

Food taboos and folk medicine among fishermen from the Tocantins River (Brazil)

by

Alpina Begossi* and Francisco Manoel de Souza Braga

Dr. Alpina Begossi, Departamento de Ecologia, IB, Universidade Federal do Rio de Janeiro, C.P. 68020, 21.941 Rio de Janeiro, RJ, Brazil.

Prof. Dr. Francisco Manoel de Souza Braga, Departamento de Zoologia, Universidade Estadual Paulista, C.P. 179, 13.500 Rio Claro, SP, Brazil.

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Abstract

Fish utilization for food and folk medicine, and fish preference of families from the Tocantins river were studied. Questionnaires were used in the 234 interviews performed in cities, towns and scattered houses located along 100 km of river stretch. Curimatá (*Prochilodus nigricans*) is the most consumed fish and pacu-manteiga (*Mylossoma duriventre*) the most preferred species. The fish species avoided are correlated with the species used in folk medicine ($r_s = 0,54$, $p < 0.02$). Food taboos, or fish species not consumed during illness, are also cited. The usefulness of fish species for folk medicine and the piscivorous habits of most fish quoted as not consumed partially explain the food choices of fishermen. These explanations conform to materialist theories in cultural ecology.

Keywords: Diet, food taboos, fishing communities, Brazil, Rio Tocantins.

Introduction

Food preferences and avoidances have been a subject of many studies in Anthropology and Human Ecology. MESSER (1984) reviewed some of these studies and factors involved in the food choice of human populations.

The avoidances of some food by people are considered to be based on ideological criteria (SAHLINS 1976) or on materialist reasons (HARRIS 1977, 1985). The ideological view considers that cultural patterns are arbitrary and derive from the human mind (ROSS 1987). Thus, we need to understand the internal logic of culturally specific symbol systems (BASSO 1978). The materialist point of view considers the costs and

* Present address: NEPAM/UNICAMP, C. P. 1170, BR-13081 Campinas, SP, Brazil.

benefits involved in any decision making process, including food choices. For example, HARRIS (1985), based mainly on ecological and economical principles, explained why cows are avoided as food in India, why dogs are usually not eaten by Westerners and why insects are eaten and considered very tasty by a variety of other human populations. As summarized by HARRIS (1987), food habits are explained by the idealist approach as consequence of culture and by the materialist criteria by environmental, demographic, technological and political-economic factors. Food avoidances, or food taboos, have also been interpreted as a way of minimizing the overexploitation of certain animals (ROSS 1978).

This study focuses on fish preferences and avoidances of fisherman families on the Tocantins river, in Brazil. Our aim is to analyze fish utilization and understand why some available fish are eaten whereas others are rejected as food. In this study we use the terms "fish avoided" for species of fish which are usually not consumed and "fish taboos" for species of fish not consumed during illness.

Methodology

The study sites include cities, small towns and riverine settlements located in the banks of the Tocantins river, between the cities of Imperatriz and Estreito. The extension of the area is about 100 km and it is located in the States of Maranhão and Tocantins. Fieldwork included mainly interviews with fishermen and their wives, and was performed in alternate months from October 1987 to June 1988.

The cities and towns studied at the Tocantins river are shown in figure 1. Imperatriz, Porto Franco, Tocantinópolis and Estreito are considered as "cities" and Itaguatins, Descarreto and Lajeádo as "towns". Riverine fishermen were sampled in both sides of the river.

1. Interviews

Interviews were based on questionnaires. A preliminary questionnaire was prepared before going into the field and tested in the first visit. The second questionnaire focused on, among others, fish food taboos and fish medicinal uses. Interviews were performed particularly with fishermen. Wives were asked about their literacy, number of children and age. They also participated in questions about diet, food taboos and medicinal animals. Women were found to react more comfortably than men in answering about food taboos as well as in quoting medicinal animals. This probably occurs because women take care of children and prepare folk medicine at home. In the case of a fisherman's absence, the questionnaire was applied to his wife. The family was the unit of study.

The "Colônias de pescadores" (fishermen's associations) of Imperatriz and Estreito helped in estimating the number of fishermen from each city and in locating their residences. The affiliation files were also consulted. Three kinds of sampling methods were carried out, depending upon the size of the settlements:

a) **cities** - fisherman houses were located after informal interviews with fishermen at the main harbor and after consulting the affiliation files of the "Colônias". Fishermen were found to live clustered in specific localities, usually close to the river. Interviews were undertaken in fishermen's homes or at the main harbor.

b) **towns** - these are small settlements, with fifteen thousands inhabitants or less. Children and other members of fisherman families helped in the location of residences.

c) **riverine settlements** - These include houses scattered along the banks of the Tocantins river. We used motor boats of 25 and 45 HP. Houses were sited from the boat and families from the first three consecutive houses interviewed; the next was skipped. By this method, we tried to sample 75 % of the fisherman families living along the river banks. Farmers were not included, unless they mentioned any kind of subsistence fishing.

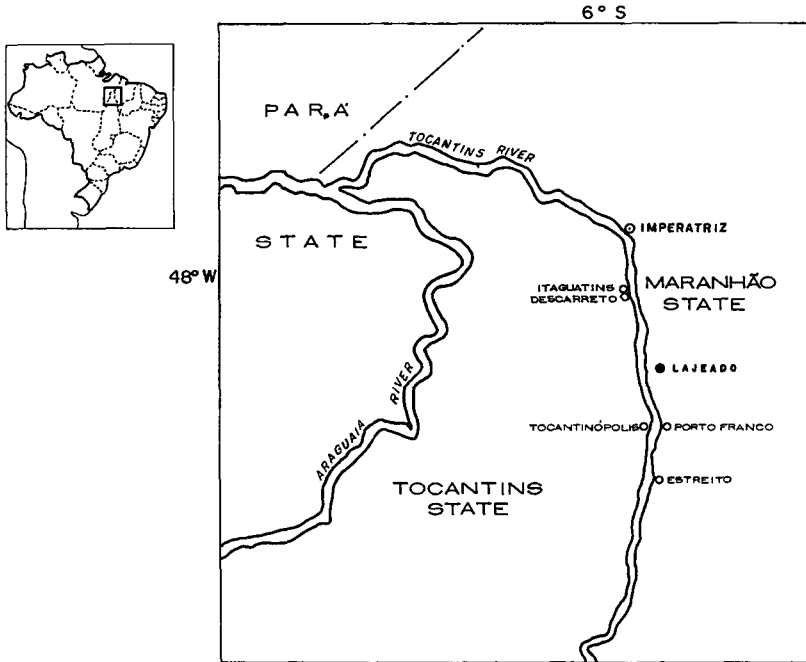


Fig. 1:
Map including the cities and towns studied.

