

ON A COLLECTION OF RATS FROM THE INDO-MALAYAN AND INDO-AUSTRALIAN REGIONS

(with descriptions of 43 new genera, species and subspecies)

by

H. J. V. SODY

(Buitenzorg).

CONTENTS

- I. Introduction.
- II. Preliminary remarks on the taking, indication, and application of measurements.
- III. The mammary formula as an important aid in the generic classification of Muridae.
- IV. Cosmopolitan species.
- V. Indo-Malayan species.
- VI. Indo-Australian species.
- VII. Alphabetical index.

I. INTRODUCTION.

In consequence of two requests (one from the "Eykman Instituut" at Batavia, where leptospirosis or Weil's disease is studied, and the other from the Institute for Plant Diseases („Instituut voor Plantenziekten") at Buitenzorg, where the classification of a collection of Celebes rats was wanted) the author was privileged in being transferred to the Buitenzorg Zoological Museum for some months.

A determination of the rats concerned, involved a study of all material available in the Museum, which, for the larger part, was unnamed. The number of specimens in the Museum, roughly estimated, totals 3000. As a result of my investigation, I was able to refer these to approximately 60 species, represented by some 150 subspecies. Although this material seems copious, it is altogether insufficient to solve several problems in connection with the systematics of subspecies. For that matter, the number of rats to be collected in future, not only should be considerably larger, but collecting should be effected more methodically also.

Unfortunately, the bulk of the author's private collection, which might have provided valuable data, is in Holland, and, due to the present circumstances, beyond reach. Nevertheless, a fair number of measurements of this material were at hand.

The present paper is a survey of all available material. Occasionally, brief discussions have been added.

II. PRELIMINARY REMARKS ON THE TAKING, INDICATION, AND APPLICATION OF MEASUREMENTS.

a. It is a growing custom to write e.g. "5 mm" instead of "5.0 mm". In some cases this causes uncertainty as 5 mm and 5.0 mm indicate different measurements!

Reversedly, this habit induces some authors to read 5.0 when 5 was given and actually meant. TATE (Bull. Am. Mus. Nat. Hist., LXXII, 1936, p. 714), for example, when copying JENTINK's toothmeasurement of the type of *Lenomys meyeri*, reproduced it as 13.0 mm. It is certain, however, that JENTINK never worked with an exactness up to tenths of millimeters, and therefore his original indication "13 mm" means in fact 12.8 - 13.2 mm. Up till now in this species I never found measurements larger than 12.0, whilst HOFFMANN gave 12.4 mm. To change JENTINK's 13 into 13.0 is therefore unwarranted.

b. Up till now I have been of opinion that external measurements, if given without comment, originated from the animal in the flesh. TATE, when discussing the external measurements of my short-tailed *Rattus concolor manoquarius*, remarked: "SODY omits to state whether the measurements given are true field measurements". This remark may indicate that sometimes measurements are given, taken from the prepared skin without mentioning this! A rather illustrative case in connection with this has been furnished by FRECHKOP. In his study of some Atjeh rats (Meded. Kon. Natuurh. Mus. België, VII, 28, 1931, p. 61) he wrote: "Les dimensions indiquées sur les étiquettes du collecteur diffèrent considérablement de celles que nous avons pu constater sur les peaux sèches et qui sont les suivantes:....." In this case, apparently, the author even preferred the skin measurements to those given on the labels and taken from the fresh animal, as he omits to quote the latter!

It may be considered unnecessary to stress the desirability to retain the long-established habit of indicating the manner in which measurements were obtained only if they have not been taken from the animal in the flesh.

c. Nowadays skull measurements are generally taken to a standard of accuracy up to tenths of millimeters. Being in a position to control numerous skull measurements which had been published previously by other authors, I often found discrepancies between the measurements presented and my own.

These differences seem to be largest in measurements taken with the sliding compasses, frequently going up to 0.2 and 0.3 mm. This rarely has consequences of taxonomic bearing, however, as only seldom with these measurements distinction is founded on parts of millimeters. With the so much finer and important toothmeasurements (always taken with the leg compasses by me), differences > 0.2 mm occur very sporadically and even a deviation of 0.2 mm is exceptional. Differences of 0.1 mm, on the other hand, occur commonly. As a rule these discrepancies are not systematical and will not effect the averages of large series to an appreciable extent. Yet, I believe that, even in case of large series, differences of averages of 0.1 mm should be neglected. Differences

exceeding 0.2 mm are important, provided that the series are sufficiently large and that the differences in averages are supported by corresponding differences in the minimum and maximum measurements.

d. In the writer's opinion the practice of stating the measurements of the largest specimens in a series only, should be abandoned. The measurements found in this way, will grow larger when larger series are available. Therefore it seems advisable to give minimum, maximum and especially average measurements of the series of "fullgrown" specimens as a whole.

e. In this way, however, we come to another difficulty: to distinguish sharply between adult and non-adult specimens, by preference in a way also clear to non-professional students.

Previously (Zool. Med. Rijksmus. Leiden, XIII, 1930, p. 100 - 140) I have considered this problem at length. The results of the present investigations, in addition to my former study, have led me to believe that, with a view to practice, a limit may be found in the complete presence of the posterior molars. This limit implies a rather early age, but this brings about the advantage that the number of specimens, which have to be cut out as too young for determination, is comparatively low.

f. Finally a single word on temporary conservation in liquid. It may be pointed out that the use of formaline is inexpedient, as this method may cause very disagreeable changes of colour. With methylated spirit the only change I observed is the transition of the very light cream colour of the belly into white in some "white-bellied" species. This character, therefore, should be valued cautiously.

III. THE MAMMARY FORMULA AS AN IMPORTANT AID IN THE CLASSIFICATION OF MURIDAE.

Formerly the mammary formulae were commonly neglected in the descriptions of rats, though it must be said that some of the present authors record them more or less regularly. As early as 1888, THOMAS wrote (Proc. Zool. Soc., 1888, p. 533) that "the mammary formula is perhaps the most important character within the restricted genus *Mus*". Nevertheless, when actually founding new genera, that author has not or hardly considered this point. The present author is fully prepared to support THOMAS's belief that the mammary formula represents a character of fundamental importance for distinguishing the heterogeneous groups, which constitute the present, so-called "genus" *Rattus*.

In the course of time many genera have already been separated from *Rattus* without consideration of the mammary formulae. Now it is interesting to realize that these formulae fully confirm the delimitations of these genera. Up till now I found some 12 different formulae in the Oriental Muridae (in wide sense geographically). These have been summarized as follows, in combination with the respective genera. Provisionally "*Rattus*" was left out of account.

0 + 1 = 2. Occurring in *Phlaeomys*.

0 + 2 = 4. Occurring in *Pithecheir*, *Chiropodomys*, *Insulaemus*, *Annomys*, *Bunomys*, *Hydromys*, *Hyomys*, *Lenomys*, *Leptomys*, *Parahydromys*, *Cyromys*, *Melomys*, *Notomys*, *Solomys*, *Uromys*, *Mastacomys*, *Pseudomys*, *Carpomys*, *Chrotomys*.

1 + 1 = 4. Occurring in *Platacanthomys*.

1 + 2 = 6. Occurring in *Haeromys*, *Maxomys*, *Echiothrix*, *Anisomys*, *Pogonomys*, *Chiruromys*, *Stenomys*, *Acanthomys*, *Lorentzimys*.

1 + 3 = 8. Occurring in *Rhizomys*.

2 + 2 = 8. Occurring in *Arvicola*, *Cannomys*, *Chiromyscus*, *Gerbillus*, *Golunda*, *Hapalomys*, *Microtus* (*Phaiomys*), *Millardia*, *Vandeleuria*, *Nesokia*.

2 + 3 = 10. Occurring in *Nyctocleptes*.

3 + 2 = 10. Occurring in *Mus*, *Leggada*, *Leggadilla* (?), *Caelomys* (probably).

3 + 3 = 12. Occurring in *Bandicota*, *Eliomys* (?)

4 + 2 = 12. Occurring in *Leggadilla* (?)

Moreover in *Gunomys* totals of 14, 16 (and 18) mammae have been found.

Obviously, never more than one mammary formula has been observed in one genus. Sometimes even only one or two were found to occur in a large number of allied genera. For example, the numerous Murid genera, endemic in New Guinea and the more eastern situated islands, show the formulae 0 + 2 = 4 and 1 + 2 = 6 only. To this rule, however, some of the following species may show exceptions:

Chiropodomys. In 1927 ALLEN (Amer. Mus. Novit., 270, p. 11) described the new species "*Chiropodomys fulvus*" and gave for it the formula 2 + 2 = 8, which is a striking deviation of the normal *Chiropodomys* formula 0 + 2 = 4. Of this species ALLEN says that it is "the first Chinese record of *Chiropodomys*". It may be questioned whether the reported species really belongs to *Chiropodomys*. In my opinion it does not, and also TATE (Bull. Amer. Mus. Nat. Hist., LXXII, 1936, p. 630) observed: "*Fulvus* differs so widely from the more typical species of *Chiropodomys* that probably it should be excluded from that genus".

Millardia. According to THOMAS (Journ. Bomb. N.H. Soc., XXIII, 1914, p. 29) the formula of "*Millardia kathleenia*" is 0 + 2 = 4. As the normal formula of *Millardia* is 2 + 2 = 8, it may be asked whether *kathleenia* has been classified correctly as *Millardia*. It is striking that, in this case also (cf. *Chiropodomys*), the differences from the other *Millardia* species seem to be large and the finding place is rather remote.

Rhizomys. THOMAS says (Ann. Mag. Nat. Hist., 8-XVI, 1915, p. 57), that the formula normally is 1 + 3 = 8, "though occasionally a minute anterior pectoral pair not functional in any specimen examined, may be present". Strictly speaking *Rhizomys* is not a Murid, but a Spalacid genus, but this is of no concern at present. The fact, however, that this second pair of mammae never becomes functional, rather proves than disproves the presence of a constant mammary formula. Apparently this is a typical case of "transition" to the

nearly related genus *Nyctocleptes*, with $2 + 3 = 10$. *Rhizomys* represents no true "exception" therefore.

Leggadilla. This is the only genus occurring twice in the foregoing list. As I am imperfectly acquainted with it (cf. THOMAS, Journ. Bomb. N.H. Soc., XXIII, 1914, p. 30), further data may throw a different light on the question.

Mastomys. Of this African genus TATE (Bull. Amer. Mus. N.H., LXXII, 1936, p. 510) says that the mammary formula "appears to be highly variable". I am unacquainted with it.

Gunomys. This genus represents a real exception. THOMAS (P.Z.S., 1881, p. 526) gave for *Mus (Nesokia) bengalensis*: "Mammae very numerous, from 14 to 18 in number, often different on the two sides of the body". In 1888 BLANFORD (Mamm., p. 423) also recorded for *Nesocia bengalensis*: "Mammae 7 to 9 pairs". In 1907 THOMAS (Ann. Mag. N.H., 7-XX, p. 202) divided the genus *Nesokia* s.a., into three: *Nesokia* s.s., *Bardicota* and *Gunomys*, the latter based on *Arvicola bengalensis*, and again he gives for this genus: 14-18 mammae. KLOSS (Treubia, II, 1921, p. 117) gives for *Gunomys*: "Mammae 12(?) to 18", for the last number probably only relying on THOMAS. WROUGHTON's record of 14-18 (Journ. Bomb. N.H. Soc., XVIII, 1908, p. 736) presumably is a copy of THOMAS. The present author (Zool. Meded. Leiden, XIII, 1930, p. 137) has reported for a Sumatra specimen of *G. b. sundavensis* $3 + 3 = 12$, and found in a Ceylon specimen of *G. gracilis* $\frac{3}{4} + \frac{2}{2} = 11$. CHASEN (Bull. Raffl. Mus., 12, 1936, p. 135) gives for a series from Penang "usually 14, but in one female 16". In any case the existence of a (very) variable mammary formula within the limits of one genus has been established here beyond doubt. Now it seems important to state that this wide range of mammary formulae occurs in a species which has an exceptionally large number of mammae! In my opinion this indicates a low degree of development. If this is right, then this exception needs not to be considered as very important.

Then we come to the genus *Rattus*.

In the Oriental species, at present recognized, the following 8 formulae were met with: $0 + 2 = 4$; $1 + 1 = 4$; $1 + 2 = 6$; $1 + 3 = 8$; $2 + 2 = 8$; $2 + 3 = 10$; $3 + 2 = 10$; $3 + 3 = 12$!

Already in the light of the foregoing considerations this list makes it probable that the present genus *Rattus* constitutes a heterogeneous group. Admittedly, here again two different formulae may occur in one species, cf. *R. rattus*, with $2 + 3 = 10$ and $3 + 3 = 12$. But in this case the two formulae correspond with two distinct oecological races and much significance has been attributed to the oecological races for the formation of new species (cf. RENSCH, Das Prinz. Geogr. Rassenkr., 1929, p. 28). It may be safely assumed that no perfect stability exists in a systematic unit, not even in a species, as, after all, the basis of our whole conception of nature is evolution. Beyond doubt, more species with deviations of the standard formula will be found (cf. "*Rattus*" *hellwardi* from Tondano, Celebes, with $1 + 2 = 6$, and from Pinedapa, with $2 + 2 = 8$), and certain small and narrowly limited variations could be accepted

without objection. But it is the "unlimited" variation in the genus *Rattus*, as understood at present, which cannot satisfy us.

For these and other reasons the author regards this genus as a very typical case of "negativism" on the issue of the formation of nominal genera: it has been degenerated to a systematical "rubbish-box" in which every species was thrown, which did not fit in one of the other genera. Admitting that the delimitation of genera is difficult and often rather arbitrary, yet this method of forming numerous small and "pure" special-genera in combination to one unwieldy and heterogeneous genus fit for almost every unidentifiable species, seems so unsatisfactory that, when a characteristic like the mammary formula presents itself, I am inclined to consider it to be extremely useful as a means of more adequate classification.

The following new genera are proposed here:

Christomys gen. n. Formula: $1 + 1 = 4$. Type species: *Mus macleari* THOMAS, Proc. Zool. Soc., 1887, p. 513.

Frateromys gen. n. Formula: $0 + 2 = 4$. Type species: *Mus fratrorum* THOMAS, Ann. Mag. N. H., 6-XVIII, 1896, p. 246. (Besides probably for *Rattus brevimolaris* TATE & ARCHB., and others).

Arcuomys gen. n. Formula: $0 + 2 = 4$. Type species: *Rattus arcuatus* TATE & ARCHB., Am. Mus. Novit., 802, 1935, p. 9.

Madromys gen. n. Formula: $1 + 2 = 6$. Type species: *Mus blanfordi* THOMAS, Ann. Mag. N. H., 5-VII, 1881, p. 24.

Taeromys gen. n. Formula: $1 + 2 = 6$. Type species: *Mus celebensis* GRAY, Proc. Zool. Soc., 1867, p. 598. PALMER (Proc. Biol. Soc. Wash., XI, 1897, p. 260) gives *Mus celebensis* as type species of *Gymnomys* GRAY. This, however, is incorrect. Very clearly it appears from GRAY's original description (P. Z. S., 1867, p. 597), that he based his new genus on *Mus macropus* GRAY. Of *M. celebensis* he says: "this rat also belongs to the section *Gymnomys*". To *Taeromys* many Celebes rats belong.

Mollicomys gen. n. Formula: $1 + 3 = 8$. Type species: *Mus hoffmanni* MATSCHIE Abh. Senck. Naturf. Ges., XXV, 1900, p. 284. Further *Rattus mollicomulus* TATE & ARCHB.

Cironomys gen. n. Formula: $1 + 3 = 8$. Type species: *Rattus hoogerwerfi* CHASEN, Treubia, 17, 1939, p. 207.

Pullomys gen. n. Formula: $1 + 3 = 8$. Type species: *Mus pulliventer* MILLER, Proc. U. S. Nat. Mus., XXIV, 1902, p. 765. Perhaps also for *Mus rogersi* THOMAS. The formula is very unusual. In the West further only known in *Mus bagobus* MEARNS.

Geromys gen. n. Formula: $2 + 3 = 10$. Type species: *Mus gestri* THOMAS, Ann. Mus. Civ. Genova, XXXVIII, 1897, p. 611. Outside *R. rattus* this formula seems to occur very rarely (*Mus doriae* TROUËSSART, *Rattus melvilleus* THOS. *Mus baluensis* THOS. may be a *R. rattus*, cf. ALLEN & COOLIDGE, Bull. Mus. Comp. Zool. Harvard Coll., LXXXVII 1940, p. 163). According to THOMAS,

Mus gestri "belongs to the Australian group of rats of which *Mus greyi* GRAY is the most typical.

Millardomys gen. n. Formula: $0 + 2 = 4$. Type species: *Millardia kathleenia* THOMAS, Journ. Bomb. N. H. Soc., XXIII, 1914, p. 29.

Octopodomys gen. n. Formula: $2 + 2 = 8$. Type species: *Chiropodomys fulvus* ALLEN, Amer. Mus. Novit., 270, 1927, p. 11.

I have confined myself to cases in which separation seemed urgent. In many of these genera more corresponding characters may be indicated justifying distinction. *Taeromys*, for example, certainly constitutes a distinct genus even without taking the mammary formula into consideration. I do not doubt that, after further study of authentic material, a still more detailed classification would seem advisable. The founding of a positive genus *Rattus*, originating from the type species, may be considered. In my opinion the majority of the eastern *Rattus* species now recognized, i.e. those with the formula $2 + 2 = 8$, will appear to be referable to a new genus, for which I propose the name:

Octomys gen. n. Formula: $2 + 2 = 8$. Type species: *Mus concolor* BLYTH, Journ. As. Soc. Beng., XXVIII, 1859, p. 295. In the following the use of this name has been avoided. It is conceivable that another name may claim priority, and subsequently a needless changing of names might result.

IV. COSMOPOLITAN SPECIES

Rattus rattus (LINN.)

Only lately (Treubia, 17, 1940, p. 395) I discussed some races of this species in a rather unsatisfactory way. At present I find myself in a position to treat the subject more thoroughly and especially more systematically as more data came at hand.

The taxonomy of this species more and more appears to be difficult to grasp. In addition to common geographic-morphological variation, a wide oecological-biological variation, often being morphologically very distinct, occurs. The combination of these two factors gave occasion to difficulties in reviewing and naming the resulting forms. MERTENS (Zool. Jahrb., LXVIII, 1936, p. 307), for instance, wishes that one „von der bisher üblichen Methode, ternäre Namen nur für geographische Rassen aufzustellen, nicht abweiche und nur in seltenen Ausnahmefällen auch rein ökologische Formen benennen würde". The admittance of „seltenen Ausnahmefällen" deprives his conception of its value as a principle, and he himself thus reversedly puts in practice his own theory that he uses a third name for the oecological forms only, leaving the geographical variations within these forms wholly unnamed! In conformity with the majority of authors I believe that there is no other (practical!) way to understand all occurring combinations of both variations than classifying them as subspecies and, consequently, to supply them all with names.

When dealing with geographical variations only, we usually content our-

selves with an enumeration of the forms in geographical succession. But, in this case, it seems advisable to establish firstly a principal division in oecological "sections". For some regions (Java, Sumatra, Borneo) this immediately yields excellent results. The following groups have been designated: a. houserats (10 mammae, dark bellied), b. ricefieldrats (12 mammae), c. field- or treerats (10 mammae, white bellied or nearly so). However, in other regions this division appears unsatisfactory. Firstly, sometimes already more sections have been indicated. BONHOTE (Fasc. Malay., Zool., I, 1903, p. 32) distinguished a „subgroup *rufescens*” (tree rat, underparts white or yellowish white, etc.) and a “subgroup *pyctoris*” (hill rat, underparts white), while he left out our very important and excellently characterized subgroup of ricefieldrats. In connexion with BONHOTE’s division HOSSACK’s study (Mem. Ind. Mus., I, 1907) should be consulted. I myself am inclined to distinguish a section for which I propose the name *lugens*, incorporating *mentawi*, *lugens*, *adustus* (and perhaps *simalurensis*, *babi*, *lasiae*, of which no material came at hand). A large difficulty is that in some regions these groups can, in other regions they cannot (or only with difficulty) be distinguished as regards their morphology. In the southeastern of the Lesser Sunda Islands (Timor, Soemba) the animals of the three Java sections are sometimes hardly distinguishable, although, for instance, the occurrence of animals with 10 and with 12 mammae proves that the various forms even there remain traceable. East of Celebes the sections merge almost completely. Animals from those regions largely agree in colour and in number of the mammae with the western houserats; the other western sections seem to be absent in the east. These rats occur there in houses, but apparently they are the common field rats at the same time. The (rather wide) local variability, occurring in the eastern region, can only be explained as incidental individual variation.

It will be clear from the foregoing considerations that when in the following all *R. rattus* races have been arranged in 4 oecological sections, no genetical or oecological relationship can always be warranted.

The 4 sections proposed here are:

1. *Diardi* section, starting from the specialized houserats as occurring in Java. Characterized (in their most specialized form) by rather short fur, dark ventral side, usually rather long tail (longer than head and body) and “normal” number of mammae (2 pairs pectoral, 3 pairs inguinal). To the trained examiner this “house type” seems to show itself in the whole texture of the fur and the colour of the ventral side. (A similar type also very clearly occurs in *Mus musculus*). The eastern forms differ more or less by their “wild” type.

2. *Argentiventer* section or group of the specialized ricefield rats. Characterized by their “silverish” (light blueish grey) ventral side (usually with faint median stripe), a usually (but not always) short tail, and especially by the increased number of mammae ($3 + 3 = 6$ pairs).

3. *Tiomanicus* section or group of races living in the open air, but not especially in ricefields. Characterized by white (or creamy white or light yel-

lowish) ventral side (in some races more or less mixed with grey), frequently a long tail, and normal number of mammae (10). It seems that these animals live in trees as well as on the ground. Possibly the races with a pure white belly are the most typical and specialized tree dwellers (cf. the investigations of West Javan animals by VAN HEURN, Korte Meded. Inst. Plantenz., 9, 1928; and Zool. Meded. Mus. Leiden, XIII, 1930, p. 151).

4. *Lugens* section, oecology wholly unknown. (If the North "Barisan islands" races should be included, the section name is *simalurensis*). Very dark bellied, but coarsely and long haired, probably adapted to living in the open. Mammae 10. The races of this group have not yet been found together with races of the *argentiventer* section.

At present the available data do not allow a more detailed classification. Further information on the methods of living of the various races may clarify relationships to some extent. Collectors should carefully record the habitat of the specimens, in connexion with their life habits (e.g. in a house, in a village, in the field, near a water course a.s.o.).

1. DIARDI-SECTION

It is generally known that amongst our houserats specimens occur with rather light, and rarely even whitish (but never white) bellies. Among the 50 Javanese in the Museum 4 such light bellied ones occur. Among some hundreds of specimens from other islands, only from Celebes (Makassar) a few light bellied ones were found. Shorttailed specimens may occur. Exceptions of the normal mammary formula ($2 + 3 = 10$) appear to be absent.

A list with some teeth- and relative tail measurements (tails expressed in percents of head and body) is presented. Arrangement mainly geographically, in the enumeration following thereupon mainly after the time of first description.

	Upper tooththrow			Tail (in %)		
Malay Peninsula	6.2	6.88	7.6	(14)	109	(39) <i>neglectus</i> , 1880 (= <i>griseiventer</i> , 1903)
Penang	—	7.4	—	(1)	—	"
Singapore	7.1	7.15	7.2	(2)	114	(1) "
Sumatra	6.2	6.84	7.5	(100)	106	(50) " (= <i>palembang</i> , 1935)
Siberoet, Sipora	6.7	7.05	7.7	(6)	108	(6) " (?)
Bangka, Billiton	6.3	6.85	7.2	(4)	114	(3) "
Sebesi, Krakatau	6.3	6.80	7.3	(20)	103.5	(15) "
Anambas	6.9	7.10	7.3	(4)	—	— " (?)
Tambelan	6.3	6.76	7.0	(8)	—	— " (?)
Serasan, S. Natoena ids.	6.9	7.10	7.3	(2)	—	— " (?)
Borneo	6.4	6.93	7.6	(50)	107	(29) " (= <i>turbidus</i> , 1913)
N. Celebes	6.3	6.95	7.6	(44)	104.5	(47) "
Saleyser	6.2	6.96	7.5	(17)	105	(12) "
Nias	6.6	6.72	7.0	(4)	89	(6) <i>maerens</i> , 1911

	Upper tooththrow			Tail (in %)		
<i>N. Pagai</i>	5.9	6.50	6.8	(5)	98	(5) <i>auroreus</i> subsp. n.
Enggano	—	6.9	—	(1)	102	(1) „ (?)
Java	6.0	6.65	7.1	(100)	103	(74) <i>diardi</i> , 1880
Onrust	6.8	6.90	7.0	(3)	—	— „
Karimoendjawa	6.4	6.73	7.1	(3)	116	(3) „
Noesa Kambangan	6.2	6.69	7.2	(17)	118	(5) „
Madoera	7.1	7.20	7.3	(3)	—	— „
Bawean	—	7.2	—	(1)	110	(1) „ (?)
Bali	6.3	6.76	7.3	(22)	103.5	(25) „ (= <i>samati</i> , 1932)
Noesa Penida	6.7	6.75	6.8	(2)	103.5	(2) „
Lombok	7.0	7.05	7.1	(2)	114	(3) „
Soembawa	6.8	6.90	7.0	(2)	—	— „
Flores	6.8	7.38	8.1	(18)	102	(13) <i>diardi</i> \leq <i>santalum</i>
Timor	7.1	7.50	8.0	(3)	106	(5) „ „ „
Soemba	7.8	8.27	8.6	(11)	99	(12) <i>santalum</i> , 1932
Lomblen	—	7.2	—	(1)	—	— ?
Alor	—	7.7	—	(1)	—	— ?
<i>S. Celebes</i>	6.8	7.40	8.0	(72)	112	(64) <i>makassarius</i> subsp. n.
Moena	6.8	7.37	7.7	(3)	103	(3) „
Boeton	6.8	7.30	8.1	(13)	109	(12) „
Togian	7.0	7.22	7.8	(9)	111	(9) „
<i>Peleng</i>	7.6	8.09	9.0	(8)	98	(8) <i>pelengensis</i> subsp. n.
Banggai	—	7.5	—	(1)	—	— ?
Taliaboë	—	7.3	—	(1)	116	(1) ?
<i>Boeroë</i>	6.8	7.50	7.9	(9)	100	(7) <i>moluccarius</i> , 1933
<i>Banda</i>	6.4	6.99	7.3	(7)	113	(7) <i>septicus</i> , 1933
Kei	—	6.9	—	(1)	103	(1) „ (?)
Tenimber	6.8	6.85	6.9	(2)	—	— „ (?)
N. Guinea: Babo	6.2	6.75	7.1	(10)	—	— „
„ : Manokwari,						
Arfak	6.4	6.77	7.2	(14)	114	(20) „
„ : Tanah Merah	6.7	6.90	7.0	(5)	—	— „
Amboina	6.2	6.60	6.9	(7)	—	— „ (?)
Ceram	6.6	6.97	7.3	(7)	—	— „ (?)
<i>Obi</i>	6.7	7.02	7.6	(14)	99	(19) <i>obiensis</i> subsp. n.
Ternate	6.5	7.13	7.5	(15)	101	(13) „
Halmahera	—	7.0	—	(1)	—	— „ (?)
Talau: Liroeng	7.0	7.38	7.7	(4)	76	(1) ?
„ : Karakelong	—	7.7	—	(1)	90	(1) ?
Sangihe	—	7.0	—	(1)	—	— ?

