

*Felis geoffroyi*. By Alfredo Ximenez

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***Felis geoffroyi* D'Orbigny and Gervais, 1844**

*Felis geoffroyi* D'Orbigny and Gervais, 1844a:40. Type locality "orillas del Rio Negro, en Patagonia."

*Pardalina warwickii* Gray, 1867:267. Type locality Paraguay, according to Sclater (1870), but see Remarks.

*Felis pardoides* Gray, 1867:403. Type locality tropical America.

*Felis salinarum* Thomas, 1903:239. Type locality Cruz del Eje, Cordoba, Argentina.

*Felis melas* Bertoni, 1914:75. Type locality Alto Mondaih, Paraguay.

**CONTEXT AND CONTENT.** Order Carnivora, Family Felidae, Subfamily Felinae, Genus *Felis*, Subgenus *Leopardus*. The genus *Felis* includes about 29 species. The subgenus *Leopardus* is here recognized following Cabrera (1958, 1961) and it includes five species, one of which is *Felis geoffroyi*. Four subspecies of *F. geoffroyi* are here recognized following Pocock (1940), Cabrera (1958), and Ximenez (1973a).

*F. g. geoffroyi* D'Orbigny and Gervais, 1844a:40, see above (*pardoides* Gray, *macdonaldi* Marelli, *leucobapta* Pocock, *argentea* Schwangart, and perhaps *flava* Schwangart and *warwickii* Gray are synonyms).

*F. g. salinarum* Thomas, 1903:239, see above.

*F. g. paraguayae* (Pocock, 1940:351). Type locality Paraguay.

*F. g. euxantha* (Pocock, 1940:352). Type locality Tiragui, Departamento Cochabamba, Bolivia, altitude 3300 m.

**DIAGNOSIS.** The following diagnosis is intended, in the aggregate, to distinguish *F. geoffroyi* from the other four species of the subgenus *Leopardus*. The pelage is between smoky gray and lion-like ochraceous, most intense on the dorsum and between white and near-cream on the venter. Over this basic color are distributed numerous black spots about 15 to 20 mm in diameter which tend to group in the central parts of the dorsum two by two so as to enclose lighter areas. The nape and back of the neck have three to seven longitudinal dark lines. The legs have transverse bands and the tail has narrow bands that are quite variable in their distribution. Three subspecies are illustrated in Figures 1 and 2.

Some external measurements in millimeters (ranges for males followed by those for females) are: total length 790 to 940, 736 to 910; length of tail 270 to 280, 250 to 275; length of hind foot 100 to 125, 95 to 120; length of ear from notch 51 to 65, 46 to 65. A sagittal crest on the skull is restricted to the extreme posterior except in old males. The temporal crests are fairly close together. Skulls are illustrated in Figures 3 and 4. The first lower molar has a small trace of a posterior cusp. The dentition is  $i\ 3/3$ ,  $c\ 1/1$ ,  $p\ 3/3$ ,  $m\ 1/0$ , total 26 (modified from Cabrera, 1961:182-183, and Ximenez, 1973a). The largest subspecies is *F. g. geoffroyi* and the smallest is *F. g. salinarum*.

**GENERAL CHARACTERS.** The skull shows a great amount of sexual dimorphism in size: the proportion between the width of the braincase and the condylobasal length in the subspecies *paraguayae* is 30.4% in adult females and 44.0% in adult males. More detailed descriptions occur in Pocock (1940), Cabrera (1961), Weigel (1961), Ximenez (1973a); diagrams and engravings appear in D'Orbigny (1844 Atlas), D'Orbigny and Gervais (1844b); engravings are in Gray (1867), and Cabrera and Yepes (1940); drawings of skulls are in Allen (1919); photographs are in Allen (1919), Marelli (1932), Walker *et al.* (1964); measurements are given in Allen (1919), Cabrera (1961), and Ximenez (1973a); photographs of a syntype and a holotype are in Ximenez (1971); and photographs of a holotype and a topotype are in Ximenez (1973a).

