Chapter 9
Primates in the Lives of the Yanomami People of Brazil and Venezuela

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9.1 Introduction

9.1.1 Preliminary Remarks

The Yanomami are an indigenous people who have largely maintained their traditional way of life and cultural patterns despite ongoing cultural transformations experienced in recent decades due to gold mining, epidemic diseases, missionary activity, contact with the market economy, and national indigenous policies. Among the tropical rainforest peoples in South America, they inhabit one of the largest indigenous reservations, a binational territory of nearly 180,000 km^2 located on the Brazil–Venezuela border. They live in relatively small autonomous villages called *shabono* and their subsistence activities depend on horticulture, hunting, fishing, and gathering. The Yanomami rely on forest animals as their main source of protein, primates being among the most intensely targeted animals on hunting expeditions. Primates also play an important role in Yanomami material culture and mythology. This chapter provides an overview of the role of primates in Yanomami culture, including (a) a comprehensive review of the available literature for information

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relevant to the classification, use and perception of primates; (b) original information from the villages of Maturacá in Brazil (J.P. Boubli [JPB]) and the Upper Orinoco of Venezuela (H. Caballero-Arias [HCA]); and (c) a summary on the current conservation status of primates in their territory. Since most of the available information had to be gleaned from anecdotes dispersed in literature sources on various other subjects, this chapter could be considered the first consolidated study of Yanomami ethnoprimatology to date.

9.1.2 The Yanomami

The Yanomami are one of Amazon's largest and most traditional indigenous societies, occupying an extensive territory in the Orinoco-Amazon interfluvial region between Brazil and Venezuela (Fig. 9.1). Yanomami is the generic term that identifies an entire linguistic family also known as Yanomama, made up of four linguistic groups: Yanomami (Yanomamɨ) located mainly in Venezuela; Yanomae (Yanomam, Yanomami), mostly found in Brazil; Sanema (Sanumá), the northernmost group situated between Venezuela and Brazil; and Shirian (Yanam, Ninam) a smaller population located in the northeast area in both sides of the border (Fig. 9.1). The Yanomami language family has no known relatives and is considered linguistically

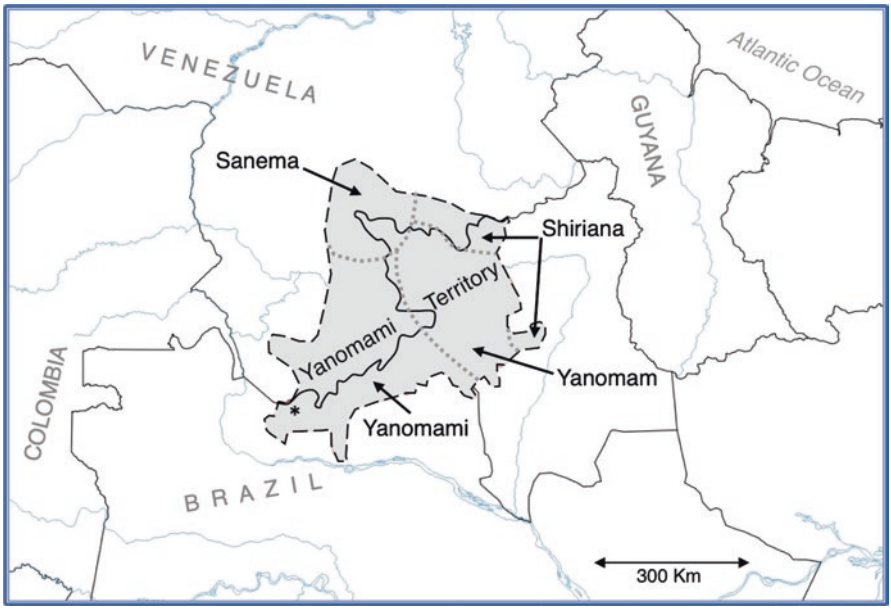

Fig. 9.1 Yanomami territory in Brazil and Venezuela. Dashed lines indicate the approximate borders between the different Yanomami dialect groups. Asterisk indicates the location of the Yanomami village of Maturacá

isolated, making it difficult to trace the ancient origins of the group (Albert 1989; Migliazza 1972; Smole 1976). Migliazza (1982) suggested a distant affiliation between Yanomami and the Panoan language family based on apparent cognates; however, a more recent review of Panoan linguistics by Fleck (2013: 24) considers this hypothesis "less plausible."

The Yanomami territory is centered on the Parima mountain range, the natural divide between Brazil and Venezuela. The area is known biogeographically as the Pantepui and it is characterized by the presence of large sandstone and granite mountains of altitudes from 800 to 3014 meters above sea level that form the watershed between the Orinoco and Amazon basins. Rivers draining the mountainous region are small, fast flowing, and very difficult to navigate due to numerous rapids and waterfalls. This region remains one of the most remote and ecologically diverse in South America.

The Yanomami population is over 35,000. The latest official censuses counted 24,603 Yanomami in Brazil (ISA 2017), and 11,431 in Venezuela (INE 2011). In Brazil, 228 villages have been recorded, distributed over a 96,650 km^2 of demarcated territory, shared between the Brazilian states of Amazonas and Roraima (ISA 2006). This territory constitutes a protected area currently identified as *Terra Indígena Yanomami* (Yanomami Indigenous Land), which was approved by a presidential decree on May 25, 1992. In Venezuela, there are over 220 Yanomami villages in Amazonas state within the Alto Orinoco-Casiquiare Biosphere Reserve with a total area of 82,662 km^2. This protected area, together with the Parima-Tapirapecó National Park located inside the biosphere reserve, was decreed on June 5th, 1991.

The Yanomami were made famous by Napoleon Chagnon's notorious ethnography *Yanomamo, The Fierce People* (1968) and an accompanying series of films in collaboration with Timothy Asch, notably *The Ax Fight* (1975). Chagnon's research and films focused especially on traditional warfare patterns, making the Yanomami out as an exceptionally violent indigenous society. Chagnon has been accused by several anthropologists of overstating the role of warfare, particularly revenge-based homicide, in Yanomami culture (Davis 1977; Albert 1989; Ramos 1987; Ferguson 1995; Sponsel 1998).

During the late 1980s and 1990s, the Yanomami received significant media attention as a result of the gold rush on the Brazil–Venezuela border, culminating in the *Haximu* massacre in 1993, in which some 16 Yanomami were killed by illegal gold miners in Yanomami territory in Brazil near the Venezuelan border. The Yanomami once again attracted significant international media attention in 2000 with the publication of Patrick Tierney's controversial book, *Darkness in El Dorado*, which accused Chagnon and other scientists working among the Yanomami of numerous unethical practices. However, the most serious allegations of genocidal medical experimentation were debunked (American Anthropological Association 2002; Gregor and Gross 2004). *The Falling Sky* (2014), Davi Kopenawa's magnificent first-person autobiography, translated and edited by anthropologist Bruce Albert, charts the history of Yanomami contact with the outside and paints a philosophical vision of Yanomami shamanism as an ongoing struggle to protect their land, their

culture, and the entire world from an apocalyptic cataclysm. From fierce primitive tribe to victims of Western greed and scientific hubris, to shaman-warriors protecting the earth from calamity, the Yanomami have maintained a special fascination within and beyond anthropology for more than half a century.

