

Antiquity of Traditional Ethnobiological Knowledge in Amazonia: The Tupí-Guaraní Family and Time

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Abstract. Traditional ethnobiological knowledge (TEK) in Amazonia can be elucidated by comparative study within a language family. Some of this TEK has been more resistant to change than certain elements from other cultural domains, such as kinship and politics. Although much TEK has been nevertheless eroded over time, the Tupí-Guaraní language family shows evidence for retention of TEK concerning not only many domesticated and semidomesticated plants but also certain wild resources. In particular, that language family has evidently retained complexes of traits that (1) associate tortoises with the human female reproductive cycle; (2) associate *Pachycondyla commutata* ants with menarche and female initiation rites; and (3) prescribe the stings of *Pseudomyrmex* spp. ants as therapy for fever and inflammatory conditions. Such knowledge, however unequally shared in modern languages and cultures, appears to be very old.

Traditional Ethnobiological Knowledge as an Object of Inquiry

In defining traditional knowledge of any sort, one of the components is age: tradition implies antiquity. Traditional ethnobiological knowledge (TEK) in Amazonia, for the present purpose, denotes specifically pre-Columbian objects of understanding that have survived to be documented ethnographically. Borrowings of ethnobiological knowledge by any one ethnic group from non-Amazonian sources that have occurred since 1492 can therefore be excluded as TEK, assuming such borrowings can be detected. Written records are often lacking and archaeological data do not necessarily yield an unbroken record of TEK to the present. Indeed, TEK has been lost autochthonously in Amazonian prehistory. It is important therefore to be able to

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Figure 1. Map of locations of native groups mentioned in the text and notes.

make comparisons based on historical linguistics and modern ethnology as a proxy window onto the Amazonian past (Figure 1).

It is sometimes implied that ethnobiological knowledge is thousands of years or “hundreds of [human] generations” old, simply because biological resources themselves, such as varieties of domesticated and semidomesticated species, are that old (Brush 1993: 660). It is assumed that the knowledge about those resources must be as old as the resources themselves. Yet knowledge of the uses of wild species in Amazonia may be more difficult

Tupian Groups

1. Ka'apor
2. Guajá
3. Tembé
4. Tupinambá
5. Guaraní
6. Yuquí
7. Sirionó
8. Tapirapé
9. Parakanã
10. Araweté
11. Maués
12. Omágua
13. Wayapí
14. Wayâpi

Non-Tupian Groups

- a. Warao
- b. Akawaio
- c. Arekuna
- d. Makusi
- e. Desana
- f. Yanomami
- g. Akuriyo
- h. Rucuyens
- i. Wayana
- j. Apalaí
- k. Quichua
- l. Kuniba
- m. Cashinahua
- n. Mebengôkre (Kayapó)
- o. Mekranoti (Kayapó)
- p. Kalapalo
- q. Kuikuru

to classify as traditional, in the sense of great age, because it tends to be more labile. Names for wild plants seem to be less retained over time than are names for domesticated and semidomesticated plants (Balée and Moore 1991, 1994). It is more problematic to reconstruct uses of wild species without linguistic evidence, because such uses, if the same between disparate groups, could have been borrowed or independently discovered, unless the cultural employment of them is richly detailed and has its source in arcane knowledge. The finer the degree of detail in the usage, together with supporting correspondence from comparative linguistics and ethnology, the more likely the knowledge of the wild species in question will be traditional.

The uses of species and varieties that have been extinct for a lengthy period of time in a cultural repertoire will be obviously even more remote from observation. If loss of biological referents involves a gradual loss of knowledge about them, much native knowledge of plants must have vanished, since (as Charles Clement [1999a, 1999b] has shown) many crop genetic resources in Amazonia have disappeared since 1492. They have been lost in the Andes both in prehistoric and contemporary times too, because of monocropping and changing technologies and market conditions (Zimmerer 1996: 84–88). In addition to species, ancient technologies have been lost as well in Amazonia. Cropping of ridged fields in the Llanos de Mojos, and the exact uses to which prehistoric features such as causeways, canals, and dikes were put, disappeared for the most part by 1200—that

is, well before the conquest (Denevan 1966; Erickson 1995). Although they all used fire captured from the hearths of other groups or lightning strikes and had ways of maintaining it, the actual technology of fire-making was definitively lost by the Tupí-Guaraní-speaking Guajá, Sirionó, Yuquí, and some of the Parakanã (Balée n.d.) as well as by the Carib-speaking Akuriyo (Kloos 1977: 120), and no doubt other peoples at one time or another (Balée n.d.; see Figure 1 for locations of groups). These groups are mainly hunter-gatherers or trekking peoples who had been subjected over time to the progressive loss of other aspects of aboriginal technology, such as the use and processing of bitter manioc, in addition to other domesticated crops.

