLANFORD [Ind. Mamm.] — The Fauna of British India, Mammalia, 1891.
DAMMERMAN [Landb. Dierk.] — Landbouwdierkunde van Oost-Indië, 1919.
——— [Agric. Zool.] — The Agricultural Zoology of the Malay Archipelago, 1929.
* ——— [Tjibodas] — The fauna of the Nature Reserve Tjibodas-Gn.Gede, Excursion C 3, 4th Pac. Sci. Congr., 1929 (list of mammals, p. 21).
* ——— On the Zoogeography of Java, Treubia XI, 1929, p. 1 (list of mammals, p. 33).
* v. HEURN (F. C.), Het land Bolang en zijn natuurlijke rijkdommen, Ind. Gids 49 II, 1927 (Zoogdieren, p. 704).

* Horsfield [Zool. Res.] — Zoological researches in Java, and the neighbouring islands, London 1824.

Jentink [Cat. ost.] — Catalogue ostéologique des Mammifères, Mus. d'Hist. naturelle des Pays-Bas, T. IX, 1887.

——— [Cat. syst.] — Catalogue systématique des Mammifères, idem T. XI, 1892; T. XII, 1888.

* Junghuhn, Java, zijne gedaante, zijn plantentooi en inwendige bouw, 2e Dr. I-III, 1853—1854.

Kloss, Seven new Malaysian Mammals, Journ. F.M.S.Mus. X, 1921, p. 229.

* Kohlbrugge, Zoogdieren van den Tengger, Natuurk. Tijdschr. Ned. Ind. 55, 1896, p. 261.

* Koningsberger, De Zoogdieren van Java, Med. 's Lands Plantent. Buitenzorg 54, 1902.

* ——— Zoologische wandelingen te Tjibodas I-VI, Teysmannia 18, 1907.

* ——— Java, Zoologisch en Biologisch, Buitenzorg 1915.

v. Martens [Preuss. Exp.] — Die Preussische Expedition nach Ost-Asien, Zool. I, 1876.

* Martin [Java] — Unsere Palaeozoologische Kenntnis von Java, Leiden 1919.

Mohnike [Thierl. Mal.] — Blicke auf das Pflanzen- u. Thierleben in den Niederl. Malaienländern, 1883.

Müller en Schlegel [Verh. Zoogd.] — Temminck's Verhandelingen over de Natuurl. Geschiedenis der Ned. overzeesche bezittingen — Zoogdieren, 1839—1844.

* Raffles [Java] — The History of Java, 2nd Ed., 1830.

* Robinson and Kloss, On five new mammals from Java, Ann. Mag. Nat. Hist. (9) IV, 1919, p. 374.

* Sody, Lijst van Buitenzorg-vogels en zoogdieren, Natuurk. Tijdschr. Ned. Ind. 87, 1927, p. 181.

* ——— Naamlijst van de Zoogdieren van Java. Met korte beschrijving van twee nieuwe subspecies, Natuurk. Tijdschr. Ned. Ind. 89, 1929, p. 160.

* ——— Twee Zoogdierlijsten van Java, Natuurk. Tijdschr. Ned. Ind. 90, 1930, p. 274.

Temminck [Mon. Mamm.] — Monographies de Mammalogie, I 1827, II 1835—1841.

——— [Fauna Jap. Intr.] — Coup-d'oeil sur la faune des îles de la Sonde et de l'empire du Japon, Faune du Japon, Introduction, 1835.

——— [Inde Arch.] — Coup-d'oeil général sur les possessions néerlandaises dans l'Inde Archipélagique I-III, 1846—1849.

* Thomas and Wroughton, On a collection of mammals from Western Java, Proc. Zool. Soc. London 1909, p. 371.

Tjeenk Willink, Mammalia voorkomende in Nederlandsch-Indië, Natuurk. Tijdschr. Ned. Indië 65, 1905, p. 153.

Trouessart [Cat.] — Catalogus Mammalium tam viventium quam fossilium, 1897—1899.

TROUESSART [Cat. Suppl.] — idem, Quinquennale Supplementum, 1904—1905.
* VETH, Java, geographisch, ethnologisch, historisch, 2e Dr. Dl. III, 1912.
WEBER [Zool. Erg.] — Zoologische Ergebnisse einer Reise in Niederländisch Ost-Indien I-IV, 1890—1907.

## Order **RODENTIA**

(RODENTS — KNAAGDIEREN)

THOMAS, On the Genera of Rodents, P.Z.S. 1896, p. 1012. MILLER and GIDLEY, Synopsis of the supergeneric groups of Rodents, Journ. Wash. Acad. Sci. VIII, 1918, p. 431. WHROUGHTON, Indian Mammal Survey—Rodentia, J.B.N.H.S. 26, 1919, pp. 351, 776, 954; 27, 1920, p. 57.

Key to the suborders

1a. Four upper incisors, a smaller inner pair behind the outer ones ..... Duplicidentata
1b. Two upper incisors ..... Simplicidentata

### Suborder DUPLICIDENTATA

Only one family represented in Java ..... Leporidae

### Suborder SIMPLICIDENTATA

Key to the families

1a. Processus angularis of mandible arising from outer side of alveoli. Body covered with spines ..... Hystricidae
1b. Processus angularis arising from lower edge of alveoli ..... 2
2a. One or two upper premolars and one lower one on each side; processus postorbitalis present; tibia and fibula distinct. Tail bushy ..... Sciuridae
2b. No premolars present, upper and lower molar series with three teeth; processus postorbitalis absent; tibia and fibula united. Tail largely scaly Muridae

### Suborder *DUPLICIDENTATA*

### Fam. LEPORIDAE

(HARES — HAZEN)

FORSYTH MAJOR, On fossil and recent Lagomorpha, Trans. Linn. Soc. London (2) Zool. VII, 1899, p. 433. LYON, Classification of the hares and their allies, Smithson. Misc. Coll. 45, 1904, p. 321. POCOCK, The external characters of the Lagomorph Rodents, P.Z.S. 1925, p. 669.

Genus **LEPUS**, LINNAEUS (1758).

The only genus represented in Java, with one species.

## **Lepus nigricollis** F. CUV.

(The Black-naped Hare — De Javaansche Haas)

**Lepus nigricollis**

F. CUVIER, Dict. Sci. Nat. 26, 1823, p. 307. MÜLLER, Verh. Zoogd., 1839, p. 37. ZELEBOR, Reise Novara Zool. I, 1869, p. 31. MARTENS, Preuss. Exp. I, 1876, pp. 256, 348, MOHNIKE, Thierl. Mal. 1883, p. 429. JENTINK, Cat. ost. 1887, p. 237; Cat. syst. XII, 1888, p. 112; Tijdschr. Aardr. Gen. (2) VI, 1889, p. 245; Weber's Zool. Erg. I, 1890, p. 122. WEBER, op.c. p. 95, BLANFORD, Ind. Mamm. 1891, p. 449, fig. 147. TROUESSART, Cat. 1897, p. 652. KONINGSBERGER, Med. Plantent. 54, 1902, p. 57. TROUESSART, Cat. Suppl. 1904, p. 543. TJEENK WILLINK, N.T.N.I. 65, 1905, p. 268. VETH, Java III, 1912, p. 292. v. BALEN, Zoogd. 1914, p. 256. BREHM, Tierl. Säuget, II, 1914, p. 123. KONINGSBERGER, Java, 1915, p. 311. OLIVIER, Teysmannia 27, 1916, p. 484. ENCYCL. Ned. Indië II, 1918, p. 75. SODY, N.T.N.I. 87, 1927, p. 199; 89, 1929, p. 162. DAMMERMAN, Treubia XI, 1929, pp. 5, 6, 35.

*Lepus melanauchen*

TEMMINCK, Faune Jap. Ir.tr. 1835, p. XIII.

*Lepus melanonauchen*

TEMMINCK, Inde Arch. I, 1846, p. 325.

*Lepus kurgosa*

GRAY, Voy. Samarang Zool. 1849, p. 23. WALLACE, Geogr. Distr. Anim. I, 1876, p. 350; Island Life 1880, p. 358.

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v. HEURN, Ind. Gids 49 II, 1927. p. 707.

*Vernacular names* [1]).

This hare is known in West Java as "kelinchi", a corruption of the Dutch "konijntje" (rabbit).

*Nomenclatural.*

In 1835 TEMMINCK introduced the new name *L. melanauchen*, corrected in 1846 by the same author into *melanonauchen*. But the species was rightly recognized as the Indian *L. nigricollis* by MÜLLER in his first paper of the "Verhandelingen" (1839).

The name *kurgosa* is not applicable to this Javan hare, it being a synonym of the Indian *L. ruficaudatus*.

*Description.*

Upperparts yellowish brown, variegated with black, hind part of the rump more greyish. Fur of the back consisting of yellowish brown hairs with darker bases and black tips, the interspersed longer hairs with the third terminal black. Behind the ears on the neck a black or brownish black mark as broad as the head. The head above has the same colour as the back; cheeks and muzzle greyish; above the nares the hairs are more rufous. Above and beneath the eyes, which have light orbital rings, are patches of black hairs. On the front of the head usually a small white spot. Whiskers black or white with black basal end. Ears when turned forward reaching beyond the head; outside dark brown, the tip blackish, the base greyish white; inside greyish, the outer margin bordered by a very narrow white fringe.

[1]) In transcribing these names according to the Dutch spelling, ch = tj, j = dj, u = oe, and y = j.

Underparts white except for the breast which is orchraceous and the hinder parts of the cheeks which are dark greyish. The sides are demarcated from the white underside by ochraceous hairs. Fur of lower surface composed of pure white hairs.

The short tail is coloured above like the back or rump, but often more uniformly blackish; underneath white.

Forelegs on the outside ochraceous, on the inside of a lighter shade; hindlegs more greyish like hinder part of back, the inside whitish. Paws underneath covered with tufts of strong hairs of clay colour.

Female with 4 abdominal mammae, the hindmost ones much nearer to each other than the anterior ones. The young ones are more rufous on the back, the black patches more regularly dispersed, whereas in older specimens these black hairs form irregular lines and spots. A young individual (♀) from Buitenzorg is more uniformly rufous on head and back, the head especially being without the typical black variegations of the normal examples.

*Remarks.* We were able to compare our Javanese examples with four Indian specimens, one from Ceylon and three from continental India, kindly lent by the Indian Museum, Calcutta. The latter have the colour of the forelegs more tawny, the muzzle yellowish instead of greyish, cheeks also washed with ochraceous and the front of the head from the nares more tawny. The general colour of the back is less dark and the black variegations are less conspicuous. I do not know whether these deviations are constant, as the Indian examples were old and somewhat faded. But should the Java form prove to be different it should bear the name "*melanauchen*" first used by TEMMINCK in 1835.

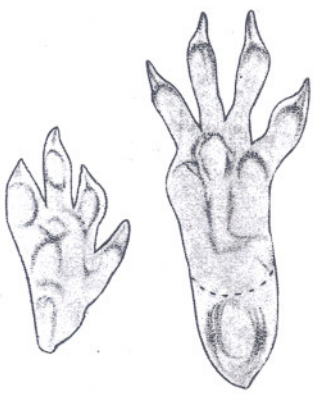

Fig. 1. Footprint of *Lepus nigricollis*; right fore and hindpaw; ¾ nat. size.

*Footprint* (fig. 1).

The footprint of the hare is rather characteristic but indistinct owing to the hairy mat on the underside of the paws. Impression of the forepaw about 2.3 × 4 cm; of the hindpaw, when fully stretched, 2.7 × 6.7 cm. When the animal is hopping the heel does not make a print and the whole impression is much shorter, about 5 cm.

*Measurements and weight.*

Measurements, average and maximum (in mm): total length, 490 (514); head and body, 415 (444); tail, 71 (79); ear, 85 (90); hindfoot, 93 (94).

Weight of two examples in the Buitenzorg Museum 1450 and 1340 gr, according to OLIVIER (1916) a full-grown specimen may even reach 2500 gr.

*Skull.*

Part of the maxillary covering the nasal cavity and squamosum in the neighbourhood of the auditory bullae broken up into a bony network; supra-occipital also very spongeous. Two pairs of upper incisors, a smaller pair behind the larger ones; the upper incisors each with one longitudinal groove

Measurements

| Mus. Btzg. No. | ♂ 117 | ♀ 1879 | ♂ 1883 | ♀ 2373 | ♂ 2410 |
|---|---|---|---|---|---|
| total length | 485 | 514 | 470 | 495 | 474 |
| head & body | 415 | 444 | 400 | 416 | 406 |
| tail | 70 | 70 | 70 | 79 | 68 |
| ear | 77 | 90 | 90 | 86 | 84 |
| hindfoot | — | 94 | 93 | 93 | 93 |

filled with cement; $p^1$ with three lobes in front, $p_1$ divided into two parts, anterior part with two lobes in front. Crown of molars divided into two parts by median transverse fold; $m^3$ very small.

Skull measurements

| Mus. Btzg. No. | ♂ 117 | ♂ 1883 | ♂ 2410 | ♂ 2411 | ♀ 1879 | ♀ 2373 |
|---|---|---|---|---|---|---|
| total length | 83.5 | 79.9 | 81.9 | 85.8 | 85.7 | 81.0 |
| basilar length | 68.8 | 63.6 | 66.3 | 69.4 | 69.6 | 65.3 |
| zygomatic breadth | 40.1 | 38.7 | 40.4 | 40.3 | 41.6 | 41.7 |
| cranial width | 28.5 | 27.5 | 28.2 | 28.1 | 28.4 | 27.5 |
| least postorb. breadth | 12 7 | 12.0 | 14.2 | 11.8 | 13.1 | 13.0 |
| med. length nasals | 37.5 | 36.5 | 35.3 | 39.1 | 39.3 | — |
| gr. breadth comb. nas. | 19.3 | 18.5 | 21.3 | 19.5 | 21.4 | 18.4 |
| palatilar length | 30.6 | 29.3 | 29.4 | 30.4 | 31.7 | 29.2 |
| length inc. foram. | 21.8 | 21.0 | 22.0 | 21.4 | 22.1 | 20.2 |
| length upper mol. ser. | 15.7 | 14.9 | 14.2 | 16.0 | 15.5 | 14.7 |
| diastema i-p | 22.6 | 22.7 | 22.0 | 22.7 | 22.9 | 21.4 |
| length lower mol. ser. | 17.4 | 15.2 | 14.5 | 17.0 | 16.9 | 15.6 |

Measurements, average and maximum (in mm): total length, 83 (85.8); basilar length, 67 (69.6); zygomatic breadth, 40.5 (41.7); cranial width, 28 (28.5); least postorbital breadth, 13 (14.2); median length of nasals, 37.5 (39.3); greatest breadth of combined nasals, 20 (21.4); palatilar length, 30 (31.7); length incisive foramina, 21.5 (22.1); length upper molar series, 15 (16); diastema i-p, 22.5 (22.9); length lower molar series, 16 (17.4).

*Habits.*

The species prefers open country with some shrubs for refuge. It is a rather harmless animal but it may become troublesome in vegetable gardens and for other low-growing crops. In West Java it is often found in tea gardens but it does no damage to this crop eating mainly thick-leaved weeds. It makes its appearance at twilight and night, and as a true hare it does not burrow but makes a litter where also the young ones are dropped. There is apparently no special rutting season and the number of young seems always to be two only. The period of gestation is said to be about one month.

