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NOTES ON *RHINOLOPHUS* LACÉPÈDE, 1799 FROM SULAWESI, INDONESIA, WITH THE DESCRIPTION OF A NEW SPECIES (MAMMALIA, MICROCHIROPTERA)

by

WIM BERGMANS & FRANK G. ROZENDAAL
Institute of Taxonomic Zoology, University of Amsterdam, P.O. Box 20125, 1000 HC Amsterdam, The Netherlands

ABSTRACT

Known Sulawesian *Rhinolophus* belong to three species: *R. philippinensis* Waterhouse, 1843, *R. celebensis* Andersen, 1905, and *R. tatar* n. sp., described in this paper. Sulawesian records of *R. euryotis* Temminck, 1835, by Tate & Archbold (1939) are based on misidentifications.

RÉSUMÉ

Trois espèces de *Rhinolophus* sont connues de Sulawesi: *R. philippinensis* Waterhouse, 1843, *R. celebensis* Andersen, 1905, et *R. tatar* n. sp., décrite dans la présente note. La mention, par Tate & Archbold (1939) de *R. euryotis* Temminck, 1835, en provenance de Sulawesi, a été basée sur des déterminations erronées.

INTRODUCTION

Andersen (1905b) described *Rhinolophus celebensis* from Macassar (now Ujung Pandang: 05°08'S 119°24'E) and from Menado (01°32'N 124°55'E). Tate & Archbold (1939) mentioned specimens of *R. celebensis* from "S. and S. E. Celebes" and from Roeroekan, N.E. Sulawesi (01°20'N 124°51'E), described a new species, *R. maros*, from Talassa near Maros (05°00'S 119°44'E), and furthermore recorded *R. euryotis* Temminck, 1835 from Wawo (03°41'S 121°04'E), from Maros, and from the Latimodjong Mountains (approximately 03°30'S 120° E). Shamel (1940) recorded *R. celebensis* from Pinedapa, Central Sulawesi (01°25'S 120°37'E), and Temboan (01°05'N 124°55'E). Tate (1943) ranked *R. maros* as a subspecies of *R. philippinensis* Waterhouse, 1843.

Recently, the Zoölogisch Museum Amsterdam received some small collections of bats from Sulawesi, among which two species of *Rhinolophus*. One series of four specimens is clearly referable to *R. celebensis*. A second series of seven specimens could not be matched with either *celebensis* or *philippinensis maros* or *euryotis*. According to the notes and measurements in Tate & Archbold (1939) the series would represent *euryotis*, but it appears that these authors applied a wrong concept of that species. They had calculated from the original description a forearm length, in the type specimen from Amboina, of 50.8 mm and mainly on this ground identified their six Sulawesian specimens (with forearm lengths of 48-51 mm) as typical *euryotis*. To arrive at this conclusion they had to reject an earlier calculation, by Andersen (1905a), which resulted in a forearm length in the type specimen of 57 mm. (Tate & Archbold, 1939, misquoted this value as "56 mm".) However, Andersen was right, as Dr. C. Smeenk informed us (in lit., 20 July 1982): "The type material of *Rh. euryotis* Temminck consists of a series of three mounted specimens, four skeletons with skulls, and 8 skulls; moreover, the skull of one of the mounted specimens has later been removed. The forearm lengths of these mounted rags are difficult to measure. An approximation is: syntype *a*, ♂, ca. 54.9 mm; syntype *b*, ♀, ca. 55.1 mm; syntype *c*, ♀, ca. 54.5 mm. It is well possible that someone else would come up with higher values; 50.8 mm, however, is nonsense." (Translation by the authors.) Three additional topotypic specimens, in better condition, are in the alcohol collection of the Zoölogisch Museum Amsterdam; they were collected on Amboina by Willemsz Geerooms before 1912 and their forearm lengths are: ZMA 19.856, ♂, 57.7 mm; ZMA 19.857, ♂, 56.3 mm; and ZMA 19.858, ♀, 56.6 mm.

Obviously neither the specimens of Tate & Archbold (1939) which form part of the collections of the Museum Zoologicum Bogoriense, Bogor, and the American Museum of Natural History, New York, nor the series here discussed (with forearm lengths of 48.7-51.8 mm) approach typical *euryotis* in size. From our series a number of other differences are apparent. As we have not been able to match these specimens with any other species, we propose a new species for it below. This paper also contains some notes and measurements of the newly collected *R. celebensis*.