2. Fish identification

Prof. J. C. GARAVELLO (Universidade Federal de São Carlos) collected and identified fish specimens, and checked many of them with fishermen. Prof. M. PETREIRE Jr., from the Universidade Estadual Paulista, contributed useful information. A list of common and scientific names of fish are in BEGOSSI & GARAVELLO (1990).

3. Fish feeding habits

Fish feeding habits were observed through the analysis of stomach contents and through the literature. Unfortunately, there are comparatively few studies on feeding habits of Brazilian fresh water fish. This kind of information for specific species was taken from BRITSKI (1972), NOMURA (1975), NOMURA et al. (1981), NOMURA & NEMOTO (1983), NOMURA & TAVEIRA (1979), NOMURA et al. (1983), CATELLA & TORRES (1984), MOURÃO & TORRES (1984) and GOULDING & FERREIRA (1984). The diet of a group of species of specific regions were found in internal reports, such as INPA/ELETRONORTE (1980/83), ITAIPU-BINACIONAL (1987) and ELETRONORTE/THEMAG (1987/89). Descriptions of trophic interactions among fishes and other organisms in the Amazon area were found in LOWE-McCONNEL (1975) and GOULDING (1980). General food habits of fresh water Brazilian fish and folk habits and beliefs are in SANTOS (1962).

Results

1. Study site description and interviews

Imperatriz is the largest city studied (Table 1). After the construction of the Belém-Brasília and São Luís-Imperatriz highways, migrants from many Brazilian states came to Imperatriz (AROSO & LIMA 1984). Migration was strong during 1960-70, and contributed to the growth and commercial development of Imperatriz (KATZMAN 1975). Fishermen of Imperatriz are located in the vicinities of the market "O Povo Merece" (where fish is sold to buyers). Most streets near fisherman houses are unpaved and houses are made of wood or are huts with mud walls.

Descarreto is found at the periphery of Itaguatins. It consists mainly of an uncovered main street, where huts made of straws or mud are found as well as a small church. Dry leaf palms are collected from the babaçú palm (*Orbignya martiana*) which is a very common palm tree in this region. It is used for roofs and walls.

Lajeado is a small town found near the Belém-Brasília highway and the Lajeado river. Porto Franco and Tocantinópolis are located at the Tocantins river banks, in opposite sides. A ferry boat connects these cities. As in the other settlements, fisherman houses are found near the river banks, living in uncovered streets and in houses made of straw or mud.

The number of interviews are found in Table 1. About 60 % of interviewed people of both sexes are illiterate (including functional illiterates). Women have in average 4 to 5 children. Commercial fishermen are found mainly at Imperatriz, Porto Franco, Tocantinópolis and Estreito. In towns, such as Itaguatins, Descarreto and Lajeado, we found both commercial and part-time fishermen-peasants (or subsistence fishermen). Riverine fishermen are usually fishermen-peasants. These categories tend to use different fishing technologies. Commercial fishermen use motor boats and a variety of nets. Subsistence fishermen use paddled canoes, small nets and hook and line techniques (BEGOSSI & PETRERE Jr. 1988). In addition, women and children often engage in subsistence fishing with hook and lines along the river banks. Nevertheless, some women are engaged in commercial fishing. Important female activities are agriculture and babaçú collection (Figure 2).

2. Fish consumption and avoidances

Figures 3 to 7 show the fish cited by 5 % or more of the interviewees. The scientific names are found in Table 2. Mandí, piau and sardinha include a set of species, most important of which are mandí-cabeça-de-ferro (*Pimelodus blochii*) followed by mandí-moela (*Pimelodina flavipinnis*), piau-cabeça-gorda (*Leporinus frederici*) and piau-vara (*Schizodon vittatum*). Sardinha is represented by species from different families and as such is not included in our discussion.

Figure 3 shows fish cited by interviewees as "fish consumed". Curimatá (*Prochilodus nigricans*) was uniformly quoted as the most consumed in all localities. Mandí-cabeça-de-ferro was cited by 50 % of fishermen from Lajeado and by 57 % of riverine fishermen. This small fish is caught by hook and line and is a cheap fish in the market (M. PETRERE Jr. pers. comm.). Branquinha (*Psectrogaster amazonica*), an important commercial fish in the Middle Tocantins, is consumed on a large scale in Imperatriz (60 %), where there are many commercial fishermen.

Tab. 1: Interviews with fisherman families performed in the area of study; * localities in the surroundings of Imperatriz: fishermen in this category were interviewed in the market "O Povo Merece", during fish landings; ** source: IBGE (Brazilian Institute of Geography and Statistics)(1987); *** rough estimation of the number of fishermen (urban areas) from the Colônias de pescadores (fishermen's associations) Z-29 (Imperatriz) and Z-35 (Estreito).

Locality	Number of Interviews	Total Population** (thousands)	Number of Fishermen (***)
Imperatriz	52	235	251
Descarreto	17	15	—
Itaguatins	19	—	20
Lajeado	14	—	—
Porto Franco	6	27	10
Tocantinópolis	23	31	40
Estreito	26	18	50
Riverine	57	—	—
Other*	20	—	—
Total	234	—	—

Figure 4 shows the fish preferred as food by fishermen families. Pacu manteiga (*Mylossoma duriventre*) and piabanha (*Brycon* sp.) were cited in all localities. Again, mandí-cabeça-de-ferro was specially mentioned by riverine fishermen (36 %). Curimatá and branquinha, the most important fish sold by fishermen, are not the most preferred fish (quoted by 3 % and 16 % of families, respectively).

Some fish are considered to have a bad taste, appearance, or are simply said to be disgusting. These fish are usually not consumed. The results concerning the question "Which kind of fish you do not eat?" are in figure 5. Cuiú-cuiú (species of Doradidae) are probably avoided due to their appearance and hard texture; as the other Doradidae, its body is covered with bone plates. Candirú (*Cetopsis* sp.) eat worms and dead animals. As observed by one of the authors (FMSB) during fieldwork in the Amazon region, fishermen from the INPA (National Institute of Amazon Research) consider the candirú very nasty, because they also eat dead human bodies. SANTOS (1962), on the other hand, pointed out that it is appreciated especially by native people. There are two kinds of candirú of common occurrence in Amazon: one type has few inches of length and is a gill parasite and people are afraid of it because it can go inside the uretra and other body cavities (family Trichomycteridae); the other, which is the one referred to in our study, is bigger and necrophagous (Cetopsidae). Other fish avoided are used in folk medicine, such as pirara and raia (ray), among others (Table 3). Ray is probably under-represented in the interviews because some fishermen do not consider it to be a fish.