*Distribution.*

India, Ceylon and West Java. In West Java the species occupies a very limited area, KONINGSBERGER (1915) giving its boundaries as follows: West the river Tjikandi in Bantam, East the river Tjitaroem, South the mountain range Salak-Gede. But this hare is now recorded from Rangkasbitoeng (OLIVIER) and Tjibadak. The species is evidently introduced into Java; moreover, the vernacular name mentioned above is also an indication of the correctness of this opinion. VON MARTENS (1876), who could buy living specimens at the Batavia markets, tells us that the species was said to have been introduced by the Governor-General DAENDELS (1807-1811), but there seems to be no historical confirmation for this supposition. VON MARTENS himself cites Major THORN's "History of the conquest of Java, London 1815", but the statement of this author does not sound very reliable as he relates that "hares and rabbits are pretty common, and deer and antilopes also plentiful".

In the Leiden Museum is a skeleton from Buitenzorg originating from KUHL and v. HASSELT, which must have been taken at the time these naturalists were making collections there in 1821.

Localities. West Java: Rangkasbitoeng; Batavia; Depok; Bolang; Buitenzorg; Tjibadak.

## Suborder *SIMPLICIDENTATA*

## Fam. HYSTRICIDAE

### (PORCUPINES — STEKELVARKENS)

LYON, Notes on the Porcupines, Proc. U. S. Nat. Mus. 32, 1907,p. 575. POCOCK, External characters of Hystricomorph Rodents, P.Z.S. 1922, p. 365. LÖNNBERG, On the Chinese Porcupine *Hystrix subcristata* with some remarks on other members of the genus, Ark. Zool. 15, No. 18, 1923, p. 1.

### Genus **HYSTRIX**, LINNAEUS (1758).

The only species in Java, *H. javanica*, was made the type of the genus *Acanthion* by F. CUVIER in 1822. This genus differs from the genus *Hystrix* s. str. only cranially in having much smaller nasals, these being not yet $^2/_5$ of the length of the skull, and having no depression on the parietals at the meeting of sagittal and coronal sutures. As pointed out by LÖNNBERG the division is, however, wholly artificial and as, moreover, the species belonging to the two genera are very similar in external appearance, we prefer to drop the genus *Acanthion*.

### *Hystrix brachyura javanica* F. Cuv.

(The Javanese Porcupine — Het Javaansche Stekelvarken).

*Acanthion javanicum*

F. CUVIER, Mem. Mus. Hist. Nat. Paris IX 1822, pp. 424, 431, pl. I, figs. 3, 4. JUNGHUHN, Java I, 1853, p. 328. GERVAIS, Hist. Nat. Mamm., 1854, p. 332. GRAY,

P.Z.S. 1866, p. 310. JENTINK, Cat. ost. 1887, p. 232; Cat. syst. XII, 1888, p. 103; Weber's Zool. Erg. I, 1890, p. 121. WEBER, op. c. p. 95; III, 1894, p. 267. LYON, Proc. U.S. Nat. Mus. 32, 1907, p. 580. VETH, Java III, 1912, p. 292.

*Hystrix torquata*

v. D. HOEVEN, Tijdschr. Nat. Gesch. Phys. III B, 1836, p. 110.

*Hystrix ecaudata*

IDEM, l.c., p. 110.

*Hystrix fasciculata*

MÜLLER, Verh. Zoogd. 1839, p. 36. MOHNIKE, Thierl. Mal. 1883, p. 429.

*Hystrix brevispinosa*

WAGNER, Schreber's Säugeth. Suppl. IV, 1844, p. 20.

*Hystrix Flemingii*

GRAY, P.Z.S. 1847, p. 101.

**Hystrix javanica**

WATERHOUSE, Nat. Hist. Mamm. II, 1848, p. 465, pl. XX, fig. 4. MARSHALL, P.Z.S. 1871, p. 235. JENTINK, N.L.M. I, 1879, p. 87. KOHLBRUGGE, N.T.N.I. 55, 1896, p. 263. TROUESSART, Cat. 1897, p. 617. KONINGSBERGER, Med. Plantent. 54, 1902, p. 57. TROUESSART, Cat. Suppl. 1904, p. 511. TJEENK WILLINK, N.T.N.I. 65, 1905, p. 266. BREHM, Tierl. Säuget. II, 1914, p. 188. v. BALEN, Zoogd. 1914, p. 261. KONINGSBERGER, Java 1915, p. 224. DAMMERMAN, Landb. Dierk. 1919, p. 219, fig. 94. ENCYCL. Ned. Ind. IV, 1921, p. 110. SODY, N.T.N.I. 87, 1927, p. 199. WEBER, Säuget. II, 1928, p. 289.

*Acanthion (Acantherium) javanicum*

GRAY, Voy. Samarang Zool. 1849, p. 22.

*Hystrix brachyura javanica*

DAMMERMAN, Agric. Zool. 1929, p. 275, fig. 130; Treubia XI, 1929, p. 35.

*Acanthion brachyurus javanicus*

SODY, N.T.N.I. 89, 1929, p. 164; 90, 1930, p. 282.

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v. HEURN, Ind. Gids 49 II, 1927, p. 706.

*Vernacular names.*

The porcupine is everywhere denoted by the malay name "landak".

*Nomenclatural.*

MÜLLER (1839) considered the forms of *Hystrix* from Java, Sumatra and Borneo as one and the same species, mentioned by him under the name *fasciculata* SHAW (1801). Later on most authors referred the true porcupines from the Greater Sunda Islands to different species but lately the forms were again united now being treated as subspecies of the *H. brachyura* originally described from the Malay Peninsula by LINNAEUS (1758).

The names *torquata* and *ecaudata* are both nomina nuda, *torquata* being a synonym of *javanica*, whereas there seems to have been an example in the Leiden Museum labelled "*ecaudata* Boie et Macklot". According to JENTINK (1879) this specimen is no longer to be found.

*Description.*

Colour above brownish, the lower half of the back bearing long quills. Head with long spinous hairs, brownish with lighter bases and darker towards the tips, growing longer on the nape but not forming a real crest. The brownish black whiskers are very long, the longest ones 15 cm, the tips being sometimes whitish. Behind the eye a few shorter bristles. Ears almost naked, the inside

clad with white hairs. Anterior half of the back covered with strong flat spines, grooved above, with light bases and white tips, these more conspicuous in the spines of the sides; spines on the back up to 6 cm. Beneath the spines very few white hairs are found. The round quills on the lower part of the back can reach a length of 16 cm; the basal half is white, the distal half with a white tip and a dark band which usually is of nearly equal length to the white portion. The hindermost part of the back bears shorter quills. Scattered between the stronger rigid quills there are more slender and flexible ones, being almost entirely white, most of them having a dark ring near the base; they may reach a length of 18 cm.

Under surface lighter brownish, the throat with a collar of white spines and a more or less conspicuous band of the same colour on the breast between the forelegs. The chin almost naked. Middle part of the belly with flat brownish spines.

The short tail is adorned at its end with a number of white hollow open quills stalked on long supports, with which the animal can make a rattling noise. Base of the tail above with quills like those on the back, underneath with white quills and spines.

Fore and hindlegs covered above with long dark brown hairs, underside more sparsely haired; the nails of a light horny colour.

The female has 6 mammae.

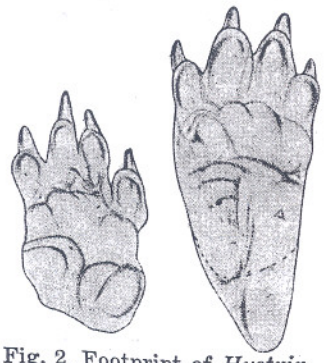

Fig. 2. Footprint of *Hystrix javanica*; right fore and hindpaw; ½ nat. size.

*Footprint* (fig. 2).

The print of the forepaw is about 6.5 × 3.7 cm, that of the hindpaw 9.5 × 4 cm when fully stretched, without the heel only 7.2 cm long.

*Measurements and weight.*

The largest specimen measured by us has a total length of 773, head and body 686, tail 87, ear 36 mm; and a weight of 8422 grammes.

*Skull.*

As the series in our collection consists mainly of half-grown individuals we give only the cranial measurements of the largest example.

Total length, 128.6; basilar length, 111.9; zygomatic breadth, 66.8; cranial width, 43.3; least postorbital breadth, 36; median length of nasals, 50.1; greatest breadth of combined nasals, 24; palatilar length, 52.5; length incisive foramen, 4.2; length upper molar series, 25.5; diastema i-p, 33.7; length lower molar series, 29.8 mm.

*Habits.*

The porcupine is a common animal of the lowlands and hilly regions, feeding on roots, tubers and low-growing crops and becoming often noxious in this way. It lives in pairs hiding itself during day-time in holes or caves or they make burrows in the soil which have usually two exits, one ending just beneath the surface. When pursued they break through this hidden exit with

astonishing rapidity. They come out at twilight and forage during the night. When angry the animal makes a rattling noise with the hollow tail quills at the same time erecting the dorsal spines and trampling the soil with its hindfeet.

The sound emitted is a kind of grunting. It keeps its fiends at a distance by turning upon them the large quills with which it can inflict severe wounds.

There seem to be only two young at each birth; two nearly full-grown embryo's were found once in a pregnant female from Buitenzorg at the end of September.

The species is much pursued on account of the quills, these being used for hairdresses, ornaments, boxes, and for making needles etc. Chinese people particularly are fond of the flesh which is very palatable.

*Distribution.*

The subspecies *javanica* is found all over Java and perhaps also in some islands in the neighbourhood but the subspecific affinities of the latter forms have not yet been fully settled.

## Fam. SCIURIDAE
## (SQUIRRELS — EEKHOORNS)

FORSYTH MAJOR, On the dentition and classification of the Sciurinae, P.Z.S 1893, p. 179. ROBINSON and KLOSS, A nominal list of the Sciuridae of the Oriental Region, Rec. Ind. Mus. XV, 1918, p. 171. POCOCK, External characters of some squirrels, P.Z.S. 1922, p. 1171; The classification of the Sciuridae, P.Z.S. 1923, p. 209.

### Key to the Subfamilies

1a. Flying squirrels, limbs united by a membrane. Skull broad with short rostrum; postorbital processes strongly developed. Molars more or less hypselodont ..... Pteromyinae

1b. Limbs free. Skull mostly slender and the postorbital processes less expanded. Molars brachyodont ..... Sciurinae

### Subfamily *PTEROMYINAE*
### (FLYING SQUIRRELS — VLIEGENDE EEKHOORNS)

SCHLEGEL en MÜLLER, Vliegende eekhoorns, Verh. Zoogd. 1839—44, p. 103.

### Key to the genera

1a. Size large, head and body exceeding 30 cm in length. An interfemoral membrane between the base of the tail and hindlegs. Tail round and bushy. Pattern of molars much complicated ..... *Petaurista*

1b. Size small, length of head and body not exceeding 25 cm. Tail entirely free, flat and distichous. Molars with cusps or ridges regularly arranged in transverse or longitudinal direction ..... *Sciuropterus*

## Genus **PETAURISTA**, PALLAS (1792).

### Key to the species

1a. General colour above uniformly chestnut. Parietal crests of the skull slightly constricted behind; nasals ending posteriorly in line with the premaxillae ..... *P. petaurista*

1b. Upper surface bicoloured, mahogany red and dark grey. Parietal crests strongly constricted behind; posterior ends of nasals reaching beyond the line connecting the premaxillae ..... *P. elegans*

### **Petaurista petaurista** (PALL.).

(The Red Flying squirrel — De Roodbruine Vliegende eekhoorn)

*Sciurus petaurista*
PALLAS, Misc. Zool. 1766, p. 54.

*Sciurus nitidus*
DESMAREST, Nouv. Dict. Hist. Nat. XXVII, 1818, p. 403.

**Pteromys nitidus**
TEMMINCK, Faune Jap. Intr. 1835, p. XII. MÜLLER, Verh. Zoogd. 1839, p. 35. SCHLEGEL en MÜLLER, op. c. 1839—44, pp. 107, 112. GRAY, Voy. Samarang Zool. 1849, p. 23. JUNGHUHN, Java I, 1853, p. 537. ZELEBOR, Reise Novara Zool. I, 1869, p. 25. JENTINK, Cat. ost. 1887, p. 181; Cat. syst. XII, 1888, p. 3; Weber's Zool. Erg. I, 1890, p. 115 WEBER, op. c., p. 95. KOHLBRUGGE, N.T.N.I. 55, 1896, pp. 263, 296. TROUESSART, Cat. 1897, p. 397. KONINGSBERGER, Med. Plantent. 54, 1902, p. 46. TROUESSART, Cat. Suppl. 1904, p. 298. TJEENK WILLINK, N.T.N.I. 65, 1905, p. 230. v. BALEN, Zoogd. 1914, p. 305. BARTELS, Tectona X, 1917, p. 264. ENCYCL. Ned. Ind. I, 1917, p. 653.

*Petaurista nitida*
THOMAS, A.M.N.H. (8) I, 1908, p. 250. THOMAS and WROUGHTON, P.Z.S. 1909, p. 387.

*Petaurista petaurista*
ROBINSON and KLOSS, Rec. Ind. Mus. XV, 1918, p. 172.

*Vernacular names.*

Sund.: tando; Javan.: walang kopo. The same names, however, are also given to other species of flying squirrels.

*Description.*

The dense fur above is long and soft, brilliantly chestnut in colour; fur consisting of hairs with basal half dusky, the distal half brown with black tip; undulating woolly hairs very numerous, mixed red-brown and dark greyish. Head above as back, front and cheeks more bay; tip of nose and orbital rings black. Outside of ears red-brown; basal half of inside almost naked, towards the tip with golden red-brown hairs.

Underparts ochraceous salmon, chin with a dark patch.

Parachute a broad expansion between the legs. Forelegs on the outer side with a special dermal extension, reaching far beyond the hands. It is supported by a bony cartilage originating from the outer side of the wrist. An antebrachial membrane (propatagium) from the arm to the side of the neck. Interfemoral

membrane (uropatagium) short, extending from the base of the tail to the heel. Patagium mainly coloured as the body; the propatagium bordered with long brownish black fur.

The long bushy tail usually chestnut above, the base and the tip always blackish; the terminal tuft with black hairs up to 10 cm long. Underneath the colour is of a lighter shade.

Forelegs above as dorsal side, hands blackish; first half of underside coloured as lower surface of body, the distal half brownish black. At the basis of the hand a bundle of stiff black bristles (carpal vibrissae). Hindlegs above as dorsum, the sides with dark brown fur, the black colour extending along the margin of the uropatagium. Feet blackish. Young specimens seem to be much darker; a foetus from Bandjar (C. Java) in our collection has head and back entirely black. The scrotum of the male is also blackish; the female with three pairs of mammae, situated at regular intervals on the middle of the belly.

*Measurements and weight.*

Measurements, average and maximum (in mm): total length, 907 (978); head & body, 410 (441); tail, 497 (556); ear, 40.5 (42); hindfoot, 76 (80).

A single specimen of 850 mm length weighed 971 grammes.

