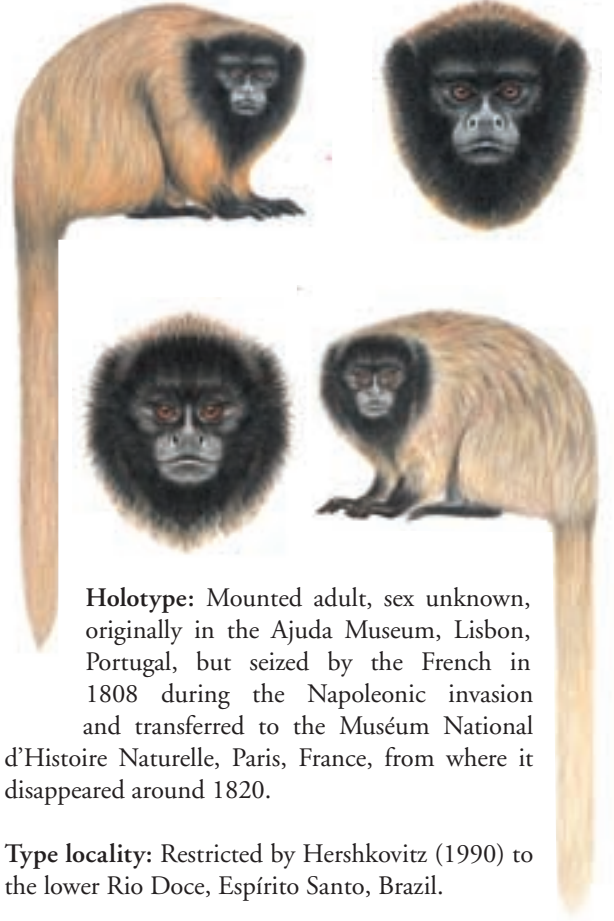


V. C. *PERSONATUS* GROUPUndescribed form of the  
*Callicebus torquatus* group

**Figure 41.** This individual was being kept in captivity at Boca Manu, Rio Manu, Peru, in 1983 and probably represents an undescribed form of the *Callicebus torquatus* group. Photographs by A. Young and R. A. Mittermeier.

*Callicebus personatus* (É. Geoffroy, 1812)

**Holotype:** Mounted adult, sex unknown, originally in the Ajuda Museum, Lisbon, Portugal, but seized by the French in 1808 during the Napoleonic invasion and transferred to the Muséum National d'Histoire Naturelle, Paris, France, from where it disappeared around 1820.

**Type locality:** Restricted by Hershkovitz (1990) to the lower Rio Doce, Espírito Santo, Brazil.

**Geographic distribution:** In the Atlantic forest of southeastern Brazil, in the state of Espírito Santo, south from the region of the lower Rio Itaúnas (Kinzey, 1982; Oliver and Santos, 1991). The Rio Mucurí, to the north of the Rio Itaúnas was marked as the limit by Hershkovitz (1990), but Oliver and Santos (1991) reported that *C. melanochir* may occur south of the lower Itaúnas as far as Barra Nova (18°54'S, 39°47'W). Oliver and Santos (1991) indicated that the region of the Rios Itaúnas and Mucurí may be a zone of intergradation between the *personatus* (to the south) and *melanochir* (to the north). *C. personatus* occurs further inland into northwestern Minas Gerais, east at least as far as Teófilo Otoni (Kinzey, 1982; Hershkovitz, 1990) and the east (right) bank of the Rio Jequitinhonha (Rylands *et al.* 1988). South of the Rios Mucurí/Itaúnas, they occur throughout the state of Espírito Santo and in the north of Rio de Janeiro (M. C. M. Kierulff in Rylands, 1988), although now extremely scarce (Oliver and Santos, 1991). *C. personatus* extends west along the Rio Doce valley into Minas Gerais as far as the Serra da Mantiqueira (Serra do Brigadeiro) (Cosenza, 1993), and at least as far south as Juiz de Fora, Minas Gerais. It remains unclear if *C. personatus*, or another species, occurs northwest of the Rio Jequitinhonha. Hershkovitz (in litt. to A. B. Rylands, January 1988) listed Buenópolis, near the

