

## NOTES ON THE DISTRIBUTION AND TAXONOMY OF PENINSULAR MALAYSIAN MONGOOSES (*HERPESTES*)

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### ABSTRACT

Malayan records of *Herpestes brachyurus* and *H. urva* have been exclusively from lowland rain forest, *brachyurus* at low-lying sites north to Perak and Terengganu States, *urva* to approximately 150 m asl south to Selangor State. External and skull dimensions of individuals of known sex/age class adequately demonstrate that small and large, short-furred, rufous-faced mongooses inhabiting lowland non-forest environments in Malaya (Peninsular Malaysia) south to Selangor, and elsewhere in Southeast Asia, constitute a single, sexually dimorphic species, *Herpestes javanicus*. Transfer of the small-sized taxon *perakensis* to *javanicus* plus dismissal of an invalid record eliminates a claimed area of sympatry between this species and *Herpestes auropunctatus*, removing the latter from the Malayan fauna. *Herpestes edwardsi* is probably now extinct in this area.

### INTRODUCTION

Despite diurnal foraging habits, mongooses are among the less familiar, least collected of the smaller Southeast Asian carnivores, of little known ecology and widely disputed relationships at species level. Rival arrangements of the 'Urva' section of the genus (cf. SCHWARZ, 1947; ELLERMAN & MORRISON-SCOTT, 1966; HINTON & DUNN, 1967; EWER, 1973) are working hypotheses that await still-needed data and, as I hope to show here, some important facts of morphological variation in 'Herpestes' (the *H. auropunctatus-javanicus* complex) have been in disarray for most of this century. Published opinion on species limits within the latter is traceable variously to reviews by BECHTHOLD (1939), CHASEN (1940) and POCOCK (1937, 1941) some of whose interpretations of primary taxonomic research results are mutually exclusive. Confusion extends also to field biology, where new findings on preferred habitats in Malaya are in conflict with earlier statements (BECHTHOLD, 1939) and the only recent allusion of relevance noted, to *H. auropunctatus* in connection with rat control in rice crops (LAM, 1982), I believe misidentifies the species.

These notes adjust and up-date the local record. Distributional limits and habitat responses of all of the mongoose species now recognised as occurring in Malaya (MEDWAY, 1983; WELLS & FRANCIS, 1988) are redefined and field and museum specimen data revise understanding of the geographical relationship between

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the taxa *auropunctatus* and *javanicus*. Work needed to resolve their much obscured systematic relationship is now more or less apparent.

## MATERIALS AND METHODS

The field data comprise miscellaneous sight identifications in Malaya between latitude 2° 58' N in Negeri Sembilan State and the Thai frontier at 6° 40' N, and a fresh road-kill and live trappings respectively in Perlis and Selangor States. Skins and/or skulls, including type material of the taxa *perakensis*, *incertus* and *siamensis* Kloss, *peninsulae* Schwarz, *birmanicus* Thomas and 'rafflesii' Anderson associated in the literature with the *auropunctatus-javanicus* group, were examined in the collections of the British Museum (Natural History) (BMNH), National University of Singapore (ZRCNUS), Institute for Medical Research, Kuala Lumpur (IMR) and the Zoology Department, University of Malaya (ZDUM).

Specimen data mostly comprise a general pelage description, fresh weight, head-body and skeletal tail lengths (where these have been available from labels), and the following four standard cranial measures, taken to 0.1 mm accuracy with vernier calipers: condylobasal length, between the extreme faces of the occipital condyles and premaxillae; maximum skull breadth across the zygomatic arches; maximum width of the braincase avoiding the posterior root of the zygomatic arch, and maximum width across the postorbital constriction. Where appropriate, the significance of a difference in median values has been tested non-parametrically.

