

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

with descriptions of 20 new species and subspecies, and with some  
remarks on the essential significance and the denomination of subspecies

by

H. J. V. SODY  
(Amsterdam)

CONTENTS

- I. Some remarks on the essence and the denomination of subspecies and formae.
  1. Extreme splitting of polytypical species into subspecies desirable.
  2. Systematic collecting and the question of the typical localities.
  3. Kinds of subspecies and other varieties within a species, and their denomination: a. Geographic subspecies, b. Biotopical subspecies, c. Phyletic or Chronological subspecies, d. Elementary or Analytical subspecies, e. Other kinds of subspecies, f. Nomenclatural treatment of the mentioned kinds of subspecies, g. Formae.
- II. Systematic part.
- III. Alphabetical index.

I. SOME REMARKS ON THE ESSENTIAL SIGNIFICANCE AND  
THE DENOMINATION OF SUBSPECIES AND FORMAE

“Every subspecies is a tangible expression of one or more creative factors, and only when we have recognized the effects may we hope to discover the cause” (F. M. CHAPMAN, in *Natural History*, 46, 1940, p. 204).

1. Extreme splitting of polytypical species into subspecies desirable.

As I think that a thorough study of phylogeny and ecology needs a careful discrimination of the smallest systematic units (subspecies or races), I advocate the extreme splitting of polytypical species into subspecies. Therefore I cannot approve of a way of working like that of DAMMERMAN (*Treubia*, 13, 1931, p. 456), who, for *Callosciurus notatus* in Java, wants to distinguish only 2 races: one form living in the extreme West (*notatus*), and a second form occurring in the extreme East of the

island (*madurae*), simply indicating all other forms inhabiting the inter-jacent varied parts of this large island as *notatus*  $\supseteq$  *madurae*!

In my opinion, the latter are very different and no gradations at all. It must be admitted that in such an area, in species which are very liable to local influences, the discrimination of appreciable races may be extremely difficult. Climate (rainfall, altitude), as well as plant growth etc. may form a real (but very irregular) draught-board with many more "colours" than white and black only. Simply uniting under one name all heteromorph forms (partly already distinguished and named) living in such a heterogeneous area, cannot be considered as a progress in knowledge, as this would suggest that all these animals would be but "intermediate transitional forms". Personally I would rather choose the opposite way: extreme splitting of the species into a great number of the smallest units. Yet it has to be said that in the systematic part of this paper I have been very conservative in denominating new races on account of the following two difficulties:

(a) collecting of specimens ought to be done more systematically and as for the question of the "typical localities" a better regulation is required;

(b) our system of different kinds of "subspecies" requires further elaboration.

## 2. Systematic collecting and the question of the "typical localities".

It is our first difficulty, that generally speaking, our method of collecting has not yet reached the scientific level, which, in my opinion, for this work also is urgently needed. In other words: even of the most common species — represented by large series — Museum material is always insufficient. Earlier already (Treubia, 18, 1941, p. 255) I alluded to the necessity that in future "the number of animals to be collected not only should be larger, but (that) collecting should be effected more methodically also". It seems desirable to comment on this with an example. For such an extremely common species as *Callosciurus notatus* I would like to draw up for Java the following collecting scheme. First of all the map of Java should be divided into a large number of small squares (more than 100). In doing so care should be taken that such a square never encloses two clearly different biotops. Then collectors should visit all these squares successively and collect a series of this squirrel in each of them. Only when all this material has been assembled a study of races can follow of which we may expect that it will be exhaustive and scientific. It may be assumed that in this case not only all existing races will come to light (together with their transitional forms, hybrids respectively) but that it will be evident at the same time where their "centra" (or real "typical localities") are situated. Here I must point out that the term "typical locality", as I use it at this place, does not mean quite the same

as is usually intended with. The usual interpretation of this indication is: the locality where the specimen, on which the name of the race has been based, has been collected. It does not need argument that with our usual method of collecting such a locality is partly but an accidental place where a collector has worked accidentally. What I mean with the term myself is: the locality where is laying the development-top (or centre?) of a race. It is clear that for a race, described in the usual way, both localities need not coincide, and even, that large overlappings may occur between both, as will be shown with an example below. In order to prevent confusion between these two conceptions it seems desirable to extend our nomenclature a little on this point by speaking of "name-typical locality" when we are meaning the place where the named type-specimen has been collected, and of "race-typical locality", when we are indicating the place where the "pure" race occurs *in optima forma*.

Certainly every systematist knows from his own practice the problems which sometimes may result from unluckily, because accidentally, turned out "name-typical" localities. A certain species forms in West Java small specimens, in East Java large ones, and in Central Java we find transitional forms. Knowing all this precisely afterwards, we conclude that of this species two races are living in Java, with their "race-typical" localities; West Java and East Java, respectively. The first collector of the species, however, accidentally did his work in C. Java, from where he brought with him a transitional specimen, which was named as the first and unique specimen of its species. In this way C. Java became the name-typical locality of the species and automatically so of the race which is indicated by repeating the name of the species. While now, later on, W. and E. Java material comes to hand and the real situation becomes clear, we are in difficulties. The only, on first sight apparently sufficient, solution would have been: to suppress the old name and to give two new ones: one for the western, the other for the eastern race. For more than one reason — which need not be explained to the systematist — such a method is excluded and formally forbidden! Moreover even such a radical method would not warrant final settlement, because further deepening of our knowledge could give a repetition of the problems.

The example given concerns *Helictis orientalis* (HORSFIELD). I solved the question (Temminckia, 2, 1937, p. 221) by taking up the name *orientalis* as belonging to the East Javanese form, and naming the West Javanese *sundaicus*. Of course the name-typical locality of *orientalis* stays unchanged: C. Java! The race-typical locality, however, if my solution is accepted by systematists and no further variations come to light, making further division necessary, is E. Java. In this way the name-typical locality can lie very remote from the centre, and even in the transitional zone to a neighbouring race, but of course never wholly outside the race or its transition-borders. Perhaps the example given may seem a rather marked

or exceptional case, but it is not, especially when collecting has been done in the usual unsystematic way in a large continent with ecological variation. In my opinion we may agree to a solution as chosen by me in *H. orientalis* — if only we are conscious that the old term “typical locality” does not always coincide with that which I have indicated now as “race-typical locality” — which latter notion is certainly the more important one to the further student.

Of course, if collecting is done in this way, the amount of material will become rather large (a difficulty of practical nature, at best), but we might limit it by restricting ourselves for the present to some of the commonest species, provided that we guard against generalizing our conclusions afterwards.

The reason why I introduced this question with such a stress in this article on squirrels, is because some of these squirrels (*Calbosciurus notatus*, *Callosciurus prevostii*) seem so excellently adapted for our purpose. They are common, and at the same time very expressive in making visible to our eyes the effects of the external creative factors.

### 3. Kinds of subspecies and other “variations” and their denomination.

#### A. GEOGRAPHIC SUBSPECIES.

Among Zoologists it is generally known at present what in the rough is a geographic subspecies, or geographic race, and there are definitions which try to say it more exactly. RENSCH, for instance, says (Das Prinzip Geogr. Rassenkr., 1929, p. 11): “Eine geographische Rasse ist ein Komplex von untereinander unbegrenzt fruchtbaren und morphologisch gleichen oder nur im Rahmen der individuellen, ökologischen und jahreszeitlichen Variabilität verschiedenen Individuen, deren charakteristische Merkmale erblich sind und in deren Verbreitungsgebiet keine andere geographische Rasse des gleichen Rassenkreises lebt. Eine geographische Rasse geht gleitend in die Nachbarrassen über oder sie ist von denselben durch so geringe morphologische Differenzen getrennt, dass eine unmittelbare stammesgeschichtliche Entstehung der Rassen auseinander angenommen werden kann”.

On the score of a number of considerations which I personally believe to be right, TOXOPEUS (De soort als functie van plaats en tijd, thesis, Amsterdam, 1930, p. 42) gives another definition. He indicates the subspecies as: „het individuen-complex, dat de plaatselijke vertegenwoordiger van het soortcomplex is” (the complex of individuals which is the local representative of the species-complex).

We agree with TOXOPEUS that it is not absolutely necessary that two geographic subspecies may never occur perfectly mixed in one territory (cf. TOXOPEUS’ “species duplex”).

Furthermore, I believe myself that also RENSCH’s demand of the sliding transition into the neighbour-races can better be omitted in the

definition. We could only satisfy this demand by accepting a special conception concerning the idea "neighbour-races", so as to exclude races living on neighbouring small islands. (Sometimes even a river can be sufficient for separating two races in such a way that no transitional forms occur, cf. *Callosciurus prevostii* in Borneo). Formerly this demand of the "sliding transition" (which is much older than RENSCH's definition) has caused already too much misunderstanding.

Finally I must object against the term "ecological" variation, in the way as used by RENSCH, which objections will be explained separately hereafter.

Compared with that of RENSCH, TOXOPEUS' definition certainly excels by its shortness, combined with more exactness. Yet I feel obliged to criticize the latter also. Firstly it does not make allowance positively for TOXOPEUS' own "species duplex"! In order to include these positively it seems necessary to mention in the definition — instead of the fallible character of separately occurring of the races — the (infallible) character of their separately arising.

Furthermore I do not think it to be correct to say, that this is the definition for the subspecies in general. Only the geographic subspecies is meant, besides which I wish to indicate a few more kinds of subspecies hereafter.

Therefore I should like to propose a slightly modified definition, for instance: "a geographic subspecies is a complex of animals belonging to one polymorphe species which are fertile among them, morphologically equal (only variable individually, both sexually and in age, as well as seasonally), of which the characteristic points are hereditary, and which owe their collective deviation from other geographic races of the same polytypic species to the fact that they are living or have been living in another, geographically different, region."

Meanwhile it appears from all this that no absolute agreement has been reached as yet about the essence of the geographic race. Which should not surprise us too much, if we realise that the old question: "What is a species?" now may be altered in: "What is a subspecies?" And perhaps, this question sometimes prevails in practice even more than in theory. Several cases occur in practice, in which, after mature consideration, we could better leave to fate the decision: whether one will pass on to separating a "new race" — or not.

Now it is my conception that one makes as serious a mistake in not separating a race when it ought to be done, as in well doing so when it ought not to be done! Where, however, the first mistake, when retrieved afterwards, leaves behind fewer "cicatrices" (in the form of superfluous synonyms), I personally prefer making the first mistake to making the second, and with that I have given the second explanation of my practical conservatism.

## B. BIOTOPICAL SUBSPECIES.

Besides I want to return to the question of the "ecological races" (see above) which I already indicated in a previous paper on rats (Treubia, 18, 1941, p. 261). It seems to me that here too the time is ripe for expressing myself somewhat more exactly. It was RENSCH himself who said a.o. (l.c., p. 16): "Ob es notwendig ist ökologische Varietäten zu benennen, mag unentschieden bleiben, bis die hier erst in den letzten Jahren Gründlich einsetzende Forschung über die Erbllichkeit dieser Formen mehr Ergebnisse gezeitigt haben wird. Auf alle Fälle sollte die Nomenklatur dann nicht den Prioritätsregeln unterliegen sondern für parallele ökologische Varietäten gleich sein: also z.B. für wiesenbewohnende Formen: var. oec. *pratensis* usw." He is not alone in this conception. Already before I quoted MERTENS (Zool. Jahrb., 68, 1936, p. 307), who demands 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" (which principle, however, he subverts in practice!). CHASEN, in his "Handlist" (Bull. Raffl. Mus., 15, 1940, p. 152) suddenly passes on to using the name "*Rattus rattus* form *diardii*" for all races of house rats of the Malaysian sub-region, and "*Rattus rattus* form *argentiventer*" for all ricefield races, thus ignoring the most striking geographic varieties within these "forms" (for instance the Balinese ricefield rat, *Rattus rattus bali* KLOSS, with a tooth measurement of 6.9 — 7.50 — 8.1 mm in 63 specimens, as against 6.7 — 7.15 — 7.8 mm in 49 specimens of the Javanese ricefield-rat, *Rattus rattus brevicaudatus* HORST & DE RAADT, a large difference which in all other cases would have been certainly acknowledged by CHASEN).

Personally I have several objections here:

1. In my opinion the name "ecological" race is very unsuited. The indication is intended as a contrast with "geographic" race. But ... is not a geographic race exactly as much an ecological race? We only can observe that the geographic one has been created by a combination of the factors of the surroundings (which would not be easy to analyse), but which indeed at best can be summarized as the complex of factors of its geographic dwelling place (possibly supported by isolation, in which factor can be recognized a geographic principle also). Therefore the name geographic race is excellently in place here. Besides, another type of race-forming occurs (also under the influence of the complex of surroundings factors!), in which clearly one special biotope can be held responsible for the formation. For an example we mention the Javanese ricefield rat, *Rattus rattus brevicaudatus*, and the Javanese house rat, *Rattus rattus diardii*. The biotopes, very distinctly chosen by these races, are not separated geographically, but occur alternately like a draught-board. Also both forms of rats occur draught-board-like. Apart from the possibility

(which, however, has no connection with our subject) that at the same time geographic races are occurring, we could say that this kind of race geographically "repeats" itself. So indeed, the name "geographic race" would be out of place. As said before the name "ecological race" does not give a distinction against the "geographic race." Therefore I propose to indicate this type of subspecies as *biotopical races*.

2. My second objection concerns the doubt, uttered by RENSCH especially for these biotopical races in general, in regard to their heredity. Of course, no more here than in any other case, I want to accept that every (biotopical) variation of the phenotype should be at once hereditary. But, just as well as I suppose that in general certain geographic variations have become hereditary, I can (with the same right) accept this conclusion for certain biotopical variations like those of *Rattus rattus* mentioned above.

3. If thus, in these biotopical races, the demands in common of all kinds of subspecies are satisfied, they deserve quite the same rank and treatment as geographic races.

To demand that with biotopical races, the heredity should be proved case by case, would be a claim that should be acceptable only if the same should be done with geographic races! Which is not the case, because this is impracticable as yet. I cannot see any reason for treating one differently from the other! So, for instance, the name should simply be: *Rattus rattus brevicaudatus* (for the Javan ricefield rat). Also the insertion of any indication between species- and subspecies-name seems superfluous. If, however, one would wish to do so, it should be "subsp. biot." — and not "var. biot." (RENSCH) or "form" (CHASEN). Moreover, see next point.

4. For the rest it is not in the least clear to me, and certainly not without further explanation, why every geographic variation, when appearing side by side with biotopical variation, should be ignored all at once, (CHASEN). It is an established fact that the ricefield rats from several islands are not identical, but that also among these exists normal geographic variation. Why ignore this variation here all at once? And it is most remarkable to see that one author (RENSCH) wishes to keep the biotopical variation outside subspecific denomination, whereas the other (CHASEN), in case of biotopical variation, uses no subspecific name at all but gives a ("form") name just only to the biotopical variation! As said before, the present author cannot see any difference in worth between both kinds of variation, and therefore he could find reasons here for a quaternary nomenclature. However, he will not propose to introduce it!

5. When further studying CHASEN's names, a very remarkable consequence appears of the conception of this author not to recognize biotopical forms as subspecies! Well considered, the names, given by CHASEN, are merely binary — with only a "form"-name behind. So we

are bound to conclude that such a group of animals which is specialised biotopically and geographically at the same time ... in CHASEN's opinion does not belong to any subspecies at all! Consequently we also would have to assume that in an island like Bali — notwithstanding its abundance of house rats and ricefield rats (the latter in a form occurring nowhere else) — occurs no single subspecies of *Rattus rattus*!

### C. PHYLETIC OR CHRONOLOGICAL SUBSPECIES.

Continuing the question of the denomination of subspecies we want to distinguish a third kind of subspecies, viz the phyletic (or chronological) race, a name which ought to be used in relation to fossil races, in species which are still living in the same region but have more or less changed. In these cases we may expect in general that the relation between the fossil and the recent race will be that of ancestor to descendant. As an example of a phyletic subspecies we might quote *Diceros rhinus sumatrensis eugenei* SODY from the Holocene in Sumatra (SODY, *Natuurw. Tijdschr. Ned. Ind.*, 102, 1946, p. 151). This form was described (but not denominated) by D. A. HOÛYER (Prehist. and fossil rhinoceroses from Mal. Arch. and India, Leiden, Diss., 1946), who found the fossil remains of the species to be larger than the recent material. He even said (p. 29): "It is now evident that in Sumatra the rhinoceros (*D. sumatrensis*) has undergone a diminution in size during the Holocene period". His only further conclusion is that such a form "has no right to (specific) distinction" (in this case from *D. sumatrensis*). In my opinion it means that we are bound to accept the difference, and we must understand it as a difference of phyletic-subspecific nature. On that account I gave it the name mentioned above. (If wanted one could provide this name with the suffix "subsp. phyl." or insert a cross which is sometimes used to mark fossil species).

It is clear with such phyletic forms that, besides a "typical locality" also exists another important criterion which, in analogy, we might call the "typical period" of such a form. Here also we must distinguish a "name-typical period" (the time in which lived the named typical specimen), and a "race-typical period", which usually will become evident later (or never).

Apart from such phyletic races we might also speak of phyletic species, i.e. species descending from each other in a straight line, and certainly this would be a clearer term than the name "mutations", which have been given to them by WAAGEN in 1869. But, in fact, I am afraid that only very seldom we will be so fortunate as to meet with a series of warranted phyletic species. More often we will have to do with "side-branch" productions (cf. our usual genealogical trees). Undoubtedly the knowledge of such side-branch species can be of large importance to the research into the direct phyletic line of a certain species (for instance

because of that side-branch species being very ancient and bringing us nearer to the primitive characters in general), but the proper relation of both species lies in their latest common ancestral form. This we could indicate as the "conphyletotype" of both species. The time in which the division began, as their "conphyletotypical period". It seems to me that such a definition of these matters is not without importance because the discovering of these conphyletotypes is one of the most important purposes of the whole palaeontological-taxonomic study. The systematist is never to forget that his work is not a final object and that it is his duty to direct himself to the wants of other succeeding branches of science. I perfectly agree with G. G. SIMPSON (Bull. Am. Mus. Nat. Hist., 85, 1945, p. 6) when he says: "Within their present scope the importance of genetic data for phylogenetic studies cannot be overemphasized" (though I agree as much with the second part of the same sentence: "but that scope is so limited that such data are not in themselves adequate for the reconstruction of more than a very few, sharply isolated, and quite minor parts of the general phylogeny of animals").

#### D. ELEMENTARY OR ANALYTICAL SUBSPECIES.

I should like to introduce the term elementary (or analytical) subspecies for what at present is generally indicated as "small species" (reine Linie, Linneont, Jordanont). It is a matter of course that the form satisfies the demand of heredity (provided that it has been isolated first from a population by analysis = continued inbreed). Such hereditary subdivisions of a species in general have right to the name of subspecies, though it may be unnecessary to give Latin names to all such elementary subspecies which never or seldom occur separately in nature. Among breeders they very often get names or numbers. In my opinion it is urgently necessary to discern this subspecific position of the "reine Linie". Its position essentially is the same as that of the other 3 proposed kinds of subspecies, the word "analytical" gives the difference: normally it is not an "ecological" (natural) form.

#### E. OTHER KINDS OF SUBSPECIES.

Beside the four kinds of subspecies distinguished above, there seem to exist others, waiting for distinction. One may think of the old-known "gentes" of the European (and other) cuckoos. I dare not classify these under the biotopical races because in this case it would be necessary to extend so much the idea biotop that I do not feel allowed to do so. For this and other kinds of groups sometimes the term "biological races" has been used. However, this name seems so vague and meaningless, that I do not wish to accept it for any case at all. I can also but incidentally refer to the "physiological subspecies" as introduced in 1932 by C. LE DOUX (Mitt. Zool. Mus. Berlin, 18).

#### F. NOMENCLATURAL TREATMENT OF THE MENTIONED KINDS OF SUBSPECIES.

Summarizing I repeat that, in my opinion, geographical as well as biotopical and phyletical races have an equal subspecific value and — while they all occur or occurred in nature, well separated from each other — deserve equal subspecific nomenclature. In complicated cases, for instance when geographic differences occur within a biotopical race, all resulting complex-genetic forms may receive the same treatment. Though, perhaps, a quaternary nomenclature — theoretically — might be preferable here I think we must do our best to avoid this as long as possible! For the analytical subspecies we can refrain from giving Latin names, because these subspecies do not occur separately in nature; or, if they do, it is in the shape of the above named subspecies. The group of biological races first needs further study.

In my opinion the only question which determines the rank of all subspecies in common, is the possession, in a group of individuals, of some hereditary characters by which it is distinguished from other groups of individuals within the same species.

#### G. FORMAE.

A still further continued nomenclature, i.e. of formae, I should not like to support. And certainly I would have serious objections against such a nomenclature when risk of confusion of such not genetically fixed formae with subspecies can arise. However, this could be avoided easily by inserting the word "forma" or "f." as is frequently done in entomology, in which case the question would become rather harmless. One could use such a forma-name behind a subspecies-name and we would not be using quaternary nomenclature yet! Therefore it would be imaginable for the present not to put the question too sharply and to leave the possibility of using a forma-name for aberrants, which repeat themselves inside a subspecies, in cases when we do not yet know the real value of the aberration (in some cases they even may be homozygotic recessive specimens in a population that we take for a subspecies). On one hand one may oppose against every extension of our system of denomination. On the other it can be of great importance to the specialist to know whether a special race is uniform or polyform, and in that case it would be useful if this could be indicated in the name with aid of forma-names or by simply adding the word "polymorph".

## II. SYSTEMATIC PART.

Hereafter follows an enumeration of all the material of *Sciuridae* in the Zoological Museum at Buitenzorg. Where possible I added data from my own collection which at the moment is preserved in the Rijksmuseum van Natuurlijke Historie, at Leiden. The Museum-material has been arranged in 30 species with about 130 subspecies.

**Petaurista petaurista (PALLAS).**

Locality	Upper tooththrow			Tail in %				Subspecies	
	Min.	Aver.	Max.	Min.	Aver.	Max.			
Batu islands <sup>1)</sup>	15.5	—	16.8	8	—	104	—	1	<i>batuana</i>
N. Sumatra <sup>2)</sup>	15.9	16.24	17.0	7	93	110.2	122	11	<i>marchio</i>
C. „ <sup>3)</sup>	14.6	15.17	15.8	9	109	118.0	130	9	„ (?)
S. „ <sup>4)</sup>	15.6	15.90	16.2	2	113	116.0	119	2	<i>rufipes</i> subsp.n.
Pulu Rūpat <sup>5)</sup>	14.4	14.85	15.3	4	101	109.8	116	4	<i>mimicus</i>
W. Java <sup>6)</sup>	16.2	16.72	17.2	4	100	126.2	140	5	<i>petaurista</i>
C. „	16.2	17.09	18.0	8	111	128.0	139	6	<i>interceptio</i> subsp.n.
E. „	15.8	16.97	18.1	15	105	113.1	127	13	<i>nigricaudatus</i>

<sup>1)</sup> MILLER, Smiths. Misc. Coll., 45, 1903, p. 27, and LYON, Proc. U.S. Nat. Mus., 34, 1908, p. 634.

<sup>2)</sup> Including 1 measurement each from HAGEN (1890), SCHNEIDER (1905), LYON (1908), and FRECHKOP (1931).

<sup>3)</sup> LYON, Proc. U.S. Nat. Mus., 34, 1908, 634.

<sup>4)</sup> Including ROBINSON & KLOSS, Journ. F.M.S. Mus., 7, 1919, p. 269.

<sup>5)</sup> LYON, Proc. U.S. Nat. Mus., 34, 1908, p. 634, and MILLER, Smiths. Misc. Coll., 61, 1913, p. 27.

<sup>6)</sup> Including 1 measurement each from MILLER, Smiths. Misc. Coll., 45, 1903, p. 27; and ROBINSON, Journ. F.M.S. Mus., 7, 1918, p. 226.