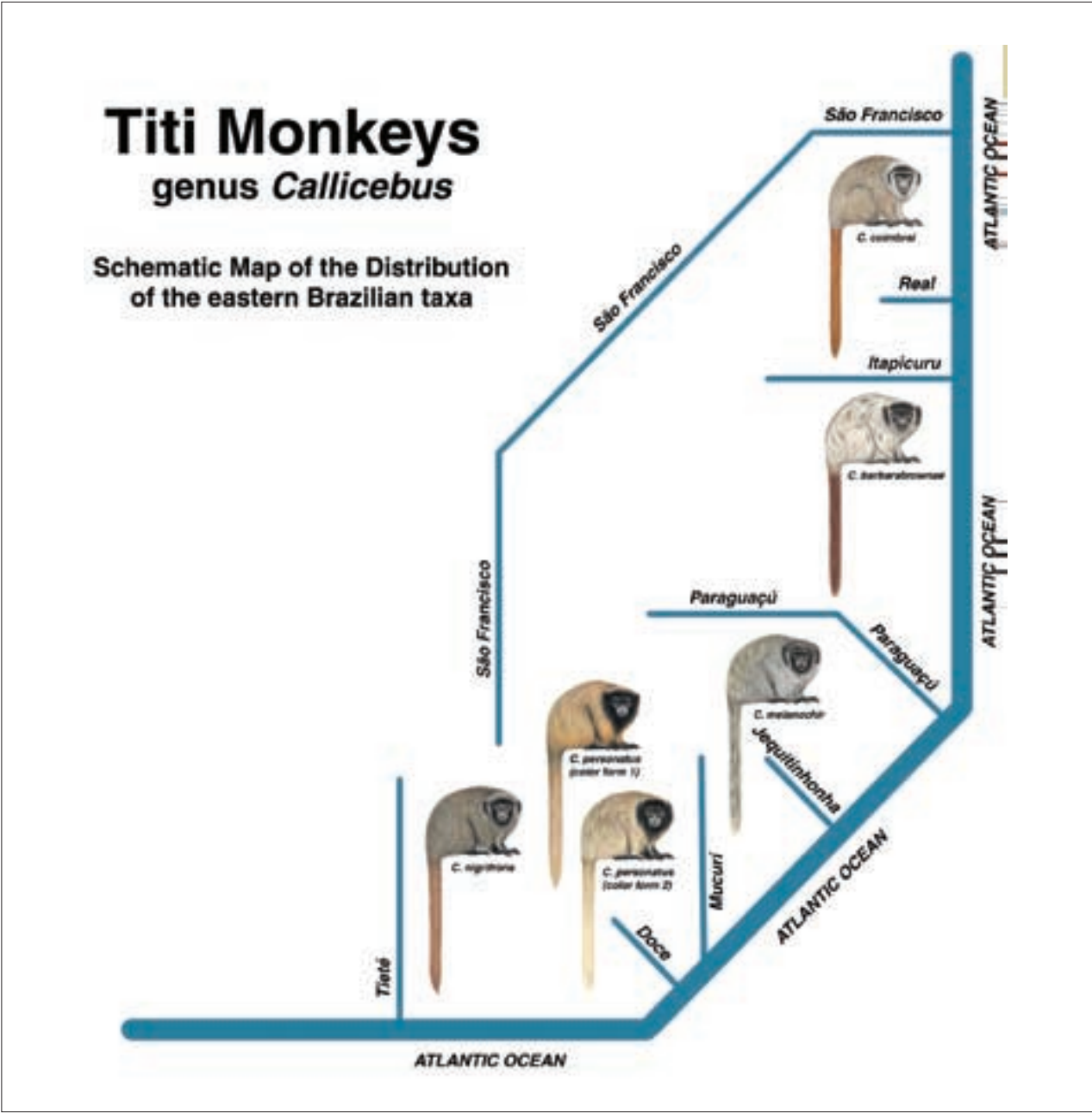


Figure 42. Schematic map of the distribution of the southern Brazilian titi monkeys of the *personatus* Group, genus *Callicebus*.



