

THE CARNIVORA OF MADAGASCAR

by

R. ALBIGNAC

The Carnivora of Madagascar

The carnivora of Madagascar are divided into 8 genera, 3 subfamilies and just one family, that of the Viverridae. All are peculiar to Madagascar except for the genus *Viverricula*, which is represented by a single species, *Viverricula rasse* (HORSFIELD), which is also found throughout southern Asia and was probably introduced to the island with man.

Palaeontology shows that this fauna is an ancient one comprising many forms, which appear to be mainly of European origin but with very occasional kinships with the Indian region.

For instance, *Cryptoprocta ferox*, although perhaps not directly related to *Proailurus lemanensis* (a species found in the phosphorites of the Quercy region of France and in the Aquitanian formations of Saint Gérard-le-Puy), nevertheless appears to be the descendant of this line.

Similarly, the origin of the *Fossa* and *Galidiinae* lines would seem to be close to that of the holarctic region.

Only *Eupleres* raises a problem, having affinities with *Chrotogale*, known at present in Indochina.

The likely springboard for these northern species is the continent of Africa.

This archaic fauna has survived because of the conservative influence of the island, which has preserved it into modern times.

In the classification of mammals G. G. SIMPSON puts the 7 genera of Madagascan carnivora in the Viverridae family and divides them into 3 subfamilies, as shown in the following table:

VIVERRIDAE FAMILY

Fossinae subfamily

(Peculiar to Madagascar)

Fossa fossa (Schreber)

Eupleres goudotii Doyère

Galidiinae subfamily

(peculiar to Madagascar)

Galidia elegans Is. Geoffroy

Calidictis striata E. Geoffroy

Mungotictis lineatus Pocock

Salanoia concolor (I. Geoffroy)

Cryptoproctinae subfamily
(peculiar to Madagascar)
Cryptoprocta ferox (Bennett)

I. THE FOSSA GENET

The genus *Fossa* comprises only one species, namely *Fossa fossa* (SCHREBER).

a. Brief systematic and anatomical description

The animal is often known by the name of *Fossa daubentoni*.

Length of body and head: 40–45 cm.

Length of tail: 21–23 cm.

The colour of the coat is generally light fawn with four black dorsal lines, two continuous and two non-continuous on the dorso-posterior part; two other non-continuous lines on the sides are also black.

The ventral surface is very light.

The cylindrical tail, the same colour as the body, has 5 small transverse streaks on the top surface.

The teeth are well developed and the canines well shaped.

Dental formula:

$$\text{I. } \frac{3}{3} \quad \text{C. } \frac{1}{1} \quad \text{P.M. } \frac{4}{4} \quad \text{M. } \frac{2}{2}$$

There is a small bare area on the bottom surface of the metatarsi and the metacarpi, more pronounced on the front paws.

The claws are short. No musk sac.

In front the animal has 5 small bare areas each having 3 long hairs; it has 4 lateral bare areas on the cheeks and one on the neck. These areas seem to correspond to glands, probably associated with markings.

b. Biology

The biology of the fossa genet is still imperfectly known.

It is a nocturnal animal apparently confined to the big forest and often little known or unknown in the villages close to the capture areas.

It seems to feed on small rodents and birds, but also on Batrachians and even fish. It probably lives in tree-trunks.

Genets apparently live in pairs.

They normally produce their young singly, between September and December.

We obtained reproductions in captivity, only one young animal being born; this would appear normal as the female has only two inguinal udders.