From these scanty figures we see:

1. that the Javan forms are obviously larger, especially in length of the tooththrow,

2. that *mimicus*, of P. Rūpat, is a small form (in this respect probably not much differing from animals of Central East Sumatra),

3. that no large differences in measurements seem to exist between *batuana* and the inhabitants of North Sumatra,

4. that animals from C.E. Sumatra show smaller tooth measurements than those from N. Sumatra. The external measurements, however, are the same, whereas in S. Sumatra the tooth measurements seem to be larger again. Of course the number of measured specimens is too small for definite conclusions, that C.E. Sumatra would be inhabited by *mimicus* or another small-toothed race.

Up till now it has generally been accepted that THOMAS' Sumatran race, *marchio*, is identical with *batuana*. Careful comparison of our Atjeh series with the original description of this race, however, seems to yield several small differences. Without having real *batuana* at hand, no certainty can be obtained, but yet I prefer to accept *marchio* as a separate race for N. Sumatra. For the extreme South of the island the foundation of a new subspecies seems necessary.

The following forms are represented in the Museum:

***Petaurista petaurista marchio* THOS.**

*Material*: N. S u m a t r a : 1 ♂, Lesten, Atjeh, 700 m, A. HOOGERWERF, 10. III. 37; 3 ♂♂, Atang Putar, Atjeh, 1000 m, A. HOOGERWERF, 3-8. IV. 37; 1 ♀, Baleq, Atjeh, 1200 m, MADZOEÐ, 12. VII. 30; 1 ♂, Redelong, Atjeh, 1300 m, MADZOEÐ, 12. VII. 30.

In coll. SODY: 2 ex. Perlak, E. Atjeh.

***Petaurista petaurista rufipes* subsp. n.**

*Type*: ♀ ad., Kluang, Palembang, S. E. Sumatra, SOEKARNO, 22. VII. 33. Buitenzorg Museum Coll. Nr. 1/33.

*Material*: The type; 1 sex. inc. Lahat, S. Sumatra.

In coll. SODY: 1 ex. Giesting, Lampongs, S. Sumatra.

*Diagnosis*:

Sides of head and forehead much lighter than in *marchio*, the black colour above the nose failing entirely. On the hands the rufous colour extends nearly to the nails, only the sides of the hands still being darkened a little. The most striking character, however, may be the feet: these are not wholly black (like in all northern specimens) but rufous for the greater part, especially on the distal part.

The second S. Sumatra specimen in the Museum appears to confirm the above said, but it has no decisive value, because it was stuffed formerly and is rather discoloured. Very unfortunately I did not make a note about the colour of the feet in the Lampongs specimen in my own collection.

Measurements of type: head and body 390; tail 464; hind foot 72; ear 43; skull: greatest length 65.5; condylo-basal length 60.9; basal length 56.3; palatal length 34.1; zygomatic breadth 45.8; interorbital constriction 14.7; breadth across postorbital processes 36.6; nasals 19.7 × 11.4; diastema 13.7; palatal foramina 3.6 × 3.2; upper toothrow 15.6 mm.

***Petaurista petaurista petaurista* (PALLAS).**

*Material*: W. J a v a : 1 ♂, Gobang, Buitenzorg, 3.XII.28; 1 ♀, Djasinga, Buitenzorg; 1 ♂, 1 ♀ imm., Tjibinong, Buitenzorg, 30.IV.36; In coll. SODY: 1 ex. Sukabumi.

In 1918 (Journ. F.M.S. Mus. 7, 1918, p. 233) ROBINSON & KLOSS selected "the Preanger Regencies, W. Java" as the habitat of this race. Further on (l.c., p. 224) they write that they "have assumed" a series from Tjibodas, W. Java to be the typical race. In my opinion ROBINSON & KLOSS actually restricted the type locality only to "Preanger". They did not (and did not wish to) restrict it to "Tjibodas". For that reason I suppose to be allowed and obliged to make a further restriction here of the type locality of *petaurista* to the "extreme West of Preanger Regencies" (lowlands?). Such a restriction appears to be necessary, as our

series from W. and C. Java falls apart into two parts: one, representing a West Javan (lowlands?) race, the other a Central Javan (mountain?) race. I prefer to consider the Western (lowlands?) form *petaurista typicus*. Unfortunately we do not possess Tjibodas specimens.

The race is characterized by the colour of the tail: rather uniform dark bay over the whole of its length except the tip, which is black. Formerly (1932), when studying my own collection, I observed the same character in my single Sukabumi specimen, when compared with all specimens collected more eastward. At that time, however, I was not able to determine any geographic distribution. At present I have studied 5 specimens of this race, all collected westward from Sukabumi, and 14 specimens of the next race, collected from Tjibuni eastward.

***Petaurista petaurista interceptio* subsp. n.**

*Type:* ♂ ad. Mount Tjerimai, W. Java, 700 m, J. J. MENDEN, 11.VII.31, Buitenzorg Museum Cat. Nr. 2666.

*Material:* J a v a : 1 ♀, 1 sex. inc. Bandjar, E. Priangan; 2 ♂♂, 1 ♀ Mount Tjerimai, 700-800 m, J. J. MENDEN, 11.VII, 22.III.31; 1 ♂, 1 ♀, Kedondong, N. slope of Mount Slamet, TRAUTMANN, 2.VIII, 7.XI.29; in coll. SODY: 4 ex. Tjibuni near Bandung, 1500 m; 2 ex. Balapulung, N.W. slope of Mount Slamet; 1 ex. Gedangan, Rembang.

*Diagnosis:*

General characters like *petaurista*. Back a trifle more rufous, less buffy. But the special distinguishing character lies in the tail (upper side): between the black tip and the blackish base there is always a zone which is pure or nearly pure rufous.

Measurements of type: head and body 392; tail 510; hind foot 77; ear 37; skull: greatest length 71.8; condylo-basal length 69.7; basal length 64.4; palatal length 37.8; zygomatic breadth 48.6; interorbital constriction 17.9; breadth over postorbital processes 37.3; nasals 20.1 × 13.2; diastema 14.9; palatal foramina 4.0 × 3.5; upper toothrow 17.3 mm.

***Petaurista petaurista nigricaudatus* ROB. & KLÖSS.**

*Material:* E. J a v a : 3 ♂♂, 3 ♀♀, Blawan, Idjen, 950 m, K. W. DAMMERMAN, 29.V, 8.VI.24; 1 ♂, Ongop-ongop, Idjen, 1850 m, K. W. DAMMERMAN, 15.V.24; 2 sex. inc., (skulls), Mount Smeru, Summit 3600 m, v.d. VEEN, V.39, J. E. s'JACOB, VII.37. In coll. SODY: 5 ex. Rambipudji; 1 ex., (skull), Tengger Mountains, 2500 m.

All these odd skulls are from animals which climbed these high elevations "to die" (?). None of these animals appears to be very aged!

***Petaurista elegans* (TEMME.).**

(*Pteromys elegans*, TEMMINCK, Fauna Jap., Coup d'oeil, Disc. prélim., 1835, p. XII. I suppose: not "MULLER", as given by CHASEN in his Handlist, and also by JENTINK, 1888).

***Petaurista elegans elegans* (TEMME).**

*Material:* W. Java: 1 ♀, Rarahan, Patjet, 1300 m, E. K. E. HALEWIJN, 23.III.1941; 1 ♂ imm., near Bandung, BEZEMER, 1918; 5 ♂♂, 3 ♀♀, Mount Tjerimai, 2000 m, J. J. MENDEN, 8-22.III.31.

BARTELS (Treubia, 16, 1937, p. 153) expressed the supposition that the locality given for the type specimen of *elegans* (Nusa Kambangan Island) must be an error, because this species is decidedly an inhabitant of the high mountain zones only. We think it wise to accept West Java as the type locality.

Probably the Tjerimai series does not belong to the same race as the other 3 specimens. The tooth measurements in the first 3 specimens (see above) are 14.9-14.97-15.0 mm. The Tjerimai series gives 13.7-14.20-14.7 mm (8).

***Petaurista elegans slamatensis* subsp. n.**

*Type:* sex. inc., Kaligua, Mount Slamet, C. Java, 1400 m, TARIP, II.1917. Buitenzorg Museum, No. 3210 (skin and mandibula only).

*Diagnosis:*

The principle difference from Western *elegans* is that the grizzled area of upper head, neck and back continues backward into a black line, which runs uninterrupted as far as the black of the tail. An additional character lies in the black on the back of the hind feet (toes). In *slamatensis* the feet are wholly reddish brown. The Patjet and Tjerimai animals all have a black band over the toes proximal of the nails. Also the specimens in my own collection (Tjibuni) show this black, and the same prevails for the 3 cotypes of *elegans* in the Leiden Museum, as Dr L. D. BRONGERSMA of that Museum kindly informed me. Only the Bandung animal equals *slamatensis* in this respect. Finally *slamatensis* has a lighter throat than any of the 10 West Javan specimens.

As no external measurements have been taken and of the skull only the mandibula has been preserved, we do not know much about the size, but it is remarkable that the lower toothrow measures 15.6 mm, against 14.0-14.62-15.3 mm in our 11 West Javanese specimens at hand.

***Aeromys tephromelas* (GÜNTHER).*****Aeromys tephromelas bartelsi* (SODY).**

*Material:* 1 ♀, Pendeng, Atjeh, N. Sumatra, 550 m, HOOGERWERF, 25.II.37; 1 ♀ imm., Kp. Babat, Palembang, S. Sumatra, SOEKARNO, 20.X.33.

The adult specimen has already been named by CHASEN, the measurements given in Treubia, 17, 1940, p. 493. The young from S. Sumatra has a slightly lighter upperside and a less pronouncedly distichous tail.

The skin of this young very much resembles that of adult *Petinomys hageni lugens*, but the ear and moustache are longer, the feet broader, the underside is less densely covered with hair and less greyish. Of course the skull is immediately decisive.

### *Hylopetis sagitta* (L.).

Locality	Upper tooththrow				Tail in %				Subspecies
	Min.	Aver.	Max.		Min.	Aver.	Max.		
Sumatra	—	8.1	—	1	—	97	—	1	<i>sumatrae</i> subsp.n.
Java	7.0	7.31	7.7	15	79	87.4	96	14	<i>sagitta</i>
Nusa Kambangan	—	6.9	—	1					

### *Hylopetis sagitta sagitta* (L.).

*Material:* W. J a v a: 1 ♂, Buitenzorg, WIGMAN, 23.VII.26; 1 ♂, Buitenzorg, purchased, 26.VIII.25; 1 ♂, Klapa Nunggal, Buitenzorg, van POLANEN PETEL, 27.VII.25; 1 ♀ Djonggol, Buitenzorg, van POLANEN PETEL, 24.X.25; 1 ♀, Palabuan Ratu, Wijnkoopsbaai, OUWENS, I.15; 3 ♂♂, 4 ♀♀, Cheribon, J. J. MENDEN, 3.IV-2.V.31; 1 ♂, Sukabumi, OUWENS, undated. C. J a v a: 1 ♀. Kebumen, Kedu, purchased, 7.X.14. 2 ♀♀, Nusa Kambangan, VAN DOORN, 24.II.38. *Additional material:* 1 ex. Sukabumi, 1 ex. Garut.

Beside these 18 specimens, which are quite uniform in the colour of the underside, there is one more specimen in the collection of the Museum (stuffed before), labelled "Sukabumi" which deviates strikingly, and, in the colour of the underside, exactly matches the type of *sumatrae* (see below).

### *Hylopetis sagitta sumatrae* subsp. n.

*Type:* (and only specimen): ♂ ad., Redelong, E.Atjeh, N.Sumatra. 1300 m. Coll. MADZOED, 14.VII.1936. Buitenzorg Museum, Cat. No. 3111.

#### *Diagnosis:*

Differing from our Java and Nusa Kambangan series (except the one labelled "Sukabumi") by the fact that the throat is not perfectly white but darkened (like the rest of the under side) by the grey bases of the hairs at that place. Furthermore the tail is slightly longer, and we must specially mention the upper tooththrow which surpasses the maximum of the 15 measured *sagitta*.

So far the new race—though based on one specimen only—seems perfectly safe. But we are in possession of a second Sumatran animal

(No. 2416, from alcohol, ex show collection, labelled "Fort de Kock"). This specimen exactly matches the Javanese! Now I suppose that one of the following two possibilities can be the case: it may be that the labels of the "Sukabumi" specimen and No. 2416 have been exchanged erroneously (both ex show collection!). But there is a second possibility. Our Atjeh type and the Sukabumi specimen evidently are mountain animals (long and thick fur), all other animals must be from lower regions. So it might be possible that *sagitta* should be the lowland form of both Java and Sumatra, while *sumatrae* should be the mountain form of both islands! The locality "Sukabumi", without the record of the altitude, is sufficiently elastic in this respect.

The differences from *harrisoni* STONE, Borneo, are difficult to ascertain, because there is no Bornean material at hand and no further description seems to exist than the original one by STONE. No skull measurements have ever been recorded. STONE's "length of skin 360 mm" and "length of tail 170 mm" would indicate that *harrisoni* is a larger animal than *sagitta* and *sumatrae* (in both the total length amounts to 285 mm), but the "hind foot 30 mm" gives a measurement also occurring in *sagitta* and *sumatrae*. The description of the lower surface "dull white, cheeks, throat and sides of abdomen tinged with rufous" cannot be applied to *sumatrae*. In this race the hairs of the lower surface have long, very dark bases with shorter, whitish or very slightly rufous, tips. The underside of the membrane (the skin itself) is not dull blackish.

Also MILLER's *amoenus*, of Kundur Island, presents the same objection: the description "underparts buffy white, somewhat clouded by the slaty grey bases of the hairs" is not applicable to *sumatrae* with its rather dark underparts.

Measurements of type: head and body 145; tail 140; hind foot 29; ear 25; skull: greatest length 36.4; condylo-basal length 33.1; basal length 29.7; occipito-nasal length 36.0; palatal length 18.4; zygomatic breadth 22.0; breadth of braincase 17.0; interorbital constriction 7.2; breadth over postorbital processes 13.9; nasals  $9.3 \times 5.9$ ; diastema 7.3; palatal foramina 2.5; upper toothrow 8.1 mm.

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

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

*Material*: 1 ♂, Teakforest, Gedangan, Rembang, C. Java, 40 m, P. BLIJRDORP; 1 sex. inc., Java.

Measurements of Gedangan specimen: Head and body 163; tail 156; hind foot 31; ear 13 mm; skull: greatest length 39.0; upper toothrow 7.7 mm (7.8 in second specimen).

**Petinomys hageni (JENT.).**

Locality	Sex	Head & body		Tail	Hind foot	Ear	Skull: greatest length	Occipito-nasal length	Basal length	Palatal length	Zygomatic breadth	Breadth of brain case	Least interorbital breadth	Postorbital processes (t.t.)	Length of one nasal	Breadth of combined nasals	Upper toothrow	Diastema
Perlak, Atjeh	♀	242	224	44	20	50.0	49.5	44.0	25.8	32.3	22.8	12.1	25.7	14.6	7.6	10.0	11.7	
"	♀	240	236	47	22	52.3	52.3	46.1	26.3	33.6	24.6	12.0	28.3	16.1	8.5	10.7	12.3	
"	♀	275	259	51	23	55.9	54.7	49.3	29.0	36.1	24.3	14.3	30.9	16.5	10.3	11.1	13.7	
"	♂	231	240	49	22	51.0	50.6	—	—	32.0	23.7	13.0	25.9	15.7	8.7	10.4	—	
"	♀	247	245	48	22	53.6	53.3	46.1	26.7	—	23.2	—	—	15.6	8.3	10.7	12.3	
"	♀	243	232	48	23	51.0	50.3	45.5	26.2	33.5	23.0	12.2	—	16.3	8.6	10.5	11.9	
"	♂	267	232	49	24	52.9	52.4	—	—	33.3	24.1	12.6	—	16.7	8.0	—	12.0	
"	♀	278	265	50	24	54.3	53.8	47.7	27.4	34.3	23.6	14.2	28.9	17.1	9.1	11.1	12.6	
"	♀	260	240	51	23	54.3	54.3	46.8	27.6	34.4	23.3	12.4	—	16.3	8.7	10.6	12.8	
"	♀	240	245	49	22	50.5	50.3	43.8	25.5	32.1	24.1	11.3	27.0	15.6	8.1	10.6	11.5	
Aru Bay	♂	270	248	49	—	—	—	—	—	—	—	—	—	—	—	—	—	—
"	♀	254	240	48	—	51.1	—	—	—	31.3	—	—	—	—	—	—	—	—
Medan	♀	—	—	—	—	54.0	53.4	47.9	28.2	35.2	24.2	13.1	25.3	15.0	8.2	10.7	12.3	
"	♂	—	—	—	—	51.2	50.6	43.9	26.5	31.2	—	12.0	22.2	15.1	7.4	11.0	11.3	
Deli (type)	—	231	245	45	—	54	—	—	25	34	—	—	—	16	—	11	—	

**Petinomys hageni hageni (JENT.).**

*Material:* E. S u m a t r a : 1♂, 1♀, Kp. Dadap, Medan, LIAS, 8.XII.27;  
1♀ imm. Pesiakan, Tebing Tinggi, VAN DER MEER MOHR, 14.VI.28.

Measurements chiefly from specimens in my own collection:

Locality	Sex	Head & body		Tail	Hind foot	Ear	Skull: greatest length	Occipito-nasal length	Basal length	Palatal length	Zygomatic breadth	Breadth of brain case	Interorbital constr.	Orbital breadth (t.t.t.)	Length of nasals	Breadth of nasals	Diastema	Length of upper toothrow
Medan	♀	—	—	—	—	—	54.0	53.4	47.9	28.2	35.2	24.2	13.1	25.3	15.0	8.2	12.3	10.7
"	♂	—	—	—	—	—	51.2	50.6	43.9	26.5	31.2	24.0	12.0	22.2	15.1	7.4	11.3	11.0
Perlak, Atjeh	♀	242	224	44	20	50.0	49.5	44.0	25.8	32.3	22.8	12.1	25.7	14.6	7.6	11.7	10.0	
"	♀	240	236	47	22	52.3	52.3	46.1	26.3	33.6	24.6	12.0	28.3	16.1	8.5	12.3	10.7	
"	♀	275	259	51	23	55.9	54.7	49.3	29.0	36.1	24.3	14.3	30.9	16.5	10.3	13.7	11.1	
"	♂	231	240	49	22	51.0	50.6	—	—	32.0	23.7	13.0	25.9	15.7	8.7	—	10.4	
"	♀	247	245	48	22	53.6	53.3	46.1	26.7	—	23.2	—	—	15.6	8.3	12.3	10.7	
"	♀	243	232	48	23	51.0	50.3	45.5	26.2	33.5	23.0	12.2	—	16.3	8.6	11.9	10.5	
"	♂	267	232	49	24	52.9	52.4	—	—	33.3	24.1	12.6	—	16.7	8.0	—	12.0	
"	♀	278	265	50	24	54.3	53.8	47.7	27.4	34.3	23.6	14.2	28.9	17.1	9.1	12.6	11.1	
"	♂	260	240	51	23	54.3	54.3	46.8	27.6	34.4	23.3	12.4	—	16.3	8.7	12.8	10.6	
"	♀	240	245	49	22	50.5	50.3	43.8	25.5	32.1	24.1	11.3	27.0	15.6	8.1	11.5	10.6	

***Petinomys hageni lugens* (THOS).**

*Material:* 1 ♂, 1 ♀, Sipora, Mentawi, ex coll. Raffles Museum, 11.X-5.XI.24.

(For measurements, see CHASEN & KLOSS, Proc.Zool.Soc., 1928, p. 820).

***Petinomys hageni ouwensi* subsp. n.**

*Type:* ♀ ad., Kubu region, Pontianak, W. Borneo. Coll. W. BRAUTIGAM, VI.1917. Buitenzorg Museum. Cat.Nr. 3759.

This specimen was mounted and exhibited in the show-collection of the Museum 25 years ago, but up to this day the occurrence of the species in Borneo has not become known in literature. It has been dismantled now and remade into a study skin. Unfortunately the original colours have faded so much that it is useless to describe them even roughly. The only thing we can say is that the pattern must have been about the same as in *hageni* from Sumatra. The skull is damaged in the exorbital and basiorbital portion, and one jugale is missing, but it is sufficient to show a good difference from *hageni*.

*Diagnosis:*

In the Bornean specimen the rostrum is shorter, and especially broader, than in Sumatran animals. Also the interorbital constriction and the tip to tip distance across the postorbital processes, are a trifle larger. In 12 specimens of *hageni* the toothrow measures 10.0-10.70-11.1 mm, in the Bornean animal 10.0 mm.

Measurements taken from the apparently not much stretched skin: head and body 29; tail 27 cm; hind foot 46; ear  $\pm$  16 mm.

Measurements of skull: greatest length  $\pm$  51.6; occipito-nasal length 51.3; palatal length 26.3; zygomatic breadth  $\pm$  35.4; breadth of braincase, above roots of zygomata, 24.3; interorbital breadth 13.7; breadth over postorbital processes 28.3; nasals 14.7  $\times$  9.2; palatal foramina 5.0; bulla 13.2; diastema 12.1; upper toothrow 10.0; lower toothrow 10.7; breadth of m<sup>2</sup> (crown) 2.7 mm.

***Petinomys vordermani* (JENT.).*****Petinomys vordermani vordermani* (JENT.).**

*Material:* Billiton: 1 ♂, 1 ♀, Begantung (Central), 50 m, F. J. KUIPER, 12.VI.37; 1 ♀, Katjang Botor (Central), 50 m, F. J. KUIPER, 2.I.37; 1 ♂, Tg. Pandan, F. J. HOUWERT, VII.18; 1 ♀, 1 sex. inc., "Billiton", BRAUTIGAM, without date.

Greatest length of skull: 27.0-29.3 mm (5). Upper toothrow: 5.3-5.48-5.7 mm (5). JENTINK's name "*vordermanni*" ought to be corrected into "*vordermani*", as the species is dedicated to VORDERMAN.

***Iomys winstoni* sp. n.**

*Type* (and only specimen) : ♂ ad., Baleq, E. Atjeh, N. Sumatra, 1200 m, Coll. Madzoed, 19.VIII.1930. Buitenzorg Museum, No 3112.

*Diagnosis:*

By its small size, the presence of a "cheek-beard" and other characters, the species is at once distinguishable from *horsfieldii*, the only *Iomys* species which has been described up till now.

On the sides of the head, behind the eye, there are rather large and thick tufts of thin (but rather stiff) long hairs (up to 2 cm in length). They arise from and near the fore edge of the ear and the part of the cheeks closely below it. They are directed partly straight upwards, partly more backwards. Also long, but less stiff and more flatly lying hairs arise above the ear and they can also be found rather abundantly along the sides of the neck as far as about 2 cm up and behind the ear.

Nearly all hairs on upper and lower sides of head and body have long, very dark blackish grey bases. Without dark bases are some patches of hairs on chin and throat (wholly white), those on the inner side of the fore legs (faintly ochraceous), many long hairs on underside of membrane, and especially those underneath the outer margin of the membrane (ochraceous). On the upper side the tips of nearly all hairs are ochraceous, the forehead and cheeks becoming purely so, on neck and back the dark bases shining through, upper side of membrane nearly or wholly blackish. A dark ring around the eye. On lower side nearly all hairs possess long, white or slightly ochraceous tips, the ochraceous colour becoming clearer on underside of membrane (though there are dark patches on the membrane near the armpit). Underneath the outer margin of the membrane runs a light, pure ochraceous band. Tail umber, base of tail lighter, upperside darker than underside, tips of hairs darkest.

Measurements: head and body 142; tail 143; hind foot 30; ear 21; skull: greatest length 36.0; condylo-basal length 33.1; basal length 30.0; occipito-nasal length 36.0, palatal length 17.2; zygomatic breadth 21.9; breadth of braincase 17.9; interorbital constriction 7.2; breadth across postorbital processes 15.6; nasals  $8.8 \times 5.3$ ; diastema 7.4; palatal foramina 2.2; upper toothrow ( $p^4-m^3$ ) 6.9 mm.