Regardless of the causes for the loss of TEK, time in general effects an erasure where there is no record keeping. Even record keeping can be destroyed, as when astronomical and calendrical systems, numeration, and writing perish with withering civilizations, even though some semblance of past esoteric knowledge (such as of arithmetic) may be preserved in speech and shared (but, on artificial devices, unrecorded) knowledge (Urton 1997). The Rosetta stone for TEK in Amazonia is not made of rock; rather, it is to be found in living native languages and cultural practices themselves. For that reason if for no other, these phenomena urgently require skillful and meticulous documentation, preservation, and protection.

Knowledge itself definitely changes, as do memories of the past. Some sorts of knowledge are more ephemeral than others. Genealogies in Amazonia seem especially subject to loss (Murphy 1979). It must be remembered that in Amazonia social standing is almost never based on who one's putative ancestors were, since anyone is a potential "somebody" and the kin who count are one's living, coresident consanguines, affines, and affinales (Rivière 1987; Basso 1988 [1973]). Although Darcy Ribeiro (1996) reported that one Ka'apor informant possessed generationally deep genealogical information, I was unable to document similar knowledge among the contemporary Ka'apor, and it seems to be an isolated case in Amazonian native societies. Ascribed relationships to the deceased guarantee no heritage in land and resources, and even if they did, the influence on Amazonian economies would be unlikely anyway. If either land or resources were at a premium in the aboriginal past, the artificial scarcities of raw materials, craft knowledge, and finished products, as documented in the intergroup trading feasts of the Upper Xingu (Oberg 1953) and the Northwest Amazon (Chernela 1993; Jackson 1983), would not be expected to occur. It comes as no surprise to find but limited evidence for corporate kinship groups, except in the Northwest Amazon. By definition, such groups would have to be built on genealogical links to the past, with the more prestigious and wealthiest of them being presumably the oldest (Chernela 1993).

Even in the Northwest Amazon, however, the ranking of sibs and their redistributive power seem quite limited. True chiefs—paramount chiefs—are not attested to in the Northwest Amazon except in confederacies, induced by contact (*ibid.*: 20–22). The ethnohistory of the ancient Atlantic and Amazonian chiefdoms is ambiguous on questions of lineal authority and genealogical memory; in any event, however incipiently stratified such societies may have been (Balée 1984a; cf. Clastres 1989; Carneiro 1995), their political structures did not survive conquest and colonialism, so we should not expect to be able to study these phenomena with comparative ethnographic and linguistic methods anyway. If an Amazonian custom has been extinct for more than four hundred years, its local, linguistic vestiges will have vanished mostly as well.

TEK may have survived better than genealogy and political structure because the web of biotic communities, Amazonian landscapes, and native technologies has been less prone to shredding and extinction. In the here and now, of course, that historical-ecological web faces unprecedented destruction by expansion and growth of the global economy (UNEP 1997). Yet some native customs that are entangled with Amazonian landscapes have remained basically intact for thousands of years, and their antiquity can be proven through comparative and historical methods.

Methods of Isolating TEK

Languages may not be the most ideal data source for adducing TEK, however, because they are subject to fairly rapid change, in evolutionary terms anyway (see Deacon 1997). In Amazonia languages have shown a striking tendency to diverge, unlike in Australia, where nearly all of the 260 aboriginal tongues fit fairly neatly into a single stock (Ruhlen 1991; Dixon 1977, 1980; Crystal 1987). The diversification of language per unit area in Amazonia is less dramatic than in New Guinea, but there are only two stocks (Austronesian and Indo-Pacific) found there (Crystal 1987: 317), whereas Amazonia has many stocks (Kaufmann 1990). Equatorial Africa is also diverse at the language level (and the continent as a whole is the most diverse of all at this level), but not as diverse per unit area as Amazonia and with fewer stocks and families (Crystal 1987; also see Dixon 1997: 95). Even if Joseph Greenberg (1987) is right that there is a single genetic grouping, which he calls Amerind, in South America, it would have to be much older than any conventional “stock” or “family” and composed of more disparate elements than the bona fide “stock” of Australian aboriginal languages.

Regardless of a sharp inclination to linguistic divergence in Amazonia, in contrast to a probable tendency to convergence in aboriginal Australia,

some words and things have stayed the same for hundreds and even thousands of years in Amazonia. Regarding aboriginal Australia, since natural features of language drift should have brought about greater diversification, some intense and prolonged interactions among the diverse languages must have occurred throughout prehistory (Dixon 1997: 89–94). As for Amazonia some of these retained words and things pertain to TEK, as has already been demonstrated for equatorial Africa regarding agricultural words and things by Bantu-speaking peoples (Vansina 1990). One way of exhuming the evidence is to compare at the family level, since the family has fairly knowable time depth and that time depth is circa two thousand years old (old enough for TEK).¹ Borrowings and substratum/superstratum influences can be usually identified and excluded, and what is left that is held in common constitutes cognacy and continuity over time. One does not have to adopt a tree or a wave model as the predominant explanatory device for linguistic change; rather, one only has to admit that lexical items for some kinds of things are more resistant to change than are lexical items for other kinds of things (Dixon 1997: 24–27). Because TEK covers the content of biota and relationships among them, the focus of reconstructive effort tends to be more on the lexicon than on the grammar of language.