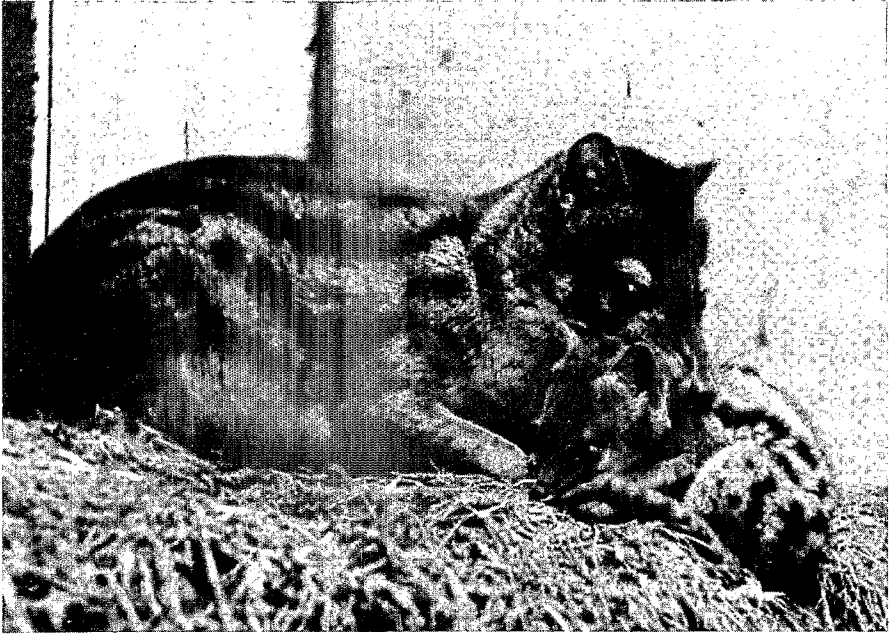


Photo 1. '*Genette Fossane*' Fossa Fossa (Schreber), female with young of 1 month.

Contrary to the general view, the young animal has substantially the same colour coat as the parents. The lines are less continuous but exist from birth. The weight at birth is about 100 grams, or approximately 1/15 of the weight of the mother.

The young animal is carried by the neck in the mother's mouth, after the manner of cats; it rolls up in a ball, with its paws drawn in, as shown in photo 1.

The young genet starts eating meat one month after birth. Weaning takes place at about two months. The animal grows quite slowly, probably reaching the weight of the adult at the age of one year.

c. Geographical distribution

The geographical distribution of the fossa genet is quite wide; the animal exists at least all over the east coast, in wooded areas, but apparently always in small numbers.

Malagasy names: Tomkasodina; Tambosadina; Fanaloka (there is confusion here with the Eupleres).

2. EUPLERES

Eupleres has a pointed snout and an elongated narrow head. The skull

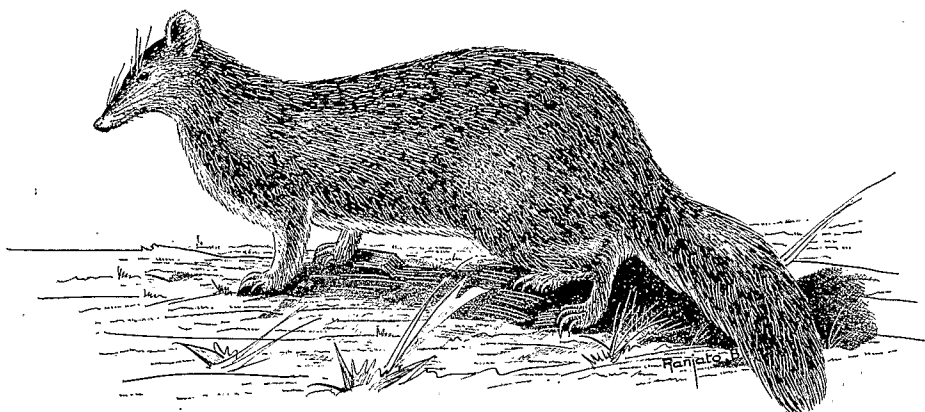


Fig. 1. *Eupleres goudotii* Doyère.

has no sagittal crest, but instead a rather inconspicuous lateral occipital crest. The zygomatic apophysis is remarkably thin. The genus comprises two species:

Eupleres goudotii Doyère

Size: Head and body: 45–63 cm. Tail: 18–25 cm.

The coat is thick, tawny-brown, the ventral side being lighter. The short, bushy tail can thicken and accumulate reserves of fat, probably enabling the animal to hibernate, or at least to live for a few days without feeding.

a. Brief systematic and anatomical description

As yet we have been able to obtain only scant information about this

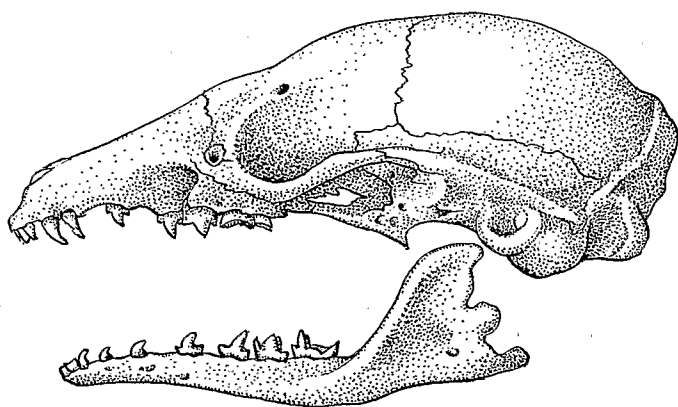


Fig. 2. Skull of *Eupleres goudotii* Doyère.