(1). *Rattus rattus diardi* (JENTINK)

For Java, Onrust, Karimoendjawa, Noesa Kambangan, Madoera, Bali (= *samati* SODY), Noesa Penida, Lombok and perhaps Bawean.

From Gedangan, E. Java, I possess a dark bellied specimen with the very abnormal tooth measurement of 7.6 mm. This specimen was left out of the table. The animals from Madoera, Bali and Lombok already show a trace of transition into the larger and shorter tailed race *santalum* of Soemba.

It is instructive to note that a specimen in the collection, gathered by the "Sunda expedition-Rensch", has been determined by MERTENS as *R. r. bre-*

vicaudatus, another one as *R. concolor ephippium*. Perhaps this may explain to some extent why MERTENS opposed to distinguish here geographical races by means of names.

Maximum Java skull measurement, known to me: 43.7 mm.

(2). *Rattus rattus neglectus* (JENTINK)

Somewhat larger toothmeasurements than *diardi*. For Borneo, Sumatra (= *palembang* TATE & ARCHB.), Malay Peninsula (= *griseiventer* BONHOTE), Bangka, Billiton, Sebesi, Krakatau, and, to my mind, North Celebes.

Maximal skull measurements: Borneo 45.0; Sumatra 44.9; Malay Peninsula 45.3 mm. In N. Celebes 46.7 (Boemboelan) and 45.3 (Minahassa).

The difference in tooth- and skull-measurements from *diardi* is very small indeed, but undeniable. The favourable results of such a distinction based on small differences of this kind, becomes apparent when studying animals of Sebesi and Krakatau. It is found now that these actually fit in with the Sumatran specimens. (Krakatau also furnishes one skull measurement of 44.6 mm. For the rest in these Krakatau animals a certain "outdoor" type is observed).

TATE & ARCHBOLD's race *palembang*, depending on the "much warmer colour" of 12 Palembang specimens, is a pure "formaline race". The Museum possesses 3 specimens from the same expedition by the same collector, which show the same warm colour, but the fact of the conservation in formaline has expressly been noted on the labels (by the Museum administration).

The specimens from Siberoet and Sipora have teeth which are rather large, but I refrain from founding a new race on them. The single specimen from Penang (CHASEN, Bull. Raffl. Mus., 8, 1933, p. 17) has a skull length of 45.8 mm.

From N. Celebes (Tomohon) we possess 4 very dark bellied specimens, which may prove to form a distinct race. They were all collected in houses. Their toothmeasurements (6.9-7.00-7.2 mm) and relative taillengths (averagely 105 %) have not been worked up in the data concerning N. Celebes.

I am not able to name our Tambelan series (old collection). In my opinion certainly not *tambelanicus* MILLER.

(3). *Rattus rattus santalum* SODY

Considerably larger than *diardi* and with shorter tail. For Soemba, whilst especially Flores and Timor animals are intermediate in the measurements between *diardi* and *santalum*. Some Flores specimens are obvious by their enormously long bristles (up to 47 mm).

In comparison with Javan examples, Soemba animals show a more obvious „outdoor" type with much lighter bellies, resembling more or less the ricefield rat. It would be very interesting to know whether *santalum* is as obligate a house inhabitant as *diardi*. For Timor the distinguishing of the races (house and ricefield) certainly becomes difficult. The existence of animals with 10 and with 12 mammae proves that actually two races occur. Some specimens, especially males, were left unnamed.

(4). *Rattus rattus maerens* (MILLER)

The separation depended on differences in colour. Nias.

The colour difference is well applicable to the specimens at hand, though they may have been preserved in formaline.

(5). *Rattus rattus aureus* subsp. n.

Type: ♀ ad., N. Pagai island. Coll. J. J. MENDEN, 16-I-1935. Buitenzorg Museum, No. 47/35.

Smaller than all other races, especially than *neglectus*, occurring in adjacent regions. Allowing for the formaline conservation, no difference in colour from Sumatra animals can be established with certainty. For N. Pagai, whilst perhaps a single specimen from Enggano, which, previously (Treubia, 17, 1940, p. 393), I brought to *diardi*, also belongs to this race.

Measurements of type: head and body 147; tail 142; hind foot 28; ear 18; skull: greatest length 36.2; condylobasal length 33.9; basal length 32.0; palatal length 19.3; zygomatic breadth 17.9; interorbital constriction 6.7; nasals 12.6×4.2 ; diastema 9.5; palatal foramina 7.3×2.6 ; upper tooththrow 5.9 mm. Mammae $2 + 3 = 10$.

(6). *Rattus rattus makassarius* subsp. n.

Type: ♀ ad., Makassar, S. Celebes, 1940. Don. Eykman Instituut (No. 668). Buitenzorg Museum, No. 477/40.

The race is characterized by the large toothmeasurement in combination with a long tail (91 - 112 - 125 % in 64 specimens). The difference with N. Celebes is very clear. — For S. Celebes, Moena, Boeton, Togian. From S. Celebes I provisionally also bring to it a series from Loka, 1200 m.

Measurements of type: head and body 180; tail 199; hind foot 40; ear 19; skull: greatest length 45.1; occipitonasal length 44.5; condylobasal length 43.1; basal length 39.4; palatal length 19.8; zygomatic breadth 21.2; interorbital breadth 6.2; nasals 15.5×4.4 ; diastema 12.0; palatal foramina 8.5×2.8 ; zygomatic plate 5.0; upper tooththrow 7.8 mm. Mammae $2 + 3 = 10$.

There is much variation in colour, especially of the ventral side. Some Makassar specimens are nearly white there. On the labels of 2 specimens (No's. 2354, 2355), ♂ and ♀ (mammae $2 + 3 = 10$), with clearly light belly, is written: "digged out", on those of another pair (No's. 2133, 2353), also ♂ and ♀ (mammae $2 + 3 = 10$), with the whitest bellies of the whole series, stands: "from house". I am not convinced that the whole of this series consists of houserats! However, arrangement of the Makassar series in two groups according to the colour of the belly, did not give any distinct correlating difference in measurements or any other character. I believe that further investigations should be carried out locally, selecting special catching localities and exactly noting these on the labels. The 8 Loka animals, differing constantly in colour, have been kept in formaline. Their tails measure 91 - 100 - 106 %, their teeth 6.8 - 7.31 - 7.8 mm.

Probably some specimens of our large Makassar series have been recently

introduced. One specimen (No. 566/40, not inserted in the series of measurements), differs widely in many respects (fur, colour, measurements and proportions of these) from the remainder of the series (hind foot 44; toothrow 8.1; length of bulla 8.2; tail 128 % etc.). As regards the skull and the exceptional length of the bristles, I would refer the animal to *santalum*, but the unusual warm brown tinge of the fur and the great length of the tail are opposed to this. The specimen is so strongly deviating that I would not hesitate to designate it as the type of a new race, if it did not originate from a seaport town.

I also removed from the Makassar series 3 specimens, which (to my recollection) closely match European (Amsterdam) black rats, and which bear the label-note: "harbour" or even "from a Netherlands steamer".

When studying the Eastern races now following, the want of my own collection, which contains over 110 specimens from Celebes, New Guinea and interjacent islands, proved a serious handicap. Only the principal measurements of these specimens were at hand. The Museum contains over 150 specimens from the same area, but with an entirely different distribution, and part of these belong to the "old" collection (without external measurements). Strictly speaking this material is insufficient for a thorough treatment. Moreover, contrary to the western part of the archipelago, this region has not yet been studied previously by other workers. Therefore my determinations should be regarded as provisional, as the division in subspecies is hypothetical to some extent.

(7). ***Rattus rattus pelengensis*** subsp. n.

Type: ♀ ad., Poelau Peleng, E. of Celebes. Coll. J. J. MENDEN, 19-VII-1938. Buitenzorg Museum, No. 147/38.

Characterized by the extraordinary large teeth. For Peleng island only.

Measurements of type: head and body 238; tail 243; hind foot 42; ear 25; skull: greatest length 50.0; condylobasal length 47.8; basal length 44.9; palatal length 27.4; zygomatic breadth 23.5; nasals $\pm 18.6 \times 5.7$; diastema 13.6; palatal foramina 8.5×3.0 ; zygomatic plate 5.7; upper toothrow 9.0 mm. Mammae $2 + 3 = 10$.

Some specimens from Banggai and Taliaboe islands, seem to indicate that, already on these neighbouring islands, similar very large toothmeasurements do not occur.

(8). ***Rattus rattus moluccarius*** SODY

Characterized by large teeth (though much smaller than in *pelengensis*) and short tail. Now restricted by me to Boeroe, the type locality.

(9). ***Rattus rattus septicus*** SODY

Characterized by small teeth and long tail. For Banda, New Guinea (Babo, Manokwari, Arfak, Tanah Merah) and perhaps Ambon and Ceram.

(10). *Rattus rattus obiensis* subsp. n.

Type: ♀ ad., Obi. Coll. SODY, No. Obi 7 (not represented in the Museum).

Characterized by small teeth and short tail. For Obi, Ternate and perhaps Halmahera.

Measurements of type: head and body 180; tail 172; hind foot 33; ear 21; skull: greatest length 44.0; occipitonasal length 43.6; basal length 40.7; palatal length 25.5; zygomatic breadth 20.7; interorbital breadth 6.4; nasals 16.5×5.7 (unusually broad); diastema 13.0; palatal foramina 8.6×3.3 ; upper toothrow 7.0. Mammae $2 + 3 = 10$.

Some specimens from islands as Lomblen, Alor, Sangihe and Talaud, had to be left unnamed. The Talaud animals could be dark bellied specimens of the local "field rat", *R. r. talaudensis*.

2. ARGENTIVENTER-SECTION

The habitat of these animals is wet rice-fields, which seems to be a characteristic in general. Some toothmeasurements and relative taillengths are presented. The arrangement is geographical, in the discussion historical.

	Upper toothrow			Tail (in %)		
Malay Peninsula	7.1	7.42	7.9	(19)	104	(19) <i>chasei</i> subsp. n.
Sumatra	6.9	7.48	8.0	(25)	94	(19) <i>argentiventer</i> , 1916
Borneo	7.3	7.35	7.4	(2)	92	(2) "
Celebes	6.8	7.22	7.6	(5)	106	(3) "
New Guinea	—	7.0	—	(1)	—	— " (?)
Java	6.7	7.15	7.8	(49)	96	(41) <i>brevicaudatus</i> , 1918
Noesa Kambangan	6.8	7.12	7.6	(9)	< 100	(9) "
Enkhuizen	—	7.0	—	(1)	97	(1) "
Bali	6.9	7.50	8.1	(63)	104.5	(65) <i>bali</i> , 1921
Lombok	—	7.3	—	(1)	104	(1) "
Soembawa	6.8	7.41	8.0	(9)	103	(8) "
Flores	6.9	7.44	8.0	(9)	106	(7) "
Timor	—	7.8	—	(1)	102	(1) " (?)
Soemba	7.1	7.73	8.2	(19)	98	(21) <i>saturnus</i> subsp. n.

(1). *Rattus rattus argentiventer* (ROB. & KLOSS)

For Sumatra, Borneo and S. Celebes.

5 Animals from Celebes, Makassar (4 of which ♀♀, with mammary formulae $3 + 3 = 12$), provisionally are referred to *argentiventer*. They are rather variable in colour of the back, hair on the tail, and size of the bullae. One of the females bears the label-note: "from rice-field dike".

Furthermore, in the old collection I found a ♀, Tanahmerah, S. New Guinea, 7.vi.1910, mammae $3 + 3 = 12$, belly (though discolored) apparently quite like *argentiventer*. Teeth 7.0 mm.

(2). *Rattus rattus brevicaudatus* HORST & DE RAADT

Fortunately, the generally accepted name *brevicaudatus* for this important rat, was found valid. It shows a smaller tooth-measurement than *argentiventer*

(see table). A series of 5 specimens from Serang, Bantam W. Java, deviates in colour.

In Java, Enkhuizen, Noesa Kambangan.

(3). *Rattus rattus bali* KLOSS

Cotypes in collection (No's 199 and 200. The numbers given by Kloss are erroneous).

Clearly larger toothmeasurements than *brevicaudatus*. Moreover, as an average, tail longer than head and body. The fact, that this race was not accepted by CHASEN in his Handlist of Malaysian mammals, may probably be explained by his being unacquainted with it, and the same may be the case with MERTENS (cf. his determination of a Bali *diardi* specimen with tooth-measurement 6.6 mm to *brevicaudatus*, and of another one to *R. concolor ephippium*).

In Bali, Lombok, Soembawa, Flores and ?Timor.

(4). *Rattus rattus saturnus* subsp. n.

Type: ♀ ad., Melolo, Soemba. Coll. G. STEIN, 15.vi.1932. Buitenzorg Museum, No. 265/35.

Larger toothmeasurement than *bali* and averagely shorter tail.

Measurements of type: head and body 190; tail 202; hind foot 36; ear 23; skull: greatest length 44.3; condylobasal length 42.2; basal length 39.5; palatal length 24.1; zygomatic breadth 22.1; interorbital breadth 5.9; nasals 16.7×4.9 ; diastema 11.8; palatal foramina 8.8×2.6 ; upper tooththrow 8.2 mm. Mammae $3 + 3 = 12$.

In Soemba. Perhaps also for Timor? In these islands it is very difficult to distinguish rice-field rats and house rats, save with the aid of the mammary formula.

(5). *Rattus rattus chaseni* subsp. n.

Type: ♂ ad., Krian, Perak, Malay States, 17.ix.1932, Raffles Museum, No. 249/32. (This specimen was very kindly lent to me by Mr. F. N. CHASEN, Director of the Museum, who was also the first to draw attention to the length of the tail in these animals. However, he did not dispose of sufficient material of *argentiventer* for comparison).

From the series of measurements, given by CHASEN (Bull. Raffl. Mus., 8, 1933, p. 23), we see that in the Malay Peninsula the total length of the whole animal exceeds the average length found in Sumatra (in 19 specimens from Malay Peninsula 325 - 361 - 395, in 19 specimens from Sumatra 261 - 324 - 364), but perhaps CHASEN may have "selected" the largest specimens of a large series. Therefore the clearest difference is the relative length of the tail: in 19 Perak specimens the tail averages 104%, only 3 individuals having tails of 97, 98 and 99%, all others 102 - 114%.

Measurements of type: head and body 194; tail 200; hind foot 41; ear 24; skull: greatest length 44.6; condylobasilar length 39.1; palatilar length 20.9;

zygomatic breadth 20.8; length of a nasal 15.1; diastema 12.0; palatal foramina 8.5; upper tooththrow 7.6 mm. (For further particulars see CHASEN, l.c.s.).

3. TIOMANICUS-SECTION

(This name is rather arbitrary, perhaps only finding its cause in the delimitation of our range. Already our own collection contains accidental representatives of forms like *kandiyanus* (KELAART, 1850) of Ceylon, and *sladeni* (ANDERSON, 1879) of Annam, which are older named and perhaps belong to the same section).

Arrangement chiefly geographical.

	Upper tooththrow			Tail (in %)		
<i>Siantan, Anamba ids.</i> ...	6.9	7.23	7.4	(3)	113	(3) <i>siantanicus</i> , 1900
<i>Malay Peninsula</i>	6.3	6.77	7.3	(22)	104.5	(24) <i>jalorensis</i> , 1903
<i>Sumatra</i>	6.1	6.67	7.2	(51)	103	(45) "
<i>Borneo</i>	6.4	6.80	7.0	(10)	104	(7) "
<i>Berhala</i>	6.0	6.52	6.9	(6)	—	— " (?)
<i>Lang eiland</i>	6.6	6.85	7.0	(11)	105	(11) <i>jalorensis</i> \leq <i>roquei</i>
<i>Jarak</i>	(5.9)	(6.16)	(6.7)	(96)	104	(81) <i>jarak</i> , 1905 ¹⁾
<i>Riouw: Tg. Pinang</i>	7.0	7.10	7.3	(3)	—	— <i>rhionis</i> , 1909
<i>Datoe</i>	6.9	7.35	7.7	(11)	95	(11) <i>ducis</i> , 1911 ²⁾
<i>Pelapis</i>	6.9	7.37	7.8	(15)	101	(14) " ²⁾
<i>Lamukotan</i>	7.0	7.24	7.6	(13)	99	(13) <i>lamukotanus</i> , 1911 ³⁾
<i>Panembangan</i>	6.8	7.23	7.6	(10)	98	(8) " ³⁾
<i>Seroetoe</i>	—	7.1	—	(1)	112	(1) " ³⁾
<i>Mata Siri</i>	7.2	7.35	7.6	(19)	99	(16) " ³⁾
<i>S. Natoena ids.</i>	6.4	6.67	7.0	(10)	93	(8) <i>pauper</i> , 1913 ⁴⁾
<i>N. Natoena ids.</i>	6.5	6.85	7.2	(10)	103	(9) <i>luxuriosus</i> , 1935 ⁴⁾
<i>Mapor (Riouw)</i>	6.5	6.83	7.2	(12)	111	(7) <i>batin</i> , 1916
<i>Koendoer (Riouw)</i>	7.0	—	7.5	(6)	109	(1) <i>kundur's</i> , 1931 ⁵⁾
<i>Doerian (Riouw)</i>	6.9	7.13	7.7	(11)	105	(11) "
<i>Enggano</i>	6.1	6.57	6.8	(6)	105	(6) <i>vernalis</i> , 1940
<i>Sebesi</i>	7.2	7.45	7.7	(2)	96	(2) <i>sebesianus</i> subsp. n.
<i>Java</i>	6.5	7.21	8.0	(67)	116	(100) <i>roquei</i> , 1929
<i>Karimoendjawa</i>	—	7.3	—	(1)	114	(1) "
<i>Madoera</i>	—	6.5	—	(1)	—	— "
<i>Noesa Baroeng</i>	—	7.6	—	(1)	117	(1) "
<i>Bawean</i>	6.9	6.97	7.0	(4)	119	(3) " (?)
<i>Meeuweneiland</i>	7.0	7.07	7.2	(3)	96	(3) <i>larusius</i> subsp. n.
<i>Deli (Klappereiland)</i>	7.0	7.28	7.6	(10)	115	(10) <i>delirius</i> subsp. n.
<i>Noesa Kambangan</i>	6.9	7.24	7.7	(30)	110	(4) <i>generatius</i> subsp. n.
<i>Soemba</i>	—	8.3	—	(1)	108	(1) <i>sumbae</i> , 1930
<i>N. Celebes</i>	6.7	7.27	7.9	(7)	106	(7) <i>argyraceus</i> subsp. n.
<i>Talaud: Liroeng</i>	7.3	7.72	8.3	(6)	86	(4) <i>talaudensis</i> subsp. n.
" : <i>Karakelong</i>	6.8	7.15	7.5	(2)	94	(2) "

¹⁾ Measurements taken from ROBINSON, Journ. F. M. S. Mus., VII, 1916, p. 10-13.

²⁾ Measurements taken from LYON, Proc. U. S. Nat. Mus., XL, 1911, p. 101

³⁾ Measurements chiefly from LYON, Proc. U. S. Nat. Mus., XL, 1911, p. 101.

⁴⁾ Measurements chiefly from CHASEN, Bull. Raffl. Mus., 10, 1935, p. 37.

⁵⁾ Measurements taken from CHASEN, Bull. Raffl. Mus., 5, 1931, p. 77.

(1). *Rattus rattus siantanicus* (MILLER)

3, Siantan, Anamba islands.

Compared by MILLER with "*alexandrinus*" of Trong, Lower Thai, and *tiomanicus*. In the shape of the rostrum these specimens agree closely with MILLER's description. The breadth of the palatal foraminae is 2.9 - 3.3 mm. A remarkable difference from MILLER's animals, however, is formed by the tail length. MILLER gives 96 % (5 specimens). Our animals 113 % (3), whilst also the measurements of CHASEN & KLOSS (Journ. Mal. Br. R.A.S., VI, 1928, 3, p. 36) point to a pronounced long tail.

(2). *Rattus rattus jalorensis* (BONHOTE)

Many specimens from Malay Peninsula, Sumatra, Borneo. Furthermore, a series without external measurements from Berhala (though having rather pure white bellies and small teeth), is reduced to this race. A series from Lang island (with the same deviation in colour) probably is a transition to *roquei* of Java. Animals from Sumatra and Borneo, in a few cases only show a purely white ventral side and in this respect some specimens are even difficult to distinguish from *neglectus*.

(3). *Rattus rattus jarak* (BONHOTE)

1, Jarak.

The measurements in the table are all taken from ROBINSON (1916). By their smallness the toothmeasurements as such seem sufficient to support the distinction of the race. However, an incomprehensible complication exists. Our Museum specimen is one from the series measured by ROBINSON (No. 249/15). This author gives for it as toothmeasurement 6.1 mm. But, actually, this measurement is at least 6.3 mm. Furthermore it is striking that for the type, BONHOTE (Journ. F.M.S. Mus., I, 1905, p. 69) gives 7 mm, which stands for at least 6.8, and thus falls outside ROBINSON's series of 96 measurements (5.9 - 6.7 mm)! Finally we read in CHASEN & KLOSS (Bull. Raffl. Mus., 5, 1931, p. 77): "There is very little, if any, difference in size between *jarak* and *jalorensis*". It is felt that some misunderstanding exists as to ROBINSON's measurements, though I cannot understand what, as that author expressly says that his tooththrow measurements are "taken on the alveolus".

(4). *Rattus rattus rhionis* (THOS. & WR.)

This race with its very dark back has originally been described from Bintang and recorded from Batam; afterwards (1925) by CHASEN from Galang. KLOSS (1921) referred 4 old specimens in our Museum to this race. On three of the labels, it is stated: "Residency of Riouw and Dependencies", on one furthermore: "Tandjoengpinang, 30.ix.1916". The fourth label only records: „Algemeene pakhuismeester Palembang, Sumatra, 29.ix.1916". The date and the method of preparation of the 4 specimens strongly point to one special collection in connection with an investigation of plague, which then might have

been sent by the "pakhuismeester" (= government harbour warehouse keeper) at Palembang. Of course this is uncertain, but even if the fourth specimen might have been really caught at Palembang, then the indication "pakhuismeester" so clearly points to a harbour- or shiprat that it is preferable not to include this rat in the fauna of Sumatra, contrary to what has been done generally up till now.

The placing of this form in the section of the fieldrats partly depends on the structure of the fur, but for the larger part on the opinion of CHASEN who (Bull. Raffl. Mus., 10, 1935, p. 21) refers this rat to the "field-rats" of the Eastern islands of the Riouw Archipelago. The colour of the belly would suggest the *diardi* section.

(5). *Rattus rattus lamucotanus* (LYON)

In our collection 1 specimen from Panebangan, which very distinctly shows an outdoor type. Furthermore 1 specimen from Seroetoe, with a somewhat too long tail (112 %).

(6). *Rattus rattus pauper* (MILLER)

1, Sirhassen; 1, Serasan, S. Natoena islands.

Distinguished by MILLER only because being smaller than *Epimys rattus neglectus* from S. Borneo. CHASEN, however, mentions difference in colour from *jalorensis* and smaller skull. I further point to the short tail.

(7). *Rattus rattus luxuriosus* CHASEN.

1, Boengoeran, N. Natoena islands.

According to CHASEN distinguished from *pauper* by the dark upper parts and by being larger. I think that also the tail may be longer.

(8). *Rattus rattus kunduris* CHASEN & KLOSS

No topotypical material available (Koendoer), but our series from Doerian (Riouw Archipelago) seems to be referable to it. This series has been described earlier by DAMMERMAN (Treubia, VIII, 1926, p. 304), who saw in it 2 races: *neglectus* (field rat) and *diardi* (house rat). He says that the first "is readily distinguished from the following form by its lighter belly and shorter tail". In fact 3 of the 4 specimens, which he reduces to *diardi*, are somewhat darker bellied than the 7 specimens, which he reckons to *neglectus*, as the grey median stripe is somewhat more obvious and broader. The present author, however, regards this as a (very small) individual variation. As for the taillength, the former author certainly was mistaken. According to the labels, the 7 "*neglectus*" give averagely 103 %, the 4 "*diardi*" 104 % of the length of head and body. I, therefore, cannot find reasons to bring these animals, which were all caught in the open air, to 2 races.

(9). *Rattus rattus vernalus* SODY

Series (in which the type) from Enggano.

Difference in colour from *jalorensis*.

(10). *Rattus rattus sebesianus* subsp. n.

Type: ♂ ad., Sebesi. Coll. K. W. DAMMERMAN, 28-IV-1921. Buitenzorg Museum, No. 60.

There is no doubt that the 2 specimens available are not houserats (our collection contains 3 houserats from Sebesi, with dark bellies as usual, and tooththrows of 6.4 - 6.9 mm) and not ricefield rats (on the contrary, our specimens are characterized by very small bullae). Moreover the measurements do not agree with those of the neighbouring races of both sections. The animals belong to the section of the field rats (according to the labels they were collected "in forest near rice field"). Already the toothmeasurements (7.2 - 7.7) exclude *jalorensis*. The skull measurement of the type (48.0) makes it impossible to bring the animals to *roquei* (maximum 45.3) or *kunduris* (maximum 46.5). From the latter race (which, to a large extent, shows the same colour) moreover clearly differing by smaller bullae.

