

**Introduced Mammals
of the World**
**Their History, Distribution
and Influence**
John L. Long

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PRIMATES

MONKEYS – SPECIES NOT KNOWN Monkeys?

Monkey species not known, uncertain or introduction details not known or not confirmed.

■ HISTORY OF INTRODUCTIONS

COCOS ISLAND (COSTA RICA)

Monkeys (species not known) were introduced unsuccessfully to Cocos Island, Costa Rica.

GALPÁGOS ISLANDS (CHILE)

Three monkeys were released on the island of Floreana, Galápagos Islands, in the 1930s, but soon disappeared (Lever 1985).

INDONESIA

Macaques (species unknown) are said to have been introduced to Batjan Island and to Timor (Lever 1985).

PAPUA NEW GUINEA

Monkeys are believed to have been introduced by the Japanese during World War 2 to New Britain as a food supply. They have become established on Cape Gloucester in the Limestone plateau country, near Aipati, Aimaya and Siac villages. The monkey is called 'nanukrawa' (Herrington 1977) and may possibly be *Macaca fuscata*. (There appears to be no mention of its presence by Flannery 1995 or other authorities.)

Family: Lorisidae *Loris*

SLOW LORIS

Nycticebus coucang (Boddaert)

■ HISTORY OF INTRODUCTION

PHILIPPINES

The slow loris is found in the Tawitawi island group (closer to Borneo than to Philippines) and was possibly introduced to Mindanao, Philippines (Groves 1971).

Family: Lemnridae *Lemurs*

CROWNED LEMUR

Lemur coronatus Gray

Until recently considered a subspecies of L. mongoz, but now regarded as distinct.

■ DESCRIPTION

HB 400–450 mm; T 400–450 mm; WT 1.8–2.2 kg.

Upper parts brownish to reddish grey; under parts grey-white to pale red; tail red-brown; eye-ring black; cheeks reddish; male has triangular crown of black fur between ears. Female is grey with light brown crown.

■ DISTRIBUTION

Madagascar. Northern and north-eastern Madagascar.

■ HABITS AND BEHAVIOUR

Habits: mainly diurnal, but not uncommonly nocturnal; mainly arboreal. **Gregariousness:** solitary; groups to 10 with several adults of both sexes; density 50–200/km². **Movements:** sedentary, but moves locally. **Habitat:** dry forest, dry wooded areas in savannah. **Foods:** fruits and some leaves. **Breeding:** births mid-September to October, but possibly other times also; gestation 125 days; young 1–2; sexual maturity *c.* 20 months. **Longevity:** no information. **Status:** numbers declining; range reduced by agriculture, burning and logging; also hunted.

■ HISTORY OF INTRODUCTIONS

INDIAN OCEAN ISLANDS

Madagascar

A French teacher, B. Le Normand, released a number of crowned lemurs onto the small, uninhabited island of Nosy Hara (Wilson *et al.* 1985; J. Wilson, in litt. in Harcourt and Thornback 1990) where they have possibly become established.

■ DAMAGE

None known.

BROWN LEMUR

Lemur fulvus Geoffroy

■ DESCRIPTION

HB 340 mm; T 440 mm; WT 1.9–4 kg.

Considerable variation within populations; males have 2 distinct colour phases, most are dark grey or grey brown dorsally; *fulvus*: upper parts and tail greyish brown; cheeks and beard white; muzzle and forehead black; under parts creamy tan; females lighter than males; *albifrons*: face black; forehead, crown, ears, cheeks and throat white or cream; tail dark; under parts pale; some lack white colour on head and are black or grey instead; female upper parts grey brown; some have head dark grey while others pale grey; *collaris*: neck, face, ears and top of head black (grey in female); cheeks pale orange, bushy in male; upper parts dark brown or grey brown with darker stripe down spine; under parts paler; *mayottensis*: variable, but similar to nominate and may have been derived from it; *rufus*: variable; upper parts grey; under parts grey brown; head cap bushy, rusty orange; muzzle black; above eyes a pale grey patch; ears grey; cheeks bushy; female reddish brown; under parts pale golden brown or grey; crown grey with light grey or whitish above eye and on cheeks; ears reddish brown.

■ DISTRIBUTION

Madagascar and Comoro islands. Widespread over Madagascar and present on Mayotte Island in the Comoros.



■ HABITS AND BEHAVIOUR

Habits: mainly diurnal, sometimes nocturnal; mainly arboreal, rarely on ground. **Gregariousness:** groups to 30 (males, sub-adults, females and juveniles); density 40–300/km². **Movements:** daily 125–150 m; monthly 450–1150 m; overlapping group home ranges 7–100/ha or more. **Habitat:** rainforest, forest, secondary growth. **Foods:** fruits, leaves, flowers, sap, buds and bark. **Breeding:** mate April–May, births September–October; gestation 120–135 days; 1 young/year; young independent of mother's back at 11–12 weeks; adult size at 2 years; breeds at 18 months to 2.5 years. **Longevity:** 21 years. **Status:** rare to vulnerable; some subspecies widely trapped for pet trade; probably declining; commonly kept pet in Madagascar.

■ HISTORY OF INTRODUCTIONS

INDIAN OCEAN ISLANDS

Madagascar

The white-fronted lemur, *L. f. albifrons*, was introduced to Nosy Mangabe (now a special reserve) in the 1930s and appears to be thriving there (Constable *et al.* 1985; Harcourt and Thornback 1990).

A few collared lemurs, *L. f. collaris*, have been introduced to Berenty Private Reserve (Jolly *et al.* 1982) and it is suggested that these animals be removed (and taken to Duke Primate Centre) to prevent hybridisation with the introduced *L. f. rufus* there (St. Catherine's Workshop 1986).

Red-fronted lemurs, *L. f. rufus*, were introduced to Berenty Private Reserve in 1974, where the original eight or nine animals imported from Morondava had increased to 62 by 1985 (Jolly *et al.* 1982).

Comoros

The Mayotte lemur, *L. f. mayottensis*, is thought to have been derived from the brown lemur, *L. f. fulvus*, and was probably introduced to the Comoros by man, possibly as long ago as several hundred years (Tattersall 1977; Wolfheim 1983). Its colouration is variable, but similar to the nominate race and there is conjecture that it may not be distinct (St. Catherine's Workshop 1986). It now occurs wherever there is forest on Mayotte, but is rare at altitudes of more than 300 m (Tattersall 1982; Harcourt and Thornback 1990).

■ DAMAGE

None known.

MONGOOSE LEMUR

Lemur mongoz Linnaeus

■ DESCRIPTION

HB 400–450 mm; T 400–450 mm; WT 1.8–2.2 kg.

Coat grey; face pale; cheeks bushy, reddish brown; beard reddish brown; under parts white to pale brown. Female grey brown; cheeks bushy, white; beard white; face dark.

■ DISTRIBUTION

Madagascar and Comoro islands. Western and north-western Madagascar and on Anjouan (Ndzouani) and Moheli (Moili) in the Comoros.

■ HABITS AND BEHAVIOUR

Habits: nocturnal, crepuscular and diurnal (may change seasonally); sleeps in trees in dense foliage, tangled vines or top of tall tree. **Gregariousness:** family groups (adult pair and offspring); occasionally groups 6–8. **Movements:** to food sites; 460–750 m/night; overlapping home ranges *c.* 1.15–100 ha. **Habitat:** dry deciduous forest, humid forest, secondary growth. **Foods:** flowers, nectar, fruits, some leaves and leaf petioles. **Breeding:** births mid-October; gestation 114–128 days; 1 young/year; weaned 5 months; sexual maturity 14–16 months. **Longevity:** captive to 26 years. **Status:** declining; endangered due to habitat destruction.

■ HISTORY OF INTRODUCTIONS

INDIAN OCEAN ISLANDS

Comoro Islands

Mongoose lemurs are found on Anjouan (Ndzouani) and Moheli (Moili) with a few feral individuals on Grande Comoro (Ngazidja Island), which have escaped or been set free there (Tattersall 1977; Thorpe 1989).

The mongoose lemurs on the Comoros were probably (Tattersall and Sussman 1975; Tattersall 1976) or almost certainly taken there from Madagascar, most likely by Mahajanga (Majunga) fishermen some time in the last several hundred years (Petter *et al.* 1977; Harcourt and Thornback 1990) and possibly in the fifteenth or sixteenth century. They are now found on Mohéli and central and eastern Anjouan and Grand Comoro. They are abundant on Mohéli (Tattersall and Sussman 1975; Tattersall 1976).

■ DAMAGE

None known.

RUFFED LEMUR

Varecia variegata (Kerr)

■ DESCRIPTION

HB 510–600 mm; T 560–650 mm; WT 2.4–5.0 kg.

Variable; face black except for short white hair on muzzle below eyes; forehead black; crown black; ears, cheeks, throat tuft white; otherwise white except for ventrum, tail, and lateral aspects of thighs and shoulders, proximal forelimbs and extremities all black; other races have mostly red body with white patch on neck; still others resemble nominate race (above) or are all black with white markings. Female heavier than male.

■ DISTRIBUTION

Madagascar. Eastern and north-eastern Madagascar, but details of distribution are poorly known.