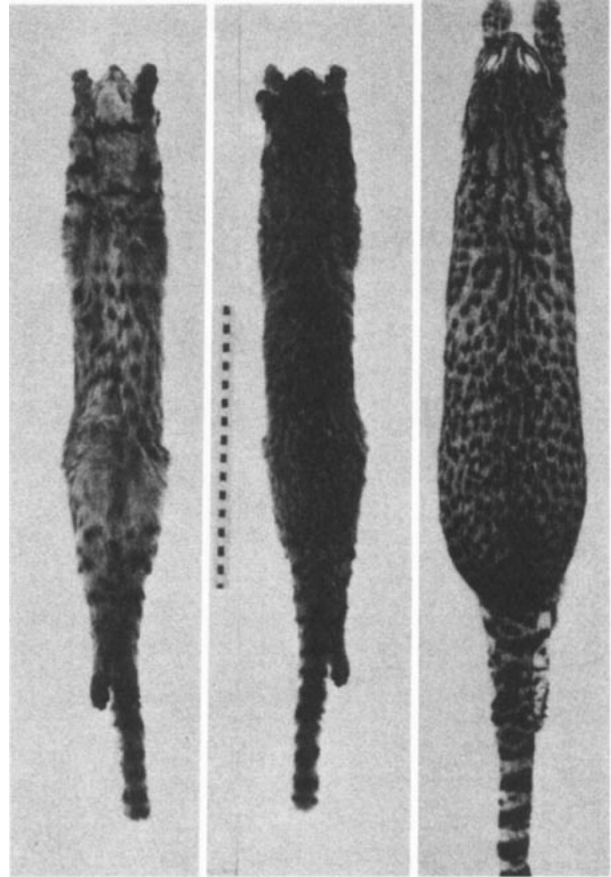


FIGURE 1. Photographs, from left to right, of ventral and dorsal views of the skin of the holotype of *Felis geoffroyi salinarum*, © British Museum (Natural History), registry no. 2.2.5.10 and negative nos. 54090 B and A (scale shows centimeters); and of a topotype of *F. g. geoffroyi*, Museo Nacional de Historia Natural, Montevideo, no. 2426.

**DISTRIBUTION.** The distribution of the species and its four subspecies are shown on the map in Figure 5 (based on Cabrera, 1958, 1961; Godoy, 1963; and Ximenez, 1973a). There is not sufficient information to determine with confidence the marginal areas for the different subspecies, the gaps on the map show this uncertainty rather than the absence of the species in these intervening areas. The species ranges from sea level to 3300 m at Tiragui, Bolivia. The ecological distribution is subtropical and temperate. There are no reports of fossils for the species (Ameghino, 1889).

**FORM.** The pelage consists of hairs of two quite different types and is thinnest on the flanks; the finest hairs are from 35.5 to 40.5  $\mu\text{m}$  in diameter and 16 to 21 mm in length, the coarsest hairs are 55.5 to 66.5  $\mu\text{m}$  in diameter and 25 to 50 mm in length; the melanin granules are generally concentrated in the distal parts, in the first 5 to 9 mm, and in the second 5 to 10 mm. Pigmentation varies according to subspecies; *F. g. geoffroyi* and *F. g. salinarum* are the palest, and *F. g. paraguayae* is the darkest in general and also has the highest percentage of melanistic individuals. The vertebral column is long and slender; there are seven cervical, 13 thoracic, seven lumbar, three sacral, and 21 caudal vertebrae; each thoracic is narrow and high; ribs one through nine are verte-

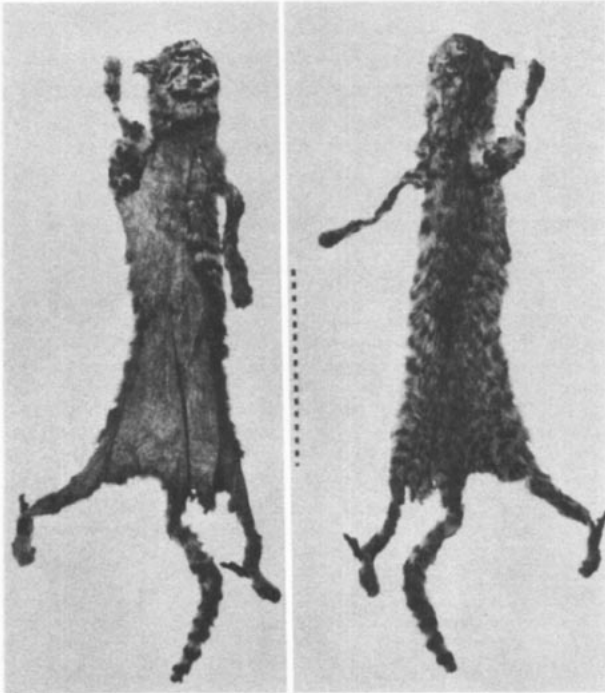


FIGURE 2. Photographs, ventral left and dorsal right, of holotype of *Felis geoffroyi euxantha*, © British Museum (Natural History), no. 34.9.2.37 and negative nos. 54089 B and A (scale shows centimeters).

brosternal and 10 to 13 are vertebrocostal. The pubic symphysis is exceptionally rigid; the sacroiliac union of the pelvis is not fused. Dental anomalies have been pointed out by Rusconi (1933) and Ximenez (1973b).

