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Praomys misonnei, a New Species of Muridae from Eastern Zaïre (Mammalia)

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With 4 figures and 4 tables

Summary

A new species of *Praomys* from Zaïre, *P. misonnei* **spec. nov.**, is described. *P. misonnei*, a member of the *P. tullbergi*-complex, is most closely related to *P. tullbergi* and *P. rostratus*. The new species is compared, with other *Praomys*-species and with most of the type specimens, by statistical analysis.

Zusammenfassung

Eine neue *Praomys*-Art aus Zaïre , *P. misonnei* **spec. nov.** wird beschrieben. Sie gehört zur *Praomys-tullbergi*-Gruppe und steht dort *P. tullbergi* und *P. rostratus* am nächsten. Die neue Art wird mit anderen *Praomys*-Arten und den meisten Typusexemplaren durch statistische Analyse verglichen.

1. Introduction

In the past several authors have drawn attention to the differences between *Praomys tullbergi* and *Praomys jacksoni*, or what could be called more generally a *tullbergi*-form and a *jacksoni*-form. Some of them even mentioned the distinguishing characters between both forms: Allen & Loveridge (1933), Hatt (1940a, b) who noticed that both forms were present in Zaïre, Petter (1965, 1975) and Eisentraut (1970). Hatt (1940a, b) recognized the east african forms *jacksoni*, *montis*, *octomastis*, *peromyscus* and the central african *minor* as belonging to the *jacksoni*-group. *Praomys viator* is also a member of the *jacksoni*-form (Rosevear, 1969). *Praomys lukolelae* is considered by Hatt (1940b) as distinct and a representative of the *tullbergi*-form, and Eisentraut (1970) mentioned that *P. morio* and *P. hartwigi* are related to *tullbergi*. Also *P. rostratus* belongs to the *tullbergi*-group.

For Hollister (1919) the east african *Praomys* species are still subspecies of *tullbergi*. Allen & Loveridge (1933) remarked that the east african forms were a distinct species *jacksoni* and not a subspecies of *tullbergi*. At the moment it is generally accepted that *P.*

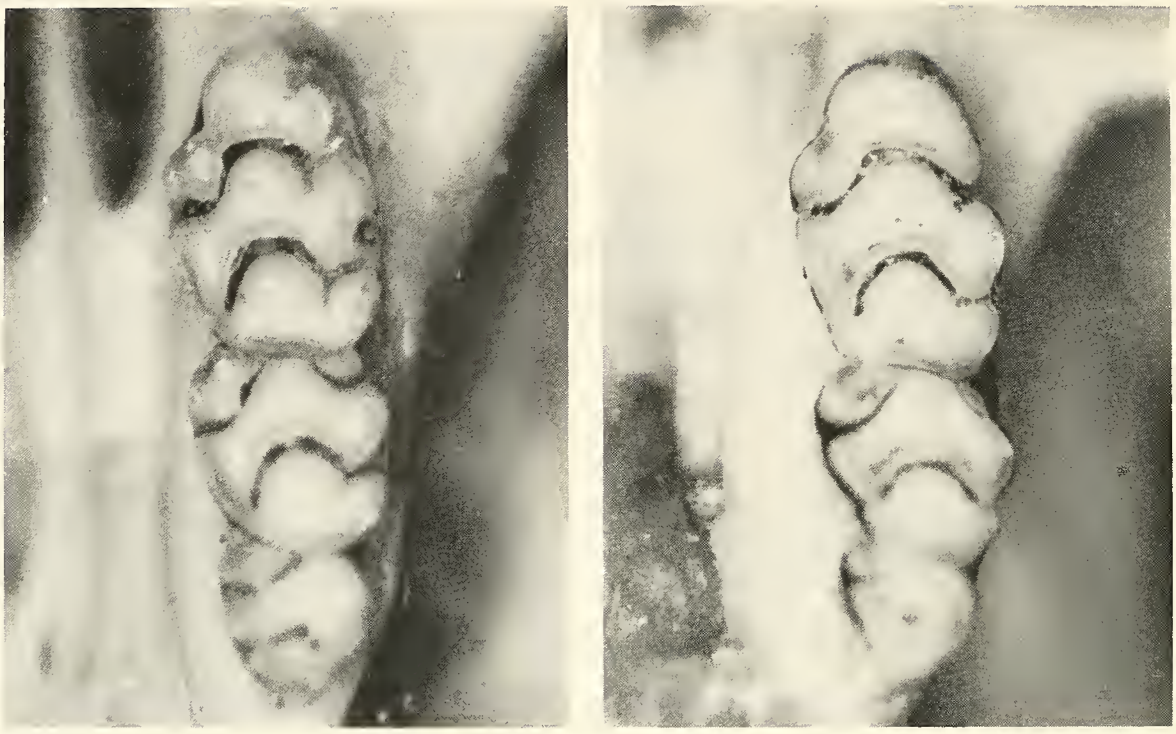

Fig. 1. Left upper molar row of *Praomys jacksoni* (SMNS 10.462) (left) and *P. misonnei* spec. nov. (SMNS 10.552, paratype) (right) both from Irangi (photograph J. Terryn).