■ HABITS AND BEHAVIOUR

Habits: diurnal and mainly crepuscular, sometimes some nocturnal activity; arboreal, rarely on ground. **Gregariousness:** pairs, territorial groups 2–5; density 20–30/km². **Movements:** more than 1 km/day; home range *c.* 197 ha. **Habitat:** humid rainforest. **Foods:** mostly fruit, also nectar, seed, leaves and bark(?). **Breeding:** births October–November; gestation 90–102 days; litter size to 6; young left in nest for 3 weeks; fully mobile at 7 weeks; sexual maturity female 20 months. **Longevity:** 19 years captive. **Status:** endangered due to habitat destruction; declining; hunted for food.



■ HISTORY OF INTRODUCTIONS

INDIAN OCEAN ISLANDS

Madagascar

The black and white ruffed lemur (*V. v. variegata*) is found on the island of Nosy Mangabé where it was introduced in the 1930s (Constable *et al.* 1985). Now as many as 100–150 individuals are on the 520 ha island. In 1984 it was estimated there were between 56 and 84 on the island (Pollack 1984) and in 1983 as many as 175/km² (Iwano 1989). They were still present there in 1998 (WCMC 1998).

In October 1997, five black and white ruffed lemurs were returned to Madagascar from the Duke Primate Centre in the United States (Kauffman 1999; Eliot 1999). These have been released in Betampona Reserve where they are doing well with help from supplementary feeding. One was killed by predators and another died from a fall, but another four have since been sent to Madagascar from the Primate Centre (Eliot 1999).

■ DAMAGE

None known.

Family: Daubentoniidae

Aye-ayes

AYE-AYE

Daubentonia madagascariensis (Gmelin)

■ DESCRIPTION

HB 360–440 mm; T 500–600 mm; WT 2–3 kg.

Coat thick, with long guard hairs of dark brown or black over short white hair; head rounded; face flatfish; face and throat yellowish white; ears large, naked; nose and spots over eyes, white; hands and feet with opposable thumbs, black; digits elongated; tail bushy, long. Female has two mammae.

■ DISTRIBUTION

Madagascar. Originally found in the coastal areas of north-western and north-eastern Madagascar and on the island of Nosy Bé.

■ HABITS AND BEHAVIOUR

Habits: arboreal, nocturnal, and elusive; nests in hollow or fork of tree during the day. **Gregariousness:** mostly solitary or in pairs, rarely 2–3; home range 4.8–5 ha. **Movements:** sedentary. **Habitat:** rain and deciduous forest, secondary growth, mangroves, bamboo thickets, open bush with low trees; occasionally cultivated areas (e.g. coconut plantations). **Foods:**



fruit (coconuts, lychees, mangoes and other cultivated fruits), plant galls, plant shoots, bark, small invertebrates, insects and their larvae, grubs, coconut pulp, bamboo pith, birds' eggs. **Breeding:** single young born October–November; gestation not known; inter-birth interval probably 2–3 years; young weaned *c.* 12 months. **Longevity:** 5–23 years (captive). **Status:** rare or extinct in parts of natural range due to habitat destruction; endangered; declining.

■ HISTORY OF INTRODUCTIONS

Introduced successfully on the island of Nosy Mangabé off the coast of Madagascar and now occurs only on this island.

INDIAN OCEAN ISLANDS

Nosy Mangabé (off north-eastern Madagascar)

In 1966 it was thought that there were less than a dozen aye-ayes left in Madagascar. Nine were subsequently transferred to a special reserve near Maroanetra in the Bay of Antogil on the island of Nosy Mangabé (520 ha) in 1967 (Burton and Burton 1969; Petter and Peyriéras 1970; Grzimek 1972). Previous to the introduction, mango and coconut trees had been planted for them and the reserve became a Special Reserve in 1966. They were still present there in 1975 and 1979 (Wolfheim 1983). Since this time a small population has remained present there (Constable *et al.* 1985; Walker 1992; Mittermeier *et al.* 1992; WCMC 1998).

■ DAMAGE

Aye-ayes are killed when they raid crops and it has been suggested that local peoples should be compen-

sated for the damage done to their crops; ayes-eyes are also killed because of local superstition (Albgnac 1987; WCMC 1998).

Family: Callithricidae *Marmosets and tamarins*

COTTON-TOP TAMARINS

Saguinus oedipus (Linnaeus)

■ HISTORY OF INTRODUCTIONS

COLOMBIA

Cotton-top tamarins have probably been re-introduced to some semi-natural environments in Colombia for the development of conservation education (Savage 1988).

GOLDEN LION MARMOSET

Golden lion tamarin

Leontopithecus rosalia (Linnaeus)

■ DESCRIPTION

HB 190–340 mm; T 260–400 mm; WT 360–710 g.

Fur long and silky, particularly mane on the shoulders; mainly gold colour or glossy golden yellow; tail long and furred.

■ DISTRIBUTION

South America. South-eastern Brazil in the state of Rio de Janeiro from Bahia to São Paulo.



■ HABITS AND BEHAVIOUR

Habits: arboreal and diurnal; sleeps in holes in trees at night. **Gregariousness:** territorial groups 2–9 (usually 1 adult, and younger animals) or temporary aggregations to 16. **Movements:** sedentary; territories 40 ha. **Habitat:** tropical forest, coastal forest, swamp forest; occasionally secondary forest and cultivated areas. **Foods:** insects, fruits and small invertebrates; lizards, small birds, birds' eggs. **Breeding:** breeds September to March; gestation 125–134 days; young 1–3; born furred, eyes open; weaned at 90 days; sexual maturity males 24 months, females 18 months. **Longevity:** 8–28 years captive. **Status:** reduced in numbers and range and now endangered; formerly a common household pet.

■ HISTORY OF INTRODUCTIONS

Golden lion marmosets have been re-introduced successfully in southeast Brazil.

SOUTH AMERICA

Brazil

Populations of golden lion marmosets began to decline in the 1960s as agricultural and industrial development in Brazil decimated the Atlantic coastal rainforest that is their habitat (McKinsey 1998). By the 1970s they were almost extinct in the wild due to trapping as pets and the considerable deforestation. In an attempt to reverse the trend the Brazilian government set aside a 5300-ha reserve in rainforest north of Rio de Janeiro for 100 wild survivors. Both the Tijuca National Park and United States National Zoo became involved in breeding them in captivity (Radetsky *et al.* 1993; McKinsey 1998).

In the 1970s a number of animals were collected and taken to Tijuca National Park in Rio de Janeiro for participation in a captive breeding program (Wolfheim 1983; Dietz 1985). In 1984 the first 10 animals were re-introduced into the wild from captive-bred stocks, but most of these failed to survive as they were not able to fend properly for themselves. In 1985 a further seven were released, of which some were trained to survive in the wild, but all except two died. More recently 134 were released, of which 43 survived and have been breeding there. Other introductions have occurred in woods on ranches in the vicinity of Silva Jardim near Rio de Janeiro.

Of the hundreds of zoo-born marmosets re-introduced only 10 to 20 percent have survived and then only with considerable human help. However, their offspring do quite well – the strategy being that these will be self-supporting whereas the parents cannot survive independently (McKinsey 1998).

From about 370 in 1983 the population in 1986 numbered about 600 animals (Kleinman *et al.* 1986;

Burton and Pearson 1987). More than 400 now roam the coastal forest of Brazil (Radetsky *et al.* 1993). In 1996 only seven captive-born animals were re-introduced, but they successfully produced 38 offspring, which are now living on their own. The present population of re-introduced marmosets is probably 220–240 animals (McKinsey 1998).

■ **DAMAGE**
None known.

TUFTED-EAR MARMOSET

Common marmoset

***Callithrix jacchus* (Linnaeus)**

■ DESCRIPTION

HB 215 mm; T 295 mm; WT 165–360 g.

Fur grizzled yellowish grey with light black bands on body; tail ringed black and grey; ears tufted.

■ DISTRIBUTION

South America. Eastern Brazil from northern Ceará to southern São Paulo.

■ HABITS AND BEHAVIOUR

Habits: diurnal; gather together in hollows at night. **Gregariousness:** large troops. **Movements:** sedentary? **Habitat:** forest and plantations. **Foods:** insects and fruits, leaves, flowers. **Breeding:** 1 young, occasionally 2–3. **Longevity:** 16 years. **Status:** common, but some fragmentation of range; commonly kept pet.



■ HISTORY OF INTRODUCTIONS

Introduced successfully(?) in Guanabara and Rio de Janeiro, Brazil.

SOUTH AMERICA

Brazil

Introduced into Tijuca, Guanabara about 1900, tufted-ear marmosets have since spread into Rio Janeiro (Avila-Pires 1969; Wolfheim 1983).

■ DAMAGE

Tufted-ear marmosets inhabit plantations of cacao, bananas and coconuts and formerly were abundant in orchards and gardens (Wolfheim 1983), but no control is carried out. They are sometimes used in biomedical research in the United States.

Family: Cebidae

New World monkeys

SQUIRREL MONKEY

***Saimiri sciureus* (Linnaeus)**

Two species of Saimiri are currently recognised, S. oerstedii Reinhardt and S. sciureus (Linnaeus), and the exact identification of the species introduced is lacking. Most of the imports to the United States came from the range of S. sciureus.

