J. Ethnobiol. 12(1):117-139 Summer 1992

FOOD TABOOS AT BUZIOS ISLAND (BRAZIL): THEIR SIGNIFICANCE AND RELATION TO FOLK MEDICINE

ALPINA BEGOSSI
Núcleo de Estudos e Pesquisas Ambientais
Universidade Estadual de Campinas, CP 1170
Campinas, 13081, SP, Brazil

ABSTRACT.—Búzios Island is a fishing community of about 44 families located off the coast of São Paulo State, Brazil. This study focuses on the food taboos of the islanders from Búzios, specifically on prohibitions in the consumption of certain species of fish and lizard. Interviews and observations on food habits were made from November 1986 to December 1987. Some fish are avoided only when persons are ill and others are recommended for these cases. Among the generally avoided fish, moray and ray receive special attention. The reasons for these avoidances were investigated and it was observed that carnivorous fish, more than other fish, are avoided during illnesses. The toxicity of fishes might also explain some avoidances. Finally, medicinal uses of some species, such as rays and lizards, seem to explain some important dietary taboos: medicinal animals may be saved as a source of drugs.

RESUMO.—A Ilha dos Búzios, situada no litoral do Estado de São Paulo, é povoada por uma comunidade de pescadores com aproximadamente 44 familias. O objetivo deste estudo é entender as proibições (tabus) alimentares dos habitantes de Búzios, especialmente aqueles referentes ao consumo de certos peixes e do lagarto. Entrevistas e observações sobre hábitos alimentares foram realizadas de novembro de 1986 a dezembro de 1987. Alguns peixes são evitados, enquanto outros são recomendados em caso de doenças. Dentre os peixes evitados no consumo alimentar merecem atenção a moreia e a raia. As razões dessas proibições alimentares são analisadas. Peixes carnivoros em geral são evitados por doentes. Peixes tóxicos podem explicar outros tabus. Finalmente, o uso medicinal de alguns animais, como da raia e do lagarto, parece explicar alguns tabus alimentares importantes. Animais usados na medicina caseira podem estar sendo preservados como fonte de remédios.

RESUME.—L'ile de Búzios, située au litoral de São Paulo, est peuplée par une communité de pêcheurs, approximativement 44 familles. L'objectif de cette étude est de comprendre les prohibitions (''taboos'') alimentaires des habitants de Búzios, en particulier celles qui se rapportent à la consomation de certains poissons et du lézard. Des entrevues et des observations sur les habitudes alimentaires ont été realisées de novembre 1986 à décembre 1987. Certains poissons sont évités et d'autres sont indiqués en cas de maladie. Parmi les poissons évités, dans la consomation alimentaire, meritent attention la murène et la raie. Les motifs de ces prohibitions alimentaires sont analisés. Les poissons carnivores sont, en général, évités par les malades. Les poissons toxiques peuvent expliquer d'autres prohibitions. Finalement, l'usage medicinal de certains animaux, comme la raie et le lézard, semble expliquer certaines prohibitions alimentaires. Les animaux utilisés dans la medicine ménagère pourraient être épargnés, entant que source de medicine.

INTRODUCTION

Food taboos and preferences have been an area of debate in ecological-cultural studies between materialists/utilitarians and symbolists/structuralists. Vayda (1987) reviewed part of this debate through the analysis of Harris's (1985) cultural materialist position.

The objectives of this study are to analyze possible ecological reasons related to the main animal avoidances reported and observed at Búzios Island, and to verify the relationships of the patterns of avoidances to protection of medicinal animals.

There are different questions concerning food taboos and the schools of thought mentioned above reflect these approaches. Symbolists have studied the relationship of taboos to religion and rituals and have focused on their *emic* aspects. For example, Barthes (1961) analyzed the psycho-sociological aspects of certain contemporary American and French feeding habits. Douglas (1969), in the classical study "Abominations of Leviticus," concluded that dietary laws were liturgical signs of purity. Sahlins (1976), stressing the importance of "cultural reason" to explain human food habits, states that edibility is inversely related to "humanity." For example, American avoidances of horse and dog are explained because they participate as subjects (and not objects) in American society. Dogs and horses are named and people commonly converse with them. On the other hand, this behavior does not occur with edible animals, such as pig and cattle. Another emic approach was taken by Basso (1972) in her study of food classification and linguistic categories among the Kalapalo Indians of the Upper Xingu (Brazil).

The questions which interest materialists are essentially related to environmental aspects of the issue and represent an *etic* approach to dietary practices. As Ross (1978) stresses, the comprehension of indigenous ideologies may be at least partially explained by material circumstances. For example, Harris (1977, 1985, 1987a, 1987b) attempts to analyze the costs and benefits involved in the adoption and spread of particular behaviors in human populations, such as food taboos and preferences. Harris's analysis of the taboo of the sacred cow of India indicated that cows were too important to be eliminated. They were animals that drew plows upon which agriculture depended. Indian farmers who slaughtered their cattle could never plow again (Harris 1977, 1985).

Other studies have included both emic and etic analyses, such as Ferro-Luzzi's (1975) study on the positive and negative attitudes towards food among Indian tribes. Others have analyzed the effects that food taboos may have on resources, such as the studies by McDonald (1977) and by Reichel-Dolmatoff (1976). The important point, as mentioned by Basso (1978), is that these different perspectives on food taboos and preferences are not incompatible but complementary.

The approach taken in this study is both etic and emic. The strong etic basis is reflected in reference to aspects of the environment, such as fish diet, fish toxicity, and medicinal use, that might explain some food taboos. Emic aspects include the perceptions islanders have about fish, such as their behavior or smell. The aim of this study is the search for possible environmental reasons that could be behind the food taboos observed at Búzios Island.