Fig. 2:

A woman breaking babaçú (*Orbignya martiana*) after collection. Notice the wall of the houses as well as the basket made of leaves of the palm tree.

Some fish are tabooed in certain circumstances. These fish are considered to be "carregado" or "reimoso". "Carregado" is a name used by fishing communities from different parts of Brazil and these food are thought to worsen illness or to cause wounds and other health problems (BEGOSSI, unpubl.). MORAN (1974) noticed food restrictions during illness, pregnancy, lactation and menstruation in Amazon communities. Families from the Middle Tocantins also explained that fish considered to be "reimoso" should be avoided especially in case of illness, wounds, menstruation and after child birth. However, we found a gradient from women who never eat certain fish species, to women and men who avoid them periodically (menstruation/child birth or disease) to men who never avoid these species. The diseases most commonly mentioned for "man avoidances" were sexually transmitted diseases and colds. Wounds were also cited.

Amazon food taboos for fish species were mainly reported by SMITH (1981). Food restrictions (including the restriction of certain fish species) during illness or related to pregnancy were also reported in other countries, such as in Malaysia (McKAY 1980; WILSON 1980) and India (FERRO-LUZZI 1980a, b, c). The fish tabooed ("carregado" or "reimoso") at the Tocantins river are shown in Figure 6. Scaleless fish, called "peixes de couro" (surubim - *Pseudoplatystoma fasciatum*, barbado - *Pinirampus pirinampu*, jaú - *Paulicea lutkeni*, and pirarara - *Phractocephalus hemiliopterus*, among others) are usually considered as "reimoso". Some fish "with scales", such as curimatá and jaraqui (*Semaprochilodus brama*), are also tabooed. These fish are considered as having a "strong meat".

Tab. 2: Feeding habits of the fish quoted during interviews.

local	Name scientific	Family	Main diet
Aruanã	<i>Osteoglossum bicirrhosum</i>	Osteoglossidae	Arthropods, fish
Barbado	<i>Pinirampus pinirampu</i>	Pimelodidae	Fish
Bico-de-pato	<i>Sorubim lima</i>	Pimelodidae	Shrimp, fish
Branquinha	<i>Psectrogaster amazonica</i>	Curimatidae	Detritus, periphyton
Cachorra	<i>Hydrolycus scomberoides</i>	Characidae	Fish
Candirú	<i>Cetopsis cf. caecutiens</i>	Cetopsidae	Insects, worms, mud, necrophagous
Capadinho	<i>Parauchenipterus galeatus</i> <i>Tocantinsia piresi</i>	Auchenipteridae Auchenipteridae	{ Algae, fruits, Bryozoa, arthropods, fish
Caranha	<i>Colossoma brachypomum</i>	Serrasalmidae	Fruits, seeds
Corvinha	<i>Plagioscion squamosissimus</i> <i>P. surinamensis</i>	Sciaenidae Sciaenidae	Insects, Crustacea, fish
Cuiú-cuiú	<i>Megalodoras irwini</i> <i>Platydoras costatus</i> <i>Pterodoras granulosus</i> <i>Pseudodoras niger</i>	Doradidae Doradidae Doradidae Doradidae	Fruits Fruits Fruits, Crustacea, molluscs Fruits, molluscs, shrimp
Curimatá	<i>Prochilodus nigricans</i>	Curimatidae	Detritus, periphyton
Filhote	<i>Brachyplatystoma filamentosum</i>	Pimelodidae	Fish
Jaraquí	<i>Semaprochilodus brama</i>	Curimatidae	Detritus, periphyton
Jauí	<i>Paulicea lutkeni</i>	Pimelodidae	Fish
Lampreia	<i>Ramphichthys marmoratus</i> <i>R. rostratus</i> <i>Sternarchoramphus mulleri</i> <i>Sternopygus macrurus</i> <i>S. obtusirostris</i>	Rhamphichtidae Rhamphichtidae Apterontidae Sternopygidae Sternopygidae	Worms and insect larvae found in the mud
Mandí	<i>Pimelodella cristata</i> <i>Pimelodina flavipinnis</i> <i>Pimelodus blochii</i>	Pimelodidae Pimelodidae Pimelodidae	Insects Benthos Detritus, fruits, arthro- pods, fish
Piabanha	<i>Brycon sp.</i>	Characidae	Insects, frogs, fish
Pacu	<i>Mylossoma duriventre</i>	Serrasalmidae	Seeds, fruits
Piau	<i>Laemolyta petile</i> <i>Leporinus affinis</i> <i>L. friderici</i> <i>L. trifasciatus</i> <i>Schizodon vittatum</i>	Anostomidae Anostomidae Anostomidae Anostomidae Anostomidae	Fruits, seeds, arthropods and larvae
Pirarara	<i>Phractocephalus hemiliopterus</i>	Pimelodidae	Seeds, fruits, roots Fish, turtles
Poraquê	<i>Electrophorus electricus</i>	Electrophoridae	Shrimp, fish
Raia	<i>Potamotrygon motoro</i> <i>P. hystrix</i> <i>Disceus thayeri</i>	Potamotrygonidae Potamotrygonidae Potamotrygonidae	Benthos Benthos Benthos

Table 2: Continued

local	Name scientific	Family	Main diet
Sardinha	many spp.	Engraulidae Characidae Clupeidae	Seeds, fruits and insects
Surubim	<i>Pseudoplatystoma fasciatum</i>	Pimelodidae	Fish
Surubim chicote	<i>Sorubimichtys planiceps</i>	Pimelodidae	Fish
Traíra	<i>Hoplias malabaricus</i>	Erythrinidae	Shrimp, fish
Voador	<i>Argonectes scapularis</i>	Hemiodontidae	Detritus, benthos and
	<i>Hemiodus unimaculatus</i>	Hemiodontidae	periphyton
	<i>H. argenteus</i>	Hemiodontidae	

3. Fish used in folk medicine

Rays are the most important fish used in folk medicine (Figure 7). The parts of the fish used to prepare the medicines and the illnesses related to them are shown in Table 3. The effectiveness of these medicines will not be discussed here. SANTOS (1962) mentioned medicinal effects of the fermented fat of pirarara and the belief that a skin disease called "puru-puru" is caused by consumption of this fish. The meat of poraquê is seldom consumed and the electric discharges of the fish are considered effective in the treatment of rheumatic pains (SANTOS 1962).

Fish fat is commonly used in folk medicine. A few interviewees quoted the fat of other fish such as cachorra, dourada, piabanha and piau-cabeça-gorda (for earaches), cuiú-cuiú (rheumatism), curimatá (eye pains), pacu manteiga (sexually transmitted diseases), surubim (cold) and of any scaleless fish ("peixes de couro") to treat skin burns. Three interviewees told us that the fat of any fish could be used to cure skin burns. A flour made from the scales of piroasca (*Arapaima gigas*) serve against asthma and pneumonia and of curimatá to cure wounds. One interviewee believed that spitting in the mouth of cará (species of Cichlidae) and throwing the fish back into the river would cure tuberculosis.