■ DESCRIPTION

HB 260–360 mm; T 350–430 mm; WT females 500–750 g, males 700–1100 g.

Body greenish yellow; throat, face and ears white; muzzle black; under parts white or light yellow; tail tip black, long, non-prehensile.

■ DISTRIBUTION

Central and South America. Costa Rica and Panama (*S. s. oerstedii*) and Amazonia, Brazil, Colombia, Ecuador, Peru, Bolivia, Venezuela and Guyanas (*S. s. sciureus*).

■ HABITS AND BEHAVIOUR

Habits: active, diurnal, arboreal. **Gregariousness:** large bands, 2–200+; density 7.5–528/km². **Movements:** daily 0.6–1.1 km; overlapping home ranges 17.5–300 ha. **Habitat:** gallery forest, forest edges, palm forest and other forest, cultivated areas, usually along streams or other waters. **Foods:** insects, fruits, leaf material, nuts, flowers, buds, seeds, arachnids, young birds and eggs, and small vertebrates. **Breeding:** mates in dry season; gestation 152–172 days; oestrous cycle 7–13 days; 1 young; clings to



mother's back for first few weeks; independent at 1 year; females mature 3 years, males 5 years. **Longevity:** 15 to 21 years captive. **Status:** declining in a number of areas due to deforestation, locally abundant in others.

■ HISTORY OF INTRODUCTIONS

Squirrel monkeys have been introduced unsuccessfully to the Hawaiian Islands, but successfully to Florida, USA, and possibly to Rio Amazonas, Colombia. They have more than likely been introduced to Costa Rica by pre-Columbian man and to Panama by Indians.

NORTH AMERICA

United States

Between 1968 and 1972 some 173 049 were imported into the United States (Banks 1972). In 1969 alone some 47 096 of these animals were imported into the United States (Jones and Paradiso 1971). It is therefore not surprising that they were introduced as a tourist attraction to Silver Run River, Silver Springs, Florida, with Rhesus macaques (*Maccaca mulatta*) and established there (Lever 1985). There appears no further mention of these monkeys in this area.

PACIFIC OCEAN ISLANDS

Hawaiian Islands

A single squirrel monkey, *Saimiri* sp., was released by the coastguard on Green Island off Kure Atoll in late 1961 and remained there in a semi-wild state until January 1967 when it disappeared (Woodward 1972).

SOUTH AMERICA

Colombia

In an attempt to produce them for export overseas, 5690 individuals were released on an island in the Rio Amazonas near Leticia, Colombia, between 1967 and 1970, but by 1972 the population had decreased to 850–966 and was still declining (Mittermeier *et al.* 1977).

Costa Rica

It has been suggested that an isolated population of squirrel monkeys in south-western Costa Rica may have been introduced there by pre-Columbian man (Hall and Kelson 1959; Hershkovitz 1969).

Panama

Squirrel monkeys now occur in the south-west and on islands south of David, but were previously more widespread; they may have been introduced there by the Indians bringing pets to the area (Bennett 1968; Hershkovitz 1969).

■ DAMAGE

Squirrel monkeys feed on crops in Costa Rica (Wolfheim 1983) and Panama (Baldwin and Baldwin 1976). In Peru and Surinam they are occasionally pests of cacao and citrus plantations (Grimwood 1969; Husson 1957) and will also feed on cultivated bananas (Durham 1972).

BLACK HOWLER

Alouatta pigra Lawrence

■ HISTORY OF INTRODUCTION

BELIZE

The black howler monkey has been re-introduced into the Cockscomb Basin, Belize (Howich *et al.* 1994).

RED HOWLER

Alouatta seniculus (Linnaeus)

■ HISTORY OF INTRODUCTION

VENEZUELA

Red howler monkeys are kept as a free-ranging species in Venezuela (Agoramoorthy and Rudran 1993).

BROWN PALE-FRONTED CAPUCHIN

White-fronted capuchin

Cebus albifrons (Humboldt)

■ DESCRIPTION

HB 300–380 mm; *T* 380–500 mm; *WT* 2.3 kg.

Slender, long limbed, with partially prehensile tail;



Brown pale-fronted capuchin

colour varies over range, but usually different shades of brown; dorsum brown with white circling the face, and white on forearms; cap darker brown.

■ DISTRIBUTION

South America. Southern Colombia and southern Venezuela, south through Amazon Basin to northern Bolivia.

■ HABITS AND BEHAVIOUR

Habits: diurnal, active; mainly arboreal; territorial. **Gregariousness:** groups 7–30; 1 adult male per troop; density 3.8–45/km². **Movements:** sedentary; home range 60–200 ha. **Habitat:** deciduous and evergreen forest. **Foods:** fruit, seeds, shoots, young birds and eggs, insects and invertebrates. **Breeding:** similar to *C. apella*; 1 young; weaned after several months. **Longevity:** no information. **Status:** declining; little information; hunted for food.

■ HISTORY OF INTRODUCTIONS

SOUTH AMERICA

Trinidad and Ecuador

Brown pale-fronted capuchins have been imported to the island of Trinidad (Roots 1976) and to Ecuador. Almost certainly introduced to Ecuador where there were remnant populations on the eastern central coast including some wildlife sanctuaries (Wolfheim 1983).

■ DAMAGE

Brown pale-fronted capuchins are infamous crop pests in northern Colombia (Green 1976). They often forage in cornfields and are killed as pests (Hernandez-

Comacho and Cooper 1976). In Peru they feed on sugar cane, limes and banana, and in Brazil are also persecuted as pests of crops (Wolfheim 1983).

BROWN CAPUCHIN

Tufted capuchin, mono, black-capped capuchin

Cebus apella (Linnaeus)

■ DESCRIPTION

HB 363–480 mm; *T* 394–490 mm; *WT* 2.0–4.5 kg.

Cap on head of short, dark, erect hairs and in male forms ridges on either side of crown; body light brown; males heavier than females by 1 kg.

■ DISTRIBUTION

South America. Southern Colombia, Venezuela, Guyanas, throughout Paraguay and Brazil to northern Argentina.

■ HABITS AND BEHAVIOUR

Habits: no information. **Gregariousness:** groups 1, 5–40; male dominance hierarchy in troops; density 28–111/km². **Movements:** home range 0.25–40 ha. **Habitat:** semi-deciduous to tropical rainforest. **Foods:** fruits, nuts, seeds, insects. **Breeding:** breeds September–December; gestation 160–180 days; polygamous; oestrous cycle 16–20 days; 1 young; sexual maturity females 4 years, males 7 years. **Longevity:** 44 years 7 months captive. **Status:** common and abundant, but declining due to clearing of forest for agriculture.



Brown capuchin

■ HISTORY OF INTRODUCTIONS

SOUTH AMERICA

Margarita Island, Venezuela (Isla de Margarita)

It has been suggested (Eisenberg 1989) that the presence of brown capuchins on this island indicates that they were originally introduced by Amerindians.

■ DAMAGE

Brown capuchins feed on crops, especially immature corn in Colombia and Guyana (Wolfheim 1983). They are destructive to cacao, citrus, palm and corn cultivation in Surinam (Husson 1957), are accused of raiding crops and gardens in Peru (Grimwood 1969), and are shot to protect crops in south-east Bolivia (Wolfheim 1983).

Family: Cercopithecidae

Old World monkeys

TALAPOIN

Miopithecus talapoin (Schreber)

■ HISTORY OF INTRODUCTION

FERNANDO POO AND CANARY ISLANDS

Talpoins from the forests of western Angola, Cameroon and Gabon may have been introduced to Fernando Poo and the Canary Islands (Haltenorth and Diller 1994).

GREEN MONKEY

Vervet monkey, greenish monkey, green gueron, grivet, savanna monkey

Cercopithecus aethiops (Linnaeus)

=*C. sabeus* (Linnaeus)

■ DESCRIPTION

HB 400–830 mm; T 500–700 mm; WT 2.5–9.0 kg.

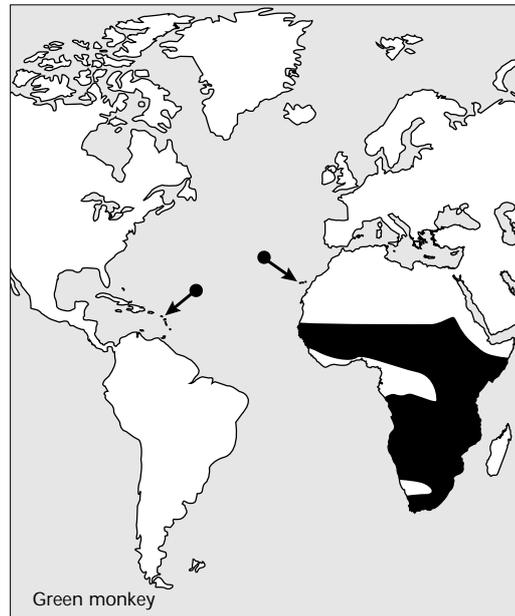
Slender with long tail; upper parts bright gold green, but varying from silver grey to reddish green; face black; forearms and forelegs grey; underparts, cheeks, sides of neck white to yellowish white; eyelids pale pink; scrotum pale blue and penis red; tail greyish green on basal two-thirds and yellowish distally.