The argument concerns conservation of culture and language over time. In Amazonia some features widely separated in space seem to resemble one another so closely that borrowing seems to be out of the question. This can be seen best within a single genetic unit, such as a language family. Eduardo Viveiros de Castro (1992: 1) noted that “there exists something in common among the different Tupí-Guaraní societies beyond their linguistic identity and behind their apparent morphosociological diversity.” While to some extent it is still true that “what to be Tupi means is an open question” (Vidal 1984–85: 4), it is nevertheless discernible that Tupí-Guaraní peoples do have “something in common” that is unique to their language family. In part, this something in common is cosmological, mythological, and sociological, as Viveiros de Castro (1984–85; 1992) has well described; it also refers to ethnobiological knowledge and practice that would have been distinguished from the other Amazonian language families millennia ago. But the proof of shared, unique ethnobiological knowledge in the Tupí-Guaraní family does not mean that the shared “linguistic identity” will be evident in reference to all individual plants and animals, and it does not mean that “morphosociological diversity” (in a language family that includes both the Tupinambá and Guaraní chiefdoms of centuries ago as well as the hunting-and-gathering Guajá and Yuquí of modern times) will obscure such shared knowledge. Even in closely related languages, one can find differences in the use and management of

Table 1. Reflexes for Some Traditional Plant Domesticates in Tupí-Guaraní Languages

English	Scientific	Reflexes in Tupí-Guaraní Languages ^a
maize	<i>Zea mays</i> L.	Ar <i>awaci</i> , As <i>awači</i> , G <i>wači</i> , K <i>awaši</i> , S <i>ibási</i> , W <i>awasi</i>
cotton	<i>Gossypium barbadense</i> L.	Ar <i>miniyu</i> , As <i>aminiyu</i> , K <i>maneyu</i> , S <i>níñu</i> , T <i>manezu</i> , W <i>miniñyu</i>
sweet potato	<i>Ipomoea batatas</i> Lam.	Ar <i>yiti</i> , As <i>yitika</i> , K <i>yitik</i> , S <i>ñiti</i> , T <i>zitik</i> , W <i>yeti</i>
annatto	<i>Bixa orellana</i> L.	Ar <i>iriko'i</i> , K <i>uruku</i> , S <i>urúku</i> , W <i>uluku</i>
arrow cane	<i>Gynerium sagittatum</i> Beauvois	K <i>u'iwa</i> , S <i>uúba</i> , T <i>u'iwa-a</i> , W <i>wiwa</i>

^a The abbreviations refer to language names as follows: Ar = Araweté, As = Asurini, G = Guajá, K = Ka'apor, S = Sirionó, and W = Wayápi. The data sources for the Ar, As, G, and K terms are found in Balée 1994 and Balée and Moore 1991, 1994. The S terms are from my unpublished notes and Schermair 1958 and 1962.

organisms (e.g., between the agriculturalist Tembé and the hunting-and-gathering Guajá, who are linguistically closely related); and in highly similar cultures (in certain respects) great language distance can be discerned (as between the Sirionó and the Araweté).

Ellen Basso (1977: 17) listed eight features that characterized a “typical Carib complex.” Perhaps it is less involved to specify such features, since the Caribs are generally more concentrated geographically (along the northern South American coast east of the Rio Negro and north of the Amazon, with only a few outliers, such as the southerly Kalapalo and Kuikuru in the Upper Xingu). Yet several such features are general enough to apply to other language families and to be part of any description of their typicality, such as bitter manioc cultivation, bilateral descent, kindreds, shamanism, and female puberty seclusion and belief in menstrual pollution. Defining unique or nearly unique features per language family seems more challenging than characterizing the typical ones, but for the purpose of reconstruction of ethnobiological knowledge, it is methodologically necessary to do just that. As for Tupí-Guaraní peoples some generalized (but not universal) and nearly unique features seem to be clear: (1) an association among exocannibalism (or only execution of foreign enemies), name bestowal, and affinity (Viveiros de Castro 1992); (2) a Dravidianate kinship terminology with elements that accommodate oblique marriage, which is more or less similar to several Carib societies (Viveiros de Castro 1998); (3) the existence of agriculture and a strong tendency to sedentarism (Noelli 1996: 34), a minimal repertoire of domesticates (Table 1), and associated

Table 2. Some Ethnozoological Items of Ritual or Medicinal Importance in Amazonia

English	Portuguese/ Spanish	Scientific	Tupí-Guaraní Reflexes ^a
yellow-footed tortoise	<i>jabuti/peta</i>	<i>Geochelone denticulata</i>	Ar <i>yaaci</i> , K <i>yaši</i>
red-footed tortoise	<i>jabuti/peta</i>	<i>Geochelone carbonaria</i>	K <i>karume</i>
lesser giant hunter ant	<i>tocandira</i>	<i>Paraponera clavata</i>	K <i>takangir</i>
Amazonian cobra ant	—	<i>Pachycondyla commutata</i>	K <i>tapiña'i</i> , W <i>tapia'i</i>
fever ant	<i>tachi</i>	<i>Pseudomyrmex</i> sp.	K <i>taši</i> , S <i>tási</i>

^a Ar = Araweté, K = Ka'apor, S = Sirionó, W = Wayãpi.

patterns of plant nomenclature and classification (Balée and Moore 1991, 1994); and (4) certain shared ritual and mythological complexes that have relevance to ethnozoology and that exhibit shared vocabulary (Table 2).