(It seems useful to note here, that the Sulawesian records of *R. euryotis* by Tate & Archbold, 1939, do not appear in Laurie & Hill, 1954; Groves, 1976; Van der Zon, 1979.)

Rhinolophus tatar n. sp.

? *Rhinolophus euryotis*; Tate & Archbold, 1939: 9, 12 (not of Temminck, 1835).

Holotype. — An adult ♀ (in alcohol, skull extracted; ZMA 21.838), mistnetted at 5 m above Moinakom River (00°41'N 124°03'E), Dumoga Nature Reserve, North Sulawesi, Indonesia, altitude 525 m, 27/28-X-1981, K. D. Bishop, F. G. Rozendaal & W. F. Rodenburg coll.; vegetation: slightly disturbed rain forest.

Paratypes. — One adult ♀ (alcohol; ZMA 21.839), all data as for the holotype; four adult ♀♀, one adult ♂ (alcohol, all skulls but one extracted; ZMA 21.840-21.844), mistnetted along Moinakom River on 27-X-1981 at 18.00 hrs., other data as for the holotype.

Description. — A medium-sized species of the *euryotis* group (Andersen, 1918), morphologically nearest to *R. arcuatus* Peters, 1871, but larger and with skull of relatively strong build.

Ears large, triangular, longer than wide, with tip curving backward; posterior margin with emargination below tip and with up to 10 transverse folds; antitragal lobe large, subrectangular, rounded posteriorly; ear base yellowish white, centre and top transparent greyish dark brown.

Nose-leaves (figs. 1-3). Anterior nose-leaf with narrow and shallow median anterior groove with at its caudal end a knob-like projection which extends down into the central nasal cavity; with rather low ridges opposite internasal lobes; with scattered short hairs near centre and towards posterior end; with short hairs on lateral outer margins, longest towards posterior ends. Transverse fold at posterior end of anterior nose-leaf rather deep. Secondary anterior nose-leaf thick, with anterior margin interrupted in the middle. Front of sella with nearly parallel sides, only slightly diverging at base, with rounded summit, and sparse short hairs; internasal lobes low, essentially triangular but distally broadly rounded, in lateral view hardly visible; connecting process starting at summit of sella, rounded, with thinly haired dorsal margin; leaf-part supporting connecting process with more and longer hairs (up to 2 mm) and with 4 tactile(?) hairs of about 4.2 mm long. Posterior nose-leaf margins with hairs of up to 2 mm in length, except for tip of lancet. Allowing for some individual variation, nose-leaf parts around central nasal cavity and sella yellowish; rims of median anterior projection and of internasal lobes, and all outer parts of nose-leaf dark greyish brown.

Lower lip with three grooves.

Fur dense and woolly. Hairs on top of head (up to 7 mm in length), on nape of neck (up to 10 mm), and on back (up to 8 mm) bicolored: a very short whitish base and a dark brown shaft. Hairs on ventral side up to 8 mm long, also with short whitish base but with medium brown shaft.

Forearm length in 6 ♀♀ 48.7-51.8 mm (mean 50.05), in 1 ♂ 49.8 mm. Metacarpal of 5th digit slightly longer than of 4th digit, the latter again slightly longer than metacarpal of 3rd digit.

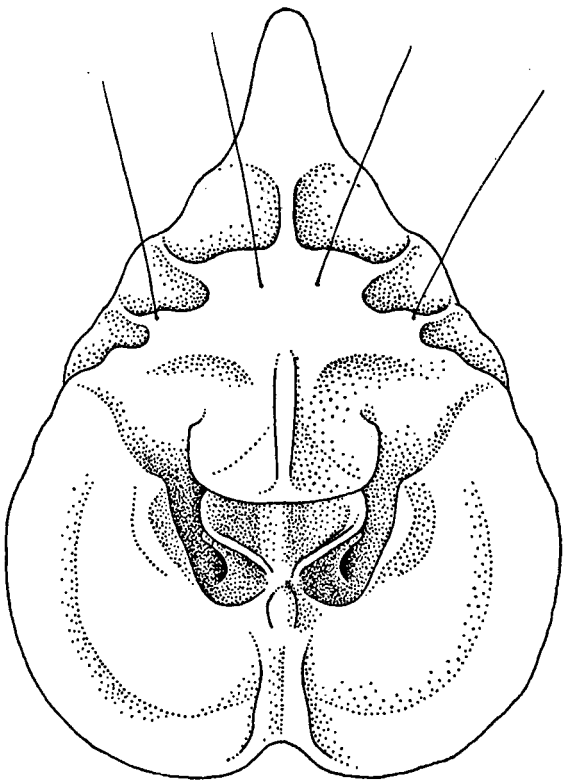
Wing insertion just above ankle.