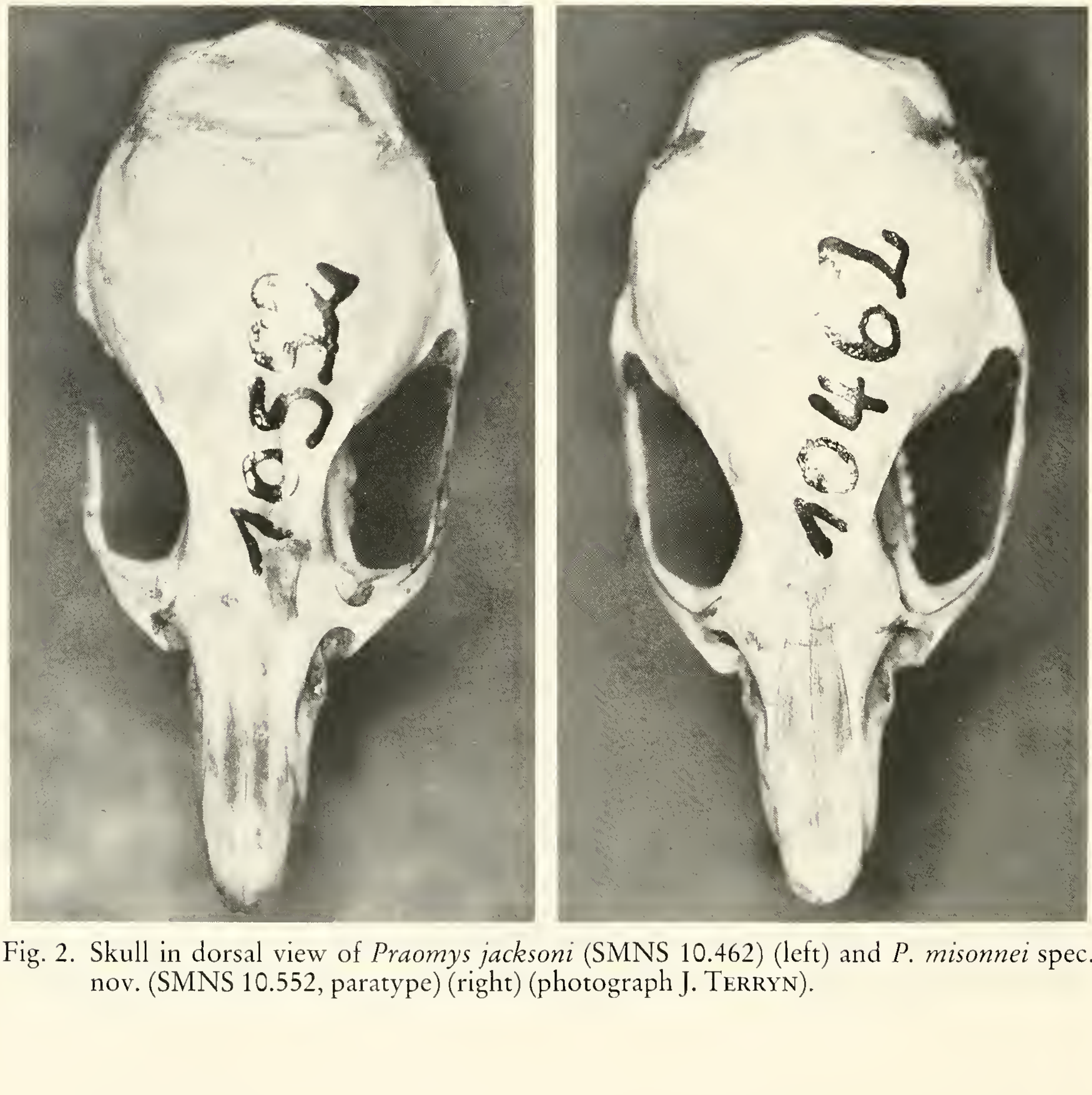

Fig. 2. Skull in dorsal view of *Praomys jacksoni* (SMNS 10.462) (left) and *P. misonnei* spec. nov. (SMNS 10.552, paratype) (right) (photograph J. Terryn).

jacksoni occurs in East and Central Africa, while *P. tullbergi* is the typical species of West Africa. Both *P. tullbergi* and *P. jacksoni* occur together in Nigeria, Cameroun, Central African Republic, Gabon, Congo and Western Zaïre (Lukolela): KINGDON (1974), MISONNE (1974), DELANY (1975), CORBET & HILL (1980), and HONACKI et alii (1982). Although ROSEVEAR (1969) remarks, while discussing the status of *tullbergi*: "It is widespread throughout the forest belt and some of the Guinea woodlands from the Gambia River to Western Cameroun. The full extent of its range elsewhere is not clear owing to the confusion in taxonomic literature." This last remark is surely true, in literature as in museums the specimens assigned to the names *tullbergi*, *jacksoni* and *morio* are confused.