The name was given in honour of one of the greatest protectors of mankind and free science of our days: Mr WINSTON CHURCHILL.

**Nannosciurus melanotis (MULLER).**

Locality	Upper tooththrow				Tail in %				Subspecies
	Min.	Aver.	Max.		Min.	Aver.	Max.		
Java	4.0	4.10	4.2	2	79	81.3	85	3	<i>melanotis</i>
Sumatra	3.8	3.85	3.9	2	78	82.5	87	2	<i>sumatranus</i>
Banka <sup>1)</sup>	4.0	4.00	4.0	2	66	78.8	87	14	<i>bancanus</i>
Billiton	—	4.1	—	1	—	—	—	—	" (?)
W. Borneo <sup>2)</sup>	—	—	—	—	54	77.3	87	20	<i>borneanus</i>
S. W. Borneo	3.5	3.71	4.0	11	83	90.2	95	10	"
E. Borneo	3.5	3.75	4.0	4	—	79	—	1	<i>pallidus</i>

<sup>1)</sup> LYON, Proc. U.S. Nat. Mus., 31, 1906, p. 594; and SODY, Temminckia 2, 1937, p. 237.

<sup>2)</sup> LYON, Proc. U.S. Nat. Mus., 31, 1906, p. 594; and 40, 1911, p. 97.

**Nannosciurus melanotis melanotis (MULLER).**

*Material:* W. J a v a: 1 ♀, Pasir Datar, Mount Gedeh, M. BARTELS, 18.XI.07; 1 ♂, 1 ♀, Mount Gedeh, M. BARTELS, 6.XII.15; 1 ♂, Djampang, purchased, undated.

**Nannosciurus melanotis sumatranus LYON.**

*Material:* 1 ♀, Puntian, S.W.K., W. Sumatra, B. STRASTERS, 21.III.15; 1 ♀, Tjabangkanan, Lampongs, S. Sumatra, 1000 m, M. A. LIEFTINCK, 28.XII.34.

There is much difference between these 2 specimens.

**Nannosciurus melanotis ?bancanus LYON.**

*Material:* 1 ♀, Gn. Liang, W. Billiton, 50 m., F. J. KUIPER, 16.XI.36.

This is a new record. Unfortunately I am not able to compare the skin with real *bancanus* (from Banka). Certainly the affinity is with *borneanus* and not with *sumatranus*.

**Nannosciurus melanotis borneanus LYON.**

*Material:* S. W. B o r n e o: 4 ♂♂, 6 ♀♀, Riam, Kotawaringin, J. J. MENDEN, 29.X-5.XII.35.

Here again comparison with typical material was impossible, and it was another difficulty that the series has been preliminary preserved in formaline. In any case there are differences from *pallidus*. A. o. the top of muzzle and head is darker.

**Nannosciurus melanotis pallidus CHAS. & KLOSS.**

*Material:* E. C e n t r a l B o r n e o: 1 ♂, Long Putus, H. C. SIEBERS, 10.VIII.25; 1 ♂, 1 ♀, Marah, H. C. SIEBERS, 13-14.XI.25; 1 ♀ Buntok, Barito river, 20 m, G. C. SHORTRIDGE, 1.X.09.

**Nannosciurus exilis (MULLER).**

Locality	Upper toothrow				Tail in %				Subspecies
	Min.	Aver.	Max.		Min.	Aver.	Max.		
W. Borneo	3.3	3.35	3.4	2	68	70.5	73	2	<i>exilis</i>
E. Borneo <sup>1)</sup>	3.3	3.55	3.8	22	56	72.2	89	10	<i>sordidus</i>
Semawang & Bettotan <sup>2)</sup>	3.1	3.57	3.9	10	58	76.6	94	10	„

<sup>1)</sup> Including "GYLDENSTOLPE, Kungl. Svensk. Vet. Akad. Handl., 60, 1919, p. 40.

<sup>2)</sup> CHÅSEN & KLOSS, Bull. Raffl. Mus., 6, 1931, p. 62.

**Nannosciurus exilis exilis (MULLER).**

*Material:* W. Borneo: 1 ♂, Peniti, Pontianak, MADZOED, 5.IV.31; 1 ♀, 1 sex.inc., Matukai, Melawi, A. BLANCHEMANCHE, 22.XI.24.

**Nannosciurus exilis sordidus CHAS. & KLOSS.**

*Material:* E. Borneo: 1 ♂, 1 ♀, Long Temelen, H. C. SIEBERS, 26.VIII.25 (♀ type of subspecies); 4 ♂♂, 1 ♀, Long Hut, H. C. SIEBERS, 17-22.VIII.25; 3 ♂♂, 1 ♀, Long Petah, 470 m, H. C. SIEBERS, 23.IX-1.X.25; 1 ♂, Long Leang Leng, H. C. SIEBERS, 1.IX.25, N. E. Borneo 2 ♂♂, 1 ♀, Peleben, S. Kajan, V. v. PLESSSEN, 12.VIII-19.IX.25.

**Sciurillus murinus (MULL. & SCHLEG.).**

For the use of the genus *Sciurillus*, see ELLERMAN, *Fam. & Gen. of Liv. Rodents*, 1, 1940, p. 317.

**Sciurillus murinus murinus (MULL. & SCHLEG.).**

*Material:* N. E. Celebes: 1 ♂, 1 ♀, "Menado", MOHARI, 1908; 2 ♂♂, 2 ♀♀, Amurang, Menado, ERIE, 15-16.IV.26; 1 ♂, 1 ♀, Tonsea Lama, Tondano, J. W. VAN BRAEKEL, 28.VII.38.

The type locality of this race, said to be "North Celebes", may be restricted to the extreme N.E. part of the island.

Tooth-measurement: 5.8-6.02-6.2 mm (6). Greatest length of skull, maximum, 37.3 mm (4). Greatest breadth, maximum, 23.1 mm (4).

**Sciurillus murinus griseus subsp.n.**

*Type:* ♀ ad., Bumbulan, Res. Menado, N. Celebes, South coast. Coll. J. J. MENDEN, 24.X.1939. Buitenzorg Museum, No 220/39. Examined: 2 ♀♀, type locality, same collector.

**Diagnosis:**

While in freshly collected *murinus* the underside is "mouse-coloured", suffused with tawny buff, in *griseus* the hairs on the underside, which have also mouse-coloured bases, possess rather long grey tips slightly



***Callosciurus tenuis altitudinus* (ROB. & KLOSS).**

*Material:* Atjeh, N. Sumatra: 2 ♂♂, 3 ♀♀, Atang Putar, 1000 m, A. HOOGERWERF, 4-13.IV.37; 1 ♂, Palo 800-1000 m, A. HOOGERWERF, 27.II.37; 1 ♂, Simpang Agusan, 1000 m, A. HOOGERWERF, 2.II.37; 1 ♂, Ngo Lembuh, Bivak I, A. HOOGERWERF, 22.II.37; 1 ♂, 2 ♀♀, Redelong, 1300 m, MADZOED, 27-28.III.30; 2 ♂♂, 1 ♀, Pajatungkalan, 2000 m, MADZOED, 30.VIII-8.IX.30; Benkulen, S. Sumatra: 4 ♂♂, 4 ♀♀, Mount Dempo, 1500-2500 m, J. J. MENDEN, 14-27.VII.36.

No difference in size can be observed between the northern and the southern series. The Dempo series is much more rufous (whole pelage) than that from Atjeh, but the former has been preserved in formaline.

***Callosciurus tenuis siantanicus* (CHASEN & KLOSS).**

*Material:* 1 ♀, P. Siantan, Anambas, F. N. CHASEN, 21.IX.25.

***Callosciurus tenuis procerus* (MILLER).**

*Material:* 1 ♂, Bunguran, N. Natunas, F. N. CHASEN, 26.VIII.28.

***Callosciurus tenuis parvus* (MILLER).**

*Material:* W. Borneo: 2 ♂♂, 4 ♀♀, Sonuwang, Landak, 500 m, J. J. MENDEN, 17.VIII-13.IX.37; 1 ♀, Perbuwak, Landak, 900 m, J. J. MENDEN, 24.VII.37; 1 ♀, Peniti, Pontianak, MADZOED, 2.IV.31.

The Perbuwak specimen has a greatest length of skull of 40.5 mm, against a maximum of 38.5 in 4 specimens from lower altitude.

***Callosciurus modestus* (MULLER).*****Callosciurus modestus modestus* (MULLER).**

*Material:* Atjeh, N. Sumatra: 1 ♂, 2 ♀♀, Mount Leuser, 550-1000 m, A. HOOGERWERF, 22.I-5.III.37; Lampongs, S. Sumatra, 1 ♀, Tjabangkanan, M. A. LIEFTINCK, 26.XII.34.

We are rather sure that here are represented two different subspecies the southern specimen lacking the orange buff, which in the northern specimens appears on shoulder region, anal region, and underside of tail. In 12 Sumatran specimens the tail averages 83% of the length of head and body.

Considered as a separate species next to *tenuis*, *modestus* seems rather difficult to distinguish from the latter. We do not feel sure that the characters, given by CHASEN (*Treubia* 17, 1940, p. 491) go further than the difference between special races of both species. Perhaps the broader nasals of *modestus* may furnish a more general distinguishing character.

***Callosciurus jentinki* (THOS.).*****Callosciurus jentinki subsignanus* (CHASEN).**

*Material:* E. Borneo: 2 ♂♂, 1 ♀, Point D, up country from Long Petah, 1172 m, H. C. SIEBERS, 16-17.X.25; N. E. Borneo: 4 ♂♂, Badang, V. VON PLESSSEN, 9.V-11.VI.35.

The Long Petah specimens are topotypes. Together with the type they give 6.6-6.9 mm for the upper tooththrow. The Badang series gives 7.0-7.3 mm, and so it might represent a larger toothed race. The tail averages 94% of the length of head and body (7 specimens).

**Callosciurus lowii (THOS.).**

**Callosciurus lowii lowii (THOS.).**

*Material:* C. E. Borneo: 4 ♂♂, 5 ♀♀, Long Petah, H. C. SIEBERS, 9.IX-11.X.25; 1 ♀, Long Hut, H. C. SIEBERS, 18.VIII.25; N. Borneo: 2 ♂♂, Border District between Netherlands & British Territories, MOHARI, 1912.

In 10 adult skulls the greatest length is 37.5-40.9 mm, the upper tooththrow measures 7.0-7.6 (average 7.23) mm. The tail averages 72% of the length of head and body (12 ex.).

**Callosciurus lowii vanakeni (ROB. & KLOSS).**

*Material:* Atjeh, N. Sumatra: 1 ♂, Geureudong, MADZOED, 3.VII.30; S. Sumatra: 1 ♀, Benkulen, Mount Dempo, ± 1800 m, J. J. MENDEN, 27.VII.36.

**Callosciurus lowii siberu (CHAS. & KLOSS).**

*Material:* 1 ♀, Siberut Isl., Mentawi Arch., C. B. KLOSS, 15.IX.24.

**Callosciurus lowii fraterculus (THOS.).**

*Material:* 1 ♀, Siberut Isl., Mentawi Arch., C. B. KLOSS, 15.IX.24.

**Callosciurus lowii pumilus (MILLER).**

*Material:* 1 ♂, 1 ♀, North Pagi Isl., Mentawi Arch., J. J. MENDEN, 29.XII.31-30.I.35.

**Callosciurus notatus (BODD.).**

I tried to obtain an insight into the geographic variation of the measurements of this species, which is very interesting because of its large geographic variation. For that purpose the accompanying tables were compiled. Unfortunately they had to remain very incomplete. Of the 26 subspecies, represented in the Zoological Museum and my private collection, 442 tooth measurements could be collected. Of the 36 subspecies, not represented in our collections, only 46 tooth measurements could be found—in total 62 subspecies with 488 tooth measurements, giving an average of less than 8 per race. Also the distribution over these races is very irregular. Of one race (*lighti* CHASEN & KLOSS) not a single measurement seems to be available, of many others not a single tooth measurement has ever been published. In my opinion the measurements of some 20 individuals of each race would be necessary for giving us a proper insight into their internal variation. If we take this number as a standard we must say that less than 10 of the 62 subspecies are sufficiently known in this respect!

## Measurements of subspecies represented in Buitenzorg Museum.

Localities	Upper tooththrow				Tail in %				Total length whole animal		Skull: greatest length		Skull: greatest breadth		Subspecies
	Min.	Aver.	Max.		Min.	Aver.	Max.		Max.		Max.		Max.		
SUMATRA															
Lesten, S. W. Atjeh	8.9	9.17	9.6	7	89	106.2	122	9	391	10	49.2	10	29.3	6	<i>percommodus</i>
Loh Sidok Bay, N. W. Atjeh <sup>1)</sup>	—	—	—	—	78	89.5	106	6	390	6	—	—	—	—	
N. E. Atjeh	8.6	8.92	9.6	4	91	94.2	102	4	367	4	48.0	4	28.2	4	
Perlak, Langsa, S. E. Atjeh	8.4	8.88	9.2	20	66	93.4	112	19	381	32	—	—	—	—	
Medan, Sum. E. Coast <sup>2)</sup>	8.7	9.35	10.2	25	78	94.0	116	15	398	15	50.4	16	30.1	17	<i>nicotianae</i>
Aru Bay, S.E.C. <sup>3)</sup>	—	—	—	—	—	98	—	1	405	1	48.9	1	30.0	1	
Tebing Tinggi, S.E.C.	9.0	9.24	9.5	5	88	95.2	108	5	410	5	49.7	5	29.6	4	
Pematang Siantar, S.E.C.	—	9.4	—	1	—	93	—	1	383	1	50.8	1	28.8	1	
S.E.C., South half <sup>3)</sup>	—	—	—	—	75	92.4	103	9	425	9	52.0	9	30.2	8	
Tapanuli Bay <sup>4)</sup>	—	9	—	1	77	90.2	105	9	405	9	—	—	29.5	1	<i>tapanulius</i>
Sarula N. Tapanuli	9.1	9.45	9.6	4	86	91.2	95	4	425	13	—	—	—	—	
Tangga, Tapanuli 350 m	9.3	9.48	9.8	5	80	92.8	99	5	420	5	53.2	5	31.0	5	
Kotatjane, Tapan., 200 m	9.7	9.80	9.9	2	93	93.5	94	2	378	2	48.8	2	—	—	
Lubuk Landur, Ophir <sup>5)</sup>	9.2	9.55	9.9	2	91	92.0	93	2	395	2	49.5	2	30.0	2	
Muara Fort de Kock	—	9.4	—	1	—	—	—	—	—	—	50.3	1	30.3	1	
Tarusan Bay <sup>6)</sup>	—	9.7	—	1	—	86	—	1	400	1	—	—	31.4	1	<i>(tarussanus)</i>
S. Penoh, S. Daris, S. Agong <sup>7)</sup>	8.2	8.99	9.5	7	75	89.7	98	7	391	7	51.7	7	29.6	7	
Benkulen (town) <sup>8)</sup>	8.8	9.10	9.5	7	74	90.0	100	7	385	7	52.5	8	29.2	8	<i>vittatus</i>
R. Pengadan, Barisan <sup>9)</sup>	9.0	9.10	9.2	2	90	91.5	93	2	378	2	50.7	2	29.4	2	
Sanggul, Benkulen, 500 m	8.6	9.18	9.7	11	80	93.2	105	10	417	11	50.5	11	30.0	9	
Dempo, Benkulen, 1400 m <sup>9)</sup>	9.0	9.20	9.4	2	89	90.5	92	2	389	2	50.7	2	29.9	2	
Lampongs, Wai Lima	9.0	9.30	9.9	8	75	95.1	109	9	425	9	49.1	8	29.2	8	
Lampongs, Gisting	8.8	9.14	9.3	5	81	100.3	111	7	381	7	—	—	—	—	
Lampongs, Wonosobo	8.4	8.82	9.1	5	85	92.6	100	7	385	7	—	—	—	—	
Kalianda, S. E. Lampongs	8.4	8.32	9.2	4	83	90.7	96	3	427	3	49.0	3	28.1	4	<i>kalianda</i> subsp.n.
Palembang & neighbourh.	8.6	8.94	9.3	7	96	102.0	108	3	385	3	49.4	7	28.0	7	
Muara Duwa, 100 m	8.4	8.83	9.1	3	95	95.5	96	2	400	3	50.4	3	28.3	3	
JAVA etc.															
Prinseneiland	—	9.4	—	1	—	77	—	1	353	1	52.0	1	31.5	1	<i>prinsulae</i> subsp.n.
Bantam, Tjikudjang	—	9.8	—	1	—	94	—	1	395	1	50.4	1	29.0	1	subspecies?
Buitenzorg	8.5	9.02	9.6	44	74	91.4	104	29	376	29	50.3	34	28.8	34	<i>notatus</i>

Callosciurus notatus (BODDAERT).

Localities	Upper tooththrow				Tail in %				Total length whole animal		Skull: greatest length		Skull: greatest breadth		Subspecies
	Min.	Aver.	Max.		Min.	Aver.	Max.		Max.		Max.		Max.		
JAVA (contin.)															
Batavia	9.0	9.20	9.7	4	61	79.5	93	4	373	4	48.7	4	28.3	4	<i>notatus</i>
Tjipanas, Garut	9.3	9.73	10.3	15	68	93.9	110	18	387	18	52.0	16	30.0	16	<i>vanheurni</i>
Tjibaregbeg, Garut	9.3	9.65	10.0	8	62	84.0	95	8	422	8	52.3	8	30.3	8	"
Tjilatjap	9.6	9.80	10.0	2	—	80	—	1	388	1	49.4	2	28.0	2	<i>balstoni</i>
Tjineam	—	9.4	—	1	89	101.0	110	3	342	3	45.6	2	25.6	1	" (?)
Cheribon	9.4	9.40	9.4	2	81	96.8	100	5	355	5	49.2	4	27.8	1	" (?)
Tandjong Modjo	8.8	8.98	9.1	4	83	97.2	103	4	385	4	51.5	3	28.2	4	<i>verbeeki</i>
Madura	8.4	8.85	9.3	4	80	89.0	95	3	375	3	49.3	3	28.1	4	<i>madurae</i>
Dampit <sup>10)</sup>	9.0	9.17	9.4	3	75	82.7	90	3	387	3	49.8	2	28.8	2	<i>tamansari</i> (?)
Tengger	—	9.0	—	1	—	78	—	1	365	1	50.4	1	29.0	1	"
Rambipudji	9.0	9.05	9.1	2	95	96.5	98	2	357	2	49.0	2	28.5	2	"
Ijang	9.0	9.23	9.5	3	70	81.7	96	4	370	4	47.5	3	27.8	3	"
Sumberwringin	8.8	8.95	9.1	2	93	95.0	97	2	378	2	49.0	2	28.1	2	"
Buduan	—	8.9	—	1	—	101	—	1	378	1	48.5	1	27.6	1	"
Badjulmati	8.4	8.50	8.6	3	84	89.3	97	3	392	3	47.2	3	28.0	3	"
Bali <sup>11)</sup>	8.6	9.04	9.4	30	51	86.0	110	40	395	40	49.8	18	28.7	17	<i>stresemanni</i>
Nusa Barung	9.0	9.51	10.0	7	91	95.9	105	7	401	7	51.9	7	29.6	6	<i>magnificus</i> subsp.n.
Saleyey (near Celebes)	9.3	9.44	9.7	5	90	100.0	112	6	396	6	48.0	6	28.7	6	<i>microtis</i>
BORNEO etc.															
Pontianak <sup>12)</sup>	9.0	9.28	9.5	6	80	93.3	107	11	420	11	52.3	11	31.7	10	<i>dulitensis</i>
Bettotan <sup>13)</sup>	9.0	9.17	9.5	10	78	97.5	109	10	415	10	51.0	10	30.2	10	<i>dilutus</i>
E. Borneo, (Zool. Mus.)	8.6	9.33	10.0	23	86	98.9	122	20	408	20	52.3	22	31.0	19	"
E. Borneo (Gyld.) <sup>14)</sup>	8.4	8.90	9.2	9	84	94.6	117	9	421	10	49.7	9	29.9	9	"
Tenggarong	8.9	9.21	9.5	9	89	101.6	109	9	380	9	—	—	—	—	"
Montellat. (Barito) <sup>15)</sup>	8.8	9.19	9.8	8	92	100.8	109	6	405	6	51.0	3	29.7	4	"
Perbuwak	9.0	9.41	10.0	8	80	97.1	110	10	428	10	52.3	9	36.2	8	" (?)
K. Tjempaga & Riam -	8.8	9.08	9.4	8	92	101.8	110	11	398	11	49.9	11	28.8	10	<i>vinocastaneus</i> subsp.n.
Melawi	8.7	9.03	9.4	3	83	92.5	102	2	406	2	51.2	3	29.3	3	"
Kajutanam	0.9	9.10	9.2	2	—	—	—	—	—	—	49.3	2	28.3	2	"
FURTHER DISTRIBUTION															
Pulu Siantan <sup>16)</sup>	9.0	9.35	9.9	4	89	91.7	97	8	375	8	51.2	8	29.9	8	<i>anambensis</i>
Bunguran <sup>17)</sup>	8.8	9.23	9.9	11	76	84.9	99	18	396	18	52.4	12	32.2	10	<i>rubidiventris</i>
Sedanau <sup>18)</sup>	8.2	8.86	9.2	7	81	89.9	99	16	368	16	50.4	8	29.6	8	<i>rutiliventris</i>
Pulu Sirhassen <sup>19)</sup>	7.9	8.48	9.0	12	78	89.9	100	16	375	16	46.7	12	27.4	12	<i>lutescens</i>
..... <sup>20)</sup>	8.7	9.11	10.1	22	78	88.5	106	25	410	26	49.3	15	29.9	24	<i>tedongus</i>