## RESULTS AND DISCUSSION

### *Herpestes brachyurus* (Short-tailed mongoose)

Acceptable records of this species are available from the following Malayan States, south to north: *Johor*—a mounted specimen, ZRCNUS 4.1508, acquired from the Old Johor museum, Johor Baru town, and safely presumed to have been collected locally even though relevant data are lacking; *Negeri Sembilan*—sightings in Pasoh Forest Reserve, Jempol district; *Selangor*—specimens from the vicinity of Kuala Lumpur (KLOSS, 1917b; HILL, 1960), Subang Forest Reserve (IMR) and Bukit Mandol, Kelang district (IMR), localities all within the middle and lower Kelang river valley; *Perak*—collected in Taiping district (KLOSS, 1917b); *Pahang*—a sighting at Kuala Lompat, Kerau Game Reserve (G.W.H. Davison, pers. comm.), and *Terengganu*—a live animal from an unrecorded locality presented to the Singapore Botanical Garden menagerie (RIDLEY, 1895). The supposition by FLOWER (1900) that 'a very dark rufous-brown mongoose' observed by him 'in the swamps near Jenan, Kedah' was *brachyurus*, though accepted by BECHTHOLD (1939), is unlikely to be correct. BECHTHOLD's evidence that Malayan *brachyurus* is rufous (cf. THOMAS, 1921; SCHWARZ, 1947) derived from a German zoo captive of undemonstrated provenance

and two 19th century skins from Malacca, a well-known centre of regional trade in specimens at that time. Recent skins from Selangor State seen in this study have all been black grizzled sandy to olive-grey, especially on the head and forequarters, and while the possibility of a rufous morph cannot be ruled out rufescence more reliably suggests *H. javanicus*, as does this particular locality. On the outskirts of modern Alor Setar town, Jenan lies in the historically cultivated plain of Kedah State and by the late 19th century would almost certainly have been deforested. 'Swamp' may therefore be taken to have meant rice-swamp, which is now known to be a stronghold habitat of *H. javanicus* in Malaya.

Central Perak and Terengganu States, i.e., between latitudes approximately 4° and 5° N, mark the northern limit of definite localisations in Malaya but on habitat grounds are unlikely to define a natural boundary. I am informed by a reviewer that the American Museum of Natural History possesses an example from Trang Province. It has not been possible to see this specimen yet but if correctly identified it carries the known mainland range at least 200 km further north and provides a first recorded occurrence of this species in Thailand. Elsewhere, *brachyurus* occurs to the limit of Sundaic evergreen lowland forest, on the Philippine island of Palawan (HEANEY, 1986; BMNH). A second individual from the Singapore Botanical Garden (ZRCNUS 4.1507, dated 25 October 1905) is likely to have been another of Ridley's zoo animals, in this instance of unknown wild origin. MEDWAY (1983) excludes Singapore Island from the wild range of *H. brachyurus*.

Although recorded from high ground in Borneo (MEDWAY, 1977; PAYNE *et al.*, 1985), accurate localisations of *brachyurus* in Malaya have all been from 100 m elevation or less, in primary or regenerating evergreen lowland forest. The aptness of Ridley's name 'water mongoose' (in apparent reference to a zoo captive he states that *brachyurus* bathes often and likes fish) remains to be confirmed but sightings at Pasoh (of two animals together) and at Kuala Lompat happen to have been on low-lying ground close to forest streams.

### ***Herpestes urva* (Crab-eating mongoose)**

This large-bodied, striped-necked mongoose is recorded from the north-eastern Indian subcontinent and subtropical China though Southeast Asia to Vietnam and Thailand (BECHTHOLD, 1939), with collections south to Kuan Khan, latitude 7° 34' N, in Trang Province (BMNH; KLOSS, 1917b; BOONSONG & MCNEELY, 1977). A hitherto overlooked specimen, IMR 87197, and a sight record (WELLS & FRANCIS, 1988) now extend the range to the middle Gombak Valley of Selangor State, latitude 3° 21' N, adding *urva* to the fauna of Malaya. The only other claim of occurrence in the Sunda Region is by HEANEY (1986), on Palawan, based on a skin and skull (BMNH 1893.3.4.6) collected by A.H. Everett in July 1892. Dr. Heaney (*in litt.*) has since suggested that the locality 'Malingai Mt' might alternatively refer to the Malingan Range of western Sabah State, Borneo. This specimen has been examined

separately by myself and C.M. Francis. We both identify it as Collared mongoose *Herpestes semitorquatus*, a Greater Sunda Island species not otherwise recorded from Palawan. 'N. Borneo' actually appears on the skull label in what is recognisably Everett's own hand and given that Everett is believed to have lived nearby in 1892 (SMYTHIES, 1960), and that no independent evidence can be found of his ever having collected mammals on Palawan, Heaney's guess is acceptable. The collector himself made a correct identification and misunderstanding may have arisen as a result of subsequent speculation that *semitorquatus* and *urva* are conspecific (ELLERMAN & MORRISON-SCOTT, 1966; EWER, 1973). At the moment, therefore, true *urva* is known in inner tropical Southeast Asia only from the mainland, and all characters of the recent Selangor specimen fall within limits set for more northerly populations (POCOCK, 1941).