There are few studies on food taboos of Brazilian maritime communities. However, Amazonian food taboos have been widely discussed and reviewed, in particular by Ross (1978). He stressed that Amazon food prohibitions can be explained by the costs and benefits of resource procurement strategies. Most data on Amazon food taboos concern game animals (Ayres and Ayres 1979; Chagnon and Hames 1980; Kiltie 1980; Moran 1977; Smith 1976). Food taboos related to game and fish species are reported by Basso (1972, 1973), Moran (1974), and Pereira (1974).

There are few studies which report on specific fish or groups of fish considered tabooed foods in the Amazon. Goulding (1981) observed that although electric fishes (gymnotoids) are the third most abundant group in the Amazon, they have no importance in the fisheries because most are small and stay hidden, and there are cultural taboos against eating them. Smith (1981) pointed out that certain fish species are avoided by Camayurá and Tapirapé Indians, as well as other Amazon inhabitants. Among Indians from the Upper Xingu, fish avoidances related to the physical state of a person and to the diet of fish were observed (Basso 1972). Recently, Begossi and Braga (1992) analyzed the relationship of food taboos and fish diet on the Tocantins River.

THE COMMUNITY

Búzios Island is a fishing community of about 220 individuals (44 families) located on the coast of São Paulo State (Fig. 1). The population of Búzios is distributed among eight small harbors, each of which has a dock and canoe shelters. The most populated harbor is Porto do Meio which included 23 families at the time of fieldwork.

Islanders from Búzios, as is the case for other inhabitants of the relatively isolated areas of southeast coastal Brazil, are called *caiçaras*. They are descendents of Tupinambás Indians and Portuguese. Fishing and manioc cultivation are their main activities (Ribeiro 1987). Indian influences are noticed especially in the processing of manioc flour. Portuguese influences are found in the fishing technology, such as nets and longlines (Mussolini 1980). In Brazil, slavery existed until the end of the nineteenth century and African features are found in the religious and in magical beliefs of the *caiçaras,* such as in the festival of São Benedito, a black saint (Correa 1981). In the beginning of this century, Japanese migrants introduced to the coast of São Paulo a type of fishing trap, the *cerco flutuante,* which is made of floating chambers of net (Japanese: *kaku-ami,* Von Brandt 1984) (Mussolini 1980). This fishing technique is also used at Búzios Island.

In the past agriculture was important at Búzios (Willems 1952). During the fieldwork reported here (14 months in 1986–1987), islanders spent most of their time in fishing activities. Manioc is cultivated by some families, usually for home consumption. Protein consumption comes especially from fish. The typical meal at Búzios is fish or squid with manioc flour, rice, beans, and sporadically, spaghetti (Begossi 1989a).

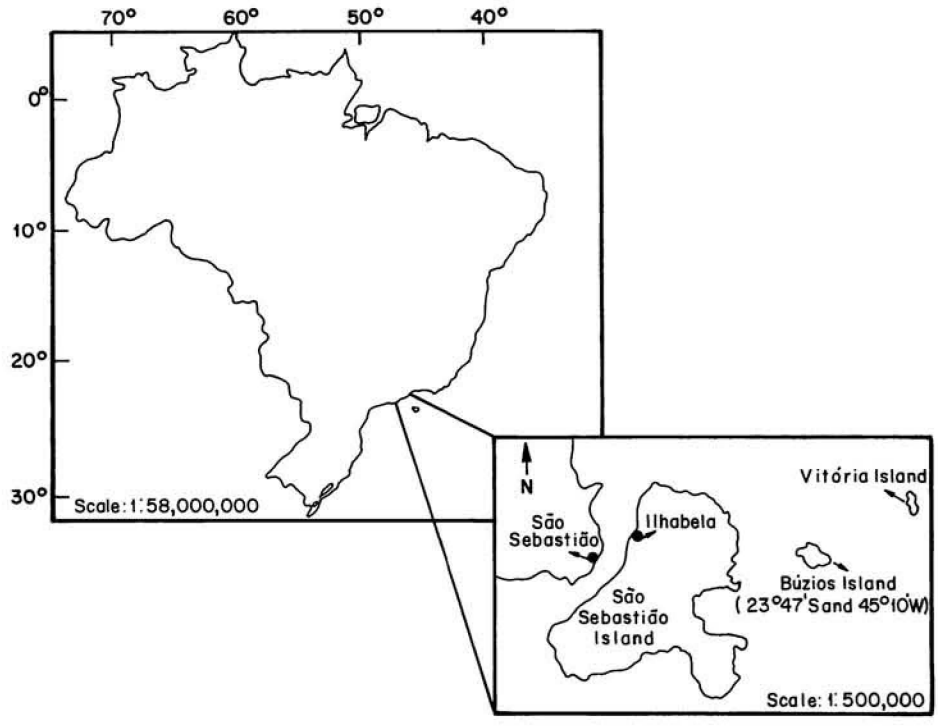

FIG. 1.—Map of Brazil showing the location of Búzios Island off the coast of São Paulo State.

METHODS

The field work at Búzios Island included observations and interviews performed during monthly visits of about a week each from November 1986 to December 1987. A total of 88 days was spent at Búzios Island as the guest of a fishing family. I sampled the diet of 10 families from Porto do Meio during a 12 months period (5 days/month); a detailed study on fish preferences at Búzios is in Begossi (1989a).