Measurements

| | W. Java | | C. Java | | E. Java | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Mus. Btzg. No. | ♂ 2008 | ♂ 2666 | ♂ 2181 | ♀ 2339 | ♂ 697 | ♂ 699 | ♂ 703 | ♀ 700 | ♀ 698 | ♀ 702 |
| total length | 850 | 902 | 978 | 878 | 897 | 907 | 865 | 953 | 943 | 902 |
| head & body | 354 | 392 | 422 | 394 | 432 | 414 | 415 | 441 | 441 | 399 |
| tail | 496 | 510 | 556 | 484 | 465 | 493 | 450 | 512 | 502 | 503 |
| ear | 38 | 37 | 42 | 42 | 41 | 39 | 41 | 42 | 40 | 42 |
| hindfoot | 75 | 77 | 80 | 76 | 72 | 75 | 76 | 80 | 74 | 78 |

Skull measurements

| Mus. Btzg. No. | ♂ 2008 | ♂ 2666 | ♂ 2181 | ♀ 2339 | ♂ 697 | ♂ 699 | ♂ 703 | ♀ 700 | ♀ 698 | ♀ 702 |
|---|---|---|---|---|---|---|---|---|---|---|
| total length | 65.0 | 71.6 | 68.7 | 66.3 | 68.5 | 70.4 | 68.1 | 69.8 | 68.8 | 69.6 |
| basilar length | 57.2 | 64.0 | 62.5 | 58.8 | 60.5 | 61.6 | 60.4 | 63.0 | 61.9 | 61.6 |
| zygom. breadth | 44.7 | 48.6 | 47.3 | 44.6 | 47.8 | 47.0 | 49.5 | 48.2 | 46.5 | 49.7 |
| cranial width | 28.5 | 31.8 | 29.0 | 29.5 | 29.8 | 31.2 | 31.4 | 30.8 | 30.5 | 31.3 |
| least interorb. br. | 13.9 | 17.5 | 15.4 | 14.2 | 15.5 | 15.6 | 16.9 | 16.6 | 15.0 | 16.4 |
| outer dist. proc. postorb. | — | 37.5 | 35.6 | 33.8 | 37.9 | 36.3 | 38.3 | — | 38.2 | 37.7 |
| median l. nasals | 13.7 | 20.6 | 22.6 | 20.5 | 20.5 | 21.6 | 21.7 | 22.5 | 20.2 | — |
| gr. br. comb. nasals | 11.9 | 13.4 | 13.6 | 11.6 | 12.4 | 12.9 | 13.1 | 13.8 | 13.8 | 14.2 |
| palatilar length | 30.5 | 33.7 | 33.9 | 31.6 | 32.3 | 31.6 | 31.8 | 33.1 | 32.3 | 32.0 |
| length inc. for. | 3.5 | 4.5 | 4.0 | 4.0 | 3.9 | 3.6 | 4.1 | 3.7 | 3.7 | 4.1 |
| l. upper mol. ser. | 15.6 | 16.8 | 16.5 | 16.4 | 15.4 | 16.7 | 17.1 | 17.5 | 16.5 | 17.3 |
| diastema i-p | 14.0 | 15.0 | 15.8 | 14.1 | 15.7 | 14.3 | 14.3 | 14.8 | 15.6 | 14.4 |
| lower mol. ser. | 16.6 | 17.4 | 17.2 | 16.8 | 17.0 | 17.8 | 17.9 | 17.4 | 17.8 | 17.8 |

*Skull* (fig. 3).

Skull broad and stout, zygomatic breadth 77.5% of the basilar length; nasals broad and short, ending posteriorly in line with the premaxillae; the parietal crests slightly constricted behind; incisive foramina short.

Measurements, average and maximum (in mm): total length, 68.7 (71.6); basilar length, 61 (64); zygomatic breadth, 47 (49.7); cranial width, 30 (31.8); least

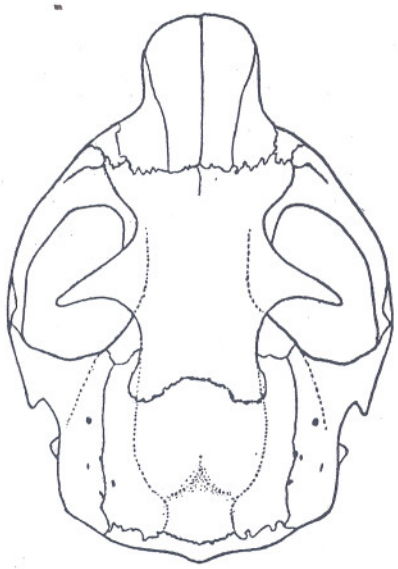

Fig. 3. Skull of *Petaurista petaurista*; nat. size.

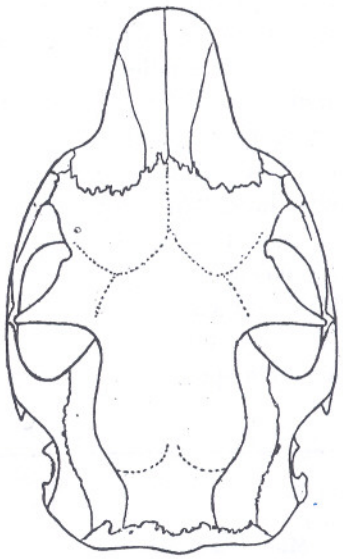

Fig. 4. Skull of *Ratufa bicolor*; nat. size.

interorbital breadth, 15.7 (17.5); outer distance of postorbital processes, 37 (38.3); median length of nasals, 20.5 (22.6); greatest breadth combined nasals, 13 (14.2); palatilar length, 32 (33.9); length of incisive foramen, 3.9 (4.5); length upper molar series, 16.5 (17.5); diastema i-p, 14.8 (15.8); length lower molar series, 17 (17.9).

*Penis bone* (fig. 5).

Fig. 5. Penis bone of *P. petaurista*, side view; × 2.

The os penis or baculum of *P. petaurista* is a simple bone, the basal half being rounded and hollow, the distal end being expanded and peculiarly twisted; the posterior border of the apex with a very minute tooth. Length 24—25.5 mm.

*Habits.*

This large flying squirrel is a forest-dwelling animal found from about sea-level to 2000 m altitude. It is quite nocturnal, coming out at twilight; in daytime it sleeps in high trees, often taking refuge in holes; when sleeping it has its back strongly bent concealing the head between the legs. When gliding from one tree to another with expanded membrane and the tail held straight out it can cover a large distance. The food consists mainly of fruits of wild trees, according to SCHLEGEL and MÜLLER preferably those of fig trees.

*Distribution.*

From Siam throughout the Malay Peninsula to the Greater Sunda Islands [1]).

*Subspecific characters.*

The Java forms have been divided into two subspecies, the typical *petaurista* and *nigricaudatus*. The latter, from East Java, is mainly characterised by the tail being black above, and the richer chestnut colour of the upper surface. This richer colour, however, is also found in examples from Cheribon and from Pekalongan (C. Java), which have a red-brown tail as in the typical West-Java form.

Key to the subspecies

1a. Tail above partly chestnut (W. Java) ..... *P. p. petaurista.*
1b. Tail above entirely brownish black (E. Java) ..... *P. p. nigricaudatus.*

### *Petaurista petaurista petaurista* (PALL.)

*Petaurista nitida nitida*

THOMAS, A.M.N.H. (8) I, 1908, p. 251.

*Petaurista petaurista petaurista*

ROBINSON and KLOSS, Rec. Ind. Mus. XV, 1918, p. 172. DAMMERMAN, Tjibodas 1929, pp. 11, 22; Treubia XI, 1929, p. 35. SODY, N.T.N.I. 89, 1929, p. 163.

*Description.*

Colour of upper surface chestnut maroon or rufous chestnut, rump and thighs darker. Black orbital rings less conspicuous. Tail more or less red-brown above with the terminal tip black.

*Distribution.*

W. Java: Gobang near Buitenzorg; Tjibodas, 1500 m.; Tjiwangi; Mt. Tjiremai, 700—800 m; Bandjar. C. Java: Pekalongan, 200 m.

### *Petaurista petaurista nigricaudatus* ROB. & KLOSS.

*Petaurista petaurista nigricaudatus*

ROBINSON and KLOSS, J.F.M.S. Mus. VII, 1918, p. 223; Rec. Ind. Mus. XV, 1918, p. 172. DAMMERMAN, Treubia XI, 1929, p. 35. SODY, N.T.N.I. 89, 1929, p. 163.

*Description.*

Colour above duller and less brownish than in the typical *petaurista*. Black orbital rings more pronounced. Tail brownish black above, beneath this colour mixed with maroon.

*Distribution.*

This race is only known at present from the Idjen mountains in the extreme east of Java, where it has been found from 950—1850 m. altitude.

[1]) By the "Greater Sunda Islands" Borneo, Sumatra, Java and surrounding islands are meant.

## Petaurista elegans (TEMM.)

(The Bicoloured Flying squirrel — De Tweekleurige Vliegende eekhoorn)

**Pteromys elegans**

TEMMINCK, Faune Jap. Intr. 1835, p. XII. MÜLLER, Verh. Zoogd. 1839, pp. 35, 56. SCHLEGEL en MÜLLER, op. c. 1839—44, pp. 107, 112, pl. 16, figs. 1—3. TEMMINCK, Inde Arch. I, 1846, p. 333. GRAY, Voy. Samarang Zool. 1849, p. 23. pl. VI. JUNGHUHN, Java I, 1853, p. 365. JENTINK, Cat. ost. 1887, p. 182; Cat. syst. XII, 1888, p. 4. TROUESSART, Cat. 1897, p. 399; Suppl. 1904, p. 298. KONINGSBERGER, Med. Plantent. 54, 1902, p. 46. TJEENK WILLINK, N.T.N.I. 65, 1905, p. 230. v. BALEN, Zoogd. 1914, p. 308. ENCYCL. Ned. Ind. I, 1917, p. 653.

*Sciuropterus elegans*

MOHNIKE, Thierl. Mal. 1883, p. 428.

*Petaurista elegans*

ROBINSON and KLOSS, Rec. Ind. Mus. XV, 1918, p. 177. DAMMERMAN, Treubia XI, 1929, pp. 4, 35. SODY, N.T.N.I. 89, 1929, p. 163.

.....

VOSMAER, Nat. Beschr. zelds. gedierten, 1804, pl.

*Historical.*

VOSMAER (1804) without mentioning a latin name has given a good description and figure of this flying squirrel, but held this species to be the male of *P. petaurista.*

*Description.*

Upperparts dark grey variegated with white, the parachute and hinder back mahogany red. On dorsum the long straight hairs are entirely black, woolly undulating hairs dark grey intermingled with white hairs, these longer and more numerous in the white patches. The long hairs of the patagium have the basal half dusky, the distal half red-brown with darker tips; woolly hairs dark grey with lighter bases and brown terminal ends. Crown of head as back, front and cheeks chestnut mixed with white and black hairs; muzzle whitish. Orbital rings and long whiskers black. Exterior of ears reddish brown.

The colour of the lower surface is orange rufous, the border of the membrane much darker, burnt sienna. Hands and feet mahogany red above, the feet sometimes more or less clouded with black, especially in young individuals. Tail black above, at the basis more brownish.

Young specimens have the upperparts more brownish and less whitish. Female with 6 mammae situated as in *P. petaurista.*

*Measurements.*

Measurements, average and maximum (in mm): total length, 684 (713); head & body, 336 (349); tail, 348 (375); ear, 36 (37); hindfoot, 62 (63).

*Skull.*

The skull is essentially the same as in the fore-going species, but relatively broader, zygomatic breadth 80% of the basilar length; nasals longer and less broad, reaching posteriorly beyond the line connecting the premaxillar bones; incisive foramina larger; the longitudinal parietal crests strongly constricted behind.

Measurements

| Mus. Btzg. No. | ♂ 2669 | ♂ 2673 | ♂ 2674 | ♀ 2670 | ♀ 2672 |
|---|---|---|---|---|---|
| total length | 665 | 681 | 685 | 713 | 677 |
| head & body | 320 | 331 | 349 | 338 | 341 |
| tail | 345 | 350 | 336 | 375 | 336 |
| ear | 37 | 34 | 35 | 37 | 36 |
| hindfoot | 62 | 62 | 61 | 62 | 63 |

Measurements, average and maximum (in mm): total length, 58.5 (59.4); basilar length, 51.5 (53); zygomatic breadth, 41.5 (42.4); cranial width, 28.3 (28.9); least interorbital breadth, 13 (13.5); outer distance of the postorbital processes, 31.5 (33); median length of nasals, 18.5 (20); greatest breadth combined nasals, 9.9 (10.5); palatilar length, 27.5 (28.3); length incisive foramen, 4.5 (5.1); length upper molar series, 13.8 (14.1); diastema i-p, 12.3 (12.8); length lower molar series, 14.5 (15.4).

Skull measurements

| Mus. Btzg. No. | ♂ 2669 | ♂ 2673 | ♂ 2674 | ♀ 2670 | ♀ 2672 |
|---|---|---|---|---|---|
| total length | 57.3 | 59.0 | 58.0 | 59.4 | 58.4 |
| basilar length | 50.1 | 52.0 | 51.2 | 53.0 | 51.8 |
| zygom. breadth | 40.6 | 41.7 | 41.0 | 42.4 | 41.5 |
| cranial width | 27.8 | 28.6 | 28.9 | 28.4 | 28.0 |
| least interorb. br. | 13.0 | 13.2 | 13.0 | 13.5 | 12.8 |
| outer dist. proc. postorb. | 30.2 | 33.0 | 32.5 | 30.3 | 32.1 |
| median l. nasals | 17.8 | 17.6 | 17.7 | 20.0 | 18.9 |
| gr. br. comb. nasals | 10.2 | 9.7 | 9.7 | 9.4 | 10.5 |
| palatilar length | 26.7 | 28.1 | 26.6 | 28.3 | 27.8 |
| length inc. for. | 3.8 | 4.6 | 4.3 | 5.1 | 4.5 |
| l. upper mol. ser. | 13.6 | 13.9 | 13.6 | 14.0 | 14.1 |
| diastema i-p | 11.9 | 12.8 | 12.2 | 12.7 | 12.1 |
| lower mol. ser. | 14.0 | 14.0 | 14.5 | 15.4 | 14.7 |

*Penis bone.*

The penis bone has the same general form as that of *P. petaurista* but is much smaller and less slender; basal half more flattened. Length 11—11.6 mm.

*Habits.*

This animal has probably the same mode of living as the preceding species but inhabits the higher mountain regions, being found up to the summit of the highest mountains in Java, 3000 m.

*Distribution.*

The species is restricted to Java.

Localities: Mt. Gede, 3000 m; Mt. Tjiremai, 2000 m; Mt. Slamat, 1400 m; Nusa Kambangan (island off the south coast of Central Java), type locality.

## Genus **SCIUROPTERUS,** F. Cuv. (1825)

THOMAS, The Genera and Subgenera of the Sciuropterus Group, Ann. Mag. Nat. Hist. (8) I, 1908, p. 1.

The old genus *Sciuropterus* has been split up by THOMAS (1908) into a great many new genera and subgenera mainly on account of differences in the dentition. But the presence or absence of an accessory premolar seems hardly of generic importance as the loss of molars may even occur in one and the same species, *e.g. Mus musculus*. In our opinion the generic validity of at least some of his new genera has to be confirmed by further investigations, therefore we prefer for the moment to treat the divisions as subgenera, at least so far as the forms are concerned which come into consideration here.