Prior to the arrival of missionaries in the middle of the twentieth century, the Yanomami lived in large communal houses (*shabono* of 50–150 people) and maintained a semi-nomadic (or semi-sedentary) lifestyle, moving to new areas in decade-long cycles (Chagnon 1968; Milliken and Albert 1997). Today, some Yanomami live in individual houses with their extended families in settled, permanent villages, while others maintain the more traditional village structure, with seasonal migrations between different *shabonos* (Albert and Le Tourneau 2007). The Yanomami cultivate manioc and plantains, among other crops, in small family gardens as well as peach palms in old garden sites around their villages (Milliken et al. 1999). The Yanomami are patrilocal and patrilineal with men living temporarily with their wives' families as bride-service for a few years. Their kinship system is Dravidian with a high preference for cross-cousin marriage within the same village/shabono (Lizot 1988). Their political organization is relatively egalitarian, with one "headman" (or more than one when the community is large and has multiple patrilineal groups) who leads the community less through fiat than by fostering consensus. Headmen tend to be older but still active men who are respected by the community for their leadership and guidance. Shamans are also important members of the community performing frequent rituals involving the consumption of psychoactive *Virola* and *Anadenanthera* snuffs ("*paricá*") to heal individuals and protect the community from evil *hekura* spirits (Lizot 1973; Milliken et al. 1999).

In most Yanomami communities, hunting of forest animals is the major source of dietary protein (see Fig. 9.2a, b); however, in communities located along larger rivers, canoes and fishing gear have been introduced through contact with neighboring indigenous or riverine populations (Boubli 1997; Menezes 2010). Hunting among the Yanomami is carried out exclusively by men (Valero 1984). Yanomami men hunt mostly during the day, since nighttime ventures into the forest are proscribed due to fear of attack by *hekura* spirits (Boubli, personal observation). This salient cultural element is reflected in Yanomami zoological classification, which divides all arboreal animals (including monkeys) into two main groups, diurnal (*paso bi*) and nocturnal (*haso bi*). Nocturnal animals (*haso bi*) include night monkeys as well as olingo, kinkajou, porcupine, and opossum. With increasing contact with outside traders, the Yanomami acquired flashlights and shotguns, which has made it easier to venture into the night. The only night hunting observed by one of the authors in Maturaca (JPB) was paca hunting (*Cuniculus paca*), which was done from a canoe floating down the river and looking for the typical reflective eye shine of this large rodent. No night treks in the forest were ever witnessed (Boubli, personal observation).

Traditionally, the Yanomami hunted with arrows shot from unusually long (by Amazonian standards) palm or hardwood bows. Over the past few decades, however, firearm use has become widespread among most Yanomami hunters (Fig. 9.2a), though many retain their skills with the bow and arrow. The Yanomami start hunting in their early teens and quickly become remarkable animal trackers. They practice

Fig. 9.2 (**a**) Yanomami hunter with his shotgun used to kill a large peccary in Pico da Neblina mountain. (**b**) A black curassow (*Crax alector*) hunted by a Yanomami hunter in Pico da Neblina National Park, Brazil. (**c**) Yanomami men returning from a collective hunting expedition bringing large bundles of smoked meat to be shared in the village of Ariabú and Maturacá in Pico da Neblina National Park, Brazil. (**d**) Neblina black uakari monkey (*Cacajao hosomi*) hunted by a Yanomami man along the Iá River in Pico da Neblina National Park, Brazil. (**e**) Yanomami children in the Yanomami village of Purima, Mavaca, Alto Orinoco, 2005. (Photographs **a**–**d**, **f**: Jean P. Boubli; Photograph **e**: Hortensia Caballero)

two kinds of hunting, solo hunting on shorter outings close to the village (*rami*), and collective hunting treks (*heniyomou*) mostly for ritual feasts (Fig. 9.2c). In both, they search for a variety of animals, but preferentially hunt large mammals and birds (Fig. 9.2a, b). Primates are among their preferred prey, due to the diurnal habit of most species, relatively large body size, and conspicuous social nature (Fig. 9.2d). In this chapter, we discuss the importance of primates to the Yanomami people with a focus on the village of Maturacá in Brazil.

9.2 Primates in Yanomami Culture: A Review

Most of the relevant literature on Yanomami interactions with primates was drawn from research carried out in Venezuela (see Table 9.1). A few additional observations were gleaned from studies carried out in Brazil (Becher 1974; Saffirio and

Scaglion 1982; Milliken et al. 1999; Albert and Milliken 2009). Comparable information on primate hunting, folk-taxonomy, mythology, and cultural practices among the related Sanema people (e.g., Taylor 1974; Colchester 1981, 1982) are omitted in this review, since the Sanema are geographically, linguistically, and culturally distinct from the main Yanomami subgroups (Yanomaï, Yanam, and Ninam) discussed here.

The Yanomami recognize eight taxa of monkeys, lumping two species of uakari under *hõsõmɨ* (Fig. 9.2d). Ten primate species are reported from the Yanomami trans-national territory (cf. Boubli 2006), with fairly consistent names reported in multiple studies (see Table 9.1). It is not clear to what extent the listed variations in terminology are due to dialect differences, as opposed to inconsistent orthographical conventions across the studies.

9.2.1 Monkey Pets

The Yanomami (Lizot 2004), like many other Amazonian peoples (Cormier 2003, 2006; Lizarralde 2002, 2019; Shepard 2002), tend to take monkeys as pets, typically recovering surviving baby monkeys after adult individuals have been killed during a hunt (Fig. 9.2e) (Baker 1953). Infant monkeys can be breastfed by women (Smole 1976) until they wean (Baker 1953). In this sense, monkey pets kept by the Yanomami take on a degree of human kinship and, therefore, are never eaten by their keepers (see Cormier 2003 for human–primate kinship concepts among the Guajá). In the Upper Orinoco, the Yanomami mostly call their pets by their species names, e.g., *hima* (dog), *hoashi* (capuchin monkey), etc. (original observation by HCA). According to Lizot (2004), the vocative *thãri* refers to animal companion, and *thãriyë yaro* is translated as "my animal companion," however, this expression seems to be used more in mythical language.

The Brazilian Yanomami have been observed to use pigments from *Bixa orellana* (red), *Genipa americana* (black), and *Picramnia spruceana* (purple) to paint monkeys and other pets, much as humans are decorated with body paint (Fuentes 1980). In the Upper Orinoco region, one of the authors (HCA) has observed that monkey pets in a *shabono* are adorned with cotton "down" in preparation for feasts, just like people. The Yanomami often keep several species as pets, including howler monkeys, spider monkeys (Fig. 9.2e), capuchins, and night monkeys. Animal pets, including monkeys, are not typically killed or consumed, but they are punished if they misbehave. When pet monkeys die, they are burned outside the *shabono* and their bones are buried (Valero 1984), a practice distinctive from Yanomami funerary practices for humans (Lizot 1988), but still including cremation and special treatment of the bones as a core element.