In both animals the fur of the belly partly consists of purely white hairs, but a larger or smaller part of the hairs has grey bases, and so in both a longitudinal darker breaststripe is formed. Back somewhat darker (less yellowish) than in average Javan material.

Measurements of type (and second ♂): head and body 227 (177); tail 204 (178); hind foot (dry) 38 (36); ear 21 (20); skull: greatest length 48.0 (39.3); condylobasal length 45.8 (36.9); basal length 42.7 (34.0); palatal length 26.8 (21.1); zygomatic breadth 22.7 (18.8); interorbital breadth 7.3 (6.0); nasals 17.7×5.3 (13.9×4.2); diastema 13.9 (10.4); palatal foramina 9.0×3.0 (7.5×3.0); length of bulla 7.0 (6.6); upper tooththrow 7.7 (7.2) mm.

(11). *Rattus rattus roquei* SODY.

Hereto our material from Java, Karimoendjawa, Noesa Baroeng, Madoera, and perhaps also from Bawean.

On the whole I may refer to my explanation in *Treubia*, 17, 1940, p. 403, where I worked out a series of measurements given by DAMMERMAN. Also in the present (larger) material the differences from *jalorensis* appear to go up without restriction. *Roquei* is larger, has a longer tail, and is probably more often purely white on the belly.

It is necessary to correct some small mistakes, made by TATE. On p. 520 of his treatise on "Some Muridae of the Indo-Australian Region" this author gives a mammary formula 3 + 3 for "the white bellied *jalorensis* rats". This must be 2 + 3. Then we read (p. 524) under *R. jalorensis*: "Javanese (and mainland?) rats". This view is untenable as the type locality lies on the mainland (Malay Peninsula). We suppose that the author has not studied the detailed original description of *roquei* (*Zool. Med. Rijksmus. Leiden*, XIII, 1930, p. 94 - 98, in Dutch!) exactly. Since, however, I gave further particulars in English (l.c.s.).

The type of this race, which ought to be in my collection, seems to be unfindable. Unfortunately, its measurements have never been taken with an

exactness up till tenths of millimeters. Therefore the skull length, recorded as 45.5, may not be reckoned larger than 45.3 mm.

(12). **Rattus rattus larusius** subsp. n.

Type: ♂ ad., Meeuwen eiland, Bantam residency, off W. coast of Java. Coll. P. F. FRANCK, 4-viii-1932. Buitenzorg Museum, No. 12/32.

Like *roquei*, but with shorter tail (92 - 96 - 102 % in the 3 specimens, against averagely 116 % in over 100 Javanese, among which there are only 2 with tails of less than 102 %).

Measurements of type: head and body 185; tail 170; hind foot 32; ear 16; skull: greatest length 39.8; condylobasal length 37.7; basal length 34.9; palatal length 22.0; zygomatic breadth 19.2; interorbital breadth 5.6; nasals 14.2×4.2 ; diastema 11.0; palatal foramina 7.0×2.9 ; upper tooththrow 7.0 mm.

(13). **Rattus rattus delirius** subsp. n.

Type: ♂ ad., Deli or Klappereiland, off S. coast of Bantam, W. Java. Coll. V. VON PLESSEN, 20.ii.1932. Buitenzorg Museum, No. 5/32.

Distinguished from *roquei* by longer hind foot and larger skull. In the 10 specimens the hind foot varies from 37 - 41 mm. Among over 100 Javan specimens there are only 2 with 37 and 2 with 36 (among 11 specimens from Lang island there is one with 37.5, and the Karimoendjawa example gives 39). The skull varies from 41.0 - 46.8, averagely 44.8 mm. For the 10 largest skulls of *roquei* (out of 60) I find 43.0 - 45.3, averagely 43.8 (here also the Karimoendjawa specimen is the largest, reaching 45 mm). The teeth of *delirius* do not seem to be larger. In all 10 specimens the belly is perfectly white. Mammæ 2 + 3 = 10.

Measurements of type: head and body 191; tail 229; hind foot 41; ear 21; skull: greatest length 46.8; condylobasal length 45.6; basal length 43.1; palatal length 37.1; zygomatic breadth 23.2; interorbital breadth 7.1; nasals 17.3×5.3 ; diastema 14.3; palatal foramina 8.4; upper tooththrow 7.2 mm.

(14). **Rattus rattus generatius** subsp. n.

Type: ♂ ad., Noesa Kambangan, S. of Central Java. Don. Eykman Instituut, 1940 (No. 8). Buitenzorg Museum, No. 294/40.

Here again a new race had to be founded on very small differences. Whilst in 60 Javanese *roquei* the maximum skull measurement is 45.3 mm, in our 30 specimens from Noesa Kambangan we find 45.6, 45.9, 46.0 and 46.3. Moreover there is difference in colour: the back is darker and the belly is on the average less white (only 5 of the 30 are white, some very dark, showing a nearly perfect transition to the local houserat). The latter difference is especially striking when opposed to *delirius* (which also shows the large skull). Further *generatius* lacks the large hind foot (maximum 36 mm, occurring $5 \times$). As against *larusius*, there is the long tail. Unfortunately it was impossible to take exactly the body- and tailmeasurements of the whole Noesa Kambangan series, but it is sure that it does not contain a specimen with tail $< 100\%$. Mammæ 2 + 3 = 10.

Measurements of type: head and body 183; tail 197; hind foot 35; ear 21; skull: greatest length 45.6; condylobasal length 42.8; basal length 40.2; palatal length 25.0; zygomatic breadth 21.1; interorbital breadth 7.2; nasals 16.6×5.0 ; diastema 12.8; palatal foramina 8.1×2.7 ; upper tooththrow 7.4 mm.

(15). ***Rattus rattus sumbae*** SODY.

Type in collection. Considerably larger than *roquei*. Soemba.

(16). ***Rattus rattus argyraceus*** subsp. n.

Type: ♀ ad., Mapangat, N. Celebes, 15.vii.1939. Leg. Klapperproefstation (No. 18). Buitenzorg Museum, No. 350/39.

By the silvery colour of the belly (caused by the grey bases of the white tipped hairs) this form somewhat resembles some members of the *argentiventer* section. But in all 8 available specimens (all ♀♀) the mammary formula is $2 + 3 = 10$. More difficult to hold is the elimination of the *diardi* section and the insertion in the *tiomanicus* group, especially because 4 of the animals have been caught in a house, the other 4 near a house. In any case, however, the rather constant silvery colour of the belly points to another race than *neglectus*.

Colour of back as in *neglectus* from N. Celebes. Ventral side partly light grey (grey hairs with whitish tips), partly (near chin, in arm-pit region and on hind belly) wholly white. As a rule over the middle of the chest a short darker median stripe. Resembles perhaps mostly *kunduris* of Riouw Archipelago (a constant difference is the lighter colour of the anterior side of the upper incisors in *argyraceus*).

Measurements of type: head and body 188; tail 212; hind foot 36; ear 22; skull: greatest length 45.1; occipitonasal length 44.6; condylobasal length 43.3; basal length 40.5; palatal length 24.5; zygomatic breadth 21.7; interorbital breadth 6.1; nasals 16.4×4.0 ; diastema 12.4; palatal foramina 8.9×3.0 ; upper tooththrow 7.3 mm.

(17). ***Rattus rattus talaudensis*** subsp. n.

Type: ♀ ad., Liroeng (Talaud islands). Coll. ERI, 29-V-1926. Buitenzorg Museum, No. 1488.

The 6 specimens from Liroeng at hand closely agree with our Doerian series of *kunduris*. In the main they only seem separable by a somewhat shorter tail and somewhat longer tooththrow. None of the specimens has a pure white belly. All show a darker median stripe on the chest, those hairs having grey bases.

Measurements of type: head and body 220; tail 190; skull: greatest length 47.0; condylobasal length 44.6; basal length 42.0; palatal length 25.5; zygomatic breadth 22.7; interorbital breadth 6.5; nasals 17.6×4.9 ; diastema 13.0; palatal foramina 9.4×3.3 ; upper tooththrow 8.3 mm.

Perhaps two specimens from Karakelong (Talaud islands) are also referable to this race.

On some labels it is stated that they were caught in the field (a.o. in dry ricefield).

Furthermore, from both islands our collection contains some rats with somewhat darker belly, which might be taken for house rats. I recorded them in the *diardi*-table, but I can not give a decisive opinion about race or group.

Possibly to be included in this section:

Rattus rattus sladeni (ANDERSON)

1, Langbian Peak, S. Annam, 5200 feet (without skull).

Rattus rattus kandiyanus (KELAART)

6, Ceylon (Nuwara Eliya; Watta ketea; Bojawantalava (?); Rainthy (?), Balangoda; two of which without skulls), 5 originating from Colombo Museum, one (Rainthy specimen) from Bombay N. H. Society, Mammal Survey. They are all labeled *R. r. kandiyanus*. The Rainthy specimen, however, strongly deviates by its broad nasals (5.0, against 4.1 - 4.4 in the other three). In the Ceylon check-lists of PHILLIPS (1929) and OSMAN HILL (1939) *kandiyanus* is said to be a house rat. PHILLIPS says: "The home of this rat seems to have been the Low-country and lower hills, but it has now spread, as a parasite to mankind, almost everywhere". Judging from our experiences in the Netherlands E. Indies the form would seem to be an outdoor rat.

4. LUGENS-SECTION

	Upper tooththrow		Tail (in %)				
Sipora, Siberoet	7.3	— 8.14	— 9.0	(10)	102	(10)	<i>mentawi</i>
N. Pagai	7.6	— 7.94	— 8.1	(8)	95	(9)	<i>lugens</i>
Enggano	—	8.7	—	(1)	82	(1)	<i>adustus</i>
Makassar (S. Celebes) ...	7.3	— 7.47	— 7.6	(3)	—	(—)	<i>barussanoides</i> subsp. n.

(1). ***Rattus rattus mentawi*** CHAS. & KLOSS

2, Sipora. Mammae 2 + 3 = 10.

(2). ***Rattus rattus lugens*** (MILLER)

8, N. Pagai. Mammae 2 + 3 = 10.

In this very uniform series the colour of the belly is much brighter than in *mentawi*. Perhaps *lugens* is very slightly larger in greatest length of skull (maximum in our series 50.0 mm) and has a shorter tail.

(3). ***Rattus rattus adustus*** SODY

1, Enggano (type). Mammae 2 + 3 = 10.

In colour of belly differing strongly from *lugens*, but rather near to *mentawi*, though still less suffused with whitish or greyish.

(4). ***Rattus rattus barussanoides*** subsp. n.

Type: ♀ ad., Makassar, S. Celebes, 1940. Don. Eykman Instituut (No. 39). Buitenzorg Museum, No. 376/40.

Diagnosis: Among some 80 Museum specimens of *R. rattus* from Makassar, there are 3 which deviate by their very dark belly. Therefore they somewhat resemble 3 specimens of an imported *R. rattus* (from Makassar "harbour"), but yet they differ clearly by a much coarser texture of the fur, larger teeth, and a distinct bicolorous (black and warm brown) pelage of the back. They also show some resemblance to *R. hoffmanni*, but a.o. they are immediately distinguishable by the smaller (narrower) teeth. In colour of the belly they come nearest to the races *lugens*, *mentawi*, *adustus*, from the southern "Barisan islands". Differing from these in texture and colour of the back-pelage (less unicolorous), smaller teeth, larger bullae. On nearer insight I have much doubt if genetic relationship here exists. Anteriorly of the nasals the type shows two bony "prae-nasalia". Also in a second specimen some similar body occurs. Mammae 2 + 3 = 10.

Measurements of type: head and body 188; hind foot 37; ear 22; skull: greatest length 45.1; occipitonasal length 43.9; condylobasal length 43.7; basal length 41.2; palatal length 25.3; zygomatic breadth 22.0; interorbital breadth 6.5; nasals 16.3 × 5.5; diastema 12.8; palatal foramina 8.5 × 2.8; length of bulla 8.0; upper tooththrow 7.5 mm.

From N. Celebes (Tomohon) we possess 4 very dark bellied specimens, of which it should be considered whether they ought to be reduced to *barussanoides*. However, they show much more the common fur of *neglectus* and a smaller (northern) measurement of the teeth, viz. 7.0 - 7.13 - 7.3 (4). If they are not combined with *neglectus*, it also is impossible to join them with *barussanoides*. Therefore they may form another new race.

Also in other localities in the archipelago individuals occur, which deviate from the normal local animals in the direction of the *lugens* section. As an instance I mention a ♀ from Krakatau, No. 31 (tooththrow 6.6 mm).

Rattus concolor (BLYTH).

The most obvious division which can be made within this species is that in:

1. *Lowland- (and hill-) forms*. With short and harsh fur (many and rather hard spines).
2. *Highland-forms*. With long fur, without hard spines.

When defining the altitude above sealevel at which the mountain forms begin to appear, it may be observed that this altitude seems to vary locally. Specimens from Radelong, Atjeh, N. Sumatra, 1300 m, already are rather long and soft haired. A series from Tjibodas, Mt. Gede, W. Java, 1400 - 1450 m, however, shows but little mountain character. Of 2 specimens from Kawah Kamodjang, Garoet, W. Java, 1640 m, one has a properly elongated fur, but both are still largely spinous. On the contrary I reckon specimens from Telaga Patengan, Mid Preanger, W. Java, ± 1700 m, and from Papandajan crater, ± 1800 m, to the mountain forms, though sometimes still rather many spines occur. In E. Java the Idjen, from 950 - 1400 m, furnishes clearly

"lowland" specimens. From 5700 feet, however, *equile* has been described, and the Museum series from 1850 - 2200 m represents this very good mountain race. As much mountainish is the series from Jang, 2200 m and Tosari, 1800 m. Finest of all, as mountain animals, is the series from Ranoe Pani and Ranoe Koembolo, S. Tengger, 2100 - 2400 m. On Mt. Lawoe, 3150 m, and Soembing 3300 m, of course also mountain animals. Of our Bali mountain specimens (Batoe Meringgit) the altitude is unknown. Three specimens from Moetoe, Flores, 1500 m, are transitional forms. Roughly the „boundary" may be fixed at 1500 m. In the mountain animals the variability in colour seems to be much larger than in the lowland specimens.

1. LOWLAND- AND HILLFORMS (CONCOLOR-SECTION)

Some toothmeasurements are the following:

French Indo China	5.0	5.20	5.4	(2) subsp.?
Thai	4.4	4.73	5.4	(6) subsp.?
Malay Peninsula	4.8	5.10	5.4	(5) <i>concolor</i>
Riouw	5.1	5.20	5.3	(2) subsp.?
Anambas	—	5.0	—	(1) subsp.?
S. Natoena	5.1	5.20	5.3	(2) subsp.?
Sumatra (lowland)	4.9	5.22	5.8	(66) <i>ephippium</i>
„ (hills)	5.0	5.17	5.6	(28) „
Java (hills)	5.0	5.44	6.0	(60) „ (?)
Hoorn (Bay of Batavia)	—	5.4	—	(1) „ (?)
Noesa Kambangan	5.1	5.25	5.4	(8) „ (?)
Madoera	5.0	5.05	5.1	(2) „ (?)
Bali	5.2	5.52	5.7	(9) „ (?) ¹⁾
Soembawa	5.1	5.22	5.5	(4) „ (?)
Flores	5.0	5.21	5.4	(12) „ (?)
Soemba	5.0	5.31	5.6	(15) „ (?) ²⁾
Timor	5.0	5.32	5.7	(14) „ (?)
Bangka	—	5.2	—	(1) <i>clabatus</i> (= <i>ephippium</i> ?)
Simaloer	—	5.6	—	(1) <i>surdus</i>
Borneo	4.9	5.35	5.7	(36) <i>schuitemakeri</i>
Bettotan, Kudat	5.0	5.22	5.9	(6) subsp.? ³⁾
Banguay	5.0	5.35	5.6	(4) subsp.? ³⁾
Panjang	4.7	4.80	4.9	(2) subsp.? ⁴⁾
Boengoeran	—	4.9	—	(1) subsp.? ⁴⁾
Celebes (hills?)	5.0	5.29	5.8	(34) <i>raveni</i>
„ (Makassar)	4.7	5.03	5.5	(100) <i>eurous</i>
Java (harbours)	4.5	5.04	5.5	(25) „ (= <i>otteni</i>)
Saleier	5.0	5.20	5.4	(2) subsp.?
Togian	4.6	4.98	5.4	(8) <i>malengiensis</i> subsp. n.
Boeroe	5.2	5.50	5.9	(4) <i>buruensis</i>
Soela islands	5.1	5.51	5.9	(4) „
Ceram	5.0	5.20	5.4	(2) subsp.?

¹⁾ TATE, Bull. Am. Mus. N. H., LXXII, 1936, p. 652, gives 5.8 and 6.1.

²⁾ Moreover one specimen with 6.2, but with abnormal pm¹.

³⁾ Measurements taken from CHASEN & KLOSS, Bull. Raffl. Mus., 6, 1931, p. 69.

⁴⁾ Measurements taken from CHASEN, Bull. Raffl. Mus., 10, 1935, p. 38.

Tanimber	5.8	5.85	5.9	(2) subsp.?
New Guinea	5.0	5.28	5.8	(6) <i>manoquarius</i> ⁵⁾
Ternate	—	5.5	—	(1) subsp.?
Sangihe	—	5.3	—	(1) subsp.?
Talaud	5.1	5.20	5.3	(2) subsp.?

(1). ***Rattus concolor concolor*** (BLYTH).

Unfortunately, of this particular race very few data are known. In our Museum it is represented by 3 specimens from the Malay Peninsula, the fourth measurement of the table is from the Tenasserim lectotype, taken by KLOSS (Rec. Ind. Mus., XIII, 1917, p. 7), the fifth has been taken from GYLDENSTOLPE (Ark. f. Zool., Stockholm, X, 1917, p. 30), who gives the very low measurement of 4.8 mm. The Thai data are all taken from literature: 2 from KLOSS (Journ. Nat. Hist. Soc. Siam, III, 1918, p. 62; III, 1919, p. 380): 4.9 - 5.4, while again GYLDENSTOLPE (Kungl. Svenska Vet. Ak. Handl., LVII, 1916, p. 45) only gives 4 very low measurements: 4.4 - 4.7. Both measurements from French Indo China are from specimens in my own collection.

(2). ***Rattus concolor ephippium*** (JENTINK).

According to CHASEN *ephippium* of Sumatra is "a poor race" and he says that "although most specimens can be separated on the wider palate, some cannot, and I cannot appreciate any other distinction". He further says that "in Java the average size of *ephippium* is very slightly larger than in Sumatra and Borneo". My figures wholly confirm CHASEN's contention that Javan specimens are larger than Sumatran (and Bornean), and certainly it would not be without reason to distinguish the Javanese and Balinese as a race! I prefer to wait for more measurements from Noesa Kambangan and the smaller islands east of Java. Provisionally the name *ephippium* may be used for Sumatra, (Bangka), Java, Hoorn, Noesa Kambangan, Madoera, Bali, also for Soembawa and Flores (= *wichmanni* JENT.) and for Timor and Soemba (though lighter bellied). (I now suppose JENTINK's *Mus wichmanni* to be a *concolor*. In general the description tallies, though some details give trouble. So JENTINK says that the underparts are "pure white, the hairs being wholly snow-white colored". The majority of our FICRES animals is not white or whitish below at all, but even rather dark. They were collected, however, at about 1200 - 1500 m, and the one specimen from Manggarai Weling (1916) seems to tally quite well with JENTINK's description. The darker bases of the belly hairs are only perceptible with difficulty and JENTINK's type was a specimen in spirit. The short tailedness of the type seems to be caused by mutilation, see JENTINK's fig. in WEBER, Zool. Ergebn., I, 1896, Tab. IX. Also the character of the divided palate-ridges (cf. DE BEAUFORT, Abh. Senckenb. Naturf. Ges., XXXIV, 1913, p. 112) does not seem to be important).

⁵⁾ Type series only. Further specimens: Huon Gulf 5.1; Marienberg 5.1, 5.3.

(3). *Rattus concolor surdus* (MILLER).

Described as "larger and paler" than *concolor*. Unfortunately only one toothmeasurement is given, which proves nothing. Besides we get measurements for the total length of 21 adult specimens: 238 - 268 - 324 mm (the largest four 285, 285, 298, 324). For 22 unselected Sumatrans (*ephippium*) I find 202 - 237 - 275. From other localities specimens of 285 and larger are very seldom, and 324 is the absolute maximum of the species known to me. In any case *surdus* seems to be a good size-race.

From Simaloer (not represented in our collection).

(4). *Rattus concolor schuitemakeri* SODY.

CHASEN considers the type of this race to be a "somewhat abnormal specimen". I agree to this. The name should be applied for Borneo, because all Borneo specimens (from many different localities) are strikingly darker in belly colour than Sumatran and Javan ones (especially the latter are much brighter: it would seem impossible to include Bornean and Javan specimens in one race).

(5). *Rattus concolor raveni* MILLER & HOLLISTER.

In addition to the measurements of the type I dispose of the measurements of 2 paratypes from Toli-Toli in my own collection. The toothmeasurements of these 3 specimens are 5.0 - 5.20 - 5.6 mm. This agrees with the material in the Museum (for the greater part from Boemboelan, Res. Menado). The original authors, who in 1921 described the form as a species, say that it has a longer tail and wider skull, the braincase especially less narrow, than *concolor* from Sempang River, Borneo. As the average of their series I find 120 %. Our 17 specimens from Boemboelan, however, give 106 %. In our series nothing indicates that the braincase should be wider. The original authors only give one measurement: 13.2 (in my para- and topotypes: 12.4, 12.7), which measurement frequently occurs in *concolor* from elsewhere. Even in the "smaller" race *eurous* of the same authors, they themselves give also 13.2 for the type. In colour of the belly, however, these animals are lighter again than *schuitemakeri* of Borneo. In this, and also in all other respects, they wholly agree with *ephippium* of Sumatra. In fact I must admit that I cannot indicate a clear difference with that race!

(6) *Rattus concolor eurous* MILLER & HOLLISTER.

The fine series of Makassar measurements, given in the table, delimit the race to which they belong, very satisfactorily. These measurements seem to correspond with *eurous*, from Molengkapoti, Kandang, N. Celebes. My private collection contains 2 para- and topotypes, which, together with the type, give 4.9 - 5.13 - 5.3 mm. According to the original authors the race is darker and more reddish in colour than *raveni*, which also prevails for our Makassar series. There is some reason to look at this race as inhabiting lowland and coast. One specimen, Loka, S. Celebes, 1200 m, I cannot locate as to race.

I further refer to *eurous* the Javan specimens described by KOPSTEIN as *otteni*. In measurements, the large Museum series of these rats from Java shows but one difference from the series from Makassar; that is a lower minimum. In 100 specimens from Makassar the tail averages 114 %, in 20 Javanese 117 %. Probably this rat (which in Java strictly is an inhabitant of the northern seaport towns: the Museum possesses specimens from Batavia, Cheribon, Pekalongan, Semarang, Soerabaja, and one "stray" specimen from Koeningan, near Cheribon, 550 m) has been brought from Celebes (Makassar) to Java by navigation. The type of *otteni* is extremely dark bellied, no match occurs in the whole series. Very young animals are also very dark bellied.

The form has already been known from Java since 1924 (OTTEN: Meded. Burgerl. Geneesk. Dienst Ned. Ind., 1924, p. 158), but nobody had cared to name it, just because of its occurrence in seaport towns only. The name was given by KOPSTEIN in Geneesk. Tijdschr. Ned. Ind., LXXI, p. 3 (not by "DE RAADT, Zool. Meded. Mus. Leiden, XIV, 1931, p. 184", as contended by TATE). In the original description no type locality (within Java) was given, but elsewhere (Zeitschr. f. Morph. u. Oekol., XXII, 1931, p. 783) KOPSTEIN said that a "type" was preserved in the Buitenzorg Zoological Museum. This specimen comes from Cheribon.

The Museum possesses 10 hybrids: *R. c. eurous* (Java) × *ephippium* (Java).

(7). *Rattus concolor malengiensis* subsp. n.

Type: ♂ ad., Malengi, Togian group, E. of Celebes. Coll. J. J. MENDEN, 29-XI-1939. Buitenzorg Museum, No. 51/40. Specimens examined: 8.

Agreeing with *eurous* in smallness of the teeth, but without the dark colour of this race. Mammae 2 + 2 = 8.

Measurements of type: head and body 124; tail 138; hind foot 25; ear 16; skull: greatest length 32.7; condylobasal length 30.0; basal length 27.7; palatal length 16.3; zygomatic breadth 15.0; interorbital breadth 5.2; nasals 11.7 × 3.3; diastema 8.6; palatal foramina 6.5 × 2.5; upper tooththrow 5.1 mm.

(8). *Rattus concolor buruensis* (ALLEN).

4, Boeroe, 560 - 1150 m.

Properly agreeing with ALLEN's description of *Mus buruensis*, though not perfectly. ALLEN describes the hind feet as "rusty blackish with the edges silvery grey", a description which does not suit very well to *concolor*, in which the hind feet are white or whitish with a commonly narrow and somewhat dark line over the middle. Distinguished from *eurous* and *malengiensis* by the larger toothmeasurement.

I also refer to it the animals from Taliaboe, Soela islands, with a similar large toothmeasurement and but little lighter in colour.

(9). *Rattus concolor manoquarius* SODY.

Contrary to the other races, the tail of this New Guinea subspecies seems to average not longer than head and body. In the type series 93 - 99 - 120 % (6).

For 4 specimens, Central Division, Papua, which he brings to this race with doubt, TATE gives 97 - 99 - 105 % (4). For his *browni* (I suppose them to be *manoquarius*) JENTINK gave 88 - 99 - 111. Unfortunately real *browni*, from Duke of York island, though probably also a race of *concolor*, is very insufficiently known.

In the Museum only 3, Hollandia (5.4 - 5.50 - 5.6 mm), and 2, Tanah Merah (5.7 - 5.8), without external measurements.

The odd (and old) Museum specimens of *concolor* from Sangihe, Talaud, and Ternate are not determinable to subspecies, similar to 2 specimens from Tanimber, which are obvious by their large toothmeasurements.