■ DISTRIBUTION

Africa. Sierra Leone, Liberia, Senegal and Somalia south to South Africa.

■ HABITS AND BEHAVIOUR

Habits: diurnal; arboreal and terrestrial; territorial. **Gregariousness:** troops of 6–50 (old male, several



females, young) and up to 140; density 0.87–153.7/km². **Movements:** home range 9.4–518 ha. **Habitat:** forest, woodland savannah, forest edges, thickets, riparian woodland, acacia groves. **Foods:** fruits, berries, grass seeds, leaves, flowers, bark, sap, bulbs, roots, shoots, seed pods, grain, young birds, birds' eggs, insects, spiders, reptiles (lizards), herbs, human food scraps. **Breeding:** breeds all year (August–September St. Kitts); in Kenya mates April–June; gestation 165–203 days; 1 or rarely 2 young; clings to mother for 3 months; weaned 3–6 months; inter-birth interval 1 year; females breed at 3–4 years, males at 4–5 years. **Longevity:** 24 years (captive). **Status:** common and abundant; hunted for meat in many areas.

Note: Behaviour on St. Kitts reported to differ slightly from that of African animals.

■ HISTORY OF INTRODUCTIONS

Green monkeys have been introduced successfully on Barbados, St. Kitts and Nevis in the West Indies, and São Tiago in the Cape Verde Islands.

ATLANTIC OCEAN ISLANDS

Cape Verde Islands

Green monkeys (*C. a. sabeus*) have been introduced by humans to the island of São Tiago (Bannerman and Bannerman 1968), probably from mainland Africa (Osman Hill 1966). They are the only mammal apart from introduced rats in the Cape Verdes. They were once more common, but still inhabited the most inaccessible heights on the island in the 1960s. They were formerly also on the island of Brava, and noted

there in 1987 (Alexander 1898), when they were abundant in the larger valleys causing much damage to the sugar cane.

WEST INDIES

Barbados, St. Kitts and Nevis (Lesser Antilles)

The green monkey is reported to occur on Barbados, St. Kitts (St. Christopher), and Nevis (Sade and Hildrech 1965; Hall 1981; Walker 1992), in the Lesser Antilles, where they are thought to be an accidental introduction associated with the slave trade between Senegal and the West Indies in the 1600s.

C. a. sabeus was first reported on St. Kitts by Father Labat (*Nouveau Voyage aux Isles de L'Amerique*, Paris, 1722) who visited the island in 1700, although there is a doubtful record that they were present on Barbados as early as 1682. According to Labat, they escaped on St. Kitts from the houses of the French when the land was laid fallow under English control. In 1719 (Smith 1745), they were numerous on Mount Misery and were reported again in 1866 to be abundant on the island. Numbers on Barbados initially increased substantially then crashed in the eighteenth century because of loss of forest habitat and bounty hunting, but increased again in the 1950s after some areas had become reforested (Walker 1992).

In 1965 they were present in all parts of St. Kitts where there was some forest cover and were most abundant in the forest of the central mountain ranges, especially in the ravines, with a total population in the vicinity of 1500 monkeys (Sade and Hildrech 1965).

■ DAMAGE

In Africa the green monkey is a frequent agricultural pest and raids orchards, native's crops and villages (MacKenzie 1953; Ansell 1960; Osman Hill 1966; Wolfheim 1983) and is a frequent pest around lodges and campsites (Estes 1993). They damage orchards and market gardens in South Africa, where control of their numbers is carried out (Hey 1964, 1967). In Africa they are known to attack humans in situations where there is overpopulation due to tourists feeding them (Brennan *et al.* 1985). They cause extensive damage to cacao plantations in Sierra Leone, feed in maize patches in Ethiopia and are a notorious crop raider in Senegal, Sierra Leone, Ghana, Nigeria, Uganda, Kenya, Zimbabwe, Malawi, Zambia and Cameroon (Wolfheim 1983). They damage cereal crops, fruits, vegetables and sugar cane (\$20 000 cane in one area) in Zimbabwe (Jarvis and La Grange 1984). Their crop raiding has led to extermination programs in several countries (e.g. Sierra Leone and Uganda). They will steal from houses and gardens and from people at picnic spots. In their favour, they are

reported to sometimes eat large numbers of injurious insects (Osman Hill 1966).

On São Tiago, in the Cape Verde Islands, green monkeys are reported to be a pest of fruit plantations and to have formerly raided sugar cane crops (Bannerman and Bannerman 1968). On St. Kitts, West Indies, they may have been responsible for the extermination of the Puerto Rican bullfinch, *Loxigilla potoricensis grandis* (Sade and Hildrech 1965).

MONA MONKEY

Cercopithecus mona (Schreber)

■ DESCRIPTION

HB 400–500 mm; T 540–800 mm; SH 320–350 mm; WT 2.5–7.5 kg.

Upper parts speckled reddish and black, darkest towards the rump; hands and arms black on lateral surface; legs black, speckled with red spots on lateral surface; under parts and medial surface of limbs, greyish white; tail patch to hips white; tail speckled reddish and black, tipped black.

■ DISTRIBUTION

West Africa. Senegal through coastal west and central Africa to western Uganda.

■ HABITS AND BEHAVIOUR

Habits: agile, territorial. **Gregariousness:** groups or family parties of 8–20 and up to 38. **Movements:** no information. **Habitat:** rainforest, islands of forest in



savanna, mangrove swamps, secondary and lowland forest, plantations, gardens, farmland. **Foods:** leaves, shoots, fruit, insects, tree snails. **Breeding:** births mainly December–February; gestation 6 months; lactation 1 year. **Longevity:** no information. **Status:** common and abundant; hunted for meat; often kept as pets.

■ HISTORY OF INTRODUCTIONS

Mona monkeys have been introduced successfully(?) to St. Kitts and Grenada in the West Indies.

WEST INDIES

St. Kitts and Grenada

It has been concluded (Sade and Hildrech 1965) that records (Hollister 1912) of the Mona monkey on St. Kitts were probably due to error and that the species occurs only on Grand Etang, Grenada. Other authors suggest that it is established on St. Kitts (Osman Hill 1966; Hall 1981) and on Grenada (Hall 1981).

■ DAMAGE

Mona monkeys raid crops and are pests of cacao and maize (Wolfheim 1983). They are frequently shot as pests in Cameroon, Zaire and Sierra Leone.

SILVERED LEAF MONKEY

Brow-ridged langur

Trachypithecus auratus (Geoffroy)

=*Presbytis cristata* Raffles

■ HISTORY OF INTRODUCTION

LOMBOK, INDONESIA

Silvered leaf monkeys occur from Peninsula Burma to

Thailand, Malaysia, Sunda and Java, Bali and Lombok and possibly Borneo. Apparently this species (as *Semnopithecus maurus*) was thought to have been introduced to Lombok by the Balinese Rajahs and is now abundant in the hills from Ampean to Rinjani (Roots 1976; Everett 1896 in Kitchener *et al.* 1990)

STUMP-TAILED MACAQUE

Stumptail macaque, bear macaque

Macaca arctoides (Geoffroy)

■ DESCRIPTION

HB 485–700 mm; T 35–100 mm; WT 8–12 kg.

Upper parts vary from blackish to brownish to reddish, but duller with age; hair shaggy, brown; forehead bald; whiskers under chin form a beard; face pink-tinged with black markings; tail short and naked. Male larger than female.

■ DISTRIBUTION

Asia. Eastern India, Bangladesh, Burma, Thailand, southern China to northern Malay peninsula and Indochina.

■ HABITS AND BEHAVIOUR

Habits: mainly terrestrial; aggressive; diurnal; partly arboreal. **Gregariousness:** group size 5–30 and up to 50. **Movements:** sometimes seasonal migration from one mountain range to another. **Habitat:** monsoon and dry primary or secondary forest. **Foods:** leaves, fruits, roots, seeds, buds, potatoes, insects and small mammals. **Breeding:** gestation 177.5 days; oestrous



cycle about 30.7 days; 1 young every second year; born naked, whitish. **Longevity:** no information. **Status:** uncommon, declining in numbers, rare in most areas.

■ HISTORY OF INTRODUCTIONS

Introduced into Bermuda and Mexico experimentally or for behavioural research purposes.

CENTRAL AMERICA

Mexico

Twenty stump-tailed macaques were released on the island of Totogochillo in Lake Catemaco, Veracruz, in August 1974 and 12 more were released on 12 November the same year. The colony was doing well after 83 days (Estrada and Estrada 1976).

WEST INDIES—CARIBBEAN

Bermuda

Released on Hall's Island, Harrington Sound, Bermuda for behavioural studies and other research by Rutgers University, United States. In May 1983 the free-ranging population was 10 stump-tailed monkeys (Lever 1985).

■ DAMAGE

Invaders of gardens and cultivated fields (Whitehead 1985), stump-tailed macaques feed on crops, including rice crops in Thailand, and in Assam cause damage to potatoes (Wolfheim 1983). At times they play havoc with crops and also even invade isolated huts (Utun Yin 1967).

TAIWAN MACAQUE

Formosan macaque, Formosan rhesus, rock macaque

***Macaca cyclopis* (Swinhoe)**

■ DESCRIPTION

HB 560 mm; T 420 mm; WT ? g.