Mattei-Muller (2007) provides a photographic record of *Aotus trivirgatus*, *Saimiri cassiquiarensis*, and *Cebus olivaceus* pets among the Yanomami. Caballero-Arias (2011) reports a juvenile spider monkey as a child's pet; Cocco (1987) reports a capuchin monkey (*hoaxi*) being kept by a girl in Iyëwei-teri; Steinvorth de Goetz

Table 9.1 Yanomami primate terminology from published studies and personal observations

				Venezuela				Brazil		
Linnaean taxonomy[a]	English common name	Spanish (Venezuela)	Portuguese (Brazil)	Grossa (1975)	Lizot (1975a, 2004)	Finkers (1986)	Mattei-Muller (2007)	Boubli, this study	B. Albert, pers. comm.	H. Ramirez, pers. comm.
Alouatta macconnelli[b]	Red howler monkey	Araguato. Mono aullador	Guariba	*iro*	*iro*	*iro*, *weyurasi* (="large ♂")	*weyurasi, iro*	*iro*	*iro a* / pl. *iro kɨkɨ*, *iro pë*	*Iro*
Ateles belzebuth[c]	Spider monkey	Marimona, mono araña	Coatá	*pasho*	*pasho*	*pasho*	*pasho*	*pasho*	*pasho a* / pl. *pasho kɨkɨ*, *pasho pë*	*pasho*
Cebus albifrons[g]	White-fronted capuchin monkey	Mono capuchino, mono blanco, mono cariblanco	Macaco prego, Cairara	*hoachi*	*hoashi*	*hoashi*	*yawerewë, hoashi, yarimɨ*	*hoashi*	not observed	*hoashi, yawerewë, yarimɨ*
Cebus olivaceus[d]	Wedge-capped capuchin monkey	Mono capuchino común	Cairara	*hoachi*	*hoashi*	*hoashi*	*yawerewë, hoashi, yarimɨ*	not observed	*yarima a* / pl. *yarima kɨkɨ*, *yarima pë*	Not observed
Saimiri cassiquarensis[g] *(ex S. sciureus)*	Squirrel monkey	Mono titi, mono ardilla	Macaco-de-cheiro	*culisi, curisi, echëechem* (="little monkey")	*kurisi, ëshëëshëmɨ*	*kurisi, ëshëëshëmi*	*kurisi, ëshëëshëmɨ*	*ëshëëshëmi*	*kusi si* / pl. *kusi sikɨ*, *kusi sipë*	*ëshëëshëmi*, *kurisi*
Aotus trivirgatus	Night owl monkey	Mono de noche	Macaco-da-noite	*Cucumü*	*makurutamɨ mo, kuukuumɨ*	*makurutami, kuukuumɨ, kukuumi*	*makukushimɨ (mo), makurutamɨ, kuukuumɨ*	*makurutami, kuukuumɨ, kukuumi*	*kuukuu moxi* / pl. *kuukuu moxipë*	*kuukuumi, makurutami*

(continued)

Table 9.1 (continued)

				Venezuela				Brazil		
Linnaean taxonomy[a]	English common name	Spanish (Venezuela)	Portuguese (Brazil)	Grossa (1975)	Lizot (1975a, 2004)	Finkers (1986)	Mattei-Muller (2007)	Boubli, this study	B. Albert, pers. comm.	H. Ramirez, pers. comm.
Cheracebus lugens	Black titi	Viudita	Zogue-zogue	*hoquepocomɨ̈*	*yõkõyõkõmɨ* (="a monkey species" (Lizot 1975a, b)), *hõkõhõkõmɨ*	*hõkõhõkõmi*	*yõkõyõkõmɨ, hõkõhõkõmɨ*	*hõkõhõkõmi*	*yõkoxi a* / pl. *yõkoxi pë*	*hõkõhõkõmɨ, yõkõyõkõmɨ*
Chiropotes israelita[g] *(ex C. satanas*[e]*)*	Bearded saki	Mono capuchino del Orinoco, mono barbudo	Cuxiú	*wisha*	*wisha*	*wisha*	*wisha*	*wisha*	*wĩxa a* / pl. *wĩxa kɨki, wĩxa pë*	*wisha, wɨsha*
Cacajao ayresi[f]	Black-headed / Aracá uakari	Mono chucuto	Bicó	–	*hõsõmɨ*	*hõsõmi*	*hõsõmɨ*	*hõsõmi*	Not observed	*hõsõmɨ*
Cacajao hosomi[f]	Black-headed / Aracá uakari	Mono chucuto	Bicó	–	*hõsõmɨ*	*hõsõmi*	*hõsõmɨ*	Not observed	Not observed	Not observed

Abbreviations: Bra.: Brazil; Ven.: Venezuela

[a]Following the latest classification of primates from the Venezuelan Guayana (Urbani and Portillo-Quintero 2018)

[b]iro (Bra: Saffirio and Scaglion 1982, Ven: Migliazza 1972), ilo (Ven: Migliazza 1972)

[c]paxo (Bra: Saffirio and Scaglion 1982, Bra: Milliken et al. 1999), pasció (Ven: Biocca 1966), pasho (Ven: Fuentes 1980, Ven: Eguillor-García 1984), basho (Ven: Chagnon 1992), paso (Ven: Migliazza 1972), pašo (Ven: Migliazza 1972)

[d]yarim (Bra: Saffirio and Scaglion 1982; referred by the authors as *Cebus* [*Sapajus*] *apella*), hoashi (Ven: Fuentes 1980), hoaxi (Ven: Cocco (1987), howashi (Ven: Chagnon 1992)

[e]wixa (Bra: Saffirio and Scaglion 1982; misidentified as *Lagothrix* sp.), wisha (Ven: Fuentes 1980), wishia (Ven: Biocca 1965)

[f]Lizot (1975a, b) does not list a Yanomami name for *Cacajao*, the reason of this absence seems to be explained as Lizot (2004:110) later indicated that "[this monkey] is less frequent in the region inhabited by the central Yanomami," where Lizot conducted most of his field research, as did D. Grossa

(1968) recorded a capuchin kept as a pet by a Yanomami girl in the Upper Orinoco; and Herzog-Schröder (1999b) recorded a man on a canoe with a capuchin pet. Grossa (1975) indicates that Yanomami girls care for capuchin monkeys as if they were babies, matching a similar observation made by Becher (1974) in a Brazilian *shabono*.