What to date has seemed less certain is shared features related to exploitation of wild resources. The following sections examine how hunting behavior may be influenced by ancient ritual food prescriptions and how the medicinal uses of certain ants may be primordial in the Tupí-Guaraní family.

Menstruating Women and the Yellow-Footed Tortoise

One fairly common feature in the Tupí-Guaraní family concerns activities associated with menarche and menstruation generally, which at face value should not be astonishing. The ritual restrictions placed on menstruating women may be so generalized that their origin is related to something pan-human and would therefore be necessarily very old, at least as old as the Upper Paleolithic and probably older than that (Knight 1991). Ritual restrictions on sexual intercourse, the handling of food, the bathing in communal waters, and so on may have a psychoanalytic basis, such as castration anxiety (Bettelheim 1955), or may be associated with a method of female solidarity and empowerment in relation to males, who are otherwise a burden on society's system of production and reproduction (Knight 1991). The importance of female puberty rites is that they are related to reproduction in an economy of people, not an economy of raw materials in Amazonia; people and labor—specifically the female labor that is needed in the production of flour from bitter manioc—are scarce, not raw materials (Rivière 1987).

One would expect a cultural complex that was at least thirty-five thou-

sand years old to have undergone permutations so that whereas the kernel of the idea remains, much has changed. Indeed, the specific manifestations of such restrictions on girls at menarche and menstruating women are variable among cultures, and this variability constitutes grounds for comparison and contrast with an eye to determining original forms in proto-societies of the past, forms as old as the protolanguages they spoke. Some cultural forms can be studied, in other words, as cognate (hence as cultural reflexes of earlier ones), regardless of the differential utility (if any) they may exhibit in these modern reflexes. In the Tupí-Guaraní family some of these cultural reflexes may be tangled up with ethnobiology.

The Ka'apor people of southeastern Amazonia have a well-documented set of ritual restrictions on menstruating women. In particular, menstruating women and girls at menarche cannot partake of any land meat other than the yellow-footed tortoise (*Geochelone denticulata*). Hunters are prescribed to fetch the tortoises for their wives and daughters, and the women are expected to eat it. The only other species of tortoise in the region, its congeneric the red-footed tortoise (*Geochelone carbonaria*), is positively tabooed as food for menstruating women, perhaps because of a folk association between it and blood (Balée 1984b: 227–28; Huxley 1956: 146, 155; Ribeiro 1976: 55).² There are other rules and regulations concerning menstruation, but this specific one seems to enjoin, to a degree, sustainable hunting (Balée 1984b, 1985).

Tortoises, which are slow of gait and easy to dispatch, are the first major game species to be hunted out near a village. In general, tortoise populations mark the outer boundary of the catchment area as a village ages. Other game (but usually not tortoises) are still taken near the village, especially in swiddens and their ecotones with the forest. The potential hunting pressure near the village that could be brought to bear is never realized, partly because the tortoise injunction forces hunters to the margins of the catchment area.³ The penalties men face for failing to hunt tortoises for their menstruating women include ostracism, cuckoldry, ridicule, and divorce—none being desirable conditions for a man in Ka'apor society. The sustainable hunting of game near the village has been documented even in the very old village of Gurupiuna, in the northern part of Ka'aporland (Queiroz 1989), where the rules of providing tortoise meat to menstruating women and girls at menarche remained in effect as of 1989, when I last visited that village.

It is difficult to find a historical precedent using documentary sources alone for this Ka'apor link of menstruation and the yellow-footed tortoise. The coastal Tupinambá of Bahia may have tabooed tortoise meat for the entire society (Métraux 1979 [1950]: 292–93), but perhaps it was only

the red-footed tortoise that is tabooed by the Ka'apor for people in ritual states, or perhaps it was an anomalous situation for only one group of Tupinambá (who were in fact many peoples) known to the chronicler André Thevet. But another chronicler of sixteenth-century Bahia indicated that tortoises, called by their Tupinambá name of *jabutis*, were edible to the people and were considered to be especially useful as food for the sick (Soares de Sousa 1987 [1587]: 255). The Tupinambá may not be ancestral in a direct historical sense to the Ka'apor, though they might have been to the Tapirapé (Wagley 1977). There were already Amazonian Tupí-Guaraní societies that predated the Tupinambá of the coast (such as ancestral groups in southwestern Amazonia) and those (like the Omágua) that simultaneously existed with them during the sixteenth century. What the Tupinambá had in common with contemporaneous groups, and with modern-day Amazonian Tupí-Guaraní groups, may be better viewed as descended from an earlier protoculture and protolanguage, a methodological usage already well established by linguists (e.g., Dietrich 1990; Rodrigues 1986: 29–39; but see Urban 1996). With the exception of *Língua Geral*, none of the contemporary Tupí-Guaraní languages are seen as descendants of Tupinambá. During the approximately two thousand years that have passed since the first Tupí-Guaraní protocultures, we can anticipate their heritage to have survived unevenly among the descendant groups, including the Tupinambá, for the analytic purpose at hand.