Appearance similar to other *Macaca* species.

■ DISTRIBUTION

Throughout the island of Taiwan.

■ HABITS AND BEHAVIOUR

Habits: little information on population density. **Gregariousness:** no information. **Movements:** sedentary? **Habitat:** forests, mountains and rocks or inland grassy hills; formerly also sea coasts and beaches. **Foods:** as for other macaques. **Breeding:** as for other macaques. **Longevity:** no information. **Status:** forced to inhabit high elevations by human pressure; declining.



Taiwan macaque

■ HISTORY OF INTRODUCTIONS

Successfully introduced to Oshima Island, Japan.

PACIFIC OCEAN ISLANDS

Oshima Island, Japan

Originally imported from Taiwan after 1942–43 to the Oshima Zoological Gardens and the islets off Shikine on Oshima Island, south of Tokyo, some 36 Taiwan macaques were noted on the island in around 1949–50 (Kuroda 1955). There is some doubt as to whether these macaques occur in the wild at Kiyozumi Prefecture, Chiba, Hondo (de Vos *et al.* 1956), where they were reported to be feral around 1949 (Imaizumi 1949).

■ DAMAGE

No information.

CRAB-EATING MACAQUE

Cynomologus monkey, long-tailed macaque, kra

***Macaca fascicularis* (Raffles)**

=*M. irus*

■ DESCRIPTION

HB 310–648 mm; T 320–670 mm; WT 1.5–8.3 kg.

Body small, graceful; pelage brown; under parts and also cheeks paler; naked skin on face, hands, feet pinkish brown; tail as long as body or longer, not prehensile.



■ DISTRIBUTION

South-east Asia. From Burma and the Philippines south to western Indonesia (Sumatra and Timor). Now on Sumba, Lombok, Sumbawa, Kanbing, Adonara, Flores, Burma, Thailand, Indochina, Philippines (Luzon, Mindanao, Basilan and Mindoro islands; also Negros Island), south to Sumatra, Java, Borneo and Timor; also on the Nicobar Islands.

■ HABITS AND BEHAVIOUR

Habits: active during day; arboreal and terrestrial; swims well. **Gregariousness:** in troops 6–100 (few males, many females, young); density 5.8–90/km²; linear dominance hierarchy between adults of same sex. **Movements:** home range 25–100 ha. **Habitat:** wide variety of habitats usually near water; forest, secondary forest, mangrove swamps, urban areas, plantations, parks, gardens, woodland, agricultural areas. **Foods:** crustaceans, fruit, insects, amphibians, crabs, shellfish, and other littorial animals, termites, cockroaches, cicadas, moths, bees. **Breeding:** throughout the year; gestation 160–170 days; peak in births in spring; oestrous cycle 24–52 days; sexual maturity females 2.5–4 and males 2–3 years. **Longevity:** 27 years captive. **Status:** locally abundant, but declining some parts of range; frequently kept pet in Indonesia.

Note: Widely used in studies that led to the development of a vaccine for poliomyelitis (Marshall 1967; Walker 1967).

■ HISTORY OF INTRODUCTIONS

Introduced successfully to Sulawesi, the Lesser Sunda Islands, Hong Kong (China), Palau group and Mauritius; unsuccessfully to the Hawaiian Islands.

ASIA

Hong Kong (China)

A group of crab-eating macaques living in the Kowloon area were probably released or escaped from captivity during or shortly after World War 2 (Marshall 1967).

INDIAN OCEAN ISLANDS

Mauritius

Taken to Mauritius by Dutch or Portuguese sailors early in the sixteenth century, crab-eating macaques now number 25 000–30 000 (Sussman and Tattersall 1986). Some were noted there by Cornelius Matelief de Jong as early as 1606. In 1979 they numbered between 12 000 and 15 000.

INDONESIA

Lesser Sunda Islands

Crab-eating macaques were introduced to the Lesser Sunda Islands from the more westerly islands of the Indonesian Archipelago (de Vos *et al.* 1956).

There is controversy as to whether they occur east of Wallace's Line as a result of human introduction (Darlington 1957; Medway 1970) or occurred there naturally (see Fooden 1975). An examination of their morphology (Aimi *et al.* 1982) concluded that on the basis of similarity and ability of the species to swim well, that the distribution on Lombok was a natural one. However, genetically (Kawamoto and Suryobroto 1985) the Lombok animal and those on Sumbawa and Timor are similar. This pattern supports the hypothesis of human introduction (Kitchener *et al.* 1990).

Crab-eating macaques are present on Sumatra, Java, Kalimantan (Borneo), Bali, Lombok, Sumbawa, Sumba, Bangka, Belitung, Litung and Riau archipelago, on Simalur and Nias islands (west of Sumatra), and as far east as Timor.

Sulawesi

The crab-eating macaque has been successfully introduced to Sulawesi (de Vos *et al.* 1956; Roots 1976).

NORTH AMERICA

United States

On several occasions free-ranging colonies of crab-eating macaques have been established in North and Central America for tourism and medical and behavioural research. One such colony has been established as a tourist attraction in Monkey Jungle near Miami, Florida (Lever 1985). Some 1188 monkeys of this species were imported into the United States in 1969 (Jones and Paradiso 1971), and between 1968 and 1972, 8058 were imported (Banks 1972).

PACIFIC OCEAN ISLANDS

Hawaiian Islands

Crab-eating macaques have been introduced to some islands in the Pacific area (Carter *et al.* 1945). Numerous monkeys have escaped, mainly on Oahu, and at least one roamed Hilo, Hawaii, for a few years (Kramer 1971).

Palau Islands

Crab-eating macaques are believed to have been introduced to Angaur Island by German phosphate miners between 1900 and 1914 (Poirier and Smith 1974 in Lever 1985). The population numbered 480–600 in 1973, all supposedly progeny from the introduction of only a single pair of crab-eating macaques.

■ DAMAGE

Crab-eating macaques are a pest in some areas because of their raids on fields and gardens (Medway 1978). They feed in cultivated fields and are known to eat rice, cassava leaves, rubber fruit, toro plants and many other crops, and as such are considered a serious pest of agriculture. They will also take food from garbage cans, rubbish dumps and botanical gardens (Wolfheim 1983). In Malaysia, Sumatra, Java and Thailand they are often killed because of their considerable depredations on crops (Wolfheim 1983; Lekagul and McNeely 1988).

Crab-eating macaques are said to pose a threat to a number of endangered endemic birds on Mauritius, and have contributed to the extinction of the blue pigeon, which occurred in 1826.

On Hong Kong they occasionally enter houses and in the past this has led to a number being shot (Marshall 1967).

JAPANESE MACAQUE

Macaca fuscata (Blyth)

■ HISTORY OF INTRODUCTION

UNITED STATES

This macaque may have been established at La Moca, in Texas (Lever 1985), but there appear to be few details.

RHESUS MACAQUE

Rhesus monkey, rhesus

Macaca mulatta (Zimmermann)

■ DESCRIPTION

HB 470–585 mm; T 205–280 mm; WT 3–12 kg.

Generally brownish or greyish green; hindquarters reddish brown; belly white; forepaws greyish; tail grey green; face, ears, hands pale copper yellow.

■ DISTRIBUTION

Southern Asia. From eastern Afghanistan and northern India to south-east China and south to Cambodia, Vietnam and central India.

■ HABITS AND BEHAVIOUR

Habits: diurnal, arboreal and terrestrial; dominance hierarchies in both sexes. **Gregariousness:** solitary or groups 8–180; males tend to live in groups with other males or alone; 2–4 times as many females in large groups; density 5–57/km², but often considerably larger populations to 753/km² in towns. **Movements:** home range 0.05–16 km²; solitary males nomadic. **Habitat:** semi-deserts to forest and urban areas; agricultural areas. **Foods:** mainly vegetation; fruits, berries, grain, leaves, buds, seeds, grass, fronds, flowers, bark; also insects, other small invertebrates, occasionally eggs and small vertebrates. **Breeding:** October–February; gestation 135–194 days; oestrous cycle about 28 days; 1 young; weaned at *c.* 1 year; inter-birth interval *c.* 14 months; sexual maturity female 3 years, male 4 years. **Longevity:** at least 20–30 years captive. **Status:** common; declining many rural areas.