9.2.2 Primate Hunting

The Yanomami have been observed to hunt all primate species found in their region (Viguera 1968, Chagnon 1992, Boubli 1997). Large-bodied social monkeys are the preferred prey species because they are relatively easy to locate as they move together in groups; however, most species are also quick, agile, and acrobatic and often escape into high branches or hilly forests (Biocca 1966). The Yanomami also consider monkey meat to be "good tasting" (Biocca 1966). So deeply associated is primate consumption with the Yanomami that non-indigenous peoples once referred to them as "monkey eaters": *guaharibos, guaicas, guaribas,* and *guaribas blancos* in Spanish colonial documents going back to the eighteenth century (Caballero-Arias 2014), or *guajaribos, uaharibos, uaribas,* and *uajaribos* (Koch-Grünberg 1924; de Barandiarán 1965) in later Brazilian sources. These varied terms derive from the Tupi-Guarani word *guaríba* or *uaríva* for "howler monkey" (*Alouatta* spp.) (Koch-Grünberg 1924). Yanomami are sometimes willing to venture dangerously close to enemy territory in search of their monkey prey. Valero (1984) reports an episode that nearly resulted in warfare when hunters from two enemy communities encountered one another in the forest while hunting monkeys. She also mentions that at a funeral she observed, monkey and curassow meat were reserved only for direct relatives of the deceased, while large prey (tapir and peccary) was served to other participants involved in mixing the plantain beer with the ashes of the dead (Valero 1984).

The Yanomami of the Upper Orinoco have a particular preference for spider monkey (Eguillor-García 1984; Valero; 1984; Cocco 1987), the largest neotropical monkey species (Emmons 1990). Several authors note that the Yanomami consider spider monkey to be particularly delicious (Steinvorth de Goetz 1968; Grossa 1975; Smole 1976), with a taste said to be "similar to agouti" (Smole 1976). At a feast in Mahekodoteri (Platanal) observed by Chagnon (1992), the Yanomami hosts were particularly proud of the 17 spider monkeys (*basho/pasho*) they had hunted. Finkers (1986) witnessed four spider monkeys and two howlers served at a three-day feast at a Yanomami community. Hames (1979), in a study of hunting among Yanomami living in a Ye`kuana on the upper Orinoco of Venezuela, recorded 18 spider monkeys among the 20 primate individuals hunted during an observation period of 216 days. Still, primates represented only about 3% of the total body weight of terrestrial animals hunted, with tapirs and peccaries accounting for most of the meat (Hames 1979). Likewise, Saffirio and Scaglion (1982) recorded capuchins (*Cebus olivaceus*), titi monkeys (*Cheracebus*

lugens, misidentified as "*Lagothrix* sp."), howlers (*Alouatta macconnelli*), and spider monkeys (*Ateles belzebuth*) in a five-month study of Yanomami hunting on the Catrimani river in Brazil. They noted that spider monkey was the second most preferred prey species, after white-lipped peccary (see also Urbani 2005). Despite resource pressure and the necessity of new hunting strategies in an "acculturated" village setting, they recorded 152 kg of primates hunted, compared to only 38.5 kg for the "unacculturated" village (Saffirio and Scaglion 1982).

As a strategy for hunting primates, the Yanomami "use an ingenious and simple system: they flush a group of monkeys, they start shouting, 'Oh! Oh! Oh!,' the others 'Ih! ih! ih!.' The monkeys get frightened and remain immobilized in terror, giving time for the hunter [to carefully aim and] to shoot" (Cocco 1987: 194, authors' translation). When hunting capuchin monkeys, the Yanomami have been observed to use dogs (Cocco 1987). A favorite arrow tip for hunting capuchins, spider monkeys, and howlers among the Venezuelan Yanomami is the *pei-namo*, made of the wood of the light palm tree *Iriartella* sp. (*yoroama*) coated with curare (Cocco 1987, Signi-Sánchez and Morales-Mago 2008). This arrow tip has 4 or 5 notches that make the tip break off inside the animal's body so it cannot be removed (Cocco 1987). The *mamokori*, also a curare-coated point, is often used for hunting primates (Good 1989). In addition, Good (1989) recorded the use of the barbed-bone *u namo* point to hunt monkeys and other arboreal animals and birds. Herzog-Schröder (1999a) reported the use of the *huso mamo* spear with a narrow, notched palm tip coated in curare, causing the monkey to become immobilized and to fall quickly. Similarly, Chagnon (1968) observed the Yanomami making large quantities of palm-tipped arrows (about 40 cm long) with lateral cuts so that the curare-coated arrow tip breaks off inside the animal. Similarly, Boubli (this study), also recorded *Iriartea* sp. Palm arrow tips with perpendicular cuts coated with curare, primarily used for hunting monkeys (Fig. 9.3).

Thus, the Yanomami appear universally to prefer curare-tipped arrows when hunting monkeys (Baker 1953; Grossa 1975; Lizot 2004) since the poison relaxes the animals' muscles, releasing their grip from tree branches so they fall from the forest canopy as they die (Chagnon 1968; Cocco 1987). However, if the poison is not well prepared, the monkey may remain high up in the canopy, gripping a branch in *rigor mortis* (Biocca 1965). Yanomami shamans have been observed applying curare to arrows while reciting the names of the animal species that will be hunted in order to ensure an effective outcome for the hunt (Finkers 1986). According to Lizot (1988), arrowheads with curare are reserved for use only in wars and for hunting spider monkeys. Biocca (1965) indicated that bearded saki monkeys should be hunted with arrows coated in old curare; if freshly made curare were used when hunting this animal, the hunter's remaining arrowheads would rot with mold (Biocca 1965). Fuentes (1980) recorded the Venezuelan Yanomami making an arrow with the bony tip of a stingray tail (order Myliobatiformes), used on rare occasions to hunt smaller vertebrates, including the bearded saki. Ethnobotanical studies among the Yanomami of Brazil recorded arrow tips especially for primate hunting made from the palm trees *Jessenia bataua* and *Iriartella setigera*, coated with the resin of *Virola elongata* (Milliken et al. 1999, Albert and Milliken 2009). Arrows meant for

Fig. 9.3 Arrow tips made by Yanomami hunters from Marari village, Brazil. The picture on the left shows an arrow-tip set and their quiver made of bamboo with a deer skin cap. The picture on the right is a close-up of the arrow tips showing the characteristic perpendicular cuts on the *Iriartera sp*. Curare-coated tips meant to allow for easy breaking inside their primate targets (the 7 tips in the middle). On the outside left (bamboo tip) and right (bone harppon-like tip) are arrow tips meant for large terrestrial prey. (Photograph: Jean P. Boubli)

other types of prey, in particular large-bodied terrestrial animals, have tips made from monkey bone: *ẽthẽri,* as described below or bamboo (Figs. 9.3 and 9.4a).