Photo 2. '*Galidia*' *Galidia elegans* I Geoffroy, female with young of 3 weeks.

animal and we shall largely confine ourselves to quoting the works of DOYÈRE and CARLSSON and the information given in the book '*Zoologie de Madagascar*' by GRANDIDIER and PETIT.

Note the development of the coecum, but also the presence of long, curved claws and the absence of prescrotal glands, in which respect it resembles the *Herpestinae*.

The teeth are small, fine and conical.

In the upper jaw, the hardly differentiated canine is curved backwards. The first premolar, also inclined backwards, is separated from the second by a wide diastema. The first premolar is caniniform and the third molariform.

The lower jaw is slender, flattened in the symphyseal region or tilted slightly downwards after the second premolar; the canine and the first premolar are very small. Both the upper and lower molars and premolars have very sharp cuspids.

Dental formula:

$$\begin{array}{cccc} \text{I.} & \frac{3}{3} & \text{C.} & \frac{1}{1} & \text{P.M.} & \frac{4}{4} & \text{M.} & \frac{2}{2} \end{array}$$

b. Biology

Eupleres is a nocturnal and crepuscular animal which probably shelters during the daytime in burrows or hollow trunks. This forest animal seems probably feeds on insects, Batrachians and lizards and almost certainly on small rodents and birds.

As for the number of young and the season when they are born, we can say little; according to the village people, Eupleres produces one or two young during the summer.

c. Geographical distribution

At present we are not yet able to give an exact distribution because of their rarity and the difficulty of observing them. We can only resort to the accounts of captures made in the past. Eupleres is reported on East coast and North of Madagascar.

Malagasy names: Fanaloka, Amboa-Laolo.

3. GALIDIA

The genus *Galidia* comprises only one species: *Galidia elegans* I. Geoffroy.

a. Brief systematic and anatomical description

Length of body and head: approx. 35 cm; Length of tail: 23 cm.

A representative of a subfamily peculiar to Madagascar, *Galidia elegans* is characterised by the presence of a single pair of udders which are inguinal; the skull is wide and the uterus is double. The tarsi and metatarsi areas are glabrous underneath. The non-retractile claws are relatively short and curved; the animal has prescrotal glands and 5 facial glands distributed in the same way as with *Fossa fossa*.

Dental formula:

$$\begin{array}{cccc} \text{I. } \frac{3}{3} & \text{C. } \frac{1}{1} & \text{P.M. } \frac{3}{3} & \text{M. } \frac{2}{2} \end{array}$$

This animal is easily identified by the red-brown colour of its coat and its long tail with alternating black rings and rings the same colour as its body.

There appear to be three different forms, or so we are led to believe by certain differences in colour according to the origin; viz:

As compared with the *Galidia* of the whole of the east coast, a form from the north of Madagascar, especially the Montagne d'Ambre, has a much lighter coat than the others. We have always counted 5 black rings with this form as against 6-7 in the *Galidia* of the whole of the east coast - including those of the Antalaha region.



Photo 3. '*Galidia*' female with young of about 2 months.

Another form is located on the west coast of Madagascar between Antsalova in the south and Soalala in the north, throughout the area of calcareous rocks known locally as 'Tsingy' and where there is a tropophilous forest. This form of *Galidia* also differs in the colour of its coat, which is quite light on the dorsal part of the body but very dark brown, almost black, on the sides, belly, paws and thighs; the head is greyer and there are 6 dark brown rings on the tail.

b. Biology

The biology of *Galidia* is now being studied; at this point we can say that *Galidia elegans* is a diurnal animal (we have come across it in activity many times during the daytime and also noted this rhythm immediately after capture).

It feeds on small rodents, birds, which it removes from their nests or actively hunts, chickens which stray too far from villages in forest clearings, and nocturnal Lemurians such as *Cheirogalei* or *Microcebi*, which it may surprise in their sleep. It may also feed on Batrachians and even on fish, which it catches.