Yet it is still possible that the menstruation-tortoise complex of the Ka'apor postdates 1492, and even that it was introduced no less by European missionaries who also had an impact on the Ka'apor language, which exhibits lexical and perhaps even syntactic influences from *Língua Geral* (Corrêa da Silva 1997). In the 1620s Franciscan missionaries in the lower Tocantins River basin, which was familiar to the ancestral Ka'apor as the Smoke River (*i-takãĩ*), had debated the sanctity of letting their native flock eat tortoise meat on holy days of obligation, such as Fridays. Some missionaries had taken the position that tortoises were not meat and could therefore be eaten, as though they were fish, on such days (Lisboa 1904 [1626–27]: 397). According to the letter from Brother Christovão Lisboa (*ibid.*) of 2 October 1626: “They told him that we had the Letter commanding me that one abstain from the tortoises on fish days for no evidence showed them to be not meat. . . . They declared publicly from the pulpit that they [tortoises] were fish, and as such one could eat them in front of the Pope . . . and that the saintly French clerics had given that [tortoise meat] for fish.”⁴ If native practice had prescribed tortoise meat on ritual days of observance (such as during menstruation and the *couvade*), the missionaries might have adopted the tortoise as a sort of ritualized fish, but

with conflicting dialogue about its propriety. Indeed, though land animals other than yellow-footed tortoises are tabooed, some scaly fish species are allowed as food (but catfish are definitely tabooed) for the menstruating Ka'apor female as well as for Caboclo women in the lower Amazon. Alternatively, did the missionaries impose the idea of ritual foods in the first place, on a society that primordially had none? Probably not, because the ritualization of tortoise flesh is spread more widely than the influence of the missionaries, and the vocabulary associated with it from more than one related tongue seems to be older than the conquest.

The question leads to the astute observation by Viveiros de Castro (1992: 361, n. 6): "There appears to be a Tupí-Guaraní system of 'tortoise transformations' at work." Although originally I lacked evidence for a menstruation-tortoise complex for any group other than the Ka'apor—and I even went so far as to state, "This ritual complex seems to be uniquely Ka'apor" (Balée 1984b: 228)—subsequent research has proven that the complex is indeed shared, albeit unevenly, among diverse Tupí-Guaraní societies of the Amazon Basin. For example, the Araweté prohibit the red-footed tortoise and allow the yellow-footed tortoise as food to people in ritual states, such as the couvade and menarche, similar to the Ka'apor (Viveiros de Castro 1992: 361, note 6). The Parakanã, who live to the south of the Araweté, also allow yellow-footed tortoise to be eaten by people in certain ritually restricted states, such as that of a warrior who has recently killed an enemy (Fausto 1997: 200). Among the Sirionó, at the time of menarche, girls in a group had to sit for several days on ritual wooden planks that had been elevated from the ground and separated from the camp. One Sirionó woman recounted that during her puberty rite, "Konombe mĩ'i ureu" [The only meat we ate was from the tortoise] (Priest and Priest 1980: 124, 131). Other sources indicate that a few other meats could be eaten by Sirionó girls during their puberty rite, but tortoises are included on these lists (e.g., Holmberg 1985 [1950]: 212–13). Both red- and yellow-footed tortoises occur in the Sirionó habitat (Townsend 1995). It is unclear, however, which tortoise is regarded as being edible during menarche. The Araweté term for the yellow-footed tortoise (*yaaci kati*) is cognate with the Ka'apor term *yaši*. Curiously, the Sirionó term *konombe* is cognate with the Ka'apor term *karume* (at the referential level of biological genus, *Geochelone*), which denotes the red-footed tortoise. *Konombe* is a folk generic name denoting both *Geochelone* species in the habitat (cf. Schermair 1962: 390). But because tortoises are among the most extensively collected of game (Holmberg 1985 [1950]: 66; also see Townsend 1995: 55–56), the gross ecological effect on overall game availability induced by an injunction to capture tortoises regardless of species could be regarded as similar

among the Sirionó, the Araweté, the Ka'apor, and the Parakanã. Even if the system of "tortoise transformations" (Viveiros de Castro 1992: 361, note 6) did not promote sustainable hunting⁵ among them all, it is clear that an association between menstruation and the tortoise is autochthonous to Amazonia, predates the Conquest, and may be a distinctive feature of the Tupí-Guaraní family.⁶ In other words, it is very old, and its modern reflexes have been transmitted from generation to generation over many hundreds, if not thousands (specifically, two thousand) of years.