Key to the subgenera

1a. Upper molar series with four teeth, $p^3$ absent; molars each with two parallel transverse ridges, the internal longitudinal ridge represented by two separate cusps ..... *Iomys*

1b. Five teeth in the upper molar series, $p^3$ present; the internal longitudinal ridge of the molars rising into a single crest ..... 2

2a. Behind the eye a strong tuft of long bristles; tail woolly throughout. The thick bullae flattened and opaque; transverse upper molar ridges more or less divided into separate cusps ..... *Petinomys*

2b. No series of bristles behind the eye; tail flat and distichous. Bullae well inflated; transverse upper molar ridges clearly defined ..... *Hylopetes*

### Subgenus ***IOMYS,*** THOMAS (1908)

To this section belongs:

#### **Sciuropterus** (*Iomys*) **horsfieldi** (WATERH.)

(Horsfield's Flying squirrel — Horsfield's Vliegende eekhoorn)

*Pteromys* (*Sciuropterus*) *horsfieldi*
WATERHOUSE, P.Z.S. 1837, p. 87.
*Sciuropterus horsfieldi*
GRAY, Voy. Samarang Zool. 1849, p. 23. THOMAS, P. Z. S. 1886, p. 75. JENTINK, Cat. syst. XII, 1888, p. 6.
*Sciuropterus sagitta horsfieldi*
TROUESSART, Cat. 1897, p. 400; Cat. Suppl. 1904, p. 299.
*Iomys horsfieldi*
THOMAS, A.M.N.H. (8) I, 1908, p. 2.
*Iomys horsfieldi horsfieldi*
ROBINSON and KLOSS, Rec. Ind. Mus. XV, 1918, p. 178. DAMMERMAN, Treubia XI, 1929, p. 35. SODY, N.T.N.I. 89, 1929, p. 163.

*Nomenclatural.*

Untill recently this species has always been confounded with *S. sagitta*. In 1886 THOMAS wrote "*S. sagitta* seems to me to be unquestionably the species

commonly known as *S. horsfieldi*", and subsequent authors have followed him. Later on the species was not only recognized as a valid one but was even made the type of a special genus erected for it by the above-mentioned specialist in 1908.

*Description.*

As we have never seen a specimen of Horsfield's Flying squirrel we can only reproduce here WATERHOUSE's original description running as follows:

"*Pteromys (Sciuropterus) Horsfieldii.* Pter. fuscus, pilis flavescenti-fuscis crebre intersparsis: corpore subtus flavescenti-albo, genis et patagio lumbari ad marginem rufescenti-flavis; cauda subtus nitide ferruginea; auribus mediocribus.

| | unc. | lin. |
|---|---|---|
| Longitudo ab apice rostri ad caudae basin ..... | 9 | 6 |
| ——— auris ..... | 0 | 7½ |
| ——— tarsi digitorumque ..... | 1 | 5 |

Obs. This species is of a larger size than the *Pteromys sagitta*, from which it differs in having the ears larger in proportion; the tail more bushy and of an uniform bright rust colour beneath; the margin of the flank skin is of a reddish yellow colour, as are also the sides of the face below the eye. On the upper parts of the body the fur is of a deep brown; each hair being grey at the base; the interspersed longer hairs, which are abundant, are of a bright brown or reddish-yellow colour at the apex. The general tint produced by this mixture is rufous brown. On the under parts of the body the hairs are of a yellow or yellowish white colour, and not grey at the base.

The specimen from which the above description is taken was presented to the Zoological Society by the Earl of Derby, and is either from Java or Sumatra. I have taken the liberty of naming it after the author of the 'Zoological Researches in Java'."

*Distribution.*

As stated above the type specimen came either from Sumatra or Java but as far as I am aware the species has never been recorded again from the latter island. JENTINK (1888) mentioned a female *Sciuropterus* under this name collected in Java by KUHL and v. HASSELT, but by adding the synonym "*Sc. aurantiacus*", which does not belong at all to the subgenus *Iomys* but to *Hylopetes*, his identification seems rather questionable. So about the occurrence of *S. horsfieldi* in Java we feel still doubtful.

### Subgenus ***HYLOPETES,*** THOMAS (1908)

Only one representative is found in Java:

### ***Sciuropterus*** (*Hylopetes*) ***sagitta sagitta*** (L.)

(The Arrow-tailed Flying squirrel — Het Vliegende Pijlstaart-eekhoorntje)

*Sciurus sagitta*
LINNAEUS, Syst. Nat. ed. XII, 1766, p. 88.

*Pteromys lepidus*
HORSFIELD, Zool. Res. 1824, s.p., pl.
*Pteromys sagitta*
MÜLLER, Verh. Zoogd. 1839, p. 35. JUNGHUHN, Java I, 1853, p. 244.
*Pteromys (Sciuropterus) sagitta*
SCHLEGEL en MÜLLER, Verh. Zoogd. 1839—44, pp. 109, 113.
**Sciuropterus sagitta**
GRAY, Voy. Samarang Zool. 1849, p. 23. JENTINK, Cat. ost. 1887, p. 182; Cat. syst. XII, 1888, p. 6. BLANFORD, Ind. Mamm. 1891, p. 367. TROUESSART, Cat. 1897, p. 400; Suppl. 1904, p. 299. KONINGSBERGER, Med. Plantent. 54, 1902, p. 47. TJEENK WILLINK, N.T.N.I. 65, 1905, p. 232, v. BALEN, Zoogd. 1914, p. 310. BREHM, Tierl. Säuget. II, 1914, p. 567. KONINGSBERGER, Java 1915, pp. 33, 201. BARTELS, Tectona X, 1917, p. 264. ENCYCL. Ned. Ind. I, 1917, p. 653. DAMMERMAN, Landb. Dierk. 1919, p. 221, fig. 95; Agric. Zool. 1929, p. 277, fig. 132.
*Sciuropterus lepidus*
CAT. Mamm. E. I. Comp. 1851, p. 163. TROUESSART, Cat. 1897, p. 401; Suppl. 1904, p. 300. KONINGSBERGER, Med. Plantent. 54, 1902, p. 47. TJEENK WILLINK, N.T.N.I. 65, 1905, p. 232. v. BALEN, Zoogd. 1914, p. 312. KONINGSBERGER, Java 1915, p. 201.
*Sciuropterus (Hylopetes) sagitta*
THOMAS and WROUGHTON, P. Z. S. 1909, p. 387.
*Hylopetes sagitta* (?)
ROBINSON and KLOSS, Rec. Ind. Mus. XV, 1918, p. 182.
*Hylopetes lepidus* (?)
ROBINSON and KLOSS, l.c., p. 182.
*Sciuropterus sagitta sagitta*
DAMMERMAN, Treubia XI, 1929, pp. 4, 35.
*Hylopetes sagitta sagitta*
SODY, N.T.N.I. 89, 1929, p. 163.

*Vernacular names.*

Sund.: mon-mon or enchang-enchang; Javan.: kechubuk or kendo.

*Nomenclatural.*

LINNAEUS' *Sciurus sagitta* has been identified by THOMAS and WROUGHTON (1909) as the same species as *S. lepidus* HORSF., although the statement in the original description that there is a membrane extending from the head to the wrist does not apply to the members of the genus *Sciuropterus*. This erroneous statement also caused HORSFIELD to consider his *lepidus* a new species. Moreover, his description is based on a rather young, darker, example. For the amalgamation of this species with *S. horsfieldi* see p. 446.

*Description.*

The general colour of the upper fur is greyish brown, the hairs being black with a narrow yellow-brown ring near the end, the tip black again; the woolly hairs are dark grey. Cheeks and the region beneath the ear greyish; orbital ring black. The long whiskers entirely black. Ears dark, sparsely clad with short brown hairs.

Patagium above blackish, dark grey underneath, fringed with a delicate narrow white border, which is interrupted for a short distance around the angle of the membrane extending from the wrist.

Underparts whitish grey, the long straight hairs white, the woolly hairs grey. Chin, throat and breast more or less white.

The tail has at its base a short constriction for about one cm, being broadest at this end gradually attenuated towards the tip, thus having the shape of a lance-head (hence the specific name). The basal constriction with short woolly hairs only, greyish in colour. The long hairs of the webbed part are fuscous and reach a length of nearly 2 cm. Underneath the colour is of a lighter shade and the proximal half bears a broad light border.

Fore and hindlegs on the outside dark grey, underneath white or whitish grey. Upper surface of hands and feet sparsely clad with dark brown hairs. The male is somewhat darker in colour than the female, upperside more Prout's brown, whereas the female has the back sullied with ochraceous, the yellow rings of the hairs being lighter and broader, and the belly also with an ochraceous hue. Young specimens are less brown above, more dark grey.

*Measurements and weight.*

Measurements, average and maximum (in mm): total length, 265 (285); head & body, 143 (157); tail, 122 (128); ear, 19 (20); hindfoot, 28.7 (30).

Weight of a male 60, of a female 69 grammes.

Measurements

| Mus. Btzg. No. | ♂ 964 | ♂ 967 | ♂ 1615 | ♂ 2696 | ♂ 2698 | ♀ 975 | ♀ 1744 | ♀ 2697 | ♀ 2699 | ♀ 2700 |
|---|---|---|---|---|---|---|---|---|---|---|
| total length ..... | 266 | 253 | 265 | 251 | 255 | 270 | 260 | 272 | 278 | 285 |
| head & body ..... | 139 | 129 | 145 | 139 | 134 | 145 | 140 | 152 | 150 | 157 |
| tail ..... | 127 | 124 | 120 | 112 | 121 | 125 | 120 | 120 | 128 | 128 |
| ear..... | 20 | 18 | 20 | 18 | 19 | 19 | 18 | 19 | 18.5 | 20 |
| hindfoot ..... | — | — | 30 | 27 | 29 | — | 29 | 27 | 29 | 30 |

*Skull.*

The first upper premolar is very small, the whole tooth rising into a single cusp, closely applied to the internal front of the second premolar.

Measurements, average and maximum (in mm): total length, 33 (34.2); basilar length, 29 (30.3); zygomatic breadth, 21.7 (23.1); cranial width, 16.6 (17.3); least interorbital breadth, 8 (8.9); outer distance postorbital processus, 15.7 (17.9); median length nasals, 10 (10.5); greatest breadth combined nasals, 5.4 (5.9); palatilar length, 15 (15.8); length incisive foramen, 2.6 (3); length upper molar series, 7.2 (7.6); diastema i-p, 7 (7.3); length lower molar series, 6.9 (7.2).

*Habits.*

This small flying squirrel is rather common but owing to its nocturnal life is seldom met with. It inhabits the fronds of palm trees chiefly coconut palms, feeding on the young nuts and making its nests among the palm leaves or inside a nut hollowed out by other squirrels.

Skull measurements

| Mus. Btzg. No. | ♂ 964 | ♂ 967 | ♂ 1615 | ♂ 2696 | ♂ 2698 | ♀ 975 | ♀ 1744 | ♀ 2697 | ♀ 2699 | ♀ 2700 |
|---|---|---|---|---|---|---|---|---|---|---|
| total length | 33.5 | 31.3 | 33.9 | 31.4 | 32.8 | 34.0 | 33.2 | 33 9 | 33.3 | 34.2 |
| basilar length | 28.6 | 26.7 | 29.2 | 28.6 | 28.8 | 30.3 | 29.0 | 30.0 | 29.3 | 30.3 |
| zygom. breadth | 21.8 | 20.0 | 21.6 | 20.3 | 21.2 | 23.1 | 22.1 | 21.8 | 22.9 | 22.8 |
| cranial width | 17.0 | 16.1 | 16.9 | 15.8 | 16.0 | 17.0 | 16.7 | 16.8 | 17.3 | 16.7 |
| least interorb. br. | 8.9 | 7.8 | 8.5 | 7.5 | 8.3 | 8.4 | 8.0 | 6.8 | 8.2 | 7.8 |
| outer dist. proc. postorb. | 15.5 | 13.5 | 15.2 | — | 15.3 | 17.0 | 15.2 | 15.0 | 17.0 | 17.9 |
| median l. nasals | 10.5 | 9.6 | 10.4 | 9.8 | 9.2 | 10.4 | 9.7 | 9.8 | 10.0 | 10.5 |
| gr. br. comb. nasals | 5.1 | 4.8 | 5.2 | 5.4 | 5.8 | 5.9 | 5.3 | 5.5 | 5.7 | 5.4 |
| palatilar length | 15.4 | 14.0 | 15.2 | 14.2 | 14.6 | 15.2 | 15.1 | 15.7 | 14.8 | 15.8 |
| length inc. for. | 2.3 | 2.6 | 2.8 | 3.0 | 2.6 | 2.5 | 2.6 | 2.7 | 2.9 | 2.6 |
| l. upper mol. ser. | 7.6 | 7.0 | 7.3 | 6.9 | 7.1 | 7.3 | 7.2 | 7.6 | 7.3 | 7.3 |
| diastema i-p | 7.0 | 6.7 | 6.8 | 6.9 | 7.0 | 7.0 | 7.1 | 7.1 | 6.9 | 7.3 |
| l. lower mol. ser. | 7.2 | 6.7 | 7.0 | 6.8 | 6.7 | 7.0 | 6.7 | 7.0 | 7.0 | 6.8 |

*Distribution.*

So far as known the typical race is found only in Java.

Localities. W. Java: Buitenzorg; Palaboeanratoe; Soekaboemi; Cheribon; Garoet; Pangandaran; Kalipoetjang. C. Java: Maos. E. Java: Soerabaja.

## Subgenus ***PETINOMYS,*** THOMAS (1908)

The only Java species and subspecies belonging to this section is:

### ***Sciuropterus*** (*Petinomys*) ***genibarbis genibarbis*** (HORSF.)

*Pteromys genibarbis*

HORSFIELD, Zool. Res. 1824, s.p., pl. SCHLEGEL en MÜLLER, Verh. Zoogd. 1839-44, p. 110.

**Sciuropterus genibarbis**

GRAY, Voy. Samarang Zool. 1849, p. 23. CAT. Mamm. Mus. E. I. Comp. 1851, p. 163. TROUESSART, Cat. 1897, p. 401; Suppl. 1904, p. 300. TJEENK WILLINK, N.T.N.I. 65, 1905, p. 234. THOMAS, A. M. N. H. (8) II, 1908, p. 303. KONINGSBERGER, Java 1915, p. 201.

*Sciuropterus (Petinomys) genibarbis*

THOMAS, A. M. N. H. (8) I, 1908, p. 6.

*Petinomys genibarbis genibarbis*

ROBINSON and KLOSS, Rec. Ind. Mus. XV, 1918, p. 183. SODY, N.T.N.I. 89, 1929, p. 163.

*Sciuropterus genibarbis genibarbis*

DAMMERMAN, Treubia XI, 1929, p. 35.

*Description.*

Upper fur very dense, long and soft, russet in colour; dorsal hairs almost entirely consisting of woolly hairs. These are dark gray with yellow-brown terminal ends and small black tips, mixed with a few longer straight hairs of the same colouration. On anterior part of back intermingled long black and greyish hairs. Head above and cheeks greyish, orbital rings russet. Ears very

short almost hidden by the long fur; behind the ear a tuft of white hairs. From the base of the ear arise a bundle of long hairs. The long whiskers on the muzzle and the series of bristles behind the eye (from which the specific name has been derived) entirely black. Upper surface of parachute sooty-brown with a very narrow fringe of lighter fur, the brachial extension bordered by russet hairs.

Underparts greyish white washed with russet, membrane more ochraceous tawny.

Tail very bushy and woolly, broadest at its base, flattened horizontally and with blunt extremity. Colour above wood-brown; beneath except at the base clouded with brown, the middle part bister.

Forelegs above russet, the hands more greyish; underneath like belly. Hindlegs above like back but darker, feet greyish.

*Measurements.*

The only example at our disposal is a remade skin from a spirit specimen, which had a total length of 265, head & body 132, and tail 133 mm.

*Skull.*

The interorbital constriction is much stronger than in *S. sagitta*, 5.3 mm; the postorbital processes are less developed; incisive foramen larger, 3.5 mm; molar series larger, upper one, 7.8; lower one, 8; median length of nasals, 10.4; greatest breadth combined nasals, 4.6; palatilar length, 14; diastema i-p, 6.5 m.

*Distribution.*

In the Buitenzorg Museum there is only one old example, a female labelled "Java". HORSFIELD obtained the type specimen at Poeger on the south coast of the eastern part of the island. It seems to be a very rare animal.