Finkers (1986) includes visual documentation showing a group of Yanomami men carrying bundles of spider monkeys on tumplines, their foreheads bearing the weight, from the hunting site to a camp in the forest for cooking. When preparing monkey meat, the Yanomami first pass it over a fire to singe off the hair (Grossa 1975). Only then are the animals gutted and butchered (Finkers 1986). Men and women work together in forest cooking camps, wrapping monkey meat in leaves or tying it with thin vines to roast over a fire, or boiling it in pots (Cocco 1987). Large monkeys, and spider monkeys especially, are tied into a characteristic "seated" or "fetal" position with vegetable fibers for roasting (Fig. 9.2f) (Smole 1976; Grossa 1975; Steinvorth de Goetz 1968). Monkey brain is considered a delicacy and is highly esteemed (Chagnon 1968). The hunter typically distributes the cooked meat among those present in the cooking camp, giving a few small pieces to those who participated in the hunting expedition but reserving the majority of the meat for the feast in the *shabono* (Finkers 1986). After butchering and roasting in such forest

Fig. 9.4 (**a**) Yanomami arrow tips made with monkey bones from the Ocamo area in Venezuela. Lengths from the end of the rolled thread to the arrow tip, from top to bottom: 18.5 cm, 18 cm, 24 cm, 18.5 cm (coll. Bernardo Urbani); (**b**) Yanomami bracelets made with monkey skins. Lengths of the bracelets, right to left: 43 cm (associated bird feathers: *Ramphastos vitellinus/tucanus*), 44 cm (associated bird feathers: *Cotinga cayana* [turquoise/black], *Xipholena punicea* [purple/white], *Ramphastos tucanus* [black/yellow]), 29 cm (associated bird feathers: *Cyanerpes* sp. [blue/black], *Ramphastos vitellinus/tucanus* [white/red/yellow]) (coll. FLSCN)

camps, prepared monkey meat is carried back to the central community (Grossa 1975) (Fig. 9.2c). The monkey meat must be well roasted to the point that it looks almost burned; otherwise, the Yanomami will not eat it (HCA). Surplus smoked monkey meat is considered to be an especially prized item to be left hanging in the *shabono* (Smole 1976).

The extensive literature on the Yanomami (mostly in Venezuela) mention a number of food taboos and other cultural practices related to primates. These taboos and practices vary from one Yanomami locality to another, as well as between different age sets. For example, Lizot (1988) reported that adolescents and young adults of both sexes (approximately 11–25 years old) were prohibited from eating bearded sakis and howler monkeys in that study region. Finkers (1986) reported that children of roughly 9–14 years of age should not eat night owl monkeys or titi monkeys.

In three Yanomami communities located in the Mavaca river basin, Finkers (1986) reported that adolescent girls and adult women between roughly 12 and 40 years of age tend to avoid eating monkeys altogether. Both Eguillor García (1984) and Finkers (1986) observed that pregnant women avoided eating spider monkey's meat, since it was said to spoil their breast milk. Food taboos also apply to Yanomami house pets, for example, dogs are not allowed to eat howler monkey meat lest they become lazy, blind, and infected with botfly larvae (Finkers 1986). If someone steps on a spider monkey skeleton (*pasho ishi*) found lying in the forest, they will become frail and sick (Lizot 2004). The bones and remains of monkeys and other animals are typically thrown into the fire hearth. To discard of animal bones carelessly makes a hunter lose his hunting abilities, becoming *sina*, a bad or unlucky hunter (Lizot 1992). The ashes of the spider monkey pubis or hip bone (*pasho ishiki*) are said to be mixed with food or placed on a person's head as a kind of curse, causing the person to fall to the ground with powerful cramps and wide-open eyes (echoing the symptoms of tetanus) until they die (Lizot 2004).

The practice of using animal terms to create personal names and group names among the Yanomami (Lizot 1973) also appears associated with some instances of primate food taboos. Terms for primates including howler monkeys (*iro*), bearded sakis (wisha) and titi monkeys (*hõkõhõkõmi*) are used for naming persons as well as dogs (Lizot 1973). Becher (1974), working among the Brazilian Yanomami at the village of *Ironasitéri* ("the place of the howler monkey"), noted that howler monkey (*iro*) was not hunted or eaten there, as it was the name of one of the shamans of this *shabono*. (Becher 1974). The people at Ironasitéri used to call themselves "howler monkey people": they stated that howler monkeys have souls, and that because of this their ancestors were able to turn into howler monkeys and vice versa (Becher 1974).

In more recent original fieldwork carried out by author JPB in the Maturacá region of Brazil, the preferred game species for the Yanomami were spider monkeys, currasows, and peccaries (Fig. 9.2a, b), although other animals such as tapirs, deer, spiny rats, agoutis, pacas, and smaller monkeys were readily taken if encountered during a hunting expedition. The main targets on these expeditions were larger monkeys such as spider and howler monkeys. However, they also hunted small primates such as titi monkeys and night owl monkeys if nothing bigger was found. In this region, no taboos around eating any monkeys were observed. As noted by other authors, the Yanomami find monkeys to be relatively easy to locate due to their conspicuous calls and noisy locomotion. Their arboreal habits also mean that it is easy for the Yanomami hunter to get within shooting range undetected. The spider monkey remains one of their preferred game species due to its alleged good taste compared to other species such as the howler monkey (see also Cormier and Urbani 2008). An avoidance or lower preference for howler monkey has been reported for other South American lowland indigenous societies (Shepard 2002; Urbani 2005; Cormier 2006, Urbani and Cormier 2015).

On one occasion, JPB observed a Yanomami hunting party returning with 23 spider monkeys from a single expedition to the foothills of Pico da Neblina, near Igarape Tukano (Figs. 9.2c and 9.5). The Yanomami of this region claim that the

Fig. 9.5 Pile of smoked game animals hunted on a large fortnight-long expedition to supply meat for the annual *pupunha* feast, in celebration for the peach palm harvest. There are 23 spider monkey carcasses in this pile together with carcasses of a tapir, caimans, peccaries, curassows among other game species. (Photograph: Jean P. Boubli)

uakari was extremely difficult to hunt with bow and arrow, so they only became a common prey item more recently, with the advent of shotguns as the main hunting tool. Now, uakaris are hunted as much as any other species (Fig. 9.2d). During a stay in Maturaca in 1994, JPB retrieved 45 recently eaten uakari skulls from fire hearths. Uakaris are hunted around Maturacá preferably from April to June when the Yanomami say the animals are fatter due to an abundance of forest fruits, in particular the fruit of the palm *Mauritia flexuosa*.

9.2.3 Monkeys and Material Culture

Monkey bones and skins are important elements in Yanomami material culture (Fig. 9.4a, b). However, monkey teeth are not generally used in body ornamentation, unlike the case for large feline and caiman teeth found frequently on necklaces and other adornments. The Yanomami manufacture characteristic arrows with

harpoon-like tips, called *ẽthẽri* (Biocca 1966; Finkers 1986; Lizot 2004), carved from the long bones of monkeys (Fig. 9.3a). Finkers (1986) describes how the "harpoon" points, carved from spider monkey bones, are secured to the shaft made from a shrub known as *etheri there* (*Mouriri myrtofolia*) by wrapping with a cord made from fibers of *shiki* (*Cecropia* sp.) thread coated in beeswax (Fig. 9.3a). Hunters need to be careful that these types of arrows are not stolen, lest they lose their hunting ability (Finkers 1986). Lizot (2004) reports the use of bearded saki bones for this type of arrowhead (Lizot 2004). Among the Brazilian Yanomami, Milliken et al. (1999) report the use of arrows with tips made from the monkey's radial bone to hunt small vertebrates. Yanomami children use wood from the palm *Bactris gasipaes* to make practice arrow tips fashioned with the same design (Milliken et al. 1999). Also, quivers for arrow-tips made of bamboo tubes are sometimes sealed with covers made of deer or monkey skin (Fig. 9.3) (Biocca 1966; Chagnon 1968; Boubli this study).

