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Lutrogale perspicillata.

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Lutrogale Gray, 1865

Lutra: Geoffroy St.-Hilaire, 1826:519. Part.
Lutrogale Gray, 1865:127. Type species *Lutra perspicillata* Geoffroy St. Hilaire by monotypy.

CONTEXT AND CONTENT. Order Carnivora, family Mustelidae, subfamily Lutrinae. The genus *Lutrogale* is monotypic (Ellerman and Morrison-Scott 1951; Harris 1968; Wozencraft 1993).

Lutrogale perspicillata (Geoffroy St.-Hilaire, 1826)

Smooth-coated Otter

Lutra perspicillata Geoffroy St.-Hilaire, 1826:519. Type locality "Sumatra."
Lutra simung Lesson, 1827:156. Type locality "Sumatra;" vide Harris (1968).
Lutra tarayensis Hodgson, 1839:319. Type locality "Nepal Terai."
Lutrogale macrodus Gray, 1865:128. Type locality "Madras."
L[*utra*]. *ellioti* Anderson, 1878:212. No type locality given.
Lutrogale perspicillata: Pocock, 1940:515. First use of current name combination.

CONTEXT AND CONTENT. Generic context as above. Three subspecies are recognized.

L. p. maxwelli Hayman, 1957:710. Type locality "Abusakhair, 5 miles W. of Persian frontier, 35 miles S.E. of Amara, Iraq."
L. p. perspicillata (Geoffroy St. Hilaire, 1826:519), see above; *ellioti* (Anderson), *macrodus* Gray, *simung* (Lesson), and *tarayensis* (Hodgson) are synonyms.
L. p. sindica Pocock, 1940:517. Type locality "Chak in the Sukkur District of Sind."

DIAGNOSIS. The smooth-coated otter (Fig. 1) differs from *Lutra lutra* in having a more massive head and heavier teeth, short smooth fur and sleek appearance, and a tail tip that is flattened dorsoventrally rather than circular in section. It differs from the hairy-nosed otter (*Lutra sumatrana*) by the hairy rhinarium of the latter in contrast to the naked nose in *L. perspicillata*. It differs from the Asian small-clawed otter (*Amblonyx cinereus*) and from clawless otters (genus *Aonyx*) by the well-developed claws on the front feet (Pocock 1940; Tate 1947; van Zyll de Jong 1972). In the field, tracks of smooth-coated otters are larger (often >8 cm wide) than those of other otters (Kruuk et al. 1993a).

GENERAL CHARACTERS. The smooth-coated otter is a large (7–11 kg) otter characterized by a very smooth, sleek pelage (Francis 2001). Color varies from dark to reddish brown, with the undersides slightly lighter. The subspecies *L. p. maxwelli* is the darkest, with a dark brown to almost black coat (Corbet 1978; Harrison and Bates 1991). Upper lip, cheeks, sides of neck, and throat are whitish or gray (Tate 1947). Underfur and guard hairs are 8 mm and 12 mm in length, respectively. Tail is flattened dorsoventrally, with a distinct lateral keel distally. Rhinarium is black, naked, and situated anteriorly; its dorsal border is barely convex. Vibrissae are well developed, white, and <90 mm in length. Eyes and ears are small. Limbs are short, strong, with broad feet. All feet are fully webbed (Harrison 1968).

Measurements (in mm) of 2 smooth-coated otters (sex unknown) from Iraq are: total length, 1,000, 1,181; length of tail, 375, 432; length of hind foot, 112, 152; length of ear, 23, 26 (Harrison and Bates 1991). Average measurements (in mm) of 4 individuals (sex unknown) from Pakistan, with range in parentheses when available, are: length of head and body, 625 (590–640); length of tail 400 (370–430); length of hind foot, 133; length of ear, 23 (Roberts 1977). The same measurements (in mm) for 1 female from Iraq, were, respectively 625, 375, 112, 26 (Hatt 1959). In India, mass of 1 juvenile male was 7.3 kg, and mass of 1 adult male was 10.9 kg (Pocock 1940). Mass of 1 male from Pakistan was 10 kg (Roberts 1977).