Wing membranes dorsally naked, ventrally with narrow zone of long medium brown hairs bordering body and with scattered short bristly hairs in the area roughly between upper arm and upper leg. Wing membranes transparent greyish dark brown to dark brown.

Tail shorter than tibia although at least 3/4 of tibia length, hardly projecting beyond membrane.

Plagiopatagium dorsally with short light-coloured hairs at caudal margin only, ventrally with thinly scattered hairs of the same type.

Skull with large and strongly projecting anterior nasal swellings (dividing septa indicated in fig. 4), in the male paratype even bulging slightly over the nasal opening in front. Sagittal crest low in younger specimens but quite high in front in older specimens, and highest in the single male



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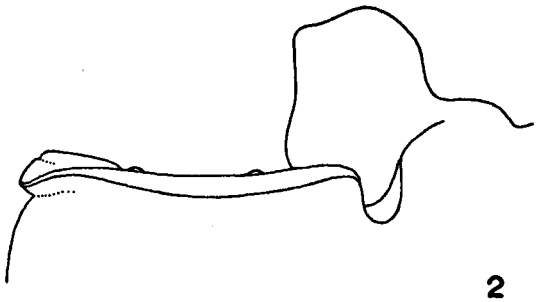

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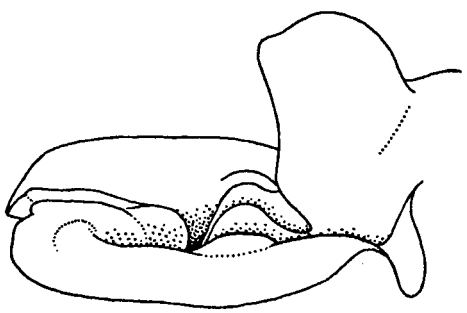

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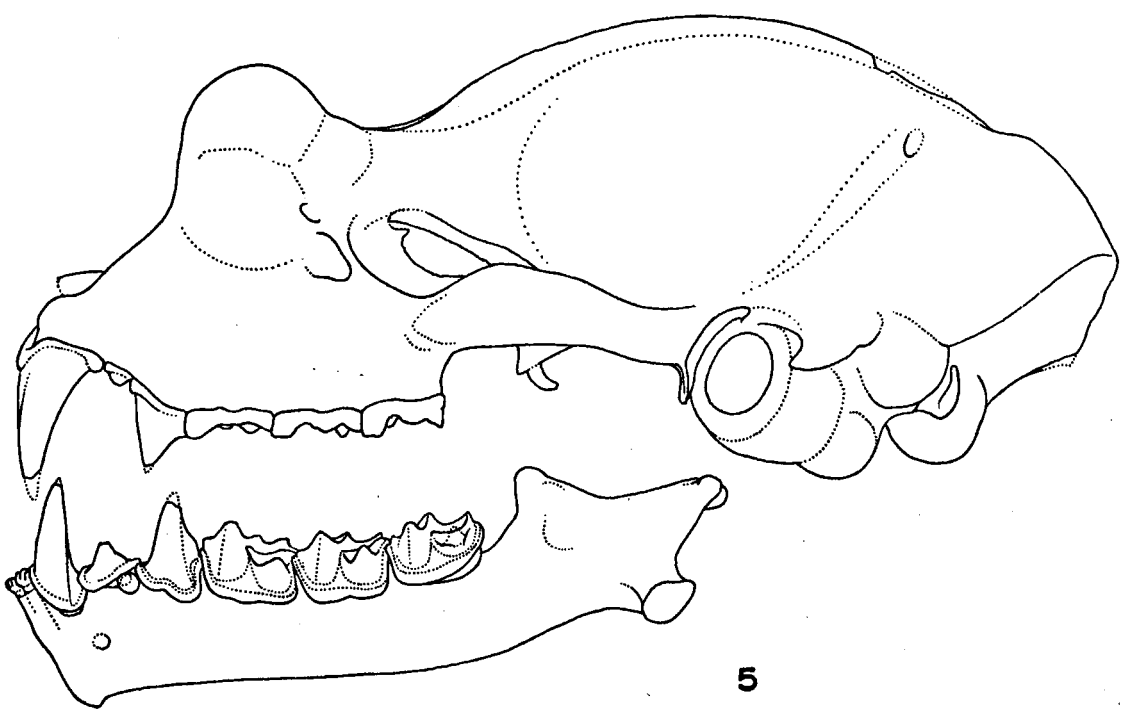