Among the most characteristic objects of Yanomami body adornments are feather-ornamented armbands (Fig. 9.4b), headbands (Fig. 9.6), and belts made from the skins of various primate species. Fossi-Cedeño (1999) describes headbands made from the skins of howler monkey and capuchins tied with cotton twine. The tail of the bearded saki is also used as a head ornament (Fig. 9.6) (Anduze 1960).

Fig. 9.6 Yanomami man from Marari village in Brazil wearing a headband made from the tail of a male *Chiropotes israelita*. Inset shows a similar headband but from Venezuela. (Photograph: Yanomami man by Franciso Pontual. Inset headband (48 cm long, 4 cm wide) from Manuel Lizarralde coll)

According to Biocca (1965), the bearded saki tail is skinned, dried, perforated, tied around the head with cotton thread, and adorned with colorful bird feathers. Similar belts, called *wisha shina*, are made from the tails of male bearded sakis, which have fuller and longer fur than females (Lizot 2004). Photographic records of Yanomami men from different regions, especially in ritual settings, often reveal prominent armbands made of primate skins decorated with feathers (Biocca 1965, 1966; Steinvorth de Goetz 1968; Viguera 1968; Grossa 1975; Eguillor-García 1984; Cocco 1987; Chagnon 1992; Lizot 1992) (Fig. 9.4b). Likewise, among the Yanomami of Brazil, a headpiece made from bearded saki (*wisha*) tail is a predominant form of festive adornment for men (Fig. 9.6). Given this animal's restricted distribution within Yanomami territory, this item is widely traded across villages (JPB, personal observation).

9.2.4 Primate Ethnoecology

Despite the wealth of published material on Yanomami ethnography, especially shamanism and warfare, there are relatively few studies focusing on ethnobiological and ethnoecological knowledge (Taylor 1974; Fuentes 1980; Milliken et al. 1999; Shepard Jr 2006; Albert and Milliken 2009). Fuentes (1980), Milliken et al. (1999), and Albert and Milliken (2009) make specific reference to plants that are consumed or otherwise used by monkeys according to the Yanomami (Table 9.2).

Plant and animal names among the Yanomami sometimes reference primate species or aspects of primate behavior. One particular species of hawk (*Buteo* sp.), for example, is associated with the bearded saki: *wisha karakapɨ* (Lizot 2004), perhaps an indication of the bird's preference for hunting this species. Fuentes (1980) likewise reports several tree names associated with primates, such as "capuchin monkey tree" (*hoashi kë moka*) and "spider monkey owl tree" (*pasho efetami*). *Pasho ãhũ* (*Garcinia macrophylla*) is a tree with edible fruits that references the spider monkey, while the *hoashi mosi* palm tree is associated with the capuchin monkey (Lizot 2004). Moreover, the sound made by *wakata* trees during windstorms is said to emulate spider monkey vocalizations (Lizot 2004). Yanomami of the village of Toototobi in Brazil associate the spider monkey with the cultivation of the introduced peach palm (*raxa paxo kɨkɨ*), while the name of a variety of bitter manioc (*hutuwisasi koko*) references the tail of the capuchin monkey (Milliken et al. 1999).

A close reading of the classic ethnographies reveals a wealth of insightful if dispersed observations relevant to primate ethnoecology. Spider monkeys are considered by the Yanomami to be strong and agile, while uakaris are noisy. Lizot (2004) notes that certain shamans who identify with the spider monkey will imitate its behavior and vocalizations to gain healing power, described by the verb *pashomou*, "to do like the spider monkey." *Pashomou* is also the sharp cry made by people to announce the arrival of visitors or enemies (Lizot 2004). On the other hand, the expression *hoashimou,* "to do like the capuchin monkey," refers to mischievous

Table 9.2 Plants used by monkeys as reported by the Yanomami

Venezuela	Brazil
Fuentes (1980)	Milliken et al. (1999), Albert and Milliken (2009)
1. *Alouatta macconneli*:	1. *Alouatta macconelli*:
morã (Burseraceae)	Leguminosae
morokoi (Melastomataceae: *Mouritia grandiflora*)	(*Elizabetha leiogyne*)
paihirimi (n. r.)	Moraceae
watupara (Burseraceae: *Dacryodes* sp.)	(*Pourouma minor*)
2. *Ateles bezebuth*:	2. *Ateles belzebuth*:
arõwae (Rhamnaceae: *Zizyphus cinnamomum*)	Moraceae
kareshi (Palmae, *Maximiliana regia*)	(*Pourouma minor*)
õpõni (Anacardiaceae: *Spondias sp.*)	3. *Cebus olivaceus*:
wanari (u. f. g.)	Sterculiaceae
yei (Palmae, *Attalea speciosa*)	(*Theobroma subincanum*)
3. *Cebus olivaceus*:	4. Monkeys (general):
ama ãsi (Caesalpiniaceae: *Elizabetha princeps*)	Anacardiaceae (*Anacardium giganteum*)
apia (Sapotaceae, *Pouteria* sp.)	Anacardiaceae
haproa (Palmae, *Oenocarpus bataua*)	*(Spondias mombin)*
hayahama thotho (Bignoniaceae: *Tynnanthus polyanthus*)	Chrysobalanaceae
hayu (n. p.)	(*Licania* aff. *heteromorpha*)
hoko (Palmae, *Oenocarpus bacaba*)	Leguminosae
kokoa (u. f. g.)	(*Hymenaea parvifolia*)
koyosi (u. f. g.)	Leguminosae
kumato (Caryocaraceae: *Caryocar villosum*)	(*Inga alba*)
misikiri (n. r.)	Leguminosae
mokorama (Marantaceae: *Ischnosiphon* cf. *aruma*)	(*Inga paraensis*)
momi (Sapotacea)	Moraceae
NAł, (Sapotaceae: *Manilkara bidentata*)	(*Pourouma bicolor* ssp. *digitata*)
shawarakurimi (Sapotaceae)	Myristicaceae
shoroshoro (Moraceae: *Cecropia* cf. *javitensis*)	(*Iryanthera juruensis*)
sititi (Gentianaceae)	Sapotaceae
weima (Palmae, *Euterpe precatoria*)	(*Chrysophyllum argenteum*)
wẽkama / wakama (Mimosaceae: *Inga nobilis*)	Sapotaceae
wito (Anacardiaceae, *Anacardium giganteum*)	(*Manilkara huberi*)
4. *Chiropotes israelita*	Sapotaceae
ashowa (Moraceae, *Pseudolmedia* sp.)	(*Micropholis melinoniana*)
hayu (Moraceae, *Pseudolmedia* sp)	
moshima (Mimosaceae, *Inga sp.)*	
shiwaikirimi (n.r.)	