Skull (Fig. 2) is strong and much deeper than wide. Rostrum is short and high. Postorbital processes are small but distinct, and zygomatic arches are long. Braincase is inflated and deep; sagittal crest is low. Palate is narrow, and mandible is robust (Harrison 1968; Harrison and Bates 1991). Average (range) skull measurements (in mm) for 11 adult males and 5 adult females, respectively, are: greatest length of skull, 124.2 (120–130), 120.8 (111–127); condylobasal length, 120.9 (115–128), 117.2 (107–123); zygomatic breadth, 75.8 (71–82), 73.2 (62–81); postorbital width, 19.7 (18–23), 18.0 (17–20); interorbital width, 22.4 (19–27), 20.9 (18–22); and maxillary width, 26.6 (25–29), 26.6 (25–29—Pocock 1940).

DISTRIBUTION. The distribution of *L. perspicillata* is disjunct (Fig. 3). *L. p. maxwelli* occurs in southern Iraq. *L. p. perspicillata* has a wider distribution and occurs in most of India, Nepal, east to southwestern Yunnan, Indochina, and south to Malaysia, Sumatra, and Java. *L. p. sindica* occurs in Pakistan.

FOSSIL RECORD. *Lutrogale* is known from the early Pleistocene of Java (McKenna and Bell 1997). A maxillary fragment from Java was described as *Lutra palaeoleptonyx* by Dubois (1908) and reclassified as *Lutrogale palaeoleptonyx* (Willemsen 1986). *L. palaeoleptonyx* differs slightly from the extant *L. perspicillata* (Willemsen 1986). Similarly, fossils described as *Lutra robusta* by Koenigswald (1933) were reclassified as *Lutrogale robusta* (Willemsen 1986). *L. robusta* is from an earlier fauna than that that includes *L. palaeoleptonyx*. *L. robusta* is older than *L. palaeoleptonyx* (Willemsen 1986). Tooth morphology of the fossils suggests that older forms of *Lutrogale* fed mainly on shellfish (Willemsen 1986).

FORM AND FUNCTION. Dental formula is i 3/3, c 1/1, p 4/3, m 1/2, total 36 (Harrison and Bates 1991). Females have 2 pairs of mammae. Smooth-coated otters have anal glands (Roberts 1977).

REPRODUCTION. In captivity, mating occurs in August and parturition mostly occurs in October (Desai 1974). In the wild,

Fig. 1. A group of 4 adult *Lutrogale perspicillata* (sexes unknown) from Sungai Buloh Wetland Reserve, Singapore. Used with permission of the photographer R. Tan.