2. HIGHLAND FORMS (NEGRINUS SECTION).

Toothmeasurements:

<i>Sumatra</i>			
Radelong, Atjeh, 1300 m	5.2	5.37	5.5 (3)
Kerintji, 7.300' - 10.000'	5.0	5.12	5.2 (6) <i>stragulum</i> ¹⁾
Dempo, 1800 m	5.2	5.35	5.5 (6)
<i>Java</i>			
Gede	5.1	5.41	5.9 (9)
Telaga Patengan, ± 1700 m	5.2	5.50	5.8 (5)
Papandajan crater, ± 1800 m	—	5.1	— (1)
Kawah Kamodjang, 1640 m	5.4	5.63	5.9 (3)
Soembing, 3300 m	5.0	5.25	5.5 (2)
Lawoe, 3150 m	5.3	5.47	5.7 (4)
Tosari, N. Tengger, 1800 m	5.4	5.72	6.2 (12)
R. Pani, R. Koembolo, S. Tengger, 2100 - 2400 m	5.5	5.90	6.2 (19)
Ijang, 2200 m	5.3	5.59	6.0 (7)
Idjen, 1850 - 2200 m	5.2	5.73	6.2 (18) <i>equile</i>
<i>Bali</i>			
Batoe Meringgit	5.3	5.57	5.7 (3) <i>meringgit</i> subsp.n.
<i>New Guinea</i>			
Anggi Gita, 1800 m	5.4	5.55	5.7 (2) <i>lassacquèrei</i>

Especially in colour the highland animals vary geographically more widely than those from lower regions. Most highland races seem to be larger than the lowland ones, with the exception of *stragulum*. For a thorough study our highland material is insufficient. In Java numerous small local races may have to be founded.

(1) *Rattus concolor stragulum* (ROB. & KLOSS).

According to the original authors, beside by the long and soft pelage, distinguished from *ephippium* by the warmer brown back and the much darker grey underside, suffused with buffy. Moreover, the bullae are smaller and the

¹⁾ Kerintji measurements taken from ROBINSON & KLOSS, Journ. F. M. S. Mus., VIII, 1918, p. 65.

posterior termination of the nasals is a little narrower. The Museum does not possess real typical specimens (Kerintji Peak, 7300 feet, Sumatra). With some reserve our specimens from Atjeh, 1300 m, and Mt. Dempo, 1500 - 1800 m are referred to it. They are not very soft and long haired and only the Atjeh specimens are a little darker than *ephippium*.

(2). ***Rattus concolor equile*** ROB. & KLOSS.

Described from Idjen, E. Java, 5700 feet. The Museum possesses paratypes, a series of topotypes, and finally some series from other mountains, especially in E. Java. These clearly prove that not on all E. Java mountains the same race occurs, but I cannot appreciate any geographical line in the variation of these forms (the western forms are smaller than the eastern ones). Some mountains only possess dark bellied and large, others light bellied and small animals. In one case (S. Tengger) the colour of the back is much darker than in all other series. Most striking is the large difference between Tosari, N. slope Tengger, 1800 m, and Ranoe Pani, Ranoe Koembolo, S. slope Tengger, 2100 - 2400 m. Eliminating some other differences we may form 2 groups:

a. *equile*: Idjen, 1850 - 2200 m; S. Tengger, 2100 - 2400 m (though possessing much darker back),

b. *meringgit*: Bali; Ijang, 2200 m; Tosari, 1800 m. Not too badly connecting: small series from Lawoe, 3150 m; Soembing, 3300 m. Further material insufficient for criticism.

(3). ***Rattus concolor meringgit*** subsp. n.

Type: ♂ ad., Batoe Meringgit, Bali. Coll. P. F. FRANCK, 9-X-1928. Buitenzorg Museum, No. 1981. Specimens examined: 3, type locality.

Differing from *equile* (Idjen, E. Java, 1850 - 2250 m, 16 specimens) by the lighter, more whitish, grey colour of the belly (contrary to the darker yellowish grey of *equile*). Also the colour of the sides is more ruddy than in *equile*.

Measurements of type: head and body 115; tail 130; hind foot 26.5; ear 18; skull: greatest length 31.2; condylobasal length 29.3; basal length 27.2; interorbital breadth 4.9; nasals 11.3×3.1 ; diastema 8.2; palatinal foramina 6.2×2.5 ; upper toothrow 8.2 mm.

As has been stated previously, almost the same colour type can be found back in Java, in the series from Ijang and Tosari.

(4). ***Rattus concolor lassacquèrei*** SODY.

Described from Anggi Gita (Vogelkop), S. of Manokwari, N.W. New Guinea, 1800 m.

I must point out that here also (like in all other cases!) my measurements for the molar row have been taken at the alveoli and not on the crowns, as TATE supposes (Bull. Amer. Mus. N. H., LXXII, 1936, p. 654).

Rattus norvegicus.

Described forms	Localities	Total length of whole animal			Greatest length of skull			Upper toothrow					
		min.	aver.	max.	min.	aver.	max.	min.	aver.	max.			
<i>norvegicus</i> BERKENHOUT ¹⁾	Norway	—	—	—	—	—	—	—	—	—	—	—	
	Netherlands	278	—	468	28	38.1	—	52.2	11	7.0	7.64	8.0	11
	France	226	—	478	61 ²⁾	—	—	—	—	—	—	—	—
<i>decumanus</i> PALLAS ³⁾	Europe	—	—	—	—	—	—	—	—	—	—	—	
<i>sylvestris</i> BRISSON ⁴⁾	Europe	—	—	—	—	—	—	—	—	—	—	—	
<i>aquaticus</i> GESSNER ⁵⁾	Europe	—	—	—	—	—	—	—	—	—	—	—	
<i>fusca</i> MILNE-EDWARDS ⁶⁾	Europe	—	—	—	—	—	—	—	—	—	—	—	
<i>hibernicus</i> THOMPSON ⁷⁾	Hebrides	—	—	—	—	—	—	—	—	—	—	—	
<i>decumanoides</i> HODGSON ⁸⁾	Br. India	—	—	—	—	—	—	—	—	—	—	—	
<i>brunneus</i> HODGSON ⁹⁾	Nepal, Br. India	—	—	—	—	—	—	—	—	—	—	—	
	Br. India	—	428	—	?	—	—	—	—	—	—	—	
	Ceylon	381	—	414	4	43.3	—	49.0	4	7.0	7.25	7.6	4
<i>brunneusculus</i> HODGSON ¹¹⁾	Nepal, Br. India	—	—	—	—	—	—	—	—	—	—	—	
<i>caraco</i> PALLAS ¹²⁾	E. Siberia	—	—	—	—	—	—	—	—	—	—	—	
	N. Manchuria	—	365	—	1 ¹³⁾	40.5	—	42.8	2 ¹⁸⁾	6.3	6.80	7.3	2 ¹³⁾
<i>primarius</i> KASHTSCHENKO ¹⁴⁾	Transbaikalia	—	—	—	—	—	—	—	—	—	—	—	
	Kansu, China	—	—	—	—	—	—	—	—	—	—	—	
<i>socer</i> MILLER ¹⁵⁾	Yunnan, China	295	—	333	3	40.0	—	41.7	3	6.8	6.93	7.0	3
	Japan	207	—	373	8 ¹⁶⁾	40.1	—	43.5	2	7.2	7.20	7.2	2
	Micronesia	297	—	412	13 ¹⁷⁾	47.3	—	49.5	?	—	—	—	—
	Celebes	440	—	460	?	42.8	—	45.4	2 ¹⁸⁾	—	—	—	—
	Celebes	440	—	460	?	42.8	—	45.4	2 ¹⁹⁾	—	—	—	—
<i>praestans</i> TROUESSART ²⁰⁾	Celebes	440	—	460	?	42.8	—	45.4	2 ²⁰⁾	—	—	—	—
	Celebes	270	—	472	70	38.2	—	56.3	75	7.0	7.82	8.7	100
	Ternate	—	340	—	1	38.2	—	41.7	2	7.3	7.75	8.2	2
	New Guinea	—	—	—	—	46.1	—	50.8	2	7.2	7.60	8.0	2
	W. Java	—	—	—	—	—	—	—	—	—	—	—	—
<i>javanus</i> HERMANN ²¹⁾	Java	288	—	495	28	36.2	—	54.5	32	7.0	7.85	8.8	43
	Bali	—	460	—	1	—	56.0	—	1	—	8.3	—	1
	Flores	—	—	—	—	—	—	—	—	—	8.1	—	1
	Sumatra	239	—	494	38	35.7	—	56.1	43	7.0	7.74	8.4	43
	Borneo	—	473	—	1	45.3	—	52.3	2	7.3	7.45	7.6	2
	Tambelan	—	—	—	—	—	51.1	—	1	—	7.6	—	1
	Goritti island	—	—	—	—	—	—	—	—	—	—	—	—
	Hawai	—	—	—	—	42.0	—	46	2 ²³⁾	7.0	7.15	7.3	2 ²³⁾
<i>maurus</i> WATERHOUSE ²²⁾													

¹⁾ BERKENHOUT, Outlines Nat. Hist. Great Britain, I, 1769, p. 5. See also ERXLEBEN, Syst. Regni Anim., I, 1777, p. 381.

²⁾ CHAPPELLIER, Bull. Mus. Hist. Nat., XXXIII, 1927, p. 482.

³⁾ PALLAS, Nov. Sp. Quadr. Glir., 1878, p. 91. See also: LINNÉ, Syst. Nat., 13th Ed., 1789, I, p. 127.

⁴⁾ BRISSON, Regn. Anim., 1756, p. 170.

⁵⁾ GESSNER, recorded by LINNÉ; "aquat., p. 732".

⁶⁾ MILNE-EDWARDS, Ann. Sc. Nat., 1872, XV, 7.

⁷⁾ THOMPSON, Proc. Zool. Soc., 1837, p. 52.

⁸⁾ HODGSON, Journ. As. Soc. Beng., X, 1841, p. 915. According to HORSFIELD, Cat. Mamm. Mus. E. I. Comp., 1851, p. 140, first described by TEMMINCK. See also: BLYTH,

Rattus norvegicus (BERKENHOUT).**Rattus norvegicus javanus** (HERMANN).

In the Museum specimens from Java (Batavia, Kendal, Cheribon, Tegal, Indramajoe, Semarang, Rembang, Bandjoewangi, Karanghaer), Flores, Sumatra (Palembang), Tambelan, Borneo (Bandjarmasin), Celebes (Makassar), Ternate, New Guinea (Arfak), and Ceylon. Here again I much miss my own collection which contains material from Java (Batavia), Bali (Boeileng), Borneo (Pontianak), Celebes (Makassar), Ternate, New Guinea (Manokwari), China, Japan and the Netherlands. Especially direct comparison with palaeartic animals thus was impossible. On behalf of other students, I offer my notes, in which the names of all races (and synonyms), as far as known to me, without claiming completeness. If not indicated otherwise, the measurements have been taken by myself (see table, p. 284).

From this table it is hardly possible to draw conclusions. HERMANN (Observ. Zool., 1804, p. 63) described his *Mus javanus* from Batavia as "staturam majorem omniaque membra validiora". The tail should be broader at the base than in *decumanus* and more covered with hair there ("ut in didelphydibus"). The ears longer and broader and differently shaped, the distance from the inner corner of the eye to the tip of the nose larger, the feet white. As regards the colour, it must be stated that both HERMANN's specimens since 1792 had been preserved "in liquore spirituoso", from which sugar had set down on the hairs! So the ventral colour ("fulvus ant helvolus") does not convey very much, but perhaps it indicates that he had the dark phase at hand. I am not able to perceive any difference in colour between specimens from Holland and the light Javanese phase, but I can only say this from recollection! However, as far as I know, in Europe we do not find the very melanistic specimens which occur here so frequently: Batavia 8 in 15, remaining Java 1 (Kendal) in 14. In 1934 Mr. W. C. VAN HEURN wrote me that he did not find the black phase among 10 Soerabaja specimens. In Sumatra (Palembang) the

Journ. As. Soc. Beng., XXXII, 1833, p. 335; THOMAS, Proc. Zool. Soc., 1831, p. 532; SCLATER, Cat. Mamm. Ind. Mus., II, 1891, p. 61.

⁹⁾ HODGSON, Ann. Mag. Nat. Hist., XV, 1845, p. 266.

¹⁰⁾ HCSSACK, Aids Ident. Rats, 1907, p. 10.

¹¹⁾ HODGSON, Ann. Mag. Nat. Hist., XV, 1845, p. 267.

¹²⁾ PALLAS, Nov. Sp. Quadr. Glir., 1878, p. 91.

¹³⁾ KURODA, Bull. Biogeogr. Soc. Japan, IX, 1939, p. 32.

¹⁴⁾ KASHTSCHENKO, Ann. Mus. Zool. Acad. Pétersb., XVII, 1912 (1913), p. 401.

¹⁵⁾ MILLER, Proc. Biol. Soc. Wash., XXVII, 1914, p. 90.

¹⁶⁾ KURODA, Trans. Sapporo Nat. Hist. Soc., XII, 1932, p. 209; Annot. Zool. Japon., XIV, 1933, p. 237.

¹⁷⁾ KURODA, Botany & Zoology, II, 1934, p. 1018.

¹⁸⁾ HOFFMANN, Abh. Ber. K. Zool. Anthr. Ethnogr. Mus. Dresden, 1886-7, 3, 1887, p. 18.

¹⁹⁾ TROUESSART, Cat. Mamm., Suppl., 1904, p. 365.

²⁰⁾ TROUESSART, Cat. Mamm., Suppl. 1904, p. 546.

²¹⁾ HERMANN, Observ. Zool., 1804, p. 63.

²²⁾ WATERHOUSE, Voy. Beagle, Mamm., 1839, p. 33.

²³⁾ W. C. VAN HEURN, in litt.

number is nearly just 50 in 100, in Celebes (Makassar) 1 in over 100, Ternate 1 in 1 (juv.). My own collection contains this phase only from Batavia. On the base of this phase I propose to introduce HERMANN's name *javanus*.

The measurements do not indicate a striking difference. In 89 European specimens the maximum length of the whole animal is 478, in 142 specimens from the Archipelago 495 (moreover occurring 494, 485, 483, 481, 479). So it is "possible" that our Malayan specimens average a little larger. As regards the measurements of skull and teeth our larger maxima (563 and 88 mm) for the present must be ascribed to the larger number of measured animals. Within the Archipelago the race *major* has been described from Celebes by HOFFMANN (Abh. Ber. K. Zool. Anthrop. Ethnogr. Mus. Dresden, 1886 - 87, No. 3, 1887, p. 18, afterwards, on account of preoccupation, replaced by *hoffmanni* TROUES-SART, and this again by *praestans* TROUESSART). HOFFMANN calls the skull larger than that of *decumanus* and, moreover, relatively broader. Furthermore he points to some difference in distance and divergence of the parietals and other small differences, which I am not able to control, but which all seem very little convincing. As regards the larger skull of Celebes specimens, I donot believe this to be correct. My Celebes maximum is 56.3 (HOFFMANN 45.4), but from Bali I possess a specimen with 56.0, and the Museum from Sumatra one with 56.1 mm. Compare also the toothmeasurements, which, in sufficiently large series (Sumatra, Java, Celebes), average nearly the same. Only the strong bicolouredness of the tail of the Celebes animals struck me. For the present I refer all our material to *javanus*.

In the Celebes animals I examined whether difference in size existed between males and females. The total length of the whole animal is:

- for the 20 largest ♂♂: 401 - 441 - 474 mm.
- " " " " ♀♀: 413 - 444 - 483 mm.

Mus musculus LINN.

Mus musculus rama CANTOR.

The name *rama* is used on the authority of CHASEN. As far as our collection is concerned, I restrict the race to Sumatra, Bangka, Java, Madoera, Bali. Dubious: Lombok, Soembawa, Soemba.

Toothmeasurements and relative taillengthes:

Sumatra	3.2 - 3.35 - 3.7 mm	(9)	92 - 93.5 - 95 %	(2)
Bangka	3.4 - 3.45 - 3.5	" (2)	— — — —	—
Java	3.1 - 3.42 - 3.7	" (15)	94 - 105 - 119	" (13)
Madoera	— 3.3 - —	" (1)	— — — —	—
Bali	3.4 - 3.50 - 3.6	" (2)	101 - 107.5 - 114	" (2)
Lombok	— 3.1 - —	" (1)	— — — —	—
Soemba	— 3.3 - —	" (1)	— 103 - —	" (1)

Mus musculus fredericae SODY.

This race has been described for Celebes on the score of the longer tail. Now I believe to be able to give another important character, with the aid of which to some extent the race could be defined geographically. I found that in the examples from the eastern part of the Archipelago, rather often the third molars fail, usually all, exceptionally only on one side. I found this in Celebes 3 (times) in 17 (specimens); Sangihe 2 in 2; Amboina 0 in 2; Obi 1 in 1; Boeroe 1 in 4; Boeton 1 in 1; Lomblen 2 in 2; Timor 2 in 6, in total 12 in 35. (Lombok, Soembawa, Soemba, dubious, in total 2 complete specimens). For New Guinea I did not observe this phenomenon (in 9 specimens), and the animals from there also seem somewhat less longtailed. Among 31 specimens of *rama* the phenomenon never occurred.

Toothmeasurements and relative taillengths:

Celebes	3.2 - 3.38 - 3.7 mm (15)	100 - 123 - 140 % (18)
Amboina	3.3 - 3.35 - 3.4 „ (2)	— - — - — „ —
Boeroe	3.3 - 3.33 - 3.4 „ (3)	— - — - — „ —
Boeton	— - — - — „ (—)	— - 133 - — „ (1)
Lomblen	— - 3.5 - — „ (1)	— - — - — „ —
(Lombok)	— - 3.1 - — „ (1)	— - — - — „ —
(Soemba)	— - 3.3 - — „ (1)	— - 103 - — „ (1)
(New Guinea)	3.2 - ? - 3.7 „ (9)	99 - 111 - 121 „ (8)

Difference in toothmeasurement from *rama* not perceptible.

Mus ouwensi KLOSS.

Type in collection.

At present I wish to reject the certainty with which formerly I (and others) accepted this animal as a race of *musculus* and I now prefer to consider it as a species. In his original description, KLOSS says that “the skulls and teeth of both are exactly alike”. Actually large differences exist. The skull of *ouwensi* is markedly higher in braincase, lower in muzzle part and narrower in palatal breadth. In *ouwensi* the nasals project less anteriorly, but the upper incisors are directed more forwardly. Very striking is the colour of the anterior side of these teeth: in *ouwensi* much darker than in *musculus*. I am too little acquainted with the genus *Leggada* to form an opinion, but it may be questioned whether this genus should be referred to. An extra anterior cusp on the first upper molars is not clearly to be seen, but also in *L. buduga* this does not seem always to be clearly present (cf. THOMAS, P.Z.S., 1881, Pl. LI, fig. 10 - 11, and HELLER, Smiths. Misc. Coll., LIV, 1924, Pl. 2a). I also remember to the information, given by OUWENS, that “instead of running like the common house mouse it (*ouwensi*) progresses by a series of leaps”.

As collecting localities of our Museum specimens KLOSS gives: Rembang, Probolinggo and Temanggoeng, E. Java; and Pamekasan, Madoera. To my surprise, in the old waste collection of the Museum I found some more examples.

Firstly one from Madioen and one from Panaroekan. On the labels is written: "loc. house", and "underside of tail white" (in the Panaroekan specimen moreover: "1 cm of tip of tail wholly white"). Furthermore I found a specimen from Waiwerang, Adonara (E. of Flores) and 5 specimens from Medan, Deli, N. Sumatra. However, the Deli specimens are not very typical, as far as the skull characters are concerned. The only fresh specimen of the species, recorded up till now, is the one dugged out by me from a ricefield dike, Tjandiroto, M. Java, 700 m. Unfortunately this specimen is not available for comparison. The external measurements are: head and body 81; tail 75; hind foot 16.5 mm.

V. INDOMALAYAN SPECIES.

***Rattus baluensis* (THOS.).**

***Rattus baluensis baluensis* (THOS.).**

2, Paka, Kinabalu, N. Borneo, 9790 and 11000 feet.

Measurements (σ and ♀ respectively): head and body 152, 162; tail 168, 170; hind foot 35, 33; ear 20, 21; skull: greatest length 39.3, —; condylobasal length 37.3, 37.6; basal length 34.3, 34.6; palatal length 21.6, 21.8; zygomatic breadth 18.9, 18.6; interorbital breadth 6.3, 6.1; nasals 14.2×4.3 , — $\times 3.9$; diastema 10.4, 10.5; palatal foramina 7.1×2.5 , 7.6×3.0 ; upper toothrow 7.0, 7.3 mm.

***Rattus mulleri* (JENT.).**

***Rattus mulleri mulleri* (JENT.).**

Of the 17 Sumatran numbers, 7 (Atjeh, Leuser collection) have already been determined by CHASEN (Treubia, 17, 1940, p. 497) as belonging to this race, another one (Palembang) by KLOSS to *campus* (ROB. & KLOSS). As far as I can see the latter race is only poorly founded and also CHASEN calls it "only doubtfully distinct from *mulleri*". The original authors based the race partly on difference in colour (saying that "the slight difference in it is only an average one"), but principally on "decidedly broader rostrum, greater zygomatic width and a little larger bullae" than *mulleri*. Contrary to Borneo a "shorter tail". The 3 specimens, on which *campus* relies, have a zygomatic width, averaging 50.7 % of the greatest length of the skulls. Six Sumatra animals, in 1918 and 1919 referred to *mulleri* by the same authors, give 48.8 %. (Even this small difference seems not to be confirmed by the Museum material). Just as small is the difference in the breadth of the rostrum. In their tables they only give measurements for the breadth of the nasals: in the 3 *campus* each 6 mm (not exactly in tenthes of mm), in the 6 *mulleri* 5.3 - 6.0 mm. Furthermore in the 3 *campus* the tail averages 118 % of head and body. Taking together all Borneo specimens known to me, I find 112 %, so even less. The only clear difference I observe within our Sumatrans is the colour, and then not a "slight" difference

and only averagely, but a large and constant one between the Atjeh series of the Leuser collection (7) and that from the Geureudong (5, also Atjeh). The last series is much more buffy, especially on the back, so much and so regularly that it is impossible to unite both series in one race. However, the Geureudong series cannot reasonably be referred to *campus*, as it does not agree with the description, nor consists of coastal or lowland animals. Yet I will not found a new race for them.

From the other finding places in Sumatra the material is too small for a comparison (2, Palembang, one of which wholly agreeing with the Leuser series, the other determined by KLOSS as *campus*; 1, Sanggoel, Benkoelen, 500 m; 1, Mt. Dempo, 1600 m; 1, Wai Lima, Lampongs).

Taking together all Sumatra specimens I know, I find for the toothrow 9.0 - 9.65 - 10.2 mm (24).

***Rattus mulleri borneanus* (MILLER).**

Our 5 specimens from Mid E. Borneo have already been determined by CHASEN & KLOSS as *borneanus*. No topotypical material being available, I accept this.

***Rattus mulleri waringensis* subsp. n.**

Type: ♂ ad., Kampong Riam, distr. Kotawaringin, S. W. Borneo. Coll. J. J. MENDEN, 4.xi.1935. Buitenzorg Museum, No. 52/36.

Diagnosis: Although the total length of the S. W. Borneo animals seems to be less than that from E. Borneo, the toothrow is markedly larger. From S.E. and E. Borneo in total 3 measurements for this total length are known to me (MILLER, GYLDENSTOLPE). They are 479, 469 (type of *borneanus*) and 464 mm. In our 16 specimens from S., S. W. and W. Borneo the maximum is 464 (followed by 456 and 455). For the toothrow, however, I find:

S. E. Borneo, type of <i>borneanus</i>	—	8.5	—	—	mm	(1)
E. Borneo (<i>borneanus</i>)	8.0	—	8.37	—	9.0	„ (7)
S. Borneo (<i>waringensis</i>)	8.1	—	8.81	—	9.2	„ (9)
S. W. Borneo (<i>waringensis</i>)	8.7	—	9.11	—	9.5	„ (6)
W. Borneo (<i>waringensis</i>)	—	—	9.0	—	—	„ (1)

The nearest small island race, *crassus* of Lamukotan, gives 8.5 - 8.73 - 9.0 (14), but of the 13 known measurements for the total length there are 6 larger than 500 (max. 550) mm!

The tail averages: in S. E. Borneo 127 % (1); E. Borneo 126 % (2); S. Borneo 108 % (9); S. W. Borneo 112 % (6); W. Borneo 112 % (1).

Many of these animals have been preserved in formaline and it seems advisable not to pay attention to small differences in colour.

Measurements of the Riam series:

Museum No.	Sex	Head & body	Tail	Hind foot	Ear	Skull: greatest length	Condylor-basal length	Basal length	Pal. length	Zygomatic breadth	Interorbital breadth	Length of nasals	Breadth of nasals	Diastema	Pal. foramina length	Pal. foramina breadth	Upper toothrow
50/36	♂	213	225	42	21	49.4	46.0	42.7	25.7	23.9	6.9	19.1	5.0	13.1	8.6	3.0	9.0
55/36	♂	206	226	42	22	46.3	43.3	40.1	24.6	23.8	7.5	18.3	5.4	12.0	7.8	3.0	9.0
52/36	♂	204	218	42	20	46.0	44.3	41.2	—	23.8	7.2	16.7	5.2	11.6	7.8	3.1	9.5
53/36	♀	203	252	42	24	49.6	47.0	44.1	26.3	24.9	7.7	18.7	5.4	13.6	8.1	3.0	9.1
51/36	♂	217	239	42	21	48.5	45.4	42.1	26.0	23.9	7.5	18.7	6.0	13.1	7.8	3.0	8.7
54/36	♀	200	225	42	22	46.3	44.3	41.0	25.3	24.0	6.8	17.6	5.0	12.2	7.4	2.9	9.4

One of the Borneo specimens was collected in house.

Rattus mulleri validus (MILLER).

1, Malay Peninsula (Selangor). Toothrow 10.4 mm.

Rattus mulleri pollens (MILLER).

4, Bangka. Toothrow 9.8 - 10.00 - 10.4 mm (4).

Rattus mulleri terempa CHASEN & KLOSS.

1, Poelau Siantan, Anambas islands. Toothrow 10.0 mm.