Abbreviations: n. r. (not reported, in Fuentes (1980): Appendix 1); u. f. g. (unknown family and genus, in Fuentes (1980): Appendix 1)
Abbreviations: Bra.: Brazil; Ven.: Venezuela
[a]Following the latest classification of primates from the Venezuelan Guayana (Urbani and Portillo-Quintero 2018)
[b]iro (Bra: Saffirio and Scaglion 1982, Ven: Migliazza 1972), ilo (Ven: Migliazza 1972)
[c]paxo (Bra: Saffirio and Scaglion 1982, Bra: Milliken et al. 1999), pasció (Ven: Biocca 1966), pasho (Ven: Fuentes 1980, Ven: Eguillor-García 1984), basho (Ven: Chagnon 1992), paso (Ven: Migliazza 1972), pašo (Ven: Migliazza 1972)
[d]yarim (Bra: Saffirio and Scaglion 1982; referred by the authors as *Cebus* [*Sapajus*] *apella*), hoashi (Ven: Fuentes 1980), hoaxi (Ven: Cocco (1987), howashi (Ven: Chagnon 1992)
[e]wixa (Bra: Saffirio and Scaglion 1982; misidentified as *Lagothrix* sp.), wisha (Ven: Fuentes 1980), wishia (Ven: Biocca 1965)
[f]Lizot (1975a, b) does not list a Yanomami name for *Cacajao*, the reason of this absence seems to be explained as Lizot (2004:110) later indicated that "[this monkey] is less frequent in the region inhabited by the central Yanomami," where Lizot conducted most of his field research, as did D. Grossa

behavior, while the related term *hoashiprou* means "lacking in discipline" (Lizot 2004). Both JPB (Maturacá) and HCA (upper Orinoco) observed naughty children and toddlers referred to as *hoashi*, the white-fronted capuchin (*Cebus albifrons*), considered mischievous and undisciplined. Other indigenous groups throughout Amazonia likewise consider capuchin monkeys to be mischievous and badly behaved, due to their curious, somewhat hyperactive nature when habituated with humans (Shepard Jr 2002; Cormier 2006). The Yanomami, like many indigenous groups in Amazonia, consider howler monkeys to be slow, lazy, and often infested with botfly larvae (Shepard Jr 2002, Cormier 2006). In fact, howler monkeys in Panama (*Alouatta palliata*) can spend more than 65% of their day resting or sleeping and moving on average only around 443 m (Milton 1980). In stark contrast, capuchins are much more active, with the white-fronted capuchins of Cosha Cashu in Peru on average spending only 12% of their day resting and moving 2 km (Terborgh 1983).

9.2.5 Monkeys in Yanomami Cosmology

Yanomami cosmology and shamanism is replete with supernatural beings or nature spirits known as *hekura*, some of which are associated with animal species (Eguillor-García 1984, Lizot 2004). The *hekura* have a type of arrow associated with the capuchin monkey, named *hoshiri shereka* (Lizot 2004). Fossi-Cedeño (1999) reports two primates *hekura*. *Sibná* is a large mythical monkey possessing great strength and the ability to fly, capable of facing any type of enemy, and announcing its presence with the sound of powerful wind as it passes through the forest. The second is *pasó* (generic term for monkey in this dialectical variation, related to the term for spider monkey, *pasho*) that consists of two monkey brothers, one larger than the other, who have the ability to cure illness by facing down illness-causing spirits with a club made from the white branch of a tree called *mahomoi*. This pair of *hekura*, associated with the setting sun, enters the Yanomami shaman through the left arm and lodges in his chest. Lizot (2004) notes other monkey *hekura*, such as *iroriwë*, the *hekura* of howler monkeys, which is ever vigilant and able to perceive the presence of enemies and unfriendly shamans. *Pashoriwë*, the spider monkey *hekura*, is of a distrustful nature, and like the howler monkey *hekura* and *hoashiwë*, the capuchin *hekura*, is alert at all times, announcing the presence of enemy shamans (Eguillor-García 1984; Lizot 2004). *Wishariwë* is the *hekura* of the bearded saki, which, aside from alerting people to the dangers of enemy shamans, also has a tendency to become enraged (Lizot 2004).

In his autobiography, Yanomami shaman Davi Kopenawa (Kopenawa and Albert 2014) provides a first-hand account of his encounters with various supernatural and mythical entities. He mentions *Paxori*, the brave and powerful spider monkey spirit, who helps shamans maintain the celestial order by holding up and repairing the fragile vault of the sky, which is in constant danger of collapsing and falling, as it once did in primordial times (Kopenawa and Albert 2014). Kopenawa describes

how the animals they hunt in the forest are different from the spirits or "images" they appeal to in shamanic trance: "And so the *iro* howler monkey we arrow in the trees is other than its image, *Irori*, the howler monkey spirit which the shamans call" (Kopenawa and Albert 2014: 60). Just as animals possess spirit "images" or counterparts, the Yanomami themselves possess animal doubles, known as *rixi*, consisting of rare animal species, encountered only in distant lands, like forest dogs for women and harpy eagles for men (Kopenawa and Albert 2014). Sometimes, these animal doubles are hunted by distant peoples at the fringes of Yanomami territory, causing illness and potential death to the human possessed of that particular *rixi*. When this happens, shamans and their helper spirits (*xapiri*), as well as certain animal *hekura* including the *purupuru namo* monkey spirit, rush to their aid, pulling out the enemy's arrow, hiding the wounded *rixi* and fending off attacking spirits while the shaman completes the cure (Kopenawa and Albert 2014). In the upper Orinoco, the double of a human being embodied in an animal is called *noreshi*, and the spider monkey (*pasho*) is one of the *noreshi* that is embodied among men of the same family (original observation by HCA). Ramos (1990) likewise mentions that the Yanomami may possess individualized alter-animals in the forest that represent some of the physical and behavioral qualities of the person.

Yanomami mythology contains numerous references to various monkey species (Wilbert and Simoneau 1990). The capuchin monkey plays a significant and somewhat humorous supporting role in the Yanomami myth about the origin of copulation, part of the larger cycle of origin myths concerning the twin male ancestors or demiurges, *Omawë* and *Yoawë*, who created the social life of the Yanomami as well as all living beings. Though numerous variations have been recorded (Eguillor-García 1984; Cocco 1987, Lizot 1975b, 1989; Chagnon 1992; Lizot et al. 1993), the story focuses on how *Hoashi* (or *Howashi* in Chagnon 1992) the white-fronted capuchin monkey, who is cousin or son-in-law to the ancestor twins, becomes a victim of his own lust for *Raharaiyma*, the daughter of a giant river creature. The ancestor twins desire her but *Hoashi* rushes to take her first. However, she is possessed with a *vagina dentata* containing a piranha that, in most versions, bites off the tip of the unfortunate *Hoashi's* penis. *Hoashi* rushes off to the trees screaming "Ko, ko, ko!" and turns into a monkey. According to Chagnon (1992), the myth explains why the capuchin monkey has a stubby, nail-shaped penis. In some versions, the capuchin monkeys hide their face in shame because they are unable to reach the attractive girl before the twins arrive. In all versions, the ancestor twins are able to successfully remove the piranhas from her vagina before copulating.