Some fish, such as branquinha (*Psectrogaster amazonica*) and ubarana (*Anodus elongatus*) are not used for any specific disease, but are recommended to be eaten by ill persons. Other animals are also considered as having curative properties. The fat and skin of caiman are used against epilepsy and snake-bites; and the fat of "sucuri" (South American Anaconda) is used for rheumatism, common colds and skin burns.

Some fish seem more important in certain localities than in others. For example, ray was mentioned by 64 % of fishermen from Estreito, 57 % from Tocantinópolis, 50 % from Imperatriz and only by 7 % from Lajeado. Jaú was mentioned by 56 % from Estreito, 48 % from Tocantinópolis, 36 % from Lajeado and only 3 % from Imperatriz. Poraquê was mentioned by 80 % of fishermen from Porto Franco and surubim chicote by 40 % of fishermen from Imperatriz (this fish was not mentioned at Porto Franco, Tocantinópolis, Estreito, and at the banks of the river from Maranhão State). It might

Tab. 3: Folk medicinal uses of fish on the Tocantins river, based on interviews with fisherman families (quotations from 5 % or more interviewees). Names in bold print refer to the most quoted fish part and disease. * called "rendição"; ** called "dor de lado"; *** Brazilian rum made of sugar cane. **** wounds specially caused by Leishmaniosis (called "Leisho") disease and by sexually transmitted diseases.

Fish	Part used	Disease	Receipt
Raia	fat	asthma cough, cold earaches skin burns hernia*	eaten or passed or massaged in the area affected
	spur	pneumonia**	toasted and drunk with water or "cachaça"***
Jaú	fat	skin burns	eaten, passed
	skin	rheumatism asthma cold earaches toothaches chilblains	or massaged
Poraquê ("Peixe elétrico")	meat	wounds****	eaten
	fat	rheumatism cold asthma aches	passed, massaged or eaten
Surubim-chicote	bones	snake-bites	tea is drunk
	meat	Leishmaniosis tuberculosis	the cooked fish is eaten
Pirarara	fat	skin burns rheumatism cough, cold asthma wounds hernia	passed or massaged
	otolith	painful urination hemorrhages snake-bites	a tea is made with a flour from the toasted stone
Traíra	fat	earaches	put in the ear
	---	diarrhea	the broth from the cooked fish is drunk
	meat	any disease	eaten

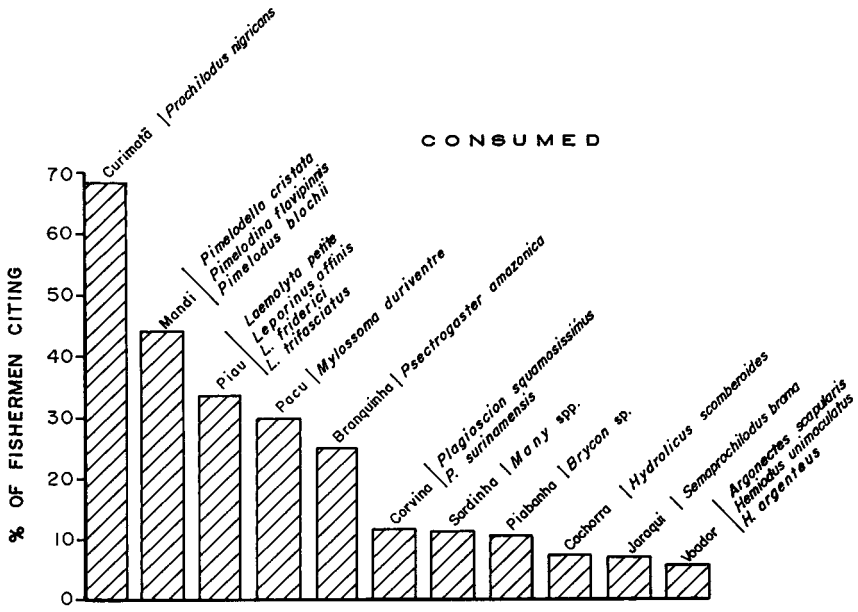


Fig. 3: Fish consumed mentioned by at least 5 % of the families interviewed (n = 233).

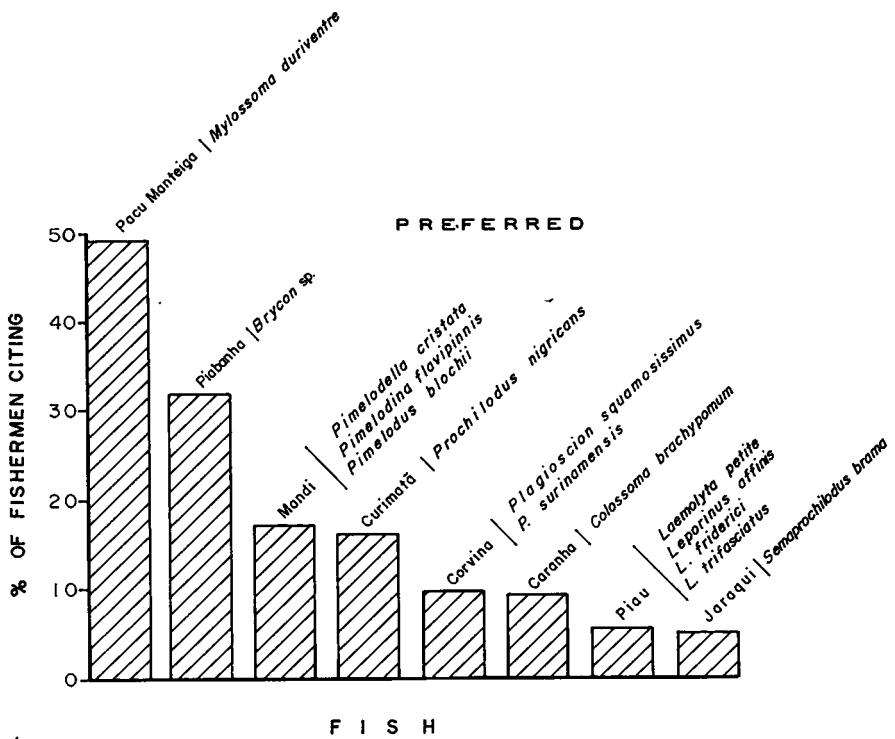


Fig. 4: Fish preferred mentioned by at least 5 % of the families interviewed (n = 185).