The *jacksoni*-form has the outer cusp of the first transverse lamina (t3) in the upper M^1 well developed (fig. 1); the supraorbital-temporal ridges are moderately or strongly raised as beads and the frontal region is cuneate (fig. 2). In the *tullbergi*-form the t3 of M^1 is obsolete or difficult to detect (fig. 1). The *tullbergi*-specimens are also characterized by having weak supra-orbital ridges, not at all raised and the interorbital constriction is smooth and has a slightly amphoral pattern (fig. 2).

For the canonical analysis we used the method of SEAL (1964) further adapted by HEBRANT (1974). This analysis maximizes the between-groups-variation in relation to the within-groups-variation. The original variables (here these are the skull measurements) are transformed to a new set of canonical variables. Therefore eigenvalues and eigenvectors are calculated. This permits representation of the specimens and of the group-centroids. For a specimen each original variable (measurement) is multiplied by its corresponding coefficient of the eigenvector (see table 3 or 4) and the obtained values are added up. This must be done for all specimens in each of the canonical variates. Now, using the obtained values, each specimen can be plotted in a diagram of canonical variates represented as an abscissa or an ordinate. In our problem there are three groups and two canonical variates. This means that only one diagram can be drawn (see fig. 3 or 4). In order to simplify the diagrams, only the canonical means (= centroids) and the most extreme values of each cluster of points are indicated.

Studying an extensive *Praomys* collection made by DIETERLEN between 1963—74 in Eastern Zaïre we found that both, the *tullbergi*-form and the *jacksoni*-form were present in Irangi (1°54'S; 28°27'E, 850 m, tropical rain forest). The comparison of the "*tullbergi*" specimens from Irangi with the *P. tullbergi* from West-Africa and with the different *Praomys* type specimen led to the conclusion that the specimens from Irangi belong to a new and undescribed species. We name this new species in honour of our colleague Dr. X. MISONNE (Brussels), who contributed a lot to the knowledge of mammals, particularly Muridae.

2. Description of *Praomys misonnei* spec. nov.

Holotype: ♂ adult, skin and skull, SMNS 10.555, original No D 8231, from Irangi (Kivu) Zaïre, collected on the 12th August 1966 by DIETERLEN. In the collections of the "Staatliches Museum für Naturkunde, Stuttgart".

Paratypes: All adult specimens from Irangi, Zaïre, with skin and skull, collected by DIETERLEN in the collections of the "Staatliches Museum für Naturkunde, Stuttgart" (SMNS numbers):

10.460, ♀, 04. 06. 1966;	10.494, ♂, 09. 06. 1966;
10.504, ♀, 11. 06. 1966;	10.505, ♀, 11. 06. 1966;
10.507, ♀, 12. 06. 1966;	10.511, ♀, 14. 06. 1966;
10.518, ♀, 15. 06. 1966;	10.549, ♀, 10. 08. 1966;
10.552, ♂, 11. 08. 1966;	10.554, ♀, 12. 08. 1966;
10.562, ♀, 05. 10. 1966;	10.565, ♂, 07. 10. 1966;
10.595, ♀, 26. 11. 1966;	10.601, ♂, 28. 11. 1966;
10.609, ♂, 26. 01. 1967;	10.613, ♂, 30. 01. 1967;
10.617, ♂, 31. 01. 1967;	10.621, ♀, 01. 02. 1967;
10.623, ♀, 02. 02. 1967;	10.631, ♀, 03. 04. 1967;

10.632, ♀, 04. 04. 1967;	10.647, ♂, 10. 04. 1967;
10.650, ♀, 07. 06. 1967;	10.659, ♀, 10. 06. 1967;
10.670, ♂, 13. 06. 1967;	20.449, ♀, 07. 09. 1971;
20.511, ♂, 17. 03. 1972;	20.526, ♂, 10. 05. 1972;
20.537, ♀, 01. 06. 1972;	20.541, ♂, 13. 06. 1972;
20.570, ♀, 22. 08. 1972;	20.621, ♂, 04. 11. 1972.

Distribution: All the known specimens were captured in Irangi (Zaïre, 850 m), tropical rain forest, where this species seems to be less abundant than *Praomys jacksoni*. Most probably the distribution area will increase after an accurate examination of all museum material from the central african rain forest. *Praomys misonnei* was not found on height in Lwiro (savanna with rests of forest), Tshibati (limit of mountain forest) and Kahuzi (mountain forest, afroalpine zone), three localities where lots of *Praomys* were captured. We have no information on the habitat preferences of *P. misonnei* as it was captured, within the Irangi region, in the same localities and habitats as *P. jacksoni*.