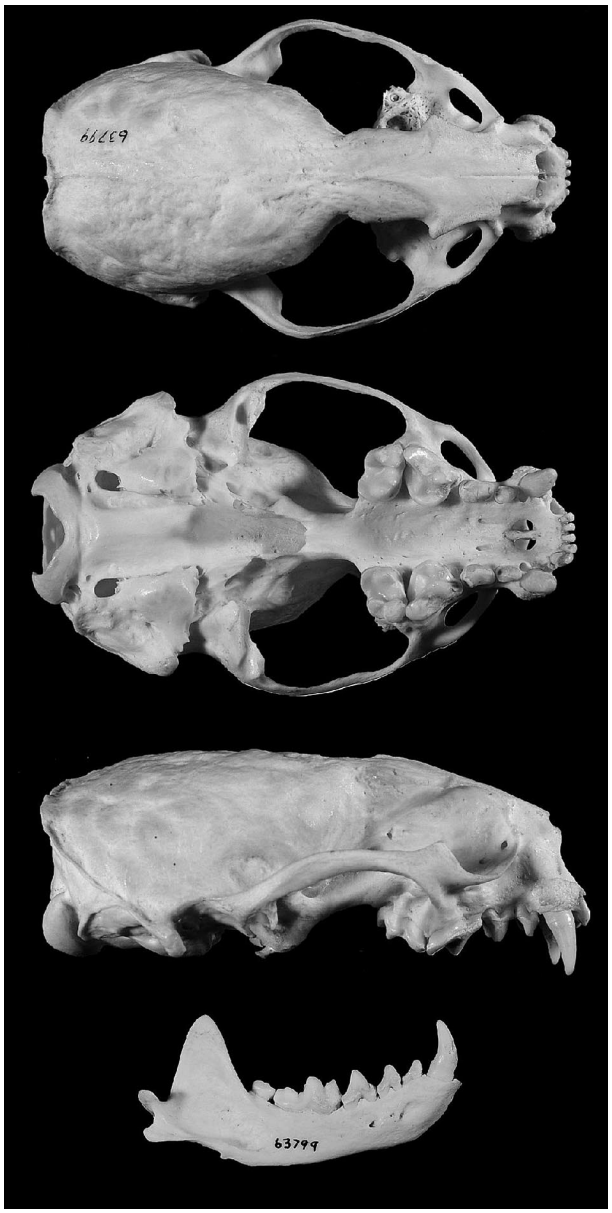

Fig. 2. Dorsal, ventral, and lateral views of cranium and lateral view of mandible of *Lutrogale perspicillata* (adult female, Field Museum of Natural History 63799). Greatest length of cranium is 116 mm.

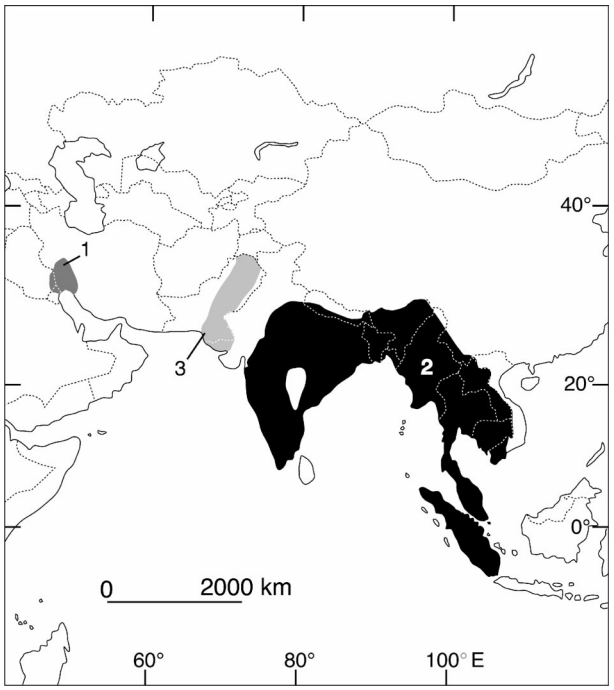

Fig. 3. Distribution of *Lutrogale perspicillata* in Asia, modified from Corbet and Hill (1992), Harrison and Bates (1991), Hatt (1959), Lekagul and McNeely (1991), and Roberts (1977). 1. *L. p. maxwelli*; 2. *L. p. perspicillata*; 3. *L. p. sindica*.

parturition occurs throughout the year if weather is good and food supply is abundant (Foster-Turley 1992). In India and Nepal, breeding occurs in winter (October–February—Hussain 1996). Estrus lasts ca. 14 days, gestation is 60–63 days, and litter size is 1–5. Eye opening occurs after 10 days and weaning at 3–5 months of age. Adult size is reached after 1 year and sexual maturity after 2–3 years (Desai 1974; Medway 1969; Yadav 1967).

ECOLOGY. Smooth-coated otters are not restricted to deep water and often forage in small, shallow rivers (Anoop and Hussain 2004; Kruuk et al. 1994) and seasonally flooded swamps during the monsoons (July–September) and early winter (October–February) in India and Nepal (Hussain and Choudhury 1997). *L. perspicillata* prefers habitat with rocky banks because of the greater availability of den sites (Hussain and Choudhury 1997). The species inhabits both inland and coastal wetlands, but when it occurs with other otter species it tends to use larger water bodies and does not occur on small streams and irrigation canals (Wayre 1978). Smooth-coated otters commonly inhabit rice fields adjacent to mangroves along coastal areas (Nor 1990). In Kuala Gula, Malaysia, smooth-coated otters were more abundant in the mangroves (Shariff 1984). In Java, *L. perspicillata* is restricted to coastal wetlands (Melisch et al. 1994). When occupying saltwater areas, smooth-coated otters require freshwater nearby (Kruuk et al. 1994; Wayre 1978).