P. Arends <sup>23)</sup>	—	—	—	—	67	80.8	94	5	355	5	46.5	2	26.0	4	<i>arendsis</i>
P. Matasiri <sup>23)</sup>	—	—	—	—	71	86.4	100	13	395	13	47.8	12	28.9	11	<i>siriensis</i>
Trong, Lower Siam <sup>24)</sup>	—	—	—	—	—	90.2	—	10	413	10	—	—	—	—	<i>miniatus</i>
Perak, Malay Penins. <sup>25)</sup>	8.2	8.68	9.0	5	84	96.7	115	4	395	4	50.1	5	28.0	4	"
	—	—	—	—	87	94.8	99	6	410	7	50.5	7	30.0	7	"
Kao Nawng, Siam <sup>27)</sup>	—	—	—	—	90	95.2	104	5	374	5	49.3	5	30.0	5	"
Endau River, Pahang <sup>28)</sup>	—	—	—	—	—	86	—	1	390	1	49.4	1	28	1	<i>peninsularis</i>
Si Karang, S. E. Johore <sup>29)</sup>	—	—	—	—	—	97	—	1	377	1	51.5	1	30.5	1	<i>subluteus</i>
Singapore island <sup>30)</sup>	9.6	9.96	10.2	9	90	95.2	107	8	434	8	51.9	9	31.8	9	<i>singaporensis</i>
Penang island	—	—	—	—	—	—	—	—	—	—	—	—	—	—	<i>lighti</i>
E. Perhentian island <sup>31)</sup>	—	9.0	—	1	86	91.4	103	48	375	19	51.0	20	29.0	20	<i>proteus</i>
W. Perhentian island <sup>31)</sup>	—	9.0	—	1	78	91.0	94	29	381	12	50.5	12	28.6	12	<i>perhentiani</i>
Great Redang island <sup>32)</sup>	—	—	—	—	90	97.9	102	26	385	13	47.5	13	29.0	13	<i>plasticus</i>
Little Redang island <sup>32)</sup>	—	8.9	—	1	92	97.6	102	8	367	8	46.7	6	27.8	8	<i>scottii</i>
Lantinga island <sup>33)</sup>	—	8.5	—	1	92	100.2	109	9	370	9	47.3	9	27.8	9	<i>watsoni</i>
P. Tenggol <sup>34)</sup>	8.1	8.47	8.9	4	73	87.5	97	4	348	4	47.0	4	27.2	3	<i>guillemardi</i>
Tioman island <sup>35)</sup>	—	—	—	—	86	88.0	90	2	362	2	50	1	28	1	<i>tenuirostris</i>
P. Pemangil <sup>36)</sup>	—	—	—	—	—	81	—	1	335	1	49	1	28	1	<i>pemangilensis</i>
P. Aor <sup>37)</sup>	—	—	—	—	—	81	—	1	335	1	45	1	25	1	<i>aoris</i>
P. Dayang <sup>38)</sup>	—	8.3	—	1	—	90	—	1	334	1	45.1	1	26.0	1	<i>famulus</i>
P. Rupert <sup>39)</sup>	—	—	—	—	78	83.8	90	5	445	5	54.9	5	32.0	5	<i>rupatius</i>
P. Padang <sup>39)</sup>	—	—	—	—	76	87.0	98	8	430	8	53.7	10	31.5	9	"
P. Tebing Tinggi <sup>39)</sup>	—	—	—	—	—	83	—	1	422	1	53.6	1	31.5	1	"
P. Merbau <sup>39)</sup>	—	—	—	—	84	91.0	98	2	425	2	52.9	2	31.7	2	"
Bintang id. (Rhio) <sup>40)</sup>	—	—	—	—	65	82.5	93	4	415	4	—	—	—	—	<i>stellaris</i>
Batam id. (Rhio) <sup>41)</sup>	—	—	—	—	81	84.0	86	3	380	3	51	1	31.3	1	<i>nesiotes</i>
Bulan id. (Rhio) <sup>42)</sup>	—	—	—	—	86	88.4	90	5	422	5	52.3	5	31.8	5	<i>lunaris</i>
P. Mapor <sup>44)</sup>	8.4	8.90	9.3	10	80	87.7	91	10	367	10	48.5	10	29.3	10	<i>maporensis</i>
P. Bangkaru (Banjak) <sup>44)</sup>	—	9.6	—	1	82	89.9	103	5	411	5	52	1	30	1	<i>saturatus</i>
P. Tuangku (Banjak) <sup>44)</sup>	—	9.0	—	1	82	87.4	95	7	400	11	49.4	1	29	1	<i>pretiosus</i>
Tana Bala (Baki) <sup>45)</sup>	—	9.6	—	1	82	83.7	102	7	415	7	52	1	34	1	<i>ubericolor</i>
P. Seraia (S. Natunas) <sup>46)</sup>	—	10.2	—	1	—	87	—	1	420	1	54	1	32.6	1	<i>icterius</i>
P. Laut (N. Natunas) <sup>46)</sup>	—	8.6	—	1	—	88.6	—	4	368	4	45	1	26.4	1	<i>seraiae</i>
P. Laut (N. Natunas) <sup>47)</sup>	—	—	—	—	—	89.9	—	9	379	9	—	—	—	—	<i>lautensis</i>
Big Tambelan id. <sup>48)</sup>	—	—	—	—	—	88.5	—	6	394	6	49	1	—	—	<i>abbotti</i>
P. Bunoa <sup>44)</sup>	—	—	—	—	—	86.8	—	4	382	4	—	—	—	—	"
Direction id. <sup>49)</sup>	—	9.2	—	1	—	96	—	1	372	1	46.4	1	26.7	1	<i>director</i>
P. Pannow <sup>50)</sup>	—	—	—	—	—	96	—	1	380	1	47	1	26.4	1	<i>pannovianus</i>
Mallewalle id. <sup>51)</sup>	8.9	9.01	9.1	7	89	93.6	97	8	377	8	48.5	6	29.1	6	<i>malawali</i>
Pamukang Bay (Borneo) <sup>52)</sup>	—	—	—	—	82	90.7	97	3	395	3	48.6	3	30.8	2	<i>conipus</i>
P. Lamukotan <sup>53)</sup>	—	—	—	—	70	84.4	93	8	420	8	51.8	8	30.2	7	<i>lamucotanus</i>
P. Datu <sup>53)</sup>	—	—	—	—	87	93.5	102	6	403	6	47.3	6	27.5	6	<i>datus</i>
P. Laut <sup>54)</sup>	—	—	—	—	83	90.0	95	6	410	6	48.8	4	30.3	4	<i>marinsularis</i>
P. Sebuku <sup>54)</sup>	—	—	—	—	85	85.5	86	2	381	2	48.0	2	29.8	2	"

H. J. V. SODY: On a collection of Sciuridae.

- 1) MILLER, Proc. U.S. Nat. Mus., 26, 1903, p. 456.
- 2) Incl. SODY, Nat. Tijdschr. Ned. Ind., 96, 1936, p. 217.
- 3) LYON, Proc. U.S. Nat. Mus., 34, 1908, p. 642.
- 4) MILLER, Proc. U.S. Nat. Mus., 26, 1903, p. 456.
- 5) ROBINSON & KLOSS, Journ. F.M.S. Mus., 7, 1919, p. 318.
- 6) LYON, Smiths. Misc. Coll., 48, 1907, p. 279.
- 7) ROBINSON & KLOSS, Journ. F.M.S. Mus., 8, 1918, p. 38.
- 8) ROBINSON & KLOSS, Journ., F.M.S. Mus., 7, 1919, p. 283 (one tooth measurement of 8.1 mm has been left out, because a printing error seems possible).
- 9) ROBINSON & KLOSS, Journ. F.M.S. Mus., 7, 1919, p. 283.
- 10) I did not insert KLOSS' measurement of 11.2 mm for the tooththrow in the type of *tamansari* (Journ. F.M.S. Mus., 10, 1921, p. 230), as it is nearly certain that this is a printing error.
- 11) Incl. SODY, Nat. Tijdschr. Ned. Ind., 93, 1933, p. 79.
- 12) Incl. LYON, Proc. U.S. Nat. Mus., 33, 1907, p. 557 (part.).
- 13) CHASEN & KLOSS, Bull. Raffl. Mus., 6, 1931, p. 58.
- 14) GYLDENSTOLPE, Kungl. Svensk. Vet. Akad. Handl., 60, 1919, p. 37.
- 15) Incl. FRECHKOP, Meded. Kon. Natuurh. Mus. België, 10, 14, 1934, p. 10.
- 16) Incl. MILLER, Proc. Wash. Acad. Sci., 2, 1900, p. 223, and CHASEN & KLOSS, Journ. Mal. Br. R.A.S., 6, 1928, Pt. 3, p. 33.
- 17) Incl. MILLER, Proc. Wash. Acad. Sci., 3, 1901, p. 127, and CHASEN, Bull. Raffl. Mus., 10, 1935, p. 34.
- 18) Incl. MILLER, Proc. Wash. Acad. Sci., 3, 1901, p. 126, and CHASEN, Bull. Raffl. Mus., 10, 1935, p. 35.
- 19) Incl. MILLER, Proc. Wash. Acad. Sci., 3, 1901, p. 124, and CHASEN, Bull. Raffl. Mus., 10, 1935, p. 34.
- 20) Incl. LYON, Proc. U.S. Nat. Mus., 31, 1906, p. 592, and SODY, Temminckia, 2, 1937, p. 235.
- 21) Incl. LYON, Proc. U.S. Nat. Mus., 31, 1906, p. 592.
- 22) Incl. LYON, Proc. U.S. Nat. Mus., 31, 1906, p. 58.
- 23) LYON, Proc. U.S. Nat. Mus., 40, 1911, p. 90.
- 24) MILLER, Proc. Wash. Acad. Sci., 2, 1900, p. 79.
- 25) GYLDENSTOLPE, Ark. f. Zool., 10, 1917, p. 27.
- 26) KLOSS, Journ. F.M.S. Mus., 4, 1911, p. 206.
- 27) ROBINSON & KLOSS, Journ. F.M.S. Mus., 5, 1914, p. 123.
- 28) MILLER, Smiths. Misc. Coll., 45, 1903, p. 10.
- 29) THOMAS & WROUGHTON, Journ. F.M.S. Mus., 4, 1911, p. 116.
- 30) MILLER, Proc. Wash. Acad. Sci., 2, 1900, p. 221, and ROBINSON, Journ. F.M.S. Mus., 7, 1916, p. 74.
- 31) KLOSS, Journ. F.M.S. Mus., 4, 1911, p. 205.
- 32) KLOSS, Journ. F.M.S. Mus., 4, 1911, p. 204.
- 33) KLOSS, Journ. F.M.S. Mus., 4, 1911, p. 206.
- 34) KLOSS, Journ. Mal. Br. R.A.S., 4, 1926, p. 259.
- 35) MILLER, Proc. Wash. Acad. Sci., 2, 1900, p. 221.
- 36) MILLER, Smiths. Misc. Coll., 44, 1903, p. 9.
- 37) MILLER, Smiths. Misc. Coll., 44, 1903, p. 10.
- 38) ROBINSON, Ann. Mag. Nat. Hist., (8) 10, 1912, p. 592.
- 39) LYON, Proc. U.S. Nat. Mus., 34, 1908, p. 642.
- 40) MILLER, Proc. U.S. Nat. Mus., 31, 1906, p. 264.
- 41) MILLER, Proc. U.S. Nat. Mus., 31, 1906, p. 264, and THOMAS & WROUGHTON, Journ. F.M.S. Mus., 4, 1911, p. 115.
- 42) LYON, Proc. U.S. Nat. Mus., 36, 1909, p. 483.
- 43) ROBINSON, Journ. F.M.S. Mus., 7, 1916, p. 67.
- 44) MILLER, Proc. U.S. Nat. Mus., 26, 1903, p. 456.
- 45) MILLER, Smiths. Misc. Coll., 44, 1903, p. 12.
- 46) MILLER, Proc. Wash. Acad. Sci., 3, 1901, p. 125.
- 47) MILLER, Proc. Wash. Acad. Sci., 3, 1901, p. 128.
- 48) MILLER, Proc. Wash. Acad. Sci., 2, 1900, p. 224.
- 49) LYON, Proc. U.S. Nat. Mus., 36, 1909, p. 509.
- 50) MILLER, Smiths. Misc. Coll., 44, 1903, p. 11.
- 51) CHASEN & KLOSS, Bull. Raffl. Mus., 6, 1921, p. 59.
- 52) LYON, Proc. U.S. Nat. Mus., 40, 1911, p. 91.
- 53) LYON, Proc. U.S. Nat. Mus., 40, 1911, p. 90.
- 54) LYON, Proc. U.S. Nat. Mus., 40, 1911, p. 91.

Of course nobody may expect that such an incomplete survey of the results could lead us to a thorough insight into the causes of these results. At best we may try to find out a few striking points—which, however, appear not to lead us to the discovery of any important laws.

The variation of the tooth measurements in the whole species should be regarded as moderately large (7.9-10.3 mm, giving a variation of 30.4%). The maximum within one separate race is 17.2% (*nicotianae*, with 8.7-10.2 mm). Some races with apparently very large teeth are:

<i>icterius</i> (Tana Bala, Batu Ids)	10.2	(1)
<i>singaporensis</i> (Singapore Id.)	9.6-9.96-10.2	(9)
<i>billitonus</i> (Billiton Id.)	9.5-9.85-10.1	(13)
<i>vanheurni</i> (Tjipanas, W. Java)	9.3-9.73-10.3	(15)
<i>magnificus</i> (Nusa Barung)	9.0-9.51-10.0	(7)

Some races with very small teeth are:

<i>guillemardi</i> (P. Tenggol)	8.1-8.47-8.9	(4)
<i>lutescens</i> (P. Serasan)	7.9-8.48-9.0	(12)
<i>tamansari</i> (Badjulmati, E. Java)	8.4-8.50-8.6	(3)
<i>famulus</i> (P. Dayang)	8.3	(1)

I fail to see a geographical line in this variation, nor do I see any relation with the occurrence in larger or in smaller islands. In some of the small islands surrounding the Malay Peninsula, some very small-toothed subspecies are found, but the few known tooth-measurements of *miniatus*, from Perak, Mal. Peninsula, are also small: 8.2-8.68-9.0 (5), while on the contrary, *singaporensis* seems to be one of the races largest in this respect.

Suchlike considerations can also be made for the maximum measurements of whole animals and of skulls. Arranging some of the races largest in order of the total length of the maximum specimens, we get:

	Total l. of whole animal	Greatest l. of skull	Greatest br. of skull
<i>rupatius</i> (P. Rupert)	445 (5)	54.9 (5)	32.0 (5)
<i>singaporensis</i> (Singapore Id.)	434 (8)	51.9 (9)	31.8 (9)
<i>kalianda</i> (Kalianda, S. Sumatra)	427 (3)	49.0 (3)	28.1 (3)
<i>nicotianae</i> (East N. Sumatra)	425 (9)	52.6 (9)	30.2 (8)
<i>vittatus</i> (Wai Lima, S. Sumatra)	425 (9)	49.1 (8)	29.2 (8)
<i>lunaris</i> (Bulan Id., Rhio)	422 (5)	52.3 (5)	31.8 (5)
<i>icterius</i> (Tana Bala, Batu Ids.)	420 (1)	54 (1)	32.6 (1)
<i>tapanulius</i> (Tangga, Tapanuli)	420 (5)	53.2 (5)	31.0 (5)
<i>lamucotanus</i> (P. Lamukotan)	420 (8)	51.8 (8)	30.2 (7)

<i>dulitensis</i> (N. W. Borneo)	420 (11)	52.3 (11)	31.7 (10)
<i>ubericolor</i> (P. Tuangku, Banjak Ids.)	415 (7)	52 (1)	34 (1)

As far as they go, these numbers show us that the maxima for greatest length and greatest breadth of the skull, in their variation do not closely follow the maxima for the total length of the whole animal.

Below are following some races which give the impression of being very small:

	<i>Total l. of whole animal</i>	<i>Greatest l. of skull</i>	<i>Greatest br. of skull</i>
<i>aoris</i> (P. Aor)	335 (1)	45 (1)	25 (1)
<i>faunulus</i> (P. Dayang)	334 (1)	45.1 (1)	26.0 (1)
<i>arendsis</i> (P Arends)	335 (5)	46.5 (2)	26.0 (4)
<i>seraiae</i> (P. Seraia, S. Natunas)	368 (4)	45 (1)	26.4 (1)
<i>lutescens</i> (P. Serasan)	375 (16)	46.7 (12)	27.4 (12)

All these small races live in small islands, but some other small islands furnish large races! And a few (not many) rather small forms live in large islands (*kalianda*, S. Sumatra; *tamansari*, Badjulmati, Java).

If, finally, we consider the relative length of the tail (average for the whole species 92%), we may first select some races with long tails (100% and more).

<i>percommodus</i> (Atjeh, N. Sumatra)	106.2 (9)
<i>kalianda</i> (Palembang, S. Sumatra)	102.0 (3)
<i>vittatus</i> (Giesting, S. Sumatra)	100.3 (7)
<i>dilutus</i> (Tenggarong, E. Borneo)	101.6 (9)
„ (Montellat, E. Borneo)	100.8 (6)
<i>vinocastaneus</i> (Tjempaga & Riam, S. W. Borneo)	101.8 (11)
<i>balstoni</i> (Tjineam, W. Java)	101.0 (3)
<i>watsoni</i> (Lantinga Id.)	100.2 (9)
<i>microtis</i> (Saleyer)	100.0 (6)

Most of these are living in large islands, Sumatra, Borneo, Java. Short tailed ( $< 82\%$ ) seem to be:

<i>arendsis</i> (P. Arends)	80.8 (5)
<i>notatus</i> (Batavia, W. Java)	79.5 (4)
<i>tamansari</i> (Ijang, E. Java)	81.7 (4)
<i>billitonus</i> (Billiton)	79.3 (13)
<i>serutus</i> (P. Serutu)	68.0 (2)
<i>pemangilensis</i> (P. Pemangil)	81 (1)
<i>aoris</i> (P. Aor)	81 (1)

Here also sometimes we see considerable variation within a short geographic distance, and up to the present day we even bring such long- and short-tailed animals into one subspecies. No doubt it is impossible

to deny some value to such differences in tail length, but it is equally impossible at present to determine the exact value of such differences. Yet this is urgently necessary, if at least we wish to raise our work of splitting a species into numerous races above the level of senseless doings, and if we wish to know how far we ought to go with our nominal splitting.

Again I want to lay stress on one of my pet desires: that—especially with this species—there may turn up many workers, who will collect and measure large local series in many places, so that we may obtain numerous perfectly reliable local minima, maxima and averages of all the measurements needed.

***Callosciurus notatus percommodus* (CHASEN).**

*Material:* N. Sumatra, S. W. Atjeh: 3 ♂♂, 7 ♀♀, Lesten, A. HOGERWERF, 9-21.III.37 (including type); N. Atjeh: 2 ♀♀, Rampah, MADZOED, 13.VI.30; 1 ♂, Alur Purba, MADZOED, 13.VI.30; 1 ♀, Blangkolam, MADZOED, 27.VI.30.

This is a race which is well distinguished by colour, rather small measurements—as compared with *nicotianae* and *tapanulius*—and a remarkably long tail, at least in the type series. The E.Atjeh-series slightly differs in colour (lighter sides of head) and in measurements. The Loh Sidoh Bay specimens of MILLER have a shorter tail, the Perlak series in my collection is decidedly smaller (nothing can be said of the colour at this moment).

***Callosciurus notatus nicotianae* SODY.**

*Material:* N. E. Sumatra, S. O. K.: 1 ♀, Pematang Siantar, Experimental Station, 15.III.1940; 4 ♂♂, 1 ♀, Tebing Tinggi, v.D. MEER MOHR, 11.15.VI.28; 3 ♂♂, 3 ♀♀, Sei Krio, Medan, v.D. MEER MOHR, 2-4.V.28; 1 ♀, Glugur, Medan, v.D. MEER MOHR, 17.III.28; 1 ♂, 1 ♀, Paja Geli, Sunggal, v.D. MEER MOHR, 19.III.28; 4 ♂♂, 2 ♀♀, Arnhemia, Sambaha, v.D. MEER MOHR, 4.7.IV.28.

The two colour types occurring side by side, everywhere are due to the difference in length of the ochraceous tips of the hairs, which, on their bases, are rather dark grey. It now appears that the race is strongly connected with *tapanulius*: both have a striking dirty grey chin and throat, broad dark lateral stripes, large measurements in general. My original separation was based on 14 Medan specimens, compared with 4 Tapanuli ones in my own collection. The difference was so great that, in the original description, I did not give special distinctive characters between both races. The present material, however, shows that in some specimens, both races perfectly pass into each other! *tapanulius* is always more or less fulvous on the belly. In some specimens the whole ventral side is purely, very finely fulvous. But often the throat region has rather much

ochraceous added. *nicotianae* is chiefly ochraceous buff, sometimes merely dark dirty grey. But in some specimens so much rufous is added that they can not well be distinguished from the above mentioned *tapanulius* specimens with much ochraceous colour. No percentage for these indistinguishable specimens can be given (perhaps 30?). The remaining and never covered difference seems just strong enough to uphold *nicotianae* as a separate race. Perhaps there also is a small difference in the measurements?

The measurements from the southern parts of the Gouvernement Sumatra's East Coast, given by LYON, seem to be larger than those of the Medan series.

***Callosciurus notatus tapanulius* (LYON).**

*Material:* W. Sumatra, S. Atjeh: 2 ♀♀, Kotatjane, 200 m, A. HOOGERWERF, 27.IV.37; Tapanuli: 3 ♂♂, 2 ♀♀, Tangga, 350 m, v.D. MEER MOHR, 3.VIII.28; Gouv. West Coast: 1 ♀, Muara Fort de Kock, OUWENS, 16.IV.11.

***Callosciurus notatus vittatus* (RAFFLES).**

*Material:* W. Sumatra, Bengkulen: 5 ♂♂, 6 ♀♀ Sanggul, 500 m, J. J. MENDEN, 4.VIII-4.IX.36; 1 ♀, Mount Dempo, 1500 m, J. J. MENDEN, 20.VII.36; S. Sumatra, W. Lampong: 2 ♂♂, 5 ♀♀, Wai Lima, H. C. SIEBERS, 6-18.XII.21.

The Wai Lima series can be incorporated into *vittatus* without objection. As regards two other series, from Gisting, and from Wonosobo, both in Lampongs (my collection), the measurements of the Gisting series seem to allow incorporation into *vittatus*. Those of the Wonosobo series are much closer to *kalianda*.

***Callosciurus notatus kalianda* subsp. n.**

*Type:* ♀ ad., Kalianda, S.E. Lampongs, S.Sumatra, 100 m. leg. J. J. MENDEN, 2.VIII.1934. Buitenzorg Museum, No. 108/34.

*Material:* 2 ♂♂, 2 ♀♀, type locality, same collector, 2-11.VIII.34. For additional material see below.

*Diagnosis:*

Differing from *vittatus* in colour, being more rufous and less ochraceous and, as it seems, smaller in measurements of the teeth than any other Sumatran race (only the Perlak, Atjeh, series shows similar small measurements). It is very remarkable, however, that the total length of the whole animal is not small at all: one of the Kalianda-animals, with 427 mm, in this respect represents the maximum for the whole of Sumatra (two other Kalianda specimens give 408 and 370 mm).

Measurements of type: head and body 192; tail 178; hind foot 42; ear 18; skull: greatest length 49.0; condylo-basal length 43.1; basal length 40.4; palatal length 24.0; zygomatic breadth 28.1; breadth of

braincase 22.3; interorbital constriction 16.9; breadth over postorbital processes 25.3; nasals  $13.4 \times 6.7$ ; diastema 10.9; length of palatal foramina 3.6; upper toothrow 9.2 mm.

There is another series in the collection of the Buitenzorg Museum tolerably well agreeing with *kalianda* in measurements and in colour:

*Material:* S. E. Sumatra, Palembang: 1 ♂, 1 ♀, Talang Betutu, purchased, 12.X.18; 1 ♀, Kluang, SOEKARNO, 28.VI.33; 1 ♂, Pangkalan Balai, purchased, 20.XI.18; 1 ♂, Palembang Ilir, MOHAMED DAOED, 12.X.18; 1 ♂, 1 ♀, Talang Djawa, SOEKARNO, 23.IV-8.V.33; 2 ♂♂, 1 ♀, Muara Duwa, J. J. MENDEN, 30.V-11.VI.34.

As already said under *vittatus*, I found the same small tooth-measurements in the series from Wonosobo.

As regards the races of Java and neighbouring islands, it must be recollected that none of the discriminations has been based on measurements, these measurements having been practically ignored up till now in this species. Therefore, differences in this respect, appearing from our table, must be looked upon as important supports of the discriminations concerned. Especially *vanheurni* now appears to be a very well founded subspecies! In length of the toothrow *vanheurni*, probably together with *balstoni*, surpasses both the more Western and the more Eastern races. As regards the colouring, the Museum material confirms the discrimination, as I gave it in 1933 (N.T.N.I. 93, 1933 p. 81), which was chiefly based on my own collection. With the material now available, no other discrimination into races could be desired. But I am convinced that in future some more new subspecies will appear to be necessary: one or two for the extreme South West, and some for the South East of Java (especially for the mountains). Two extremely well founded new races will be described below: one from Prinsen Island, and one from Nusa Barung Island.

***Callosciurus notatus prinsulae* subsp. n.**

*Type:* (and only specimen): ♂ ad., Prinsen Island, W. of Bantam, W. Java. Coll. K. W. DAMMERMAN, 23.VII.1929. Buitenzorg Museum Cat. No. 712.