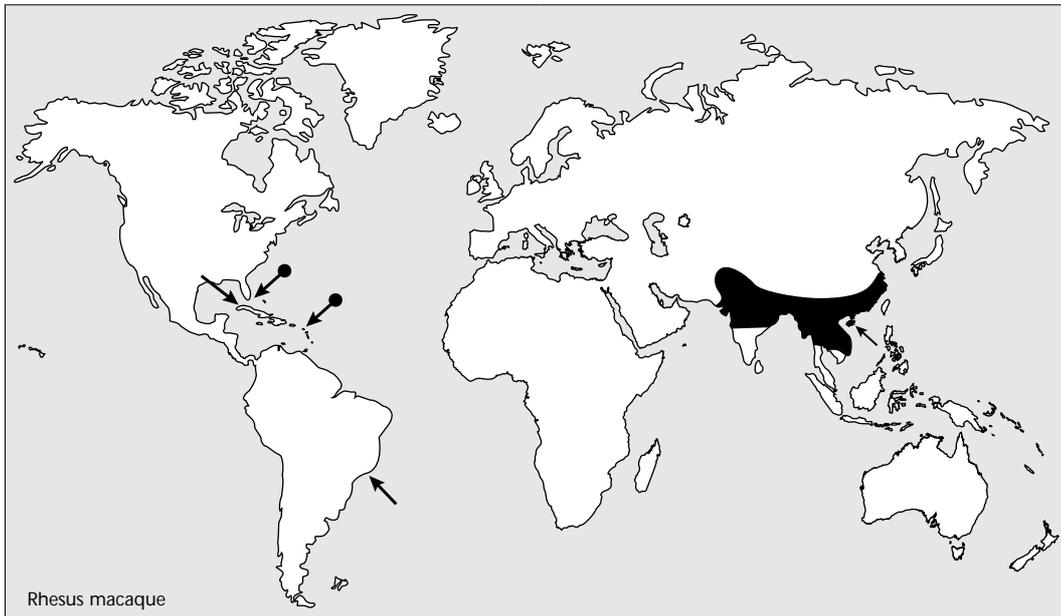
■ HISTORY OF INTRODUCTIONS

Introduced successfully to Puerto Rico, West Indies and possibly near Peking in China. Free-ranging colonies probably exist in India, the United States and Brazil. Unsuccessfully introduced into Germany and Cuba.

ASIA

India

There are apparently some feral troops of rhesus in some towns and forest areas in India (Ciani 1986).



China

An isolated population of rhesus monkeys exists near Peking (Beijing), which is probably introduced (Ellerman and Morrison-Scott 1966; Corbet 1978). However, it is now thought to be one of a relic group representing a former occurrence of the species across northern and eastern China (Walker 1992).

EUROPE

Germany

In Germany there have been at least two escapes that have established for a short period and one successful introduction. An animal escaped in a fruit-growing area near Berlin in 1912 where it remained for a few months before being shot. A second animal lived on the rooftops and in parks of Bonn for a few weeks before being captured (Niethammer 1963).

NORTH AMERICA

United States

A number of rhesus colonies appear to have been established in the United States: at Silver Springs some were released in 1933 on the Silver Run River and there were 78 there in 1968. In 1983, there were 65 rhesus monkeys and squirrel monkeys (*Saimiri* spp.) on the south bank and 200 on the north bank. In 1956–57 a colony of rhesus monkeys was said to have existed on Hilton Head Island offshore from Bluffton, but none remained in 1974.

In the 1970s a free-ranging population was established at Loggerhead Key, Florida, where they were bred for cancer research (Lever 1985). The feral population remaining in central Florida, was probably

established as a tourist attraction, and has existed there since the 1930s (Wolfe and Peters 1987). In 1969 alone 27 462 were imported into the United States (Jones and Paradiso 1971), and between 1968 and 1972 some 127 004 were imported into the United States (Banks 1972).

A free-ranging colony of rhesus monkeys was established in Marion County, Silver Springs, Florida, in 1938 (Wolfe and Peters 1987). Although there are no records of the date and circumstances of the introduction, it seems most likely that they were released in 1938, a date supported by a newspaper article at the time. They were more than likely placed on an island in the Silver River by a Colonel Tooey to make a wildlife exhibit for his 'Jungle Cruises' along the river. The monkeys then escaped from the island to other locations along the river. The descendants of those that stayed near the island today inhabit the Ocala National Forest. Others established themselves further up the river near the headwaters and are known as the Silver Springs monkeys. In 1968 a census found 78 living along the north and south banks of the Silver River (Maples *et al.* 1976). In 1981 two large troops were found, each in excess of 50 animals. By 1986 the total in three troops numbered 185 animals (Wolfe and Peters 1987).

SOUTH AMERICA

Brazil

In the 1940s about 300 rhesus monkeys were released for research into yellow fever on Ilha do Pinheiro in Guanabara Bay, Rio de Janeiro; in 1947 around 100

remained at large. It appears that these are still established there (Hausfater 1974; Roonwal and Mohnot 1977; Lever 1985).

WEST INDIES-CARIBBEAN

Puerto Rico

Four hundred rhesus monkeys (Grzimek 1972) were released on Cayo Santiago Island in 1938, but the project was later abandoned because they fought with gibbons introduced at the same time and also attacked human visitors (Carpenter 1942; Altmann 1962; Wilson and Elicker 1976). More recent information suggests that Cayo Santiago may still have a feral population of rhesus, and that they may recently have been introduced to several additional islands (Heatwole *et al.* 1981). They were there in 1965 (Sade and Hildrech 1965) and occurred on at least four cays in the 1970s (Philibosian and Yntema 1977).

A free-ranging population exists at the Caribbean Primate Research Centre on Puerto Rico, where they are maintained for behavioural studies.

Cuba

During World War 2 many rhesus monkeys were released for pathological research on Morrillo del Diablo Key, near the Isle of Pines, Cuba. The project was abandoned in the 1950s and some of the monkeys swam to the Isle of Pines, but failed to become established there (Lever 1985).

■ DAMAGE

Rhesus monkeys can become a serious nuisance in gardens and orchards where they steal fruit and other food and damage field crops. They raid fields and gardens and are regarded as pests in the south-east parts of their range (Walker 1992), while in some parts of India they are held to be sacred (Morris 1965).

Rhesus monkeys are known to damage such crops as sugar cane, wheat, grain, pulse, millet, maize, raisins, rice, mulberries, pomegranates and vegetables. However, the extent of the damage is not known and is probably small on a national scale and not as great as that caused by insects, rodents and plant disease (Wolfheim 1983).

PIG-TAILED MACAQUE

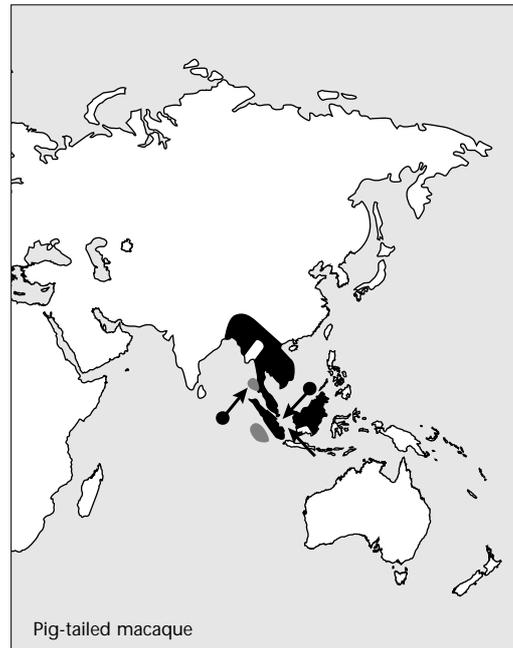
Pigtailed monkey, brok

***Macaca nemestrina* (Linnaeus)**

■ DESCRIPTION

HB 470–600 mm; T 125–230 mm; WT 3.5–13.6 kg.

Large, thick set; coat colour variable, but usually uniform mid-brown; crown and forehead with dark



brown; under parts paler; light brown hairs on sides of face form conspicuous fringe around head and ears; tail short, carried half erect and arched over body and is one-third to one-half body length. Female weighs less than male.

■ DISTRIBUTION

Southern Asia. Northeastern India (Assam), Burma, Thailand and south to Malaya, Sumatra and Borneo. Also on Bangka and the Mentawi Islands (Siberut), Sipora and the Pagai Islands.

■ HABITS AND BEHAVIOUR

Habits: arboreal, terrestrial, vocal, elusive, shy. **Gregariousness:** troops or parties of 3–50, but occasionally males solitary; density 1–126/km². **Movements:** moves from one feeding area to another; males more often solitary; several parties may travel together or feed together; overlapping home ranges 60–828 ha. **Habitat:** deciduous and evergreen forest, woodland, coastal swamps, plantations and gardens. **Foods:** omnivorous; fruits, grain, leaf shoots, bark and pith, flowers, buds, nuts, seeds, insects. **Breeding:** any time of year; gestation 162–186 days; oestrous cycle 32–42 days; young 1; born brown-haired which turns black in 1 month; weaned 12 weeks; sexual maturity 50 months. **Longevity:** 26 years (captivity). **Status:** fairly common; locally abundant, but declining.

■ HISTORY OF INTRODUCTIONS

Probably introduced successfully to the Andaman Islands, Singapore and Penang Islands.

ASIA**Singapore and Penang, Malaysia**

Pig-tailed macaques are not native to either Singapore or Penang Island, or other small islands off the coast of Malaya, although they are often introduced there (Harrison 1966; Medway 1969, 1978).

INDIAN OCEAN ISLANDS**Andaman Islands**

Pig-tailed macaques, *M. n. leonina*, have been introduced from India and established in the Andamans (de Vos *et al.* 1956; Burton and Burton 1969; Encycl. Brit. 1976; Lever 1985).

■ DAMAGE

In Borneo, Thailand and Malaya, pig-tailed macaques often raid cultivated crops including grain (padi) and fruit crops (Medway 1978; Payne *et al.* 1985). In Sumatra they are reported to damage corn, papaya and oil palms (Wolfheim 1983).

