Stodart, E.; Myers, K. (1964): A comparison of behaviour, reproduction and mortality of wild and domestic rabbits in confined populations. CSIRO Wildl. Res. **9**, 144—159.
Stolte, H. A. (1950): Über Entwicklung und Vererbung des Temperaments wilder und domestizierter Kaninchen. N. Erg. Probl. Zool. Klatt-Festschr. **145**, 980—999.
Zimen, E. (1971): Wölfe und Königspudel. Vergleichende Verhaltensstudien. München: Piper.

Anschrift des Verfassers: Dr. Richard Kraft, Institut für Zoologie (Lehrstuhl I) der Universität Erlangen-Nürnberg, Universitätsstraße 19, D-8520 Erlangen

Notes on the Indonesian Mountain Weasel, *Mustela lutreolina* Robinson and Thomas, 1917

By P. J. H. van Bree and M. Sc. Boeadi

Institute of Taxonomic Zoology (Zool. Museum), Amsterdam, and Museum Zoologicum Bogoriense, Bogor

Receipt of Ms. 2. 1. 1978

Abstract

The paper reviews our present knowledge of the little-known Indonesian carnivore *Mustela lutreolina*, occurring on the islands of Sumatra and Java in areas above 1000 metres. Data on some undescribed specimens are also given. The species, closely related to *Mustela sibirica*, is most probably a northern Palaearctic element, which came to these islands during the period of the Quaternary glaciations.

In 1917, Robinson and Thomas described the mustelid species *Mustela lutreolina* based on a single, male specimen (the skin and skull are now in the British Museum (Nat. Hist.); reg. nr 17.814.2) collected at Tjibodas (6°44′ S, 107°00′ E), West Java, on 17-II-1916. In the description it is stated that the animal was killed at an altitude of 5500 feet (1676.4 m). After the publication of the diagnosis only two primary studies on some other specimens appeared in print, viz. one by Brongersma (1940) and a short account by Sody (1949). In his detailed paper, with clear illustrations, Brongersma described a skull and a baculum of an animal from Tjibuni (7°20′ S, 106°50′ E) near Bandung, West Java, altitude 1500 m, collected on 6-IX-1932 and borrowed from the private collection of H. J. V. Sody, and the mounted skin with extracted skull from a specimen from Bencoolen, Sumatra (enumerated as *Mustela henrici*, spec. "d", by Jentink, 1892: 140), presented to the Leiden Museum by Wienecke in 1865. Sody treated briefly five representatives of the species formerly present in the Buitenzorg (now Bogor) Museum and he published some measurements. He also mentioned having examined a skin of *Mustela lutreolina*, collected in 1912 by M. E. G. Bartels at Kaligua, Mount Slamat (7°14' S, 109°12′ E), Central Java, at an altitude of 1500 m.

Z. Säugetierkunde 43 (1978) 166—171

ISSN 0044—3468/ASTM-Coden ZSAEA 7

So in total we have only published data for 8 specimens and therefore it is useful to publish some notes on another three specimens of *Mustela lutreolina* present in the collections of the Museum Zoologicum Bogoriense at Bogor, Indonesia. It also might be useful to enumerate again the specimens now present at Bogor as in the paper by Sody (1949) there are some inaccuracies. For instance, he omitted to mention that already in 1946 two Bogor specimens had been presented to the Rijksmuseum van Natuurlijke Historie at Leiden, and concerning the specimen in his private collection (now RMNH 26107) he did not recall its sex, although Brongersma (1940) had described and pictured its baculum.

	Reg. Nr.							
	MZB 278	MZB 6749	MZB 6768	MZB 8433	MZB 12 000	MZB 12 001	RMNH 7181	RMNH 7182
	Age							
	young adult	adult	adult	adult	young adult	young adult	young adult	adult
	Sex							
	male	male	male	male	male	male	male	male
Condylobasal length	51.1	57.6	60.1	57.1	55.8	56.9	58.7	59.4
Breadth rostrum over canines	10.3	12.2	12.9	11.9	12.2	12.3	12.5	12.5
Zygomatic width	25.7	30.9	30.6	30.3	28.4	29.2	31.3	31.7
Mastoid width	22.5	27.4	26.8	25.4	24.8	25.1	26.7	27.4
Interorbital constriction	9.4	11.9	11.9	11.3	10.4	10.9	11.9	12.1
Postorbital constriction	11.2	13.8[1]	12.4[1]	13.1[1]	12.8	12.8	13.5[1]	14.0[1]
Length palate (prosthion-staphylion)	22.0	26.0	27.3	22.0	25.4	25.7	26.6	27.3
Length upper toothrow (I^1—M^2)	16.7	17.7	19.3	16.7	19.0	19.9	19.6[2]	20.7
Length mandible	28.0	33.5	34.3	28.0	31.8	32.2	33.5	34.9
Length lower toothrow (I_1—M_2)	—	20.8	20.6	—	20.9	20.2	20.2[3]	21.5[3]
Greatest length bulla auditori	15.5	16.8	18.0	15.5	15.9	16.2	17.3	17.8