Description: *Praomys misonnei* spec. nov. has the typical *Praomys*-colour and cannot be distinguished from *P. jacksoni* or *P. tullbergi* on pelage-characters. The general texture of the pelage is soft, there is no underfur. The belly is greyish, the top of each hair is white, the basis has a grey colouration. The dorsal colour is variable. The dorsal colour of the young specimens is dark grey and the very old specimens are more rufous coloured. It is known that in *Praomys* a certain degree of rufous colouring develops with increasing age. The dorsal hairs of the mid back are 9—10 mm. The colour of the dorsal pelage is darker and less rufous than in *P. jacksoni* and this can also be seen in older specimens. Palatal ridges 2+7, as in *P. tullbergi*.

The supra orbital ridges, the interorbital constriction and the t3 on M^1 are as in *P. tullbergi*. The anterior palatal foramina up to the front edge of the first root of M^1, very rarely beyond the front edge (while in *P. jacksoni* the anterior palatal foramina are reaching mostly just between the molar rows). The palatine reaches forward well into M^1. There is always a t3 on M^2. For measurements of the type and all paratypes see table 1.

For comparative measurements of *P. jacksoni* from Irangi and *P. tullbergi* from West Africa see table 2. The most distinguishing measurements between *P. misonnei* and *P. jacksoni* are breadth of M^1 and the interorbital breadth. When comparing *P. misonnei* with *P. tullbergi* we find highly significant differences for ten skull measurements. *Praomys tullbergi* is highly significantly bigger than *P. misonnei* for PAF, ZYPL, BNAS, ROM, and highly significantly smaller for UPTE, UPDE, M^1, LOTE, BUL, and BRCA. The new species is also highly significantly smaller than *Praomys rostratus* and this for all measurements with the exception of CHOA and BUL. We could not find a sexual dimorphism.

3. Canonical analysis of the craniometrical data

In order to demonstrate the differences between *P. jacksoni* from Irangi (here considered as typical *P. jacksoni*), *P. tullbergi* from Ivory Coast (considered to be typical *P. tullbergi*; see Van der Straeten & Verheyen 1981) and *P. misonnei* spec. nov. we elaborated different canonical analyses. We will treat here two of them. On the graphical presentation of these canonical analyses we plotted also the different *Praomys* type specimens. The type specimens of those species who are, on external or teeth and skull characters, clearly different from what we described in the introduction as a *jacksoni*-form or a *tullbergi*-form are not represented in the figure 3 and 4, with the exception of *P. melanotus* as this is the only type specimen that lies within the delimitation of *P. misonnei*.

Table 1. *Praomys misonnei* spec. nov. — Measurements [mm] of adults, number of specimens, mean, range and standard deviation are given from left to right. For more information about the measurements we refer to VAN DER STRAETEN & VAN DER STRAETEN-HARRIE (1977). The external measurements are those shown on the museum labels.

Symbol	Description	holo-type			
HB	Head and body length	108,0	33;	112,0 (89,0 –123,0)	7,4
TL	Length of tail	139,0	32;	141,3 (113,0 –163,0)	9,5
HL+N	Length of hind foot + nail	25,0	31;	24,4 (21,0 – 25,5)	0,9
EL	Length of ear	19,0	30;	18,5 (16,0 – 21,0)	1,1
GRLE	Greatest length of skull	29,65	33;	31,01 (29,20– 32,35)	0,88
PRCO	Prosthion-condylion	26,95	33;	28,24 (26,50– 29,70)	0,95
HEBA	Henselion-basion	22,55	33;	24,09 (22,50– 25,70)	0,91
HEPA	Henselion-palation	13,15	33;	13,57 (12,60– 14,70)	0,46
PAF	Length of palatal foramina	6,10	33;	6,46 (5,90– 7,15)	0,28
DIA1	Length of diastema	8,05	33;	8,64 (8,00– 9,55)	0,43
DIA2	Distance between the anterior border of the alveole of M^1 and the edge of upper incisor	8,55	33;	9,24 (8,30– 10,60)	0,59
INT	Interorbital breadth	4,65	33;	4,65 (4,40– 4,95)	0,14
ZYG	Zygomatic breadth on the zygomatic process of the squamosum	13,65	33;	14,21 (13,50– 15,15)	0,48
PAL	Palate breadth between M^1	2,95	33;	2,99 (2,80– 3,30)	0,12
UPTE	Length of upper cheekteeth	4,85	33;	5,01 (4,70– 5,35)	0,17
UPDE	Breadth of upper dental arch	6,00	33;	5,98 (5,60– 6,30)	0,17
M^1	Breadth of M^1	1,45	33;	1,43 (1,35– 1,50)	0,04
ZYPL	Breadth of zygomatic plate	3,05	33;	3,28 (2,95– 3,60)	0,16
BNAS	Greatest breadth of nasals	2,85	33;	3,08 (2,80– 3,50)	0,19
LNAS	Greatest length of nasals	11,20	33;	11,79 (10,85– 12,70)	0,52
LOTE	Length of lower cheekteeth	4,70	33;	4,69 (4,50– 5,00)	0,12
CHOA	Breadth of choanae	1,60	33;	1,55 (1,20– 1,95)	0,14
BUL	Length of auditory bulla	4,30	33;	4,49 (4,20– 4,90)	0,13
BRCA	Braincase breadth	12,10	33;	12,44 (11,85– 13,00)	0,34
DIN	Depth of incisors	1,45	33;	1,46 (1,30– 1,65)	0,08
ROH	Rostrum height at anterior border of M^1	6,30	33;	6,65 (6,00– 7,20)	0,28
ROB	Rostrum breadth at anterior border of zygomatic plate	4,85	33;	4,94 (4,55– 5,35)	0,21
PCPA	Distance between the extreme points of processus condylicus and processus angularis	8,10	28;	8,77 (8,10– 9,20)	0,32