## Subfamily *SCIURINAE*

## (SQUIRRELS — EEKHOORNS)

HORSFIELD, General enumeration of Indian Sciuri, Zool. Res. 1824. MÜLLER en SCHLEGEL, Eekhoorns, Verh. Zoogd. 1839—44, p. 85. JENTINK, List of squirrels in the Leyden Museum, N.L.M. V, 1883, p. 91. THOMAS. The penis-bone as a guide to the classification of certain squirrels, A.M.N.H. (8), 1915, p. 383.

### Key to the genera

1a. Giant squirrels, head and body over 30 cm. Molar series with four teeth ..... *Ratufa*

1b. Pigmy squirrels, head and body not exceeding 9 cm. Facial part of skull very broad, zygomatic breadth more than 80% of basilar length ..... *Nannosciurus*

1c. Medium-sized squirrels ..... 2

2a. Arboreal squirrels; tail about the same length as head and body. Colour of back unicolorous ..... *Sciurus*

2b. Ground squirrels; tail much shorter than head and body. Back with dorsal stripes ..... *Lariscus*

## Genus **RATUFA**, GRAY (1867)

Only one species occurs in Java:

### **Ratufa bicolor** (SPARRM.)

(The Large Malay Squirrel — De Groote Tweekleurige Eekhoorn)

*Sciurus bicolor*

SPARRMANN, Götheb. Vet. Handl. I, 1778, p. 70. HORSFIELD, Zool. Res. 1824 s.p. pl. SCHINZ, Säugeth. 1831, p. 208. MÜLLER en SCHLEGEL, Verh. Zoogd. 1839-44, pp. 85, 88. JUNGHUHN, Java I, 1853, p. 465. v. MARTENS, Preuss. Exp. I, 1876, p. 52. JENTINK, N. L. M. V, 1883, p. 108; Cat. ost. 1887, p. 186; Cat. syst. XII, 1888, p. 14; Weber's Zool. Erg. I, 1890, p. 115. WEBER, op. c., p. 95. BLANFORD, Ind. Mamm. 1891, p. 373. KOHLBRUGGE, N.T.N.I. 55, 1896, pp. 263, 297. KONINGSBERGER, Med. Plantentuin 54, 1902, p. 49. VETH, Java III, 1912, p. 293. KONINGSBERGER, Java 1915, p. 542. BARTELS, Tectona X, 1917, p. 264.

*Sciurus javensis*

SCHREBER, Säugeth. 1775-92, p. 781, T. 216. GRAY, Voy. Samarang Zool. 1849, p. 23.

*Sciurus (Eosciurus) bicolor*

TROUESSART, Cat. 1897, p. 410.

**Ratufa bicolor**

TROUESSART, Cat. Suppl. 1904, p. 308. TJEENK WILLINK, N.T.N.I. 65, 1905, p. 236. THOMAS and WROUGHTON, P.Z.S. 1909, p. 388. BREHM, Tierl. Säuget. II, 1914, p. 532. v. BALEN, Zoogd. 1914, p. 287. ENCYCL. Ned. Ind. I, 1917, p. 653. ROBINSON and KLOSS, Rec. Ind. Mus. XV, 1918, p. 187. v. HEURN, Ind. Gids 49 II, 1927, p. 706. WEBER, Säuget. II, 1928, p. 274.

*Vernacular names.*

This large squirrel is known in Java as "jalarang" or "jaralang".

*Description.*

Colour above bone-brown to blackish brown, the head above entirely, or from behind the eyes, cinnamon-brown, this paler colour extending between the ears and grading into the colour of the back. Dorsal hairs entirely black, mixed with hairs having ochraceous tawny terminal ends and dark tips; coarse woolly hairs blackish. Specimens with worn pelage show irregular patches of these tawny hairs which may become rather extensive so that this discolouration occupies the greater part of the back. The flanks and the rump, often the whole dorsum, interspersed with black hairs tipped with ivory-white, there being a great variation as to the amount of such hairs. Muzzle brownish black; the long whiskers black; cheeks greyish white; the eyes with black orbital rings. The dark dorsal area behind the ears is sharply defined from the light colour of the underside. Ears rather short, the inside and outside black-haired.

Underparts ochraceous buff, the throat lighter. The longer blackish hairs have the distal half light, the dark woolly hairs which have yellow tips showing through.

Outside of forelimbs black, above the hand a band of light ochraceous hairs; the inside ochraceous buff. A few long bristles implanted at the base of the wrist. Hindlegs on outside coloured like the rump; the feet black, the basal portion often more or less whitish especially on the interior part.

Tail on upper and lower surface buff-yellow, the base being coloured like the rump; the very long hairs have the basal part black.

Female with three pairs of mammae situated at equal distance from each other on the belly in a V-shaped form.

*Measurements and weight.*

Measurements, average and maximum (in mm): total length, 750 (790); head & body, 350 (364); tail, 409 (468); ear, 25.5 (29); hindfoot, 76 (80).

Weight according to KOHLBRUGGE 1400 grammes.

Measurements

| Mus. Btzg. No. | 2064 | 2332 | 2317 | Raffles Mus. | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Buitenzorg | | | Tjibodas | | | Badjoelm. | | | Tamansari | | |
| | ♂ | ♂ | ♀ | ♂ | ♀ | ♀ | ♂ | ♂ | ♀ | ♂ | ♂ | ♀ |
| total length | 736 | 780 | 754 | 753 | 788 | 727 | 690 | 760 | 790 | 710 | 760 | 770 |
| head & body | 355 | 364 | 369 | 351 | 320 | 319 | 345 | 350 | 345 | 300 | 350 | 350 |
| tail | 381 | 416 | 385 | 402 | 468 | 408 | 345 | 410 | 445 | 410 | 410 | 420 |
| ear | 24 | 26 | 25 | 27 | 28 | 29 | 24 | 24 | 25 | 27 | 23 | 24 |
| hindfoot | 75 | 74 | 66 | 76 | 80 | 77 | 73 | 74 | 77 | 70 | 75 | 75 |

*Skull* (fig. 4).

Measurements, average and maximum (in mm): total length, 67 (68.7); basilar length, 61.5 (64.2); zygomatic breadth, 44 (46.2); cranial width, 30 (31); least interorbital breadth, 28 (30.5); least postorbital breadth, 21.5 (22.5); outer distance postorbital processes, 39.5 (41); median length of nasals, 23.6 (25.2); greatest breadth combined nasals, 13.4 (14.5); palatilar length, 26.6 (27.6); length incisive foramen, 6.2 (7.1); length upper molar series, 14 (14.6); diastema i-p, 16 (16.6); length lower molar series, 14.7 (15.5).

Skull measurements

| Mus. Btzg. No. | 2064 | 2332 | 2317 | 2319 | Raffles Mus. | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Buitenzorg | | | | Tjibodas | | | | E. Java | | | |
| | ♂ | ♂ | ♀ | ♀ | ♂ | ♂ | ♀ | ♀ | ♂ | ♂ | ♂ | ♀ |
| total length | 66.6 | 66.1 | 68.7 | 65.5 | 67.6 | 67.7 | 66.5 | 68.3 | 66.4 | 67.3 | 67.2 | 67.8 |
| basilar length | 60.4 | 60.8 | 63.1 | 60.4 | 62.2 | 61.6 | 61.0 | 64.2 | 60.1 | 60.7 | 61.1 | 62.2 |
| zygom. breadth | 42.6 | 43.0 | 43.1 | 42.5 | 45.0 | 43.9 | 43.8 | 46.2 | 44.5 | 44.3 | 43.1 | 43.3 |
| cranial width | 31.0 | 29.7 | 30.0 | 29.3 | 30.8 | 30 6 | 29.5 | 29.9 | 30.0 | 30.4 | 30.7 | 28.9 |
| least interorb. br. | 26.4 | 26.5 | 28.0 | 26.9 | 27.9 | 27.5 | 27.2 | 27.7 | 29.0 | 30.5 | 27.5 | 29.0 |
| least postorb. br. | 21.0 | 21.5 | 21.0 | 21.6 | 21.4 | 22.3 | 21.7 | 19.7 | 22.5 | 22.2 | 21.8 | 19.9 |
| outer dist. proc. postorb. | 39.5 | 39.4 | 39.8 | 38.7 | 40.5 | 36.8 | 39.5 | 40.0 | 41.0 | 38.8 | 40.1 | 40.1 |
| median l. nasals | 23.7 | 21.8 | 24.6 | 24.7 | 23.1 | 23.4 | 23.9 | 22.5 | 25.2 | 24.4 | 22.8 | 22.8 |
| gr. br. comb. nasals | 11.7 | 13.3 | 13.7 | 12.9 | 13.8 | 14.5 | 13.6 | 13.2 | 13.7 | 13.7 | 13.2 | 14.0 |
| palatilar length | 26.0 | 26.8 | 27.0 | 26.7 | 27.4 | 27.6 | 26.8 | 27.3 | 26.0 | 26.3 | 24.6 | 26.8 |
| length inc. for. | 7.1 | 6.0 | 6.9 | 6.3 | 5.4 | 6.0 | 5.5 | 5.6 | 5.9 | 6.3 | 6.0 | 6.3 |
| l. upper mol. ser. | 12.8 | 14.4 | 14.6 | 14.2 | 14.4 | 14.3 | 14.4 | 13.7 | 13.8 | 13.6 | 14.0 | 13.6 |
| diastema i-p | 16.2 | 16.0 | 16.4 | 14.8 | 16.2 | 16.6 | 15.3 | 16.3 | 16.0 | 16.1 | 15.1 | 14.9 |
| l. lower mol. ser. | 13.9 | 15.5 | 14.6 | 14.3 | 14 6 | 15.5 | 14.6 | 13.6 | 15.0 | 14.9 | 15.0 | 14.4 |

*Penis bone* (fig. 6).

The baculum is a simple short bone of 9.4—9.9 mm length, slightly upcurved; the basal end is expanded and hollowed; the apex narrowed and flattened horizontally.

*Habits.*

The Large Malay Squirrel is a forest-dwelling species, living generally in pairs or single; it is rather common in uncultivated regions and diurnal in habit. The nest is said to be composed of twigs and leaves in the top of high trees and the number of each litter is only two. When asleep the animal rolls itself up keeping the head covered by the tail.

Fig. 6. Penis bone of *Ratufa bicolor*, side view; × 3.

*Distribution.*

The species is recorded from the Greater Sunda Islands (except Borneo) and Bali.

*Subspecific characters.*

Usually two subspecies occurring in Java are distinguished, the West Java form *bicolor* and the *albiceps* from East Java. The form *major* described by MILLER from Tjibodas on account of the larger size has to be dropped. As may be seen from the figures above there is no essential difference as to size of body and skull between examples from Tjibodas and those from other localities in Java.

The differential characters of the two forms are mainly based on differences in colour. But although the large series of East Java specimens present in the Raffles Museum has the general colour above more bister or cinnamon-brown and in worn pelages the buff parts often very extensive, we have got examples from Buitenzorg and Garoet, West Java, which are hardly distinguishable as to the colour of the upper surface. The only reliable character by which the East Java form can be separated is the amount of yellow on the tail, this being darker especially underneath owing to the much shorter yellow terminal ends of the black hairs.

Key to the subspecies

1a. Tail buff-yellow, the long hairs with large yellow distal ends (W. Java) ..... *R. b. bicolor*

1b. Tail darker, the yellow ends of the hairs for less extensive than the black part (E. Java) ..... *R. b. albiceps*

### *Ratufa bicolor bicolor* (SPARRM.)

*Ratufa bicolor major*

MILLER, Proc. Biol. Soc. Wash. XXIV, 1911, p. 28.

*Ratufa bicolor bicolor*

ROBINSON and KLOSS, Rec. Ind. Mus. XV, 1918, p. 187. DAMMERMAN, Tjibodas 1929, p. 22; Treubia XI, 1929, p. 35. SODY, N.T.N.I. 89, 1929, p. 163.

*Description.*

Tail above and underneath buff-yellow, the very long hairs with large yellow terminal ends, basal parts black. For description of the other parts of the body see above.

*Distribution.*

Localities. W. Java: Oedjoengkoelon; Oedjoengteboe and Tjiomas, 300 m (Bantam); Wijnkoops Bay; Mt. Salak, 300—1000 m; Bolang; Tjibodas, Mt. Gede 1400—1800 m; Kamodjan (Garoet); Tjibaregbeg (south of Garoet); Tasikmalaja; Kalipoetjang.

### *Ratufa bicolor albiceps* (DESM.)

*Sciurus albiceps*
DESMAREST, Nouv. Dict. Hist. Nat. X, 1817, p. 105. JENTINK, N. L. M. V, 1883, p. 110; Cat. syst. XII, 1888, p. 16.

*Ratufa albiceps*
TJEENK WILLINK, N.T.N.I. 65, 1905, p. 237.

*Ratufa bicolor baliensis*
ROBINSON and KLOSS (not THOMAS), Rec. Ind. Mus. XV, 1918, p. 187.

*Ratufa bicolor albiceps*
DAMMERMAN, Treubia XI, 1929, p. 35. SODY, N.T.N.I. 89, 1929, p. 163.

*Description.*

This subspecies differs from the typical *bicolor* by the darker tail, the long black hairs of which have less extensive yellow distal ends.

*Distribution.*

Localities. E. Java: Mt. Raoeng, 700 m; Idjen Massif, 500—1200 m; Badjoelmati.

## Genus **SCIURUS,** LINNAEUS (1758)

In 1915 the old genus *Sciurus* was split up by THOMAS on account of the differences in the structure of the os penis, although there are no essential differences in the skulls and teeth, neither in the external appearances. Thus the Oriental species formerly referred to *Sciurus* were put in the genus *Callosciurus,* already established in 1867 by GRAY, the members of which have compound bacula with a narrow blade attached to the main shaft. We are of opinion, however, that not too much importance should be attached to this bone as a taxonomic character. The os penis of the mammals, entirely enclosed by the tissues of the sexual organ, has certainly in this respect not the same importance as in other groups of animals, *e.g.* the insects with their exoskeletal genital apparature. We therefore prefer to consider *Callosciurus* as a subgenus until the generic validity is confirmed by other anatomical characters.

### Subgenus ***CALLOSCIURUS,*** GRAY (1867)

Key to the species

1a. A clearly defined pale lateral stripe above a dark one, the latter coloured like the sides of the body; a distinct light orbital ring. Skull more slender,

zygomatic breadth 66% of basilar length. Penis bone upcurved and rather stout ..... *S. notatus*

1b. Pale lateral stripe less distinct, dark lateral stripe black; orbital rings less conspicuous. Skull broader, zygomatic breadth 72% of basilar length. Penis bone slender and nearly straight ..... *S. nigrovittatus*

### **Sciurus** (*Callosciurus*) **notatus** BODD.

(The Common Malay Squirrel — De Klappereekhoorn)

*Sciurus notatus*

BODDAERT, Elench. Anim. I, 1775, p. 119. JENTINK, Weber's Zool. Erg. I, 1890, p. 116. WEBER, op.c., p. 95. KOHLBRUGGE, N.T.N.I. 55, 1896, p. 263. KONINGSBERGER, Med. Plantent. 54, 1902, p. 52. TJEENK WILLINK, N.T.N.I. 65, 1905, p. 240. THOMAS and WROUGHTON, P. Z. S. 1909, p. 388. BREHM, Tierl. Säuget. II, 1914, p. 535. v. BALEN, Zoogd. 1914, p. 293. KONINGSBERGER, Java 1915, pp. 58, 200, 301. ENCYCL. Ned. Ind. I, 1917, p. 653. DAMMERMAN, Landb. Dierk. 1919, p. 220. v. D. MEER MOHR, Trop. Natuur IX, 1920, p. 166. KLOSS, J. F. M. S. Mus. X, 1921, p. 232. v. HEURN (F. C.), Ind. Gids 49 II, 1927, p. 706. DAMMERMAN, Agric. Zool. 1929, p. 276. SODY, N.T.N.I. 90, 1930, p. 283.