A series of interviews were carried out as part of a broader study on diet and fishing at Búzios Island (Begossi 1989a). Interviews were made at six of the eight small harbors of the island: Porto do Meio (23 houses), Guanxuma (7 houses), Pitangueira (4 houses), Costeira (1 house), Porto do Cais (2 houses), and Mãe Joana (2 houses). The two other harbors were not included in the study due to difficulty of access. Interviews included questionnaires and were conducted when possible with all adult men and women (18 years of age or older). The first interview was made with 73 islanders (about 88% of the adult residents). This interview included the questions "Que peixes você não come?, Porque? (What kind of fish don't you eat? Why?). Another interview, with 57 people, included questions such as "Que peixes você não come quando está doente?" (What kind

of fish don't you eat when you are sick?) and "Que peixes você come quando está doente?" (What kind of fish do you eat when you are sick?). Questions concerning medicinal animals were asked in another interview, in which 32 islanders described animals used to cure diseases or heal wounds. Informal conversations and direct observations on food taboos and folk medicine were made at Porto do Meio harbor. These included observations on foods avoided by islanders and on the preparation of home-made medicines.

Analyses of the lipid contents of fish species were based on samples of 100 gr salted and dried tissue. They were made by E.S. Contreras and J.L. Guimarães of the Laboratory of Food Engineering, Universidade Estadual de Campinas, São Paulo. Details are found in Begossi (1989a).

Fish collected at Búzios Island were identified using the keys of Figueiredo (1977), Figueiredo and Menezes (1978, 1980), and Menezes and Figueiredo (1980, 1985). Identifications of molluscs were based on Rios (1985). Specimens collected were deposited at the Museu de Zoologia, Universidade de São Paulo (MZUSP).

FISH TABOOS

The fish most strongly avoided as food by islanders from Búzios are *camburú* (moray, *Gymnothorax* spp.), *raia* (species of ray), *bonito* (bullet mackerel and little tunny, *Auxis* sp. and *Euthynnus alletteratus)*, and *tinhuna* (sargeant major, *Abudefduf saxatilis)* (Table 1). Begossi (1989a) used regression analysis to investigate the variables (calories, fish boniness, price, and availability, among others) involved in the choice of animal protein, consisting mostly of fish, by islanders from Búzios. Fish avoidances or taboos could not be explained by any of these variables.

The reasons interviewees offered for avoiding fish varied among fish species (Table 2). For example, the avoidance of *camburú* (moray) is explained by its "snake-shape," bad smell, aggressive behavior, ugly appearance, and conspicuous teeth (Fig. 2). Ray avoidance had similar explanations, except that rays are not "snake-shaped" nor do they have teeth. In fact, aggressive behavior may help explain the avoidance of certain prey types. A fisherman at Búzios who caught three *camburú* (moray) had to leave two at sea due to the difficulty he had removing the hooks from these aggressive prey. Lenko (1965) reported that inhabitants from Búzios avoid eating *camburú* because they believe it climbs out the sea to fight the poisonous *jararaca (Bothrops* sp.), a very common snake on the island. *Bonito* (bullet mackerel and little tunny) (Fig. 2) is avoided due to presence of "blood" (i.e., a high concentration of hemoglobin) (Moyle and Cech 1982). *Tinhuna* is said to have a strong or bad smell.

Some fish avoided by islanders, such as bonito, ray, and shark (Table 2), are termed *carregado. Carregado* includes a set of supposed attributes of an animal, such as teeth, blood, aggressive behavior, "strong flesh," fattiness *(graxa)*, and factors that could cause inflammation if eaten by someone who is wounded or unhealthy. A frequent answer during interviews was "se comer peixe carregado a ferida inflama" (if you eat a *carregado* fish, you will get inflammation of wounds). Women are not supposed to eat these fish during menstruation or after childbirth.

TABLE 1.—Fish avoided by at least 3% of interviewees (total number: 73) from Búzios Island.

Names			Percentage of interviewees
Local	English	Scientific	practicing avoidance
camburú	moray	*Gymnothorax* spp.	25
raia	ray	*Raja cyclophora, Myliobates* sp., *Dasyatis* sp. (?)	21
bonito	mackerel, tunny	*Auxis* sp., *Euthynnus alleteratus*	18
tinhuna	sargeant	*Abudefduf saxatilis*	16
cação	shark	*Rhizoprionondon lalandei,* among other spp.	15
corvina	sand drum	*Umbrina coroides*	11
garoupa	grouper	*Epinephelus* spp.	10
piragica	yellow chub	*Kyphosus incisor*	8
bagre	catfish	*Notarius grandicassis*	7
budião	hogfish, parrotfish wrasse	*Bodianus* spp., *Scarus vetula, Sparisoma* spp., *Halichoeres* spp.	7
enchova	bluefish	*Pomatomus saltator*	7
salema	porkfish	*Anisotremus virginicus*	7
bicuda	guachanche	*Sphyraena guachancho*	6
goete	weakfish	*Cynoscion* spp.	6
betara	kingfish	*Menticirrhus americanus*	4
espada	cutlass fish	*Trichiurus lepturus*	4
frade	angelfish	*Pomacanthus paru*	4
tainha	mullet	*Mugil platanus*	4
baiacú	pufferfish	*Sphoeroides spengleri*	3
corcoroca	tomtate	*Haemulon aurolineatum*	3
mamangaba	scorpionfish	*Pontinus rathbuni*	3
olhete	yellowtail	*Seriola lalandi*	3
pargo	spadefish	*Chaetodipterus faber*	3
sargo	black margate	*Anisotremus surinamensis*	3
xalerete	bluerunner	*Caranx crysos*	3
small and rocky fishes			3

Observations: 10% of interviewees mentioned they eat any kind of fish; 4% mentioned they usually avoid eating turtle *(Chelonia mydas);* another 4% avoid eating dolphin (Cetacea).