Table 2. *Praomys tullbergi* (from Ivory Coast) and *P. jacksoni* (from Irangi). — Measurements [mm] of adults. For further details see table 1.

Symbol	*P. tullbergi* (West-Africa)			*P. jacksoni* (Irangi)		
HB	35;	104,0 (86,0 –115,0)	5,7	88;	115,4 (94,0 –131,0)	7,4
TL	33;	129,7 (119,0 –144,0)	6,5	82;	146,9 (125,0 –168,0)	10,7
HL+N	35;	24,1 (22,2 – 25,9)	0,7	88;	25,0 (22,0 – 28,0)	1,2
EL	35;	14,9 (10,9 – 17,6)	1,3	80;	18,4 (15,0 – 22,0)	1,1
GRLE	35;	31,20 (29,20– 34,00)	1,13	89;	30,99 (28,10– 34,20)	1,06
PRCO	35;	28,36 (26,45– 31,50)	1,16	88;	28,47 (26,10– 31,75)	1,08
HEBA	35;	24,18 (22,50– 27,00)	1,05	88;	24,35 (22,00– 26,90)	1,00
HEPA	35;	13,70 (12,60– 15,50)	0,61	88;	13,61 (12,35– 14,90)	0,53
PAF	35;	6,75 (6,10– 7,35)	0,34	87;	6,93 (5,75– 8,10)	0,51
DIA1	35;	8,88 (8,05– 10,35)	0,49	87;	8,53 (7,35– 9,30)	0,45
DIA2	15;	9,13 (8,00– 10,20)	0,62	87;	9,33 (8,15– 10,55)	0,58
INT	34;	4,69 (4,45– 5,10)	0,16	87;	4,88 (4,45– 5,35)	0,20
ZYG	34;	14,12 (13,15– 15,35)	0,50	86;	14,68 (13,30– 16,10)	0,54
PAL	35;	2,97 (2,75– 3,40)	0,14	87;	3,04 (2,70– 3,45)	0,17
UPTE	35;	4,86 (4,40– 5,30)	0,22	87;	4,97 (4,55– 5,50)	0,19
UPDE	35;	5,80 (5,45– 6,45)	0,21	87;	6,13 (5,75– 6,65)	0,21
M^1	35;	1,40 (1,30– 1,50)	0,06	89;	1,51 (1,45– 1,65)	0,05
ZYPL	34;	3,43 (2,95– 4,10)	0,25	87;	3,07 (2,55– 3,50)	0,19
BNAS	35;	3,37 (2,90– 3,75)	0,20	87;	3,30 (2,80– 3,90)	0,21
LNAS	34;	11,95 (10,30– 13,45)	0,67	87;	11,79 (10,35– 13,30)	0,56
LOTE	35;	4,57 (4,15– 4,95)	0,17	88;	4,67 (4,35– 5,10)	0,18
CHOA	33;	1,44 (1,20– 1,70)	0,14	87;	1,39 (1,00– 1,80)	0,16
BUL	33;	4,36 (4,10– 4,60)	0,12	82;	4,53 (4,10– 4,85)	0,16
BRCA	35;	12,21 (11,65– 13,10)	0,30	86;	12,55 (11,50– 13,45)	0,31
DIN	11;	1,52 (1,35– 1,65)	0,08	87;	1,52 (1,25– 1,80)	0,11
ROH	35;	6,97 (6,35– 7,90)	0,35	87;	6,86 (5,80– 7,70)	0,35
ROB	35;	5,00 (4,50– 5,50)	0,24	87;	5,17 (4,45– 5,90)	0,29
PCPA	7;	8,78 (8,10– 9,10)	0,33	86;	8,93 (7,70– 9,80)	0,45

For the first canonical analysis we used 18 measurements (see table 3) and 143 adult specimens divided as follows in three groups:

1.) *Praomys tullbergi* (Ivory Coast), 30 specimens;
2.) *Praomys misonnei* (Irangi), 33 specimens;
3.) *Praomys jacksoni* (Irangi), 80 specimens.