CRESTED CELEBES MACAQUE

Crested macaque, Celebes crested macaque, black ape, moor macaque, Sulawesi black ape, Celebes black ape

***Macaca nigra* (Desmarest)**

=*Cyanopithecus niger*

■ DESCRIPTION

HB 475–665 mm; T 20–65 mm; WT about 6 kg.

Upper parts dark brown to black; crown with conspicuous conical mass of long erectile hair; face elongated; eyebrows protruding; face, hands and feet hairless; under parts black to nearly grey; buttock pods bright flesh coloured.

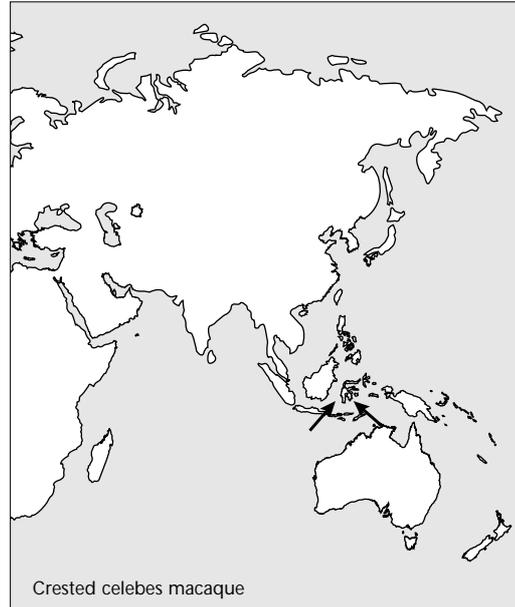
■ DISTRIBUTION

Western Indonesia. Northern peninsula of Sulawesi, also on Batjan and some of the smaller adjacent islands; Manadotua and Talise (Talisei) north to Sulawesi; Lembeh east of Sulawesi; on Muna and Butung off south-east shore and other small islands.

■ HABITS AND BEHAVIOUR

Habits: arboreal and terrestrial. **Gregariousness:** 5–25, groups to several hundred. **Movements:** sedentary? **Habitat:** forest and adjacent grasslands, mangrove swamps, bamboo forest. **Foods:** probably roots, buds, leaves, fruits, seeds, insects, worms, eggs, chicks. **Breeding:** oestrous cycle 33.5 days; little information. **Longevity:** no information. **Status:** common, little information.

Note: Natural history and biology in wild appear to be unknown, but probably is similar to other macaques.



Crested celebes macaque

■ HISTORY OF INTRODUCTIONS

Possibly introduced to Ambon and Maluku, where it may also be native.

INDONESIA**Ambon**

The crested Celebes macaque has possibly been introduced to Ambon (de Vos *et al.* 1956; Lever 1985), but there appears to be little information.

Maluku

M. nigra is presumably a recent introduction to the island of Batjan (Flannery 1995). The date of arrival is unknown and the species has not spread to other islands. They were common on Batjan in 1991.

■ DAMAGE

On Sulawesi the crested Celebes macaque is held to be sacred and causes little trouble, though occasionally they raid plantations (Morris 1965). They will feed in orchards, gardens and cornfields, but the amount of damage appears small (Wolfheim 1983).

BARBARY APE

Barbary macaque

Macaca sylvanus* (Linnaeus)*■ DESCRIPTION**

HB 550–750 mm; T absent; SH 500 mm; WT 5–17 kg.

Robust body; head rounded; muzzle short; coat greyish brown above with darker face; under parts pale; tail absent. Female is smaller than male and has shorter hair on crown.



■ DISTRIBUTION

North Africa. Gibraltar, Morocco and northern Algeria. Formerly much of North Africa and Europe.

■ HABITS AND BEHAVIOUR

Habits: diurnal, territorial and arboreal. **Gregariousness:** troops up to 12–25 (males, females, young) and up to 35; multi-male groups; density 12–70/km². **Movements:** sedentary. **Habitat:** wooded mountains and rocky areas, mixed oak forest and fir forest, marquis, garrigue, cedar and palm forests; matorral. **Foods:** insects, scorpions, plants, leaves, fruits, pine cones, leaf tips, seeds, roots, invertebrates, flowers, herbs, grasses, berries, spiders. **Breeding:** breeds throughout the year, but usually only every second year; young born May–September; gestation 180–210 days; 1 rarely 2 young; stays with female to 6 months; weaned 3 months; mature at 3–4 years. **Longevity:** 15–21 years captive. **Status:** declining due to habitat destruction and hunting.

■ HISTORY OF INTRODUCTIONS

During the Pleistocene Barbary apes were widespread throughout Europe and North Africa. By 1920 they only occurred in five regions of Morocco and Algeria, and now probably only in about three. They are now probably restricted to a few isolated areas of montane forest and most of the wild population occurs in the Middle Atlas, Morocco.

Barbary apes have been introduced successfully on Gibraltar in the Mediterranean, possibly to Spain, and to Germany, but in the latter were exterminated for unknown reasons. Planned re-introductions in Algeria–Morocco may have already occurred.

EUROPE

Germany

A soldier (Count Schlieffen) returning from Africa imported Barbary apes and released them on his estate at Windhausen near Kessel in 1763. Here they bred and maintained their numbers (with considerable help) for a period of about 20 years. The population was destroyed for reasons that are now uncertain. Some stories indicate that a child was abducted and another child attacked by the apes, but other accounts suggest that the colony contracted rabies from a dog. Whatever the reason, a monument that still stands today was erected in their honour (Niethammer 1963; Grzimek 1972).

Gibraltar

Introduced to Gibraltar (Sanderson 1955; Corbet 1978), Barbary apes have been there since early times. Possibly the Phoenicians, Carthaginians or Romans took them there originally. Records indicate that they were there in AD 711. They appear to have been there in 1779–83 and may have been there as early as 1704 (Walker 1992). They were first mentioned officially by the British in 1856 when there were about 130 apes there. In 1858 all except three died from an epidemic, but soon after, additional ones were introduced from North Africa. In 1910, 200 apes were there, but since 1913 their numbers have been regulated to about 30–40. In 1943 the numbers had fallen to seven so between 1942 and 1945 a male and six females were imported from North Africa and released (Zeuner 1963; Burton and Burton 1969). Since then a number have been exported to keep the population within bounds.

On the island, where they exist in a state of semi-domestication, their numbers have been as low as seven (in 1924), and as high as 30 animals (in 1955). Their numbers have been supplemented, at least occasionally, by further introductions (seven in 1931, seven in 1943–45) from North Africa. Attempts are made to keep a maximum of 30 monkeys by periodical removal of some to zoos (MacRoberts and MacRoberts 1971).

From 1948 onwards their numbers have fluctuated between 24 and 40. Seventy-six have been exported and a further 10 culled (Lever 1985). Superstition has it that if the apes leave the rock the British will lose the island.

Spain

Fossil remains indicate that *M. sylvanus* occurred in much of Europe during the late Pleistocene and some animals may have survived in southern Spain as late as the 1890s (Walker 1992).

Recently some Barbary apes escaped from captivity in Spain and began to live and reproduce in the wild (Deag 1977; Taub 1977, 1984).

NORTH AFRICA Algeria–Morocco

Plans have been formulated to re-introduce surplus stocks of Barbary apes to areas where they occurred previously but are now extinct (Oates 1996).

■ DAMAGE

Barbary apes are hunted and shot as pests where they raid crops, gardens and garbage dumps (Deag 1977; Whitfield 1985; Burton and Pearson 1987), although in most areas damage appears to be limited. In Morocco they are shot because of the damage they cause to cedar trees by stripping the bark and eating the cambium layer (Deag 1977). On Gibraltar they are often regarded as a pest when they raid garbage cans and gardens (MacRoberts and MacRoberts 1971).

ZANZIBAR RED COLOBUS

Kirk's colobus

***Colobus kirkii* (Gray)**

=*Procolobus badius kirkii*, and often treated as a subspecies of *C. badius*

■ DESCRIPTION

HB 460–700 mm; T 420–800 mm; WT 5–13 kg.

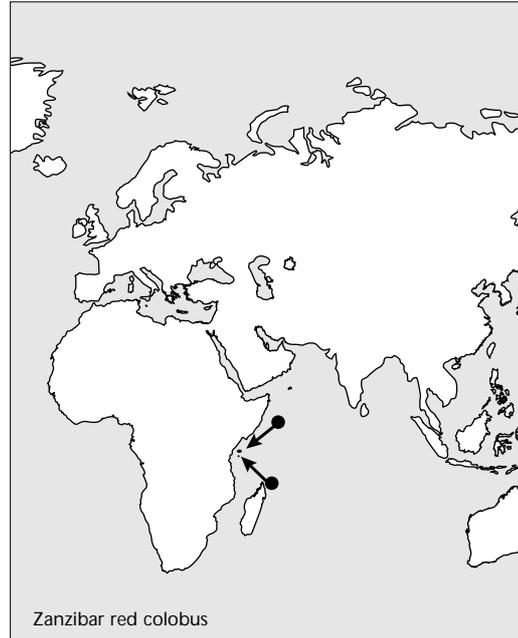
Face brown, framed in a fringe of long white hair across the head and at back of the cheeks; whiskers white; back and shoulders black two-thirds, remainder of back and upper tail red; forearms and feet darker; remainder pale brown; chest white; underside of hind legs whitish.