Most authors have described *H. urva* as a waterside animal. Malayan records have merely been from forest, lightly to heavily disturbed, semi-evergreen in northern Perlis, evergreen in Selangor, respectively at 10 and about 150 m asl. Animals seen in Perlis in mid March 1987, during the latter part of the local dry season, were some distance from the nearest surviving stream.

#### ***Herpestes auropunctatus* and *H. javanicus* (Small Indian and Javan mongooses)**

Collectively, these short-furred mongooses occur from the Arabian peninsula across the northern Indian subcontinent, through extreme southern China and Southeast Asia to the Malay Peninsula and Java. A claimed presence in Sumatra (BECHTHOLD, 1939) based on the unique type of 'H. rafflesii' Anderson is not supported by re-examination of this specimen (BMNH 1855.12.24.225). Pelage colour differs from all other mongooses seen in this study and skull condition is that of a young juvenile. However long, coarse body hair and conspicuously down-curved rather than level dorsal profile of the cranium remove it from the *auropunctatus-javanicus* complex. CHASEN (1940) probably correctly guessed it to be *H. semitorquatus*.

As noted, the taxonomy of the complex is contentious with roughly equal support of two opposing arrangements: reduction to a single species, *javanicus*, varying clinally in size but abruptly in pelage colour west to east (POCOCK, 1937, 1941; BECHTHOLD, 1939; WENZEL & HALTENORTH, 1972; BOONSONG & MCNEELY, 1977); two species of overlapping range (CHASEN, 1940; ELLERMAN & MORRISON-SCOTT, 1966; HINTON & DUNN, 1967; MICHAELIS, 1972; EWER, 1973; MEDWAY, 1983; CORBET & HILL, 1986). By the latter arrangement, founded on size within a claimed zone of sympatry in Malaya and Thailand, the small-bodied taxa *perakensis*, type locality Taiping district, Perak State, *siamensis* of NW Thailand and *rubrifrons* of south China represent *H. auropunctatus*; *peninsulae*, identified from Perak to NW Thailand (CHASEN, 1935), and *exilis* of Cambodia and southern Vietnam the larger *H. javanicus* (CHASEN, 1940; ELLERMAN & MORRISON-SCOTT, 1966).

This second arrangement locates the discontinuity of pelage colour within the

species *auropunctatus*, western forms up to and including *birmanicus* of southern Burma being yellowish to olive-brown, wholly non-rufescent; those to the south and east characteristically rufescent especially on the head. In proposing it, CHASEN nevertheless ignored a note by KLOSS (1917b) on his type specimens of *perakensis* and two from the same district identified as *peninsulae* in which it is stated that their colour 'is almost exactly similar'—an impression affirmed here from some of the material involved (BMNH, ZRCNUS). Of at least equal relevance is the previously unremarked fact that both of Kloss's *perakensis* types and all three of his *siamensis* (distinguished only by their subtly lighter tone) were female while his *peninsulae* were both male.

Against what might be considered to be an obvious inference has been set a three-fold weight difference and notable difference in skull shape (Figure 1) between freshly collected specimens of a single sex: an adult male from Chuping, Perlis State, and an identically coloured, cage-trapped therefore presumably independently hunting, juvenile male from Sekinchan, Selangor State. The possible taxonomic meaning of these differences was then examined within an extended suite of characters measured on 25 other Malayan specimens, assembled without reference to original identification and comprising mostly recent IMR material (Table 1, Figure 2). The sex ratio from label data roughly balanced, and among individuals judged from dentition and degree of skull ossification to be adult, most measurements partitioned neatly by sex (cf, POCOCK 1941): *head-body length*—females 320–360 mm, males 365–415 mm; *skeletal tail length*—females 250–265 mm, males 275–315 mm (it has been claimed that *auropunctatus* has a proportionately longer tail than *javanicus*; female and male percentages of head-body length averaged 76.1 and 75.7 with no significant difference between median values,  $U = 37$ ,  $P = 0.05$ , Mann-Whitney U test); *fresh weight*—females 526–842 g, males 875–1800 g (means of 9 individuals of each sex 738 and 1173 g; an exceptional female of 960 g had been in captivity and may not have been at regular weight); *condylobasal length of the skull*—females 66.7–71.1 mm, males 76.4–81.5 mm; *zygomatic breadth*—females 31.6–35.7 mm, males 35.5–42.8 mm.