Rattus infraluteus (THOS.).

Rattus infraluteus maxi SODY.

1, Atang Poetar, Atjeh, 1000 m. Toothrow 11.3 mm.

Rattus sabanus (THOS.).

Rattus sabanus vociferans (MILLER).

2, Negri Sembilan, Malay Peninsula, 1300 feet (without skulls).

Rattus sabanus ululans (ROB. & KLOSS).

3, Palembang and Sanggoel, Benkoelen, Sumatra, 500 m.

Rattus sabanus strepitans (MILLER).

2, Poelau Sianten, Anambas islands.

Rattus sabanus siporanus (THOS.).

2, Sipora.

Rattus sabanus soccatus (MILLER).

7, N. Pagai.

Rattus sabanus mayapahit (ROB. & KLOSS).

2, Blawan, Idjen, E. Java, 950 m; 3, Noesa Kambangan, S. of Java, sealevel.

Measurements:

	Subspecies	Locality	Museum No.	Sex	Head & body	Tail	Hind foot
1	<i>vociferans</i>	N. Sembilan, Mal. Pen.	48	♂	208	360	47
2	"	" " "	47	♂	239	360	46
3	<i>ululans</i>	Benkoelen, Sumatra	422/36	♂	234	363	45
4	"	" "	411/36	♂	248	386	46
5	<i>strepitans</i>	P. Sianten, Anambas	43/37	♂	223	312	43
6	"	" "	42/36	♂	224	334	46
7	<i>siporanus</i>	Sipora	2882	♂	287	335	52.5
8	"	"	2881	♂	285	320	52
9	<i>soccatus</i>	N. Pagai	34/35	♂	—	—	—
10	"	" "	39/35	♂	280	275	51
11	"	" "	38/35	♂	262	284	51
12	"	" "	35/35	♂	250	297	51
13	"	" "	36/35	♂	244	278	51
14	"	" "	33/35	♂	246	273	50
15	"	" "	37/35	♂	232	273	50
16	<i>mayapahit</i>	Blawan, Idjen, E. Java	670	♂	217	297	42
17	"	" " "	669	♂	229	330	44
18	"	Noesa Kambangan	291/40	♂	230	327	46
19	"	" "	876/40	♂	—	328	46
20	"	" "	873/40	♂	—	301	45

	Ear	Skull: grea- test length	Condylloba- sal length	Basal length	Palatal length	Zygomat- ic breadth	Interorbital breadth	Length of nasal	Breadth of nasal	Diastema	Pal. foramina length	Pal. foramina breadth	Upper toothrow
1	25	—	—	—	—	—	—	—	—	—	—	—	—
2	23.5	—	—	—	—	—	—	—	—	—	—	—	—
3	25	55.2	51.3	47.9	29.0	25.5	8.5	22.3	6.2	15.4	8.4	3.4	9.5
4	27	55.6	52.1	48.9	29.1	26.6	8.5	20.7	6.0	15.1	8.3	3.2	9.9
5	25	54.3	49.4	46.2	27.2	24.5	8.5	22.0	6.1	13.9	8.3	3.5	10.0
6	25	53.6	49.5	46.1	27.3	24.6	8.6	21.2	6.0	14.4	8.6	3.6	9.7
7	27	59.3	55.3	51.9	29.5	28.3	10.3	24.1	6.9	15.3	8.2	3.9	10.9
8	28	58.7	54.4	50.8	29.6	27.8	9.1	23.6	6.6	16.0	8.2	4.2	10.6
9	—	58.5	55.3	51.5	30.2	26.3	9.7	24.0	6.4	15.7	9.0	3.5	10.9
10	25	53.7	50.2	46.5	27.7	26.3	8.8	21.0	6.1	14.0	7.5	3.6	10.8
11	28	54.9	50.4	46.8	27.0	26.3	9.3	21.7	6.2	14.2	7.1	3.7	10.3
12	26	53.3	50.6	47.2	27.3	25.4	9.2	21.3	6.0	14.1	7.6	3.4	10.4
13	26	53.7	50.6	46.7	27.2	24.7	9.1	20.7	5.9	14.0	8.0	4.0	10.7
14	25	52.8	48.7	45.0	26.3	24.2	9.0	20.5	6.0	13.5	8.0	3.4	10.7
15	28	52.9	49.6	45.6	26.9	24.0	8.8	19.9	5.8	14.1	7.7	3.3	10.1
16	29	—	47.8	44.7	26.7	23.2	7.7	—	5.1	13.3	8.0	2.8	9.4
17	29	53.2	49.7	46.8	27.4	25.2	8.0	20.7	5.3	13.6	8.4	3.2	9.9
18	25	54.9	52.2	49.1	28.8	25.3	8.1	21.5	6.0	15.1	7.9	3.5	9.8
19	26	57.3	52.8	50.1	29.7	26.7	8.1	22.1	6.0	14.7	8.2	3.4	10.4
20	25	54.5	50.9	47.8	28.5	24.4	7.9	20.2	5.7	14.3	8.2	3.5	10.2

Rattus rajah/surifer.

In 1934 describing my *R. surifer solaris* of Java, I already wrote that I was not able to distinguish *rajah* from *surifer*. I then based my opinion on my own collection. Now I dispose of 60 specimens in the Museum. Again I tried to separate the races according to the 3 distinguishing characters given by ROBINSON (A.M.N.H., 9-vii, 1921, p. 234) and KLOSS (Treubia, II, 1921, p. 122) and found:

a. It cannot be said that "generally speaking *R. surifer* is a brighter animal". Perhaps this prevails in Borneo.

b. The colour of the bases of the dorsal fur is variable within very small series: of 3 specimens of *surifer pagensis* from Siberoet, one has very clear brown bases (the other two dirty grey). Reversedly: of 2 specimens of *rajah hidongis* from S. Natoena, one has very evident (the other less evident) grey bases.

c. As regards the posterior extension of the nasals (beyond the fronto-premaxillary sutures), though here also among the series of *surifer* large exceptions occur, in which the nasals clearly extend posteriorly beyond the named sutures, this character seems the most usable one.

In the following I simply followed the usual division.

Rattus rajah (THOS.).**Rattus rajah pallax (MILLER).**

1, Bukit Dantai, Negri Sembilan, 2400 feet (teeth 7.3 mm).

1, Doerian, Riouw Archipelago (7.1 mm).

1, Lesten, Atjeh, N. Sumatra, 700 m (7.1 mm).

Rattus rajah hidongis KLOSS.

1, Serasan (type), 1 Sirhassen, S. Natoena islands (teeth 6.9, 6.9 mm).

Besides the assurance that there occurs no difference in colour, KLOSS, in his original description, gave as only difference from *pallax*: "skull with rostrum broader and less tapering". This certainly does not work out. CHASEN (Bull. Raffl. Mus., 10, 1935, p. 18) points to the shorter tail.

Rattus rajah verbeeki SODY.

3, Noesa Kambangan, S. Java, sealevel.

I doubt if these animals are really *verbeeki*. No Javan specimen could be compared with them, but on my recollection they are not so dark of back as typical *verbeeki* of Gedangan, N. Mid Java. Furthermore they are somewhat smaller. It may be remarked that I never found myself able to reduce 3 specimens, Pangandaran, S. Mid Java, in my own collection, to *verbeeki*. Herewith some measurements:

Locality	Sex	Head & body	Tail	Hind foot	Ear	Skull: greatest length	Occipito-nasal length	Basal length	Palat. length	Zygomatic breadth	Interorbital breadth	Length of nasals	Breadth of nasals	Diastema	Pal. foramina length	Pal. foramina breadth	Upper toothrow
Gedangan (type)	♂	230	213	46	25.5	51	50.5	—	24	22.5	8	18	5.5	14.5	—	—	7.6
"	♀	217	—	42	—	50	49	42	23.5	22	8	19	5.2	14	7	—	7.3
"	♂	203	210	43	25	47.5	47.5	40	23	20.5	7.5	19	5	13	7	—	7.1
"	♀	202	198	43	24.5	48.5	48	40	—	21.5	7.5	18	5	14	—	—	7.1
Pangandaran	♂	201	189	42	22	—	—	—	—	—	—	—	—	—	—	—	7.2
"	♀	192	185	40	20	45	44.5	37.5	21.5	20	7	17	4	12	6.3	—	7.0
"	♂	192	176	40.5	23.5	—	—	39	21.5	20	7.3	—	—	12	6.3	—	7.0
Noesa Kam-bangan	♀	—	196	42	24	—	—	—	23.2	—	7.4	18.9	5.0	13.0	6.8	4.0	7.0
"	♀	—	180	41	21	44.7	44.1	38.3	22.0	20.3	7.2	17.7	4.6	13.0	6.5	3.4	6.6
"	♂	—	124	34	19	35.8	35.5	28.7	16.8	16.7	6.3	12.7	3.9	9.0	5.0	2.7	6.4

Rattus surifer (MILLER).

Rattus surifer ravus (ROB. & KLOSS).

16, Sanggoel, Benkoelen, 1000 m; Wai Lima, Lampoeng residency, 0 m; Kalianda, Lampoeng residency, 100 m (all Sumatra). Teeth 5.7 - 6.25 - 6.8 mm (16).

Rattus surifer natunae CHASEN.

1, Boengoeran, Natoena islands. Teeth 7.0 mm.

Rattus surifer pagensis (MILLER).

3, Sipora and Siberoet, Mentawai islands. Teeth 6.9 - 6.97 - 7.0 mm (3).

Rattus surifer bandahara ROBINSON.

30, Borneo.

For the present I take these all together as *bandahara*, though this combination is not sufficiently based. The type from Kina Balu (and 2 other specimens from there) shows a broad zinc-orange gorget and so do 2 of the 3 specimens from Long Petah, Mid E. Borneo (not the specimen from 1170 m). In the 8 specimens, Riam, Kotawaringin, S.W. Borneo, the collar clearly occurs twice, all others but one show a trace of it. In 19 specimens, Kali Tjempaga, Sampit, S. Borneo, only once such a very slight "trace" is present. There is also difference in size. The 3 Long Petah specimens have skulls with 42.5 - 43.6 mm in greatest length. (CHASEN & KLOSS record a very remarkable specimen from Sarawak with 51 mm!). In the 8 specimens from Riam 44.5 mm occurs once, in the others the maximum is 41.7. In the 19 specimens from K. Tjempaga

the maximum is 40.2. But there are no old specimens in the latter series. Tooth-measurements do not differ much:

Kina Balu and Long Petah 6.1 — 6.40 — 6.8 mm (4).

S. and S. W. Borneo 5.8 — 6.23 — 6.7 mm (27).

Unfortunately real typical animals are too little known, but CHASEN & KLOSS (Bull. Raffl. Mus., 6, 1931, p. 64) give as measurements for "*bandahara*" from:

Bettotan and Samawang 6.6 — 6.85 — 7.0 mm (8).

I have no doubt that further division will be necessary.

Rattus surifer serutus (MILLER).

1, Seroetoe, Karimata. Teeth 6.5 mm.

Rattus surifer koratis KLOSS.

1, Dan Ban, S. Annam. Teeth 6.7 mm.

Rattus surifer solaris SODY.

1, Tjeringin, Laboean, Bantam, W. Java (no skull). The determination is provisional. The label measurements are: head and body 156, tail 146, hind foot 36 mm. Caught on $\frac{1}{2}$ km from the sea. This very old specimen was determined *Epimys jerdoni* BLYTH (under which name we also have specimens of *R. bukit* and *R. cremoriventer*. Compare the old medical literature).

Rattus inflatus (ROB. & KLOSS).

4, Mt. Dempo, S. Sumatra, 1800 m. Teeth 6.0 - 6.55 - 7.0 mm (4).

Since the mammary formula seems to be $1 + 2 = 6$, in my opinion a new genus could be made for this species.

Rattus cremoriventer (MILLER).

Rattus cremoriventer kina (BONHOTE).

2, Long Petah, Mid E. Borneo (no skulls); 8, Riam, S. W. Borneo; 3, Kali Tjempaga, S. Borneo. Toothmeasurements of the Riam series: 5.4 - 5.74 - 6.0 mm (8).

Rattus cremoriventer cretaceiventer (ROB. & KLOSS).

1, Palaboean, W. Java, sealevel; 1, Artjamanik, Bandoeng, 1700 m; 1, Malang, E. Java; 1, Blawan, Idjen, 950 m. Teeth 5.7 - 5.98 - 6.3 mm (4). Old specimens: "*Epimys jerdoni*". Furthermore: 1, Noesa Kambangan. Teeth 5.7 mm.

Moreover the collection contains 2 specimens, Oeboed, Bali, which, with the available material, cannot be separated from Javanese. Teeth 6.0 - 6.1 mm.

Rattus rapit (BONHOTE).

Measurements:

Locality	Upper trothrow			Tail in %			Subspecies
	Min.	Aver.	Max.		Aver.		
Borneo, Kina Balu	—	6.6	—	1	155	1	<i>rapit</i>
Sumatra, Atjeh	6.9	7.05	7.2	12	137	11	<i>atchinensis</i> subsp.n.
" , Ophir	6.5	6.81	7.1	9	149	8	(<i>fraternus</i>)
" , Kerintji	5.8	6.43	6.9	25	145	24	(<i>fraternus</i>)
" , Dempo	6.1	6.65	7.1	30	146	28	(<i>fraternus</i>)
" , Tanggamaes	6.2	6.45	6.7	2	157	2	(<i>fraternus</i>)
Java, Salak	6.8	7.11	7.3	16	151	16	<i>fredericae</i>
" , Gede	6.8	7.10	7.6	100	150	98	<i>lepturus</i>
" , Tal. Patengan, K. Tjiwidej	6.9	7.15	7.6	24	160	25	(<i>lepturus</i>)
" , Tjiboeni	—	—	—	—	153	19	(<i>lepturus</i>)
" , Tangkoeban Prahoe	—	—	—	—	140	1	(<i>lepturus</i>)
" , Soembing	6.8	6.90	7.0	3	145	2	(<i>lepturus</i>)
" , Sindoro	—	7.1	—	1	144	1	(<i>lepturus</i>)
" , Tjareme	6.8	7.12	7.7	25	141	23	<i>maculipectus</i>
" , Papandajan	7.0	7.28	7.6	12	150	8	(<i>maculipectus</i>)

Rattus rapit rapit (BONHOTE).

1, Mt. Kina Balu, Lumu Lumu, 5500 feet. Very spinous.

Rattus rapit atchinensis subsp. n.

Type: ♂ ad., Pajatoong Kalan, Atjeh, N. Sumatra, 2000 m. Coll. MADZOED, 9.ix.1930. Buitenzorg Museum, No. 3156. Specimens examined: 6, type locality; 4, Atang Poetar, Atjeh, 1000 m; 1, Blang Kedjeren, Atjeh, 800 m.

Diagnosis: Resembling *R. r. fraternus* from Kerintji, W. Sumatra, but with larger toothrow (6.9 - 7.05 - 7.2 (12), against 5.8 - 6.43 - 6.9 (25) in Kerintji). Spines always present, though sometimes they are only thin and soft. In all specimens the cream underside shows dark blots (on collar and sometimes over middle line of belly). Perhaps the tail is somewhat shorter than in *fraternus*.

Measurements of type: head and body 139; tail 213; hind foot 34; ear 23; skull: condylobasal length 34.4; palatal length 18.7; diastema 9.4; palatal foramina 6.4 × 2.8; upper toothrow 7.2 mm.

Rattus rapit fraternus (ROB. & KLOSS).

No material from type locality, but I provisionally bring to this race 20 specimens, Mt. Dempo, 1500 - 2300 m; and 2, Mt. Tanggamaes, 2100 m.

Even very young specimens and those from 2300 m always show many and clear spines. Probably the different localities show differently shaped blots on the ventral side (Dempo, 2300 m!).

Rattus rapit fredericae SODY.

All Javan numbers differ from all Sumatran by the lack of spines or spiny hairs.

3, Mt. Salak, 1920 - 2100 m. Differing from *lepturus* in darker colour of the head and more gradually (over a pure grey zone) passing from the colour of the belly into that of the sides and back. Also the other characters, mentioned in the original description, appear to be well defined.

Rattus rapit lepturus (JENTINK).

Hereto first 55 specimens, Mt. Gede, 1800 - 3000 m. On ventral side perfectly white or (a small part) with an extremely small indication of a pectoral patch. Agreeing very well and to be reckoned to this race:

23, Telaga Patengan, Mt. Patoeha, 1700 m (though two of these deviate, the one by possessing a distinct collar, the other by a suchlike collar plus a dark cross band over the belly).

5, Kawah Tjiwidej, 1700 m.

1, Mt. Tangkoeban Prahoe, 1700 m.

2, Mt. Soembing, 3300 m.

1, Mt. Sindoro, 3100 m.

From the table of measurements I left out the following "abnormal" toothmeasurements: Kandangbadak 5.9, Tjibodas 5.7, Telaga Patengan 5.7 and 5.8 mm. On the label of the Tjibodas specimen is recorded that it was born and bred in the cage.

Rattus rapit maculipectus SODY.

15, Mt. Papandajan, 1800 - 2235 m. Not at all really "typical" for the subspecies (Mt. Tjareme), but yet about half of them is provided with distinct dark blots on the ventral side.

Rattus bukit (BONHOTE).

Measurements:

Locality	Upper toothrow				Tail in %		Subspecies
	Min.	Aver.	Max.		Aver.		
N. Sumatra, Atjeh	5.9	6.05	6.3	13	130	10	(<i>jacobsoni</i>)
S. Sumatra	5.7	6.07	6.5	6	129	6 ¹⁾	<i>jacobsoni</i>
Java, lower regions	5.7	6.15	6.7	65	130	24	<i>temminckii</i>
W. Java, higher regions	5.9	6.22	6.4	6	126	5	<i>treubii</i>
E. Java, higher regions	6.1	6.22	6.3	6	136	7	<i>besuki</i>
Bali	6.3	6.60	6.8	7	126	8 ²⁾	<i>baturus</i>

¹⁾ Including the measurements of BARTELS.

²⁾ Including the measurements of MERTENS.

Rattus bukit jacobsoni BARTELS.

[Syn. *Rattus bukit lieftincki* CHASEN. Type in collection].

From Sumatra we possess 1 specimen from Sanggoel, Benkoelen, 500 m, and 13 from Atjeh (Atang Poetar), 1000 m. I think to be allowed to look on the first as a representative of *jacobsoni*. The separation of this race from *temminckii* was based by BARTELS on the less sharply margined and shorter brownish median area of the hindfeet, which holds good for our Sumatrans (only 2 of the Atjeh specimens could be reckoned to the Javans, and among 60 Javans I only find 3, which could be reckoned to the Sumatrans, two of them lack the dark area wholly). Unfortunately the Sanggoel specimen is ex formaline. The differences in colour from *lieftincki* seem only to be caused by the formaline. The Sanggoel specimen is not duller than the northern series and therefore it is brighter than *temminckii*. I feel obliged for the present to consider *lieftincki* as a synonym of *jacobsoni*.

Rattus bukit temminckii KLOSS.

As a characteristic for this form (opposed to the mountain races), I took the presence of many hard spines. Belonging to it:

3, Tjibodas, Mt. Gede, 1400 m (very hard spinous) (the type of *treubii* is from Tjibodas, Mt. Gede, 5000 feet!); Series, Kaligoea, Mt. Slamet; 1, Klein Getas, Bodja; 3, Rajap, Djember; 1, Soemberwringin, Mt. Raoeng, 710 m; 2, Blawan, Idjen, 950 m; 1, Kendeng III, Idjen, 1400 m (still distinctly spinous).

In E. Java the toothmeasurements are somewhat larger than in W. Java. The specimens from the old collection were labelled *Epimys jerdoni*.

Rattus bukit treubii (ROB. & KLOSS).

1, Mt. Tangkoeban Prahoe 1700 m (very pronounced montane); 1, Mt. Papandajan, 1800 m.

Partly the original description of this subspecies depends on a misunderstanding. The authors say that *treubii* is "always lacking the ochraceous patch on the chest, which is always present in Sumatran animals", but they mean Sumatran animals of *fraternus*, which is a *rapit* and not a *bukit*! Sumatran *bukit* never possess an ochraceous patch on the chest. Further the type locality of *treubii* seems to have been designated rather unfavourably, in so far as our 3 Tjibodas specimens (1400 m) are still very hard spinous. However, a paratype (Tjibodas, 5000 feet) in my own collection was soft haired, like my series from Mt. Tjareme, 2750 m.

Rattus bukit besuki SODY.

3, Wonokriti, Pasoeroean, 1800 m (rather good mountain animals); 1, Djambangan, Mts. Tengger, 1900 m (good mountain animal); 1, Ijang Plateau, 1400 m (good mountain animal, though still rather hard spinous); 7, Ongop-Ongop, Idjen, 1850 m (though one specimen rather hard spinous).

Summarizing: In Java up to 1400 m usually rather pronouncedly spinous. Sometimes at 1400 m already good montane (Tjibodas, 5000 feet; Ijang), sometimes (Tjibodas 1400 m; Idjen) animals from this altitude appear to represent clearly the lower form. At 1700 m the mountain type prevails, though one specimen from 1850 has a rather hard fur.

Rattus bukit baturus SODY.

2, Gitgit, Bali.

Very well confirming the race by the broad nasals (4.6 and 4.7 mm). On the other hand MERTENS gives 4.2 - 4.4 for 3 specimens from Gitgit, but this does not mean a denial of the race. The average for 7 Balinese is now 4.44 mm, as against a maximum in 60 Javan specimens of 4.4 mm. See further the toothmeasurements.

Rattus alticola (THOS.).

2, Mt. Kina Balu (Kemberango), 7040 feet.

Agreeing with the original description, except that in both specimens the yellowish white spines on the ventral side do not possess this colour over the whole of their length, but show subterminal grey brown rings, which give a very remarkable speckled appearance.

Measurements (♂ and ♀): head and body 159, 148; tail 172, 152; hind foot 33, 23; ear 22, 22; skull: greatest length 39.8, 39.1; zygomatic breadth 18.0, 18.6; nasals 16.1 × 3.3, 15.0 × 3.0; diastema 10.5, 9.7; palatinal foramina 6.2 × 3.1, 6.0 × 2.8; upper toothrow 5.9, 5.9 mm. Mammae 2 + 2 = 8.

Rattus whiteheadi (THOS.).

With only 34 specimens available, it cannot be expected that we could give a detailed delimitation of the geographical distribution of the races in this difficult case. CHASEN, who possesses "several hundreds" of these rats, made a very useful attempt to give a survey. He comes to the conclusions:

a. that *asper* (= *klossi*), with dull back and usually grey or only lightly rufous washed underside, is restricted to the Malay Peninsula,

b. of the N. Borneo form, *whiteheadi* (= *perlutus*), which is dark bellied and lighter backed, he says that "there can be no doubt that W. Sumatra must be included in the range of *whiteheadi* and not *asper*". Unfortunately he does not give a further delimitation of this "W. Sumatra".

c. that the Riouw Archipelago form, *batamanus* (= *mandus*), with grey belly, besides on some coastal islands, should also occur in the adjacent low country of central E. Sumatra. This race is distinguished from *whiteheadi* by the noticeably larger skull. Actually LYON's skull measurements of *mandus*, E. Sumatra, are 35.0 - 38.0 (7), as against a maximum of 34.4 in 24 specimens from Borneo. The toothmeasurements of the same *mandus* specimens are 5.8 - 6.06 - 6.3 (7), as against 4.9 - 5.42 - 6.2 (45) for Borneo.

d. finally it is said that *batus* (Pini island, W. off Sumatra) on description is not distinguishable from Atjeh specimens, which latter are strongly rufous bellied, like *whiteheadi*, and with dark back and large measurements, like *batamanus*.

This means that, for Sumatra, CHASEN recognises 3 races, *batus*, *whiteheadi* and *batamanus*. However, I am unable to classify our material in these races satisfactorily. I offer the following determinations:

***Rattus whiteheadi batus* (MILLER).**

On the authority of CHASEN I bring our Atjeh material to this race. The colour of the back is rather variable, the belly is rufous. The measurements are not very large: skulls 31.0 - 36.4 (10), teeth 5.0 - 5.45 - 5.8 (11). Connecting: 1, Galang, Deli, with 33.8 and 5.5 mm. The tail averages 92% (10).

***Rattus whiteheadi* subsp. incert.**

The following specimens with strongly rufous ventral side:

5, Sanggoel, Benkoelen,	500 m.	Teeth 5.4 — 5.52 — 5.7 (5),	tail in % 80.
1, Moearadoewa, Palembang,	100 m,	„ 5.7 (1),	„ „ „ 88.
2, Kalianda, Lampoeng,	0 m.	„ 5.6 — 5.65 — 5.7 (2),	„ „ „ 81.
2, Wai Lima, Lampoeng,	0 m.	„ 5.5 — 5.75 — 6.0 (2),	„ „ „ 82.

With the exception of the Palembang specimen, which has a light back, this series agrees by a rather dark colour of the back and by the short tail. In any case the rufous belly and the small skulls (maximum 33.8 mm) exclude *batamanus*, whilst for *whiteheadi* CHASEN gives a light colour of the back.

If the ground were virginal, the material at hand would have led me to accept one subspecies for the whole of Sumatra. This subspecies would, in that case, be difficult to distinguish from the Bornean specimens of *whiteheadi* in our collection.

***Rattus whiteheadi whiteheadi* (THOS.).**

1, Badang, N. E. Borneo; 2, Long Petah, Mid E. Borneo, 470 m.

***Rattus whiteheadi coritzae* subsp. n.**

Type: ♀ ad., Riam, Kotawaringin, S. W. Borneo. Coll. J. J. MENDEN, 1.xi.1935. Buitenzorg Museum, No. 83/36.

Diagnosis: Of the 8 available specimens from the type locality, 7 are lighter than any other material from Borneo and Sumatra. The type has a purely light grey belly with an insignificant lengthwise pectoral rufous stripe. The others are more or less washed with this colour over the whole ventral side. Only the darkest specimen is not distinguishable from *whiteheadi*. Tail averagely 93%.

Measurements of type: head and body 132; tail 116; hind foot 28; ear 18; skull: greatest length 31.9; palatal length 14.9; zygomatic breadth 14.0; interorbital constriction 5.3; nasals 10.3 × 3.8; diastema 7.8; palatal foramina 4.1 × 2.3; upper tooththrow 5.6 mm.