Ant Medicine

Another feature of the Ka'apor puberty rite that is not entirely unique concerns "the ordeal." At the end of about a ten-day period of seclusion in a ritual enclosure (*kapi*), during which time a young female's feet cannot touch the ground, the Ka'apor initiate's hair is shaved off (traditionally with a bamboo knife, now with scissors). Seclusion of girls at first menses and preventing their feet from touching the ground is extremely common worldwide (Knight 1991: 383–89), and it is found in numerous Tupí-Guaraní societies. The head-shaving is found also with the Sirionó (Holmberg 1985 [1950]: 212), the Wayãpi (Campbell 1989: 85–86, 1995: 56), and the Tupinambá (Métraux 1979 [1950]: 100; Staden 1974 [1557]: 171). Perhaps the practice is not specifically Tupí-Guaraní in origin, but it may be distinctive of Amazonia. It serves a pseudocalendrical purpose, for when the girl's hair reaches her shoulders in these societies, she may be married, but not before then. After the Ka'apor initiate's hair is shaven, adult members of her uterine kin group tie long strings made from *kirawa* fiber (*Neoglaziovia variegata*) snugly about her forehead and chest (Figure 2). Carefully knotted about their thoraxes, on each of these strings are about six *tapiña'i* ants (*Pachycondyla commutata*) [= *Neoponera commutata* Reg., = *Termitopone commutata*]. They sting the girl repeatedly; having been stung myself by *tapiña'i* ants, I can confirm that the venomous sting is like that from a wasp—sharp, hot, and painful but still a distant second in discomfort from the sting of the dreaded, lesser giant hunter ants, *Paraponera clavata*.

Remarkably, the Wayãpi of French Guiana also apply the same ants to the body in ordeals (F. Grenand 1989: 417), as do their Carib-speaking neighbors, the Wayana (Devillers 1983: 82). The Wayana may have borrowed the use of the particular ant species used in this practice, called *ma-rake*, from the Wayãpi, since it does not seem to be used elsewhere, though ant ordeals involving other ants are common in northern South America, throughout the Cariban and Arawakan homelands. The Wayapí of north-



Figure 2. Ka'apor initiation ceremony, village of Xoanĩ, 1981. The adults tie a string of stinging *Pachycondyla commutata* ants about the initiate's forehead.

ern Brazil specifically use these ants to sting female initiates in the puberty rite. Called *tapia'i*, ten to fifteen of the ants are tied onto a belt made from palm leaf fiber (probably *Astrocaryum paramaca*) (F. Grenand 1989: 248), and then are applied to the girl's arms legs, abdomen, back, and brow (Campbell 1995: 56). The swordleaf fiber of a closely related species of palm (*Astrocaryum vulgare* Mart.) is used by the Tupí-Guaraní-speaking Guajá of southeastern Amazonia, who do not cultivate *Neoglaziovia variegata*, to make rope and thread (Balée 1992); perhaps there are grounds for a cultural homology here between *Astrocaryum* spp. and *Neoglaziovia variegata*. In other ways as well, including mortification of the flesh (also done by the Tupinambá) (Staden 1974 [1557]: 171), the ordeal among the Ka'apor and Wayapí initiates are quite similar, despite a geographic separation of about six hundred miles. Whereas the general outlines of puberty rites and ritual avoidances of menstruants may be found throughout Amazonia and even worldwide (Knight 1991), some of the specific manifestations, such as these among contemporary Tupí-Guaraní societies, indicate something unique to them, and probably to their forebears.

The use of ants in Amazonian ordeals has been long known. The Maués of the Central Amazon are perhaps most famous for letting lesser giant hunter ants sting boys in virility ordeals (Spix and von Martius 1938 [1831]: 297). Pain and fever from the venomous stings last up to twenty hours or so (cf. Lenko and Papavero 1979: 297, 302–3). The use of ant stings in medicine, magic, and ritual seems especially common in northern Amazonia. Tocandiras are used to sting men, women, and children in diverse ordeals among the Cariban Wayana (O ritual da tocandira 1982), the Apalaí (ibid.), and the Warao (Roth 1924: 708). Unidentified wasps are sometimes used instead of stinging ants in ordeals among the Apalaí (Farabee 1967 [1924]: 223; Roth 1915: 309–10) and the Rucuyens (Roth 1915: 309–10). First-time menstruants among the Desana (Eastern Tukanoan) of the Northwest Amazon actually eat toasted saúva ants (*Atta* sp.) inside a ritual enclosure as part of their initiation ceremony (Reichel-Dolmatoff 1996: 56).