Two parameters that did not so partition were maximum braincase width: females 23.3–25.1 mm, males 23.8–26.4 mm, and width of the postorbital constriction. This latter covers the morphological difference in Figure 1 and the complete series revealed its development (skull b) from a situation in which the lateral contours of the braincase run more or less smoothly forward to the rostrum (skull a) to be an age factor (as noted by Pocock in *H. urva* and recently by BLANFORD (1987) in the Polecat *Mustela putorius*). It is associated with ossification of a strong postorbital bar and apparent backward displacement of the braincase, enlarging the area of origin of the temporal adductor mass, and is recessed deepest (to skull-width 8.9 mm) in males. On average, males also develop the more exaggerated sagittal and lambdoid crests. Thus it is not believed that this variation has taxonomic significance.

Juveniles, including the Sekinchan specimen, recognised by deciduous teeth,



Table 1. Measurements of Malayan *Herpestes javanicus*.

Coll/number	Locality	Age/Sex	Head-body length(mm)	Tail-length (mm)	Weight (g)	Condylbasal length (mm)	Zygomatic breadth (mm)	Braincase width (mm)	Postorbital constriction (mm)	
ZDUM	Chuping, Perlis	Ad	m	384	290	1545	80.8	41.1	25.9	10.6
ZDUM	(captive)	Ad	m	—	—	—	80.2	42.2	25.6	9.7
IMR 4387	Kuala Jerlun, Kedah	Ad	m	400	300	903	77.2	<u>35.5</u>	25.0	11.4
IMR 74785	Kedah	(Ad)	m	380	302	908	—	—	—	—
IMR 69475	(captive)	Ad	m	—	—	—	<u>81.5</u>	<u>42.8</u>	25.7	10.2
IMR 4407	Kuala Jerlun, Kedah	Ad	m	400	290	893	78.0	37.6	26.0	13.6
IMR 5041	Kuala Jerlun, Kedah	Ad	m	385	295	<u>1800</u>	77.3	38.0	26.0	12.1
IMR 5042	Kuala Jerlun, Kedah	Ad	m	400	(295)	1300	(78)	38.2	25.4	12.1
IMR 4398	Jalan Kangar, Kedah	Ad	m	400	<u>315</u>	<u>875</u>	80.3	38.6	26.4	12.0
IMR 105237	(captive)	Ad	m	<u>365</u>	<u>275</u>	1236	<u>76.4</u>	38.2	<u>23.8</u>	8.9
IMR 4734	Alor Setar, Kedah	(Ad)	m	<u>415</u>	310	1100	—	—	—	—
IMR 4371	Kuala Jerlun, Kedah	Jv	m	365	275	541	73.6	33.4	24.8	12.4
IMR 74789	Kedah	Jv	m	300	250	350	68.3	32.7	24.2	14.5
ZDUM	Sekinchan, Selangor	Jv	m	275	218	517	62.4	31.0	24.0	15.9
IMR 4410	Jalan Kangar, Kedah	Ad	f	350	260	735	70.5	35.4	24.0	11.4
IMR 5025	Kuala Jerlun, Kedah	Ad	f	335	<u>265</u>	<u>842</u>	(71)	33.2	23.9	11.5
IMR 74706	Parit Buntar, Perak	Ad	f	<u>320</u>	250	<u>526</u>	70.5	<u>35.7</u>	23.9	11.5
IMR 74805	Parit Buntar, Perak	Ad	f	350	<u>250</u>	666	68.1	34.8	24.0	12.0
IMR 74786	Kedah	(Ad)	f	350	(295)	767	<u>66.7</u>	<u>31.6</u>	<u>25.1</u>	14.9
IMR 4385	Alor Setar, Kedah	Ad	f	330	260	720	70.9	34.9	23.8	11.1
IMR 4683	Baling, Kedah	Ad	f	350	260	702	69.8	34.2	24.3	11.5
IMR 4409	Kuala Jerlun, Kedah	Ad	f	<u>360</u>	260	728	70.2	34.9	23.6	10.1
IMR 105236	(captive)	Ad	f	350	255	(960)	<u>71.1</u>	35.4	23.3	10.1
IMR 4386	Kuala Jerlun, Kedah	Jv	f	285	201	243	61.1	30.1	23.1	13.5
IMR 4788	Kedah	Jv	f	290	235	350	—	—	—	—
ZDUM	Sekinchan, Selangor	Jv	f	380	210	441	—	—	—	—