[1] Probably deformed by a *Skrjabingylus*-like infection (see: van Soest et al. 1972). — [2] P^2 at left missing. — [3] P_2 at right missing.

Material examined by the authors:

MZB 278, male (might be a female, according to Sody 1949: 152); skin and skull, Sukawana, Mount Tangkubanprahu (6°48′ S, 107°32′ E), West Java, alt. 1500 m, 23-XII-1918, leg. B. Straster. No external measurements.

MZB 6749, male; skin, skull and baculum, Ijang Highlands (7°59′ S, 113°40′ E), East Java, alt. 2000 m, 2-XII-1932, leg. A. J. M. Ledeboer; Tl (Total length) = 473 mm, T (Tail length) = 152 mm, Hf (Length hindfoot) = 50 mm, E (Ear length) = 21 mm, W (Weight) = 340 g.

MZB 6768, male; skin and skull, S. E. slope of Mount Dempo (4°02′ S, 103°07′ E), South Sumatra, alt. 1800 m, 10-IX-1941, leg. W. C. Verboom; Tl = 483 mm, T = 170 mm, Hf = 54 mm, E = 26 mm.

MZB 8433, male; skin and skull, Tjibodas (6°44′ S, 107°00′ E), on Mount Gedeh, West Java, alt. 1450 m, 14-VII-1958, leg. M. Sukarto; Tl = 479 mm, T = 165 mm, Hf = 52 mm, E = 25 mm.

MZB 12000, male; skin, skull and baculum, origin not known yet — died in Jakarta Zoo, 4-XI-1977; Tl = 433 mm, T = 136 mm, Hf = 52 mm, E = 22 mm, W = 295.5 g.
MZB 12001, male; skin, skull and baculum, origin not known yet — died in Jakarta Zoo, 4-XI-1977; Tl = 463 mm, T = 150 mm, Hf = 52 mm, E = 22 mm, W = 335 g.
RMNH 7181, male; skin, skull and baculum, Ijang Highlands, East Java, alt. 2200 m, 16-XI-1932, leg. A. J. M. Ledeboer; Tl = 464 mm, T = 161 mm, Hf = 48 mm, E = 22 mm, W = 317 g.
RMNH 7182, male; skin, skull and baculum, Ijang Highlands, East Java, alt. 2200 m, 2-VIII-1932, leg. A. J. M. Ledeboer. No external measurements.

While checking the material mentioned in the introduction and given in the list, one notes as one of most striking features the fact that all the mustelids, of which the localities are known, were collected in areas above 1000 m (see map). The locality Bencoolen or Benkoelen (now Bengkulu) (3°48′ S, 102°15′ E) is not in contradiction to this as in the last century this name was not only used for the town (at sea level) but also for the whole residence and for the mountainous region east and north of the town. It is therefore highly probable that the animal was collected at a high altitude. In relation to its occurrence at high altitudes, also the negative evidence, viz. that the species is not represented in the huge collection of mammals collected at the lowland areas of northern and eastern Java present in the British Museum (Natural History), is rather important. Nor is it present in the rather large collection of mammals from the lower parts of the former residence of Deli, northeastern Sumatra, present in the Zoological Museum in Amsterdam.

Fig. 1. Simplified map of Malacca and the western part of the Indo-Australian Archipelago showing the localities (dots) where *Mustela lutreolina* has been found. Stippled: areas above 1000 meter

The measurements of the intact specimens indicate an animal of the size of a fullgrown, female Polecat, *Mustela putorius* Linnaeus, 1758, or of adult European Minks, *Mustela lutreola* (Linnaeus, 1766). It is with the last species that Robinson and Thomas (1917) compared their animal and it can be said, now more specimens are available for study, that indeed the resemblance in size and colour is rather striking. The fur in *M. lutreolina* is, however, more sleek (less bushy), the tail therefore thinner and the animals have a more slender appearance. There are no significant differences in colour between the fur of the upper side and of the under side. Only at the lower border of the mouth and on the chin a small white area can be found. The variation in size and shape of the white spot is given in fig. 2. It is important to note that there is no mask nor other facial markings or the faintest indication of these markings in the skins we studied. The overall colour of the fur can be described as glossy, dark russet (colour 34), according to Frank B. Smithe's (1975) Naturalist's Color Guide (The American Museum of Natural History, New York).