To the Kayapó, ants with the most potent stings are used in hunting magic; their bodies are crushed, mixed with urucu juice, and then pasted onto hunting dogs so these will “hunt with determination as the ants do” (Posey 1979: 143). The Cariban Akawaio of Guyana also apply ant charms to their hunting dogs (Colson 1976: 454). Stinging ants were applied to hunters themselves as fetishes among the Makusis (Roth 1924: 178), the Arekunas, and the Akawaio (Im Thurn 1883: 229, cited in Roth 1915: 280). The Carib-speaking Akawaio call these ant “medicines” (i.e., catalysts or fetishes) by the generic term *murang* (Colson 1976: 454). *Murang* seems

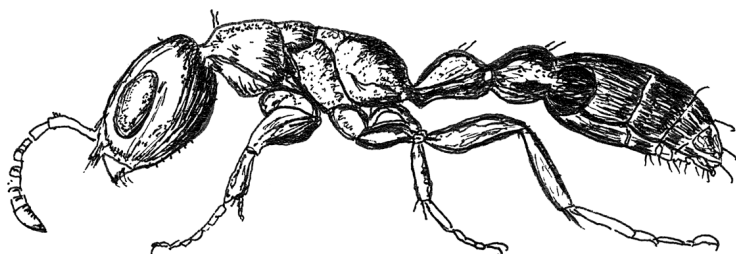


Figure 3. *Pseudomyrmex*, Neotropical genus of stinging ants that exhibit a biologically active venom (redrawn from Hölldobler and Wilson 1990).

strikingly similar in phonetics and meaning to *posáŋa*, a Língua Geral (Tupian) term (Balée 1994: 90, Table 5.1), and suggests further evidence for borrowing between Cariban and Tupian peoples in the post-Columbian period. But it seems that only Tupí-Guaraní cultures aboriginally prescribed the stings of *tapiña'i* ants in puberty rites.

This ritual with *tapiña'i* ants bespeaks a common heritage of the Ka'apor and the Wayapí/Wayãpi to the far north. Since these northern groups have not lived south of the Amazon since before the early 1700s (P. Grenand 1982: 151–63), it is an old custom. The reflex terms for the ant itself (Ka'apor *tapiña'i* and Wayãpi *tapia'i*), moreover, testify to an ancestry and familiarity with the ant that originated many hundreds of years ago, namely, from the time of the beginnings of the Tupí-Guaraní language family itself.

Another use of ants is astonishingly similar between the Ka'apor and Sirionó, who are separated by an even greater divide of some 1,400 miles of the Amazon Basin. Both groups employ ant species from the relatively homogeneous genus *Pseudomyrmex* (called by the reflexes *taši* in Ka'apor and *tási* in Sirionó) as fever remedies and anti-inflammatories (Figure 3). No evidence in Lenko and Papavero 1979 indicates any use for these ants in native or Caboclo medicine in the vast area intervening between the Ka'apor and Sirionó (cf. Posey 1994: 58). The only other area thus far identified where their use seems likely as a febrifuge and in related contexts is among the Yanomami in northern Brazil (Milliken 1998). No other published medicinal references on these species are known in the Amazon. So it is likely that this usage has either been independently discovered by the Ka'apor and Sirionó, respectively, or inherited from Tupí-Guaraní proto-cultures of the remote past. A polysaccharide isolated from the venom of *Pseudomyrmex* sp., which is closely related to all other *Pseudomyrmex* species including those of the Ka'apor and Sirionó habitats, has activity

on the human complement system and may be useful in treating rheumatoid arthritis (Schultz and Arnold 1977, cited in Hogue 1993: 454; Schultz and Arnold 1978). The retention of the term for these ants together with the common medicinal use to which they are put by the Ka'apor and the Sirionó, who could not have borrowed this knowledge from each other, suggests a parallel not a convergent process of retention. Some appeal to utilitarianism may be made regarding pseudomyrmecine ants as remedies for fever and rheumatic complaints. The venom produced is probably not simply a "counter-irritant," as has been suggested for other sorts of ant stings in the literature (Roth 1924: 708), but a biologically therapeutic treatment for these inflammatory conditions. Borrowings cannot be reconstructed, only inferred; the little the Sirionó have in common with the Ka'apor tends to be cognate. In other words, this knowledge exemplifies Amazonian TEK. It is cognate and ancient at once.

Documenting TEK in Amazonia

TEK is shared unequally in Amazonia. Even city-dwellers of the Lower Amazon who abide by restrictions on catfish and other foods (generically called *comida remosa*) during ritual periods of danger (such as menstruation and sickness, generically called *resguardo*) seem to echo native constraints on behavior seen in puberty rites and the couvade, even if they do not hunt tortoises. Indeed, there are none there to hunt except the occasional backyard pet originally found in the interior forests or in the zoological park.

It cannot be argued that in all cases does TEK result in the same, similar, or any ecological effects. Even among native societies deriving their cultural personas from a common source, as among the Tupí-Guaraní societies, it can be seen that they have been exposed differentially over their historical course to contacts with other societies; perhaps this is most obvious in the Upper Xingu and the Northwest Amazon. But isolated groups, such as the Tapirapé, with their Central Brazilian ceremonial moieties and wrestling contests (Wagley 1977), also exhibit hybrid cultural traits, if culture is defined only in reference to language families or like genetic groupings. So we cannot assume that TEK can be traced through a language family to an origin that dates from the time of the protolanguage or protolanguages (see Dietrich 1990, who posits more than one) of that family; likewise, reconstructions of words can lead to red herrings. If one did not know the history of contact, it might be assumed that "firewater" in diverse American Indian languages could be reconstructed as an aboriginal term for whiskey (Bloomfield 1984 [1933]: 455), given that "fire" and "water" are acceptable glosses for preexisting morphemes.