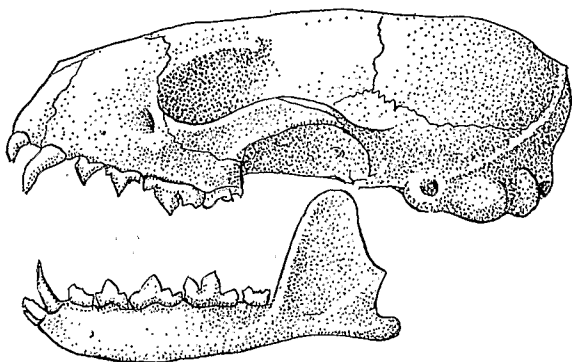


Fig. 3. Skull of *Galidia elegans* I Geoffroy.

Its webbed paws suggested to us that it might be able to swim, and we were able to confirm this in captivity.

It certainly shelters most often in burrows, which it digs very fast and frequently conceals by covering them with leaves. Indeed, on our breeding grounds we once even walked on one; the animal, far from reacting, merely dug itself in deeper. Sometimes it probably also shelters in hollow trunks.

Galidia produces its young singly, between December and March (we have had 5 births in captivity or from freshly captured animals).

The young animal is carried in its mother's mouth as with cats. It weighs about 50 grams at birth.

Like the fossa, the young animal begins to eat meat one month after birth and is substantially weaned at two months.

It has the same colour coat as its parents and the same number of streaks in its tail.

It probably takes a year to reach the size of the adult.

c. Geographical distribution

This animal appears to exist in all the wooded areas of the east coast and in the trophical forests on the calcareous ground of the west coast.

Malagasy names: Vontsira; Halaza (the Malagasy certainly mean *Viverricula rasse*).

4. MUNGOTICTIS

The genus *Mungotictis* includes only one species: *Mungotictis lineatus* Pocock.



Photo 4. '*Mungotictis*' female with young of 2 months.

a. Brief systematic and anatomical description

Size: Body and head: 25–27 cm; Tail: 23–25 cm.

This animal has many points in common with *Galidia elegans*; in particular it has the same appearance and dental formula, the paws are also webbed and it swims very well.

We note that it has the same diurnal rhythm of activity, or at least this is what we have found in captivity.

Its coat is light fawn in colour and has 8–10 darker longitudinal stripes.

b. Biology

Its biology, too, seems very similar to that of *Galidia*.

As in *Galidia*, the five facial glands are distributed as follows: four on the sides of the head and the fifth in the middle of the neck; these glands appear to serve for markings.

Although we have not yet located its habitations, it probably lives in hollow trunks and, more frequently, in burrows.

Like *Galidia*, *Mungotictis* normally produces its young singly, although sometimes in twos, in the summer between September and November.



Photo 5. 'Mungotictis' *Mugotictis lineatus* Pocok.

The young animal, like the *Galidia* weighing some 50 g at birth, begins to eat meat at one month and is weaned at two months.

c. Geographical distribution

Hitherto this species has been reported only on the west and south coasts of Madagascar, where it seems to be relatively common in the xerophytic forests, even where these are relatively degraded.

Malagasy names: Bokiboki (in the west); Vontira or Votsotsoke (in the south-west).

GALIDICTIS

The genus *Galidictis* appears to comprise only one species: *Galidictis striata* (E. Geoffroy).

a. Brief systematic and anatomical description

Size: Body and Head: 32–34 cm; Tail: 28–30 cm.

The appearance of *Galidictis striata* is substantially the same as that

of *Mungotictis lineatus*, but its coat has five much wider longitudinal stripes (approx. 10 cm each), which are dark brown.

The dentition also appears to be the same.

b. Biology

The animal's biology is not yet known. It is thought to produce its young singly, once a year in the summer, the female having two udders.

It is probably a nocturnal animal, not afraid to enter the villages to raid the henhouses. Presumably it also feeds on small rodents, Batrachians and insects.

c. Geographical distribution

It is thought to be confined to the east coast, where there are considerable numbers according to the natives, but we have been unable either to observe or to capture it.

Malagasy name: Vontsirafotsy.

SALANOIA

This genus comprises one specie:

Salanoia concolor (I. Geoffroy)

a. Brief systematic and anatomical description

Size: body and head: 25–30 cm; Tail: 20–25 cm.

On this animal, too, we have very little information at present.