Moran (1974) observed that Amazon *caboclos* (people of mixed European and Indian background) have some food restrictions during illness, pregnancy, lactation, and menstruation. The foods prohibited are called hot *(quente or reimoso)*. Smith (1976, 1981) studied food habits of transamazon settlers and of *caboclos* from Itacoatiara in Amazonas State. In these cases, the fish avoided, referred to as

FIG. 2.—Some animals avoided at Búzios Island: (a) a fisherman handling a *camburú* (green moray, *Gymnothorax funebris);* (b) some Scombridae avoided are *bonito-banana* (bullet mackerel, *Auxis* sp.) (top) and *bonito-pintado* (little tunny, *Euthynnus alletteratus)* (bottom).

TABLE 2.—Explanations given by Búzios islanders about fish avoidances.

Explanation	Fish		
		In case of disease	
	Avoided (n=65)	Avoided (n=32)	Eaten (n=8)
Never ate it	*baiacú, boto, camburú, raia, tainha,* turtle.		
Snake-shape	*camburú*		
Bad smell	*camburú, frade, garoupa, piragica, raia, tinhuna, cação*		
Dangerous, aggressive	*camburú, raia, cação*		
Carregado[1]	*bonito, raia, cação*	All cited in Table 3	
Blood	*bonito*	*bonito*	
Illness, body wounds, toothaches, after child-birth[2]	*bonito, bicuda, cavala, enchova, espada, goete raia, tainha, sororoca, cação*	All cited in Table 3	
Ugly, nasty	*camburú, raia*		
Fatty	*garoupa, goete*	*olhete*	
Scaleless	*cação*		
Many bones	*budião, corcoroca, jaguaricá,* small rocky fish, *sardinha, tinhuna*		
It eats mud or dirty things	*corvina, timbáli*		
Hard flesh	*corvina*		
Soft flesh	*namorado*		
Toxic	*baiacú*		
Sting presence	*mamangaba*		
Difficult to capture	*raia*		
Bad for women: it is believed woman	*raia*		

Explanation	Fish		
		In case of disease	
	Avoided (n=65)	Avoided (n=32)	Eaten (n=8)
explodes, visceral organs are exposed			
Conspicuous teeth		*bicuda, camburú enchova, espada, marimbá, piragica, paru, cação*	
Weak flesh[3]			*pargo, piragica*
With scales			*garoupa, marimbá, piragica, panaguaiú*
Docile, not aggressive			*garoupa, jaguariçá, marimbá, olhete, piragica, salema sargo.*
Little blood			*badejo, garoupa, marimbá, olhete cação*
Tooth absence			*cação*

[1]*Carregado* means with conspicuous teeth, fatty *(graxa)*, with blood, aggressive, with strong flesh, or that it exacerbates any illness.

[2]Body wounds are the most cited health problem associated with the consumption of some fishes.

[3]Opposed to strong flesh or *carregado.*

Scientific names of fishes absent from other tables (mentioned by only one interviewee): *cavala (Scomberomorus cavalla), namorado (Paranthias furcifer), sardinha (Sardinella brasiliensis), timbáli (Fistularia petimba).*

Observations: Another interview, only about ray avoidance, showed that 63% of interviewees (n=30) do not eat ray, for the reasons listed above. In the interview reported here, explanations such as "I do not like it" are not included; scientific names are found in Tables 1, 3, and 4.

reimoso, are those that cannot be eaten by anyone suffering from a wound, measles, tumors, and skin rash; these fish are believed to exacerbate health problems and to have a "strong meat." Pereira (1974) observed that scaleless fish *(peixes de couro)* are usually avoided in the Amazon River and that some illnesses are believed to be caused by these fish. Begossi and Braga (1992) observed similar fish avoidances by fishermen living along the Tocantins River. These

fishermen also called the avoided fish *reimoso* or *carregado*. The similarities of names and meanings of avoided fish in regions so distinctive environmentally as the Amazon and Búzios Island are worthy of investigation.

Similar food taboos have been reported in other regions of the world. Wilson (1980) reported avoidances of ray, bonito, and mackerel, among others, by Malay women after childbirth. Ferro-Luzzi (1980a, 1980b) described the avoidance of ray, shark, *Sphyraena* (same genus as *bicuda)*, and *Scomberomorus* (same genus as *sororoca)* (Table 2) by pregnant and puerperal women from Talminad, India. Ecological or nutritional aspects of the species in question might help explain similar fish avoidances from such diverse communities.

DIET RESTRICTIONS IN CASE OF DISEASE

Among the fish avoided, interviewees emphasized that some species were avoided mainly by people suffering from disease or wounds in the body (Table 2). In order to understand this type of prohibition, another set of interviews was undertaken. The most important fish avoided by unhealthy persons are *bonito* (bullet mackerel and little tunny) and *enchova* (bluefish, *Pomatomus saltator)* (Table 3). Other fish are accepted or even recommended in case of illness. The most important of these are *marimbá* (spottail pinfish, *Diplodus argenteus)* and *garoupa* (grouper, *Epinephelus* spp.) (Table 4). *Cação* (small shark) was mentioned both as a fish to be avoided and as one recommended in illnesses (Table 3 and Table 4). It is not clear if islanders were referring to different species of *cação* or if its classification is variable among islanders.

Some diseases, such as bronchial asthma and psoriasis, as well as heart attacks, are not as frequent in populations with a fish-based diet, such as the Eskimo (Lands 1986). The consumption of different species of fish might also have effects on the health of consumers.

Table 2 shows that many fish avoidances are explained by Búzios islanders by the fact that the fish are *carregado*. According to Smith (1981), *reimoso* fish are considered to be oily; many catfishes, for example, have abundant fat reserves. High fat concentration was cited by interviewees from Búzios as the reason to avoid a few types of fish (Table 2). Data on lipid contents of fish species mentioned by more than 10% of interviewees are shown in Table 5. There is no significant difference between the mean fat content of fish which are avoided and those which are eaten (ANOVA I, F, $p > 0.77$). Thus, fat content cannot explain why some fish are avoided and others are preferred as food in case of illness. Begossi and Braga (1992) found that fish avoided by fishermen living along the Tocantins River are low in calories while fish consumed and preferred by them tend to be high in calories.