Rattus whiteheadi subitus CHASEN.

1 Sirhassen, S. Natoena islands.

Rattus edwardsi (THOS.).**Rattus edwardsi ciliatus** (BONHOTE).

1, Gunong Tahan, Pahang, Malay Peninsula, 5200 feet; 1, Selanga, Pahang border, Malay Peninsula, 4000 feet (no skulls).

Rattus canus (MILLER).**Rattus canus sodyi** BARTELS.

2, S. W. slope Mt. Pangrango-Gede, W. Java. Paratypes.

Maxomys bartelsii (JENTINK).

Tooth- and tailmeasurements:

Mt. Gede (<i>bartelsii</i>)	5.0 — 5.39 — 5.7 mm	(85)	102 %	(89)
Tjiboeni (<i>tjibunensis</i>)	5.2 — 5.56 — 6.0 mm	(15)	100 %	(21)
Mt. Slamet (<i>obscuratus</i>)	4.9 — 5.16 — 5.4 mm	(16)	102 %	(10)

Maxomys bartelsii bartelsii (JENTINK).

In addition to a series of 13 from Tjibodas, 1400 - 1600 m, I provisionally refer to this race all other W. Javan material: Poentjak, 1350 m; Kandangbadak, 2400 m; Lebak Saät, 2400 m; Artjamanik, Bandoeng, 1700 m; Telaga Patengan, 1700 m. The material (43 specimens) is insufficient for comparison of the different localities. There are a few specimens, which possess much black on the middle of the back, but I suppose that this colour fades after the skins have been preserved for some years.

Maxomys bartelsii obscuratus (BARTELS).

2, Mt. Slamet, 2000 and 2500 m (paratypes). An old series (1919), Kaligoea, Mt. Slamet, differs in colour from these paratypes, but I suppose this to be a question of discoloring by age.

Cironomys hoogerwerfi (CHASEN).

1, Blang Kedjeren, 800 m (type); 1, Ngo Lemboeh; 2, Mt. Leuser; 3, Pajatoeng Kalan, 2000 m; all Atjeh, N. Sumatra.

Though apparently restricted to a very small area, the species seems to be common there. The 3 Pajatoeng Kalan specimens were collected on 9-12-IX-1930 and remained undetermined in the Museum. From the same place, dated 13-14-IX-1930, 2 specimens came in the Museum at Brussel. FRECHKOP recorded them as *Epimys* sp. (Meded. Kon. Natuurh. Mus. België, VII, 1931, p. 5). The next 4 specimens (Leuser expedition) came in CHASEN's hands.

One of the Pajatoeng Kalan specimens (the ♂) strongly deviates from the others by the tips of the hairs on the ventral side not being rufous but whitish.

Measurements:

Museum No.	Sex	Head & body	Tail	Hind foot	Ear	Skull: grea- test length	Condylo- basal length	Basal length	Pal. length	Zygomatic breadth	Interorbital breadth	Length of nasals	Breadth of nasals	Diastema	Pal. foramina length	Pal. foramina breadth	Upper toothrow
311/37	♀	189	257	37	26	41.5	38.9	36.8	22.3	20.3	5.8	14.6	5.0	10.9	8.2	3.0	7.6
324/37	♀	183	225	37	26	43.1	40.2	37.3	23.0	—	6.0	14.7	4.8	11.0	8.3	3.0	8.2
351/37	♀	173	230	35	23	41.8	38.5	36.2	21.8	19.5	6.2	15.2	4.7	10.7	7.9	2.9	7.7
317/37	♀	126	168	32	23	—	—	29.6	18.3	—	5.6	—	—	8.6	6.6	2.4	7.4
3148	♀	180	241	36	25	—	39.2	36.6	22.0	20.0	6.1	—	—	11.2	7.5	2.7	7.8
3150	♀	175	214	36	24	—	37.8	35.2	21.7	—	6.3	—	—	10.6	7.4	3.0	7.9
3149	♂	168	215	36	24	—	36.2	33.6	—	—	—	—	—	10.2	7.8	2.6	7.7

***Bandicota indica* (BECHST.).**

***Bandicota indica setifera* (HORSF.).**

Many specimens, but the last ones dating from 1936 (Indramajoe) and 1926 (Krawang). Also my own collection contains but 4 specimens from the last 10 years (Buitenzorg; Gedangan). The Museum localities are:

W. Java: Tjimerang, Soekaboemi; Tjiandjoer; Tasikmalaja; Galoer, Tjiamis; G. Anaga, Krawang; Poerwakarta; Haoer Geulis, Indramajoe; Pali-manan; Cheribon.

C. Java: Brebes; Tegal; Pekalongan; Batang; Wonosobo; Semarang; Salatiga.

E. Java: Koedoes; Koelon Progo, Djokjakarta; G. Kidoel; Malang; Tjokro. Madoera: Flanakan; Pamekasan.

Toothmeasurements:

W. Java	10.3 — 11.27 — 12.1 mm (25)
C. Java	9.9 — 11.22 — 12.0 mm (13)
E. Java	10.2 — 11.03 — 11.9 mm (11)
Madoera	11.1 — 11.55 — 12.0 mm (2)
Total	9.9 — 11.22 — 12.1 mm (51)

***Gunomys bengalensis* (GRAY).**

***Gunomys bengalensis bengalensis* (GRAY).**

2, Calcutta and Deccan, E. Bengal, India. One a perfect albino, the other nearly so. Mammae 4 + 3(4) = 14(16). Toothrows 7.0, 7.3 mm.

***Gunomys bengalensis sundavensis* KLOSS.**

Cotypes in collection (Oeleëlheuë, Atjeh, N. Sumatra). Further: 1, Meureudoe, Atjeh; 1, Wlingi, E. Java; all already mentioned by KLOSS. Moreover I found a specimen from Koedoes, E. Java, which dispels my last doubts of the occurrence of the species in Java. A Meureudoe specimen in my own collection has 3 + 3 = 12 mammae.

Measurements (including the Meureudoe specimens):

Locality	Sex	Taken on skin			Skull: greatest length	Condylobasal length	Basal length	Palatal length	Zygomatic breadth	Interorbital breadth	Breadth between ridges on parietals	Length of nasalia	Breadth of nasalia	Diastema	Palatal foramina	Upper tooththrow
		Head & body	Tail	Hind foot												
Oeleëlheuë,																
Atjeh	♂	170	135	30	39.6	39.2	36.4	23.4	23.2	6.2	10.1	11.8	4.3	12.1	8.0	8.3
"	♀	140	120	33	37.8	37.3	36.4	22.3	22.2	6.2	11.0	11.5	4.1	11.2	8.3	8.1
Meureudoe, N. Sumatra	♂	200	155	32	40.0	40.0	37.3	23.6	—	6.2	10.6	12.2	4.0	11.7	9.0	8.2
Meureudoe, N. Sumatra	♀	140	125	—	35.1	—	32.7	20.7	21.1	5.7	11.2	10.5	3.7	10.3	6.0	8.0
Koedoes, E. Jav.	♂	175	145	32	43.2	43.1	40.6	24.9	25.5	7.1	9.7	13.6	4.6	13.6	8.1	8.0
Wlingi, E. Jav.	♀	160	120	29	37.3	36.8	34.1	21.7	22	6.0	10.6	11.1	4.0	11.0	7.4	8.0

(Greatest length of skull always taken without the teeth.)

Chiropodomys gliroides (BLYTH).**Chiropodomys gliroides anna** THOS. & WROUGHT.

37 Specimens from:

W. Java: Buitenzorg; Tjikopo; Palaboean; G. Tjimerang, Soekaboemi; Sindangkerta, Tjipatoedja, S. coast; Indramajoe; Cheribon.

C. Java: Brebes; Tegal; Pemalang; Siloewok Sawangan, near Weleri; Semarang.

E. Java: Bodjonegoro; Roengkoet, Soerabaja; Probolinggo; Blawan, Idjen, 950 m.

Bali: Oeboed.

Toothmeasurements:

W. Java	3.6 — 3.77 — 3.9 mm	(15)
C. Java	3.4 — 3.73 — 3.9 mm	(15)
E. Java	3.6 — 3.77 — 3.9 mm	(11)
Java	3.4 — 3.75 — 3.9 mm	(41)
Bali	3.6 — 3.74 — 3.9 mm	(5)

Low measurements are found in the Siloewok Sawangan specimens: 3.4 - 3.58 - 3.7 mm (5), all rather young.

The 5 Balinese specimens slightly differ from the Javan. The maximum of the total length of the whole animal is 223 mm (against 222 in 40 Javan), the maximum length of the skull is 26.4 mm (26.3 in 35 Javan), the tail is shorter (averagely 129 %, against 144 in 35 Javan), the bullae are a trifle smaller, the colour of the belly is less clearly white.

Measurements:

Locality	Sex	Head & body		Tail	Hind foot	Ear	Skull: greatest length	Occipito-nasal length	Basal length	Palatal length	Zygomatic breadth	Breadth of braincase	Interorbital breadth	Length of nasals	Breadth of nasals	Diastema	Palatal foramina	Upper toothrow
Buitenzorg	♀	77	119	19	15	24.3	24.3	20.0	11.9	14.0	12.1	4.8	7.4	2.1	6.4	3.4	3.7	
	♀	82	120	17	14	24.4	24.4	20.3	12.0	13.7	12.4	4.9	7.2	2.3	6.0	3.2	3.9	
Mt. Salak	♂	78	—	17	14	24.3	24.2	21.1	12.2	14.0	12.5	4.9	6.9	2.2	6.2	—	3.9	
	♂	85	114	19	14	23.3	23.1	19.6	11.9	13.3	12.2	4.7	6.7	2.4	6.1	3.0	3.7	
" "	♂	87	113	17	13	24.4	24.3	21.1	12.2	14.1	12.4	4.6	6.9	2.5	6.4	3.1	3.8	
	♂	87	113	17	13	24.4	24.3	21.1	12.2	14.1	12.4	4.6	6.9	2.5	6.4	3.1	3.8	
Gedangan,																		
nr. S'rang	♀	74	124	18	16	25.4	25.2	21.6	12.8	15.0	12.4	4.8	6.6	2.7	6.8	3.3	3.7	
" "	♀	78	110	16	15	24.3	24.2	21.8	12.9	14.7	12.3	4.5	7.3	2.9	6.8	3.9	3.8	
" "	♂	85	112	17	14	24.3	24.1	20.8	12.3	14.2	12.4	4.8	6.8	2.5	6.3	3.4	3.6	
" "	♂	81	117	17	14	24.3	24.2	20.8	12.2	14.6	12.1	4.4	7.0	2.3	6.7	3.9	3.6	
" "	♂	81	120	18	15	24.6	24.5	21.0	12.0	14.0	12.0	5.0	8.0	2.5	6.2	3.8	3.7	
" "	♂	86	119	19	17	26.1	26.0	22.6	13.0	15.4	12.9	4.9	7.8	2.7	7.0	3.9	3.9	
" "	♀	60	95	16	12	21.5	21.4	17.2	10.7	12.0	11.8	4.9	6.0	2.0	5.2	2.7	3.6	

Chiropodomys gliroides peguensis (BLYTH).

2, Serasan, S. Notoena islands.

Determination only on geographical base (and THOMAS' view, as given by CHASEN, Bull. Raffl. Mus., 15, 1940, p. 184).

Skull-measurements (both ♀): Greatest length 22.9, 26.1; condylobasal length 21.6, 24.7; basal length 19.3, 22.9; palatal length 11.5, 13.2; zygomatic breadth 13.9, 15.3; breadth of braincase 11.7, 12.3; interorbital breadth 4.4, 4.5; length of nasals 6.9, 8.2; breadth of nasals 2.4, 2.4; diastema 6.0, 7.0; palatal foramina 3.4 × 1.8; 4.2 × 2.2; upper toothrow 3.9, 3.8 mm.

Chiropodomys pusillus THOS.

1, "North Borneo, leg. MOHARI, 1912".

Determination especially based upon the very short palatal foraminae. Probably the type was an unfullgrown specimen. It must be acknowledged, however, that the teeth of our specimen seem too large.

Measurements: head and body 90; tail 130; hind foot 19.5 (all taken on the skin); skull: greatest length 26.0; condylobasal length 23.9; basal length 21.6; zygomatic breadth 15.4; breadth of braincase 12.8; interorbital breadth 4.9; nasals 8.4 × 2.9; diastema 7.2; palatal foramina 2.8 × 2.1; upper toothrow 3.7; combined lengths of m¹ and m², crowns, 2.9; lower toothrow 3.5 mm.

Mycteromys crociduroides (ROB. & KLOSS).

Mycteromys crociduroides crociduroides (ROB. & KLOSS).

2, Kerintji, Sumatra, 7300 feet (paratypes). Teeth 4.2, 4.2 mm.

Mycteromys crociduroides vulcani ROB. & KLOSS.

2, Pangrango, W. Java, 3000 m. 2, Papandajan, W. Java, 2335 m. Teeth 3.7 - 3.76 - 3.9 mm (5).

Pithecheir melanurus CUV.*Pithecheir melanurus melanurus* CUV.

From Tjidjoelang, Mt. Salak; Tjitjadas; Bandoeng; Djeroeklegi, Maos, C. Java, 10 m. Further: 3 specimens, Noesa Kambangan, which are a trifle darker and seem to differ by other proportions of the measurements.

Locality													Museum No.	Sex	Head & body	Tail	Hind foot	Ear	Skull: greatest length
1 Mt. Salak, Tjidjoelang													179/34	♀	175	217	31	19	46.3
2 " " "													80/34	♂ juv.	119	127	26	14	31.2
3 Tjitjadas, Bandoeng													207	♂	—	—	—	—	42.0
4 Djeroeklegi, Maos (C. Java)													83/33	♂	149	195	32	18	43.0
5 „Nat. in Buitenzorg”.													272	♂	—	—	—	—	35.6
6 " " "													2445	♂	—	—	—	—	45.6
7 " " "													2446	♀	—	—	—	—	40.3
8 Noesa Kambangan.													E 37	♀	—	218	30	15	46.5
9 " "													E 72	♀	—	212	30	15	46.9
10 " "													E 7a	♀	—	178	28	14	38.3

Occipito-nasal length	Condylol-basal length	Basal length	Pal. length	Zygomatic breadth	Breadth of braincase	Interorbital breadth	Length of nasals	Breadth of nasals	Diastema	Pal. foramina length	Pal. foramina breadth	Upper tooth-row
1 —	43.3	—	24.1	24.0	16.5	8.3	16.9	6.2	13.0	8.0	3.6	8.0
2 —	—	—	—	—	—	—	—	—	—	—	—	—
3 —	39.4	35.7	21.0	20.8	16.3	7.2	13.6	5.1	10.0	7.4	3.4	8.8
4 —	40.5	37.3	22.7	22.2	16.4	6.8	15.3	4.6	11.2	8.0	3.0	8.4
5 —	—	—	—	—	—	—	—	—	—	—	—	8.3
6 —	43.6	40.4	23.6	23.7	17.0	8.0	16.4	6.0	12.4	8.2	3.9	8.6
7 —	37.9	35.0	20.5	21.0	15.4	7.1	12.5	5.2	10.6	7.2	3.5	8.0
8 46.1	38.8	40.3	24.2	23.2	16.5	7.1	14.5	5.0	12.1	7.5	3.2	9.2
9 45.3	39.1	40.6	24.1	24.0	16.6	6.7	16.3	4.9	12.0	7.3	3.2	9.2
10 37.8	36.3	32.9	19.9	19.7	15.4	6.0	13.3	4.0	9.6	6.4	3.2	8.6

Rhizomys sumatrensis (THOS.).*Rhizomys sumatrensis insularis* (THOS.).

1 ♂, Medan; 1 ♂, Aloor Simpang, Langsa; 1 ♂, Bataklanden.

All whitish, part of the hairs provided with subterminal dark brown rings. In the last named specimen these rings are pronouncedly rufous, but this colour does *not* occur especially on the head. It has been kept in spirit.

Rhizomys sumatrensis padangensis BRONGERSMA.

1 ♀, 1 ♂ (juv.), Tapanoeli; 1 ♀, Palembang; 1 ♀, Fort de Kock; 1 ♀, Padang Pandjang (last named 3 specimens Sumatra's Westcoast).

All much darker than *insularis* and more rufous, except the Fort de Kock specimen, which is hardly darker and only shows some rufous on the head. Apart from geographical considerations, our first impression for this specimen would be *insularis*.

VI. INDO-AUSTRALIAN SPECIES.

Rattus hellwardi (JENTINK).

Rattus hellwardi hellwardi (JENTINK).

2, Amoerang; 3, Lola Tetawiran; both N. Celebes.

The Tetawiran specimens are much darker on the back than the Amoerang ones, which lack all trace of black there. There is also much variation in colour of the belly fur: in some the hairs are white to the base, in others they have long grey bases. Teeth: 6.7 - 6.95 - 7.3 mm (13).

Rattus hellwardi griseogenus subsp. n.

Type: ♀ ad., Masembo, Mengkoka Mts., S.E. Celebes, 550 m. Coll. G. HEINRICH, 26-I-1932. Buitenzorg Museum, No. 93/41.

Distinguished from *hellwardi typicus* by possessing grey cheeks (before and below the eyes). In colour of the back our specimens are intermediate between those from Amoerang and Tetawiran, recorded under *hellwardi typicus*. Mammae 2 + 2 = 8.

Measurements of type (and second ♀): head and body 194, 182; tail 220, 215; hind foot 44, 42; ear 24, 25; skull: greatest length 46.7, 46.6; occipitonasal length 46.3, 46.5; condylobasal length 42.5, 41.8; basal length 38.8, 38.4; palatal length 22.0, 21.6; zygomatic breadth 21.4, 21.6; breadth of braincase 18.0, 18.0; interorbital breadth 7.2, 7.7; nasals 18.0 × 5.1, 18.0 × 5.1; diastema 12.2, 12.1; palatal foramina 7.0 × 3.8, 7.0 × 3.6; length of bulla 5.9, 6.0; upper toothrow 6.9, 6.9 mm.

Rattus musschenbroekii (JENTINK).

Rattus musschenbroekii musschenbroekii (JENTINK).

1, Manado; 1, Mapanget; 7, Tomohon; 2, Lola Tetawiran; all N. Celebes. Toothrow 5.5 - 5.93 - 6.3 mm (40).

Rattus musschenbroekii lalawora subsp. n.

Type: ♀ ad., Tangka Salokko, Mengkoka Mts., S. E. Celebes, 2000 m. Coll. G. HEINRICH, 23-XII-1931. Buitenzorg Museum No. 94/41.

Differing from *musschenbroekii typicus* in being spineless (on the sides there are a few soft white hairs, which may represent the remnants of the many and hard spines of the lowland animals). The specimen is also brighter in colour of upper side (especially on sides of head and body) than any other specimen I saw. Mammae 2 + 2 = 8.

Measurements of type: head and body 132; tail 115; hind foot 32; ear 16; skull: greatest length 36.5; occipitonasal length 36.3; condylobasal length 32.3; basal length 30.1; palatal length 16.5; zygomatic breadth \pm 17; breadth of braincase 14.4; interorbital breadth 6.2; nasals 13.4×4.0 ; diastema 8.8; palatal foramina 5.2×2.4 ; zygomatic plate 4.8; upper tooththrow 6.0 mm.

The type is the only specimen. But from the same mountain, 1500 m, we possess a specimen, which is quite different and seems to be slightly abnormal. It has a spineless but rather short and thin fur, which is nearly as dark above as below, like northern specimens in their youth pelage. The incisors have much too little orange.

***Rattus sapoensis* sp. n.**

Type: ♂ ad., Malengi, Togian islands, E. of Celebes. Coll. J. J. MENDEN, 2-XII-1939. Buitenzorg Museum, No. 50/40.

At first sight much resembling dark bellied *R. rattus*, but strikingly characterized by the very long bristles on the hind part of the back (up till 57 mm). The rather long, but not soft, fur of the back consists of woolly hairs (grey, with long, ochraceous buff tips), many spiny hairs, especially on anterior half of back (white, with black tips, grooved) and the already mentioned long, black piles. General colour of upper side ochraceous buff mixed with black, becoming lighter towards the sides (buffy grey), gradually passing into the dark grey of the ventral side (especially in the middle suffused with buff). Chin well haired and perfectly unicolorous with the whole ventral side. Tail black. Tailrings 10 - 11 per cm.

From *R. rattus* the skull differs in the course of the supraorbital ridges and the form of the supraoccipital. The latter has a rather straight-lined posterior margin and suggests the shape of a trapezium. The very distinct supraorbital ridges are smoothly bent along frontals and parietals and at their posterior ends pass almost without interruption into the slanting sides of the trapezium.

Measurements of type: head and body 195; tail 175; hind foot 36; ear 21; skull: greatest length 43.6; occipitonasal length 43.3; condylobasal length 41.5; basal length 39.0; palatal length 23.5; zygomatic breadth 20.1; interorbital breadth 6.5; breadth of muzzle 7.4; nasals 14.7×4.3 ; diastema 12.1; palatal foramina 8.3×2.7 ; zygomatic plate 4.7; upper tooththrow 6.8; breadth of m¹ 1.8 mm.

With much reserve I refer to this species 2 other specimens from the same island (Nos. 46/40, 49/40) (tooththrows 7.5, 7.5 mm, tails 91, 93 %), which in many respects differ from the type. The bristles, however, are also rather long (37, 38 mm).

***Rattus biformatus* sp. n.**

Type: ♀ ad., Malengi, Togian islands, E. of Celebes. Coll. J. J. MENDEN, 14-XII-1939. Buitenzorg Museum, No. 61/40.

After separating *R. sapoensis*, there remain (besides 1 *R. rattus*) 7 other rats from Malengi, also superficially much resembling *R. rattus*, but short tailed like *sapoensis*. They differ from *sapoensis* by not possessing such strongly elongated piles, their larger teeth (breadth of m^1 2.0-2.2 mm, against 1.85 in the type of *sapoensis*), somewhat greater palatal length, zygomatic and rostral breadths. However, the 7 rats between them show much variation, even two mammae formulae! As regards the colour of the belly they very distinctly show 2 groups. It may be possible that they do not belong to one close systematic unit, but I am unable to find any further characters, changing correspondingly to the belly colour and I therefore keep them together.

The type plus the 3 other ones of the same group (type a) are well densely haired (compact and longer than *R. rattus*). Fur of dorsal side consisting of woolly hairs (dark grey with ochraceous buff tips), few hard spines (whitish with black tips), intermixed with rather elongated bristles (black, sometimes light tipped at the sides). Belly with soft grey hairs, between which many harder ones with long light grey (whitish) tips. Chest buffy, middle line of chest and belly slightly darker, chin lighter. The type shows on head and chest some white hairs placed together. Tail black, \pm 9 rings per cm. Mammae in type and second ♀ $2 + 3 = 10$.

The other specimens (type b) are strongly suffused with buff or ochraceous buff over the whole ventral side. One of the ♀♀: $2 + 3 = 10$, the other: $1 + 3 = 8$.

Museum No.	Sex	Head & body	Tail	Hind foot	Ear	Skull: greatest length	Condylbasal length	Palatal length	Zygomatic breadth	Interorbital breadth	Length of nasals	Breadth of nasals	Diastema	Zygomatic plate	Pal. foramina, length	Pal. foramina, breadth	Upper toothrow
61/40 (a)	♀	208	178	36	22	45.6	42.1	24.7	22.6	7.0	17.3	5.8	12.2	5.6	8.3	3.3	7.2
47/40 (a)	♂	198	160	38	22	43.3	41.1	23.9	21.1	6.1	16.2	5.1	11.7	5.0	8.1	3.0	7.8
56/40 (a)	♀	170	152	36	20	40.0	36.7	21.2	18.8	5.7	14.5	4.3	10.2	4.1	7.4	2.7	7.2
57/40 (a)	♀	137	129	33	20	35.2	32.4	19.5	16.9	5.5	12.0	3.8	8.3	3.7	6.0	2.6	7.0
48/40 (b)	♀	206	195	35	21	46.2	44.8	26.1	22.6	7.2	16.4	5.3	13.6	5.7	9.1	3.3	7.3
60/40 (b)	♀	206	180	38	22	46.2	44.0	25.9	22.9	7.2	18.0	5.8	13.3	6.2	8.0	3.2	7.1
52/40 (b)	♂	210	162	36	24	43.9	41.2	24.3	21.6	6.4	16.4	5.5	11.8	5.6	8.0	3.3	7.2

Rattus elaphinus sp. n.

Type: ♂ ad., Taliaboe (plains), Soela islands, E. of Celebes. Coll. J. J. MENDEN, 23-X-1938. Buitenzorg Museum, No. 374/38. Specimens examined 12.

Characterized by the handsome, smooth rufous buff colour of the back, a very fine mixture of this colour with black. The dorsal fur is rather dense and moderately long, consisting of woolly hairs (grey with ochraceous buff tips, which make perfectly invisible the grey), between which, on whole back and sides, an abundance of longer piles, black, on the sides with light tips. No spines. Ventral side ochraceous grey, rather dark, sometimes flecked with castaneous, especially on chin and chest. Sometimes the ventral colour rather strongly

reminds *R. whiteheadi*. Tail black, rings 10-11 per cm. Mammae: pectoral 2 pairs (but anterior pair extremely difficult to discover), inguinal once 2 pairs.

Measurements of type: head and body 208; tail 183; hind foot 34; hind ear 20; skull: greatest length 49.0; occipitonasal length 49.0; condylobasal length 45.7; basal length 42.6; palatal length 27.2; zygomatic breadth 22.7; interorbital breadth 7.8; nasals 19.4×6.4 ; diastema 14.0; palatal foramina 9.4×3.4 ; zygomatic plate 5.5; length of bulla 7.2; upper toothrow 7.4 mm.

Tail in whole series 88 - 100 - 112 %. Teeth 7.1 - 7.46 - 8.0 mm.

***Rattus foramineus* sp. n.**

***Rattus foramineus foramineus* SODY.**

Type: ♀ ad., Boeloekoemba, S. Celebes. Coll. Raden AWIBOWO, 1-II-1937. Buitenzorg Museum, No. 20/37. Examined: 3 ♀♀, type locality; 1 ♂, Sinarassa, Makassar.