*Sciurus badjing*

KERR, Anim. Kingd. 1792, p. 269. JENTINK, Cat. ost. 1887, p. 192; Cat. syst. XII, 1888, p. 27.

*Sciurus plantani*

LJUNG, K. Vet. Akad. n. Handl. XXII, 1801, p. 99, t. 1. HORSFIELD, Zool. Res. 1824, s. p., pl. MÜLLER, Verh. Zoogd. 1839, p. 35. GRAY, Voy. Samarang Zool. 1849, p. 24. CAT. Mus. E. I. Comp. 1851, p. 151. JUNGHUHN, Java I, 1853, p. 244. ZELEBOR, Reise Novara Zool. I, 1869, p. 24. JENTINK, N.L.M. V, 1883, p. 133. MOHNIKE, Thierl. Mal. 1883, p. 428. BARTELS, Tectona X, 1917, p. 264. v. HEURN (W. C.), Vakbl. Biol. 7, 1925, p. 17. SODY, N.T.N.I. 87, 1927, p. 200.

*Sciurus bilineatus*

DESMAREST, Mamm. 1817, p. 336. SCHINZ, Säugeth. 1831, p. 208.

**Sciurus** (*Heterosciurus*) **notatus**

TROUESSART, Cat. 1897, p. 415; Suppl. 1904, p. 313.

*Callosciurus notatus*

THOMAS, A. M. N. H. (8) XV, 1915, p. 385. ROBINSON and KLOSS, Rec. Ind. Mus XV, 1918, p. 221. POCOCK, P. Z. S. 1923, p. 219. SODY, N.T.N.I. 88, 1928, p. 325.

*Vernacular names.*

This common squirrel is known all over Java by the name "bajing"; in Bantam (W. Java) the name "bu-ut" is used for squirrels generally.

*Description.*

General colour above a variegated umber; longer hairs on middle of back blackish with two to three yellowish rings; dark woolly hairs with two light similar rings, the basal half black. Head above like back, the muzzle darker; the eyes surrounded by a ring of light-coloured hairs. Ears rather short, inside sparsely clad with hairs coloured like the head. The long whiskers which reach far beyond the ears entirely black.

The colour of the underparts very variable, from pure greyish to ochraceous tawny or light orange-rufous, the axillar and inguinal regions often tinged with these colours. The sides bordered by a pale stripe of yellowish colour extending

from fore to hind limbs; under this stripe runs another darker one of the same colour as the sides. Outside of limbs coloured like back, inside coloured like lower surface; hands and feet grey well contrasted with the colour of the limbs exteriorly.

Tail above at the base like rump, but otherwise of a lighter hue, with irregular black bands, the tip often tinged with red; underneath more tawny olive.

There are six mammae in the female, two inguinal and one pectoral pair.

*Varieties.*

Pure albino's of *notatus* are sometimes met with, in our collection are examples from Buitenzorg and Mr. Cornelis (Batavia).

*Measurements and weight.*

Measurements, average and maximum (in mm): total length, 370 (385); head & body, 192 (205); tail, 178 (190); ear, 18 (20); hindfoot, 44 (47).

Weight, average and maximum: ♂♂, 228 (248); ♀♀, 232 (256) grammes.

Measurements

| | W. Java | | | | | C. Java | | | | E. Java | | Madoera | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mus. Btzg. No. | ♂ 712 | ♂ 719 | ♂ 2021 | ♂ 2050 | ♀ 2020 | ♂ 2109 | ♂ 1741 | ♂ 1623 | ♀ 2102 | ♀ 232 | ♀ 1906 | ♂ 1626 | ♂ 1627 |
| total length | 353 | 362 | 350 | 376 | 372 | 376 | 355 | 385 | 378 | 378 | 370 | 370 | 360 |
| head & body | 199 | 183 | 177 | 202 | 182 | 189 | 196 | 205 | 204 | 192 | 189 | 190 | 200 |
| tail | 154 | 179 | 173 | 174 | 190 | 187 | 159 | 180 | 174 | 186 | 181 | 180 | 160 |
| ear | 20 | 17 | 20 | 18 | 18 | 17 | 18 | — | 17 | 19 | 18 | — | — |
| hindfoot | 45 | — | 43 | 42 | 43 | 45 | — | 45 | 43 | — | 43 | 47 | 45 |

Skull measurements

| Mus. Btzg. No. | 712 | 719 | 2021 | 2050 | 2020 | 2109 | 1741 | 1623 | 2102 | 232 | 1906 | 1625 | 1627 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| total length | 50.7 | 47.0 | 47.4 | 46.5 | 46.4 | 49.8 | 47.0 | 48.9 | 49.2 | 46.8 | 45.5 | 47.3 | 46.8 |
| bas. length | 45.6 | 40.8 | 41.0 | 41.3 | 40.4 | 42.7 | 41.3 | 43.6 | 42.2 | — | 40.5 | 41.7 | 41.8 |
| zyg. breadth | 31.4 | 26.6 | 28.5 | 27.2 | 27.0 | 27.8 | 27.9 | 27.8 | 28.6 | 28.1 | 27.6 | 27.9 | 27.7 |
| cran. width | 22.2 | 20.5 | 21.7 | 21.2 | 20.7 | 22.2 | 20.5 | 21.7 | 22.2 | 21.8 | 20.8 | 21.8 | 21.0 |
| interorb. br. | 17.9 | 15.5 | 15.9 | 15.9 | 15.6 | — | 16.2 | 16.1 | 16.9 | 16.4 | 14.6 | 16.7 | 16.2 |
| postorb. br. | 16.9 | 17.0 | 16.9 | 16.8 | 17.1 | 18.3 | 16.3 | 17.1 | 17.8 | 17.2 | 16.1 | 18.0 | 17.2 |
| med. l. nas. | 16.9 | — | 15.2 | 14.5 | 13.9 | 14.4 | 15.1 | 14.5 | 15.6 | 14.6 | 14.0 | 15.1 | — |
| gr. br. c. nas. | 7.0 | — | 6.9 | 6.5 | 5.8 | — | 6.1 | 6.9 | 6.6 | 6.9 | 6.7 | 6.5 | 6.7 |
| pal. length | 23.2 | 20.3 | 20.8 | 20.6 | 20.2 | 22.5 | 20.8 | 21.5 | 22.1 | 20.8 | 20.2 | 21.3 | 20.9 |
| l. inc. for. | 3.1 | 2.9 | 2.8 | 2.5 | 3.1 | 3.0 | — | 3.1 | 3.1 | 2.7 | 2.8 | 2.9 | 3.0 |
| upper mol. ser. | 9.6 | 9.0 | 9.2 | 9.2 | 9.3 | 10.0 | 9.5 | 9.2 | 10.3 | 8.6 | 9.1 | 8.9 | 9.1 |
| diastema i-p | 13.2 | 11.3 | 11.8 | 11.0 | 11.0 | 12.0 | 12.1 | 12.5 | 11.6 | 12.3 | 11.4 | 11.8 | 11.8 |
| lower mol. ser. | 9.1 | 9.3 | 9.0 | 9.7 | 9.0 | 10.0 | 10.1 | — | 9.6 | 9.1 | 9.1 | 8.7 | 9.0 |

*Skull.*

Measurements, average and maximum (in mm): total length, 47.5 (50.7); basilar length, 41.5 (45.6); zygomatic breadth, 27.5 (31.4); cranial width, 21.3

(22.2); least interorbital breadth, 16 (17.9); least postorbital breadth, 17 (18.3); median length of nasals, 14.7 (16.9); greatest breadth combined nasals, 6.5 (7); palatilar length, 21 (23.2); length incisive foramen, 2.9 (3.1); length upper molar series, 9.3 (10.3); diastema i-p, 11.7 (13.2); length lower molar series, 9.3 (10.1).

The skull of No. 712, a single specimen from Prinsen Island (Sunda Straits), is very large reaching in nearly all dimensions maxima except the molar series. The latter fact may be an indication that we are not dealing here with a special large race but with a very old individual only.

*Penis bone* (fig. 7).

The os penis is, like in all members of this group of squirrels, a compound bone consisting of a shaft with a very sharp-edged smaller bone attached to it. The proximal half of the shaft is thickened, its slender distal half strongly upcurved, the apex with two lateral and one median keel. The accessory bone or blade lying in the distal cavity of the shaft is attached to it with expanded base and about $^1/_4$—$^1/_5$ the length of the entire bone. Length (measured in a straight line) 22—25 mm, breadth of hollow basal end 3—3.2 mm.

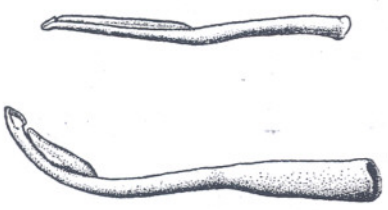

Fig. 7. Penis bone of *S. nigrovittatus* and *S. notatus*, side view; × 2.

*Habits.*

This is the commonest and most familiar squirrel of the lowlands of Java found abundantly from the seashore up to about 1000 m above sea level. It is everywhere seen in cultivated districts and does not avoid human habitations, being a common sight in gardens and in avenues of trees. It often becomes a notorious pest, specially of coconuts in the husk of which a round hole is eaten to get at the kernel. They are also a nuisance for many kinds of fruits, devouring also the buds and blossoms and stripping off the bark of different trees. The species, however, is not exclusively frugivorous, insects are also eaten.

The cry is a kind of shrill whistling, when alarmed the animal utters a grunting noise. The nest is made in high trees, consisting of a loose structure of twigs and leaves with an inner lining made of fibrous matter, preferably cocos fibres. Usually only two young are produced at each birth; the breeding-season seems to be mainly in the wet monsoon.

*Distribution.*

Siam, Malay Peninsula, the Greater Sunda Islands, eastward to Bali, Saleyer and probably Celebes.

*Subspecific characters.*

As already said before the colour of the lower surface of this species is very variable and has led consequently to the description of a number of special races or forms mainly differing in the colour of the fur of the under-parts. In the true *notatus* from West Java the colour of these parts is a uniformly

grey, but in some examples this colour is slightly suffused with ochraceous or tawny, while the axillar and inguinal region, especially in the males, may exhibit an ochraceous tawny or even rufous hue. The eyerings are ochraceous buff. In a single example from Prinsen Id. these orbital rings are light buff, nearly white. As already mentioned before this specimen has a very large skull, the tail being underneath especially light in colour but otherwise it matches the typical *notatus*. Going more eastward and southward we see that the ochraceous suffusion of the under surface becomes more and more intensive. In examples from Garoet and neighbourhood, *vanheurni* SODY, the lower fur, also on the inside of the limbs, has a greyish tinge washed with ochraceuos, the resulting colour being Saccardo's umber. The fur consists of stiff dark hairs with yellow terminal ends and grey woolly hairs with yellowish tips, whereas in true *notatus* the hairs are black and the tips silvery white. But here also the colour is not constant, some specimens are as dark grey as examples from Buitenzorg, others have the tawny suffusion much more intensive and a few are practically not separable from *balstoni* (see below); usually the muzzle is more greyish and the nose more blackish. The forms from Tjilatjap on the south coast of Java have been described as *balstoni,* here the ochraceous tawny colour of the lower surface becomes still richer; the orbital rings are broader and capucine orange, this colour extending on the cheeks. However, a specimen from Buitenzorg has the whole underside washed with ochraceous tawny and in this respect it comes extremely near an example of *balstoni* in our collection except for the eyerings which are smaller and lighter in colour. Specimens from Tjibaregbeg, south of Garoet but west of Tjilatjap, show also various tinges of their underparts; two of them are even more greyish underneath than Garoet examples, but on the whole the series has the rufous colour more intense than in *balstoni,* in other respects they match the latter form but they exhibit a black nose and a more greyish muzzle like the Garoet form.

Now, if we examine series from the north coast of Java we find that they all agree in the more rufous lower fur, which is typical for *madurae,* first described from Madura Id., off the eastern part of Java. In true *madurae* the underside is light orange-rufous or buckthorn brown, the hairs with dark bases but the brighter part far more extensive than in *balstoni,* sometimes the hairs entirely ochraceous to rufous.

Examples from Cheribon (W. Java) have the upperparts like true *madurae* but the eyerings are larger and more orange in colour; sides of head also washed with ochraceous; lower parts like in *madurae* only slightly darker. Specimens from Koedoes (C. Java), named *verbeeki* by SODY, are only less rufous than *madurae,* but according to the author himself there are from the same locality individuals which are indistinguishable from true *madurae*! Still another form, from the Idjen Massif, has been denoted as *tamansari* on account of the slightly more darker lower fur; it differs also from *madurae* in having the upperparts less grey and the shoulders and upper surface of arms a little more sullied with ochraceous. But examples from the Raoeng Mt., also a part of the Idjen Massif,

are hardly different from typical *madurae* in the latter respects. We have got also a small series from the Ijang Mt., west of the Idjen, here again we find examples with the underparts exactly like the true *madurae* and others less rufous, more greyish like *tamansari*.

Thus we see that there are all intergradations between the typical grey-bellied *notatus* from West Java and the rufous-bellied *madurae* from East Java and Madura. This change of colour going from West to East is also in accordance with GLOGER's rule, which states that darker colours inherent to humid rainy areas become more yellowish and red in animals living in dry arid regions. The line of demarcation between the two races runs probably from somewhere west of Cheribon to somewhere east of Tjilatjap. All along this line on either side we can expect intermediate forms. Moreover specimens from arid localities in the western part of Java may show the ochraceous discolouration, whereas those from moist areas in East Java will show a greyish suffusion. We should expect that the forms inhabiting higher mountain regions in the drier eastern half of Java will exhibit a darker lower fur but this seems to be not always the case.

After studying the larger series now at our disposal we can recognize only two truly geographical races in Java, the West-Java *notatus* and the East-Java *madurae*. All other forms are intergradations or only individual variations and in our opinion it is a useless and unnecessary burden to taxonomy to designate and name all these more or less intermediate forms. Moreover, a species like this squirrels inhabiting mainly cultivated districts, which are so diverging as to their environmental conditions, most likely will show all kind of variations, but unless a form can be tied down to a special ecological habitat or a definite climatic area it does not require subspecific separation.

Key to the subspecies

1a. Lower surface greyish or slightly washed with ochraceous (W. Java) ..... *S. n. notatus*

1b. Lower surface ochraceous to light orange-rufous with or without a slight greyish suffusion (C. & E. Java, Madura) ..... *S. n. madurae*

1c. Intermediate forms with rich ochraceous tawny suffusion of the underparts (W. & C. Java) ..... *S. n. notatus* > *madurae*

### *Sciurus* (*Callosciurus*) *notatus notatus* (BODD.)

*Sciurus andrewsi*
BONHOTE, A. M. N. H. (7) VII, 1901, p. 456. TROUESSART, Cat. Suppl. 1904, p. 313.
*Callosciurus notatus notatus*
ROBINSON and KLOSS, Rec. Ind. Mus. XV, 1918, p. 221. SODY, N.T.N.I. 89, 1929, p. 163.
*Callosciurus notatus typicus*
SODY, N.T.N.I. 88, 1928, p. 326.
*Sciurus notatus notatus*
DAMMERMAN, Treubia XI, 1929, p. 35.