In table 3 the eigenvectors are given of the 18 variables for the two canonical variates. In fig. 3 we give the graphical presentation. For each group the center and the most extreme values are indicated by a polygonal delimitation. The following types were plotted on the graph using the calculated eigenvectors: *P. tullbergi melanotus*, *P. tullbergi sudanensis*, *P. jacksoni montis* (all three represented in fig. 3) and *P. tullbergi lukolelae* (not represented in fig. 3).

Table 3. Eigenvectors of 18 variables for the two canonical variates.

Variable Symbol	1	2
GRLE	1,1522	1,0239
PRCO	0,5717	−0,4503
HEBA	−0,9558	0,2569
HEPA	−0,3640	−0,3531
PAF	−0,9340	0,6014
DIA1	2,7813	−0,3654
INT	−2,2646	2,3147
ZYG	−0,9946	0,3369
PAL	0,9074	1,3470
UPTE	2,3838	−1,2528
UPDE	−2,6393	−2,9619
M^1	−7,0135	6,7317
ZYPL	2,7673	0,5720
BNAS	0,0413	4,2153
LNAS	−0,5354	−0,0348
LOTE	−1,1341	0,5168
BUL	−0,7317	−2,3720
BRCA	0,4899	−2,0043

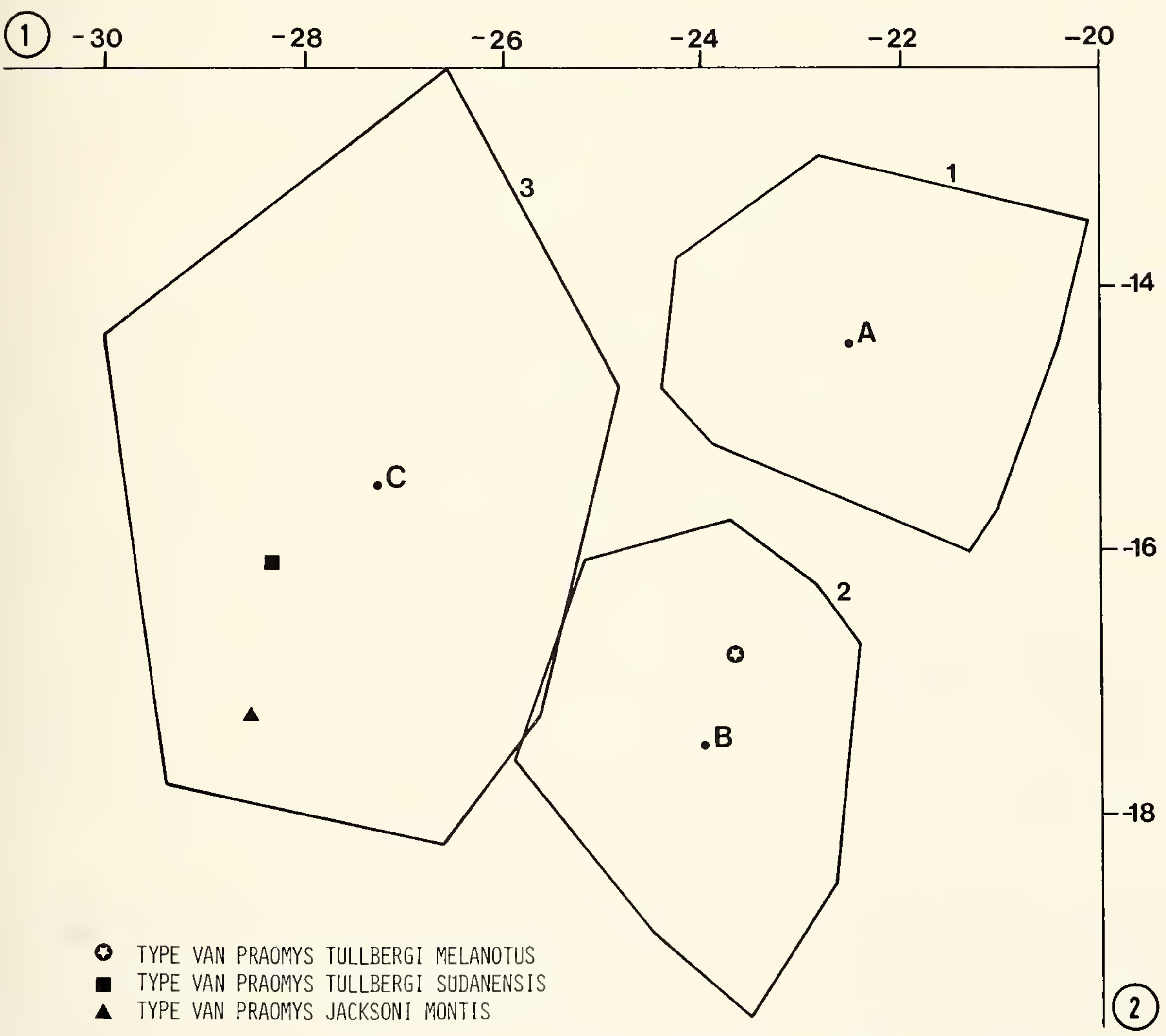

Fig. 3. Canonical analysis using 18 measurements: Canonical means (dots at capital letters) and extreme limit of each cloud of points; canonical variates 1 (abscissa) and 2 (ordinate); — 1(A) *Praomys tullbergi*, — 2(B) *Praomys misonnei* spec. nov., — 3(C) *Praomys jacksoni*.