Other explanations given by Búzios Islanders for avoiding certain fish during illness is that those fish have teeth. The fish commonly eaten during illnesses are considered docile (Table 2). As shown in Table 6, fish which are avoided by unhealthy persons are usually predators of other fish species. On the other hand, most fish accepted during sickness feed on invertebrates or plankton. Thus, the diet of the fish seems to determine which species islanders avoid and accept as

TABLE 3.—Fish avoided by at least 3% of interviewees (total number: 57) from Búzios for fear of exacerbating disease.

Names			Percentage of interviewees
Local	English	Scientific	practicing avoidance
bonito	mackerel tunny	*Auxis* sp. *Euthynnus alletteratus*	74
enchova	bluefish	*Pomatomus saltator*	68
xalerete	bluerunner	*Caranx crysos*	35
espada	cutlass fish	*Trichiurus lepturus*	30
cação	shark	*Rhizoprionondon lalandei*, among other spp.	25
bicuda	guachanche	*Sphyraena guachancho*	14
sororoca	mackerel	*Scomberomorus brasiliensis*	11
goete	weakfish	*Cynoscion* spp.	9
raia	ray	*Raja cyclophora*, *Myliobates* sp. *Dasyatis* sp. (?)	7
tainha	mullet	*Mugil platanus*	7
xaréu	jack	*Caranx latus*	7
jaguariçá	squirrel fish	*Holocentrus ascensionis*	5
camburú	moray	*Gymnothorax* spp.	4
olhete	yellowtail	*Seriola lalandi*	4

Observation: Nine percent of interviewees mentioned that they avoid eating any fish while ill.

food when they are ill. Invertebrate or plankton feeders are said to have "weak flesh," i.e., a kind of meat that does not exacerbate health problems. Smith (1981) observed that fish considered *reimoso* are those which eat all kinds of creatures. Most fish avoided by people from the Tocantins River region are carnivorous whereas consumed and preferred fish are usually herbivorous or detritivorous (Begossi and Braga 1992). Some fish can be especially unhealthy if they occasionally eat other venomous fish. The probability of acquiring (and accumulating) toxins increases in higher trophic levels. These toxins may be pollutants, such as heavy metals, or natural substances, such as those obtained by eating toxic plankton, invertebrates, or fish.

TOXIC FISHES

Most families at Búzios consider *baiacú* (pufferfish, *Sphoeroides spengleri)* to be venomous (Lenko 1965). Pufferfish poisoning has been reported since the seventeenth century (e.g., Piso 1658). Actually, tetrodoxin, a neurotoxin, is present

TABLE 4.—Fish favored by at least 3% of interviewees (total number: 57) from Búzios during illness.

Names			Percentage of interviewees
Local	English	Scientific	
marimbá	spottail	*Diplodus argenteus*	47
garoupa	grouper	*Epinephelus* spp.	44
piragica	yellow chub	*Kyphosus incisor*	37
cação	shark	*Rhizoprionondon lalandei*, among others	16
sargo	black margate	*Anisotremus surinamensis*	16
panaguaiú	halfbeak	*Hemiramphus balao*	14
tinhuna	sargeant	*Abudefduf saxatilis*	12
salema	porkfish	*Anisotremus virginicus*	11
corcoroca	tomtate	*Haemulon aurolineatum*	7
jaguariçá	squirrel fish	*Holocentrus ascensionis*	7
olhete	yellowtail	*Seriola lalandi*	5
badejo	black grouper	*Mycteroperca bonaci*	4
budião	hogfish, parrotfish wrasse	*Bodianus* spp., *Scarus vetula, Sparisoma* spp. *Halichoeres* spp.	4
olho de boi	amberjack	*Seriola dumerili*	4
pargo	porgy	*Calamus penna, Pagrus pagrus*	4
xalerete	bluerunner	*Caranx crysos*	4

Observations: A total of 14% of interviewees don't consume any special fish in case of illness. Another 5% mentioned chicken as a food for ill persons.

in liver, ovaries, and skin glands of pufferfish (Gopalakrishnakone 1988; Watabe et al. 1987). Species of *bonito* (Fig. 2), rays, and sharks are also avoided at Búzios (Table 1, Table 3). According to islanders, the meat of *bonito* deteriorates very rapidly. Mackerel-like fishes, tunas, skipjacks, and *bonitos*, if not adequately preserved, may be occasionally poisonous—a toxic substance is formed within the body musculature (Russell 1965)—and shark muscles have been mentioned as toxic, as has the liver of other elasmobranchs (Hashimoto 1979). Fish taboos of this kind have also been reported in India and Malaysia (Ferro-Luzzi 1980a, 1980b; Wilson 1980).

More than 500 fish species have been reported to cause intoxication in humans; their distribution favors the tropical seas (Habermehl 1981). These fish tend to occur more frequently around islands than along continental shores (Russell 1965). Much of the available information on the distribution of toxic fish is based on

TABLE 5.—Lipid content of some fish species from Búzios Island.