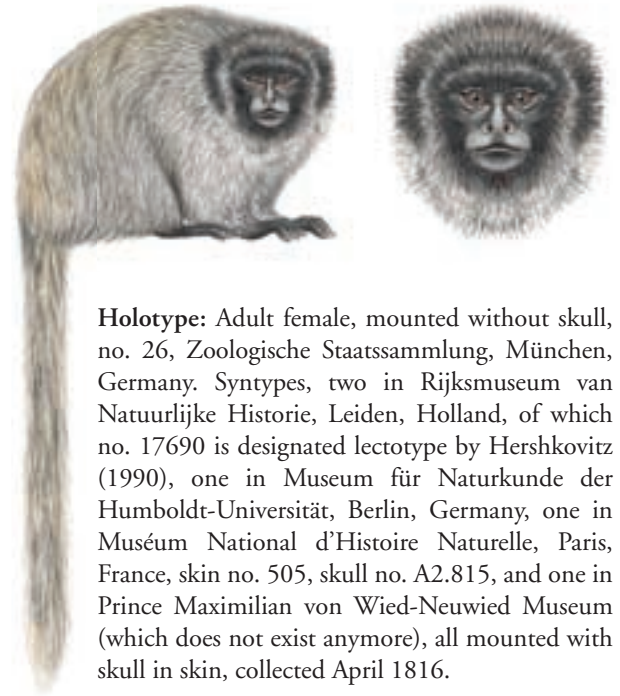
**Figure 43.** *Callicebus personatus* É. Geoffroyi, 1812, from Minas Gerais, Brazil. Photographs by R. A. Mittermeier.

Serra do Cabral (17°54'S, 44°11'W), northwestern Minas Gerais, as a locality for *C. personatus*, but it was not included as a locality in his publication in 1990 (Figs. 42 and 44).

**Diagnostic characters:** Throat, sideburns, forehead and crown blackish to plane of ears, rest of body sharply defined uniformly buffy to orange like nape except blackish hands, lower arms and feet. Two color variations, body and tail uniformly buffy or orange (Figs. 3 and 37).

Distinguished from *C. nigrifrons*, *C. melanochir*, and *C. barbarabrownae* by blackish forehead, crown to line of ears, cheeks, ear tufts, and throat, the hairs not banded; and back of crown sharply contrasting orange; from *C. coimbrai* by black instead of buffy cheeks, sideburns, chest, back of head, and nape (Fig. 43).

### *Callicebus melanochir* Wied-Neuwied, 1820



**Holotype:** Adult female, mounted without skull, no. 26, Zoologische Staatssammlung, München, Germany. Syntypes, two in Rijksmuseum van Natuurlijke Historie, Leiden, Holland, of which no. 17690 is designated lectotype by Hershkovitz (1990), one in Museum für Naturkunde der Humboldt-Universität, Berlin, Germany, one in Muséum National d'Histoire Naturelle, Paris, France, skin no. 505, skull no. A2.815, and one in Prince Maximilian von Wied-Neuwied Museum (which does not exist anymore), all mounted with skull in skin, collected April 1816.

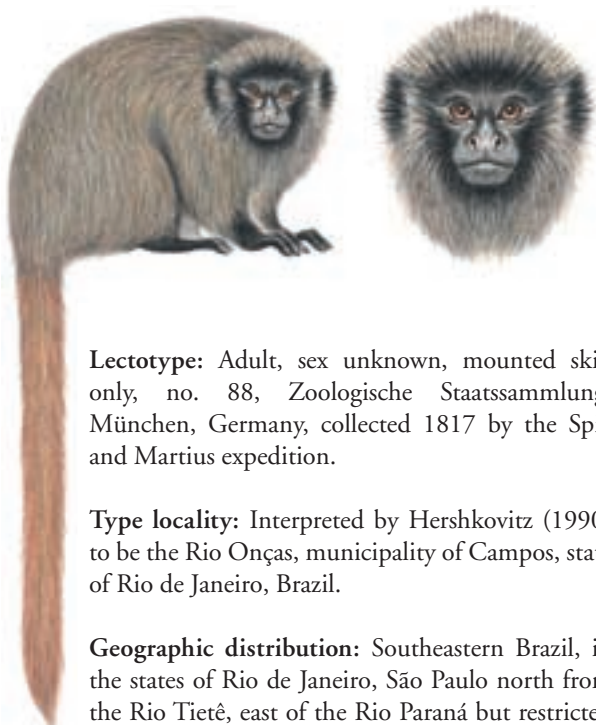
**Type locality:** Morro d'Arara or Fazenda Arara, state of Bahia, Brazil.

**Geographic distribution:** Hershkovitz (1990) gives the range as the Atlantic coastal forest of eastern Brazil, north from the Rio Mucuri in the state of Espírito Santo to the Rio Paraguaçu in Bahia. As discussed for *C. personatus*, it would seem that the southern limit is not clearcut, and is possibly marked by a zone of intergradation in the valleys of the Rios Itaúnas and Mucuri in northern Espírito Santo. To the north, *C. melanochir* extends as far as the Rio Paraguaçu, where it meets the range of *C. barbarabrownae* (Hershkovitz, 1990; Oliver and Santos, 1991; Flesher, 1999). Inland it would appear that its range is limited by inhospitable liana forests and dry forests of the interior of the state of Bahia. South of the Rio Jequitinhonha, it is restricted to coastal forest, being replaced by *C. personatus* further inland (Figs. 42 and 44).