*Diagnosis:*

Only one specimen is available, which already has been studied before and then united with *notatus* typicus of W. Java, but I consider this new race as very well based. When studying the colours, the specimen appears striking at once by its light and pure grey underside, which colour also continues over the whole innerside of the hind legs. Among the very large Java-series there are only 2 specimens resembling it in this respect: 1, Tjikudjang, W. Bantam, and 1, Palabuan Ratu, Wijnkoopsbay. But the type of *prinsulae* has a strikingly clear yellow underside of the tail, absent in the Javan specimens mentioned. Before I passed on to measur-

ing of the skull, I already felt quite sure that separation was necessary. Further the skull proved to be so much larger and relatively broader, that separation could also be based on these points alone. In 54 *notatus* the maximum greatest length of the skull is 50.4 mm (in the specimen mentioned from Tjikudjang), in *prinsulae* this measurement is 52.0 mm. The zygomatic breadth in *notatus* never surpasses 29.0 (Tjikudjang), in *prinsulae* it is 31.5 mm! Now in Java we also have large races: *vanheurni* and *balstoni* (which, for the rest, need no serious comparison of the measurements with *prinsulae*, because they are decisively distinguished from this race in the colouring). Here the skull may equal *prinsulae* in greatest length (maximum 52.3 in 30 specimens), but the maximum for the zygomatic breadth is only 30.3 (for the whole of Java).

Measurements of type: head and body 199; tail 154; hind foot 45; ear 20; skull: greatest length 52.0; condylo-basal length 48.7; basal length 45.6; palatal length 26.5; zygomatic breadth 31.5; breadth of braincase 21.9; minimum interorbital breadth 18.1; breadth across postorbital processes 27.6; nasals  $16.6 \times 7.1$ ; diastema 13.1; palatal foramina 3.0; upper toothrow 9.4 mm.

***Callosciurus notatus notatus* (BODDAERT).**

*Material:* W. Java, Res. Buitenzorg: 3 ♂♂, 2 ♀♀, Buitenzorg, A. BLANCHEMANCHE, 14-16.I.21; 2 ♂♂, 1 ♀, Buitenzorg, MADZOED, 3-6.XI.28; 2 ♀♀, Buitenzorg, P. F. FRANCK, 5.X.24; 3 ♂♂, Kp. Sindangbarang, Buitenzorg, SOEKARDJO, 9-11.IX.25; 2 ♂♂, Pantjasan, Buitenzorg, SOEKARDJO, 14.XI.25; 1 ♂, Kp. Gunung Batu, SOEKARDJO, 11.XI.25; 1 ♀, Buitenzorg, SOEKARDJO, undated; 1 ♂, 1 ♀, Tjiapus, Mount Salak, 650 m, P. F. FRANCK, 20.IV.37; 1 ♀, Tjiomas, Mount Salak, 500 m, SOEKARDJO, 10.XII.25; 1 ♂, Tjijulang, Pondok Gedeh Estates, 400 m, MADZOED, 25.XII.37; W. Java, Res. Batavia: 2 ♂♂, 1 ♀, Batavia, SAING, 8.III.21; 1 ♂, Suradita, Tangerang, W. ROMSWINCKEL, 14.X.29.

*Additional material:* ex Coll. SODY: 2 Tjigombong, 2 Tjariu, W. Java. The 5 specimens from Batavia and Tjariu have rather short tails.

***Callosciurus notatus* subsp. n.**

*Material:* W. Java: 1 ♂, Tjianten, Mount Salak, 1200 m, P. F. FRANCK, 27.III.32; 1 ♂, Palabuan Ratu, Wijnkoopsbay, South Coast, P. F. FRANCK, 18.I.34; 1 ♀, Tjikudjang, Bantam, P. F. FRANCK, 29.VIII.32.

Not indentifiable. Probably one or two new races will prove to be necessary when more material will be available.

***Callosciurus notatus vanheurni* SODY.**

*Material:* W. Java, Garut: 4 ♂♂, 4 ♀♀, Tjipanas, 750 m, W. C. VAN HEURN, 29.X-11.XI.28; 1 ♂, Tjipanas, H. J. V. SODY 6.XI.

27; 7 ♂♂, 1 ♀, Tjipanas, P. F. FRANCK, 18-19.XI.30; 3 ♂♂, 5 ♀♀, Tjibaregbeg, P. F. FRANCK, 13-17.XI.30.

The specimens from Tjipanas are distinguished by long skulls and especially, by large tooth sizes. The material from Tjibaregbeg, though slightly differing in colour, can best be put into this race.

**Callosciurus notatus balstoni** (ROB. & WROUGHT).

*Material:* 1 ♂, Tjilatjap, South Central Java, H. J. V. SODY, 15.XI.27.

As my own large series of this race from Tjilatjap is not measured, no good average of measurements can be given. However, the impression is that *balstoni* in some respects shows similar large measurements as *vanheurni*.

**Callosciurus notatus (balstoni ?).**

*Material:* W. J a v a : 1 ♂, 1 ♀, 1 ♀ imm., Tjineam, E. Preanger, 300 m, KOPSTEIN, V.28; 2 ♂♂, 1 ♀, Cheribon, North Coast, J. J. MENDEN, 6.V.28; 1 ♂, 1 ♀, Mount Tjerimai, 700 m, J. J. MENDEN, 18.III.31.

*Additional material:* ex coll. SODY: 14 specimens Tjandiroto, C. Java.

All specimens mentioned under this heading seem to belong together by the warm colour of the underside. For the rest they seem rather near to *balstoni*. For the present they best are united with that race.

**Callosciurus notatus verbeeki** SODY.

*Material:* C. J a v a : 2 ♂♂, Tandjong Modjo, Kudus, H. J. V. SODY, 20.IX.27.

**Callosciurus notatus madurae** (THOMAS).

*Material:* M a d u r a I s l. : 1 ♂, Bangkalan, H. J. V. SODY, 5.VII.27; 1 ♂, Sumenep, H. J. V. SODY, 23.I.28; 1 ♂, Pamekasan, H. J. V. SODY, 20.XII.27.

Probably THOMAS' measurement for the hind foot of the type (34 mm) is a misprint for 43 mm.

**Callosciurus notatus tamansari** (KLOSS).

*Material:* E. J a v a : 1 ♀, Duwet, Tengger Mountains, 900 m, SOEPARMA, 13.VII.39; 2 ♂♂, 2 ♀♀, Jang Highland, 550 m, P. F. FRANCK, 11-19.XI.28; 2 ♀♀, Sumber Wringin, Raung Mountains, 710 m, K. W. DAMMERMAN, 16.II.23; 3 ♀♀, Badjumat, Banjuwangi, SOEKARNO, 23.XI.36; 1 ♀, Buduan, Besuki, K. W. DAMMERMAN, 16.II.23.

Formerly I united the East Javan specimens with *stresemanni* of Bali, basing that opinion on my own collection. The present material from E. Java does not give any elucidation. It only rouses the belief that some different races are represented in it. Large series from all the E. Javan mountains are urgently needed. When for the present I summarize all these specimens under "*tamansari*", this is only because all better insight is failing here.

A remarkable series is that from Badjumat, with very pale colouring and very short tooththrows. KLOSS' tooth measurement for the type of *tamansari* (11.2 mm) is certainly a mistake. Probably this must be something like 9.2 mm!

***Callosciurus notatus stresemanni* (THOS.).**

*Material:* Bali: 3 ♂♂, 2 ♀♀, Gitgit, P. F. FRANCK, 11-13.X.28; 1 ♀, Gitgit, 530 m, B. RENSCH, 3.VIII.27; 1 ♂, Brantanlake, 1200 m, B. RENSCH, 3.VIII.37.

***Callosciurus notatus magnificus* subsp. n.**

*Type:* ♂ ad., Nusa Barung island, S. of Besuki, E. Java. leg. A. HOOGERWERF, 3.VII.39, Buitenzorg Museum. Coll. Nr. 47/39.

*Material:* 3 ♂♂, 4 ♀♀, type locality, same collector, 3-4.VII.39.

*Diagnosis:*

This is a very striking new race, perhaps the finest and certainly the darkest I ever saw. No other subspecies seems to approximate it in colours. Back much darker than in any other race I know, something like dark umber, the separate hairs black with normally 3 short, tawny or rusty rings, tips black, soft underfur more greyish. Dark lateral stripes of the same colour or rather pure blackish by absence of the light rings. Underside a very warm tawny or rusty, most of the hairs with grey bases, which may become very short on throat, innerside of legs, and axillae. Light lateral stripes not very heavy, in colour much resembling the belly. Sides of head lighter. Rusty ring round the eye. Tail dorsally, much like back, but the longer hairs have more (5) and longer rusty rings. Along the middle of the underside a light stripe, quite as rusty as the belly, a number of the hairs wholly rusty, especially so on the distal part of the tail. Hands and feet blackish with very fine rusty grey speckles.

Measurements of type: head and body 200; tail 195; hind foot 42; ear 20. Skull: greatest length 49.3; condylo-basal length 46.8; basal length 43.3; palatal length 24.5; zygomatic breadth 29.2; breadth of braincase 21.2; interorbital breadth 18.0; breadth across postorbital processes 26.1; nasals 13.9 × 7.0; diastema 11.8; palatal foramina 3.1; upper tooththrow 9.1 mm.

In some respects this seems to be a rather big form.

***Callosciurus notatus microtis* (JENT.).**

*Material:* 2 ♂♂, 4 ♀♀, Saleier Isl., S. of Celebes, J. REYNVAAN, 14.VI-VIII.37.

The somewhat peculiar habitat of this race may suggest the idea of its original introduction there by man. Of course we cannot answer this question with certainty, but there is no doubt that nowadays it forms a well distinguished type.

**Callosciurus notatus dulitensis** (BONHOTE).

*Material:* W. Borneo, Pontianak: 1 ♂, 1 ♀, vicinity of Pontianak town, Gouv. Agric. Inform. Off., 27.V.40; 2 ♂♂, Pematang Tudjuh, MADZOED, 15.III.31; 1 ♀, Batu Ampat, MADZOED, 12.III.31; 1 ♂, Peniti, MADZOED, 3.IV.31.

Four of the specimens have already before been identified as *dulitensis* (CHASEN, Treubia, 15, 1935, p. 5). As we do not possess typical *dulitensis*, I am fully prepared to accept this determination without comment.

**Callosciurus notatus dilutus** (MILLER).

*Material:* N. Borneo: sex. inc., Border of British and Neth. territories, between S. Sembakung and S. Sebuk, MOHARI, 1912; N. E. Borneo; Bulungan Distr.: 1 ♂, 3 ♀♀, Peleben, S. Kajan, V. VON PLESSEN, 6.VII.-3.VIII.35; 2 ♂♂, Badang, S. Bahan, V. VON PLESSEN, 22.V.35; E. Borneo: 2 ♂♂, 3 ♀♀, Long Petah, H. C. SIEBERS, 25.IX-9.X.25; 2 ♂♂, 5 ♀♀, Marah, H. C. SIEBERS, 1.VIII-22.XI.25; 2 ♂♂, 1 ♀, Muara Antjalung, H. C. SIEBERS, 27.VII-1.XII.25.

Differing from *dulitensis* in the colour of the underside, which is usually more pale and diluted with white. Only the Muara Antjalung series rather closely approaches *dulitensis*. The last mentioned 15 specimens had already been identified as *dilutus* by CHASEN & KLOSS (J. Mal. Br. R.A.S., 6, 1928, p. 41). The tooth measurements given by GYLDENSTOLPE are very small. Also with other animals it struck me that this author gave such small tooth measurements! Perhaps he practiced another method of measuring? Though more data remain very necessary, we already are getting a strong impression that Bornean animals of this species are rather long-tailed.

**Callosciurus notatus** subsp. n.

*Material:* 3 ♂♂, 5 ♀♀, Perbuwak, Landak, W. Borneo, 800 m., J. J. MENDEN, 26.VII-13.VII.37.

The Museum possesses series from Perbuwak, W. Borneo, strikingly differing from all specimens already mentioned in the colour of the underparts which is a very lively rufous, instead of ochraceous or buff. However, they have been in formaline, and for that reason it seems better not to pay attention to this very particular colour. In some of them the lower side is extremely diluted with white. The impression is that they are nearer to *dilutus* than to our *dulitensis* from Pontianak.

**Callosciurus notatus vinocastaneus** subsp. n.

*Type:* ♀ ad., Kali Tjempaga, Sampit, S.W. Borneo. leg. J. J. MENDEN, 17.VI.1935. Buitenzorg Museum, No. 132/35.

*Material:* S. Borneo: 4 ♂♂, 3 ♀♀, type locality, same collector, 12-23.VI.35; S. W. Borneo: 2 ♂♂, 2 ♀♀, Riam, Kotawaringin, J. J. MENDEN, 7.X-20.XI.35; W. Borneo: 1 ♂, 1 ♀, Kajutanam, OUWENS, 23.IV.11; 3 ♂♂, Melawi, Labang Hara & Nangah Serawai, A. BLANCHEMANCHE, 7.XII.24-I.25.

*Diagnosis:*

This series strongly differs from all our further Bornean material by a very rich and deep chestnut colour of the under side. In fact I never saw other specimens with so rich a colour—our single Billiton specimen coming nearest.

Measurements of type: head and body 206; tail 190; hind foot 44; ear 16; skull: greatest length 47.9; condylo-basal length 45.1; basal length 41.8; palatal length 24.3; zygomatic breadth  $\pm$  29.0; breadth of braincase 23.0; interorbital constriction 17.2; nasals  $13.3 \times 7.0$ ; diastema 10.9; length of palatal foramina 3.6; upper toothrow 9.3 mm.

The Kali Tjempaga and the Riam series certainly belong together in colour and measurements. The Melawi series has already been named before as *dulitensis* (by CHASEN & KLOSS, Journ. Mal. Br. R.A.S. 6, 1928, p. 41). These authors say that "these specimens are deep chestnut below and can be exactly matched by examples from Baram and Sarawak". Certainly the Melawi animals are not so intensely dark chestnut as the Sampit ones. Still I can say that our whole series, as specified above, is very uniform in colour when compared with this species, and it would be absolutely impossible to mistake any of our 16 *vinocastaneus* for any other Bornean specimen in our collection. Judging from the material which I have seen, I regard *vinocastaneus* to be a very strong colour race.

***Callosciurus notatus anambensis* (MILLER).**

*Material:* 2 ♂♂, Siantan Isl., Anamba Isls, F. N. CHASEN, 3-17.IX.25.

***Callosciurus notatus rubidiventris* (MILLER).**

*Material:* 1 ♂, Bunguran Isl., North Natuna Isls, F. N. CHASEN, 31.VIII.28.

Though the whole animals are not so very large, the skulls, as a rule, seem to be very long and broad. The table measurement of 32.2 for the zygomatic breadth is surpassed only in *ubericolor* and *icterius*, both from Banjak Isls.

***Callosciurus notatus rutiliventris* (MILLER).**

*Material:* 1 ♀, Sedanau Isl., North Natuna Isls, F. N. CHASEN, 18.IX.28.

***Callosciurus notatus lutescens* (MILLER).**

*Material:* 1 ♂, Sirhassen Isl., South Natuna Isls, P. M. DE FONTAINE, 17.VIII.31.

In all respects this appears to be a very small form; together with *guillemardi* it is the smallest one I know.

**Callosciurus notatus tedongus (LYON).**

*Material:* 1 ♂, Muntok, Banka Isl., H. C. SIEBERS, 25.XI.23.

**Callosciurus notatus billitonus (LYON).**

*Material:* 2 ♀♀, Billiton, D. BRAUTIGAM, 10.I-12.II.14.

The average of the tooth measurements is very high. The tails are rather short.

**Callosciurus notatus serutus (MILLER).**

*Material:* 1 ♂, Serutu Isl., Karimata Isls, MADZOED, 25.III.31.

As only 2 measurements are available, the very low tail measurement has not much value at present.

**Callosciurus nigrovittatus.**

Locality	Upper tooththrow				Tail in %				Subspecies
	Min.	Aver.	Max.		Min.	Aver.	Max.		
SUMATRA									
Atjeh	8.3	8.39	8.6	8	82	91.1	99	9	<i>bocki</i>
Tapanuli	8.4	8.47	8.6	4	80	84.0	88	2	"
Korinchi, 2450-7300 ft. <sup>1)</sup>	8.0	8.42	8.8	17	75	82.6	90	16	"
Benkulen	8.5	8.75	9.0	2	80	80.5	81	2	"
Dempo	7.8	8.10	8.4	2	75	78.0	81	2	"
Palembang <sup>c</sup>	8.4	8.79	9.2	7	64	83.3	96	7	"
Lampongs	—	8.6	—	1	—	95	—	1	subspecies?
BORNEO									
C. Borneo <sup>2)</sup>	8.1	8.60	8.9	3	86	88.3	90	3	<i>brookei</i>
JAVA									
Bantam	—	9.5	—	1	—	84	—	1	<i>bantamensis</i> subsp.n.
Mount Salak	8.9	9.02	9.2	5	76	91.7	107	3	<i>salakensis</i> subsp.n.
Buitenzorg	8.4	8.75	9.1	10	80	90.0	98	10	<i>nigrovittatus</i>
Djasinga	8.3	8.71	9.0	9	82	91.1	110	10	"
Tjineam	9.0	9.24	9.7	10	86	95.2	107	11	" (?)
Tjibodas	9.0	9.57	9.2	3	82	85.3	88	3	subspecies ?
Kamodjan	8.9	8.97	9.0	3	92	94.7	98	3	"
Tjerimai	8.8	9.09	9.3	10	66	90.5	101	10	<i>phoenicurus</i> subsp.n.
Muriah	9.2	9.40	9.6	4	80	87.0	92	3	<i>madsoedi</i>
Gedangan	8.8	8.95	9.1	2	88	96.5	105	2	subspecies?
Slamat, Kaligua	—	9.7	—	1	—	—	—	—	"
Sindoro	—	9.0	—	1	—	—	—	—	"
Ranu Pani	8.6	9.02	9.4	5	68	84.5	100	8	<i>tenggerensis</i> subsp.n.
Idjen <sup>3)</sup>	8.6	8.94	9.1	5	85	89.2	97	6	<i>besuki</i>
Idjen, 950 m.	8.5	8.68	9.0	4	78	83.5	88	4	subspecies?
Banjuwangi	9.0	9.10	9.2	2	80	87.5	95	2	"
Nusa kambangan	8.9	9.21	9.6	18	77	91.3	102	19	<i>diardi</i>

<sup>1)</sup> After ROBINSON & KLOSS.

<sup>2)</sup> Including THOMAS and GYLDENSTOLPE.

<sup>3)</sup> Including type.

The collection of this species gives rise to considerable difficulties: the number of specimens from many different localities is large enough to raise a lot of questions with regard to the discrimination of subspecies, but at the other hand, this number and particularly the total number in the series from each locality is too small for the solution of most of these questions. Moreover part of the material has been preserved in formaline.

Especially the table of measurements given here suffers from the insufficient number of measured animals. From the individually rather variable relative length of the tail certainly no conclusions can be drawn. From the tooth measurement we may come to the supposition that, at least in Java, exist a number of small races, a conclusion which is wholly confirmed by studying of the skins: while locally exists a proper constancy, the series from different collecting stations often are strongly differing from each other. A special line, for instance from West to East, or from low to high altitudes, could not be found in this variation. Small measurements are found in East Javan animals living at rather high altitude (*besuki*, Idjen, 850-1850 m), and in West Javan animals living at rather low elevation (*nigrovittatus*, Buitenzorg and Djasinga).

For Java some rather good races could be separated. In this paper eight races are described or recognized: 4 from different mountains (*salakensis*, *phoenicurus*, *tenggerensis*, *besuki*), 2 others, which are geographically perfectly isolated (*madsoedi*, *diardi*), and finally 2 West Javan lowland races (*nigrovittatus*, *bantamensis*). Many of the Javan animals had to be left unidentified, waiting for more material. I suppose that in the long run we shall have to admit a particular race to every isolated mountain, higher than 1000 m. In this case again I suppose large diversity in mountain forms but little difference in the lower regions (cf. *Rattus concolor*).

***Callosciurus nigrovittatus bocki* (ROB. & WROUGHT).**

*Material:* N. S u m a t r a, A t j e h : 1 ♀, Pendeng, 550 m, A. HOGERWERF, 27.II.37; 4 ♂♂, 4 ♀♀, Atang Putar, 1000 m, A. HOGERWERF, 1-9.IV.37; N. W. S u m a t r a. 1 ♂, 1 ♀, Tapanuli, purchased, 2.IV.15; 2 ♂♂, Tapanuli, v.d. MEER MOHR, 1.VIII.28, S. W. S u m a t r a: 1 ♂, 1 ♀, Sanggul, Benkulen, 500 m, J. J. MENDEN, 8.VIII.36; 1 ♂, 1 ♀, Mount Dempo, 1800 m, J. J. MENDEN, 16-29.VII.36; S. E. S u m a t r a: P a l e m b a n g: 1 ♂, 3 ♀♀, Kluang, SOEKARNO, 30.VI-7.X.33; 2 ♂♂, 1 ♀, Muara Duwa, 100 m, J. J. MENDEN, 9-13.VI.34; *Incertae sedis*: 1 ♂, Wai Lima, Lampongs, S. Sumatra, H. C. SIEBERS, 18.XII.21.

The Sumatran material is quite insufficient for an efficient arrangement, also because part of it has been in formaline. A specimen from Wai Lima, Lampongs is very aberrant. It differs strongly by the more greenish, less warm tinge of the upperside and the lighter, more buffy,

tinge of the underside of the head and of the light lateral stripes. More Lampongs material is urgently needed.

***Callosciurus nigrovittatus brookei* (THOS.).**

*Material*: 1 ♀, Point D, up country from Long Petah, C.E. Borneo, 1171 m, MADZOED, 16.X.25.

*Sciurus brookei*, THOMAS, A.M.N.H., 6.IX.1892, p. 253; P.Z.S., 1892, p. 225 (Mount Dulit, 5000'); CHASEN & KLOSS, Journ. Mal. Br. R.A.S., 6, 1928, p. 42 (the present specimen); HOSE, The Field book of a Jungle-Wallah, 1929, p. 148; BANKS, Journ. Mal. Br. R.A.S., 9, 1931, p. 47; CHASEN, Bull. Raffl. Mus., 15, 1940, p. 143.

*Tomeutes brookei*, ROBINSON & KLOSS, Rec. Ind. Mus., 15, 1918, p. 231; GYLDENSTOLPE, Kungl. Svenska Vet. Ak. Handl., 60, 1919, p. 39.

*Sciurus notatus*, SIEBERS, Midd. O. Born. Exp. 1939, Zoöl. Versl., p. 366 (the present specimen).

*Callosciurus brookei*, ELLERMAN, Fam. Gen. Liv. Rodents, 1940, p. 374.

*Sciurus modestus brookei*, CHASEN, Treubia, 17, 1940, p. 492.

Though up till now nearly every author has considered this form an ally of *Tomeutes* (*tenuis* or *modestus*) or of *Callosciurus hippurus* (ELLERMAN), I feel quite convinced that it is simply *Callosciurus nigrovittatus*, though THOMAS described his *Sciurus nigrovittatus orestes* also from Mount Dulit, 4000 feet! The description of CHASEN's *Sciurus nigrovittatus venetus*, from Kinabalu, 3300', seems to fit so well with *brookei* that I would suggest it to be a synonym.

***Callosciurus nigrovittatus nigrovittatus* (HORSF.).**

*Material*: W. Java: 1 ♂, 2 ♀♀, Buitenzorg, Roy. Bot. Gardens, P. F. FRANCK, 5.VII.23, 13.IV.32; 4 ♂♂, 2 ♀♀, Buitenzorg, Roy., Bot. Gardens, purchased, 5.II.23, 14.VII.23, 2.II.25, 21.VIII.41; 1 ♂, Buitenzorg town, P. F. FRANCK, 22.VII.24; 1 ♂, Buitenzorg, purchased, 20.IX.15; 2 ♂♂, Lulut, Tjileungsir, E. of Buitenzorg, H. C. SIEBERS, 27.XII.23; 5 ♂♂, 5 ♀♀, Djasinga Estates, W. of Buitenzorg, P. F. FRANCK, W. ROMSWINCKEL & DENIN, 9-12.IV.29; 1 ♂, 1 ♀, Tjiddjulung, Pondok Gedeh Estates, S.W. of Buitenzorg, 400 m, MADZOED, 25.XII.37, 22.I.39; 1 ♂, Batavia town, purchased, 26.VI.1916;

*Additional material*: 1 sex. inc., Tjisarua, E. of Buitenzorg, 1000 m.