The dental formula is thought to differ somewhat from the genera dealt with above:

$$\begin{array}{cccc} \text{I. } \frac{3}{3} & \text{C. } \frac{1}{1} & \text{P.M. } \frac{4}{3} & \text{M. } \frac{2}{1} \end{array}$$

b. Biology

Salanoia is thought to live mainly in the forest, sheltering in tree trunks or burrows.

It may be assumed to produce its young singly, but this is unconfirmed.

Its diet is probably restricted to small rodents, birds and various small Batrachians.

c. Geographical distribution

This animal appears to exist only on the east coast of Madagascar, in the wooded areas, and even there it is thought to be quite rare.



Photo 6. '*Cryptoprocte*' *Cryptoprocta ferox* Bennett.

Malagasy names: Vontsira (the Malagasys seem to confuse the genera *Galidia* and *Salanoia*). Salano.

CRYPTOPROCTA

The genus *Cryptoprocta* contains only one species, *Cryptoprocta ferox* Bennett.

a. Brief systematic and anatomical description

This animal combines features of the Viverridae and Felidae.

The adult is relatively large by the standards of the Madagascan carnivora, its body length sometimes being up to one metre.

The tail is the same sort of length as the body: 60–80 cm.

Its colouring is dark tawny brown, the ventral surface and the inside of the thighs being light red-brown.

Cryptoprocta is a semi-plantigrade animal, but its short, curved claws are retractile, in which respect it resembles the Viverrinae; on the other hand, the presence of an anal sac and the absence of prescrotal glands are more suggestive of the Herpestinae. Certain features, however, link

the animal with the Felidae, in particular the constitution of the male and female genitals.

There are six udders, unlike all the other carnivora of Madagascar, which have only two.

The dental formula is also slightly different:

$$\begin{array}{cccc} \text{I.} & \frac{3}{3} & \text{C.} & \frac{1}{1} & \text{P.M.} & \frac{3}{3} & \text{M.} & \frac{1}{1} \end{array}$$

b. Biology

It seems to be a crepuscular and nocturnal animal, but we have had two reports of *Cryptoprocta* in activity in the early afternoon. It is mainly arboreal.

It wreaks considerable havoc in henhouses, as a rule killing all the inhabitants, but usually takes away only some of them. It also feeds on Lemurians, which it can certainly hunt actively, being of great agility and an excellent climber.

It seems to live mainly in caves.

It produces more young at a time than the other Madagascan carnivora, often two, it appears, and sometimes up to 3-4 young per litter, between September and December.

c. Geographical distribution

This animal exists throughout Madagascar, with the main concentra-

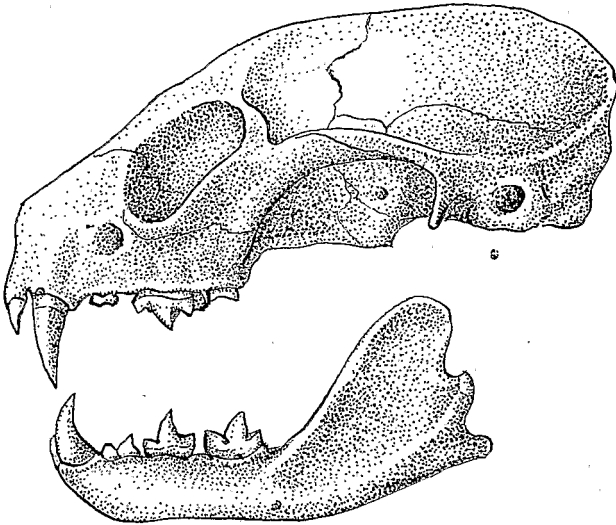


Fig. 4. Skull of *Cryptoprocta ferox* Bennett.