**REPRODUCTION.** A single litter per year is produced, usually of two or three young (Cabrera and Yepes, 1940). Implantation occurs in both horns of the uterus. Births have been reported between the months of December and May in Uruguay. Ximenez (1973a) reported a female with three fetuses near term in the month of April. Gonzalez (1973) reported two litters in the month of December. Places where young have been found include cavities beneath the roots of trees.

**ECOLOGY.** These cats in general have few predators upon them except man. Occasionally acarine ectoparasites and trematode endoparasites are found in *F. geoffroyi* but these have been inadequately studied up to now. The species is common in many parts of its range and is the cat most frequent in the fur trade of Uruguay (Ximenez, 1973a). Individuals are active at night but uncommonly may be seen in crepuscular hours. The subspecies *F. g. paraguayae* generally lives in wooded areas, including narrow zones of low trees along streams in grasslands, and feeds on birds such as *Myiopsitta monachus* and *Nothura maculosa*, and mammals such as *Oryzomys* and *Cavia*.

**GENETICS.** The species has a diploid number of 36 chromosomes. The autosomal complement includes 34 metacentric or submetacentric chromosomes but no acrocentrics. A pair of small submetacentric chromosomes designated  $E_1$  are satellites. The X chromosome is nearly metacentric and moderately small and the Y chromosome is a small submetacentric. The karyotype differs from that of the domestic cat in lacking acrocentrics in the group designated F and in having an extra pair of metacentrics in the group designated C. This karyotype is identical to that of the tiger cat, *Felis tigrina* (Wurster and Benirschke, 1968). The chromosomes are designated following the "San Juan" system of nomenclature devised for domestic cats. The pair of chromosomes designated  $E_1$  have been compared for all species of *Felis*. The absence of acrocentrics and the extra C pair of *F. geoffroyi* are features seen also in the karyotype of *F. pardalis* (Hsu and Benirschke, 1969). Study of the karyotype of a melanistic male of *F. g. paraguayae* from Departamento de San Jose, Uruguay, by Dr. F. Saez of the Institute of Biological Sciences in Mon-