Fig. 2. Schematic drawings of the chin, throat and breast of eight specimens of *Mustela lutreolina* showing the variation in size and shape of the white-coloured patch. J. Zaagman (ZMA) fecit

The skull, clearly described and pictured by Brongersma (loc. cit.), differs, however, from that of *Mustela lutreola*. For the dimensions of skulls of *M. lutreolina*, see the added table. In morphology and dimensions the skull of *lutreolina* closely resembles that of *Mustela sibirica* Pallas, 1773; so much so that if one ignored the origin of the *Mustela lutreolina* skulls one would identify them as *Mustela sibirica* if the keys published by Pocock (1941) and Stroganov (1969) were used.

Already in their original description Robinson and Thomas (1917: 262) wrote: "the species would appear to be allied to *M. subhemachalana* Hodgson, 1837 [now considered to be a subspecies of *Mustela sibirica;* see Pocock 1941], known from Sikkim and Nepal at high elevations and also recorded from near Bhamo [24°15′ N, 97°15′ E; northern Burma] and the Karin Hills (Thomas 1892: 919), but it differs by its much darker colour, etc.". This remark induced a number of authors (e. g. Ellerman and Morrison-Scott 1966) to consider *lutreolina* a subspecies of *Mustela sibirica*.

Although the present authors are also convinced that *lutreolina* is closely related to *sibirica*, there are, however, two arguments for considering *lutreolina* a separate species and not a subspecies of *sibirica*, at least provisionally. Firstly there are the differences in fur colour and the total absence of facial markings in *lutreolina* and secondly there is the great isolation in time and space of *lutreolina*, as compared to the complex of *sibirica* subspecies. In relation to this isolation it may be useful to point out that neither *sibirica*-like mustelids nor *Mustela lutreolina*-like animals have been found in Malaca (see Medway 1969), a rather well studied peninsula with mountainous areas above 1000 metres, where one could, or would, expect them.

For the occurrence and distribution of *Mustela sibirica*, see Ellerman and Morrison-Scott (1966), Stroganov (1962), and Pocock (1941). It is important

to indicate that at the southern border of its distribution (northern India, Nepal, Bhutan, northern Burma) the species live at an altitude of 5,000 to 16,000 feet (1524 to 4877 m). So, assuming that their biology did not change radically in the course of time, there must have been a much cooler climate during the period that *sibirica*-like animals reached Sumatra and Java. Furthermore the sea level must have been so low that Sumatra and Java formed part of the Asian mainland. Both conditions were found during the period of the Quaternary glaciations and we therefore may regard *Mustela lutreolina* as a northern Palaearctic element in the Indonesian fauna.

Unfortunately we are unable to give any details about the biology of *Mustela lutreolina*. It probably will have the same way of life as *Mustela sibirica* and other mustelids of the same size but contrary to *Mustela lutreola* it will not be so closely attached to water (the feet are not half-webbed as in *lutreola*). As already indicated in the table of skull measurements we found in some skulls, in the region of the postorbital processes and the postorbital constriction, dark coloured swellings and other bone deformities as we know from the European mustelids *Mustela erminea* and *Mustela nivalis*, which are infected by the nematode *Skrjabingylus nasicola* (Leuckart, 1842). Whether the same species of parasitic nematode is found in *lutreolina* or another species must wait till fresh material of the nematode can be studied.

Concluding this short paper we want to thank Miss Daphne M. Hills for checking the collection of mammals of the British Museum (Natural History) for the presence (besides the type material) of *Mustela lutreolina*, Dr. H. Felten for the same at the Senckenberg Museum (Frankfurt/Main) and Dr. G. G. Musser at the American Museum of Natural History (New York). Drs. W. Bergmans kindly checked the collections in Washington (D.C.) and Chicago, for which we are grateful. That the species is not common is indicated by its absence in the above-mentioned collections. Sincere thanks are due to Dr. Ch. Smeenk and Mr. J. Schouten of the Rijksmuseum van Natuurlijke Historie at Leiden for allowing us to study material of *M. lutreolina* from their collection and for furnishing additional information. Dr. I. R. Ball kindly read the draft of this paper.