HORSFIELD gave as habitat of the species "Java" only. KLOSS restricted the type locality to W. Java. At present it seems necessary to restrict it still further and I propose: to Buitenzorg.

I reckon to this subspecies the specimens enumerated above. From the Buitenzorg series, 4 (Botanic Gardens) are abnormal (partial reduction of black in the fur). For Buitenzorg is furthermore remarkable the frequent occurrence of 6 light grey to whitish round blots round the 6 mammae. I do not remember having ever seen similar blots in animals from other regions (sometimes there are naked blots round the teats). Two animals, from Lulut, E. of Buitenzorg, incline to *salakensis*. The Batavia specimen has pure white ventral side and inner sides of legs.

*Incertae sedis: Material:* W. Java: 4 ♂♂, 6 ♀♀, Tjineam, Preanger, P. F. FRANCK, 20-22.XI.30; 1 ♂, Tjipanas, Garut, P. F. FRANCK, 19.XI.30; 1 ♂, 2 ♀♀, Kamodjan, Garut, H. C. SIEBERS, 31.V-14.VI.23; C. Java: 1 ♂, 1 ♀, Gedangan, Res. Semarang, A. C. V. VAN BEMMEL & SOEKARNO, 28-29.II.40; 1 ♂, Kaligua, Mount Slamet, DENIN, 25.VII.16.

The fine Tjineam-series shows some affinity to this race, but, opposite to that, small differences in colour, for instance a clearer ringing of the tail and especially a larger tooth measurement (aver. 9.24, against 8.74 mm in 18 specimens from Buitenzorg and Djasinga). I prefer not to place this series definitely in the preceding subspecies. The same is the case with 3 specimens from Kamodjan, Garut, with dark backs, giving the impression of being transitional forms between other races, with 2 specimens from Gedangan, Semarang, which point somewhat to *tenggerensis*, and with a single mountain specimen from Kaligua, Mount Slamet, Res. Pekalongan.

***Callosciurus nigrovittatus salakensis* subsp. n.**

*Type:* ♀ ad., Tjianten, Mount Salak, W. Java, 1000 m, leg. P. F. FRANCK, 29.XII.1931. Buitenzorg, No. 123/31.

*Material:* Type locality: the type; 1 ♂, 1 ♀, P. F. FRANCK, 25-27.III.32; 1 ♂ SCHATTENKERK, 15.II.32.

*Additional material:* ex coll. SODY, 19, Mount Salak, W. Java, ± 600 m.

*Diagnosis:*

To be separated from *nigrovittatus* on account of the following differences: dorsal side darker; rufous colour on head much warmer and extending further backwards, especially on chin and throat, sometimes continuing on the breast; light ventral zone narrower. The contrast between this light colour and the bordering intensely black stripes is very pronounced.

Measurements of type: head and body 174; tail 186 (!); hind foot 43; ear 18; skull: greatest length 47.2; condylo-basal length 43.2; basal length 39.7; palatal length 22.7; zygomatic breadth 29.4; breadth of braincase 22.2; interorbital constriction 17.5; nasals 13.7 × 6.8; diastema 9.0; palatal foramina 3.3; upper toothrow 9.0 mm.

*Incertae sedis: Material:* Tjibodas, Mount Gedeh, W. Java, 1400 m: 2 ♂♂, K. W. DAMMERMAN, 4.X.30; 1 ♂, A. DE VOS, 16.XII.40; Mount Sindoro, C. Java, 2000 m: 1 ♂, H. DOCTERS VAN LEEUWEN, 22.V.27.

The three ♂♂ from Tjibodas somewhat resemble *salakensis*, but they are markedly lighter. The Sindoro specimen joins *salakensis* by the dark colour of the upperside, and also in other respects. It shows more affinity to *salakensis* than to *tenggerensis*, but in fact nothing more can be said about this material.

***Callosciurus nigrovittatus bantamensis* subsp. n.**

*Type* (and only specimen) : ♂ ad., Tjikudjang, Bantam, W. Java, P. F. FRANCK, 28.VII.32, Buitenzorg Museum Cat. No. 3636.

***Diagnosis:***

Has the light upper side of *nigrovittatus*, but the warmly tinged rufous colour of *salakensis* on chin and throat, continuing to the breast. It is distinguishable at once from these both subspecies by the bleaching of the dark lateral stripes. Though at this place the bases of the hairs are still rather dark grey, not black, the buff tips of these hairs prevent any impression of black: the stripes are only a little darker brown than the back, but for the rest not much darker than the back of *salakensis*.

Measurements of type: head and body 207; tail 173; hind foot 42; ear 14; skull: greatest length 48.0; condylo-basal length 44.3; basal length 40.6; palatal length 22.8; zygomatic breadth 29.5; breadth of braincase 22.0; interorbital constriction 19.0; nasals  $12.5 \times 7.0$ ; diastema 10.9; palatal foramina 3.1; upper toothrow 9.5 mm.

***Callosciurus nigrovittatus* subsp.**

*Material:* 2 ♂♂, 1 ♀, Bandjarwangi Estates, Tjikadjang, W. Java 900 m, C. P. J. DE HAAS, 13.III, 31.V, 20.VI.41 1 ♀, Mount Papan-dajan, 1700 m, A. DE VOS, 30.X.41.

This small series stands apart by the strong reduction of the buff on chin and throat. Very probably a separate race, but I prefer to wait for more material.

***Callosciurus nigrovittatus phoenicurus* subsp. n.**

*Type:* ♂ ad., Mount Tjerimai, Cheribon, W. Java, 1000 m, leg. J. J. MENDEN, 23.II.1931. Buitenzorg Museum, Cat. No. 2677.

*Material:* 4 ♂♂, 8 ♀♀, type locality, 700-2500 m, same collector, 5.VI.28, 5.I.29, 23.II.31, 18.III.31.

The most striking character is the bright rufous colour of the underside of the tail (exceptionally also occurring in single specimens from other regions). Furthermore, in the series as a whole the ventral side is the most whitish, especially the throat. The dark lateral stripes are rather strongly reduced. The upperside is the most pale one for the whole of Java.

Measurements of type: head and body 189; tail 157; hind foot 42; ear 14; skull: greatest length 46.9; condylo-basal length 42.9; basal length 39.7; palatal length 22.1; zygomatic breadth 28.1; breadth of braincase 22.9; interorbital constriction 18.1; nasals  $14.2 \times 6.3$ ; diastema 10.7; palatal foramina 3.3; upper toothrow 8.9 mm.

***Callosciurus nigrovittatus tenggerensis* subsp. n.**

*Type:* ♀ ad., Ranu Pani, Tengger Mountains, E. Java, 2100 m, leg. A. C. V. VAN BEMMEL, 8.VII.39. Buitenzorg Museum, Coll. No. 74/39.

*Material:* 2 ♂♂, 4 ♀♀, 1 ♀ imm., Type locality, A. C. V. VAN BEMMEL & SOEPARMA, 5-11.VII.39; 2 ♀♀, 1 ♀ imm., Nongkodjadjar, Tengger Mountains, 1400 m, A. M. R. WEGNER, 9.VIII, 19.VIII, 30.XI.41.

*Diagnosis:*

Especially striking is the greenish lateral bordering of the light middle part of the throat. In accordance with its being an inhabitant of the higher mountain zones it has rather long fur.

Measurements of type: head and body 175; tail 145; hind foot 38; ear 17; skull: greatest length 45.8; condylo-basal length 42.2; basal length 39.1; palatal length 22.4; zygomatic breadth 28.0; breadth of braincase 21.7; interorbital breadth 16.9; nasals 13.0 × 6.9; diastema 10.0; palatal foramina 2.5; upper toothrow 9.2 mm.

***Callosciurus nigrovittatus besuki* (KLOSS).**

*Material:* Idjen Mountains, E. Java: 2 ♂♂, 1 ♀, Ongop-Ongop, 1850 m, K. W. DAMMERMAN, 18-25.V.24; 1 ♀ imm., Blawan, Idjen, 950 m, K. W. DAMMERMAN, 8.VI.24.

*Incertae sedis: Material:* 2 ♂♂, 2 ♀♀, Blawan, Idjen, 950 m, K. W. DAMMERMAN, 1-8.VI.24.

The race is characterised by the fact that on the underparts the tips of the hairs are often considerably sullied with buff. The distribution of the race is not yet wholly clear. KLOSS' material came from 1600-5700 feet, the ♀ imm. from Blawan is indistinguishable from this race, but 4 further specimens from Blawan appear rather certainly not to belong to this subspecies. I am not able to classify them into any other described race.

***Callosciurus nigrovittatus diardi* (JENT.).**

*Material:* Nusa Kambangan, off S. coast C. Java: 6 ♂♂, 4 ♀♀, Brangbang, P. F. FRANCK, 15-16.II.29; 1 ♂, 3 ♀♀, Djumblang, P. F. FRANCK, 20.II.29; 3 ♂♂, 1 ♀, Gligir, P. F. FRANCK, 17.II.29; 1 ♂, Karangtengah, P. F. FRANCK, 16.II.29; 1 ♀, Gladangan, P. F. FRANCK, 21.II.27.

Though we have no absolute certainty that JENTINK's *Sciurus diardi* from N. Kambangan, was really a *nigrovittatus* from that island, we prefer for the present to use the name for this slightly deviating race. It seems rather near to *nigrovittatus* typicus, from which it is distinguishable by the more sideward extension of the grey over the innerside of the thighs of the hind legs. This difference is very small, but seems to be constant. In the series as a whole we observe a pure grey tinge of the middle of the throat within the lateral margins of pale rufous.

**Callosciurus nigrovittatus madsoedi (SODY).**

Not represented in the museum. Unfortunately only 4 skull measurements of this very obvious colour-subspecies from Mount Muria Peninsula, N.C. Java, have been taken by me. They give the impression that this race has a very large tooth measurement.

**Callosciurus albescens (BONHOTE).****Callosciurus albescens albescens (BONHOTE).**

*Material:* N. Sumatra, E. Atjeh: 1 ♀, Rampah, MADZOED, 26.X.30; 1 ♂, Blangkolam, MADZOED, 27.VI.30; W. Atjeh: 1 ♂, Meluwak Kungkeh, A. HOOGERWERF, 22.I.37; 2 ♂♂, 2 ♀♀, Atang Putar, 1000 m, A. HOOGERWERF, 1-6.VI.37.

Upper tooththrow 8.0-8.19-8.5 mm (7). The maximum greatest skull length is 46.6, the maximum zygomatic breadth 27.0 mm (both in the Blangkakan specimen).

**Callosciurus prevostii (DESM.).**

Locality	Upper tooththrow				Tail in %				Total length		Subspecies
	Min.	Aver.	Max.		Min.	Aver.	Max.		Max.		
<b>REPRESENTED IN MUSEUM:</b>											
Atjeh, N. Sumatra	10.3	10.67	11.1	13	86	98.4	109	9	481	9	<i>piceus</i>
Aru bay, N. E. Sumatra	—	—	—	—	79	90.2	96	12	490	12	"
Palembang, S. E. Sumatra	10.3	16.60	10.8	3	90	101.8	114	4	486	4	subsp.?
Banka	—	11.0	—	1	89	96.7	103	6	552	6	<i>bangkanus</i>
Mendanau	10.8	11.00	11.2	2	78	87.8	96	10	480	10	<i>mandanauus</i>
Karimata besar	9.8	10.12	10.4	6	69	87.2	100	23	484	23	<i>carimatae</i>
Panebangan	9.5	9.88	10.6	6	78	93.2	107	19	440	19	<i>armalis</i>
S.W. Borneo	10.0	10.40	10.9	9	93	99.1	107	9	506	9	<i>waringentis</i>
Sangau, W. Borneo	—	—	—	—	76	93.1	100	13	505	13	<i>sangaus</i>
W. Borneo	—	—	—	—	93	99.4	113	14	530	14	<i>palustris</i>
W. Borneo	10.9	10.95	11.0	2	102	109.5	117	2	499	2	<i>coomansi</i>
W. Borneo	10.2	10.77	11.1	4	98	112.0	128	4	483	4	<i>borneoentis</i>
N.W. Borneo	—	—	—	—	94	100.1	108	10	502	10	"
N.W. Borneo	9.7	10.36	10.9	5	82	96.4	106	5	491	5	<i>kuchingensis</i>
N. Borneo	10.0	10.78	11.6	16	83	100.2	112	13	509	13	<i>pluto</i>
N.E. Borneo	10.0	10.49	10.9	11	91	105.0	116	11	491	12	<i>atricapillus</i>
N.E. Borneo	9.8	10.42	11.2	6	70	81.1	107	6	513	6	"
P. Pandjang, S. Natunas	9.0	9.54	10.4	12	96	96.5	97	2	460	2	<i>navigator</i>
<b>NOT REPRESENTED IN MUSEUM:</b>											
Siam	10.6	10.85	11.1	2	85	95.5	96	2	519	2	subsp.?
Perak, Mal. Peninsula	—	11.0	—	1	83	96.6	111	3	505	3	<i>humei</i>
Tapanuli	—	11.0	—	1	87	91.9	100	12	498	12	<i>erebus</i>
Siak river, E. Sumatra	—	11.0	—	1	80	102.0	109	27	565	27	<i>melanops</i>
S. Penjalei	—	—	—	—	71	94.8	104	6	552	6	<i>penialius</i>
S. Rupat	—	—	—	—	86	94.1	100	13	542	13	<i>nyx</i>
P. Kundur	—	—	—	—	90	93.7	105	8	530	8	<i>condurensis</i>
P. Karimata	—	11.0	—	1	92	94.7	100	14	502	14	<i>carimonensis</i>
P. Tamaju	—	—	—	—	95	98.2	105	5	470	5	<i>proscipinae</i>
P. Pelapis	—	—	—	—	70	79.9	87	3	430	3	<i>pelapius</i>
Banguay	10.1	10.45	10.9	5	93	100.4	110	5	440	5	<i>caedis</i>
Balambangan	9.5	10.12	10.6	5	91	92.2	93	5	435	5	"

Unfortunately again in this species the measured numbers of specimens are generally much too small. The table only allows a few superficial conclusions, and even these urgently ask for confirmation.

A very low tooth measurement is found in *navigator* (P. Pandjang, S. Natunas). A small race is *armalis* (P. Panebangan, Karimata), and also *pelapius* (P. Pelapus) and *caedis* (Banguey, Balambangan Isls). Large animals occur in East Sumatra (*melanops*) and neighbouring islands: P. Rupert (*nyx*), P. Kundur (*condurensis*), P. Pendjalei (*penalius*) and Banka (*bangkanus*). Further perhaps West Borneo. Especially for the relative length of the tail the data are very insufficient. A striking difference in this respect is seen between series from our Museum of *atricapillus* and the figures given by GYLDENSTOLPE and LYON for the same race. Unfortunately of *pelapius*, with its tail of only 80%, only 3 specimens are known.

The study of abundant material: at least some 20 animals from each locality, may lead to very interesting conclusions! I never saw a wild species of mammal with so rich and large a variation in the colours as occurs here. We may suppose that it is extremely sensitive to influences of climate and facies!

***Callosciurus prevostii piceus* (PETERS).**

*Material:* N. Sumatra, E. Atjeh: 1 ♀, Alur Purba, MADZOED, 16.VI.30; 1 ♀, Rampah, MADZOED, 24.X.30; W. Atjeh: 3 ♂♂, 1 ♀, Lesten, Mount Leuser, 700 m, A. HOOGERWERF, 10-21.III.37; 2 ♂♂, 1 ♀, Tapa Tuan, ENDIH, undated.

*Additional material:* 1 ex. Alur Purba, 1 ex. Rampah.

The specimens from Lesten and from East Atjeh are purely black and chestnut without any other colour. The Tapa Tuan series, though at first sight quite alike, at close inspection shows a lighter shade of black on most of those parts of the upper surface and sides, which are not black in *rafflesii*. These parts are sometimes extremely finely and faintly grizzled, and this may be a slight transition towards *rafflesii*. MILLER's *erebus*, from Tapanuli Bay, also shows suchlike, very faint, transitional characters. CHASEN united it with *piceus*.

***Callosciurus prevostii* subsp.**

*Material:* S. E. Sumatra, Palembang: 1 ♂, Kluang, SOEKARNO, 7.VI.33; 2 ♂♂, Talang Sungai, SOEKARNO, 26.IV.33; 1 ♀, Vicinity town of Palembang, DOCTERS VAN LEEUWEN, VIII.22.

The specimens do not fit exactly with the description of *melanops* (Indragiri), *rafflesii* (Benkulen), or *harrisoni* (Lampung).

***Callosciurus prevostii navigator* (BONH.).**

*Material:* 1 ♀, P. Pandjang, S. Natuna Isls, P. M. DE FONTAINE, 11.VIII.31.

**Callosciurus prevostii mendanauus** (LYON).

*Material:* 1 ♂, P. Mendanau, W. of Billiton, F. J. KUIPER, 21.VIII.36.

**Callosciurus prevostii carimatae** (MILLER).

*Material:* 3 ♂♂, 1 ♀, P. Karimata Besar, Karimata Isls, MADZOED, 23-26.III.31.

*Additional material:* 2 ex. same locality.

**Callosciurus prevostii armalis** (LYON).

*Material:* 3 ♂♂, 2 ♀♀, P. Panebangan, Karimata Isls, MADZOED, 19-20.III.31.

*Additional material:* 2 ex. same locality.

Unfortunately we possess only very poor Borneo-material of this interesting species, of which already some 12 or 15 recognizable subspecies from that island have been described. I perfectly agree with the doubt, expressed by ALLEN & COOLIDGE, Bull. Mus. Comp. Zool. Harv. Coll., 87, 1940, p. 156, whether *baluensis*, *baramensis*, and *medialis*, are really representatives of *C. prevostii*. Yet I cannot avoid describing two more forms from there.

**Callosciurus prevostii waringensis** subsp. n.

*Type:* ♂ ad., Riam, Kotawaringin, S.W. Borneo. leg. J. J. MENDEN, 6.XII.1935, Buitenzorg Museum, Coll. No. 28/36.

*Material:* Kotawaringin, S. W. Borneo: 4 ♂♂, 4 ♀♀, Riam, J. J. MENDEN, 31.X-6.XII.35; 1 ♀, Kumai, J. J. MENDEN, 21.XII.35; 1 ♂, no exact locality, Ir J. SCHROO, 18.VIII.41.

*Diagnosis:*

Allied to *sanggaus* LYON which has a wholly black back and tail, but with a few differences: the thighs are lighter: the white lateral stripe continues over the thighs along the border with the ferruginous of the underside, nearly up to the heel of the foot; beside this elongation, a faint grey tinge is caused by the black bases of the hairs shining through. Shoulders again are lighter and less rufous, and the same prevails for the grey of head and neck.

Measurements of type: head and body 245; tail 228; hind foot 53; ear 20; skull: greatest length 55.1; condylo-basal length 51.5; basal length 48.0; palatal length 28.1; zygomatic breadth 33.8; breadth of braincase 25.1; interorbital constriction 22.5; nasals 16.0 × 8.0; diastema 13.3; palatal foramina 3.2; upper toothrow 10.3 mm.

**Callosciurus prevostii coomansi** subsp. n.

*Type:* ♀ ad., Pematang Tudjuh, Northern bank Pungur Besar River, Pontianak district, W. Borneo, sealevel, leg. MADZOED, 14.III.1931. Buitenzorg Museum, Cat. No. 2898.

*Material:* 2 ♀♀, type locality, same collector, 14-15.III.31.

These specimens, together with those from Peniti, North of Pontianak, mentioned below as *borneoensis*, have already been identified by CHASEN (Treubia, 15, 1935, p. 5), who considered all of them to be *borneoensis*. In my opinion, however, one thing seems sure, namely that both series cannot be united into one subspecies. Of course this conclusion is based in the first instance upon the differences to be observed between the series, but the collecting places may be said to confirm it: they are separated by the Landak River and the Little Kapuas River.

It is another question which of both series may represent *borneoensis*. Here arise great difficulties. CHASEN believed that the P. Tudjuh specimens (my *coomansi*) agree best with the plate of *borneoensis* (cotype), given by SCHLEGEL (Nederl. Tijdschr. Dierk., 1, 1863, Mammif., Pl. I, fig. 3) and with the description of the cotypes, published by LYON. He points out the fact that the Peniti specimens have the sides of head and neck reddish or grizzled, the P. Tudjuh ones have them blackish. This is certainly true, and very important. But there are also differences between P. Tudjuh and SCHLEGEL's animals. CHASEN himself points out the difference in colour of the feet. Furthermore in P. Tudjuh a very striking character is the upward continuation of the white lateral stripes at their anterior end (behind the shoulders, about as in the figure of his *borneoensis*, given by LYON, Proc. U.S. Nat. Mus., 40, 1911, Pl. 4, fig. 2). Furthermore the sharp black sublateral stripe fails in P. Tudjuh (also in LYON's figure). There are differences of similar importance between the type of *borneoensis* and the Peniti series (see CHASEN, furthermore the patch on the upper lip is white in *borneoensis*, rufous in Peniti, and the sides of the back are rather richly coloured in Peniti). Perhaps SCHLEGEL's specimen, our two series and LYON's figure represent 4 different races! Which would not be such an astonishing fact—in a sensitive species like this one, in an area like that in question consisting of many islands, completely separated by the branches of the estuary delta of the large Kapuas River! For the present, however, I wish to accept the Peniti series as "*borneoensis*", and to describe the P. Tudjuh series as a new subspecies. Here it may be compared with LYON's excellent description of his *palustris*. BANKS has already indicated on his map (Proc. Zool. Soc., 1931, Pl. 1) the whole area of the estuary delta as inhabited by *palustris*. But — in this special case—this conclusion seems somewhat premature.

*Diagnosis:*

While in *palustris* the sides of neck, shoulders and sides of the body are a fine and even grizzle of black and white only, without red or rufous, *coomansi* shows a very fine and bright rufous on the shoulders and posteriorly of this a white vertical stripe, separating this rufous from the pure grey of the sides of the back. Also the arms are more or less rufous. In *palustris* the base of the whiskers, and the area around the lips is buffy, in *coomansi* white. Furthermore the underparts are not

particularly darkened: only the sublateral "black" stripes are rather broad, but not at all black: only a little darker than the rest of the undersurface. The rest of the underside is a trifle lighter than in our specimens of *borneoensis*, nearly so as in *waringensis*.

Measurements of type: head and body 247; tail 252; hind foot 59; ear 20; skull: greatest length 56.4; condylo-basal length 53.7; basal length 50.0; palatal length 27.5; zygomatic breadth 33.8; breadth of braincase 24.3; interorbital constriction 21.8; nasals  $17.7 \times 8.5$ ; diastema 14.1; palatal foramina 3.9; upper toothrow 10.9 mm.

The name is given in honour of Mr L. COOMANS DE RUYTER, who has contributed much to the knowledge of Bornean fauna.

***Callosciurus prevostii* ? *borneoensis* (MULL. & SCHLEG.).**

*Material*: W. Borneo: 1 ♂, 1 ♀, Peniti, Pontianak, MADZOED, 3.IV.31; 1 ♂, 2 ♀♀, Senuwang, Landak, 500 m, J. J. MENDEN, 1-17. IX.37.

*Additional material*: 2 ex. Peniti.

As explained above, in reality the Peniti series may be something else than pure *borneoensis*. The Senuwang specimens ( $\frac{2}{3}$  of the distance in a straight line from Pontianak to Perbuwah) are rather intermediate between the Peniti series and *kuchingensis*, but probably nearest to *borneoensis*, since the black of the back does not or hardly touch the white lateral stripes.

***Callosciurus prevostii kuchingensis* (BONHOTE).**

*Material*: 3 ♀♀, Perbuwah, Landak, Pontianak distr., W. Borneo, 900 m (straight East of Singkawang, not far from Serawak border), J. J. MENDEN, 27.VII-12.VIII.37.

*Additional material*: 2 ex. same locality.

Uniform in the principle character: the sharply-marked, ungrizzled junction of black of the back and white of the lateral stripe.