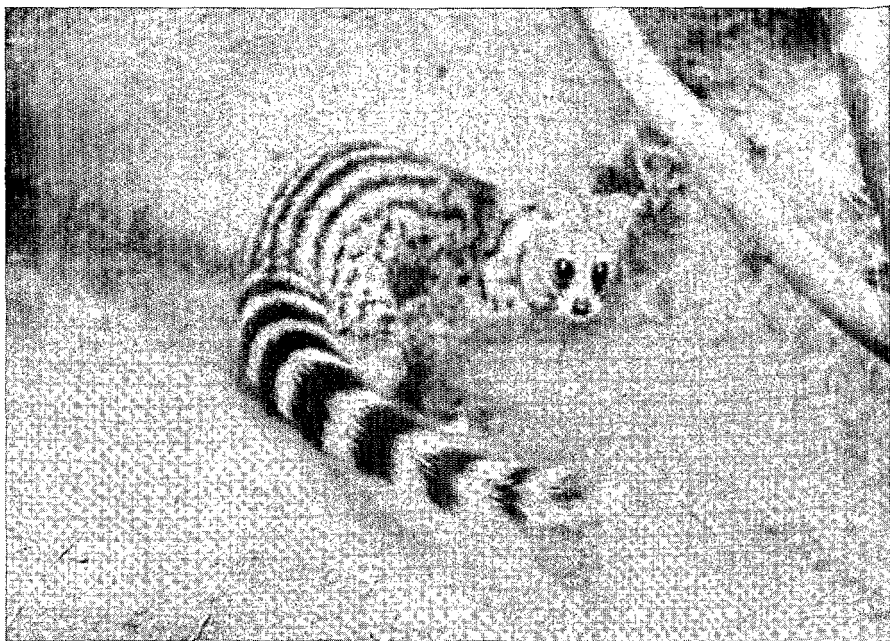


Photo 7. 'Civette' *Viverricula zibethica* (Horsfield).

tions on the coasts; it is very rare on the central plateau.

There is also said to be a black form, and we have had a recent report of this, but we have been unable as yet to verify its existence.

Malagasy Names: Fosa; Tratraka (SE); Fosa mena (black variety).

THE CIVET-CAT

The genus *Viverricula* is represented by only one species in Madagascar: *Viverricula indica*.

This civet-cat was probably introduced to Madagascar by immigrants from Asia.

a. Brief systematic and anatomical description

Size: Head and body: 45–50 cm; Tail: 34–36 cm.

This is a short-legged animal with paws, having a light grey coat with 8 longitudinal black lines on the dorsal surface.

It is often confused with *Fossa fossa* by the inhabitants of the bush villages, because of its almost identical appearance, although its tail is much longer and its snout shorter.

b. Biology

This civet-cat seems to be largely confined to all the degraded areas of Madagascar. It certainly digs burrows, and unlike most of the other carnivora of the main island produces several young per litter. It feeds principally on small rodents but does not scorn chickens, which it enters the villages to kill.

c. Geographical distribution

The animal thus exists throughout the island and seems to be relatively abundant almost everywhere.

Malagasy names: Zaboady (centre and W); Halaza (E).

Conclusion

Although our knowledge of the carnivora of Madagascar is still scant, this quick review shows that they are all very much *sui generis*.

Indeed, apart from Viverricula they are all indigenous to Madagascar.

In general, they share the common feature of being excellent climbers, not afraid of tackling the highest treetops to seize their prey.

Their diet is always highly varied, ranging for nearly all species from insects (e.g. grasshoppers) to Lemurians by way of reptiles, Batrachians and even, in many cases, the fish of the small watercourses, which they catch by eye, thanks to their extreme fleetness and great agility.

In addition, except for Viverricula they are all almost exclusively forest animals, which are, of course, content with even a degraded cover, but which are non-existent, or virtually so, in savanna areas.

The low rate of reproduction of many of these creatures, confined to a single young animal per litter per year, suggests to us that in the absence of some measures of conservation, however restricted in scope, they are likely to become extinct sooner or later.

Apart from the destruction of their biotope, which limits their reproduction, they are killed by the villagers living near the wooded areas, who, usually quite justifiably, wish to protect their domestic animals.

The only refuges in which they have a chance of survival in the future are the nature reserves and various areas where hunting and trapping are banned.

BIBLIOGRAPHY

- ALBIGNAC (R.) - 1969 - a - Notes éthologiques sur quelques Carnivores malgaches: *Galidia elegans*. I. Geoffroy (Ethology of *Galidia elegans*). La terre et la vie, 2, pp. 202-215.