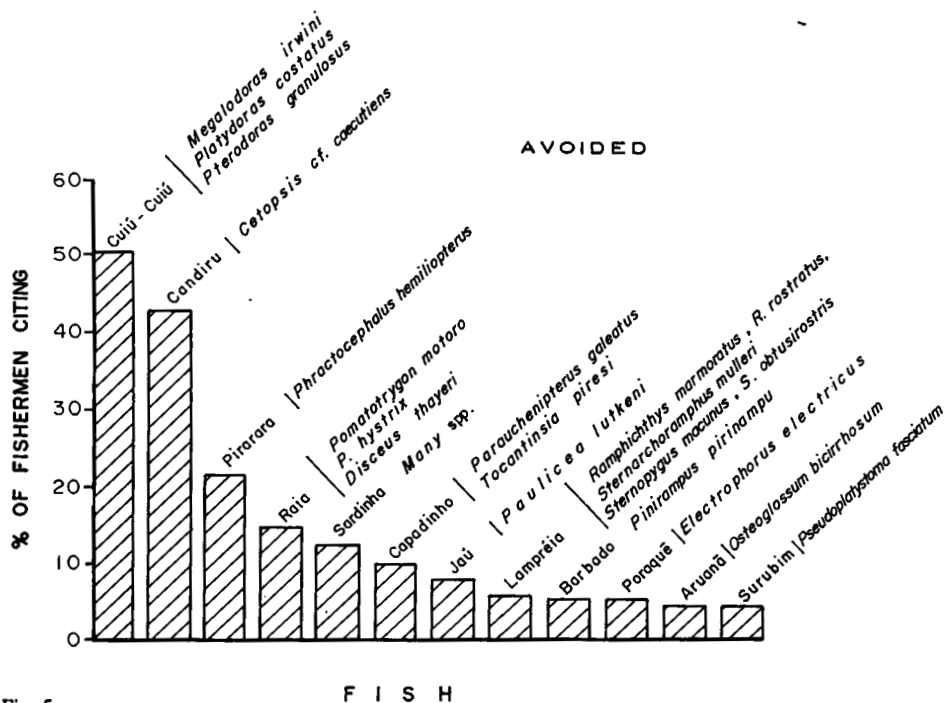


Fig. 5: Fish avoided as food and mentioned by at least 5 % of the families interviewed (n = 222).

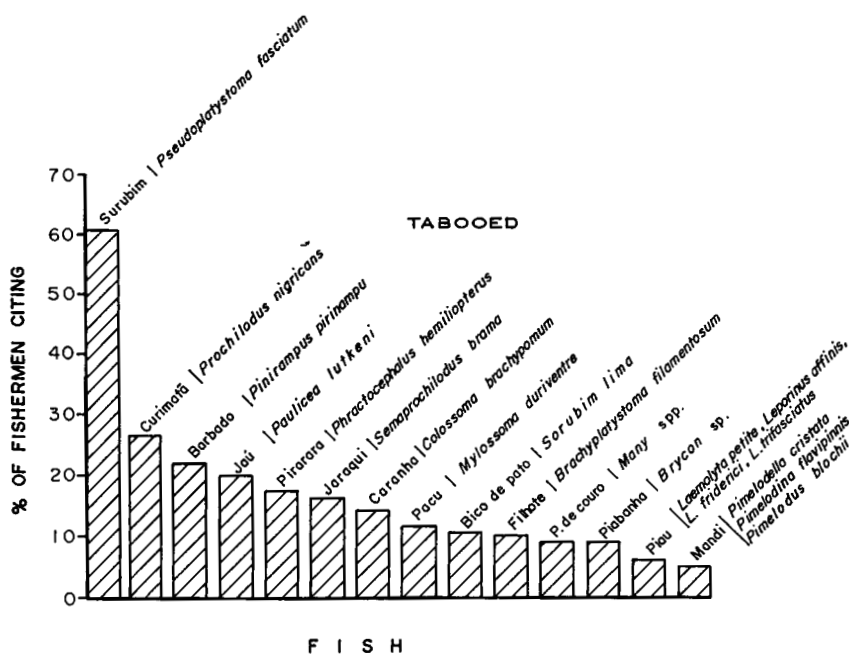


Fig. 6: Fish classified as "tabooed": fish avoided during illness, menstruation or after child birth. Total families interviewed = 196. "Peixes de couro" means any scaleless fish.

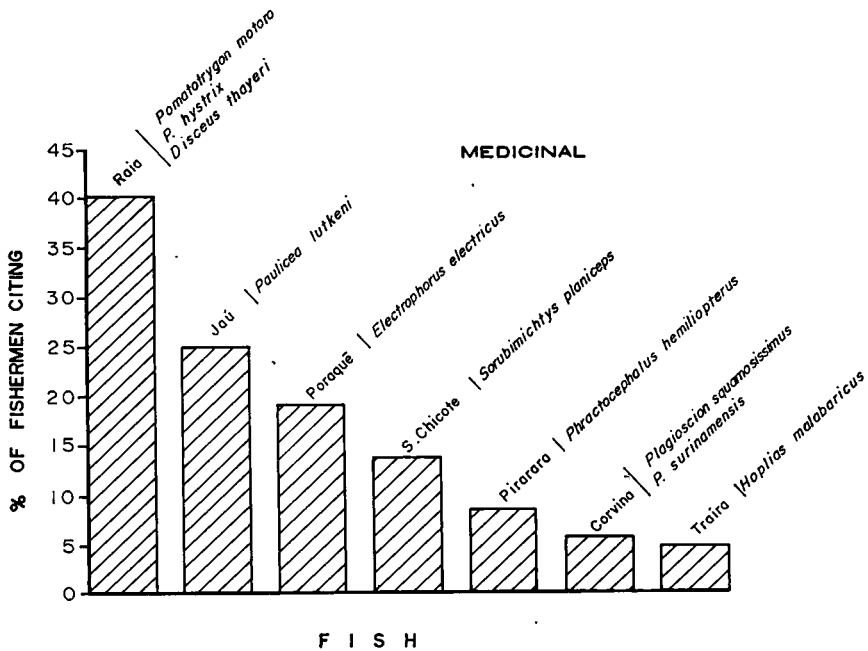


Fig. 7:
 Medicinal fish. These fish (or their fat) are used to cure asthma, skin burns and rheumatic pains, among others.
 Interviews = 189.

be asked if these differences are related to environmental circumstances. Or, in other words, can these fish uses serve as "biological indicators" for local diseases? Leishmaniosis and malaria are common in this part of Brazil. The fact that fishermen from Imperatriz mentioned proportionally more the use of surubim chicote to cure this disease could represent the importance of Leishmaniosis in this area. Without data on local tropical disease this hypothesis cannot be tested. These data are not easily available because they are not recorded since many sick people do not go to hospitals, particularly in isolated settlements.