Note: Extremes of range in adults of each sex, other than for postorbital constriction, are underlined; approximate or uncertain data are in parentheses.

incomplete ossification of the postorbital bar and other still-open skull sutures, were all substantially smaller showing female and males condylbasal skull-lengths as low as 61.6 and 62.4 mm and mean body weights of 345 and 469 g—the latter 2.0 to 2.5 times less than respective values for adults. Attenuation of the upper weight range of adult males, from a skewed cluster as around 900 g (Figure 2), implies continued growth at sexual maturity independent of the probability that older individuals are harder to trap.

In none of the data sets, weight included, is there convincing evidence of within-sex bimodality suggestive of the presence of a mix of taxa, and no features respectively of KLOSS's *perakensis* or his *peninsulae* material could be distinguished from these sets. Individuals varied slightly in colour, for example in degree of tawiness of the underparts, but this variation cut across size, was poorly defined and could easily have been a function of coat age. The only reasonable conclusion, therefore, must be that *perakensis* is indeed the Malayan female of *H. javanicus*, of which the accepted local subspecific name has been *peninsulae*. By analogy, and not withstanding the confusion of names and some slight (individual?) colour variation, NW Thai *siamensis* is likely to be the female of the larger form identified as *peninsulae* in Chiang Mai district (CHASEN, 1935), in which case prior claims of sympatry between the species *auropunctatus* and *javanicus* in Southeast Asia evaporate.

These arguments, of course, beg the question of why confusion should have arisen in the first place. There is no doubt that all workers have been hampered by shortage of material. Misconceptions may also have arisen from curatorial errors. KLOSS could only have described a species *perakensis* by having inferred both sexes of *H. j. peninsulae* to be of relatively large size. It is certainly likely that he consulted a then fairly recent paper on J.J. Vassal's collection of *exilis* from southern Vietnam (BONHOTE, 1907) in which a skin of head-body length 364 mm and skull of length and breadth 75 and 39 mm is identified as female. Vassal specimens now at the BMNH have been re-examined. Only 1906.11.6.10 carries a head-body measurement of 364 mm, and a tail-length of 284 mm—both larger than any Malayan female *H. javanicus* handled. Zygomatic breadth of the skull is 39 mm, as stated, but its condylobasal length is actually 79.3 mm. A second specimen from the same locality (Nhatrang) has only slightly smaller measurements overall and is also labelled female. The one other complete, fully ossified adult skull (BMNH 1878.6.17.8) seen from within the geographical range of this characteristically red-bodied subspecies, on the other hand, has measurements of only 32.2 and 69.3 mm. Since it, too, is labelled female, and is well within Malayan measurements for this sex, I follow POCOCK (1941) in supposing that the Nhatrang specimens had been mis-sexed, giving a false impression of female size that could have been transposed to *peninsulae*.

KLOSS (1918) listed as 'adult female' *peninsulae* a specimen from Perak of condylobasal skull length 71 mm but head-body and tail measurements (373 and 282 mm) that by definition here are certainly male. In this same paper, he expressly states that mongoose skins were received from his Perak collectors separate from skulls and it is suggested that at least one mis-match occurred as a result, specifically between this 'female' and ZRCNUS 4.1511, another 'aged female' in the same batch of material. The latter's head-body and tail lengths (361 and 265 mm) fit my female *H. javanicus* data comfortably but skull dimensions (condylobasal length 78.7 mm, zygomatic breadth 40.7 mm, re-checked) are indisputably male. A reallocation of the parts makes immediate sense.