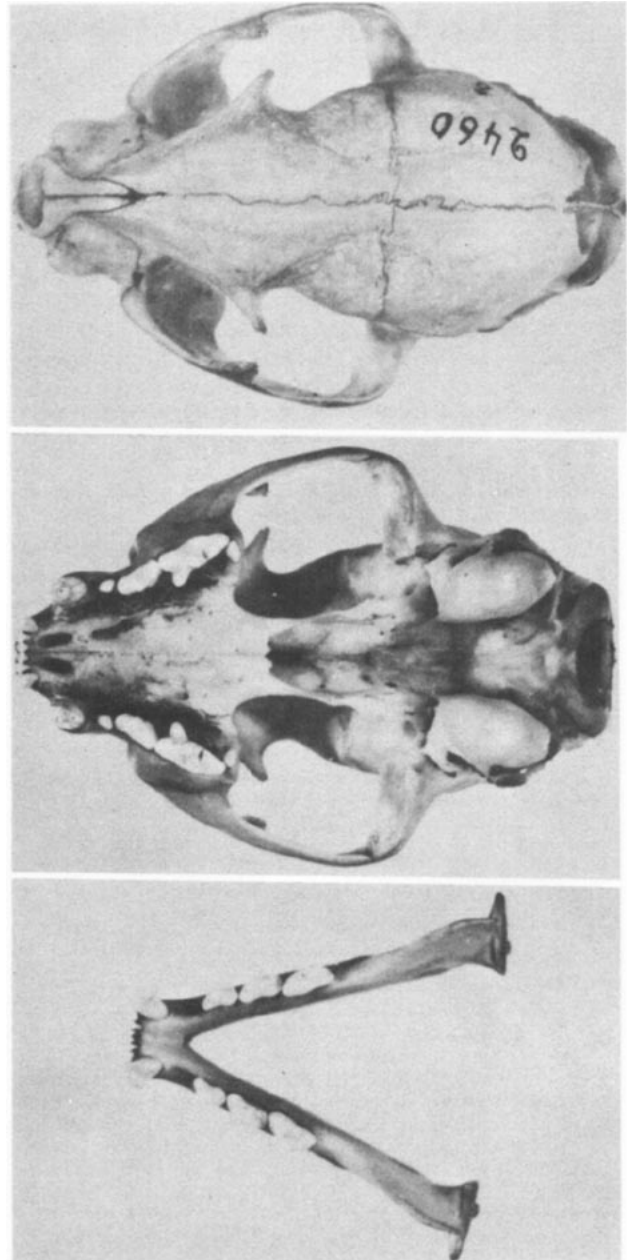


FIGURE 3. Photographs, from top to bottom, of dorsal and ventral views of cranium and dorsal view of mandibles of young adult male of *F. g. paraguayae*, Museo Nacional de Historia Natural, Montevideo, no. 2460.

tevideo gave similar results. Geisler *et al.* (1968) treated *Leopardus* as a genus and remarked that according to a letter from Dr. Wurster the karyotype of two samples of "*Oncifelis geoffroyi*" examined corresponded to those of *Leopardus*.

**REMARKS.** There seems to be evidence to justify the validity of the subspecies here recognized, although the relationships of *F. g. euxantha* do need further study.

The concepts of genus and subgenus have not been uniformly applied at the same taxonomic levels by all workers and this has resulted in a good deal of confusion in regard to the systematics of this species. Confusion has arisen also because of the relatively great morphological homogeneity presented by the small spotted South American cats. In the earlier stages of development of systematic and biogeographic knowledge, many descriptions were based on single examples from scattered localities.

D'Orbigny and Gervais (1844a) described the species *geoffroyi* in the genus *Felis* and this arrangement was used by Elliot (1883), Milne-Edwards (1891), Sclater (1870), Thomas

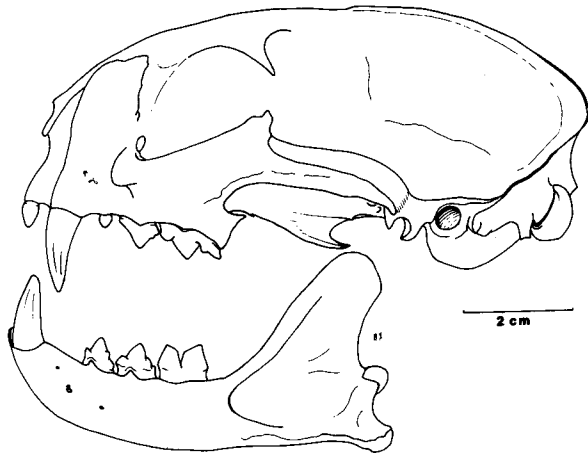


FIGURE 4. Lateral view of cranium and mandible of male adult of *F. g. paraguayae*, Museo Nacional de Historia Natural, Montevideo, no. 806.

(1903), Gibson (1899), and Cabrera (1911). Following Sewertzow, 1858, the names *Oncoides*, *Herpailurus*, and *Oncifelis* were used variably as generic and subgeneric names by various authors (Lahille, 1898; Allen, 1905, 1919; Pocock, 1917, 1940; Cabrera and Yepes, 1940; Schwangart, 1941; and Weigel, 1961). The name *Leopardus* was used by Simpson (1945) as a subgenus, including only the species *F. pardalis*. Cabrera (1958, 1961) used *Leopardus* also for a subgenus but included within it the species *wiedii*, *tigrina*, *geoffroyi*, and *guigna*. Weigel (1972) has used the name *Leopardus* as a genus.

The name *Leopardus himalayanus* Gray (1843) is a *nomen nudum* for there exists neither a description nor an illustration to verify the species. *Pardalina warwickii* is a name employed by Gray for a specimen of *F. geoffroyi* that, according to Sclater (1870), came from Paraguay (it was purchased from Captain Hairby in Buenos Aires). The locality is regarded as dubious and the name *warwickii* is considered as a synonym of *F. g. geoffroyi* in the interest of nomenclatorial stability.