Medicinal animals are usually avoided as food, and this will be discussed in the next section.

Discussion

Two kind of explanations seem related to the food avoidances found at the Tocantins river. The first is the probable knowledge of fish food habits by fishermen. The second concerns the "usefulness" of fish or maintenance of available fish to be used for medical purposes (BEGOSSI 1989a).

1. Fish diet

The feeding habits of the fish mentioned by interviewees are in Table 2. Comparing this table with Figures 3 to 6 we observe that carnivorous fish, most of which with piscivorous habits, are the fish avoided as food (75 %) or tabooed (57 %). In contrast, 64 % of fish consumed and 62 % of fish preferred can be considered as herbivorous or as detritivorous. Secondary consumers are often avoided as food while primary consumers tend to be preferred as food. A similar pattern was observed in a previous research in a maritime fishing community, located in southeast Brazil (Búzios Island) (BEGOSI, unpubl.). The probability of acquiring toxins increases as one moves up in the trophic levels (toxins may accumulate at top levels). Cases of toxic fish exist, such as the well known ciguatera (LEWIS 1984). Thus, the avoidance of piscivorous fish, especially in case of illness (fish tabooed) may be an adaptive behavior.

2. Medicinal fish, or "the drugstore hypothesis"

BEGOSI (1989a) argued that fish considered to be important in the treatment of diseases of isolated populations may be tabooed as to be available for folk medicine. Many people feel comfortable when living in cities, near medical centres and drugstores. Nature is the "drugstore" of isolated human populations. Plants used for medical care are collected and also cultivated; fish species used for this purpose should be preserved. Tocantins riverine fishermen seem to conform to this behavior. It should be pointed out that in Brazil, living in or near cities does not guarantee medical care. Pharmaceutical medicines are expensive and most poor people rely on home made medicines. For example, fishermen from Imperatriz, the largest city in our study, are also using fish as medicines.

If the "drugstore hypothesis" holds, we should expect that the most important fish species used for folk medical care would also be the most avoided as food. A Spearman correlation was calculated for all the fish mentioned in interviews (Table 4). Results indicate that the fish species most avoided are also used for medical purposes ($r = 0.54$, $p < 0.02$, $df = 20$).

Tab. 4: Spearman's correlation among fish utilization at the Tocantins river based on interviews with fishermen. * $0.05 < p < 0.10$; ** $p < 0.02$, $df = 20$.

	Medicinals	Avoided
Avoided	0.54**	
Tabooed	0.07	0.43*

3. Other aspects: parasites, lipids and toxins

Position in the food web and importance in folk medicine are the most important factors explaining fish avoidances for consumption on the Tocantins. Other minor factors also play a role in fisherman diet. For example, internal organic features of specific fish or fish "diseases" influence this behavior.

The family Pimelodidae, one of the biggest families of Amazon fish (SANTOS et al. 1984), is a very important group of fish avoided as food and/or tabooed. Among 12 fish cited as avoided in interviews (only common names are considered: if mandí includes three species of Pimelodidae, we counted as one), 4 are Pimelodidae, and among 13 cited as tabooed, 7 are Pimelodidae. We found only 1 Pimelodidae among the fish consumed (out of 11) and preferred (out of 8). Pimelodidae are usually parasited by cestoids. ITAIPU-BINACIONAL (1987), listed four pathogenic species of cestoids proteocephalids of Pimelodidae: (*Januella glandicephalus*, *Megathylacus brooksi*, *Travassielia avitelina* and *Peltidocotyle rugosa*). In the same Itaipu reservoir, 605 Pimelodidae of the species *Paulicea lukeni*, *Pimelodus maculatus*, *Pinirampus pirinampu*, *Pseudoplatystoma corruscans*, *Sorubim lima*, *Hemisorubim platyrhynchus*, *Iheringichthys labrosus*, *Pseudopimelodus zungaro* and *Pimelodella* sp. were analyzed. Among these, 450 were parasited by cestoids, found in their digestive tract. These parasites are responsible for localized sores and make the fish more susceptible to secondary infectious diseases.

Another aspect is the lipid content of fish. Members of fisherman families during interviews commented that "reimoso" fish contain "graxa" (fat). SMITH (1981) pointed out that fat fish are avoided in Amazon. Data on lipid content of Amazon fish species are not readily available. However, JUNK (1976, cited in SMITH 1981) and JUNK (1985) provided a list of the lipid content for some species. The fish most eaten and preferred by fisherman families (curimatá, mandí, piau, paci-manteiga and piabanha) have high lipid contents (Table 5). The most avoided and tabooed fish (cuiú-cuiú, pirarara, surubim and curimatá) have low lipid contents, except for curimatá. Thus, contrarily to SMITH's (1981) hypothesis, fat fish are not the most tabooed. Actually, if there is any tendency, it is that fat fish are the most eaten and preferred fish.

According to evolutionary ecological models, such as "optimal foraging theory" (PYKE 1984; STEPHENS & KREBS 1986), conventional foragers should maximize their net energy intake, which are usually measured in calories. BEGOSSI (1989b) observed the importance of variables other than calories, such as fish bones and prices, in the diet (especially fish) of families from Búzios Island (SE Brazil). If fishermen from the Tocantins river are "optimal foragers", all other things being equal, they should be selecting the prey with the highest caloric content, which appears to be the case. As lipids are more important than proteins for determining caloric contents (WHO 1973), eating fat fish would be an optimal strategy. However, data on lipid content for many Amazon fish species are lacking and the few data available do not allow us to reach reliable conclusions.

Finally, certain fish can also be toxic. There are no available data on the natural toxicity of Amazon fishes. However, in a list of toxic plants and animals found in ROSENBERG (1987), the ray *Potamotrygon* sp. and six species of catfish are mentioned. The toxicity of some fish can be related to fish food habits, since many fish acquire their toxicity through the food web. However, more studies are needed to have a complete understanding of the complex relationships of feeding patterns of fish and of local fishermen.

4. Conclusions

Food preferences and avoidances among fisherman families from the Tocantins river can be partially explained by two major factors: fish food habits and fish "usefulness". Fish that are secondary consumers are avoided as food, especially piscivorous fish. In

contrast, herbivorous and detritivorous fish are preferred as food. The probability of acquiring toxins in the food web could explain this pattern of food preference. Fat fish are well accepted by people and the calories obtained from them probably support it.

Tab. 5: Fat content of fish species (%). Source: JUNK (1976) in SMITH (1981) (= S) and JUNK (1985) (= J). ● Species mentioned in interviews; ■ genera mentioned and □ family mentioned; * *Pseudoras niger*.