As for the skin there is a great likeness with *R. salocco* TATE & ARCO (on description). The only difference I can find is the colour of the tail, which is unicolorous dark (one of the specimens, No. 21/37, shows a very remarkable aberration: the dry skin distinctly shows that, beginning at the base, one fourth is dark, one fourth light, and the terminal one fourth dark again). But there are important differences in the skull. For *salocco* TATE points to the „very large bullae" (9.0, 9.5 mm). The 4 *foramineus* give 7.7 - 8.4. In many other respects, however, *foramineus* just gives larger measurements: hind foot 41 - 44 (in *salocco* 39, 39), zygomatic plate 4.4 - 6.6 (4.0, 4.3), length of nasals 17.0 - 19.0 (16.6, 16.7), upper toothrow 7.8 - 9.3 (7.9, 8.3) mm. Especially striking is the very long palatal foraminae: 9.5 - 10.8 (8.8, 9.0) mm.

Dorsal fur consisting of medium soft, fuscous hairs (17 mm) with long ochraceous buff tips, between which longer blackish hairs with light tips (length normally 35 mm, in the Sinarassa specimen exceeding 50 mm). Slender white hairs represent the spines. Ventral pelage white or slightly buffy. Transition from dorsal to ventral colour indistinct. Especially the ventral side is abundantly furnished with somewhat harder hairs, forming a rather striking characteristic of the species. Mammae $2 + 2 = 8$ (3 ×).

***Rattus foramineus pelurus* subsp. n.**

Type: ♀ ad., Poelau Peleng, E. of Celebes. Coll. J. J. MENREN, 19-VIII-1937. Buitenzorg Museum, No. 145/38. Examined 2, type locality.

Like *R. foramineus* typicus, but with bicolorous tail: basal 3/5 black, remainder white. Fur harder. On back the long hairs very abundant, sometimes reaching 50 mm. In the type a silver or golden shine lies on the back, caused by the much glittering, projecting tips of the hard hairs. By the much elongated bristles the animal is reminded of *xanthurus*, but a striking difference is formed by the less compact and much harder fur of the belly. Striking is furthermore the great height of the muzzle. Mammae: $2 + 2 = 8$ (2 ×).

Measurements:

Subspecies		Museum No.	Sex	Head & body	Tail	Hind foot	Ear	Skull: greatest length	Occipito-nasal length	Condyllo-basal length
1.	<i>foramineus</i> , type	20/37	♂	222	256	42	24	46.4	46.4	44.2
2.	"	21/37	♂	203	238	41	24	46.8	46.5	45.0
3.	"	22/37	♂	196	230	41	23	45.5	45.4	42.8
4.	" (<i>Sinarassa</i>)	2352	♂	211	219	45	23	50.3	50.3	49.0
5.	<i>pelurus</i> , type	145/38	♂	256	255	45	26	54.2	—	49.0
6.	"	146/83	♂	210	243	44	24	—	—	—

Basal length	Pal. length	Zygomatic breadth	Interorbital breadth	Breadth of muzzle	Length of nasals	Breadth of nasals	Diastema	Zygomatic plate	Length of bulla	Pal. foramina length	Pal. foramina breadth	Upper tooth-row
1. 41.2	24.4	23.5	6.6	8.6	17.0	5.3	12.9	4.4	7.6	10.2	3.3	8.2
2. 42.1	25.0	24.5	6.4	8.7	18.4	5.3	12.7	5.7	8.4	10.8	3.3	9.3
3. 39.9	23.1	22.0	6.3	8.7	17.0	5.4	12.5	5.1	7.7	9.5	3.3	7.8
4. 46.1	27.4	25.6	6.0	8.9	19.0	5.3	14.4	6.0	8.3	10.7	3.4	8.9
5. 46.1	—	± 30	6.8	± 10.7	21.7	7.0	14.5	5.8	—	± 10.8	± 4.0	± 9.5
6. —	—	—	6.8	9.8	± 18.1	5.4	± 12.5	4.3	8.4	—	± 3.6	9.2

Rattus toxi sp. n.

Type: ♀ ad., Wadjo, S.W. peninsula of Celebes. Coll. Controleur, 12-IV-1915. Buitenzorg Museum, No. 95/41. (Ex-stuffed specimen, labelled *Epimys celebensis* Gray).

The specimen is much discolored, but, apart from that, I cannot identify it with any of the known Celebes species. Back thinly but rather long haired. Fur consisting of woolly hairs, many long, not very hard spines and, especially on the hind parts of the back, a number of long bristles (up to 38 mm). Certainly the rather uniform rufous buff colour of the upper side is not the original one. Belly white, not sharply defined at the sides. Tail dark, with about 9 rings to the cm. Mammae: 2 + 3 = 10.

Measurements: head and body 22; tail 24 cm; hind foot 43 mm (all from dry skin); skull: greatest length 50.0; occipitonasal length 49.6; condylobasal length 48.5; basal length 45.4; palatal length 27.7; zygomatic breadth ± 23; interorbital breadth 6.7; nasals 19.3 × 5.2; diastema 13.5; palatal foramina 9.2 × 3.5; zygomatic plate 6.1; bulla 8.2; upper toothrow 8.1 mm.

The skull somewhat resembles that of *R. norvegicus*, but has the supraorbital ridges wider apart and not so parallel, different position and form of bullae, incisors more opisthodont. (Much different from *Taeromys celebensis*).

Rattus brachyrhinus TATE & ARCHB.

2, Baroka, Mekeo distr., C. Division, Br. Papua, 30 m. Teeth 7.1, 7.5 mm. (The measurements given by TATE are 7.3 - 7.83 - 8.3 (12)).

This rat (with mammae $3 + 3 = 12$) was placed by RÜMMLER as a subspecies of *R. gestri* ($2 + 3 = 10$), and the same he did with *R. vanheurni* ($3 + 2 = 10$). In my opinion there is no reason for uniting these very different rats into one polytypic species.

[Rattus vanheurni SODY.

Here a reply to TATE's remarks may find place. That author writes: „In spite of SODY's hesitation concerning the mammary count of *vanheurni*, there seems to be no reason to doubt its mammary formula ($2 + 3 = 10$). Perhaps SODY believed that it could be thrown in with the *concolor* group (formula $2 + 2 = 8$)". I must answer that I am quite certain that *vanheurni* does *not* belong to the *concolor* group, and the mammary formula, which I gave with some reserve, was not $2 + 3 = 10$, but $3 + 2 = 10$. The number of inguinal mammae is certainly 2 pairs only, there are certainly 2 pairs of pectoral ones (very low and quite near to each other), and *probably* a third pair, laid far in front.]

Rattus mordax (THOS.).

The mammary formula seems to indicate that the following forms should not be referred to *Stenomys*, contrary to RÜMMLER's opinion. For the same reason I do not bring the races to *leucopus*, but unite them under *mordax*. The mammary formula of *ringens* has been given as $1 + 2 = 6$ by THOMAS (Nova Guinea, XIII, 1922, p. 728).

Rattus mordax coenorum (THOS.).

6, Pionierbivak, 60 m; Prauwenbivak, 110 m; Hollandia; all N. New Guinea. Teeth: 7.6 - 8.07 - 8.4 mm (6). Mammae: $2 + 2 = 8$ ($2 \times$).

Rattus rattus tramitius (THOS.).

7, Doormanpadbivak, 1410 m, N. New Guinea. Teeth: 7.3 - 7.37 - 7.6 mm (4). Mammae: $2 + 2 = 8$ ($2 \times$).

Rattus rintjanus sp. n.

Type: ♂ ad., Lohoboeaja, Rintja, W. of Flores. Coll. Dr. J. K. DE JONG, 8-XI-1929. Buitenzorg Museum, No. 2405.

The fur seems to be abnormal by the large spininess and the sallow colours. Some naked spots prove that, before conservation, decay had set in.

Fur over whole body very abundantly furnished with spines, reaching 21 mm on the posterior part of the back. Between them few woolly hairs occur, which, moreover, are shorter than the spines. Especially on the posterior half of the back rather many long bristles (up to 50 mm).

General colour in the upper side light umber, on the head somewhat more bay, under side cream buff. The spines on the back are whitish with light umber tips, the woolly "underfur" grey, the long piles dark brown with light tips. On the belly the spines are light cream buff, the woolly hairs light grey. Hands and feet white. Whiskers partly white, partly blackish. Tail above fallow-dun, beneath white at base, becoming darker towards tip. Tailrings 7-8 per cm.

The teeth are very much worn, their structure cannot be well determined. As, apparently, the inner cusps of m^2 and m^3 , are not isolated, and the tail is very coarsely scaled it seems probable that a new genus shall have to be created for this species.

Measurements: head and body 200; tail 160; hind foot 40; ear 24; skull: greatest length 45.9; condylobasal length 42.9; basal length 40.0; palatal length 23.9; zygomatic breadth \pm 22; interorbital breadth 6.3; palatal breadth at roots of m^3 4.0; nasals 18.0×5.7 ; diastema 12.4; palatal foramina $9.5(?) \times 2.3$; zygomatic plate 6.1; length of bulla 8.2; upper toothrow 9.0; breadth of m^1 , crown, 2.7 mm.

Taeromys celebensis (GRAY).

We have only 4 specimens from 3 different localities: Amoerang and Tonsea, both N. Celebes; Wawo, Mengkoka, S.E. Celebes. There is variation (most striking are the small toothmeasurements of the Amoerang and Mengkoka specimens), but the series is too small for conclusions. Mammae: $1 + 2 = 6$.

Locality		Museum No.	Sex	Head & body	Tail	Hind foot	Ear	Skull: greatest length	Occipitonasal length
Temboan, N. Celebes		—	♂	215	295	51	—	48.7	48.3
" " "		—	♀	220	300	52	—	53.0	52.9
Distr. Tonsea, N. Celebes		338/38	♂	—	—	—	—	—	—
" " " "		346/38	♂	—	—	—	—	—	—
Amoerang, N. Celebes		1498	♂	—	—	45	—	47.1	46.2
Mengkoka Mts., S. E. Celebes		(802)	♂	200	276	42	27	49.4	49.1

Condylobasal length	Basal length	Palatal length	Zygomatic breadth	Breadth of braincase	Interorbital breadth	Length of nasals	Breadth of nasals	Diastema	Zygomatic plate	Pal. foramina, length	Pal. foramina, breadth	Upper toothrow
—	43.4	25.7	22.6	18.6	6.7	18.1	5.4	13.5	—	7.2	3.0	9.1
—	46.8	28.5	24.9	18.8	6.7	20.0	7.0	15.0	—	9.0	3.0	9.3
—	—	25.7	—	—	6.7	18.7	5.4	13.0	5.2	8.2	3.0	9.3
—	—	26.9	25.3	19.5	6.8	18.7	5.8	13.7	5.8	7.7	3.0	9.7
44.0	41.1	24.5	22.7	18.3	6.4	17.0	5.0	13.1	4.5	7.6	2.9	8.4
47.3	44.1	25.8	23.1	18.5	7.2	17.8	5.9	14.0	5.1	7.6	3.2	8.4

Taeromys dominator (THOS.).**Taeromys dominator dominator** (THOS.).

1, Manado; 5, Lola Tetawiran, both N. Celebes. Toothmeasurements in 25 specimens, N. Celebes: 9.4 - 9.95 - 11.0 mm. Taillength 24 specimens, N. Celebes: averagely 114 %.

A sixth specimen from Lola Tetawiran (No. 368/39), causes great difficulties. The skin tallies the others. At first sight the skull also seems to match, but, on a close inspection, it appears to show many important differences: shortened frontalia, lengthened parietalia, narrowed supraoccipitale, the lengthened anterior palatal foraminae posteriorly reach to the line connecting the anterior sides of m^1 , the posterior margin of the bony palate but little projects behind the posterior sides of m^3 , audital bullae differently shaped, upper incisors less opisthodont, breadth of zygomatic plate only 6.3, upper toothrow only 9.0 mm, etc. One may suspect an oversight in the combination of skin and skull, but, as far as I can see, the skull does not belong to any other Celebes species. I leave the specimen undetermined.

Taeromys dominator ursinus subsp. n.

Type: ♂ ad., Wawa Karaeng, Lompobatang, S. Celebes, 2200 m. Coll. G. HEINRICH, 15-IV-1931. Buitenzorg Museum, No. 92/41.

Like *R. dominator typicus* from N. Celebes, but with much longer and compacter fur, and not pure white below (especially on the middle of the chest the hairs have long grey bases). Tail 145 % (in 7 specimens from C. and S. Celebes, lowlands, 124 %). The skull differs by the anterior margin of the zygomatic plate sloping down steeply.

Measurements:

Subspecies	Locality	Museum No.	Sex	Head & body	Tail	Hind foot	Ear	Skull: greatest length
1. <i>dominator</i>	Lola Tetawiran	310/39	♀	275	297	52 ¹⁾	30	60.0
2. "	" "	306/39	♀	232	280	51 ¹⁾	28	55.5
3. "	" "	365/39	♂	236	298	54 ¹⁾	28	59.1
4. "	" "	326/39	♀	235	275	51 ¹⁾	28	55.3
5. "	" "	342/39	♀	232	261	52 ¹⁾	28	56.6
6. "	Minahassa	—	♀	214	249	48	25	55.5
7. "	"	—	♀	243	280	50	28	57.2
8. "	"	—	♀	210	250	49	26	54.7
9. "	"	—	♂	235	261	49	26	53.4
10. "	"	—	♀	262	288	52	31	59.6
11. "	"	—	♂	266	285	51.5	30.5	57.5
12. "	"	—	♂	255	277	49	29	59.7
13. <i>ursinus</i>	Wawa Karaeng	92/41	♂	218	317	48	24.5	54.8

¹⁾ Nail included.

Occipito-nasal length	Condylo-basal length	Basal length	Pal. length	Zygomatic breadth	Breadth of braincase	Interorbital breadth	Length of nasals	Breadth of nasals	Diastema	Pal. foramina length	Pal. foramina breadth	Zygomatic plate	Upper tooth-row
1.59.4	55.8	52.8	32.4	29.6	19.7	8.1	21.1	6.6	15.5	7.7	3.0	9.0	10.3
2.55.3	50.7	47.8	29.8	25.6	19.2	8.1	20.8	5.9	17.2	8.0	2.7	6.8	10.0
3.58.5	55.0	51.6	32.5	27.2	19.3	7.4	22.7	6.7	15.5	7.7	3.1	7.6	10.0
4.54.8	50.2	47.2	29.3	26.8	19.3	7.3	21.1	5.7	13.7	7.3	2.5	7.2	9.6
5.56.0	52.3	49.1	30.8	27.5	19.4	7.9	21.7	5.8	14.3	7.7	2.9	7.2	9.4
6.55.5	—	46.8	28.6	25.8	19.6	6.9	21.2	5.4	13.8	8.0	3.0	—	9.8
7.56.4	—	50.2	31.0	27.1	20.3	7.3	22.1	6.3	15.2	8.0	3.0	—	9.6
8.54.3	—	46.4	28.8	24.9	19.5	6.9	20.8	5.4	13.6	7.0	2.7	—	9.5
9.53.3	—	45.6	27.8	25.1	19.8	7.2	20.5	5.6	13.0	6.3	2.7	—	9.7
10.59.1	—	51.5	32.1	27.3	20.7	7.7	25.9	5.9	15.2	8.2	3.3	—	10.6
11.56.4	—	50.7	31.5	27.7	21.0	7.3	21.3	6.2	15.1	7.6	3.1	—	10.5
12.59.2	—	51.6	32.3	26.8	20.3	7.9	23.7	6.2	15.3	7.7	3.1	—	9.8
13.54.8	50.5	47.4	29.6	26.1	19.0	7.1	22.1	5.6	14.3	7.8	3.0	6.3	9.7

Taeromys xanthurus (THOS.).

14, Mapanget; 6, Tomohon; 1, Goenoeng Kaoedoean, Tongkoerareanan, West-kali, all N. Celebes. Teeth: 7.8 - 8.29 - 8.9 mm (27). Tail 128 % (29). Mammæ: 1 + 2 = 6.

All caught in forest or in coconut garden. A ♀, 13-IX-1939, with 2 embryos.

Taeromys paraxanthus sp. n.

Type: ♂ ad., Toelap West, Tonsealama, Tonsea distr., N. Celebes. Coll. J. W. VAN BRAEKEL, 1938. Buitenzorg Museum, No. 341/38.

Skin hardly distinguishable from *T. xanthurus*: fur a little compacter, colour a trifle more buff (especially on sides of head), the dark basal part of the tail 1/2 of the whole length (*xanthurus* maximum 2/5). Like in *xanthurus* the piles are excessively elongated (up to 72 mm). But skull largely different: upper toothrow 10.3 mm (maximum in *xanthurus* 8.9), breadth of m¹ 3.0 (*xanthurus* 2.6). By the largeness of the teeth resembling *Lenomys*, but the palate is not especially narrowed. Upper toothrow rather strongly converging anteriorly, spreading posteriorly.

Measurements of type: head and body 22 1/2; tail 28 1/2 cm; hind foot 47 mm (all taken from dry skin); skull: greatest length ± 51 1/2; palatal length 28.1; zygomatic breadth 25.2; interorbital breadth 7.1; nasals 21.3 × 5.7; diastema 14.0; palatal foramina 8.6 × 3.2; zygomatic plate 6.0; upper toothrow 10.3 mm.

Taeromys tatei sp. n.

Type: ♂ ad., Toelap West, Tonsealama, Tonsea distr., N. Celebes. Coll. J. W. VAN BRAEKEL, 25-VIII-1938. Buitenzorg Museum, 340/38.

A rather dark, long furred rat, below somewhat lighter than above by the long grey tips of the belly hairs. Back with woolly hairs (up to 20 mm in length,

dark grey at bases, subterminally slightly brownish, tips light buff) and rather many piles (up to 30 mm, black). Belly with woolly hairs (grey) and very many slightly thicker, longer and straighter ones (dark grey over basal half, light grey, slightly buffy, over terminal half). General colour effect almost as in *Arcuomys arcuatus*, but with back finely speckled; probably very much like *R. hamatus*. Hairs on back of hands and feet dark brown, but near and on the fingers and toes white. Tail black over basal $\frac{1}{3}$, rest white. In the dried skin the very developed penis has a length of 13½ mm. In the second specimen (a ♀, though labeled ♂) there is a strange scrotum-like development round the anal region. Mammae: pectoral 1, inguinal probably 2 pairs.

Measurements of type and ♀: head and body 23, 24; tail 21, 22 cm; hind foot 43½, 43½ mm (all from skins). Skulls: palatal length 22.8; 22.5; ante-orbital notch to end of premaxilla 17.7, 17.7; zygomatic breadth ± 21.2, 23.0; braincase 17.0, 18.3; interorbital breadth 6.3, 6.7; nasals 17.1 × 5.0, 17.7 × 5.0; diastema 11.8, 13.7; palatal foramina 7.6 × 3.0, 9.0 × 3.6; zygomatic plate 4.0, 4.5; upper toothrow 8.2, 8.4; m¹ 4.1 × 2.3, 4.2 × 2.5 mm.

The only species with which exact comparison seems to be desirable, is *R. hamatus*, from which our species differs in the following points: anteorbital plate *not* extending well forward "about as in *R. norvegicus*" (MILLER & HOLLISTER), rostrum not "long, much longer than in *norvegicus* and *rattus*", supra-orbital ridges very distinct over frontals and anterior half of parietals, upper toothrows not especially converging anteriorly (distance m¹-m¹ 4.2; m³-m³ 4.5 mm), m¹ not especially elongated, incisors not opisthodont.

Taeromys(?) marmosurus (THOS.).

1, Tomohon; 1, Mapanget, both Minahassa, N. Celebes.

It must be admitted that these specimens clearly deviate from the description of the type and of the specimens from Manado in my own collection, as far as I can judge from remembrance. They are not „cinnamon brown”, but grey, with short buff tips of the grey woolly hairs and the black bristles. The fur is also shorter. Moreover, the Museum contains 1 specimen, Mamasa, Toradjalanden, which is brown above and possesses very long bristles (> 50 mm), and which also does not match the description. I suppose the latter specimen to represent a new race.

Measurements:

Locality	Museum No.	Sex	Head & body	Tail	Hind foot	Ear	Skull: grea- test length	Occipito- nasal length
1 Manado, N. Celebes	—	♂	214	245	38	20	46.7	46.6
2 " " "	—	♂	206	234	38	20	43.6	43.6
3 Tomohon, N. Celebes	323/39	♂	160	220	37	22	39.2	39.2
4 Mapanget, " "	307/39	♀	161	230	38	17	41.4	41.2
5 Mamasa, Toradjalanden	408	♀	—	—	(36)	—	—	—

	Condylo- basal length	Basal length	Palatal length	Zygomatic breadth	Interorbital breadth	Length of nasals	Breadth of nasals	Diastema	Zygomatic plate	Pal. forami- na, length	Pal. forami- na, breadth	Upper toothrow
1	—	40.5	23.7	20.7	6.3	18.0	5.4	12.7	—	9.0	3.2	7.4
2	—	39.4	—	19.3	6.3	16.8	5.3	12.1	—	8.3	2.9	7.0
3	36.8	33.5	19.9	18.7	6.4	13.1	4.0	10.0	3.3	7.7	2.9	7.3
4	39.0	36.2	20.3	19.5	5.9	14.9	4.8	10.6	3.8	7.1	2.7	7.1
5	—	—	21.8	—	—	15.6	4.1	10.9	4.1	8.0	—	7.4

Taeromys(?) bontanus (THOS.).

1, Wawa Karaing, Lompobatang, S. Celebes, 2500 m.

Measurements (♂): head and body 207; tail 268; hind foot 45; ear 23; skull: greatest length 46.3; occipitonasal length 45.8; condylobasal length 45.1; basal length 41.8; palatal length 24.4; zygomatic breadth 23.9; interorbital breadth 6.3; nasals 17.1 × 4.7; diastema 12.4; palatal foramina 10.2 × 2.8; zygomatic plate 5.3; length of bulla 8.5; upper toothrow 9.3 mm.

Arcuomys arcuatus (TATE & ARCHB.).

1, Tanka Salokko, Mengkoka Mts., S.E. Celebes, 1500 m. Teeth 8.9 mm.

Mollicomys hoffmanni (MATSCHIE).

Mollicomys hoffmanni hoffmanni (MATSCHIE).

25, N. Celebes (Amoerang, Mapanget, Tomohon, Lola Tetawiran, Tonsca, Boemboelan). Teeth 7.4 - 7.89 - 8.4 mm (45). (For the type HOFFMANN gave 8.6 mm!).

Mollicomys hoffmanni linduensis (MILL. & HOLL.).

8, Mamasa, Toradjalanden. Teeth 7.0 - 7.33 - 7.6 mm (6). Smaller and more warmly colored than *hoffmanni* typicus. In my own collection 3 paratypes, Boembaroedjaba and Pinedapa: 7.4 - 7.70 - 7.9 mm (3).

Mollicomys hoffmanni mengkoka (TATE & ARCHB.)

2, Mengkoka Mts., 550 m. The only differences from *hoffmanni* typicus given by the authors, are the narrow zygomatic plate and rather shorter toothrow. Both characters seem incorrect. In our paratypes the teeth measure 7.6, 8.0 mm. Together with 3 specimens of TATE: 7.6 - 7.98 - 8.4 (5). Also the zygomatic plate is not narrower, nor do I see any other difference.

[Rattus chrysocomus (HOFFMANN).

There is 1 specimen, Mamasa, Toradjalanden, C. Celebes, belonging to a series of 9, which, in 1921, has been sent to THOMAS for determination. This one specimen (the only one of the series lacking a skull) was provided by him with the name *Rattus chrysocomus*, and in Treubia, II, 1921, p. 111, he wrote: "1

♀, Toradjalanden, Mamasa. In his large paper on the mammals of Celebes Dr A. B. MEYER has reduced both *chrysocomus* and *fratrorum* to synonyms of *R. callitrichus* JENT., but all these are perfectly distinct, differing considerably in size and having quite appreciable diagnostic skull characters". This certainly is correct (as I was able to control when studying the type of *Mus chrysocomus* at the Dresden Museum), but I do not see any reason to bring this one Mamasa skin (without skull) to *chrysocomus*. I think it to be a young *R. hoffmanni*, to which also the other specimens belong (though they were „determined" by THOMAS as *R. neglectus*!). For measurements of the type see under *Frateromys brevimolaris*.]

Frateromys fratrorum (THOS.).

24, N. Celebes (Manado, Amoerang, Tomohon, Mapanget, Lola Tetawiran, Tonsea. In my own collection 52, Manado, Tondano, Sikeles. Type locality: Roeroekan, 3500 feet).

Up till now only 2 specimens of this very common rat have been described (THOMAS, A.M.N.H., 6-XVIII, 1896, p. 246; MATSCHIE, Abh. Senck. Nat. Ges., XXV, 1900, p. 286). Some corrections and addenda are necessary.

According to THOMAS the fur is of median length (altitude 3500 feet). In my series the length of the common hairs goes up to 15 mm, which certainly may be called long. THOMAS says: "without longer bristles intermixed". But there are fine, longer bristles, especially on the posterior part of the back, reaching 23 mm. Sometimes, however, they are short and may be easily overlooked (though recognizable in colour). THOMAS calls the dorsal fur "finely sprinkled with dull yellowish". I should say that the normal hairs on the back are finely yellow-tipped, the bristles are wholly black. THOMAS' "head rather paler" (than back) does not apply to my material. Whilst for the tail THOMAS gives "about 11 scales to the cm", I find some 15. The length of the dark part of the upper side varies from $\frac{1}{2}$ to nearly the whole length of the tail. Of the parietal foraminae THOMAS says "not reaching back to level of m^1 "; sometimes, however, they do so. These discrepancies are all of minor importance. More serious is, that, for the length of the nasalia, THOMAS gives 19.4 mm. In our series the maximum is 19.1. MATSCHIE's "weisse" and "nur auf der Oberseite bis zu $\frac{2}{3}$ der Länge dünn und durchsichtig dunkelbehaarter Schwanz" is quite wrongly described. The whole tail is shortly but well haired, dark on the dark, white on the white part. It must be observed that the picture of *Mus callitrichus*, given by MEYER (A. B. Mus. Dresden, VII, 7, 1899, Pl. VII, 1) not at all "recht gut *fratrorum* könnte darstellen", whilst the picture of the skull of *M. chrysocomus*, given by HOFFMANN (A. B. Mus. Dresden, 1886-87, No. 3, 1887, fig. 1) does not deserve consideration for a comparison of the bullae, as this skull was broken there. Mammae $0 + 2 = 4$.