***Callosciurus prevostii pluto* (GRAY).**

*Material*: 1 ♂, 1 ♀, Sebuku region, N. Borneo, near border between Neth. and British territory, MOHARI, 1912.

***Callosciurus prevostii atricapillus* (SCHLEG.).**

*Material*: N. E. Borneo: 4 ♂♂, 3 ♀♀, Peleben, S. Kajan, V. VON PLESSEN, 1.VII-12.X.35; 2 ♂♂, 1 ♀, Badang, S. Bahau, Bulungan, V. VON PLESSEN, 3-11.VI.35; E. Borneo: 1 ♂, Muara Antjalung, H. C. SIEBERS, 27.VII.25.

*Additional material*: 2 ex. Badang, N.E. Borneo.

As an exception in this species, the specimens of this series (from one place) are rather variable, especially in the degree of darkness of upper side and tail. Some of the Peleben specimens are partly purely black

above, in the other Peleben specimens only the forehead is black, the rest of the upperside is a grizzle of black and buff. Most of the Badang animals are of the latter type, though the amount of black on the head is always less than in the lightest specimens from Peleben. One or two have only very little black and on the tip of the nose only, one lacks every trace of black. The Muara Antjalung specimen is moderately black, and matches best the Peleben series. The tails vary from black to a grizzle like that of the backs. Generally the darkest specimens also have the darkest tails.

The identification of these animals was difficult. On description the Badang series seems rather near to MILLER's *atrox*. Perhaps that name might be a better one for part of our material.

#### *Callosciurus hippurus* (GEOFFR.).

##### *Callosciurus hippurus hippurosus* (LYON).

*Material*: N. Sumatra: 1 ♀, Lesten, Mount Leuser, Atjeh, 700 m, A. HOOGERWERF, 16.III.37; 1 ♂, 1 ♀, Alur Purba, E. Atjeh, MADZOED, 1-3.X.30.

Most probably these specimens represent two different races. In the specimen from Lesten the area around the nose is wholly clear grey, just like in our specimen of *borneensis*, E. Borneo. In the two specimens from Alur Purba, the upper lip and the sides of the nose are rufous.

##### *Callosciurus hippurus borneensis* (GRAY).

*Material*: 1 ♀, Peleben, Sungei Kajan, district Bulungan, N.E. Borneo, V. VON PLESSSEN, 9.IX.35.

#### *Callosciurus preyeri* (THOMAS).

##### *Callosciurus preyeri inquinatus* (THOMAS).

*Material*: N. Borneo: 2 ♂♂, between Sembakung river and Sembuku river, border of British and Neth. territories, MOHARI, 1912.

One specimen has all underparts equally rufous, the other has even more rufous on chin and throat, but the rest of the underparts is but little suffused with rufous.

#### *Callosciurus melanogaster* (THOS.).

	Upper toothrow			Tail in %	
Sipora <sup>1)</sup>	10.0	— 10.31	— 10.9 (13)	84.4	(14) <i>melanogaster</i>
Siberut <sup>2)</sup>	9.9	— 10.28	— 10.9 (14)	83.2	(14) <i>mentawi</i>
N. Pagai <sup>3)</sup>	9.4	— 10.06	— 10.8 (9)	85.7	(9) <i>atratus</i>

<sup>1)</sup> Incl. THOMAS, Ann. Mus. Civ. Stor. Nat. Genova, XXXIV, 1895, p. 668, and CHASEN & KLOSS, Proc. Zool. Soc., 1928, p. 823.

<sup>2)</sup> Incl. CHASEN & KLOSS, Proc. Zool. Soc., 1928, p. 823.

<sup>3)</sup> Incl. MILLER, Smiths. Misc. Coll., 45, 1903, p. 13.

**Callosciurus melanogaster melanogaster** (THOS.).

*Material:* 1 ♂, 2 ♀♀, Sipora, Mentawi Isls, C. B. KLOSS, 11-28.X.24.

**Callosciurus melanogaster mentawi** (CHAS. & KLOSS).

*Material:* 2 ♂♂, 1 ♀, Siberut, Mentawi Isls, C. B. KLOSS, 16-25. IX.24; 1 ♂, Siberut, Mentawi-Isls, J. J. MENDEN. 31.XII.34.

**Callosciurus melanogaster atratus** (MILLER).

*Material:* 4 ♂♂, 5 ♀♀, North Pagi Isl., J. J. MENDEN, 5-20.I.35.

**Callosciurus leucomus** (MULL. & SCHL.).**Callosciurus leucomus leucomus** (MULL. & SCHL.).

*Material:* N. Celebes: 2 sex. inc., Menado, MOHARI, 1908; 1 ♂, Menado, Exp. Station Menado, 23.IX.33; 1 ♂, 1 ♀, Amurang, Menado, ERIE, 15.IV.26; 4 ♂♂, 2 ♀♀, Tonsea Lama, J. W. VAN BRAEKEL, 1938. Upper toothrow 8.3-8.68-8.9 mm (10). Largest specimen 335 mm (2). Maximal greatest length of skull 48.0 (9), maximal zygomatic breadth 29.1 mm (8).

**Callosciurus leucomus occidentalis** (MEYER).

*Material:* 10 ♂♂, 3 ♀♀, Bumbulan, S. coast N.E. Celebes, J. J. MENDEN, 19.IX-22.X.39.

Upper toothrow 7.9-8.47-9.0 mm (13). Largest specimen 353 mm (9). Maximal greatest length of skull 47.7 (11); maximal zygomatic breadth 29.8 mm (10).

**Callosciurus weberi** (JENTINK).

*Material:* C. Celebes: 1 ♂, 1 ♀, Masamba, SOENARDJI, 8.XII.39, 1.VII.40; 1 ♂, 1 ♀, Palopo, MOHARI, 1908; N. Celebes; 1 ♂, Menado, MOHARI, 1908.

The Menado specimen does not present a measurement for the upper molar row (greatest length of skull 44.1 mm). In the other four specimens it is 7.7-7.88-8.0 mm. Maximal greatest length of skull 44.6 (4). Maximal zygomatic breadth 26.1 mm (4).

**Callosciurus tonkeanus** (MEYER).

*Material:* 1 ♂, 1 sex. inc., Buton Isl., MOHARI, undated.

These two animals have been a long time in the show of the Museum, until lately stuffed, now made to study-skins. On the glass of the case, in which they were exhibited, was an indication: "*Sciurus tonkeanus* MEYER. Boeton, MOHARI leg." I am not able to say much more. The species has been described from Tonkean, S. E. Celebes. The original description is very incomplete, a.o. not a single measurement has been given. Some skull measurements of our specimens (♂ and ♀) are:

Greatest length 42.7, 42.0; condylo-basal length 38.8, 37.3; basal length 35.5, 34.3; palatal length 19.0, 18.1; zygomatic breadth 25.7, 25.0; breadth of braincase 20.0, 20.1; interorbital constriction 16.1, 16.1; nasals 11.0 x 7.0, 10.9 x 6.3; diastema 8.6, 8.4; palatal foramina 2.8, 2.4; upper tooththrow 8.3, 8.4 mm.

**Callosciurus rubriventer (MULL. & SCHL.)**

*Material:* 1 ♂, Bumbulan, S. coast N.E. Celebes, J. J. MENDEN, 26.X. 39; 2 ♂♂, 1 ♀, Palopo, C. Celebes, MOHARI, 1908.

It is only after much hesitation that I decided not to describe the Palopo animals as a new race. They are differing very strikingly from our Bumbulan specimen. Both forms have the same fulvous underside, arms and hands, legs and feet. But in the Bumbulan specimen the colour of the upperside is a mixture of black and fulvous-buff, in the Palopo series a mixture of brownish and buff. The general difference in colour is very large. And perhaps there also is a difference in the measurements. The reason why I do not separate the Palopo series, is, that it consists of old specimens (perhaps discoloured ?), whereas the Bumbulan specimen is from formaline.

Skull measurements:

	Greatest length	Zygom. breadth	Upper tooththrow
♂ Bumbulan	68.5	38.7	12.5
♂ Paloppo	64.0	37.0	13.0
♂ "	64.6	36.0	13.7
♀ "	65.3	38.5	13.4

The external measurements of the Bumbulan specimen are: head and body 300; tail 235; hind foot 61; ear 30 mm.

**Ratufa bicolor (SPARRM.).**

Locality	Upper tooththrow				Tail in %				Total length		Subspecies
	Min.	Aver.	Max.		Min.	Aver.	Max.		Max.		
Sumatra <sup>1)</sup>	13.0	13.79	14.8	55	113	124.5	139	49	874	49	<i>palliata</i>
W. Java <sup>2)</sup>	13.0	14.00	15.0	45	90	110.4	146	39	837	39	<i>bicolor</i>
C. and E. Java <sup>3)</sup>	13.0	13.99	15.0	25	92	113.0	137	23	790	24	<i>albiceps</i>
Nusa Barung	—	13.0	—	1	—	118	—	1	692	1	subsp. n.
Bali <sup>4)</sup>	13.7	14.00	14.2	6	108	118.0	128	5	740	5	<i>baliensis</i>

<sup>1)</sup> Incl. LYON, Proc. U.S. Nat. Mus., 32, 1907, p. 445; LYON, Proc. U.S. Nat. Mus., 34, 1908, p. 636; ROB. & KLOSS, Journ. F.M.S. Mus., 8, 1918, p. 38; SODY, Nat. Tijdschr. Ned. Ind., 93, 1933, p. 79.

<sup>2)</sup> Incl. MILLER, Proc. Acad. Nat. Sci. Philad., 54, 1902, p. 147; MILLER, Proc. Biol. Soc. Wash., 24, 1911, p. 28; SODY, Nat. Tijdschr. Ned. Ind., 93, 1933, p. 79.

<sup>3)</sup> Incl. SODY, Nat. Tijdschr. Ned. Ind., 93, 1933, p. 79.

<sup>4)</sup> THOMAS, Ann. Mag. Nat. Hist., 8-XI, 1913, p. 506; SODY, Nat. Tijdschr. Ned. Ind., 93, 1933, p. 77.

These measurements slightly differ from those which I gave previously (N.T.N.I., 93, 1933, p. 79). From Sumatra I gave (l.c.) as a minimum 12.8, after MILLER, Proc. Ac. Nat. Sci. Phil., 54, 1902, p. 148. Afterwards this specimen was remeasured by LYON, who found 13.0. This will be the minimum for Sumatra. In Treubia, 13, 1911, p. 453, DAMMERMAN gave a measurement of 12.8 for a "Buitenzorg" (Djasinga) animal in our museum (No 2064). Remeasuring it, I found exactly 13.0. This I consider to be the minimum for Java.

***Ratufa bicolor peninsulae* MILLER.**

*Material:* 1 ♂, Malay Peninsula?, no collector, undated.

***Ratufa bicolor palliata* MILLER.**

*Material:* N. Sumatra, Atjeh: 1 ♂, 1 ♀, Alur Purba, MADZOED, 27-29.IX.30; 1 ♂, 1 ♀, Redelong, 1300 m, MADZOED, 17.VII-4.VIII.30; 1 ♀, Baleq, 1200 m, MADZOED, 6-VIII.30; 1 ♂, Pulau Munteh, Mount Leuser, A. HOGERWERF, undated; Central W. Sumatra: 1 sex. inc., Manindjau, S.W.K., ROOKMAKER, X.24; S.W. Sumatra: 1 ♀, Saluma, Benkulen, 0 m, F. W. RAPPARD, 16.IX.36; 3 ♂♂, 4 ♀♀, Sanggul, Benkulen, 500 m, J. J. MENDEN, 4-28.VIII.36; 3 ♀♀, Mount Dempo, 1200-2000 m, J. J. MENDEN, 18-24.VII.36; S.E. Sumatra: 1 ♂, 1 ♀, Kluang, Palembang, SOEKARNO, 9.X-22.XI.33; S. Sumatra, Lampongs: 1 ♀, Bandjar Manis, Gisting, 500 m, M. A. LIEFTINCK, 30.XII.34; 1 ♂, Kalianda, 100 m, J. J. MENDEN, 14.VIII.34.

Maximum skull length 74.4 mm.

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

*Material:* W. Java: 1 ♀, Java's 1st Pt., Sunda Straits, K. W. DAMMERMAN, 24.VII.24; 2 ♀♀, Tjikudjang, Bantam, P. F. FRANCK, 28-29.VII.31; 1 ♂, Tjihundji, Bantam, A. HOGERWERF, 12.X.32; 2 ♂♂, 2 ♀♀, Tjianten, Mount Salak, SCHATTENKERK & FRANCK, 19.XII.31, 25.III.32, 27.IV.32, V.32; 1 ♂, 1 ♀, Tjiburajut, Mount Salak, MADZOED, 29.VIII.31; 2 ♂♂, 2 ♀♀, Mount Salak, MADZOED, 6-8.IX.29; 1 ♂, Djasinga Est., Buitenzorg, ROMSWINCKEL, 12.IV.29; 1 ♀, Bolang Est., Buitenzorg, CH. E. JANS, 8.V.32; 1 ♂, Djongol, Buitenzorg, CH. E. JANS, 20.X.29; 1 ♂, Pasir Pogor, Buitenzorg, MADZOED, 20.IV.27; 2 ♀♀, Buitenzorg, purchased; 1 ♀, Kawah Kamodjan, Garut, Preanger, H. C. SIEBERS, 17.VI.23; 2 ♀♀, Bandjarwangi Est., Tjikadjang, Preanger, 900 m, C. P. J. DE HAAS, 2.II-7.V.41; 2 ♂♂, 1 ♀, Tjibareg-beg, Garut, P. F. FRANCK, 14-17.IX.30.

Maximum skull length 74,6 mm.

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

*Material:* E. Java: 1 ♂, Sumberwringin, Raung Mts, 710 m, K. W. DAMMERMAN, 20.II.23; 1 ♀, Banjuwangi, Besuki, SOEKARNO, 25.XI.36.

*Provisionally placed in this race:* 1 ♂ Nusa Barung, off S. E. coast of Java, A. HOOGERWERF, 3.VII.39.

Maximum skull length 75.0 mm.

Already previously (N.T.N.I., 93, 1933, p. 77) I worked out some differences between Sumatra, West, Central, and East Java, basing on my own collection. In the present material I observed once more that the two East Javanese specimens are paler, more bleached than in any of the West Javanese specimens.

By its small tooth measurement the N. Barung specimen gives the impression to represent a separate small race (as I feel sure it does). As regards the colours it shows the typical *baliensis* tail: rather short buff tips of the hairs, over the underside a distinct, perfectly black central area. The head is light, the lightest of our whole series. The hind feet show very little buff on the innersides.

#### **Ratufa affinis (RAFFLES).**

**Ratufa affinis affinis (RAFFLES).**

*Material:* 1 ♂, Singapore Isl., 1896.

**Ratufa affinis bungaranensis (THOS. & HART.):**

*Material:* 1 ♂, Bunguran, N. Natuna Isls, F. N. CHASEN, 21.VIII.28.

**Ratufa affinis sirhassenensis BONHOTE.**

*Material:* 1 ♂, P. Sirhassen, S. Natuna Isls, P. M. DE FONTAINE, 26.VIII.31.

**Ratufa affinis polia LYON.**

*Material:* Billiton Isl.: 1 ♂, Begantung, 50 m, F. J. KUIPER, 1 ♀, Banten, F. J. KUIPER, 21.VIII.36.

**Ratufa affinis griseicollis LYON.**

*Material:* 1 ♀, Panebangan, Karimata Isls, MADZOED, 20.III.31.

The further Borneo-identifications, following below, should be regarded as provisional in most cases.

**Ratufa affinis sandakanensis BONHOTE.**

*Material:* N. Borneo: 6 ♂♂, 2 ♀♀, 1 sex. inc., between Sembakong and Sebuku rivers, border of British and Neth. terr., MOHARI, 1912.

I am not quite sure about this identification. Comparison was only possible with the descriptions by BONHOTE, and by CHASEN & KLOSS. In general the likeness with BONHOTE's type seems not bad; only, when BONHOTE mentions "a small patch of ferruginous on the cheeks", I think that this is not in accordance with my series, in which there is very much ferruginous on the sides of the head, especially posteriorly of the ears and also on the underside of the head and often over the nose. As regards the description of CHASEN & KLOSS, my specimens seem to belong

Ratufa affinis (RAFFLES).

Locality	Upper tooththrow				Tail in %				Total length		L. of skull		Br. of skull		Subspecies
	Min.	Aver.	Max.		Min.	Aver.	Max.		Max.		Max.		Max.		
Singapore <sup>1)</sup>	12.8	13.05	13.3	2	114	118.0	125	3	711	3	63.1	2	39.0	3	<i>affinis</i>
Bunguran, N. Natunas <sup>2)</sup>	11.8	12.33	12.8	6	119	123.4	130	7	770	7	65.9	6	42.0	7	<i>bungaranensis</i>
P. Sirhassen, S. Natunas <sup>2)</sup>	11.8	12.18	12.4	7	—	122	—	1	575	1	60.8	7	38.9	8	<i>sirhassanensis</i>
Banka <sup>4)</sup>	12.0	12.41	13.0	14	103	113.4	123	14	770	14	62.0	1	39.9	13	<i>bancana</i>
Billiton <sup>5)</sup>	12.4	12.98	13.5	14	102	116.2	125	13	735	13	64.0	2	41.1	13	<i>polia</i>
Panebangan, Karimata <sup>6)</sup>	—	12.7	—	1	115	119.0	123	4	802	4	67.0	4	40.7	4	<i>griseicollis</i>
Semawang, Bettotan <sup>7)</sup>	12.9	13.35	13.9	10	116	128.5	137	10	795	10	68.0	10	42.2	10	<i>sandakanensis</i>
Border expedition	12.7	13.33	14.0	11	—	—	—	—	—	—	68.2	11	42.7	11	"
Bulongan (Museum)	12.7	13.62	14.2	6	107	120.8	129	6	786	6	68.8	6	43.7	6	<i>lumholtzi</i>
Bulongan (GYLDENSTOLPE) <sup>8)</sup>	12.4	12.94	13.7	9	113	123.9	133	11	802	11	68.2	11	42.0	11	"
Kuching	—	12.6	—	1	—	—	—	—	—	—	65.0	1	40.2	1	<i>cothurnata</i>
Pontianak-region	12.7	13.33	13.8	7	116	124.6	134	7	776	7	67.8	7	44.7	7	"
Mnt. Palung, etc. <sup>9)</sup>	—	—	—	—	111	120.5	130	9	795	9	66.0	9	41.8	9	"
Kendawangan River <sup>9)</sup>	—	—	—	—	110	119.3	142	10	755	10	66.5	10	40.7	10	"
Riam	12.7	13.17	13.7	6	118	122.2	126	5	810	6	68.2	6	42.7	6	"
Barito R. (Type) <sup>10)</sup>	—	—	—	—	—	114	—	1	750	1	—	—	—	—	<i>ephippium</i>
Kali Tjempaka	12.3	12.77	13.5	6	100	120.3	136	6	721	6	65.5	6	40.2	6	"
Klumpang Bay <sup>11)</sup>	—	—	—	—	109	118.7	132	10	813	10	68.5	10	42.3	10	"
Pamukang Bay <sup>11)</sup>	—	—	—	—	118	125.1	133	7	765	7	67.0	7	41.7	6	"

<sup>1)</sup> Incl. BONHOTE, Ann. Mag. Nat. Hist., (7) 5, 1900, p. 495, and MILLER, Proc. Wash. Acad. Sci., 2, 1900, p. 73.

<sup>2)</sup> Incl. CHASEN, Bull. Raffl. Mus., 10, 1935, p. 32.

<sup>3)</sup> Incl. BONHOTE, Ann. Mag. Nat. Hist., (7) 5, 1900, p. 489; CHASEN, Bull. Raffl. Mus., 10, 1935, p. 32.

<sup>4)</sup> LYON, Proc. U.S. Nat. Mus., 31, 1906, p. 589; SODY, Temminckia, 2, 1937, p. 234.

<sup>5)</sup> Incl. LYON, Proc. U.S. Nat. Mus., 31, 1906, p. 589.

<sup>6)</sup> Incl. LYON, Proc. U.S. Nat. Mus., 40, 1911, p. 96.

<sup>7)</sup> CHASEN & KLOSS, Bull. Raffl. Mus., 6, 1931, p. 56.

<sup>8)</sup> GYLDENSTOLPE, Kungl. Svensk. Vet. Akad. Handl., 60, 1919, p. 33; LÖNNBERG & MJÖBERG, Ann. Mag. Nat. Hist., (9) 16, 1925, p. 514.

<sup>9)</sup> LYON, Proc. U.S. Nat. Mus., 40, 1911, p. 96.

<sup>10)</sup> MILLER, Tijdschr. Nat. Gesch. Physiol., 5, 1838-39, p. 147.

<sup>11)</sup> LYON, Proc. U.S. Nat. Mus., 40, 1911, p. 96.

to their first section of *sandakanensis*, as the flanks are of not very cold colour or greyish. It may be of importance to mention that in all my specimens but one the tail is grizzled, sometimes ringed with buffish grey. No actual comparison with material from Sandakan being possible, I provisionally bring my series to *sandakanensis*. The measurements of the teeth and other parts seem to agree closely.

***Ratufa affinis lumholtzi* LÖNNBERG.**

*Material:* N. E. Borneo, Bulongan Distr.: 2 ♂♂, 3 ♀♀, Badang, S. Bahang, V. VON PLESSEN, 16.V-9.VI.35; 1 ♂, Peleben, S. Kajan, V. VON PLESSEN, 26.VIII.35.

If LÖNNBERG's race is a good one, the best way is to consider our material as identical with this race. LÖNNBERG's race is placed by him opposite *baramensis*. In my "*sandakanensis*" good and certain differences are present, such as the much warmer colour of the whole animal, and the pure black or blackish, not grizzled or ringed tail. As regards the difference, given by LÖNNBERG: "outside of forelimbs not light, like the underparts, but grizzled in the same way as the flanks", I am in difficulties again, as no *baramensis* is available for actual comparison, and even toptypical material would be necessary. From CHASEN & KLOSS' description I get the impression that specimens like LÖNNBERG's *lumholtzi* are occurring in Sarawak, but must be regarded as deviating from *baramensis*, forming the "fifth section" of these authors. When I use the name *lumholtzi* here, it is without my personal conviction, especially because I do not know *baramensis*. No measurements of this race are recorded in literature. The tooth measurements given by GYLDENSTOLPE for his Bulongan series, which I now suppose to be *lumholtzi*, are much smaller than those from our series, but I am not sure that GYLDENSTOLPE took his measurements in the usual way!

***Ratufa affinis cothurnata* LYON.**

*Material:* W. Borneo: 1 ♀, Kuching, Serawak, exchanged, 7.III.1900; 3 ♂♂, 3 ♀♀, Peniti, Pontianak, MADZOED, 3.IV.31; S. W. Borneo: 1 ♂, 5 ♀♀, Riam, Kotawaringin Distr., J. J. MENDEN, 4-12.XI.35.

*Additional material:* 1 sex. inc. Pematang Tudjuh, S. of Pontianak, W. Borneo.

In absence of pure *cothurnata* critical decision is very difficult again. I am rather sure that the Kuching specimen represents another race than the Riam series, but it seems undesirable to undertake a further division on base of my scanty material.

***Ratufa affinis ephippium* (S. MULLER).**

*Material:* S. Borneo: 6 ♀♀, Kali Tjempaga, Sampit, J. J. MENDEN, 16.VI-17.VII.35.

I place this series in *ephippium* because there is a good likeness with the original description and picture. As regards the measurements, unfortunately I have to say again that I do not know anything about typical *ephippium*. I can only state that my animals, collected West of the terra typica of *ephippium*, which I suppose to be the Barito River, are remarkably small, especially in the tooth measurements, while those of LYON, from Pamukang and Klumpang Bays, E. of Barito River, do not give that same impression. Tooth measurements have not been recorded by LYON, but the maxima for other measurements are not small at all. Again, there is an urgent want for topotypical material.