**Diagnostic characters:** Forehead, crown, and throat dominantly grayish agouti, buffy or pale brownish agouti, the hairs finely banded, cheiridia and facial fringe blackish, overall the least colorful member of the *personatus* Group.

Distinguished from *C. nigrifrons* and *C. personatus* by the forehead not being sharply defined blackish, entire crown blackish agouti or grayish agouti like nape, and sides of neck and throat grayish or blackish agouti; from *C. barbarabrownae* by overall much darker coloration; from *C. coimbrai* by grayish agouti, buffy or pale brownish agouti forehead, crown, and throat.



*Callicebus nigrifrons* Spix, 1823

**Lectotype:** Adult, sex unknown, mounted skin only, no. 88, Zoologische Staatssammlung, München, Germany, collected 1817 by the Spix and Martius expedition.

**Type locality:** Interpreted by Hershkovitz (1990) to be the Rio Onças, municipality of Campos, state of Rio de Janeiro, Brazil.

**Geographic distribution:** Southeastern Brazil, in the states of Rio de Janeiro, São Paulo north from the Rio Tietê, east of the Rio Paraná but restricted to the right bank of the Rio Paranaíba in western Minas Gerais. It occurs on both sides of the uppermost reaches of the Rio São Francisco, extending to the east as far as the Serra da Mantiqueira and Serra do Espinhaço in Minas Gerais, where it meets the range of *C. personatus* (Figs. 42 and 44). As in all of the Atlantic forest titi monkeys, although widespread, the extreme fragmentation and urbanization of the forests within its range means that today populations are isolated and generally very small, and in many places they are locally or regionally extirpated even where forests patches remain.



**Figure 44.** Distributions of the Atlantic forest titi monkeys, genus *Callicebus*, belonging to the *personatus* Group. Map by Stephen D. Nash.

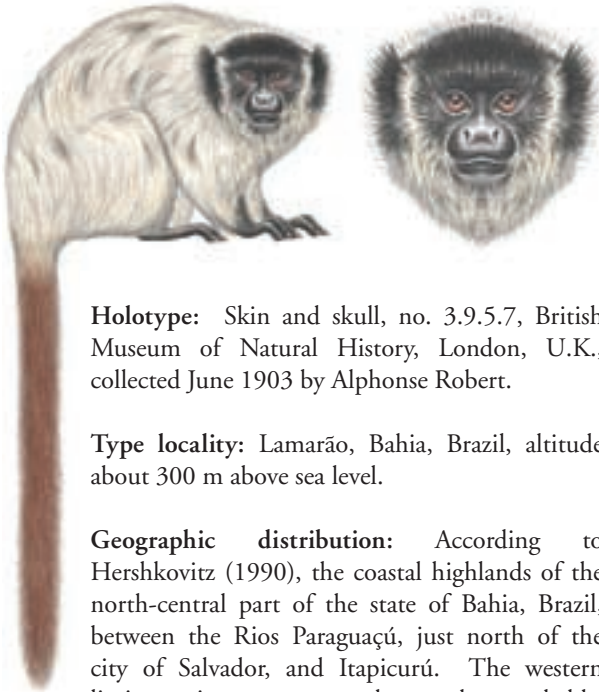


**Figure 45.** Top. The southern masked titi, *Callicebus nigrifrons* (Spix, 1823). An individual from the south-east of the state of Minas Gerais, Brazil, 1979. Bottom. A titi monkey from Guapí-Mirim, São Paulo, Brazil. This is within the recognized distribution of *Callicebus nigrifrons*, but this individual had a darker mask and mantle and a more orange, rather than rusty-brown, tail. Photographs by R. A. Mittermeier.

**Diagnostic characters:** Forehead and crown blackish to about halfway plane of ears, rest of crown grading into coarsely banded brownish agouti or orange-brown of nape; throat pale brownish agouti like chest; cheiridia and ears black; tail orange.

Distinguished from *C. melanochir* and *C. barbarabrownae* by blackish forehead, and anterior portion of crown blackish thinly mixed with buff-banded hairs; from *C. personatus* by blackish front of crown grading into agouti of nape without line of demarcation, and throat pale brownish agouti like chest; from *C. coimbrai* by pale brownish agouti sideburns, throat, and chest (Fig. 45).