Variation: the dorsal side somewhat varies in darkness and on the ventral side the tips of the hairs are sometimes more whitish, sometimes clearly

yellowish. Only 2 specimens strikingly differ by being much browner above and below. Furthermore there may occur *patches* in the fur:

- a. small white patch on the head (30 of the 76 specimens: 19 ♂, 10 ♀, 1 ?)
- b. white pectoral patch (1 ♂, 1 ♀)
- c. fine darkbrown patches on ventral side (1 ♂, 4 ♀), certainly due to some outside chemical influence.

The skull varies in the degree of pointedness of the nasals (commonly tapering anteriorly, exceptionally slightly blunt).

Measurements: In 74 specimens the teeth give 7.3 - 7.77 - 8.2 mm (39 ♂♂: 7.3 - 7.84 - 8.2; 34 ♀♀: 7.3 - 7.69 - 8.2), variation 12 %. Greatest length of skull 35.0 - 46.2, variation 31 %. Relative taillength 77 - 94 - 116 % (60).

Frateromys brevimolaris (TATE & ARCHB.).

2, Lalolis, S.E. Celebes, 300 m.

TATE & ARCHBOLD say that "when the type of *chrysocomus* is restudied it may be found that our *brevimolaris* will fit in with it". Indeed I can find only one difference: *brevimolaris* has a bicolored tail; in my notes on the type of *chrysocomus* I read that the tail of that specimen is black. For this reason I maintain TATE & ARCHBOLD's name unchanged.

In my own collection is a specimen from Boeton, which wholly fits in with these both specimens. Mammae 0 + 2 = 4.

Measurements (together with those of the type of *chrysocomus*: external measurements from HOFFMANN, skull measurements taken by me):

Locality	Museum No.	Sex	Head & body	Tail	Hind foot	Ear	Skull : greatest length	Occipitonasal length	Condylonasal length	Basal length
1 Lalolis S. E. Celebes	(631)	♂	149	149	33	17	—	—	—	—
2 " " " "	(636)	♂	150	146	32	20	—	—	—	—
3 Boeton	—	♂	134	120	30.5	22.5	37.1	36.6	34.1	32.1
4 Type <i>chrysocomus</i>	—	♂	175	125	32	—	± 39.5	—	—	—

Pal. length	Zygomatic breadth	Breadth of braincase	Interorbital breadth	Length of nasals	Breadth of nasals	Diastema	Zygomatic plate	Pal. foramina, length	Pal. foramina, breadth	Length of bulla	Upper toothrow	Crown m ¹ , length	Crown m ¹ , breadth
1 20.5	—	—	6.3	15.8	4.2	11.3	2.8	6.6	2.6	7.2	6.3	3.1	2.2
2 20.0	—	—	—	15.1	4.0	10.7	—	6.8	—	7.0	6.8	3.3	2.2
3 18.4	18.8	15.3	6.0	14.4	3.8	9.4	2.9	6.4	2.4	7.0	6.3	3.2	2.2
4 20.0	± 18.6	15.3	6.2	15.7	4.1	10.5	3.1	6.2	2.3	—	6.8	3.6	2.2

Frateromys(?) penitus (MILL. & HOLL.).

Frateromys penitus penitus (MILL. & HOLL.).

2, Tanko Salokko, Mengkoka Mts., S.E. Celebes, 1500 m. Teeth 7.6, 7.7 mm.

Frateromys penitus inferior (TATE & ARCHB.).

2, Wawo, Mengkoka Mts., S.E. Celebes, 50 m. Teeth 7.7, 8.0 mm.

Differing from *penitus typicus* by coarser fur and lighter colour. Perhaps the teeth are larger.**Frateromys penitus heinrichi** (TATE & ARCHB.).

2, Lombasang, Lompobatang, S. Celebes, 1100 m. Teeth 7.3, 7.7 mm.

In structure of fur and colour I cannot see differences from *penitus typicus*, but the rostrum seems to be narrower.**Lenomys meyeri** (JENTINK).

2, Amoerang; 1, Tomohon, both N. Celebes.

The Amoerang specimens show such an enormous difference in colour from that of Tomohon, that we must think at different races.

Measurements (including 1 Manado specimen in my own collection):

Locality	Museum No.	Sex	Head and body	Tail	Hind foot	Ear	Skull: greatest length	Occipitonasal length	Condylbasal length	Basal length	Palatal length	Zygomatic breadth	Ineorbital breadth	Length of nasals	Breadth of nasals	Diastema	Pal. foramina, length	Pal. foramina, breadth	Upper tooth, length
Manado	—	♀	226	250	44	24	51.2	51.2	—	44.5	27.0	25.0	7.2	19.4	5.0	12.4	7.3	3.3	11
Amoerang	384	♂	—	—	(40)	—	45.0	44.5	—	—	24.3	23.0	7.5	17.2	5.4	11.0	7.1	3.0	12
"	—	♀	—	—	(44)	—	55.6	55.3	53.3	50.2	30.1	28.5	8.0	22.0	6.3	15.0	8.1	3.0	12
Tomohon	346/39	♂	263	236	(44)	—	48.3	47.8	46.3	43.2	25.8	25.0	7.7	18.3	5.4	11.4	7.3	3.1	11

Echiothrix leucura GRAY.

4, Toelap West, Tonsealama, Tonsea distr., N. Celebes.

Measurements (including 5 specimens in my own collection):

Locality	Museum No.	Sex	Head and body	Tail	Hind foot	Ear	Skull: greatest length	Occipitonasal length
1. Toelap West	352/38	♂	—	—	—	—	—	—
2. " "	359/38	♂	—	—	—	—	55.6	54.6
3. " "	360/38	♂	—	—	—	—	56.0	55.2
4. " "	538/38	♀	—	—	—	—	—	54.8
5. Tondano	—	♂	224	211	94	46.5	54.2	53.7
6. "	—	♂	208	242	116	50	53.7	52.7
7. "	—	♀	235	—	—	50	56.3	54.9
8. "	—	?	164	191	116	44	48.1	47.9
9. Temboan	—	♀	225	260	116	53	56.0	54.7

	Condylobasal length	Basal length	Palatal length	Zygomatic breadth	Breadth of braincase	Interorbital breadth	Length of nasals	Breadth of nasals	Diastema	Pal. foramina, length	Pal. foramina, breadth	Upper toothrow
1.	—	—	31.3	—	20.3	8.1	23.7	4.2	19.7	10.0	3.7	7.0
2.	53.1	—	29.9	24.9	19.9	7.6	24.4	4.6	19.8	9.4	3.6	7.0
3.	52.2	48.2	31.0	24.3	19.9	7.9	24.0	4.1	19.7	9.6	3.3	7.0
4.	—	—	31.8	25.2	19.4	7.4	23.5	4.2	20.7	10.3	3.8	7.2
5.	—	47.9	30.5	23.6	18.9	7.2	23.5	3.8	18.9	9.2	3.2	7.2
6.	—	46.7	29.1	23.3	19.3	7.4	23.8	4.0	18.4	9.5	3.2	7.0
7.	—	50.5	31.9	24.4	18.6	7.2	25.1	4.3	20.2	10.4	3.6	7.4
8.	—	41.3	26.5	20.3	18.3	7.2	20.0	3.9	16.1	8.1	2.8	7.3
9.	—	49.6	31.1	24.1	19.5	7.8	24.3	4.5	19.3	9.5	3.3	7.6

Haeromys minahassae (THOS.).

1, Tomohon, N. Celebes.

Measurements of this specimen, THOMAS' type, and 2 Minahassa specimens in my own collection:

	Museum No.	Sex	Head and body	Tail	Hind foot	Ear	Skull: greatest length	Occipitonasal length	Basal length	Palatal length	Zygomatic breadth	Breadth of braincase	Interorbital breadth	Length of nasals	Breadth of nasals	Diastema	Length of pal. foramina	Upper toothrow
Type	—	♀	77	—	20	—	—	—	18.6	—	12.3	11.8	3.8	7.1	2.5	6.1	2.9	3.2
Manado	—	♂	78	126	19	15	—	—	—	11.3	12.4	11.7	3.9	7.6	2.0	6.0	3.1	3.3
"	—	♀	72	130	19	14	23.8	23.8	19.8	12.0	12.4	11.4	4.0	7.6	2.0	6.3	3.5	3.3
Tomohon	373/39	♂	70	140	19	16	23.9	23.9	19.6	11.7	12.4	11.6	4.1	7.7	2.2	6.2	2.9	3.3

Melomys moncktoni (THOS.).

Melomys moncktoni rubex (THOS.).

75, Doormanpadvivak, N. New Guinea, 1410 m, Teeth 6.3 - 6.71 - 7.2 mm (80).

Maximum skull length 35.5 mm. Mammae: 0 + 2 = 4.

The collector (W. C. VAN HEURN) mentions that he never found more than 2 embryos. Very common in the moss-wood.

Melomys moncktoni fuscus RÜMMLER.

3, Prauwenbivak (Idenburg River); 4, Pionierbivak (Mamberamo River), N. New Guinea. Teeth 6.7 - 6.92 - 7.2 mm (6).

The 3 largest specimens have skull lengths of 36.9, 37.7, 38.3 mm. Mammae: $0 + 2 = 4$. My *mamberamus* is a synonym of *fuscus*.

One specimen lived in a hole in the side of a trench in the wood (VAN HEURN).

Melomys moncktoni tafa TATE & ARCHB.

1, Mt. Tafa, 2450 m; 1, Murrae Pass, Ere Creek, 2860 m, both Br. Papua. Teeth: 6.5, 6.6 mm. Mammae: $0 + 2 = 4$.

Melomys rufescens (ALSTON).**Melomys rufescens rufescens** (ALSTON).

2, Prauwenbivak (Idenburg River); 9 Pionierbivak (Mamberamo River), 30 m, N. New Guinea; 1, Wataikwa River, 700 feet. Teeth: 6.1 - 6.46 - 6.7 mm (11).

Greatest skull measurement 35.3. Two specimens with skulls of 28.2 and 28.3 have the posterior molars just erupting. Mammae $0 + 2 = 4$.

Some specimens were caught in the forest, others "in house". At Prauwenbivak they were a pest in the store-houses.

Melomys levipes (THOS.).**Melomys levipes rattoides** THOS.

3, Pionierbivak (Mamberamo), 30 m, N. New Guinea. Teeth 8.2 - 8.58 - 9.1 mm (4).

Greatest skull length 47.2 (type 48.5) mm. Young animal, with skull of 37.9, has already complete molars. Mammae $0 + 2 = 4$.

Caught in forest.

Melomys leucogaster (JENTINK).**Melomys leucogaster talaudium** (THOS.).

There are 7 specimens from the Talaud islands: 3, Liroeng; 3, Beo, Karakelong, Talaud; 1, "Talaud islands". I studied them to find out which is the relation between *talaudium* THOS., 1921, and *caurinum* THOS., 1921, from both of which we possess 2 paratypes. I come to the conclusion that they form one race, *talaudium*. Though both names were given in 1921, THOMAS did not compare both "species" and gives no differences. RÜMMLER (Mitt. Z.M. Berlin, XXIII, 1938, p. 107 - 109) studied the types (in British Museum, ex Buitenzorg Museum). The only difference he mentions is the longer tail of *talaudium*, but it may be remarked that both types miss external measurements, taken before skinning. The same is the case with our paratypes. There is difference in colour: the *caurinum* paratypes are distinctly darker. But this difference is upset by their origin: the *talaudium* specimens are both from Liroeng; one of the *cau-*

rinum paratypes (with same date of collecting as the type and thus certainly also a topotype) is from "Talaud islands", the other from *Liroeng*, that is: the type locality of *talaudium*! So the difference in colour may be neglected. The 3 further Talaud specimens are as light as the *talaudium* paratypes from *Liroeng*. Mammæ: 0 + 2 = 4.

Measurements (including those of THOMAS' types of *talaudium* and *caurinum*. Measurements in parenthese taken from the dry skin):

Locality		Museum No.	Sex	Head & body	Tail	Hindfoot	Ear
1	Liroeng (Type of <i>talaudium</i>)	—	♂	(145)	(190)	(31)	—
2	"	411	♀	—	—	(31.5)	—
3	"	410	♀	—	—	(29)	—
4	Beo, Karakelong	1490	♀	174	—	(30.5)	15
5	"	1491	♀	—	180	(30.5)	16
6	"	1492	♀	172	183	(31.5)	13
7	"Talaud islands" (Type of <i>caurinum</i>)	—	♂	(176)	(137)	(30)	(15)
8	"	413	♂	—	—	(29)	—
9	Liroeng	412	♀	—	—	(25)	—

Skull: greatest length	Occipitonasal length	Condylbasal length	Basal length	Palatal length	Zygomatic breadth	Interorbital breadth	Length of nasals	Breadth of nasals	Diastema	Pal. foramina, length	Pal. foramina, breadth	Upper toothrow
1 39.5	—	37.8	—	—	21	6.2	—	—	—	6.3	—	7.3
2 39.5	38.7	37.8	35.0	21.0	20.7	6.1	13.4	4.5	11.2	6.5	2.4	7.7
3 37.0	39.6	36.0	33.0	20.1	18.3	6.0	12.8	4.3	10.1	5.6	2.2	7.8
4 39.9	39.9	37.8	35.2	20.8	21.0	6.8	13.0	4.9	11.7	5.0	2.4	7.5
5 37.1	36.3	37.0	33.8	20.1	19	5.7	13.5	4.2	10.4	6.2	2.4	7.3
6 38.7	38.2	36.8	33.5	20.4	19.6	6.2	13.7	4.1	10.7	6.1	2.4	7.4
7 39	—	—	—	—	—	6.7	—	—	—	5.4	2.6	8
8 —	—	34.2	31.1	18.8	18.1	6.3	—	—	9.6	4.4	2.4	7.5
9 ± 31	—	28.2	25.8	15.8	16.1	5.9	10.1	3.6	7.7	4.1	2.0	7.5

One of the Beo-labels reports "from forest", another "from tree".

***Stenomys niobe* (THOS.).**

***Stenomys niobe niobe* THOS.**

2, Mt. Tafa, 2400 m, Br. Bapua, C. Division. Tooth 5.6, 5.7 mm. Mammæ: 1 + 2 = 6.

***Stenomys niobe arrogans* (THOS.).**

3, Doormanpadbivak II, 2400 m. Teeth 5.6 - 6.00 - 6.3 mm (3).

Greatest skull length 34.5 mm. Mammæ: 1 + 2 = 6.
In dense moss-forest (VAN HEURN).

***Uromys caudimaculatus* KREFFT.**

***Uromys caudimaculatus validus* PET. & DOR.**

2. Oriomo River, Dagwa, Br. Papua, W. Division. Teeth 11.8, 12.1 mm.

***Uromys caudimaculatus siebersi* THOS.**

1, Gn. Daab, Great Kei. Paratype.

Measurements: head and body 250; tail 218; hind foot 47; ear 22; skull: greatest length 59.9; occipitonasal length 59.9; condylobasal length 56.9; basal length 53.4; palatal length 34.9; zygomatic breadth 31.8; interorbital breadth 10.5; nasals 21.8 × 9.0; diastema 18.0; palatal foramina 7.5 × 2.9; zygomatic plate 8.5; upper tooththrow 11.3 mm. Mammæ 0 + 2 = 4.

***Papagomys* gen. n.**

Type species: *Mus armandvillei* JENTINK.

By size and other characteristics much resembling *Mallomys*, of which no specimen is available, but there are good descriptions (a.o. THOMAS, Nov. Zool., V, 1898, p. 1) and figures (JENTINK, Nova Guin., IX, 2, Zool., 1911. Pl. VII, d; RÜMMLER, Zeitschr. Säug., VIII, 1933, p. 97, and Pl. XIV, 4; ROTHSCHILD & DOLLMAN, P.Z.S., 1933, Pl. IV, 7, 8, 9; RÜMMLER, Mitt. Z.M. Berl., XXIII, 1938, Pl. II, 2. Of *M. armandvillei* there exist figures in WEBER, Zool. Erg., II, 1892, Pl. V, 1-7).

Skull differing from *Mallomys* by lacking the broad convex inflation of the anterior interorbital region and the concavity behind it. Parietal and supra-orbital ridges very heavy and nearly passing on to the lachrymal. Inner cusps of the upper molars equal in number to *Mallomys* and clearly isolated, with the exception, however, of the posterior two of m^3 , whilst also the outer cusps are rather strongly connected with the central ones. The last lamina of m^1 shows a distinct external cusp. The difference in design of the lower molars from JENTINK's figure (1911) is also very large. The anterior lamina of m_1 shows 2, nearly equal cusps, the posterior lamina of m_3 forms one broad undivided edge, etc. JENTINK's figures of the teeth (1892) are very good.

***Papagomys armandvillei* (JENTINK).**

3, Mboera and Roeteng, W. Flores.

Measurements:

Museum No.	Sex	Head & body	Tail	Hind foot	Ear	Skull: greatest length	Occipitonasal length	Condylobasal length	Basal length	Pal. length	Zygomatic breadth	Interorbital breadth	Length of nasals	Breadth of nasals	Diastema	Pal. foramina length	Pal. foramina breadth	Upper tooththrow
99	♂	—	—	—	—	75.7	75.7	73.2	68.4	42.1	38.6	9.3	29.1	7.4	21.3	10.9	4.3	15.7
2394	♂	422	345	90	41	77.7	77.3	75.2	—	42.6	41.9	7.9	29.2	9.1	21.6	14.0	4.1	16.1
2395	♂	435	360	95	44	81.7	81.7	77.5	72.8	44.5	40.6	9.0	32.1	9.5	23.8	14.9	4.1	15.0

VII. ALPHABETICAL INDEX.

✓ <i>Acanthomys</i>	258	<i>caraco</i>	284	<i>Gerbillus</i>	258
<i>adustus</i>	262, 276	✓ <i>Carpomys</i>	258	<i>gestri</i>	260, 310
<i>alticola</i>	298	<i>caudimaculatus</i>	322	<i>Geromys</i>	260
✓ <i>Anisomys</i>	258	<i>caurinum</i>	320	<i>gliroides</i>	302
<i>anna</i>	302	<i>celebensis</i>	260, 311	<i>Golunda</i>	258
✓ <i>Annomys</i>	258	<i>chasei</i>	268, 269	<i>gracilis</i>	259
<i>aquaticus</i>	284	<i>Chiomyscus</i>	258	<i>greyi</i>	261
<i>arcuatus</i>	260, 315	<i>Chiropodomys</i>	258, 302	<i>griseiventer</i>	263, 265
✓ <i>Arcuomys</i>	260, 315	<i>Chiruromys</i>	258	<i>griseogenus</i>	305
<i>argentiventer</i>	262, 268	✓ <i>Christomys</i>	260	<i>Gunomys</i>	258, 259, 301
<i>argyraceus</i>	270, 275	<i>Chrotomys</i>	258	<i>Gymnomys</i>	260
<i>armandvillei</i>	322	<i>chrysocomys</i>	315, 317	<i>Haeromys</i>	258, 319
<i>arrogans</i>	321	<i>ciliatus</i>	300	<i>Hapalomys</i>	258
✓ <i>Arvicola</i>	258	<i>Cironomys</i>	260, 300	<i>heinrichi</i>	318
<i>asper</i>	298	<i>clabatus</i>	278	<i>hellwardi</i>	259, 305
<i>atchinensis</i>	295	<i>coenororum</i>	310	<i>hibernicus</i>	284
<i>aureus</i>	264, 266	<i>concolor</i>	261, 277, 278, 279	<i>hidongis</i>	292
<i>babi</i>	262	<i>coritzae</i>	299	<i>hoffmanni</i> (M) ..	260, 315
<i>bagobus</i>	260	<i>cremoriventer</i>	294	<i>hoffmanni</i> (R.) ..	284, 286
<i>bali</i>	268, 269	<i>cretaceiventer</i>	294	<i>hoogerwerfi</i>	260, 300
<i>baluensis</i>	260, 288	<i>crociduroides</i>	303	<i>Hydromys</i>	258
<i>bandahara</i>	293	<i>Cyromys</i>	258	<i>Hyomys</i>	258
✓ <i>Bandicota</i>	258, 301	<i>decumanoides</i>	284	<i>indica</i>	301
<i>bartelsii</i>	300	<i>decumanus</i>	284	<i>inferior</i>	318
<i>barussanoides</i>	276	<i>delirius</i>	270, 274	<i>inflatus</i>	294
<i>batamanus</i>	298, 299	<i>diardi</i>	262, 263, 264	<i>infraluteus</i>	290
<i>batin</i>	270	<i>dominator</i>	312	<i>Insulaemus</i>	258
<i>baturus</i>	296, 298	<i>doriae</i>	260	<i>insularis</i>	304
<i>batus</i>	299	<i>ducis</i>	270	<i>jacobsoni</i>	296, 297
<i>bengalensis</i>	259, 301	<i>Echiothrix</i>	258, 318	<i>jalorensis</i>	270, 271
<i>besuki</i>	296, 297	<i>edwardsi</i>	300	<i>jarak</i>	270, 271
<i>biformatus</i>	306	<i>elaphinus</i>	307	<i>javanus</i>	284, 285
<i>blanfordi</i>	260	<i>Eliomys</i>	258	<i>jerdoni</i>	294, 297
<i>bontanus</i>	315	<i>ephippium</i>	278, 279	<i>kandiyanus</i>	270, 276
<i>borneanus</i>	289	<i>equile</i>	282, 283	<i>kathleenia</i>	258, 261
<i>brachyrhinus</i>	310	<i>eurous</i>	278, 280	<i>kina</i>	294
<i>brevicaudatus</i>	268	<i>foramineus</i>	308	<i>klossi</i>	298
<i>brevimolaris</i>	260, 317	<i>fraternus</i>	295	<i>koratis</i>	294
<i>browni</i>	282	✓ <i>Frateromys</i>	260, 316	<i>kunduris</i>	270, 272
<i>brunneus</i>	284	<i>fratrorum</i>	260, 316	<i>lalawora</i>	305
<i>brunneusculus</i>	284	<i>fredericae</i> (M.)	287	<i>lamucotanus</i>	270, 272
<i>bukit</i>	296	<i>fredericae</i> (R.) ..	295, 296	<i>larusius</i>	270, 274
✓ <i>Bunomys</i>	258	<i>fulvus</i>	258, 261	<i>lasiae</i>	262
<i>buruensis</i>	278, 281	<i>fusca</i>	284	<i>lassacquerei</i>	282, 283
✓ <i>Caelomys</i>	258	<i>fuscus</i>	320	<i>Leggada</i>	258, 287
<i>campus</i>	288	<i>generatius</i>	270, 274		
✓ <i>Canomys</i>	258				
<i>canus</i>	300				

Leggadilla	258, 259	musschenbroekii	305	ravus	293
Lenomys	258, 318	Mycteromys	303	rhionis	270, 271
Leptomys	258			Rhizomys	258, 304
lepturus	295, 296	natunae	293	ringens	310
leucogaster	320	neglectus	263, 265	rintjanus	310
leucopus	310	negrinus	282	rogersi	260
leucura	318	Nesokia	258	roquei	270, 273
levipes	320	niobe	321	rubex	319
lieftincki	297	norvegicus	284, 285	rufescens (M.)	320
linduensis	315	Notomys	258	rufescens (R.)	262
Lorentzimys	258	Nyctocleptes	258		
lugens	262, 263, 276			sabanus	290
luxuriosus	270, 272	obiensis	264, 268	samati	264
		obscuratus	300	santalum	264, 265
macleari	260	Octomys	261	sapoensis	306
macropus	260	Octopodomys	261	saturnus	268, 269
maculipectus	295, 296	otteni	278, 281	schuitemakeri	278, 280
Madromys	260	ouwensi	287	sebesianus	270, 273
maerens	263, 266			septicus	264, 267
major	284, 286	padangensis	305	serutus	294
makassarius	264, 266	pagensis	293	setifera	301
malengiensis	278, 281	palembang	263, 265	siantanicus	270, 271
Mallomys	322	Papagomys	322	siebersi	322
mamberamus	320	Parahydromys	258	simalurensis	262, 263
mandus	298	paraxanthus	313	siporanus	290, 291
manoquarius	279, 281	pauper	270, 272	sladeni	270, 276
marmosurus	314	peguensis	303	soccatus	290, 291
Mastacomys	258	pelengensis	264, 267	socer	284
Mastomys	259	pellax	292	sodyi	300
maurus	284	pelurus	308	solaris	294
maxi	290	penitus	317	Solomys	258
Maxomys	258, 300	perlutus	298	Stenomys	258, 310, 321
mayapahit	290, 291	Phaiomys	258	stragulum	282
melanurus	204	Phlaeomys	258	strepitans	290, 291
Melomys	258, 319	Pithecheir	258, 304	subitus	300
melvilleus	260	Platacanthomys	258	sumatrensis	304
mengkoka	315	Pogonomys	258	sumbae	270, 275
mentawi	232, 276	pollens	290	sundavensis	259, 301
meringgit	282, 283	praestans	284, 286	surdus	278, 280
meyeri	318	primarius	284	surifer	292, 293
Microtus	258	Pseudomys	258	sylvestris	284
Millardia	258	pulliventer	260		
Millardomys	261	Pullomys	260	Taeromys	260, 261, 311
minahassae	319	pusillus	303	tafa	320
mollicomulus	260			talauensis	268, 270, 275
Mollicomys	260, 315	rajah	292	taladium	320
moluccarius	264, 267	rama	286	tambelanicus	265
moncktoni	319	rapit	295	tatei	313
mordax	310	rattoides	320	temminckii	296, 297
mulleri	288	Rattus	259, 288, 305	terempa	290
Mus	258, 286	rattus	259, 261	tiomanicus	262, 270
musculus	286	raveni	278, 280	tjibuniensis	300

toxi	309	validus (R.)	290	waringensis	289
tramitius	310	validus (U.)	322	whiteheadi	298, 299
treubii	296, 297	Vandeleuria	258	wichmanni	279
turbidus	263	vanheurni	310	xanthurus	313
ululans	290, 291	verbeeki	292		
Uromys	258, 322	vernalus	270, 272		
ursinus	312	vociferans	290, 291		
		vulcani	304		