*Felis melas* Bertoni, 1914, is a name based on a specimen from Alto Mondaih, Paraguay, and is not valid because it is a junior homonym of *F. melas* Cuvier. Cabrera (1958) regarded the holotype of *melas* Bertoni as a specimen of *F. g. paraguayae* with a tendency toward melanism; however, Bertoni (1939) later reported that his specimen was a melanistic individual of *F. braccata* (now regarded as a subspecies of *F. colocola*). Bertoni (1930) was the first author to use the name combination *Felis geoffroyi* for cats from Paraguay.

The subspecies *argentea* and *flava* are here, for the first time, included in the synonymy of the nominate race, which was described on the basis of three specimens registered in the Catalogue of Mammals of the Museum National D'Histoire Naturelle of Paris as nos. 90, 91, and 92. According to Schwangart (1941:15), P. Rode wrote him that no. 92 was considered to be the holotype and that it and no. 90 came from Patagonia, whereas no. 91 came from Buenos Aires. In contradiction to this information, F. Petter informed Ximenez (1971:70) that the type specimen is no. 91 and that its label bears the notation "Republique Argentine," whereas nos. 90 and 92 are inscribed "Patagonie." The difference between the information from Rode and Petter may have originated from records in the catalogue of the museum where, perhaps, more than one specimen was labeled "type." For the present, and until some reviser sees fit to select a lectotype, the specimens collected by D'Orbigny can be regarded as syntypes. D'Orbigny and Gervais (1844a) clearly indicated that they obtained the three specimens from the banks of the Río Negro, in Patagonia. There seems to be no convincing reason to doubt this origin. Schwangart based his subspecies *argentea* and *flava* on the three specimens obtained by D'Orbigny, although Schwangart had not examined the three specimens. The description of *flava* fits that of Pocock for *paraguayae*, but because Schwangart based *flava* on the color of a specimen represented by D'Orbigny (1844: plate 14) from an uncertain locality, it is impossible to accept the synonymy of *flava* with *paraguayae*, at least until more critical examination of the D'Orbigny specimens is made.

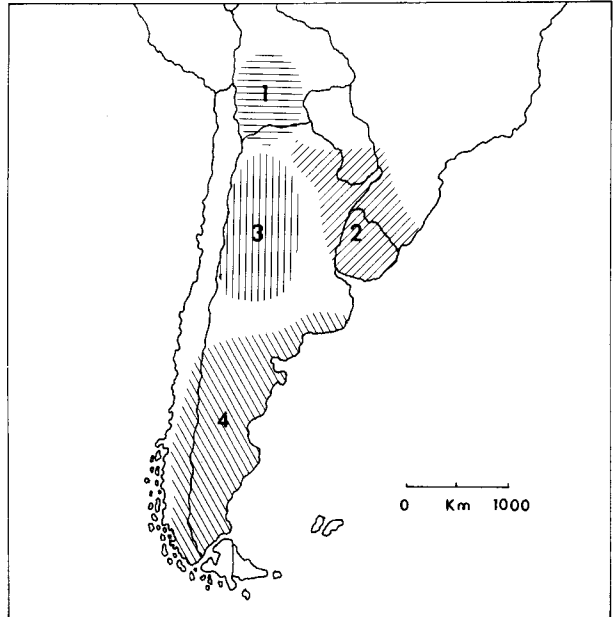


FIGURE 5. Map of southern South America showing the principal areas occupied by each of the four subspecies of *Felis geoffroyi*: 1. *F. g. euxantha*; 2. *F. g. paraguayae*; 3. *F. g. salinarum*; 4. *F. g. geoffroyi* (adapted from Cabrera, 1958; Godoy, 1963; and Ximenez, 1973a).

The description of color and form of the subspecies *argentea* falls within the range of individual variation of *geoffroyi*. Schwangart (1941:15) admitted the possible invalidity of the name *argentea*. He mistakenly referred to the date of publication of *F. geoffroyi* as 1843 when actually it was 1844. Scherborn and Griffin (1934) have discussed the question of this date.

The subspecific names refer to localities, Paraguay for *paraguayae* and salty places for *salinarum*; persons, the naturalist Frances D'Étienne Geoffroy Saint-Hilaire (1772-1844) for *geoffroyi*, the English collector Warwick for *warwickii*, the Argentinean collector Maldonado for *macdonaldi*; or to the colors white, silver, and reddish, for *leucobapta*, *argentea*, and *flava*, respectively.

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