**Lariscus insignis (CUV.).**

Localities	Upper tooththrow				Tail in %		Subspecies
	Min.	Aver.	Max		Aver.		
Sipora, Mentawai <sup>1)</sup>	16.0	10.46	11.0	13	45	12	<i>obscurus</i>
Siberut, Mentawai <sup>1)</sup>	10.0	10.31	10.7	8	44	9	<i>siberu</i>
N. Pagai	9.9	10.35	10.9	10	43	7	<i>auroreus</i> subsp. n.
Sumatra, Lampongs	9.0	9.49	10.1	11	58	10	<i>insignis</i>
"  , Benkulen	9.0	9.43	9.9	6	58	6	<i>diversoides</i> subsp. n.
"  , Mt Dempo <sup>2)</sup>	8.7	9.05	9.7	21	47	20	<i>niobe</i>
"  , Atjeh	8.2	8.64	9.0	7	58	6	<i>atchinensis</i> subsp. n.
Anambas <sup>3)</sup>	8.9	8.95	9.0	3	56	3	<i>castaneus</i>
Borneo <sup>4)</sup>	8.2	8.64	8.9	7	58	13	<i>diversus</i>
Java, Mt Salak	9.3	9.71	10.0	25	61	27	<i>javanus</i>
"  , further W. part	9.3	9.53	10.0	7	63	6	"
"  , Mt Tjerime	9.2	9.62	10.0	9	57	8	"
"  , Mt Slamet	9.3	9.66	10.1	7	62	6	"
Nusa Kambangan	—	9.3	—	1	42	1	"
Java, Mt Muria <sup>5)</sup>	9.6	9.67	9.7	3	66	3	<i>murianus</i>
"  , Mt Idjen <sup>6)</sup>	9.0	9.15	9.3	4	62	4	<i>vulcanus</i>

<sup>1)</sup> Incl. CHASEN & KLOSS, P.Z.S., 1928, p. 828.

<sup>2)</sup> Incl. ROBINSON & KLOSS, Journ. F.M.S. Mus., 7, 1919, p. 287.

<sup>3)</sup> Incl. CHASEN & KLOSS, Journ. Mal. Br. R.A.S., 6, 1928, Pt. 3, p. 34.

<sup>4)</sup> Incl. LYON, Proc. U.S. Nat. Mus., 90, 1911, p. 92; GYLDENSTOLPE, Kungl. Svensk. Vet. Ak. Handl., 60, 1919, p. 32.

<sup>5)</sup> Incl. SODY, Temminckia, 2, 1937, p. 219.

<sup>6)</sup> Incl. KLOSS, Journ. F.M.S. Mus. 10, 1921, p. 233.

Four very distinct races appear to occur among our Sumatran material. Unfortunately the habitat of typical *insignis* and of *niobe* is rather indefinite. The type locality of *insignis* is "Sumatra", without any further indication (CHASEN: lowlands). The type of *niobe* is recorded to have been collected by BOCK at "Paja", Sumatra. Now "paja" means "marsh" only. However, I follow ROBINSON & KLOSS who suggested to read "Pajakombo" for "Paja". Furthermore I propose to restrict the type locality of *insignis* to Lampongs, S. Sumatra, lowlands. In any case two of the Sumatran races, represented in this collection, must be described as new.

**Lariscus insignis obscurus** (MILLER).

*Material:* 1 ♂, 2 ♀♀, Mentawi Isls, C. B. KLOSS, 12-20.X.24.

**Lariscus insignis siberu** (CHAS. & KLOSS).

*Material:* 1 ♀, Siberut, Mentawi Isls, C. B. KLOSS, 1.X.24.

**Lariscus insignis aureoreus** subsp. n.

*Type:* ♀ ad., North Pagi Isl., W. of Sumatra. leg. J. J. MENDEN, 23.I.1935, Buitenzorg Museum, Coll. No. 16/35.

*Material:* 7 ♂♂, 3 ♀♀, same locality and collector, 4-23.I.35.

*Diagnosis:*

Similar to *obscurus* in all respects, except that the general colour of the whole upper side is more reddish and less yellowish.

Measurements of type: head and body 192; tail 88; hind foot 42; ear 16; skull: greatest length 52.5; condylo-basal length 47.1; basal length 43.6; palatal length 26.2; zygomatic breadth 28.9; breadth of braincase 20.5; interorbital constriction 13.7; nasals  $17.9 \times 5.3$ ; diastema 13.7; palatal foramina 3.5; length of bulla 8.0; upper toothrow 9.9 mm. In 10 specimens the bullae measure 7.8-8.09-8.4 mm.

**Lariscus insignis insignis** (CUV.).

*Material:* S. Sumatra: 2 ♂♂, Wai Lima, Lampongs, H. C. SIEBERS, 26.XI.21; 2 ♀♀, Lampongs, undated.

For comparison with the other Sumatran races a short description of these animals and a series in my own collection may be given.

Upperside lightest of all Sumatran races and strikingly bicolorous: not only the area between the black lateral stripes is more greyish than other parts of the upper side, but also outside these stripes the central part of the animal is lighter and less buff than the foremost and hindmost parts. A kind of saddle is formed. The ventral side is light, always suffused with ruddy orange, especially on the thighs. Bases of the hairs usually white. Tips of tail hairs whitish. Central line of underside tail buff. Tail rather long, toothrow moderately long. Bullae moderately large (7.4-7.85-8.2 mm in 4 specimens).

**Lariscus insignis diversoides** subsp. n.

*Type:* ♂ ad., Sanggul, Benkulen, W. Sumatra,  $\pm$  500 m, leg. J. J. MENDEN, 11.VIII.1936. Buitenzorg Museum, Coll. No. 430/36.

*Material:* 3 ♂♂, 3 ♀♀, type locality, same collector, 11-28.VIII.36.

*Diagnosis:*

Upperside the most reddish of all Sumatran races, strongly bicolorous: the area between the black lateral stripes somewhat yellowish, outside thereof rather strongly reddish, in this respect somewhat inclining towards *diversus* from Borneo. Ventral side light, still more suffused with ruddy orange than in *insignis*. Bases of the hairs white

or light grey. Tips of tail hairs whitish. Central line of underside tail buff. Tail rather long, tooththrow moderately long. Bullae large (8.0-8.16-8.5 mm in 5 specimens).

Measurements of type: head and body 203; tail 102; hind foot 44; ear 16; skull: greatest length 49.9; condylo-basal length 45.0; basal length 42.0; palatal length 25.2; zygomatic breadth 27.6; breadth of braincase 21.8; interorbital breadth 14.6; nasals  $15.5 \times 7.0$ ; diastema 12.7; palatal foramina 3.4; length of bulla 8.0; upper tooththrow 9.6 mm.

One specimen, ♂, Tjabangkanan, Gisting, Lampongs, S. Sumatra, 1000 m, leg. M. A. LIEFTINCK, differs from *insignis*, and comes quite near to *diversoides* by the reddish colour of the back outside the black lateral stripes.

***Lariscus insignis niobe* (THOS.).**

*Material*: 10 ♂♂, 9 ♀♀, Mount Dempo, W. Palembang, S. Sumatra, ± 1800 m, J. J. MENDEN, 12-31.VII.36.

Upperside darkest of all Sumatran races, unicolorous, that means: the area between the black lateral stripes of the same colour as the further parts. Ventral side with clear orange yellow tips, also over the whole chin. Bases of the hairs very dark, causing the very dark tinge of the whole underside. Tips of tail hairs buff. Central line of underside of tail a dark grizzle of black and buff. Tail rather short, tooththrow rather short. Bullae very small (6.9-7.27-7.6 mm in 16 specimens).

***Lariscus insignis atchinensis* subsp. n.**

*Type*: ♂ ad., Atang Putar, Atjeh, N. Sumatra, 1000 m, leg. A. HOOGERWERF, 11.IV.37, Buitenzorg Museum, Coll. No. 472/37.

*Material*: 3 ♂♂, Atang Putar, Atjeh, N. Sumatra, A. HOOGERWERF, 6-13.IV.37.

*Additional material*: 4 ex. Perlak, E. Atjeh, N. Sumatra, in coll. SODY.

*Diagnosis*:

Upperside on the whole more yellowish than in every other Sumatran series, unicolorous. The black stripes perhaps running somewhat less far backwards. Ventral side rather dark, though less so than in *niobe*, the light central zone very narrow. Tinged only little orange yellow. Especially on the chin the tips of the hairs are whitish. Bases of the hairs dark grey. Tips of tail hairs buffish. Central line of underside tail a dark grizzle of black and buff. Tail rather long, tooththrow short. Bullae small (7.2-7.50-7.8 mm in 5 specimens).

In the Atang Putar specimens another phenomenon was found which I suppose to be a constant character of the race, viz the nasalia shaped like a swallow's tail: the nasals at their posterior extremities are separated over some distance by a long tapering continuation of the frontal bone. I did not observe this in any of the other Sumatran races, but it was found back in my 4 specimens of *diversus*.

Measurements of type: head and body 173; tail 90; hind foot 45; ear 20; skull: greatest length 47.8; condylo-basal length 42.3; basal length 39.5; palatal length 23.4; zygomatic breadth 26.0; breadth of braincase 19.0; interorbital constriction 12.5; nasals  $14.4 \times 6.3$ ; diastema 12.1; palatal foramina 3.2; length of bulla 7.5; upper toothrow 8.5 mm.

**Lariscus insignis castaneus (MILLER).**

*Material:* 1 ♂, Pulau Sianten, Anambas islands, F. N. CHASEN, 30. IX.25.

**Lariscus insignis diversus (THOS.).**

*Material:* N. W. Borneo, Landak Distr.: 1 ♂, Perbuwak, J. J. MENDEN, 17.VIII.37; 1 ♀, Semuwang, J. J. MENDEN, 7.IX.37; S. E. Borneo, Kotawaringin Distr.: 2 ♀♀, Kumai, J. J. MENDEN, 5-6.I.38.

No comparison with topotypical material was possible. The fur between the black lateral stripes is not "ashy grey", as THOMAS says of his Sarawak specimen. But there is no difference of any importance between our N.W. and S.W. Borneo specimens.

**Lariscus insignis javanus (THOS. & WROUGHT).**

*Material:* W. Java: 2 ♂♂, 4 ♀♀, Mount Salak, MADZOED, 5-9. IX.29; 1 ♀, Pondok Gedeh Est., 400 m, Buitenzorg Distr., MADZOED, 25.XII.37; 1 ♂, Botanical Garden Tjibodas, Mount Gedeh, 1400 m, C. VAN WOERDEN, 2.I.31; 1 ♀, Mount Papandajan, Negla, in forest, 1550 m, A. DE VOS, 27.X.41; 1 ♂, vicinity town of Cheribon, J. J. MENDEN, 23.VI.28; 5 ♂♂, 4 ♀♀, Mount Tjerimai, 700-2500 m, J. J. MENDEN, 1.VI.28, 5.I.29, 23.II.31, 22.III-28.III.31; C. Java: 1 ♀, Mount Slamet, Tegalsari, 700 m, BALGOOY, 5.VI.35; Nusa Kambangan, off S. Coast of C. Java: 1 ♀, Gligir, P. F. FRANCK, 17.II.29. *Additional material:* 1 sex. inc. Tjibodas, Mount Gedeh, 1400 m; 1 sex. inc. Tjibeber, W. Java, 1080 m.

Though there is some variation, it is difficult to find a geographical or ecological line in the material available at the moment. The single Cheribon specimen is strongly washed with rufous, above and below, and the Tjerimai series as a whole is more rufous below than the Salak series. The specimen from Nusa Kambangan differs especially by its broad light underside. Without doubt it will be necessary in future to describe more subspecies.

**Lariscus insignis vulcanus (KLOSS).**

*Material:* E. Java: 1 ♂, 2 ♀♀, Ongop-ongop, Idjen Mountains, 1700 m, K. W. DAMMERMAN, 25.V.24.

*Incertae Sedis:* 1 ♀, Blawan, Idjen Mountains, DAMMERMAN, 31.V.24; 1 ♂, Argapura, Jang Highland, 2900 m, P. F. FRANCK, 19.VII.35.

In the original description of *vulcanus* (type locality Ongop-ongop Idjen, E. Java, 5700 ft) BODEN KLOSS supposed that *javanus* would be the lowland and submontane form throughout whole Java and alongside of a series from West Java, he also brought in this form a specimen from Tamansari, Idjen, 1600 ft. I am fully prepared to accept the race *vulcanus* and also the only distinguishing character, given by KLOSS: hairs of tail tipped with buff or tawny, instead of white. But I am afraid that it is not possible to separate this species in Java simply in a lowland and a mountain race. The buff hair tips on the tail also occur in my single Cheribon specimen. But in my Tjerimai series from 700, 800, 1000, 2000, and 2500 m, only the single specimen from 2000 m in this respect clearly shows the *vulcanus* type.

There appear to be more differences. Our topotypical *vulcanus* specimens strike by the broad, light belly zone, and in this respect our animal from Idjen, 950 m matches them, though having white hairtips on the tail. But the broad light belly does not occur in our specimen, from Jang Highland, 2900 m.

In my opinion the most important distinguishing character of *vulcanus* lies in the small size of the teeth (see table). The specimen from Blawan, 950 m, presents for it 9.6, that from Jang Highland, 2900 m, 9.3 mm. I should prefer to leave these both specimens unidentified as far as their race is concerned.

#### **Rhinosciurus laticaudatus (MULLER).**

##### **Rhinosciurus laticaudatus saturatus ROB. & KLOSS.**

*Material:* 1 ♂, Alur Purba, E. Atjeh, N. Sumatra, MADZGED, 17, VI.30.

As far as I know there are collected only six specimens in Sumatra up till now (1, Indragiri, SCHNEIDER; 1, Deli, DE BUSSY; 2, Rimbo Pengadang, Barisan Range, JACOBSON; 1, Lampongs, SODY). As far as I remember this Atjeh animal seems to differ strongly from my (at present inaccessible) specimen from Lampongs, S. Sumatra.

Some measurements are:

Head and body 199; tail 115; hind foot 44; ear 17; skull: greatest length 56.8; condylo-basal length 51.2; basal length 48.0; palatal length 30.8; zygomatic breadth 27.3; breadth of braincase 22.1; interorbital constriction 13.0; nasals 18.8 × 6.6; diastema 16.4; palatal foramina 4.0; bulla 11.2; upper toothrow 11.7 mm.

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## ALPHABETICAL INDEX

	Page		Page
<i>Aeromys tephromelas</i> . . . . .	70	<i>Callosciurus notatus</i> <i>datu</i> s . . . . .	83
— — <i>bartelsi</i> . . . . .	70	— — <i>dilutus</i> . . . . .	82, 93
<i>Callosciurus albescens</i> . . . . .	101	— — <i>director</i> . . . . .	83
— — <i>albescens</i> . . . . .	101	— — <i>dulitensis</i> . . . . .	82, 93
— — <i>hippurus</i> . . . . .	106	— — <i>famulus</i> . . . . .	83
— — — <i>borneensis</i> . . . . .	106	— — <i>guillemardi</i> . . . . .	83
— — — <i>hippurosus</i> . . . . .	106	— — <i>icterius</i> . . . . .	83
— — <i>jentinki</i> . . . . .	79	— — <i>kalianda</i> . . . . .	81, 88
— — — <i>subsignanus</i> . . . . .	79	— — <i>lamucotanus</i> . . . . .	83
— — <i>leucomus</i> . . . . .	107	— — <i>lautensis</i> . . . . .	83
— — — <i>leucomus</i> . . . . .	107	— — <i>lighti</i> . . . . .	83
— — — <i>occidentalis</i> . . . . .	107	— — <i>lunaris</i> . . . . .	83
— — <i>lowii</i> . . . . .	80	— — <i>lutescens</i> . . . . .	82, 94
— — — <i>fraterculus</i> . . . . .	80	— — <i>madurae</i> . . . . .	82, 91
— — — <i>lowii</i> . . . . .	80	— — <i>magnificus</i> . . . . .	82, 92
— — — <i>pumilus</i> . . . . .	80	— — <i>malawali</i> . . . . .	83
— — — <i>siberu</i> . . . . .	80	— — <i>maporensis</i> . . . . .	83
— — — <i>vanakeni</i> . . . . .	80	— — <i>marinsularis</i> . . . . .	83
— — <i>melanogaster</i> . . . . .	106	— — <i>microtis</i> . . . . .	82, 92
— — — <i>atratus</i> . . . . .	107	— — <i>miniatus</i> . . . . .	83
— — — <i>melanogaster</i> . . . . .	107	— — <i>nesiotes</i> . . . . .	83
— — — <i>mentawi</i> . . . . .	107	— — <i>nicotianae</i> . . . . .	81, 87
— — <i>modestus</i> . . . . .	79	— — <i>notatus</i> . . . . .	81, 82, 90
— — — <i>modestus</i> . . . . .	79	— — <i>pannovianus</i> . . . . .	83
— — <i>nigrovittatus</i> . . . . .	95	— — <i>pemangilensis</i> . . . . .	83
— — — <i>bantamensis</i> . . . . .	95, 99	— — <i>peninsularis</i> . . . . .	83
— — — <i>besuki</i> . . . . .	95, 100	— — <i>percommodus</i> . . . . .	81, 87
— — — <i>bocki</i> . . . . .	95, 96	— — <i>perhentiani</i> . . . . .	83
— — — <i>brookei</i> . . . . .	95, 97	— — <i>plasticus</i> . . . . .	83
— — — <i>diardi</i> . . . . .	95, 100	— — <i>pretiosus</i> . . . . .	83
— — — <i>madsoedi</i> . . . . .	95, 100	— — <i>prinsulae</i> . . . . .	81, 89
— — — <i>nigrovittatus</i> . . . . .	95, 97	— — <i>proteus</i> . . . . .	83
— — — <i>phoenicurus</i> . . . . .	95, 99	— — <i>rubidiventris</i> . . . . .	82, 94
— — — <i>salakensis</i> . . . . .	95, 98	— — <i>rupatius</i> . . . . .	83
— — — <i>subspec.</i> . . . . .	95, 99	— — <i>rutiliventris</i> . . . . .	82, 94
— — — <i>tenggerensis</i> . . . . .	95, 99	— — <i>saturatus</i> . . . . .	83
— — <i>notatus</i> . . . . .	80, 81, 82	— — <i>scottii</i> . . . . .	83
— — — <i>abbotti</i> . . . . .	83	— — <i>seraiae</i> . . . . .	83
— — — <i>anambensis</i> . . . . .	82, 94	— — <i>serutus</i> . . . . .	82, 95
— — — <i>aoris</i> . . . . .	83	— — <i>singaporensis</i> . . . . .	83
— — — <i>arensis</i> . . . . .	83	— — <i>siriensis</i> . . . . .	83
— — — <i>balstoni</i> . . . . .	82, 91	— — <i>stellaris</i> . . . . .	83
— — — <i>(balstoni?)</i> . . . . .	82, 91	— — <i>stresemanni</i> . . . . .	82, 92
— — — <i>billitonus</i> . . . . .	82, 95	— — <i>subluteus</i> . . . . .	83
— — — <i>conipus</i> . . . . .	83	— — <i>subspec?</i> . . . . .	81, 90, 93

	Page		Page
<i>Callosciurus notatus tamansari</i>	91	<i>Callosciurus tenuis surdus</i>	78
— — <i>tamansari</i> (?)	82	— — <i>tonkeanus</i>	107
— — <i>tapanulius</i>	81, 88	— — <i>weberi</i>	107
— — ( <i>tarussanus</i> )	81	<i>Hylopetis sagitta</i>	71
— — <i>tedongus</i>	82, 95	— — <i>sagitta</i>	71
— — <i>tenuirostris</i>	83	— — <i>sumatrae</i>	71
— — <i>ubericolor</i>	83	<i>Iomys winstoni</i>	75
— — <i>vanheurni</i>	82, 90	<i>Lariscus insignis</i>	113
— — <i>verbeeki</i>	82, 91	— — <i>atchinensis</i>	113, 115
— — <i>vinocastaneus</i>	82, 93	— — <i>aureoreus</i>	113, 114
— — <i>vittatus</i>	81, 88	— — <i>castaneus</i>	113, 116
— — <i>watsoni</i>	83	— — <i>diversoides</i>	113, 114
— <i>prevostii</i>	101	— — <i>diversus</i>	113, 116
— — <i>armalis</i>	101, 103	— — <i>insignis</i>	113, 114
— — <i>atricapillus</i>	101, 105	— — <i>javanus</i>	113, 116
— — <i>bangkanus</i>	101	— — <i>murianus</i>	113
— — <i>borneoensis</i>	101	— — <i>niobe</i>	113, 115
— <i>prevostii? borneoensis</i>	105	— — <i>obscurus</i>	113, 114
— <i>prevostii caedis</i>	101	— — <i>siberu</i>	113, 114
— — <i>carimatae</i>	101, 103	— — <i>vulcanus</i>	113, 116
— — <i>carimonensis</i>	101	<i>Nannosciurus exilis</i>	77
— — <i>condurensis</i>	101	— — <i>exilis</i>	77
— — <i>coomansi</i>	101, 103	— — <i>sordidus</i>	77
— — <i>erebus</i>	101	— — <i>melanotis</i>	76
— — <i>humei</i>	101	— — <i>bancanus</i>	76
— — <i>kuchingensis</i>	101, 105	— — <i>melanotis? bancanus</i>	76
— — <i>mandanauus</i>	101, 103	— — <i>melanotis borneanus</i>	76
— — <i>melanops</i>	101	— — <i>melanotis</i>	76
— — <i>navigator</i>	101, 102	— — <i>pallidus</i>	76
— — <i>nyx</i>	101	— — <i>sumatranus</i>	76
— — <i>palustris</i>	101	<i>Petaurista elegans</i>	69
— — <i>pelapius</i>	101	— — <i>elegans</i>	70
— — <i>penialius</i>	101	— — <i>slamatensis</i>	70
— — <i>piceus</i>	101, 102	— — <i>petaurista</i>	67
— — <i>pluto</i>	101, 105	— — <i>batuana</i>	67
— — <i>proscipinae</i>	101	— — <i>interceptio</i>	67, 69
— — <i>sanggaus</i>	101, 103	— — <i>marchio</i>	67, 68
— — <i>subspec.</i>	101, 102	— — <i>mimicus</i>	67
— — <i>waringensis</i>	101, 103	— — <i>nigricaudatus</i>	67, 69
— <i>preyeri</i>	106	— — <i>petaurista</i>	67, 68
— — <i>inquinatus</i>	106	— — <i>rufipes</i>	67, 68
— <i>rubriventer</i>	108	<i>Petinomys genibarbis</i>	72
— <i>tenuis</i>	78	— — <i>genibarbis</i>	72
— — <i>altitudinus</i>	78, 79	— — <i>hageni</i>	73
— — <i>parvus</i>	78, 79	— — <i>hageni</i>	73
— — <i>procerus</i>	78, 79	— — <i>lugens</i>	74
— — <i>siantanicus</i>	78, 79	— — <i>ouwensi</i>	71

	Page		Page
Petinomys vordermani . . . . .	74	Ratufa bicolor . . . . .	108
— — vordermani . . . . .	74	— — albiceps . . . . .	108, 109
Ratufa affinis . . . . .	110	— — baliensis . . . . .	108
— — affinis . . . . .	110, 111	— — bicolor . . . . .	108, 109
— — bancana . . . . .	111	— — palliata . . . . .	108, 109
— — bungaranensis . . . . .	110, 111	— — peninsulæ . . . . .	109
— — cothurnata . . . . .	111, 112	— — <i>subspec.</i> . . . .	108, 110
— — ehippium . . . . .	111, 112	Rhinosciurus laticaudatus . . . . .	117
— — griseicollis . . . . .	110, 111	— — saturatus . . . . .	117
— — lumholtzi . . . . .	111, 112	Sciurillus murinus . . . . .	77
— — polia . . . . .	110, 111	— — griseus . . . . .	77
— — sandakanensis . . . . .	110, 111	— — murinus . . . . .	77
— — sirhassenensis . . . . .	110, 111		