Chasen, who clearly accepted KLOSS's findings, is himself under suspicion of

having erred over skull ZRCNUS 4.1505 collected by or for H.G. Deignan at Chieng Mai, which he recorded as female (CHASEN, 1935) despite a condylobasal length of 77.9 mm and breadth of 41.3 mm (re-checked). Unfortunately, the associated skin lacks recorded measurements.

Only one independent claim of *H. auropunctatus* occurring in Malaya is outstanding. CANTOR (1846), collecting in the vicinity of Penang, reported a single example, female, distinguished from 'numerous' *javanicus* on colour. Among several of his mongoose specimens still held by the BMNH, one 'female' (1879.11.21.55) labelled 'Keddah' (Kedah State, NW Malaya) does completely lack rufescence, indeed is not separable on colour and pelage texture from Indian *H.a. pallipes*, i.e., is paler and yellower even than neighbouring Burmese *H.a. birmanicus*. The record is anomalous but HINTON & DUNN (1967) point out that *H. auropunctatus* is a traditional west and south Asian pet, in the past also used for rat control on ships. Both Penang and to a lesser extent the nearby port of Kedah itself were being visited by sea traders from peninsular India at that time (J.K. Wells, pers. comm.) and CANTOR may, therefore, have obtained a shipboard captive—as long ago hinted by BLANFORD (1891). Another piece of circumstantial evidence is provided by the condition of this young individual's skull which is asymmetrical after healing from a crushing of the left zygoma and side of the braincase probably too massive to have been survived in the wild state.

The use of two specific names for what now appear to be allopatric taxa may seem premature and findings so far might better be interpreted as support for the panmictic species concept of POCOCK and others. It will be argued elsewhere (WELLS *et al.*, in prep) that this alternative is actually little better founded than CHASEN's claim of sympatry in Malaya. A more complete review of geographical variation is needed but given that *birmanicus* is recorded to within 400 km west, and somewhat south of Chieng Mai, and BOONSONG & MCNEELY (1977) claim to have identified a non-rufescent mongoose in extreme northern Thailand itself, the possibility that two good species actually do meet, albeit further north than envisaged by CHASEN, should not yet be ruled out.

In the meantime, and independent of decisions on species limits, it seems certain that only *H. javanicus* is proper to the fauna of Malaya. Absent from the southern States, its disjunct distribution astride the equator is a typical one matched by a whole sub-fauna of vertebrates that avoid rain forest. Of 34 reliably localised specimens and good sightings, north to south, six are from Perlis State, 17 from Kedah, five from middle Perak and six from Selangor, to Kuala Selangor on the edge of the mangrove at 3° 21' N. Trapping success by IMR collectors suggests that in NW Malaya at least the species is common. There are no confirmed records east of the spinal mountain range but a possible *H. javanicus* has been seen in typical habitat in northern Terengganu State and it would be surprising if no population inhabited the agricultural plain of NE Malaya. Occurrence has long been demonstrated in adjacent provinces of Thailand (BONHOTE, 1900). Notwithstanding statements by BECHTHOLD

(1939), there have been no records away from lowland plains in Malaya where this mongoose inhabits bamboo and other scrubland, rough plantations including young teak, *Imperata* grassland and paddy and sugarcane fields.

### *Herpestes edwardsi* (Indian grey mongoose)

Generally assumed to have been introduced into Malaya, this final species is known there from a CANTOR (1846) record, unlocalised; a possible sighting in Seberang Prai (mainland Penang State) by FLOWER (1900); one or more specimens claimed by KLOSS (1917b) to have come from Taiping district, adjacent to Seberang Prai, but which FLOWER states were unlocalised (although in the Taiping museum); a specimen from near Kuala Lumpur (FLOWER, 1900) and Cuvier's type of *Herpestes malaccensis* supposedly from Malacca (BLANFORD, 1891). No record post-dates the turn of the century and given that in its native range *edwardsi* is a bold and familiar frequenter of habitation (e.g., PRATER, 1965), it is unlikely to have been overlooked had breeders established themselves feral. Probably, this species is now extinct in Malaya.

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