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Figs. 1-3, *Rhinolophus tatar* n. sp., paratype, ZMA 21.839: 1, horseshoe from above; 2, horseshoe from left side; 3, horseshoe from left side, under an angle, to show form of knob-like projection and of internasal lobes.
Figs. 4-5, *Rhinolophus tatar* n. sp., holotype, ZMA 21.838: 4, skull from left side (premaxillae partly missing); 5, mandible from left side.

TABLE I

Measurements of *Rhinolophus tatar* n. sp. (body measurements from alcohol specimens); holotype and paratypes, collection Zoölogisch Museum Amsterdam.

Specimen	holotype	paratypes					
Collection number	21.838	21.839	21.840	21.841	21.842	21.843	21.844
Sex	♀	♀	♀	♀	♀	♀	♂
Forearm length	49.9	48.7	49.9	49.0	51.0	51.8	49.8
Ear length	19.6	19.1	20.2	19.5	20.5	20.5	20.2
Horseshoe width	9.6	9.6		9.2	9.8	9.0	9.5
Hindfoot length	12.3	11.5	11.5	12.4	12.0	11.8	11.9
Tibia length	22.7	23.2	22.5	22.7	23.2	24.9	23.6
Tail length	19.0	17.4	18.2	16.3	20.2	18.3	18.8
Second digit: metacarpal	38.9	36.7	36.4	35.9	37.8	38.3	35.7
Third digit: metacarpal	35.9	34.8	34.6	35.4	36.0	36.5	35.0
1st phalanx	13.7	13.4	13.6	13.2	12.9	14.4	13.0
2nd phalanx	25.4	23.7	23.8	24.5	25.6	25.4	24.8
Fourth digit: metacarpal	37.4	35.5	35.6	35.7	36.4	37.4	35.3
1st phalanx	9.0	8.8	8.8	8.8	9.4	9.3	8.7
2nd phalanx	15.6	14.6	14.0	13.9	15.4	14.3	14.9
Fifth digit: metacarpal	37.7	36.2	36.0	36.6	37.1	38.0	36.4
1st phalanx	10.3	10.6	10.8	10.4	11.6	11.3	10.5
2nd phalanx	13.6	12.5	12.4	12.4	13.7	12.6	13.8
Greatest skull length							23.6
Occipito-maxillar length	21.4		21.7	21.8	21.7		22.5
Condylo-canine length	19.5		19.35	19.2	19.7		
Palatal length	1.9						
Mandible length	15.3		14.85	15.0	15.4		15.8
Cranium width	9.4		9.0	9.2	9.2		9.6
Interorbital width	2.05		2.0	2.0	2.05		2.1
Width across nasal swellings	5.9		6.1	6.05	6.1		6.4
Mastoid width	10.65		10.5	10.5	10.65		10.8
Zygomatic width	11.05		10.8	11.0	11.0		11.5
C^1-C^1 (crowns)	5.9		6.05	6.1	6.0		6.6
C^1-M^3 (crowns)	8.95		8.6	8.9	9.0		9.5
M^3-M^3 (crowns)	8.5		8.6	8.6	8.5		9.0
C_1-M_3 (crowns)	9.5		9.2	9.35	9.6		9.9
M^1: length	2.1		2.1	2.15	2.25		2.0
width	2.3		2.25	2.3	2.3		2.2
M_1: length	2.25		2.2	2.15	2.25		2.25
width	1.6		1.5	1.6	1.45		1.5

paratype. Infra-orbital bridge slender, in one specimen (ZMA 21.840) lacking on left side but for rudimentary basal outgrowths. Palatal bridge very short, in holotype specimen less than 1/4 of maxillary tooth-row length, median anterior point level with posterior half of P^4, median posterior point with extreme posterior border of M^1. Basioccipital not unusually narrowed.