Fish		Percentage Lipids	Total Solids (gr)
AVOIDED			
camburú	*Gymnothorax* spp.	9	64
bonito	*Euthynnus alletteratus*	3	58
raia	*Dasyatis* sp. (?)	1	63
corvina	*Umbrina coroides*	4	56
tinhuna	*Abudefduf saxatilis*	3	72
cação	*Sphyrna* sp.	1	54
MEAN		4	—
AVOIDED DURING ILLNESS			
cação	*Sphyrna* sp.	1	54
bonito	*E. alletteratus*	3	58
enchova	*Pomatomus saltator*	3	57
xalerete	*Caranx crysos*	13	61
espada	*Trichiurus lepturus*	—	—
sororoca	*Scomberomorus brasiliensis*	—	—
bicuda	*Sphyraena guachancho*	—	—
MEAN		5	—
ACCEPTED DURING ILLNESS			
cação	*Sphyrna* sp.	1	54
piragica	*Kyphosus incisor*	6	54
marimbá	*Diplodus argenteus*	5	61
garoupa	*Epinephelus* sp.	6	58
salema	*Anisotremus virginicus*	7	59
tinhuna	*A. saxatilis*	3	72
panaguaiú	*Hemiramphus balao*	2	48
sargo	*Anisotremus surinamensis*	3	59
MEAN		4	—

Sample base: 100 gr of salted and dried tissue (Begossi 1989a). Only fish mentioned by more than 10% of interviewees are included.

which fish local inhabitants believe to be toxic and on the locations where these fish are caught (Lewis 1984), rather than on an objective evaluation of toxicity and distribution. A list of some toxic species is shown in Table 7. Many of these species occur around Búzios Island.

TABLE 6.—Feeding habits of fish avoided and eaten during illness by islanders.

Fish	Family	Feeding habit[1]
AVOIDED		
bonito	Scombridae	fish and squid
cação	Carcharhinidae[2]	carnivorous
enchova	Pomatomidae	fish
xalerete	Carangidae	small fish: herrings and anchovies
espada	Trichiuridae	fish
sororoca	Scombridae	fish and squid
bicuda	Sphyraenidae	fish and crustacea
EATEN		
cação	Carcharhinidae[2]	carnivorous
piragica	Kyphosidae	invertebrates, vegetal matter
marimbá	Sparidae	algae, crustacea, molluscs
garoupa	Serranidae	fish
salema	Pomadasyidae	annelids, crustacea, molluscs, ophiuroids
tinhuna	Pomacentridae	plankton, invertebrates
panaguaiú	Exocoetidae	zooplankton
sargo	Pomadasyidae	crustacea, equinoderms, small fish

[1]Data are from Figueiredo and Menezes (1980), Menezes and Figueiredo (1980) and Moyle and Cech (1982).

[2]This is the most common family; other families are Sphyrnidae and Odontaspididae.

Fish cited by more than 10% of interviewees are included. Scientific names are found in Tables 3 and 4.

Ciguatera has not been reported for southeast Brazil, nor are there known cases of fish intoxication in this region. However, information is lacking on the food habits of fishing populations and on their experience with toxins. Also, fish mentioned as avoided by a reasonable proportion of interviewees (Table 1 and Table 3) are known to cause poisoning in man in other regions. As pointed out by Lewis (1984), fish not valued as food in a particular locale may be ciguatoxic, but not yet identified as such scientifically. *Ciguatera* poisoning is usually found in the

TABLE 7.—Some poisonous fishes. Data compiled from Rosenberg (1987) and Russell (1965).

Fish name			
Local	English	Scientific	Occurrence[1]
baiacú	puffer	*Sphoeroides* (14 spp.)	G
	bandtail puffer	*Sphoeroides spengleri*	S
barracuda	barracuda	*Sphyraena* (7 spp.)	G
bicuda	guachanche	*Sphyraena guachancho**	S
budião	hogfish	*Bodianus rufus**	S
	parrotfish	*Scarus* (7 spp.)	G
		*Scarus vetula**	S
	wrasse	*Bodianus bilunulatus*	G
cação, tubarão	dog fish	*Squalus acanthias*	B
	spiky jack	*Squalus fernandinus*	B
	hammerhead	*Sphyrna zygaena**	G
camburú	moray eel	*Gymnothorax* (9 spp.)	G
		*Gymnothorax funebris**	S
		*Gymnothorax moringa**	S
caranha	snapper	*Lutjanus* (28 spp.)	G
		*Lutjanus cyanopterus**	S
garoupa	grouper	*Epinephelus* (8 spp.)	G
		*Epinephelus morio**	S
jaguariça	squirrel fish	*Holocentrus ascensionis*	S
olho de boi	amberjack	*Seriola aureovitta*	G
		Seriola dumerili	S
peixe-porco	file fish	*Aluterus monoceros**	S
		Alutera scripta	G
raia	lesser electric ray	*Narcine brasiliensis*	B
	spotted stingray	*Aetobatus narinari*	B
	stingray	*Dasyatis* (22 spp.)	G
	eagle ray	*Myliobates* (6 spp.)	G
xalerete	bluerunner	*Caranx crysos**	S
xareú	horse-eye jack	*Caranx latus*	S
	cardinal fish	*Apogon* sp.	G
	jack crevalle	*Caranx hippos*	G
		*Mugil cephalus**	G
		*Mycteroperca tigris**	G
		*Upeneus arge**	G

[1]S: species collected at Búzios Island; G: genera found at Buzios; B: genera or species found in SE Brazil (based on Figueiredo 1977).

*Species responsible for ciguatera poisoning (Russell 1965).

Pacific Islands, on the coasts of the United States, and in the Caribbean (Habermehl 1981; Russell 1965). It is caused by the ingestion of fish with ciguatoxin (Hashimoto 1979). This neuromuscular toxin is acquired by fish through the ingestion of the bottom-dwelling dinoflagellate *Gambierdiscus toxicus* (Lewis 1984; Miller et al. 1987). According to Lewis (1984), *ciguatera* is highly unpredictable because toxic individuals are indistinguishable from non-toxic ones.