Smooth-coated otters are predominantly fish eaters, but they also eat rats, insects, and snakes; in coastal areas, they consume crabs (Anoop and Hussain 2005; Haque and Vijayan 1995; Roberts 1977; Wayre 1978). Fish consumed are typically 5–30 cm in length (Anoop and Hussain 2005; Wayre 1978). In Perak, Malaysia, smooth-coated otters consume mostly fish (82% of scats, $n = 50$; mostly *Trichogaster pectoralis*), followed by mollusks, mammals, and Coleoptera, but no remains of crabs occurred in the scats (Nor 1989). In Nepal, scats contained mostly fish; minor items were frogs, crabs, shrimp, snakes, and insects (Houghton 1987). In Thailand, 70% of scats ($n = 53$) were dominated by fish, 13% by amphibians, 11% by crabs, 4% by snakes, and 2% by arthropods (Kruuk et al. 1994). Fish consumed by *L. perspicillata* were mostly >15 cm (53%); the remainder were 10–15 cm (22%) or <10 cm (25%—Kruuk et al. 1994). In India, 96% of 152 scats of smooth-coated otter contained fish, 7% contained insects, 5% contained birds, 3% contained mollusks, 1% contained frogs, and 1% contained worms (Haque and Vijayan 1995).

Population density of smooth-coated otters in Pahang National Park, Malaysia, was 1.0–1.3 otters per kilometer of waterway (Shariff 1984). Density presumably is higher in brackish environments (Sabrina 1985). A social group of smooth-coated otters requires 7–12 km of river as a feeding territory (Hussain 1996; Wayre 1978).

Smooth-coated otters may compete for resources with *A. cinereus*; however, the latter occurs mostly in rice fields and small muddy streams, whereas *L. perspicillata* occupies mostly large bodies of water (Sabrina 1985). Moreover, *L. perspicillata* is a specialized fish-eater, whereas *A. cinereus* feeds mostly on crabs. The smooth-coated otter also is sympatric with *L. lutra* but the latter consumes smaller fish and more amphibians than does *L. perspicillata* (Kruuk et al. 1994).

When groups of smooth-coated otters forage, the commotion may attract birds such as great egrets (*Casmerodius albus*), intermediate egrets (*Mesophoyx intermedia*), grey herons (*Ardea cinerea*), stork-billed kingfishers (*Pelargopsis capensis*), and collared kingfishers (*Todirhamphus chloris*), which benefit from the smaller fish that flee into shallow water (Helvoort et al. 1996; Kruuk et al.

1993b). Interaction with birds may be detrimental to otters because great egrets attempt to steal fish (Helvoort et al. 1996).

The species is tolerant of human activity provided that food and suitable habitat are abundant (Sabrina 1985). Groups of smooth-coated otters often approach workers in rice fields and may be perceived as intimidating (Foster-Turley 1992). In India, a fisherman who caught a cub in a net died of injuries caused by scratching and biting from a group of smooth-coated otters that approached when the cub emitted shrills cries while it was being released (Nagulu 1992).

Smooth-coated otters are sometimes trapped for their pelts (Roberts 1977). In some areas, smooth-coated otters are perceived as predators of domestic animals, although no evidence from scats supports this (Foster-Turley 1992).

Smooth-coated otters are easily tamed (Ansell 1947; Harrison 1968). In parts of India and Bangladesh, smooth-coated otters are trained to assist in fishing by catching large fish or herding fish into nets (Biswas 1973; Pocock 1940). They are also used as decoys to help fisherman catch Ganges river dolphins (*Platanista gangetica*—Pocock 1940). Longevity may reach 15–20 years in captivity (Chakrabarti 1993; Medway 1969).