Teeth morphology normal for the group, relative teeth measurements only very little smaller than in *R. euryotis*. P^2 small but in tooth-row, on the external side. P_3 very small, outside line of tooth-row, wedged in between P_2 and P_4 which are in contact except in specimen ZMA 21.841 where they are narrowly separated. In one specimen, ZMA 21.840, P_3 is lacking on left side.

Measurements. — See table I.

Remarks. — Andersen (1905a), while placing *Rhinolophus* species related to *euryotis* and *arcuatus* into one group, the *arcuatus* group (or *euryotis* group of Andersen, 1918, and Tate & Archbold, 1939), hinted that this group contained two types, with intermediates: an *arcuatus* type with small teeth, low sagittal crest, small zygomatic width, and narrow, linear anteromedian horseshoe groove,

and an *euryotis* type with large teeth, high sagittal crest, larger zygomatic width, and broad, more or less pentangular anteromedian horseshoe groove. Tate & Archbold (1939) divided the *arcuatus* group into an *arcuatus* subgroup and an *euryotis* subgroup along the same line. *Rhinolophus tatar* would, on external characters, be classed as a member of the *arcuatus* group, with as nearest relative *R. arcuatus*. But, apart from being distinctly larger (forearm lengths 48.7-51.8 mm, against 44-48.3 mm in *arcuatus*), its skull tends toward the *euryotis* type. Its teeth are not small, its zygomatic width is not narrow, and its sagittal crest is not low if compared to *R. euryotis*.

The distributions of proposed subspecies of *arcuatus* form a somewhat strange pattern:

arcuatus Peters, 1871: Luzon and Mindoro;
exiguus Andersen, 1905: Mindanao and Guimaras;
proconsulis Hill, 1959: Sarawak;
beccarii Andersen, 1907: Sumatra;
angustifolius Sanborn, 1939: Wetter Island.

The first four distributions together pose no problems. But Wetter Island would suggest a possible overall Indonesian distribution. Indeed, Sanborn (1939) remarked that with *arcuatus* on Wetter, and the related *R. toxopei* Hinton, 1925 on Buru, and the other subspecies north and west of Sulawesi, *arcuatus* "should be found on intermediate islands or in the Celebes". But his *angustifolius*, with such peculiar characters as a very narrow sella and a tail as long as the tibia, is probably a distinct species. The present find of a distinct species of the *arcuatus* subgroup on Sulawesi seems to support this suggestion.

Range. — North-east Sulawesi; if the *euryotis* specimens from Sulawesi recorded by Tate & Archbold (1939) are *tatar*, then it is possibly distributed over all of Sulawesi.

Derivatio nominis. — Tate & Archbold (1939) were the first authors who presumably recognized *Rhinolophus tatar* as a species, not yet known from Sulawesi. Only through an error, they attached a wrong name to it. The specific name *tatar* is formed by uniting the first letters of the names of these outstanding contributors to Indo-Australian chiropterology.

Rhinolophus celebensis Andersen, 1905

Material. — One ♀ and three adult ♂♂ (alcohol, one with extracted skull; ZMA 21.816-21.819), mistnetted next to Moinakom River, Dumoga Nature Reserve, North Sulawesi, Indonesia, altitude 525 m, 27-X-1981, 18.00 hrs., K. D. Bishop, F. G. Rozendaal & W. F. Rodenburg coll.; vegetation: slightly disturbed rain forest.

Remarks. — The specimens were caught in the same net and at the same time as the paratypes ZMA 21.840-21.844 of *Rhinolophus tatar* described above. The female is possibly subadult (forearm length 41.6 mm). The males have forearm lengths of 42.8, 44.0 and 44.2 mm, respectively. Specimen ZMA 21.818 has a greatest skull length of 20.1 (premaxillae included), a zygomatic width of 9.35, a maxillary tooth-row length of 7.3, and a mandibular tooth-row length of 7.7 mm.

ECTOPARASITES

Three specimens of *R. tatar* were infested with a species of the genus *Stylidia* Westwood, 1840 (Nycteribiidae). One fly of the same genus, but of a different species, was found on a specimen of *R. celebensis*. (Identifications by the first author; both species may be new.) All four *R. celebensis* specimens were more or less heavily infested with what probably are the embedded females of an ascodipterid fly species, in the skin along their arms. One specimen of *R. tatar* yielded some streblid flies. Another specimen of *R. tatar* had a few mites (Acari).

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