

# NOTES ON THE TAXONOMY OF *MACACA NEMESTRINA LEONINA* BLYTH, 1863 (PRIMATES: CERCOPITHECIDAE)

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In his work on the taxonomy of pigtail macaques, *Macaca nemestrina*, Fooden (1975) mentioned three subspecies (*nemestrina*, *leonina*, *pagensis*), although he felt that "available evidence is not conclusive as generally assumed" to establish subspecific vs. specific status to the three forms. Subsequently, Groves (1993) confirmed Fooden's conclusion but later recognised *pagensis* (the Mentawai macaque) as a full species (Groves, 1997). Therefore at present, *M. nemestrina* includes only *leonina* and the nominal form as subspecies. The nominal subspecies occurs on Sumatra, Borneo and Peninsular Malaysia, while *leonina* ranges from eastern Assam (India) extending south-eastwards through Myanmar, south-western Yunnan, Thailand, Laos, Vietnam, south to Peninsular Thailand, where the two taxa meet along the Surat Thani-Krabi depression (Fooden, 1975). Contrary to the nominal form, few *leonina* individuals are currently kept in zoos or laboratories worldwide. Some individuals of both forms of *nemestrina* have been kept at the Rome Zoological Gardens since the '70s, thus allowing some morphological observations to be made. The results of these are reported below.

Three *leonina* individuals (one male and two females) were already present in the zoo around 1975. Their origin is unknown, but owing to their similarity to the individual in Calcutta Zoo shown by Fooden (1975, p. 113) and given that India was a major exporter of macaques up to 1978 (Mack and Mittermeier, 1984), it seems likely they come from Northeast India. Subsequently, four *leonina* individuals (three males and one female) were accepted in 1979, together with two (one male and one female) of the typical subspecies. Their origin is unknown but it is likely they were wild-caught.

## SPECIFIC STATUS OF *LEONINA*

The morphological differences between *nemestrina* and *leonina* are evident (Fig. 1). These include the different sexual swellings in the two taxa. Sexual-skin swelling during and after the menstrual period is particularly developed in the macaques of the *silenus-sylvanus* group (the group containing *M. nemestrina* Fa, 1989). According to Fooden (1975), the sexual-skin swellings of *leonina* have yet to be reported. Observations of at least two adult females in Rome Zoo demonstrate a clear-cut separation of the two forms in this respect. In particular, the subcaudal swelling is highly developed in *leonina* (Fig. 2), closely resembling that of *M. silenus* (Fooden, loc. cit. p. 29). This difference is possibly linked to the different ecological niche of the two taxa, with *nemestrina* being almost totally terrestrial, and therefore showing a "continuous pillowlike mass" (Fooden, loc. cit. p. 28) while in the arboreal *leonina* (like *silenus*) the development of the swelling is mainly limited under the tail, a structure evidently adapted to an arboreal life-style.

Hybridisation occurs between the two taxa, both in the wild and in captivity (Fooden loc. cit.). In Rome, a male *nemestrina* led a group of *leonina* for two years, producing a female offspring with the only available female. The female *nemestrina* x *leonina* produced two male offspring with a *leonina* male. These two males, in which *nemestrina* characters dominate, are presently breeding with pure *nemestrina* females in a research institute in Milan (Rigamonti, pers. comm.). A narrow zone of intergradation has also been documented on the Thai-Malay Peninsula (Fooden, 1975; Albrecht, 1980), but this phenomenon has been