Species	Local name	Fat (%)
■ <i>Brachyplatystoma flavicans</i>		0.6 (J)
● <i>B. filamentosum</i>	Filhote	0.6 (J), 0.6 (S)
■ <i>B. vaillanti</i>		4.8 (J)
■ <i>Brycon</i> sp.	Piabanha	22.8 (S)
■ <i>Brycon</i> cf. <i>melanopterus</i>		15.2 (J)
■ <i>Colossoma bidens</i>		0.5 (J)
■ <i>Colossoma macropomum</i>		1.5 (J)
□ <i>Hemiodus unimaculatus</i>		16.6 (J)
■ <i>Leporinus fasciatus</i>	Piau	15.8 (S)
■ <i>Mylossoma</i> sp.	Pacu	24.8 (S)
● <i>Osteoglossum bicirrhosum</i>	Aruanã	2.6 (S), 2.6 (J)
● <i>Oxydoras niger</i> *	Cuiú-cuiú	0.2 (S), 0.4 (J)
● <i>Phractocephalus hemiliopterus</i>	Pirarara	0.2 (J)
● <i>Pimelodina flavipinnis</i>	Mandí	13.6 (J)
● <i>Pimelodus blochii</i>	Mandí	10.2 (J)
● <i>Plagioscion squamosissimus</i>	Corvina	5.8 (S)
● <i>Prochilodus nigricans</i>	Curimatá	17.4 (S)
● <i>Pseudoplatystoma fasciatum</i>	Surubim	2.0 (S), 0.3 (J)
■ <i>Semaprochilodus taenurus</i>		8.2 (J)
■ <i>S. insignis</i>		9.4 (S)

Medicinal fish are avoided as food. The theories of HARRIS (1985) seem to fit in this food avoidance case. Animals that are too important for other tasks should not be eaten, and the only way to avoid temptation is to classify them as "bad to eat". The presence of parasites in the Pimelodidae as well as their piscivorous habit reinforces an existing taboo. Food avoidances may also not be related to animal conservation. Animals may not be avoided or tabooed especially to be preserved: some are not consumed because there are better uses for them. This study suggests that to understand food choice and taboos we must look for other uses of food items or for the context in which the population lives.

Summary

Food choice patterns are a polemic subject in Human Ecology. We studied fish uses and choices (consumption, medicine, preference and avoidance) among families of fishermen from the Middle Tocantins

(Brazil). The study sites included cities, towns and riverine settlements along 100 km of the river. Questionnaires were used to guide the interviews with the families (fishermen and/or wives). Curimatá (*Prochilodus nigricans*) is the most consumed fish and pacu-manteiga (*Mylossoma duriventre*) the most preferred fish. Other fish, such as species of Doradidae (called "cuiú-cuiú"), are avoided as food. Surubim (*Pseudoplatystoma fasciatum*) is avoided as food in specific health circumstances. The fat of ray is commonly used to treat asthma. The main explanation for the avoidances of certain fish may be their "usefulness" (used for medicine, Spearman, $r = 0.54$, $p < 0.02$) and their piscivorous habits. More research is needed to look for a general pattern of fish avoidances.

Resumo

Escolhas alimentares são um ponto polêmico em Ecologia Humana. Estudamos a utilização e escolha (consumo, medicina caseira, preferência e rejeição) de peixes entre famílias de pescadores do Médio Tocantins (Brasil). As áreas de estudo incluíram cidades, vilas e comunidades ribeirinhas localizadas ao longo de 100 km do rio. Utilizamos questionários para guiar as entrevistas. Curimatá (*Prochilodus nigricans*) é o peixe mais consumido e pacu-manteiga (*Mylossoma duriventre*) o mais preferido. Outros peixes, como algumas espécies de Doradidae (chamadas de cuiú-cuiú) são evitados como alimento. Peixes como o surubim (*Pseudoplatystoma fasciatum*) são tabus alimentares relacionados à saúde individual. A gordura da raia (*Potamotrygonidae*) é bastante usada no tratamento da asma. As principais razões que podem explicar porque certos peixes não são consumidos são a sua "utilidade" (medicina caseira, Spearman, $r = 0.54$, $p < 0.02$) e seus hábitos piscívoros. Entretanto, são necessários mais estudos para encontrar um padrão geral de tabus alimentares com relação à peixes.

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References

- AROSO, O.C.L. & O.C. LIMA (1984): Áreas culturais linguísticas maranhenses. - *Ciência e Cultura* 36: 995-998.
- BASSO, E.B. (1978): Comments. - *Current Anthropology* 19: 16-17.
- BEGOSSI, A. (1989a): Tabus alimentares na Ilha dos Búzios, uma comunidade de pescadores. - In: DIEGUES, A.C. (ed.): III Encontro de Ciências Sociais e o mar no Brasil, Coletânea de trabalhos apresentados. São Paulo, IIOUSP/F. FORD/UICN: 253-262.
- BEGOSSI, A. (1989b): Food diversity and choice, and technology in a Brazilian fishing community (Búzios Island, São Paulo State). - PhD Dissertation, Univ. California, Davis, USA (UMI # 8919534).
- BEGOSSI, A. & J.C. GARAVELLO (1990): Notes on the ethnoichthyology of fishermen from the Tocantins river. - *Acta Amazônica* 20: 341-351.