A myth of origin describes how howler monkeys, spider monkeys, and bearded sakis were created when a *hekura* took the shape of a vine hanging from the sky (*hetu mɨsi*), split in half and opened: the beings located at the level of the trees turned into these primates (Lizot 1975b). Another version of the myth describes how a certain kind of climbing vine, *rasirasi* fell from an *apia* (*Micropholis* sp.) tree, which howler monkeys, spider monkeys, capuchin monkeys, and bearded sakis then climbed. Bearded sakis and spider monkeys later dispersed from the tree, while the howlers sat there and began shouting. People also climbed the tree, but those who fell while climbing turned into peccaries, while those who walked on branches

and fell due to their weight became tapirs (Lizot 1989). Lizot (2004) makes brief mention of a mythological place referred to as *irori*, "howler monkey village" or *hoashiri*, "capuchin monkey village."

Regarding the origin of curare, a Yanomami story says that a man decided to create a poison (Lizot et al. 1993). He first tried it on a monkey, which died, confirming its proper preparation and lethal toxicity. The myth of the ancestor of snakes, one of the mythological animals that are now called "sleeper snakes," placed the tail of a bearded saki on his head before going to a party (Lizot 1989). *Wataperariwe*, a Yanomami mythological being, also wears the tail of a bearded saki while walking. In the myth of the "petrified hunter," a man pursuing a group of spider monkeys reaches a rock that begins to turn red, and the man proceeds to turn to stone (Lizot 1989).

9.3 Observations on Primates in the Rio Branco—Rio Negro Interfluvium

9.3.1 Study Site and Study Period (JPB)

Some 2000 Yanomamis of the Kohoroxi-teri group live in and around the village of Maturacá within Pico da Neblina National Park on the upper Rio Negro of Brazil (Boubli 1997, Menezes 2010), the largest Yanomami population in the binational territory. The Yanomami of Maturacá are distributed in eight permanent villages: Maturacá, Ariabú, União and Auxiliadora along the Maturacá canal, Maiá on the Maiá river, Nazaré on the Iá river, Pohoro and Xamatá in small right bank tributaries of the Marauiá river. Ariabú and Maturacá are the two largest villages with about 500 people each (Boubli 1997, Menezes 2010, Boubli, personal observation). The other villages are somewhat smaller with 400 people or fewer. All observations come from a series of field trips taken by JPB to the Yanomami territory in Amazonas, Brazil, from 1986 to 2005, more specifically to the Rio Negro—Rio Branco interfluvial region of Amazonia (Boubli 1997).

In surveys of this region, JPB recorded ten primate species of which five occur throughout the entire territory, namely, *Ateles belzebuth, Alouatta macconnelli, Cheracebus lugens, Saimiri cassiquiarensis,* and *Aotus trivirgatus*. Three species are restricted to the eastern part of the territory: *Chiropotes israelita, Cacajao ayresi, and Cebus olivaceus*; while two are found only in the west*: Cacajao hosomi* and *Cebus albifrons*. A maximum of seven and a minimum of four primates are found in sympatry in different parts of this region (see Boubli 2006). Despite the apparently pristine state of the forest in this region, with a small human population overall, primate densities are naturally low. This is primarily due to the characteristic poor sandy soils in this region limiting forest primary productivity (Boubli 2005). Low primary productivity translates into low biomass at higher trophic levels. The region is covered by a forest mosaic consisting of white sand savanna forests (*campinarana*), *terra firme* uplands, swamp forests and seasonally flooded forests along black water

rivers (*igapós*) (Boubli 2002). These forests are dominated by a limited number of Fabaceae and Euphorbiacieae species (Boubli 2002), most of which produce dry, barochorous fruits that are not favored by arboreal frugivores such as primates, except seed eaters such as uakaris and bearded sakis. However, forests on the slopes of Pico da Neblina mountain range appear to be more productive and species-rich. Although not systematically surveyed, the frugivore community of these slopes appears to be much richer and more abundant. Spider monkeys, in particular, are restricted to this habitat, being virtually absent or extremely rare throughout the flat lowlands below. This ecological fact is determinant to Yanomami choices of settlement and hunting patterns.

9.4 Conservation Outlook

In 2014, the IUCN Primate Specialist Group met to reevaluate the conservation status of all New World Primates. Of the 10 primate species found in the Yanomami territory, only two were classified as threatened, namely, white-bellied spider monkey, *Ateles belzebuth*, and Neblina uakari, *Cacajao hosomi*. *A. belzebuth* has a large distribution, spreading from the foothills of the Andes in Ecuador to the right bank of the Rio Branco in Roraima, Brazil. This species was classified as Endangered under IUCN Criteria A (A2acd + 3 cd + 4acd), which signifies a recent reduction in numbers due to habitat destruction and hunting. Yanomami hunters heavily target this primate as one of their preferred game species. Primates such as the spider monkey that have relatively extended life histories are especially sensitive to overhunting (see Urbani 2005).

Neblina uakaris are also heavily hunted and have been driven to near local extinction along the Maturacá channel, a place where the Yanomami once considered them the most abundant primate. A recent review of the taxonomy of black uakaris separated this taxon into three distinct species with Neblina uakaris restricted to a much smaller range than previously thought (Boubli et al. 2008). In a species assessment in 2012, Neblina uakaris were classified as vulnerable under criteria A2d as there is reason to believe the species has declined by at least 30% over the past 30 years, mainly due to hunting by the Yanomami.

The increased efficiency of firearm use, coupled with rapid population growth of Yanomami communities, has certainly contributed to this decline in primate populations. Guns are much more effective weapons than traditional technology (Yost and Kelley 1983), resulting in an almost tenfold increase in hunting success when compared with bow-and-arrow (Alvard and Kaplan 1991; Levi et al. 2009). Sustained hunting with firearms can reduce populations of sensitive species like large primates very quickly to the point of local extinction in the vicinity of human settlements (Peres 1990; Shepard et al. 2012). However, as long as reserves are large and the human population relatively low, even vulnerable animal species manage to persist by repopulating from distant, non-hunted zones in what is known as “source-sink dynamics” (Novaro et al. 2000; Sirén et al. 2004). Such natural mechanisms of

species recovery can be leveraged in community-based management systems for subsistence hunting in areas where forest cover is still largely intact, such as indigenous and sustainable use reserves in Amazonia (Levi et al. 2009; Shepard et al. 2012; Antunes et al. 2016).

9.5 Final Considerations

The Yanomami live in one of the most remote areas of South America. They have rich cultural traditions, beliefs, and practices that express their intimate knowledge about and relationships with various animal species, including primates. Primates are important in Yanomami diet, material culture, and mythology. Their traditional way of life has undergone rapid change over the last 30 years due to contact with missionaries, researchers, and gold miners and the influx of Western goods, medicines, and technology. Although their forest remains largely intact, wildlife species, including primates appear to have declined in regions near roads and urban centers, as well as near larger Yanomami villages with access to firearms and ammunition. Large primate species can be seen as core, "flagship" species, both in the terms of their cultural importance to the Yanomami, and their role as indicators of hunting pressure and general ecological health. Elsewhere in Amazonia, computer-based modeling in conjunction with participatory monitoring and applied research has focused on large primates as keystone biocultural species for streamlining community-based conservation efforts and modeling alternative management scenarios (Levi et al. 2009, Shepard et al. 2012). Ongoing collaborative research among anthropologists, biologists, and the Yanomami themselves will be crucial to monitoring the health of primate populations and finding solutions for hunting sustainability and food security.

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