But we would be no further along in understanding the persistence and antiquity of TEK in Amazonia if all features of native life are ascribed to borrowings and exchanges with other groups. It would constitute a philosophical trap of particularism, and general statements concerning mechanisms of TEK would be logically impossible to make. Ethnobiological knowledge in the Tupí-Guaraní family can be and has been lost, and some of it has been borrowed through the centuries. But peculiar cultural and linguistic correspondences among diverse contemporary Tupí-Guaraní societies, such as those presented in this article, indicate that some knowledge of wild biological resources in Amazonia has remained essentially unchanged over thousands of years. It is the future of such knowledge that the postmodern world has cast into doubt.

Notes

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- 1 Although Johanna Nichols (1992: 24) posits an older time depth for language families, at about twenty-five hundred to four thousand years, the genetic units recognized as families in Amazonia seem usually younger than this; Nichols's figure for the family in fact better overlaps with the ranges of the stock in Amazonia (see Kaufman 1990: 51). In the schema proposed by Mary Haas (1969: 60), the protolanguage of the family (such as Proto-Tupí-Guaraní) would be of the first order, since it is based on reconstruction made from comparison of living languages; the protolanguage of a stock, such as Proto-Tupí, would be of the second order, based on the comparison of reconstructed languages. It is probably wisest to work with both orders and between them for more accurate reconstructions.
- 2 Curiously, the red-footed tortoise was traditionally prescribed as food for Ka'apor women with late onset of menstruation or menarche to induce menstruation (Ribeiro 1996: 584).
- 3 There might be other reasons why it is never realized, but these have not been identified. If all tortoises were actually tabooed while other game were always allowed, perhaps a greater hunting pressure would be witnessed in the vicinity of Ka'apor villages.
- 4 "Lhe dizerem que tinhamos nós a Carta mandando eu que se abstivessem dos Jabotins nos dias de peixe por não haver razão que mostrasse não serem Carne . . . disserão no pulpito publicamente que elles erão peixe e por tal se comião diante do Papa . . . e que os religiosos santos francezes por peixe o derão" (Lisboa 1904 [1626-27]: 397).

- 5 That tortoises are quickly hunted out and serve as an index on the availability of other game is supported by evidence from the Mekranoti Kayapó (Werner 1984: 193, cited in Balée 1985: 499–500), who do not use the species for the same ritual purposes as do the Tupí-Guaraní societies mentioned here. In general, the ecological implications of tortoise hunting may be similar, regardless of ritual taboos and injunctions that surround it. Yet its continuity through time may be unrelated to any functional role it may play in the ecology and economy of native society, since it has persisted only among a few of many surviving Tupí-Guaraní groups. In other words, Galton's Problem may be invoked as easily as the functionalist argument to explain the survival, in distinctive versions, of this trait into modern times.
- 6 Ka'apor informants say that the menstruation-tortoise complex began with the origin of the moon. Moreover, the words for moon (*yahĩ*), menstruation (*yaiĩ*), and the tortoise (*yašiĩ*) are very similar phonetically. Moon (*yabiĩ*) was a boy who surreptitiously had sexual intercourse with his sister; he had used genipapo juice to paint his face and thus disguise himself during these rendezvous. Upon being discovered, however, he fled from his punitive covillagers to the sky on a ladder of arrows. His sister followed. He became the moon, and she, Venus (Huxley 1956: 164–66). As part of Moon's revenge on those who forced him into his celestial exile, he imposed menstruation and concomitant meat taboos, except for yellow-footed tortoises, on women (Balée 1984b: 247). A very similar myth was recorded among the Caboclos on the Acará River (Oliveira 1951: 29–30), where the Ka'apor people once lived in the early nineteenth century. It is intriguingly similar in certain respects to a belief of the Panoan-speaking Cashinahua of eastern Peru. According to ethnographer Kenneth Kensinger (1995: 35): "Women, unlike men, menstruate, a physiological process which according to the Cashinahua has its origins in a curse placed on women by an incestuous male who had been fatally cursed by his sister before going on a raid. His severed head, with the telltale black paint on its face, cursed all women as it climbed into the sky to become the moon, and each month both men and women are reminded of the consequences of incest." (Also see Lévi-Strauss 1978: 97–99.)

The association of the moon, menstruation, incest, and genipapo juice (from *Genipa americana*) is found also in the mythology of the Ecuadorian Jungle Quichua (Whitten 1976: 51) and the Arawakan Kuniba (Lévi-Strauss 1978: 94). Although menstruation, the moon, and incest are common in mythology (Knight 1991), these specific associations seem peculiarly Amazonian. If an original, Amazonian, or American mythic foundation cannot be found, perhaps some borrowing occurred among diverse Amazonian language families and stocks at some remote point in the past. In any event myths linking the moon and menstruation across fundamentally unlike societies must be more common, and more alike, than ritual practices conjoining menstruation and a preference or even prescription for tortoise meat, which suggest a more recent though still ancient origin.

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