### *Callicebus barbarabrownae* Hershkovitz, 1990



**Holotype:** Skin and skull, no. 3.9.5.7, British Museum of Natural History, London, U.K., collected June 1903 by Alphonse Robert.

**Type locality:** Lamarão, Bahia, Brazil, altitude about 300 m above sea level.

**Geographic distribution:** According to Hershkovitz (1990), the coastal highlands of the north-central part of the state of Bahia, Brazil, between the Rios Paraguaçu, just north of the city of Salvador, and Itapicurú. The western limits to its range are unknown but probably, at least historically, the middle reaches of the Rio São Francisco. Ricardo B. Machado and the late A. Brandt (pers. comm. 1988) recorded a population of *Callicebus* at the Serra da Quixaba in the municipalities of Canudos and Monte Santo, north of the Rio Vaza-Barris, northern Bahia (39°20'W, 10°15'S). Ilmar B. Santos also recorded *Callicebus* at Jeremoabo, a little to the east, on the northern margin of the Rio Vaza-Barris in 1990 (pers. comm.). Marinho-Filho and Veríssimo (1997) confirmed the westernmost locality. They observed it in gallery forest at Mirorós, municipality of Ibipêba, western Bahia (11°24'S, 42°17'W). *C. barbarabrownae* was evidently once widespread in forests east and south of the Rio São Francisco



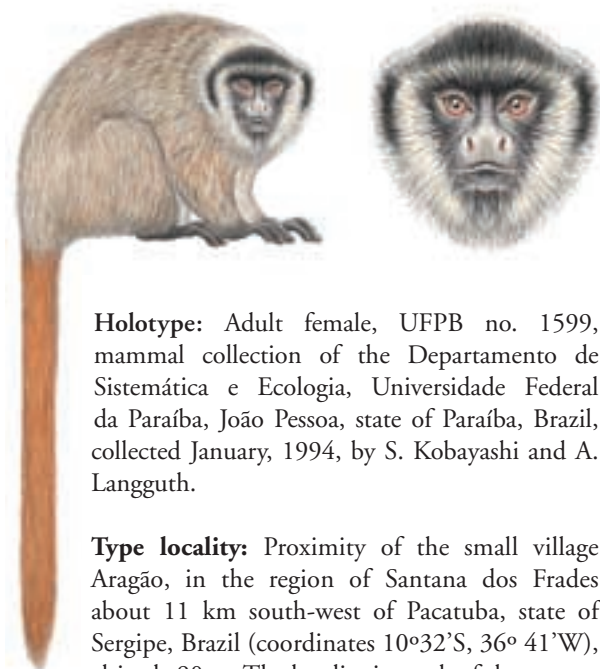
**Figure 46.** The blond titi, *Callicebus barbarabrownae* Hershkovitz, 1990. In captivity at the Federal University of Minas Gerais, Belo Horizonte, in the mid-1980s before the species was described. Photograph by R. A. Mittermeier.

(see Coimbra-Filho and Câmara, 1996), but today survives only in small forest enclaves in what is now predominantly *caatinga* (dry thorn scrub) (Figs. 42 and 44).

**Diagnostic characters:** Superciliary vibrissal line black, forehead and crown to anterior plane of ears dominantly buffy; raised hairs of rest of crown buffy, the fine tips blackish; sideburns, nape, and shoulders pale buff; hairs of back and sides of body banded pheomelanin and eumelanin; thighs and upper arms paler, forearms and legs like back; cheiridia blackish; throat, chest, and belly nearly entirely buffy; tail dominantly orange, base of tail yellowish; ears and skin blackish.

Distinguished from *C. melanochir* by dominantly buffy crown, sideburns, throat, trunk, and limbs with the subterminal pheomelanin (buffy) bands of hairs paler; from *C. nigrifrons* and *C. personatus* by forehead buffy instead of blackish; from *C. coimbrai* by buffy forehead and crown. (Fig. 46).

***Callicebus coimbrai*  
Kobayashi & Langguth, 1999**



**Holotype:** Adult female, UFPB no. 1599, mammal collection of the Departamento de Sistemática e Ecologia, Universidade Federal da Paraíba, João Pessoa, state of Paraíba, Brazil, collected January, 1994, by S. Kobayashi and A. Langguth.

**Type locality:** Proximity of the small village Aragão, in the region of Santana dos Frades about 11 km south-west of Pacatuba, state of Sergipe, Brazil (coordinates 10°32'S, 36° 41'W), altitude 90 m. The locality is south of the estuary of the Rio São Francisco.