*Description.*

General colour above grizzled umber; eyerings ochraceous buff. Ears on the outside blackish. Underparts greyish, the hairs dark with silvery white tips in the typical form; sometimes the tips ochraceous causing a slight suffusion of this colour. Axillae and inguinal region often tinged with tawny or rufous.

*Distribution.*

West Java. Localities: Prinsen Id.; Oedjoengteboe, 300 m; Tangerang (Bantam); Batavia; Buitenzorg; Wijnkoops Bay.

### *Sciurus* (*Callosciurus*) *n. notatus* > *madurae*

*Sciurus notatus balstoni*
ROBINSON and WROUGHTON, J. F. M. S. Mus. IV, 1911, p. 234. DAMMERMAN, Treubia XI, 1929, p. 35.

*Callosciurus notatus balstoni*
ROBINSON and KLOSS, Rec. Ind. Mus. XV, 1918, p. 221. SODY, N.T.N.I. 88, 1928, p. 328; 89, 1929, p. 163.

*Callosciurus notatus vanheurni*
SODY, N.T.N.I. 88, 1928, p. 327; 89, 1929, p. 163.

*Description.*

Intermediate between *notatus* and *madurae*; greyish colour of lower surface with a strong suffusion of ochraceous tawny; eyerings broader, buffy to orange in colour. Often the muzzle more greyish and the nose more blackish than in typical *notatus*.

*Distribution.*

South-West and S. Central Java. Localities: Garoet; Tjibaregbeg; Kalipoetjang; Tjilatjap.

### *Sciurus* (*Callosciurus*) *notatus madurae* (THOS.)

*Sciurus notatus madurae*
THOMAS, A.M.N.H. (8) V, 1910, p. 386. DAMMERMAN, Treubia XI, 1929, p. 35.

*Callosciurus notatus madurae*
ROBINSON and KLOSS, Rec. Ind. Mus. XV, 1918, p. 221. SODY, N.T.N.I. 88, 1928, p. 331; 89, 1929, p. 163.

*Sciurus notatus tamansari*
KLOSS, J.F.M.S. Mus. X, 1921, p. 230. DAMMERMAN, Treubia XI, 1929, p. 35.

*Callosciurus notatus tamansari*
SODY, N.T.N.I. 88, 1928, p. 329; 89, 1929, p. 163.

*Callosciurus notatus verbeeki*
SODY, N.T.N.I. 88, 1928, p. 330; 89, 1929, p. 163.

*Description.*

Colour above less bright than in *notatus*, more light brownish olive; eyerings buffy to orange; sides of head, inside of ears and neck behind them washed with buff. Outside of ears coloured like back in typical *madurae* but in examples from more western localities blackish as in *notatus*. Under surface and inside of limbs ochraceous tawny to orange-rufous, the hairs with dark bases but the brighter part more extensive, or entirely ochraceous to rufous. Specimens from moist localities or humid mountain regions may exhibit a greyish suffusion of

the underparts; if this character proves to be a constant one these forms may be separated as *tamansari*.

*Distribution.*

North & East Java and Madura. Localities. W. Java: Cheribon; Mt. Tjiremai, 700 m. C. Java: Koedoes. E. Java: Bodjonegoro; Besoeki; Ijang Mt., 500—700 m; Raoeng Mt., 700 m; Idjen Massif, 500 m; Badjoelmati. Madura: Bangkalan; Pamekasan; Soemenep.

### **Sciurus** (*Callosciurus*) **nigrovittatus** HORSF.

(The Black-striped Squirrel — De Zwartgestreepte Eekhoorn)

*Sciurus nigrovittatus*

HORSFIELD, Zool. Res. 1824, s.p. MÜLLER, Verh. Zoogd. 1839, p. 34. MÜLLER en SCHLEGEL op.c. 1839—44, pp. 86, 95. GRAY, Voy. Samarang, Zool. 1849, p. 24. CAT. Mus. E. I. Comp. 1851, p. 152. JENTINK, Cat. Syst. XII, 1888, p. 28. KONINGSBERGER, Med. Plantent. 54, 1902, p. 52. THOMAS and WROUGHTON, P.Z.S. 1909, p. 388. BREHM, Tierl. Säuget. II 1914, p. 535. BARTELS, Tectona X, 1917, p. 264. v. HEURN, Ind. Gids 49 II, 1927, p. 706. SODY, N.T.N.I. 87, 1927, p. 200.

*Sciurus griseiventer*

I. GEOFFROY, Mag. Zool. 1832.

*Sciurus notatus* (part.)

TJEENK WILLINK, N.T.N.I. 65, 1905, p. 240. TROUESSART, Cat. 1897, p. 416.

**Sciurus** *(Heterosciurus)* **nigrovittatus**

TROUESSART, Cat. Suppl. 1904, p. 314.

*Callosciurus nigrovittatus*

ROBINSON and KLOSS, Rec. Ind. Mus. XV, 1918, p. 222.

*Vernacular names.*

This species is called by the same native name as the foregoing one, occasionally it is distinguished as "bajing utan".

*Nomenclatural.*

It is a noteworthy fact that MÜLLER in the first paper of the „Verhandelingen" had apparently a clear notion of the distinctness of the two species *nigrovittatus* and *notatus* (*plantani*), telling us that both are equally common in Java and Sumatra. But in a next paper of the same work by the said author and SCHLEGEL the two species were amalgamated, and this opinion has been accepted by almost all older authors. Now the specific distinctness of the two forms is well established and confirmed by the study of the penis bone.

*Description.*

Upper surface as in *notatus* but less bright, light olive-brown or buffy brown; hands and feet, especially the latter, less greyish not much contrasting with the colour of the body. The muzzle, sides of head and neck, chin, and the eyerings more or less ochraceous tawny. Pale lateral stripe hardly marked off from sides of body; dark lateral stripe broad and black. Underparts and limbs interiorly dark greyish, the throat with buffy suffusion, which continues sometimes on the breast as an indistinct median stripe.

Hairs on middle of black with 2 or 3 light bands, which are also found with the dark woolly hairs. The lower fur consists of straight black hairs and grey woolly hairs, both ending in white tips.

Tail paler in colour than in *notatus*, the black annuli more regular and more conspicuous; the tip usually black.

Females with six mammae, two inguinal and one pectoral pair. The mammae occasionally surrounded by very conspicuous broad rings of light sometimes nearly white hairs.

*Varieties.*

We have in our collection two specimens, one from Batavia the other from Buitenzorg, having the lower surface and inside of limbs pure white; the pale and black lateral stripes have disappeared. Possibly we are dealing here with the form described by JENTINK as *diardi* (see p. 465).

In the Botanical Gardens, Buitenzorg, often specimens are met with, occurring together with normally coloured individuals, which are very pale, the upper surface including the limbs being tawny olive to light clay colour. In the palest example the tail is cinnamon-buff and the dark annuli are almost obsolete. The underparts are lighter grey and sullied with buffy.

*Measurements.*

Measurements, average and maximum (in mm): total length, 355 (390); head & body, 190 (200); tail, 165 (190); ear, 16 (18); hindfoot, 42 (44).

Measurements

| | W. Java | | | | N. Kambangan | | | | E. Java | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mus. Btzg. No. | ♂ 2058 | ♂ 2063 | ♀ 2055 | ♀ 2061 | ♂ 2072 | ♂ 2073 | ♀ 2074 | ♀ 2090 | ♂ 645 | ♂ 646 | ♀ 644 | ♀ 648 |
| total length | 390 | 352 | 350 | 359 | 355 | 360 | 340 | 360 | 343 | 343 | 302 | 350 |
| head & body | 200 | 188 | 184 | 197 | 200 | 185 | 187 | 190 | 178 | 185 | 162 | 191 |
| tail | 190 | 164 | 166 | 162 | 155 | 175 | 153 | 170 | 165 | 158 | 140 | 159 |
| ear | 18 | 17 | 18 | 16 | 16 | 15 | 14 | 14 | 16 | 16 | 15 | 16 |
| hindfoot | 40 | 44 | 38 | 42 | 44 | 43 | 40 | 40 | 40 | 43 | 38 | 42 |

Skull measurements

| Mus. Btzg. No. | 2058 | 2063 | 2055 | 2061 | 2072 | 2073 | 2074 | 2090 | 645 | 646 | 644 | 648 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| total length | 46.4 | 44.6 | 43.6 | 45.3 | 47.0 | 45.0 | 44.6 | 44.8 | 44.6 | 44.7 | 40.0 | 44.0 |
| bas. length | 40.0 | 38.0 | 37.8 | 39.1 | 39.7 | 39.1 | 38.7 | 38.7 | 39.3 | 38.9 | 34.6 | 38.2 |
| zyg. breadth | 28.5 | 27.7 | 26.3 | 27.9 | 29.2 | 27.6 | 28.7 | 28.0 | 26.7 | 28.4 | 24.6 | 27.5 |
| cran. width | 21.5 | 21.3 | 20.6 | 21.0 | 22.2 | 20.9 | 21.5 | 21.3 | 21.5 | 22.1 | 20.8 | 21.6 |
| interorb. br. | 16.4 | 16.8 | 17.3 | 17.8 | 18.7 | 17.2 | 16.5 | 16.6 | 16.1 | 18.2 | 13.7 | 16 6 |
| postorb. br. | 16.9 | 17.2 | 16.3 | 17.0 | 17.8 | 16.5 | 16.7 | 17.0 | 17.5 | 17.1 | 16.5 | 17.5 |
| med. l. nas. | 14.1 | 13.5 | 13.2 | 13.3 | 13.2 | 13.8 | 12.1 | 12.3 | 12.5 | — | 12.3 | — |
| gr. br. c. nas. | 6.8 | 6.1 | 6.2 | 6.9 | 6.8 | 6.2 | 6.8 | 6.4 | 6.0 | 6.5 | 5.8 | 6.3 |
| pal. length | 19.6 | 18.4 | 18.4 | 19.1 | 19.3 | 19.7 | 18.6 | 18.1 | 19.0 | 19.0 | 17.5 | 18.4 |
| l. inc. for. | 3.2 | 3.2 | 3.2 | 3.1 | 3.2 | 2.9 | 2.9 | 3.0 | 3.0 | 2.9 | 3.0 | 3.1 |
| upper mol. ser. | 8.8 | 8.4 | 8.6 | 8.7 | 9.0 | 9.0 | 8.9 | 9.0 | 8.9 | 9.2 | 8.5 | 8.7 |
| diastema i-p | 11.0 | 11.0 | 10.1 | 11.0 | 11.2 | 10.2 | 9.8 | 10.0 | 10.5 | 10.3 | 9.7 | 10.9 |
| lower mol. ser. | 8.7 | 8.0 | 8.2 | 8.2 | 8.1 | 8.3 | 8.5 | 8.4 | 8.6 | 8.6 | 8.3 | 8.2 |

*Skull.*

The skull of *nigrovittatus* is not so large as that of *notatus* but proportionally broader, the zygomatic breadth being 72% of the basilar length; palatilar length shorter; length of molar series less.

Measurements, average and maximum (in mm): total length, 45 (47); basilar length, 39 (40); zygomatic breadth, 28 (29.2); cranial width, 21.5 (22.2); least interorbital breadth, 17 (18.7); least postorbital breadth, 17 (17.8); median length of nasals, 13 (14.1); greatest breadth combined nasals, 6.5 (6.9); palatilar length, 19 (19.7); length incisive foramen, 3 (3.2); length upper molar series, 8.8 (9.2); diastema i-p, 10.6 (11.2); length lower molar series, 8.4 (8.7).

*Penis bone* (fig. 7).

The baculum in this species is a rather slender bone bayonet-like in form; the hollowed basal end very slightly expanded, the apex turned upwards. Length 20—21.6 mm.

*Habits.*

The black-striped squirrel has about the same mode of life as the *notatus*; in cultivated districts they seldom occur together but in more forested hilly regions the two species may be found on the same spot. Unlike *notatus* its range extends to the highest mountain tops.

*Distribution.*

Malay Peninsula and the Greater Sunda Islands.

*Subspecific characters.*

Examples from the Idjen Massif, East Java, have been separated from the true *nigrovittatus* as *S. n. besuki* on account of the underparts being more or less sullied with buff. But we have got specimens from Blawan, Idjen 950 m, which, four out of five, are practically without this suffusion and hardly separable from typical *nigrovittatus* from West Java. Also the differential characters given for *besuki* are not specific to the mountain form, as examples from Mt. Tjiremai, 700-2500 m, and Mt. Sindoro, 2000 m, have the lower fur clear greyish. Moreover, an ochraceous suffusion should sooner be expected in specimens from arid localities than from more humid mountain regions. So for the moment we cannot allow subspecific value to this buffy suffusion.

We have not seen the form *madsoedi* SODY so we cannot offer an opinion but it seems not very probable that we are dealing here with a truly geographical race but rather with a dark variety.

Pending further investigations we think it better to accept for the present only one Java subspecies.

### *Sciurus* (*Callosciurus*) *nigrovittatus nigrovittatus* (HORSF.).

*Callosciurus nigrovittatus nigrovittatus*

ROBINSON and KLOSS, Rec. Ind. Mus. XV, 1918, p. 222. SODY, N.T.N.I. 89, 1929, p. 163.

*Sciurus nigrovittatus nigrovittatus*

DAMMERMAN, Tjibodas 1929, p. 22; Treubia XI, 1929, p. 35.

*Sciurus nigrovittatus besuki*
KLOSS, J.F.M.S. Mus. X, 1921, p. 231. DAMMERMAN, Treubia XI, 1929, p. 35.
*Callosciurus nigrovittatus besuki*
SODY, N.T.N.I. 89, 1929, p. 163.
*Callosciurus nigrovittatus madsoedi*
SODY, N.T.N.I. 89, 1929, p. 163; 90, 1930, p. 261.

*Description.*

Upper fur light olive-brown or buffy brown; cheeks, sides of neck, and chin washed with ochraceous or tawny. Lower surface and inside of limbs dark greyish, this colour sometimes sullied with tawny.

*Distribution.*

Java and South Sumatra. Localities. W. Java: Oedjoengteboe and Tjiomas, 300 m (Bantam); Batavia; Buitenzorg; Wijnkoops Bay; Mt. Gede, 1200—2400 m; Mt. Tjiremai, 700—2500 m; Garoet, 700 m; Kalipoetjang. C. Java: Tjilatjap; Noesa Kambangan; Karangbolang; Mt. Sindoro, 2000 m; Mt. Moeria, 500 m. E. Java: Idjen Massif, 500—1850 m.

### Sciurus diardi JENT.

*Sciurus diardi*
JENTINK, N. L. M. I, 1879, p. 38; V, 1883, p. 125; Cat. ost. 1887, p. 189; Cat. syst. XII, 1888, p. 21. TJEENK WILLINK, N.T.N.I. 65, 1905, p. 241. v. BALEN, Zoogd. 1914, p. 298. DAMMERMAN, Treubia XI, 1929, pp. 4, 35. SODY, N.T.N.I. 89, 1929, p. 163; 90, 1930, p. 277.
*Sciurus (Heterosciurus) diardi*
TROUESSART, Cat. 1897, p. 418; Suppl. 1904, p. 315.

*Description.*

As we have no specimens of this form at hand JENTINK's original description is quoted here:

"*Sciurus Diardii*, Temminck in litt. Fur above rusty coloured, the underparts of the body being yellowish white. Hairs of the head, back, sides of the body and outside of legs black near the base, higher on rusty, with a very small black tip. Several entirely black hairs are intermixed with these.

The hairs of the tail are very long rusty, with a subterminal black ring and black tip. Hairs of chin, throat, chest, belly and inside of legs entirely yellowish white.