- ALBIGNAC (R.) – 1969 – b – Naissance et élevage en captivité de jeunes *Cryptoprocta ferox*, Viverridae malgaches. (Birth and breeding of *Cryptoprocta ferox*) *Mammalia*, 33, pp. 93–97.
- ALBIGNAC (R.) – 1970 – a – Notes éthologiques sur quelques Carnivores malgaches: *Fossa fossa* (Schreber) (Ethology of *Fossa fossa*). *La terre et la vie*, 3, pp. 383–394.
- ALBIGNAC (R.) – 1970 – b – Notes éthologiques sur quelques Carnivores malgaches: *Cryptoprocta ferox* Bennett. (Ethology of *Cryptoprocta ferox*). *La terre et la vie*, 3, pp. 395–402.
- ALBIGNAC (R.) – 1971 – a – Notes éthologiques sur quelques Carnivores malgaches: *Mungotictis lineata* Pocock (Ethology of *Mungotictis lineata*).
- ALBIGNAC (R.) – 1971 – b – Une nouvelle sous espèce de *Galidia elegans*: *G. e. occidentalis*. (Viverridae de Madagascar). Mise au point de la répartition géographique de l'espèce (A new species of *Galidia*, *Viverridae* of Madagascar) *Mammalia*, 35, pp. 307–310.
- CARLSSON (A.) – 1902 – Über die Stellung von *Eupleres goudoti* (on the position of *Eupleres goudoti*). *Zool. Jahrb., Abt. Syst.*, 16, pp. 217–236.
- CARLSSON (A.) – 1910 – Die genetischen Beziehungen der madagassischen Raubtiergattung *Galidia* (The genetic relationships of the Madagascar predacious genus *Galidia*) *Zool. Jahrb., Abt. Syst.*, 28, pp. 559–602.
- CARLSSON (A.) – 1911 – Über *Cryptoprocta ferox* (On *Cryptoprocta ferox*) *Zool. Jahrb., Abt. Syst.*, 30, pp. 419–470.
- DOYERE – 1835 – Notice sur un mammifère de Madagascar formant le type d'un nouveau genre de la famille des Carnaciens insectivores de Monsieur CUVIER (An account of a Madagascar mammal constituting the type of a new genus of the family of M. CUVIER's insectivorous Carnivora). *Ann. Sci. Nat.*, (2), 4, pp. 270–283.
- GRANDIDIER (G.) AND PETIT (G.) – 1932 – Zoologie de Madagascar (The zoology of Madagascar), ed. géographique maritime et coloniale, Paris, 258 p.
- MILNE-EDWARDS (A.) AND GRANDIDIER (A.) – 1867 – Observations anatomiques sur quelques mammifères de Madagascar I. Le *Cryptoprocta ferox* (Anatomical observations on some mammals of Madagascar I. *Cryptoprocta ferox*) *Ann. Sci. Nat., Zool.*, 7, pp. 314–338.
- PETTER (G.) – 1961 – Le peuplement en Carnivores de Madagascar – (The population of Carnivora of Madagascar). Problèmes actuels de palaeontologie (Current problems of paleontology) Paris, 29 May – 3 June 1961 – Centre National de la Recherche Scientifique, pp. 331–342.
- Pocock (R. I.) – 1915 – a – On the species of the Mascarene Viverrid *Galidictis* with the description of a new genus and a note on *Galidia elegans*. *Ann. Mag. Nat. Hist.*, (8), 16, pp. 113–124.
- Pocock (R. I.) – 1915 – b – On some of the external characters of the palm civet (*Hemigalus derbyanus* gray) and its allies. *Ann. Mag. Nat. Hist.*, (8), 16, pp. 153–162.
- Pocock (R. I.) – 1915 – c – On some of the external characters of the genus *Linsang*, with notes upon the genera *Poiana* and *Eupleres*. *Ann. Mag. Nat. Hist.*, (8), 16, pp. 341–351.
- Pocock (R. I.) – 1915 – d – On some external characters of *Galidia*, *Galidictis* and related genera. *Ann. Mag. Nat. Hist.*, (8), 16, pp. 351–356.
- Pocock (R. I.) – 1915 – e – The name of the species described by Gray *Galidictis vittatus*. *Ann. Mag. Nat. Hist.*, (8), 16, pp. 505–506.
- Pocock (R. I.) – 1916 – On some external Characters of *Cryptoprocta ferox*. *Ann. Mag. Nat. Hist.*, (8), 17, pp. 413–425.

Author's address: R. ALBIGNAC
O.R.S.T.O.M.,
B.P. 434,
Tananarive,
Madagascar.

Reprint from

BIOGEOGRAPHY AND ECOLOGY IN MADAGASCAR

edited by

R. BATTISTINI & G. RICHARD-VINDARD

THE CARNIVORA OF MADAGASCAR

by

R. ALBIGNAC



DR. W. JUNK B.V. PUBLISHERS THE HAGUE 1972

12 061 1 11
O. R. S. I. C. M.
83552ool.