- BEGOSSI, A. & M. PETRERE Jr. (1988): Utilização de recursos aquáticos e tecnologia entre pescadores do Médio Tocantins (GO e MA). - In: DIEGUES, A.C. & R.R. SALES (eds.): II Encontro de Ciências Sociais e o mar no Brasil, Coletânea de trabalhos apresentados. São Paulo, IOUSP/F. FORD/UICN: 158-169.
- BRITSKI, H.A. (1972): Peixes de água doce do Estado de São Paulo. Sistemática. - In: Poluição e Piscicultura. - C.I.B.P.U. São Paulo, Faculdade de Saúde Pública da USP, Instituto de Pesca: 79-108.
- CATELLA, A.C. & G.E. TORRES (1984): Observações sobre o espectro e estratégia alimentar do peixe-cachorro, *Acestrorhynchus lacustris* (REINHARDT, 1974) (Characidae, Acestrorhynchini), do reservatório de Tres Marias - rio São Francisco, MG. - Anais do Seminário Regional de Ecologia 4: 103-125.
- ELETRONORTE/THEMAG ENGENHARIA (1987/89): Bacia do Médio Tocantins. Aproveitamento hidrelétrico do sítio Serra Quebrada - Santo Antonio: estudos de viabilidade (ictiofauna). - Relatórios técnicos nº 1, 2, 3, 4, 5, 6 and final (internal reports).
- FERRO-LUZZI, G.E. (1980a). Food avoidances at puberty and menstruation in Tamilnad. - In: Food, ecology and culture. New York, Gordon & Breach, Science Publ. Inc.: 93-100.
- FERRO-LUZZI, G.E. (1980b): Food avoidances of pregnant women in Tamilnad. - In: Food, ecology and culture. New York, Gordon & Breach, Science Publ. Inc.: 101-108.
- FERRO-LUZZI, G.E. (1980c): Food avoidances during the puerperium and lactation in Tamilnad. - In: Food, ecology and culture. New York, Gordon & Breach, Science Publ. Inc.: 109-118.
- GOULDING, M. (1980): The fishes and the forest: explorations in Amazon natural history. - Berkeley, Univ. of California Press.
- GOULDING, M. & E.J.G. FERREIRA (1984): Shrimp-eating fishes and a case of prey-switching in Amazon river. - Revista Brasil. Zool. 2: 85-97.
- HARRIS, M. (1977): Cannibals & kings. - New York, Vintage Books.
- HARRIS, M. (1985): Good to eat: riddles of food and culture. - New York, Simon & Schuster.
- HARRIS, M. (1987): Food ways: historical overview and theoretical prolegomenon. - In: HARRIS, M. & E.B. ROSS (eds.): Food and Evolution. - Philadelphia, Temple Univ. Press: 57-92.
- IBGE (1987): Anuário Estatístico do Brasil, 1986. - Rio de Janeiro, Centro de Documentação e Disseminação de informações.
- INPA/ELETRONORTE (1980/83): Estudo da ecologia e controle ambiental na região do reservatório da UHE de Tucuruí - ictiofauna. - Relatórios técnicos nº 1, 2, 3 and final (internal reports).
- ITAIPU BINACIONAL (1987): Ictiofauna e Biologia pesqueira. - FUEM-SUREHMA/ITAIPU BINACIONAL, 2 vols.
- JUNK, W.J. (1976): Biologia de água doce e pesca no interior. - Relatório Anual do INPA, Manaus, Instituto Nacional de Pesquisas da Amazônia: 105 pp.
- JUNK, W.J. (1985): Temporary fat storage, an adaptation of some fish species to the waterlevel fluctuations and related environmental changes of the Amazon river. - Amazoniana 9(3): 315-351.
- KATZMAN, M.T. (1975): Regional development policy in Brazil: the role of growth poles and development highways in Goiás. - J. Econ. Developm. Cult. Change 24: 75-107.
- LEWIS, N.D. (1984): Ciguatera-parameters of a tropical health problem - Human Ecology 12: 253-274.
- LOWE-McCONNEL, R.H. (1975): Fish communities in tropical freshwaters: their distribution, ecology and evolution. - London, Longman.
- McKAY, D.A. (1980): Food, illness and folk medicine: insights from Ulu Trengganu, West Malaysia. - In: Food, ecology and culture. - New York, Gordon & Breach, Science Publ. Inc.: 61-66.
- MESSER, E. (1984): Anthropological perspectives on diet. - Ann. Rev. Anthropol. 13: 205-249.
- MORAN, E. (1974): The adaptive system of the Amazonian Caboclo. - In: WAGLEY, C. (ed.): Man in the Amazon. - Gainesville, Univ. Florida Press.
- MOURÃO, G. de M. & G.E. TORRES (1984): Espectro alimentar e atividade predatória da corvina, *Pachyrurus squamipinnis* (Pisces, Sciaenidae) no reservatório de Tres Marias, rio São Francisco, MG. - Anais do Seminário Regional de Ecologia 4: 295-309.

- NOMURA, H. (1975): Alimentação de tres espécies de peixes do gênero *Astyanax* BAIRD & GIRARD, 1854 (Osteichthyes, Characidae) do rio Mogi Guaçu. - Rev. Brasil. Biol. 35: 595-614.
- NOMURA, H. & L. NEMOTO (1983): Alguns caracteres merísticos e da biologia do cascudo, *Plecostomus paulinus* IHERING, 1905 (Pisces, Loricariidae) do rio Mogi Guaçu, SP. - Rev. "O Solo" 75: 64-79.
- NOMURA, H. & A.C.D. TAVEIRA (1979): Biologia da saguira, *Curimatus elegans* STEINDACHNER, 1974 do rio Mogi Guaçu, São Paulo (Osteichthyes, Curimatidae). - Rev. Brasil. Biol. 39: 331-339.
- NOMURA, H., MENEZES, J.F.S. & M.V.F.A. SOUZA (1983): Evidências da ação predadora do tucunaré, *Cichla ocellaris*, sobre a tilápia do Congo, *Tilapia rendalli* (Pisces, Cichlidae). - Anais do Seminário Regional de Ecologia 3: 223-231.
- NOMURA, H., NEMOTO, L. & I.M.M. MUELLER (1981): Alimentação de seis espécies de peixes do gênero *Plecostomus* WALBAUM, 1782 (Pisces, Loricariidae) do rio Mogi-Guaçu. - Anais do Seminário Regional de Ecologia 2: 389-405.
- PYKE, G.H. (1984): Optimal foraging theory: a critical review. - Ann. Rev. Ecol. Syst. 15: 523-575.
- ROSENBERG, P. (ed.) (1987): Common names index, poisonous animals, plants and bacteria. - Toxicon 25: 799-890.
- ROSS, E.B. (1978): Food taboos, diet, and hunting strategy: the adaptation to animals in Amazon cultural ecology. - Current Anthropology 19: 1-36.
- ROSS, E.B. (1987): An overview of trends in dietary variation from hunter-gatherer to modern capitalist societies. - In: HARRIS, M. & E.B. ROSS (eds.): Food and Evolution. - Philadelphia, Temple Univ. Press: 7-57.
- SAHLINS, M. (1976): Culture and practical reason. - Chicago, Univ. Chicago Press.
- SANTOS, E. (1962): Peixes de água doce: vida e costumes dos peixes do Brasil, 2nd ed. - Rio de Janeiro, Briguiet & Cia Editores.
- SANTOS, G.M., JÉGU, M. & B. MERONA (1984): Catálogo de peixes comerciais do Baixo Rio Tocantins. - Manaus, ELETRONORTE/CNPq/INPA.
- SMITH, N.G.H. (1981): Man, fishes and the Amazon. - New York, Columbia Univ. Press: 87-91.
- STEPHENS, D.W. & J.R. KREBS (1986): Foraging theory. - Princeton, Princeton Univ. Press.
- WILSON, C.S. (1980): Food taboos at childbirth: the Malay example. - In: Food, ecology and culture. - New York, Gordon & Breach, Science Publ. Inc.: 67-74.
- WHO (1973): Energy and protein requirements. - World Health Organization Technical Report 522: 1-121.