Table 4. Eigenvectors of 10 variables for the two canonical variates.

Variable Symbol	1	2
DIA1	1,2483	−0,6902
INT	−2,1100	1,5419
ZYG	−1,2613	−1,0649
UPTE	1,6279	−1,1749
M^1	−14,8172	4,1362
BNAS	0,2479	4,4100
LNAS	−0,1532	−0,2606
LOTE	−0,0809	−0,7577
BUL	−2,2351	−2,0057
ROH	0,9009	1,8431

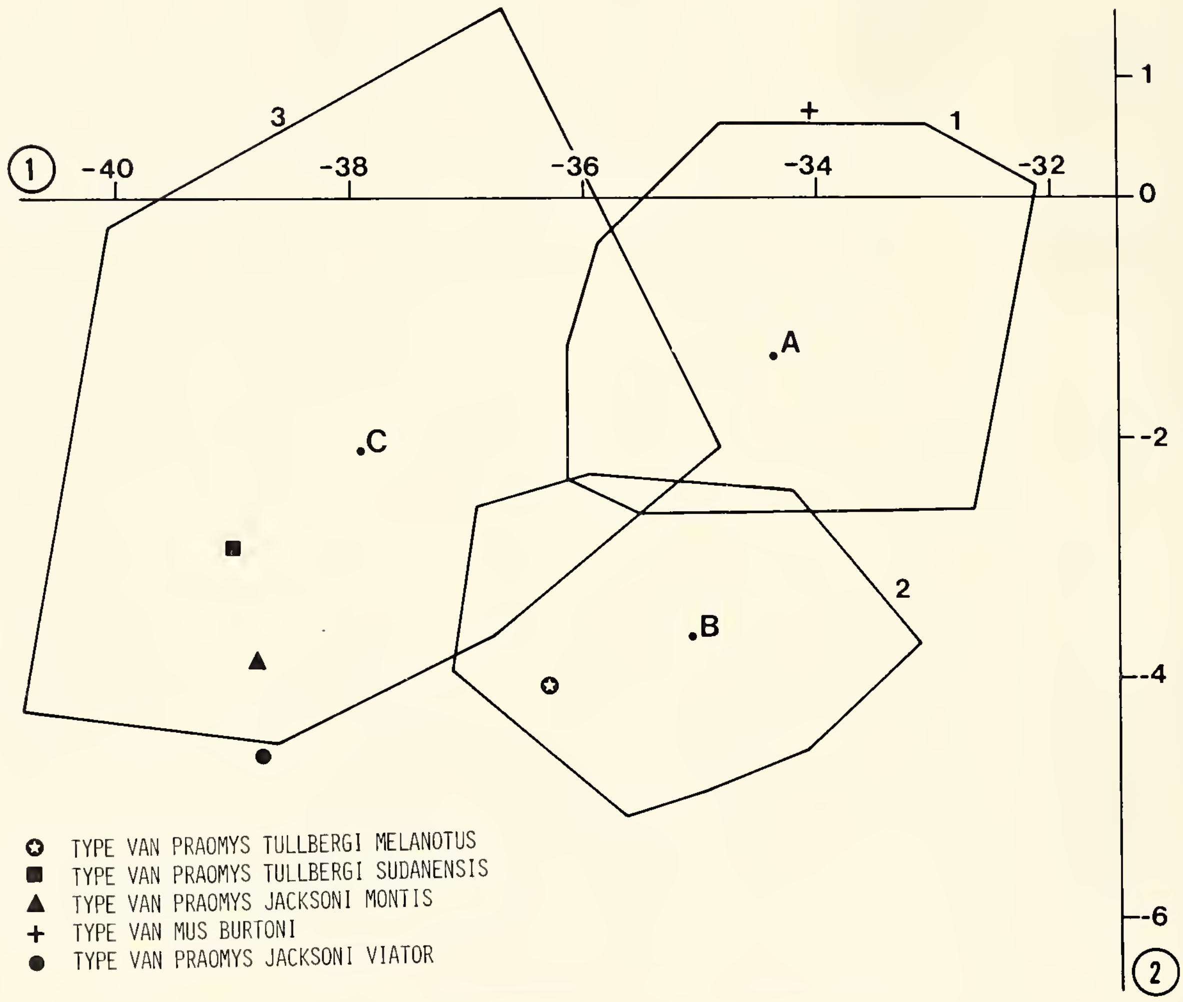

Fig. 4. Canonical analysis using 10 measurements. For explanation see fig. 3.