BEHAVIOR. Smooth-coated otters are strong swimmers. They are mainly diurnal, with a short lull in activity during midday (Foster-Turley 1992; Shariff 1984). They are social and hunt in groups (Kruuk et al. 1994; Wayre 1978). When fishing in a group, smooth-coated otters travel in a V-formation going upstream (Helvoort et al. 1996). Groups consist of up to 11 individuals (Shariff 1984). Of 99 observations of smooth-coated otters in Pahang National Park, most were of single animals ($n = 65$) or pairs ($n = 25$), and rarely of groups of 3 ($n = 9$). In contrast, 16 observations of smooth-coated otters in brackish waters in Perak (Shariff 1984) included singletons ($n = 6$), pairs ($n = 4$), and groups of 3 ($n = 2$), 5 ($n = 2$), and 8–11 individuals ($n = 2$).

For foraging, *L. perspicillata* selects less rocky areas of shallower parts of lakes that are narrower and slanting (Anoop and Hussain 2004). Also, foraging occurs among fallen tree trunks, rapids, fishing nets, and other obstructions (Shariff 1984). Small fish are swallowed whole (Helvoort et al. 1996), but large fish are taken to shore (Ansell 1947). Most foraging activity occurs in water, but animals go on land to eat large fish and to rest and defecate. In Thailand, latrine (or spraint) sites of *L. perspicillata* occur on small rocks, sand banks, and large boulders, 1–3 m above water level. Spraint sites often smell of rotten fish. Mean number of spraints on each site was 2.2 ($n = 38$—Kruuk et al. 1993a). Smooth-coated otters roll and rub on grassy areas, especially after defecation (Shariff 1984). They sometimes rest on bare sand and grassy areas along river banks (Shariff 1984).

Vocalizations include a call note that sounds between a whistle and a chirp, a whispered "ha," a variety of chirps and chitters, and a screaming wail when threatened or provoked (Harrison 1968). Smooth-coated otters often stand on their hind legs (Sivasothi and Nor 1994).

Copulation occurs in water and lasts <1 min (Badham 1973; Yadav 1967). Smooth-coated otters often dig their own breeding dens (Badham 1973; Wayre 1978). Dens occur under tree roots, in openings created by piles of boulders, or in dense vegetation (Shariff 1984). In Nepal, 8 dens were in exposed tree roots and 1 was a tunnel in the sand (Houghton 1987). In India and Nepal, dens may occur in swamps, and these are sometimes used as natal den sites and nurseries (Hussain 1996). Smooth-coated otters form small family groups of a mated pair with up to 4 offspring from previous seasons (Hussain 1996; Wayre 1978).

CONSERVATION STATUS. *Lutrogale perspicillata* is the largest and most common of Asian otters (Mason and Macdonald 1990). In peninsular Malaysia, the smooth-coated otter is common in Penang and Perlis states (Nor and Ahmad 1990), and also is common in Nepal (Houghton 1987). The species is listed as Vulnerable (VU Azacd) by the International Union for the Conservation of Nature and Natural Resources and is on appendix II of the Convention on International Trade in Endangered Species (IUCN 2004). The species is endangered in Java, where only a few small isolated populations remain; most threats to the species are caused by water or wetland pollution (Foster-Turley and Santiapillai 1990; Melisch et al. 1994). The species has bred in captivity (Foster-Turley 1990).

GENETICS. *Lutrogale perspicillata* has 2n = 38, with a fundamental number of 62 (van Zyll de Jong 1987). The species hybridized in captivity with the small-clawed otter (*A. cinereus*—Melisch and Foster-Turley 1996; Siswomartono 1994).

REMARKS. *Lutrogale* is from the latin *lutr* meaning otter, and *gale* meaning weasel or cat. The specific name *perspicillata* is Latin for conspicuous (Borror 1960). Other vernacular names include smooth otter, smooth-coated Indian otter, India smooth-coated otter, black otter, indischer Fischotter (German), loutre d'Asie or loutre indienne (French), nutria lisa or nutria simung (Spanish), lontra liscia (Italian), and Berang-berang bulu licin (Indonesian).

Morphological differences between *Lutrogale* and *Lutra* are similar to those separating *Lontra* and *Lutra*, supporting the separate genus (van Zyll de Jong 1972). *L. perspicillata* is most closely related to *Lutra* and has phylogenetic links with *Pteronura* (van Zyll de Jong 1987; 1991).

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