Zusammenfassung

Bemerkungen über das Indonesische Bergwiesel, Mustela lutreolina Robinson und Thomas, 1917

Im Rahmen einer Untersuchung über *Mustela lutreolina*, einem kleinen, wenig bekannten Musteliden auf Java und Sumatra, wird der gegenwärtige Wissensstand zusammenfassend dargelegt. Ergänzt werden die Ausführungen durch Angaben von Körperdaten bislang nicht beschriebener Individuen. Die mit *Mustela sibirica* nahe verwandte *Mustela lutreolina* ist sehr wahrscheinlich ein Faunenelement der nördlichen Paläarktis; eine Besiedlung der Inseln erfolgte während der Eiszeit.

References

Brongersma, L. D. (1940): Note on *Mustela lutreolina* Rob. and Thos. Temminckia **5**, 257—263.

Ellerman, J. R.; Morrison-Scott, T. C. S. (1966): Checklist of Palaearctic and Indian mammals. 1758 to 1946. 2nd ed. London. pp 1—810.

Jentink, F. A. (1892): Catalogue systématique des mammifères (Singes, Carnivores, Ruminants, Pachydermes, Sirènes et Cétacés). Mus. d'Hist. Nat. des Pays-Bas, Leiden, **XI**, 1—219.

Medway, Lord (1969): The wild mammals of Malaya and offshore islands including Singapore. Kuala Lumpur, Singapore, London. **I—XIX**, 1—127.

Pocock, R. I. (1941): The Fauna of British India, including Ceylon and Burma. Mammalia, London, **II**, I—XII, 1—503.

Robinson, H. C.; Thomas, O. (1917): A new Mink-like *Mustela* from Java. Ann. Mag. nat. Hist. (8), 20, 261—262.
Sody, H. J. V. (1949): Notes on some Primates, Carnivora, and the *Babirusa* from the Indo-Malayan and Indo-Australian regions (with descriptions of 10 new species and subspecies). Treubia 20, 121—190.
Soest, R. W. M. van; Land, J. van der; Bree, P. J. H. van (1972): *Skrjabingylus nasicola* (Nematoda) in skulls of *Mustela erminea* and *Mustela nivalis* (Mammalia) from the Netherlands. Beaufortia 20, 85—97.
Stroganov, S. U. (1969): Carnivorous mammals of Siberia. Jerusalem. I—X, 1—522.
Thomas, O. (1892): On the Mammalia collected by Signor Leonardo Fea in Burma and Tenasserim. Ann. Mus. Civico Storia nat., Genova (2), 10, 913—949, pls X, XI.

Authors' addresses: Dr. P. J. H. van Bree, Institute of Taxonomic Zoology (Zool. Museum), 36 Plantage Kerklaan, NL-1018 CZ Amsterdam, the Netherlands; Boeadi M. Sc., Museum Zoologicum Bogoriense, Jalan Ir. H. Juanda 3, Bogor, Indonesia

Beobachtungen und Experimente zum Futterlernverhalten des Rehs (*Capreolus capreolus*)

Von Helen Müri

Aus dem Zoologischen Institut der Universität Zürich

Eingang des Ms. 4. 8. 1977

Abstract

Observations and experiments on learning processes in foodchoice of roe-deer (Capreolus capreolus)

Studied individual and social learning processes in foodchoise of roe-deer living in an enclosure. Alltogether there were eight fawns (3 ♀♀, 5 ♂♂) and six adult animals (4 ♀♀, 2 ♂♂) involved in the experiments. After learning to eat a certain foodtype with particular form-smell-combination three pairs of fawns, one adult female and a control-group of two adult pairs were tested in a 4-way-choice-experiment: they were confronted with the habitual type as well as three new types differing from the latter in form and/or smell. Results indicate, that animals learn to eat different foodtypes successively. The new types are usually accepted in the following order: smell known/form unknown, smell and form unknown, from known/smell unknown. Before eating a new type different kinds of examination follow each other in a fixed sequence. When animals were grouped in pairs the partners behaved differently: only one animal learned to eat unknown foodtypes. The hypothesis, that this might be role-differentiation was supported by a pilot-experiment, which showed that role-changes are possible. The results are considered to be part of a complex system offering a maximum of new food-resources while minimizing the hasard of intoxication.

Z. Säugetierkunde 43 (1978) 171—186

ISSN 0044—3468/ASTM-Coden ZSAEA 7