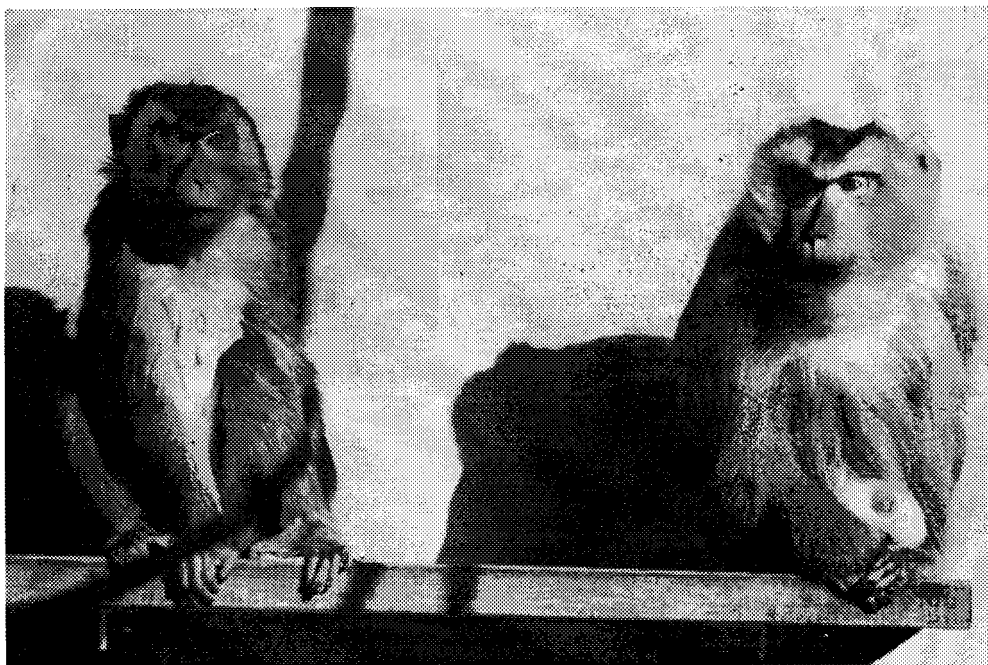


Figure 1 - An adult female *Macaca nemestrina* (left) and an adult male *M. leonina* (Zousename Gaetano) at Rome Zoo (photo S. Gippoliti, 1989)

reported among several macaca taxa in the wild, including usually parapatric closed related species such *asfascicularis* and *mulatta* in Indochina (Albrecht and Miller, 1993) and gene exchange seems limited among pigtailed in the Isthmus of Kra (Fooden loc. cit.). Distinctivity at the species level is indirectly supported also by zoogeographical data. The Isthmus of Kra, which delimits the range of *nemestrina* and *leonina*, is the border between the Indochinese subregion and the Sundaic subregion. The latter contains many endemic mammal genera and species which do not extend north of the Isthmus itself (Corbet and Hill, 1992). Interestingly, in a recent revision of the genus *Nycticebus*, Groves (1998) reached a similar conclusion splitting *N. coucang* into two species, one Indochinese (*ben-galensis*) and one Sundaic (*coucang*).

#### INTRASPECIFIC VARIABILITY IN *MACACA LEONINA*

Differences in body size and colour pattern were evident and consistent between the two

groups of *leonina* present in the zoo. Although exact dimensions are unknown, the individuals imported in 1979 (hereafter group B) were smaller in size than the pigtailed already present (group A) and they were dominated by the *nemestrina* male. Their pelage is browner which lightly contrasts with the belly. Also the hair colour of the crown was distinctly darker in the male of group A (house-name "Gaetano") than in males of group B. The pelage of group A tends to be greyish. It must be noted that pelage colour tends to become whitish with age (the two surviving *leonina* of group A are well in their thirties, possibly older). All males have narrow reddish streaks which extend laterally from the outer corner of each eye to the side whiskers.

#### CONCLUSIONS

Fooden himself recognises, although maintaining a one species status, that «Since the degree of morphological differentiation between *pagensis* and *nemestrina* is compara-

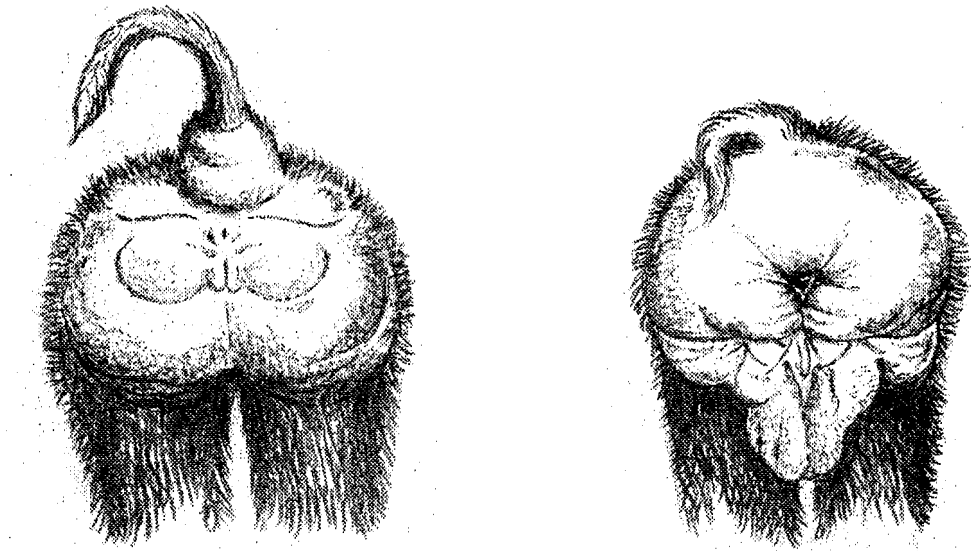


Figure 2 - Female sexual swellings in *M. leonina* (from a photo of S. Gippoliti) and *M. nemestrina* (from Fooden, 1975).

ble to that between *nemestrina* and *leonina*, it seems reasonable to accord equivalent taxonomic status to all three of these forms» (Fooden, 1975 p. 91). Present evidence suggests they should be separated at species level. In particular, the Indochinese pigtail macaque (*Macaca leonina*) morphology and ecology differ considerably from those of *M. nemestrina* and should the two species be geographically isolated, such distinctiveness could be recognised much earlier. Furthermore, *leonina* may present intraspecific geographic variability other than simply increased body-size at northern latitudes (Albrecht, 1980) which should be assessed through a classical morphometric analysis and biomolecular research.

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