Over 300 fish species of the families Acanthuridae, Aluteridae, Balistidae, Carangidae, Chaetondontidae, Labridae, Lethrinidae, Lutjanidae, Muraenidae, Scaridae, Serranidae, and Sphyraenidae have been implicated in *ciguatera* fish poisoning (Habermehl 1981). The most common are the high level carnivores and omnivores, such as *Sphyraena barracuda, Gymnothorax javanicus, Lutjanus bohar,* large *Caranx,* Epinephelinae, and reef sharks (Lewis 1984; Quod and Legrand 1988). The avoidance of top carnivores by islanders from Búzios (Table 6) could be the result of a cautious diet; when a person is unhealthy avoidances (taboos) are adhered to more strictly. According to Russell (1965), in cases of ciguatoxin, while both herbivorous and carnivorous fishes can cause *ciguatera,* the latter are more toxic and, in some areas, they are the only sufficiently toxic fish to cause poisoning in man. Kodama and Hokama (1989) pointed out that, in cases of *ciguatera,* carnivorous fishes may concentrate toxins and even modify them biochemically leading to the formation of other variants of toxins. Moreover, other kinds of toxins which may result in fish avoidances may be still undetected.

OTHER FOOD TABOOS AND FOLK MEDICINAL ANIMALS

Among the available animal protein at Búzios Island, beef (usually dry meat: jerky), followed by fish and chicken are the items preferred by fishing families (Fig. 3). However, fish are the items consumed most frequently (Begossi 1989a). Dry meat is expensive and cannot be a common item of diet except for the most prosperous households in Porto do Meio Harbor. Among the animals avoided by islanders, the most important are lizard, octopus, turtle, and squid. Lizard *(teiú, Tupinambis teguixin),* in particular, is avoided as food by 96% of interviewees (Fig. 3, Fig. 4).

At Búzios Island the taboo concerning lizard consumption is the strongest of all animal protein avoidances. The "incidence of horror" (Rea 1981; Turton 1978) to lizard is strong. Islanders usually spit on the ground when they see or talk about this animal. This behavior expresses how nasty and dirty the lizard is in their point of view.

Lizards are the main source of protein and fat for some human populations, such as the aborigines living in the northern part of the Great Sandy Desert, Australia (Cane 1987). Other populations, such as some from the Sonoran Desert, avoid eating lizards (Rea 1981).

Lizard is a high caloric meat (293 kcal. in 100 gr salted and dried tissue, Begossi 1989a), but families at Búzios only use lizard fat for medicinal purposes. It is used to treat *jararaca (Bothrops* sp.) bites and to cure rheumatism (Table 8 and Fig. 4), among other ailments. In northeast Brazil, lizard fat is used against snakebites, asthma, and throat pains (Campos 1967). In 1658, Piso reported that lizard

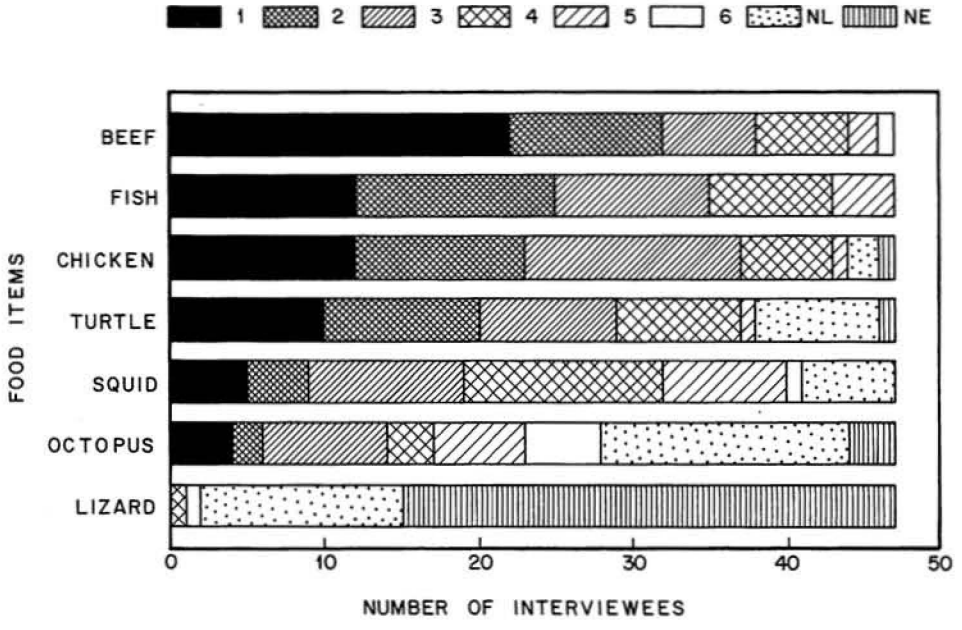

FIG. 3.—Preference of animal protein: results from interviews (n=47). Bars are coded (1—6) to show the animal protein ranking given by islanders; NL = does not like it, NE = does not eat it in any way.

FIG. 4.—*Teiu* (lizard, *Tupinambis teguixin):* this animal is strongly avoided as food, but its fat is used against snake-bites and to cure rheumatism.

TABLE 8.—Medicinal animals cited in interviews (n=32). Bold face indicates more important usages and animal part used.

Name[1]	Percentage response	Scientific name	Diseases	Utilization
(S) *lagarto, teiu* (lizard)	81	*Tupinambis teguixin*	**snake-bites** **rheumatism** asthma tetanus **skin thorns**	The **fat** *(enxundia)* is drunk with water or applied on the affected area. Meat is eaten for snake bites of *Bothrops* sp.
(S) *tartaruga* (turtle)	47	*Chelonia mydas*	bronchitis asthma rheumatism	The **heart** is toasted and tritured. The powder is drunk with water and/or tobacco. For rheumatism, the fat is massaged on the affected area.
(N) *cavalinho* (sea horse)	34	*Hippocampus reidi*	**bronchitis** women's hemorrhages after childbirth	Toasted and drunk as a tea or with *pinga* (Brazilian rum)
(C) chicken	22	*Gallus gallus*	cough bronchitis asthma	The **fat** is massaged on chest or drunk with water.
(N) *almofadinha, barata do mar* (ray eggs)	13	*Raja cyclophora*	women after childbirth: hemorrhages	**Eggs** are toasted and drunk as tea or with *pinga*.
(S) *caramujo* (snail)	9	*Megalobulinus* sp.	wounds	The **shell** is toasted and tritured. The powder is applied on wounds. Toasted meat may be used the same way. Can be drunk with water.
(N) *peixe morcego* (batfish)	3	*Ogcocephalus vespertilio*	bronchitis	?