**Geographic distribution:** First described from three localities in eastern Brazil, along the coast of the state of Sergipe, between the Rio São Francisco in the north and the Rio Real in the south (the southern border of Sergipe). Oliver and Santos (1991) obtained reports of the occurrence of titi monkeys in the vicinities of Umbauba, Estância, and Aruá in coastal southern Sergipe, and also at Cachoeira da Abadia and Jandaira in north-east Bahia, which are probably referable to *C. coimbrai*. They indicated that the Rio São Francisco was the northern limit to the range of the genus in the Atlantic forest. Sousa (2000) reported two further localities in Sergipe: Mata do Crasto in the municipality Santa Luzia do Itanh, and the Mata do Dira in the municipalities of Itaporanga and Laranjeiras. Sousa (2000) also reported hearing vocalizations of titi monkeys in the Matas do Conde, municipalities of Conde and Jandaira in extreme northern Bahia in 1996. The western limits of its range are unknown, but Ricardo B. Machado (pers. comm. 1989), Marinho-Filho and Veríssimo (1997) recorded *Callicebus* in forest patches in the Caatinga, inland between Monte Santo and Uauá in the upper valley of the Rio Vaza-Barris, and Jeremoabo and Canudos in northern Bahia. Marinho-Filho and Veríssimo (1997) identified them as the form *barbarabrownae*, although they are at about the same latitude as *coimbrai*. The evidence obtained by Kobayashi and Langguth (1999) indicated that *C. coimbrai* is today restricted to the humid coastal Atlantic forest of Sergipe, and that its southern limit is the Rio Itapicurú in Bahia, the northern limit to the range of *C. barbarabrownae* (Hershkovitz, 1990). Considering the widespread and rapid destruction of the forests in northern Bahia and Sergipe even in the early 16<sup>th</sup>

Century (Coimbra-Filho and Câmara, 1996), *C. coimbrai* undoubtedly had a much broader range in the past (Figs. 39 and 40).

**Diagnostic characters:** Forehead, crown, and ears black; trunk buffy; cheiridia blackish; tail orange; sideburns, cheeks, back of head, and nape pale buffy; anterior half of dorsum saddle-backed (with striped pattern).

Distinguished from all other titis of the *C. personatus* Group by black forehead, crown, and ears sharply contrasting with buffy sideburns, cheeks, back of head, nape, and trunk.

## Discussion

In this review, we elevate all currently known taxa of titi monkeys, genus *Callicebus*, to full species status using the same arguments as De Vivo (1991), Van Roosmalen *et al.* (1998), and Van Roosmalen *et al.* (2000) in their respective reviews of Amazonian marmosets, genus *Callithrix*. As in Amazonian *Callithrix* (or *Mico*, following Rylands *et al.*, 2000), titi monkeys in lowland Amazonia invariably have their distributions confined by river barriers. These rivers may fall in the 'black-water', 'clear-water' or 'white-water' category. Both Amazonian *Callicebus* and *Callithrix* (*Mico*) are restricted to dry-land (*terra firme*) rain forests, and only titis of the *C. moloch* and *C. cupreus* Groups tend to seasonally venture into flooded forest habitat along black-water and clear-water streams, to feed on certain fruits only available there during high water. Individuals belonging to both of these genera are unable to swim, meaning that an accidental fall into the water will quickly result in drowning. Passive transfer to the other side of a river barrier through river bend cut-offs has probably not occurred either because populations of Amazonian titis and marmosets are not found in white-water flooded forest (*várzea*), the only kind of habitat that is usually subjected to cross-river transfers. Also, they probably cannot survive on temporary *igapó* (black-water flooded forest) islands long enough to be transferred to the other side of the river.

Most of the lowland tributaries of the Amazon River are fringed with *várzeas* and *igapós* several kilometers wide and sometimes as many as 10 kilometers, which usually stretch from the mouth to the headwaters, effectively isolating populations of *terra firme*-dwelling primates such as *Callithrix*, *Callicebus*, *Saguinus*, *Chiropotes*, *Lagothrix* and *Ateles*. For these monkeys, the only way to colonize adjacent interflaves is to circumvent river barriers near their headwaters, where the floodplain ends and the river becomes narrow enough to cross. In the vicinity of these headwaters, there should be or have been contact zones between populations of the taxa inhabiting the adjacent interflaves. If interbreeding takes place between the two taxa and broad natural hybrid zones of intergradation occur, we should treat them as races or subspecies. However, in most taxa of Amazonian *Callicebus*, *Callithrix*, and *Saguinus*,