Whiskers quite long, black. Ears short, rounded, with scarce hairs. Cutting-teeth yellow. The end of the tail is wanting.

Measurements of the only specimen we received, which is an adult: head and body, 230; ear, 14; hind foot, 44; length of nasalia, 13; length upper molar series, 9; distance between incisor and first upper molar, 11; idem and first lower molar, 6 mm.

Hab.: Nusa Kambangan (e coll. Blüme)."

*Remarks.*

This description of *diardi* is fairly well apposite to that of the white-bellied variety of *nigrovittatus* given on p. 463. Also the measurements, taking into account that JENTINK's figures are those from a stuffed specimen, quite agree with those of *nigrovittatus*. Moreover, the black-striped squirrel is very common on Nusa Kambangan, the island off the south coast of Central Java, so it need not be a matter of surprise if the above-mentioned variety should also occur there.

However, the matter cannot be settled until an examination of the type specimen in the Leiden Museum has been made.

## Genus **LARISCUS**, THOMAS et WROUGHTON (1909)

The only representative in Java is:

### **Lariscus insignis** (F. CUV.)

(The Striped Ground-squirrel — De Gestreepte Grondeekhoorn).

*Sciurus insignis*
F. CUVIER, Mamm. 1821, pl. 233. HORSFIELD, Zool. Res. 1824, s.p., fig. MÜLLER en SCHLEGEL, Verh. Zoogd. 1839—44, pp. 87, 99. GRAY. Voy. Samarang Zool. 1849, p. 25. CAT. Mus. E. I. Comp. 1851, p. 151. JENTINK, N.L.M. V, 1883, p. 136; Cat. ost. 1887, p. 193; Cat. syst. XII, 1888, p. 29; Weber's Zool. Erg. I, 1890, p. 117. WEBER, op.c., p. 95. KONINGSBERGER, Med. Plantent. 54, 1902, p. 50; Java 1915, p. 497. BARTELS, Tectona X, 1917, p. 264.
*Xerus (Eoxerus) insignis*
TROUESSART, Cat. 1897, p. 409.
**Funambulus** *(Rhinosciurus)* **insignis**
TROUESSART, Cat. Suppl. 1904, p. 306.
*Rhinosciurus insignis*
TJEENK WILLINK, N.T.N.I. 65, 1905, p. 235. v. BALEN, Zoogd. 1914, p. 283. BREHM, Tierl. Säuget. II, 1914, p. 351. ENCYCL. Ned. Ind. I, 1917, p. 653.
*Laria insignis*
THOMAS and WROUGHTON, Abstr. P.Z.S. 1909, p. 19.
*Lariscus insignis*
ROBINSON and KLOSS, Rec. Ind. Mus. XV, 1918, p. 233.

*Vernacular names.*
Sund.: bajing tanah; Javan.: bokol.

*Description.*
Colour of upperparts variegated greyish brown, shoulders, flanks and outside of hindlegs more bay; on the back three black longitudinal stripes of 4—6 mm in breadth, on the shoulders and the rump fading into the colour of the upper fur. Straight hairs on middle of back entirely black or shorter ones with an ochraceous to reddish brown subterminal band; dark grey woolly hairs also with a yellow band near the end. Sides of the head of a lighter hue than the general colour of upper surface. Inside of the ear and outer border with short black hairs with ochraceous annuli, outside blackish. The long black whiskers reach beyond the opening of the ear. Hand and feet more greyish.

Under surface whitish, washed with apricot buff, more markedly on the throat. Hairs on belly white with buffy ends; woolly hairs whitish with dark bases. Inside of forelegs more greyish, of hindlegs more orange.

The bushy tail blackish brown with long hairs, the latter black with one to three ochraceous rings on the basal half, the distal end whitish with dark tip; the tip of the tail with more yellow-ending hairs.

Female with three pairs of mammae situated at about equal distance from each other, the pectoral pair less developed.

*Measurements.*

Measurements, average and maximum (in mm): total length, 283 (300); head & body, 181 (194); tail, 102 (119); ear, 17.5 (19); hindfoot, 44 (46).

Measurements

| | W. Java | | | | | | | E. Java | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Mus. Btzg. No. | ♂ 2313 | ♂ 2689 | ♂ 2690 | ♂ 2691 | ♀ 2310 | ♀ 2311 | ♀ 2312 | ♂ 641 | ♀ 640 | ♀ 642 |
| total length | 296 | 283 | 293 | 280 | 280 | 271 | 274 | 281 | 300 | 275 |
| head & body | 183 | 180 | 185 | 194 | 184 | 165 | 190 | 165 | 181 | 183 |
| tail | 113 | 103 | 108 | 86 | 96 | 106 | 84 | 116 | 119 | 92 |
| ear | 19 | 17 | 16 | 18 | 17 | 17 | 17 | 17 | 18 | 18 |
| hindfoot | 45 | 46 | 46 | 45 | 40 | 44 | 46 | 42 | 44 | 44 |

Skull measurements

| Mus. Btzg. No. | 2313 | 2689 | 2690 | 2691 | 2310 | 2311 | 2312 | 641 | 640 | 642 |
|---|---|---|---|---|---|---|---|---|---|---|
| total length | 50.6 | 47.7 | 47.2 | 49.6 | 49.0 | 48.3 | 49.2 | 44.7 | 48.6 | 45.4 |
| bas. length | 43.3 | 41.6 | 42.2 | 42.9 | 43.1 | 42.7 | 43.3 | 38.1 | 42.6 | 40.2 |
| zyg. breadth | 27.7 | 28.1 | 28.1 | 29.0 | 28.2 | 27.2 | 28.9 | 26.9 | 29.0 | 26.8 |
| cran. width | 20.7 | 21.3 | 21.3 | 21.7 | 20.3 | 19.8 | 21.1 | 20.6 | 20.8 | 19.9 |
| interorb. br. | 13.0 | 13.3 | 13.3 | 13.5 | 13.3 | 12.8 | 13.8 | 12.2 | — | 12.0 |
| postorb. br. | 15.1 | 15.7 | 16.2 | 15.8 | 15.3 | 16.0 | 16.1 | 15.6 | 15.7 | 14.8 |
| med. l. nas. | 16.5 | 15.1 | 14.8 | 15.6 | 16.3 | 16.3 | 16.4 | 14.5 | 15.9 | 14.6 |
| gr. br. c. nas. | 6.1 | 6.0 | 6.1 | 6.2 | 5.7 | 6.0 | 6.1 | 5.1 | 6.2 | 5.6 |
| pal. length | 22.9 | 22.7 | 22.1 | 22.8 | 22.3 | 21.6 | 22.6 | 19.7 | 21.0 | 20.4 |
| l. inc. for. | — | 3.8 | 3.8 | 3.9 | 3.8 | 3.6 | 3.9 | 3.2 | 3.6 | 3.5 |
| upper mol. ser. | 9.8 | 9.9 | 9.3 | 9.7 | 9.5 | 9.7 | 9.6 | 9.1 | 9.0 | 9.2 |
| diastema i-p | 13.2 | 12.9 | 13.0 | 13.5 | 13.2 | 12.8 | 13.2 | 11.4 | 12.4 | 11.7 |
| lower mol. ser. | 9.6 | 9.3 | 9.0 | 9.5 | 9.2 | 9.2 | 9.4 | 9.2 | 8.8 | 9.0 |

*Skull.*

Skull elongated especially the muzzle; postorbital processes very short.

Measurements, average and maximum (in mm): total length, 48 (50.6); basilar length, 42 (43.3); zygomatic breadth, 28 (29); cranial width, 20.7 (21.7); least interorbital breadth, 13 (13.8); least postorbital breadth, 15.6 (16.2); median length of nasals, 15.5 (16.5); greatest breadth combined nasals, 6 (6.2); palatilar length, 22 (22.9); length incisive foramen, 3.7 (3.9); length upper molar series, 9.5 (9.9); diastema i-p, 12.7 (13.5); length lower molar series, 9.2 (9.6).

*Penis bone* (fig. 8).

The os penis of this species is of the *Tomeutes*-like type, being short and thick-set and the distal half sharply upturned. Basal part hollowed, the anterior portion flattened above. The blade much developed, the anterior part with short expanded base closely applied to the upturned part of the shaft, posteriorly reaching until the base of the main bone. Length 10—10.4 mm; basal width 3.2—3.5 mm.

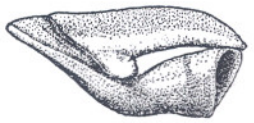

Fig. 8. Penis bone of *Lariscus insignis*, side view; × 3.

*Habits.*

This ground-squirrel is found in the forests up to the summit of the highest mountains; its mode of life is more terrestrial, the food consisting of fallen fruits and those of low-growing shrubs, but the diet is not entirely frugivorous, insects being also taken. The noise emitted is a shrill chirp, reminding the cry of a bird.

*Distribution.*

Malay Peninsula and the Greater Sunda Islands.

*Subspecific characters.*

The Java form has been set apart as *L. i. javanus* being somewhat larger and darker than the other races. The palatilar length is said by THOMAS and WROUGHTON to be 24 mm as against 19—22 mm in typical *insignis*, but the greatest length measured in our series is only 22.9 mm.

Specimens from East-Java mountains were separated as *vulcanus*. In this form the majority of the hairs of the tail has buff terminal ends; the underside is less buffy, more greyish white with ochraceous suffusion and the inside of the hindlegs not orange. This buff discoloration of the tail is, however, not a subspecific distinctness of all East-Java examples, neither characteristic for mountain specimens. Thus a specimen from Blawan, Idjen Massif 950 m, has the tail hairs tipped with white, whereas an example from the lowlands of Cheribon, West Java, has nearly no white-tipped hairs in the tail. Another specimen from Mt. Tjiremai, taken at 2000 m, has the tail yellowish but its lower fur is intermediate between *javanus* and *vulcanus*.

So for the time being we cannot yet confine the form *vulcanus* to a special climatic or geographical area, and I think we better accept presently only one subspecies for Java.

### *Lariscus insignis javanus* THOS. et WROUGHTON.

*Laria insignis javana*

THOMAS and WROUGHTON, Abstr. P.Z.S. 1909, p. 19.

*Lariscus insignis javanus*

THOMAS and WROUGHTON, P.Z.S. 1909, p. 389. ROBINSON and KLOSS, Rec. Ind. Mus. XV, 1918, p. 234. DAMMERMAN, Tjibodas 1929, p. 22; Treubia XI, 1929, p. 36. SODY, N.T.N.I. 89, 1929, p. 162.

*Lariscus niobe vulcanus*
KLOSS, J.F.M.S. Mus. X, 1921, p. 233.
*Lariscus insignis vulcanus*
DAMMERMAN, Treubia XI, 1929, p. 36. SODY, N.T.N.I. 89, 1929, p. 162.

*Description.*
For description see above.
*Distribution.*
Java. Localities. W. Java: Oedjoengteboe, 300 m (Bantam); Mt. Salak near Buitenzorg; Wijnkoops Bay; Tjibodas, 1400 m; Tjibeber, 1080 m; Cheribon; Mt. Tjiremai, 700—2500 m. C. Java: Noesa Kambangan. E. Java: Idjen Massif, 500—1850 m.

## Genus **NANNOSCIURUS**, TROUESSART (1880).

Java is occupied by only one species and subspecies.

### *Nannosciurus melanotis melanotis* MÜLL. et SCHL.

(The Black-eared Pigmy squirrel — De Zwartoor-dwergeekhoorn).

*Sciurus soricinus*
WATERHOUSE, Cat. Mamm. 1838, p. 46 (nomen nudum). JENTINK, N.L.M. V, 1883, p. 130; Cat. ost. 1887, p. 191; Cat. syst. XII, 1888, p. 25. VETH, Java III, 1912, p. 293.
*Sciurus melanotis*
MÜLLER, Verh. Zoogd. 1839, p. 35. MÜLLER en SCHLEGEL, op.c. 1839-44, pp. 87, 98, pl. 14, fig. 4—7. GRAY, Voy. Samarang Zool. 1849, p. 25. JUNGHUHN, Java I, 1853, p. 465. KONINGSBERGER, Med. Plantent. 54, 1902, p. 51; Java 1915, p. 542. BARTELS, Tectona X, 1917, p. 264.
**Nannosciurus melanotis**
TROUESSART, Cat. 1897, p. 446; Suppl. 1904, p. 345. TJEENK WILLINK, N.T.N.I. 65, 1905, p. 249. LYON, Proc. Biol. Soc. Wash. XIX, 1906, p. 51. THOMAS and WROUGHTON, P.Z.S. 1909, p. 389. v. BALEN, Zoogd. 1914, p. 302. ENCYCL. Ned. Ind. I, 1917, p. 649.
*Nannosciurus melanotis melanotis*
ROBINSON and KLOSS, Rec. Ind. Mus. XV, 1918, p. 248. DAMMERMAN, Treubia XI, 1929, p. 36. SODY, N.T.N.I. 89, 1929, p. 163.

*Description.*
Upper fur greyish snuff-brown [1]) composed of blackish hairs with two yellowish rings and entirely black hairs, and undulating woolly hairs dark with a broad ochraceous subterminal band. Muzzle ochraceous; chin whitish; the neck between the ears with a broad band of a somewhat lighter tinge than the back. Head with black lines extending from the middle of the nose to the eyes, running above the ochraceous buff eyerings and ending at the ears. Beneath each black line a broader whitish stripe running from the nose below

[1]) The colour of the upper surface has been described by LYON as red-brown, but probably this is due to his specimens having been in a preserving fluid. In describing delicates tinges, especially for subspecific discrimination, one should never use specimens having been preserved in spirit or any other fluid, as this may alter the colour, the discolouration looking often quite natural and therefore being very deceptive.

the eye and the ear and ending a short distance behind the latter. On the muzzle those stripes sullied with buff and below fringed by a black streak diffusing on the sides of the head. Hands and feet above of a somewhat lighter hue than the back. Ears on the inside and at the anterior border with short yellowish hairs; the outside with longer black hairs. A tuft of long black hairs behind the ear sharply contrasting with the white stripe running underneath. The very long black whiskers reach to the axillae.

Underparts greyish slightly tinged with buff, more markedly on the breast; straight hairs blackish tipped with light yellowish; woolly hairs dark grey.

Tail variegated brownish black, the long black hairs with a brownish ring near the base and a larger one in the middle part, the distal end with a broad whitish ring, the tip dark again.

*Measurements.*

Measurements of three specimens (in mm): total length, 145, 147, 150; head & body, 80, 82, 81; tail, 65, 65, 69; ear, 10, 9, 11; hindfeet, 24, 23, 24.

*Skull.*

The skull is very broad especially the frontal region, zygomatic breadth more than 80% of the basilar length. Maxillar root of zygoma a thin vertical septum facing frontally. Postorbital processes directed backwards, the posterior tip lying above the squamosal root of the zygomatic arch.

Measurements of two skulls (in mm): total length, 24.5, 24.3; basilar length, 19.8, —; zygomatic breadth, 16.1, 17.3; cranial width, 13.4, 14.3; least interorbital breadth, 9.6, 10.4; median length of nasals, 8.3, 8.0; greatest breadth combined nasals, 3.2, 3.4; palatilar length, 10.0, 10.3; length incisive foramen, 1.2, 1.2; length upper molar series, 4.1, 4.0; diastema i-p, 4.9, 5.1; length lower molar series, 3.9, 3.8.

*Distribution.*

The range of the species covers the Greater Sunda Islands, the typical *melanotis* being confined to Java.

Localities. W. Java: Buitenzorg; Mt. Gede, 1000 m; Djampang.