The first canonical variate contains 80,6% of the total variation and the second 19,4%. The first canonical variate shows a separation between the *P. tullbergi*-form and the *P. jacksoni*-form. The second canonical variate separates *P. tullbergi* and *P. misonnei*. The type specimens of *sudanensis* and *montis* coincide with *P. jacksoni* from Irangi. The type-specimen of *melanotus* lies in the delimination of *P. misonnei* and the type-specimen of *lukolelae* falls within the *P. tullbergi*-group.

In a second canonical analysis we used only 10 measurements to create the possibility to plot the type of *P. tullbergi* on the graph. For the calculations we used 144 adult specimens and three groups:

1.) *P. tullbergi* (Ivory Coast), 31 specimens;
2.) *P. misonnei* (Irangi), 33 specimens;
3.) *P. jacksoni* (Irangi), 80 specimens.

In addition to the four type specimens used in the first canonical analysis, also the following type specimens are figured here, and this using the calculated eigenvectors: *Mus burtoni* (= *P. tullbergi*), *P. jacksoni viator* and *Mus morio* (the last one not represented in fig. 4).

Again there are only two canonical variates that contain 78,3% and 21,7% of the total variation respectively.The results (given in table 4 and fig. 4) are similar to the results of the first canonical analysis. There are three groups but here there is a small overlap, as some of the important discriminating measurements were not used. Also the position of the type-specimens is about the same. Considering the three type-specimens not involved in the first canonical analysis, *viator* is just out of the *P. jacksoni*-delimitation and *Mus burtoni* is just out of the *P. tullbergi*-group, but both are far away from *P. misonnei*. *Praomys morio* lies in the overlap between *P. tullbergi* and *P. jacksoni*.

If we consider the same three species but now grouped according to age, similar results are obtained (age as determinated by the degree of tooth-wear). The differences due to growth are of minor importance than the differences between the three species. If also *P. rostratus* is involved in the canonical analysis, the first canonical variate is dominated by the differences between *P. rostratus* and the other species. If *P. jacksoni*-specimens from Tshibati, Lwiro and Kahuzi are included as three additional groups, there is a great coincidence between the *P. jacksoni*-samples originating from the different localities.

4. Discussion

It is clear that two species of *Praomys* occur in Irangi. *P. jacksoni* is one of them and the type-specimens of *montis, sudanensis* and *viator* lie within the delimitation of this species. A complete discussion of the *P. jacksoni*-complex, including the exact systematic status of the different species and subspecies, will be the subject of a later publication (Van der Straeten, in preparation).

The second species from Irangi belongs to the *P. tullbergi*-complex , but differs considerably from the Ivory Coast specimens and from the *P. tullbergi*-type-specimen. Both, the *P. tullbergi*- and *P. lukolelae*-type-specimens, fall between the *P. tullbergi* from Ivory Coast. Considering the biometry of the skull there are only minor differences between *P. tullbergi* and *P. lukolelae*. The important biometrical difference between both is the hindfoot-length (over 30 mm in *P. lukolelae*), and Hatt (1934) used this character in his description to separate *P. lukolelae* from the other *Praomys*-species. From all type-specimens of importance for this study only that of *P. melanotus* lies within the delimitation of *P. misonnei*.

Praomys melanotus, however, is not a representative of the *P. tullbergi*- or *P. jacksoni*-complex. *P. melanotus* is related to *P. delectorum* and to other mostly smaller *Praomys*-species described from isolated mountain areas in East Africa. These species have the outer cusp of the first transverse lamina in the upper M^1 well developed and sometimes t3 is even bigger than t1. Therefore it was considered it was considered by Hatt (1940a) as belonging to the *P. jacksoni*-complex. But *P. melanotus* has no or only weak supra-orbital crests and can easily be separated from *P. jacksoni*. The coincidence on the graphical presentation of the *P. melanotus*-type with the *P. misonnei*-specimens demonstrates that one has to be careful when interpreting the results of a biometrical analysis.

The newly described species belongs to the *P. tullbergi*-complex and is different from the other described species of this complex: *P. tullbergi*, *P. lukolelae*, *P. rostratus*, and *P. morio*. A new examination of all museum material from East and Central Africa will be necessary to obtain a more accurate distribution map of *P. misonnei*.

Ecology: For nearly all specimens of *Praomys* collected in Irangi the exact trapping localities including ecological data are available. Collecting was done in different habitats, as primary forest, secondary forest and oil-palm-plantations.

In all habitats and in at least ten different localities both species were collected during the nocturnal phase. So we can state that *P. jacksoni* and *P. misonnei* spec. nov. share the same habitat and the same phase of activity. Nevertheless different ecological demands in the two species must exist, but they are unknown for the moment.

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