■ DISTRIBUTION

Zanzibar Island, Tanzania.

■ HABITS AND BEHAVIOUR

Habits: diurnal; acrobatic, mostly arboreal. **Gregariousness:** lives in groups 5–100 (made up of many family groups) which constantly split and reunite; density 100/km². **Movements:** sedentary?; overlapping home ranges; territories 25–150 ha. **Habitat:** forest, woodland, secondary forest, mangrove swamps, private gardens with fruit trees. **Foods:** flowers, fruits, leaves, shoots, buds and charcoal. **Breeding:** gestation 4.5–5.5 months; 1 young; weaned 9–12 months, sometimes up to 3 years; inter-birth interval to 3.5 years for some; sexual maturity 2–4 years. **Longevity:** 2? years as captive. **Status:** endangered due to cutting of forest.



Zanzibar red colobus

■ HISTORY OF INTRODUCTIONS

Translocated successfully to the island of Zanzibar and introduced to Pemba Island.

AFRICA

Zanzibar and Pemba Islands

Populations of red colobus have been translocated to Masingini and Kichwele Forest on Zanzibar, and to Ngezi on Pemba Island. The species was rare on Zanzibar in 1978 and the total population only 150–200 (Wolfheim 1983). The total population may now be only 1400–2000, mainly in the Jozani Forest Reserve. The animal is threatened by timber felling, agriculture and hunting (Burton and Pearson 1987).

■ DAMAGE

The Zanzibar red colobus is not generally an agricultural pest, but is shot on Zanzibar because of crop damage probably committed by green monkeys (Wolfheim 1983). However, it continues to be reported to damage village crops (Struhsaker 1998).

Family: Hylobatidae Gibbons

WHITE-HANDED GIBBON

Lar gibbon

***Hylobates lar* (Linnaeus)**

Specific identification not known, but H. lar appears to be the animal most commonly traded.

■ DESCRIPTION

HB 454–473 mm; WT 4.2–5.4 kg.

Mainly black or buff to cream colour; hands and feet, brow band and sides of face white or at least paler than body or forearms; long slender limbs; arms longer than legs.

■ DISTRIBUTION

Asia. From Hainan, Indochina, south-west Thailand, Tenasserim, Cambodia, Malaya and Sumatra.

■ HABITS AND BEHAVIOUR

Habits: arboreal, rarely on ground; crepuscular and diurnal. **Gregariousness:** family parties (males, females, young). **Movements:** home range c. 40 ha. **Habitat:** forest. **Foods:** fruits, leaves, new shoots, flowers, insects. **Breeding:** gestation 210–215 days; 1 young; sparsely furred; weaned 4–7 months; inter-birth interval 2–4 years; sexual maturity 6–8 years. **Longevity:** 21–32 years captive. **Status:** no information.

■ HISTORY OF INTRODUCTIONS

There may be free-ranging populations of gibbons in Thailand and elsewhere, but those on the Hawaiian Islands, Bermuda and Puerto Rico have been abandoned or discontinued.

ASIA

Thailand

Short-term releases of gibbons (*Hylobates* sp.) have been made on Ko Klet Kaeo in the Gulf of Siam for reasons of conservation (Berkson and Ross 1969; Wilson and Elicker 1976).

PACIFIC OCEAN ISLANDS

Hawaiian Islands

Short-term releases of gibbons (*Hylobates* sp.) have been made on Lānaʻi, Hawaii (Wilson and Elicker 1976).

WEST INDIES–CARIBBEAN

Bermuda

Gibbons (*Hylobates* sp.) have been released onto Hall's Island in an attempt to establish a permanent colony (Baldwin and Teleki 1974) for scientific and behavioural studies by the International Psychiatric Research Foundation and the Rockman Research Institute, United States (Lever 1985). The colony appeared to have been present in the locality at least between 1975 and 1977.

Puerto Rico

Gibbons (*Hylobates* sp.) were released on Cayo Santiago Island in 1938, but the project was abandoned when they fought with introduced rhesus monkeys (*Macaca mulatta*) and attacked human visitors (Wilson and Elicker 1976; Carpenter 1972).

■ DAMAGE

None known.

Family: Pongidae

Apes

CHIMPANZEE

Chimp

***Pan troglodytes* (Blumenbach)**

=*P. satyrus*

■ DESCRIPTION

HB 635–940 mm; SH 700–920 mm; WT males 56–80 kg, females 30–68 kg.

Mainly black (sometimes brown or ginger) with white patch near rump; hairs on head directed backwards or parted; face bare, generally black; nose, hands, ears and feet flesh coloured; brow ridges prominent; tail absent. Female smaller than male.

■ DISTRIBUTION

Africa. Tropical Africa (14°N to 10°S) from Guinea and Sierra Leone to Zaire, Uganda and Tanzania.

■ HABITS AND BEHAVIOUR

Habits: arboreal and terrestrial; diurnal; constructs nests of vegetation in trees for sleeping; territorial. **Gregariousness:** groups or troops of 2–30, and up to 80; dominance hierarchy; density 0.05–26/km². **Movements:** forages over 1.5–15 km; nomadic within home range; home range 5–40 km² and up to 560 km² in marginal habitat. **Habitat:** tropical rainforest,



wooded savannah. **Foods:** fruits, nuts, shoots, pith and gum, leaves, roots, vegetables, birds' eggs, insects, small mammals, blossom, seeds, stems, bark, honey. **Breeding:** all year; gestation 202–261 days; promiscuous; inter-birth interval 4–5 years; 1 young rarely 2; stays with female for 2–3 years; sexual maturity females 5.5 years, males 8–9 years. **Longevity:** captive 53 years; may be 60 years in wild. **Status:** declined in numbers through habitat loss and hunting; range fragmented.

■ HISTORY OF INTRODUCTIONS

AFRICA

Several attempts have been made to establish free-ranging colonies of chimpanzees in Senegal, Uganda, the Netherlands and the United States. Only those in Lake Victoria appear to have much chance of long-term success.

Senegal

Beginning in 1973 some re-introductions may have occurred in Senegal with captive-born or captive chimpanzees.

Tanzania

Ten chimpanzees were released on uninhabited Rubondo Island in Lake Victoria. All 10 came from zoos in Europe. It was hoped that the area would become a tourist attraction (Grzimek 1966).

Uganda

Some chimpanzees have been released on Ngamba Island (24 km from Entebbe) in Lake Victoria in about 1998 (Southwell 1999).

EUROPE

Netherlands

A semi-free-ranging colony of chimpanzees was established at Arnhem, in the Netherlands (Van Hoof 1973).

NORTH AMERICA

United States

One male and three female chimpanzees were released on Ossabaw Island, Georgia, in June 1972 in order to establish a free-ranging colony for the requirements of medical research (Wilson and Elicker 1976). The animals are becoming rare and difficult to obtain and so it was decided to establish the colony for future needs. A female died in January 1973, but the remainder appeared to become established with the addition of food and water. In September 1973, four more females were added to the colony and all seven chimps remained on the island to 1975. Ossabaw is one of a series of coastal islands off Georgia and 13 km from the mainland.

Some were also placed on islands in Lion County, Safari, Florida, in 1967, and were reported to be breeding successfully.

■ DAMAGE

Chimpanzees feed on cultivated food crops in Ivory Coast, Cameroon, Equatorial Guinea and Zaire (Burton and Pearson 1987). In Tanzania they eat the stalks of sugar cane and maize, pith of banana stems and nuts of oil palm (Wolfheim 1983). In other areas, such as Uganda, Congo and Gabon, crop damage is used as an excuse to kill them.

E N D E N T A T A

Family: Bradypodidae *Sloths*

The maned sloth, *Bradypus torquatus* Illiger, an endangered species from south-eastern Brazil is reported to have been successfully translocated in that country (Pinder 1986; WCMC 1998).

BROWN THROATED SLOTH

Grey or brown three-toed sloth, three-toed sloth

Bradypus variegatus Schinz

=*B. griseus* Gray

■ HISTORY OF INTRODUCTIONS

CENTRAL AMERICA

Panama

Introduced to Barro Colorado Island, Panama Canal Zone (de Vos *et al.* 1956), but there is no mention of any introduction by most authorities (Hall 1981; Eisenberg 1989; Walker 1992; Wilson and Reeder 1993).

■ DAMAGE

None known.



Family: Dasypodidae *Armadillos*

SIX-BANDED ARMADILLO

White-bristled hairy armadillo, peludo, yellow armadillo

Euphractus sexcinctus (Linnaeus)

■ DESCRIPTION

HB 400–500 mm; T 119–250 mm; WT 3.2–6.5 kg.

Coat generally greyish to reddish brown with sparse hairy cover; ears small; head pointed and flattened and with shield of large plates; fore and hindquarter shields separated by 6–8 moveable bands; tail long, armoured, has two or three distinct bands at base; forefeet with five toes.

■ DISTRIBUTION

South America. Southern Surinam and adjacent eastern Brazil to Bolivia, Paraguay, Uruguay and northern Argentina.

■ HABITS AND BEHAVIOUR

Habits: mainly nocturnal, occasionally diurnal;