Name[1]	Percentage response	Scientific name	Diseases	Utilization
(S) *ouriço do mar, manacarú* (sea urchin)	3	*Lytechinus variegatus*	snake-bites (*Bothrops* sp.)	It is tritured; the green juice is drunk.
(N) *cobra*	3	(?) (snake)	against bad luck (*mau-olhado*)	The skin is toasted and drunk with water.
(C) *jaguariçá* (squirrelfish)	3	*Holocentrus ascensionis*	body wounds	The stinger is put in contact with wounds.
(N) *limo do fundo do mar*	3	algae (?)	bronchitis	Used to make syrups

[1]Code before name indicates consumption pattern: (N)—not consumed; (S)—seldom consumed; and (C)—consumed.

fat was used to cure skin wounds. The observation that the most disgusting animal for Búzios islanders is also the most important in medicinal terms reinforces the argument suggested by Harris (1977), that food taboos may work to "avoid temptation." Or, in other words, a strong taboo against the consumption of lizard will help to maintain its availability for medicinal uses.

At Búzios Island, ray and other fish (*cavalinho, peixe morcego,* and *jaguariçá* Table 8) were described as medicinals. The medicinal utilization of sea horse (*Hippocampus* sp.) as an emmenagogue at Búzios Island had already been observed by Lenko (1965). Fishermen from the Tocantins River region use a broader diversity of fish than do Búzios islanders to cure diseases and many of these are also avoided as food. For example, fat of *raia (Potamotrygon* spp. and *Disceus thayeri)* is used for asthma; fat from *jaú (Paulicea lutkeni)* for skin burns, and that of *poraquê (Electrophorus electricus)* for rheumatism (Begossi and Braga 1992).

Other animals avoided as food, such as turtle *(Chelonia mydas)*, are also used for medicinal purposes (Table 8). Campos (1967) reported the use of *cagado* (fresh water turtle) against rheumatism in northeast Brazil. Ayres and Ayres (1979) reported that *caboclos* from Aripuaña (southern Amazon) avoid eating *onça parda (Felis concolor,* cougar) due to its medicinal value.

CONCLUSIONS

The fish avoided as food at Búzios Island are fish with aggressive behavior, a bad odor, or those classified as *carregado,* such as *camburú* (moray), ray, *bonito* (bullet mackerel and little tunny), and *tinhuna* (sargeant major). *Carregado* are fish

avoided during illness; there are other species of fish which are recommended for ill persons. These are mostly fish that feed on invertebrates or plankton. The *baiacú* (pufferfish) is also considered toxic and is not eaten at Buzios. Other medicinal animals are subject to food taboos; the most tabooed is the lizard, which has the greatest medicinal value.

As pointed out by Ross (1978), food taboos may be explained by ecological adjustments in resource exploitation. Costs and benefits of foraging strategies can offer explanations that go beyond solely cultural explanations. The avoidance of some animals as foods may be partially explained by the importance of maintaining them for medicinal purposes. According to the "drugstore hypothesis" (Begossi 1989b; Begossi and Braga 1992), nature is the "drugstore" of isolated human populations; plants (collected and cultivated) as well as animals are used for medicinal purposes. As is the case for Harris's (1977, 1985) sacred cow, medicinal animals are also too important to be consumed as food. Note that the strongest food taboo pertains to the lizard, which is the most frequently used medicinal animal (Table 8). According to Rea (1981), a dietary restriction does not necessarily protect an animal from human predation, as it may still be taken for its feathers, hide, or medicinal/religious value. At Búzios, if medicinal animals were also consumed, predation pressure would be stronger on these animals. Therefore, the maintenance of a species through food taboos may also have utilitarian purposes.

Food avoidances and taboos express the perceptions that a community has about its environment. Islander perception is that some fish are "healthy" and others "unhealthy." This behavior could be based on an old or a present environmental feature. A taboo may at first be useful. Once in existence, it develops an inertia of its own and may no longer be adaptive (Carneiro 1978). Taboos are like cultural traditions which do not change instantly in response to environmental conditions ("cultural inertia") (Boyd and Richerson 1985).

Ross (1978) observed that Upper Xingu Basin (Brazil) populations which depend heavily on fishing have dietary restrictions concerning terrestrial game animals. On the other hand, fish is insignificant in the diet of Yanomano, Shuara (Jivaro), and Mundurucú populations, and large game restrictions are absent. Ross concluded that where aquatic fauna is abundant, aquatic organisms are prized as food and land creatures are considered inedible. However, Kiltie (1980) suggested, based on optimal foraging theory, that food taboos should not depend on prey availability, but rather on the ranking of food preferences.

According to optimal foraging theory (Pyke 1984), when resources are abundant a predator should specialize in high ranking prey; if resources are scarce low ranking prey are included in the diet. If we consider that fishing communities such as Búzios Island have plenty of available animal protein, we should expect to find the low ranking prey being avoided in these communities (i.e., they will specialize in some animal protein items). As suggested by Rea (1981), taboos are a luxury: for example, rich riverine peoples with agriculture can afford them but peoples from harsh areas have to be more generalist in their food choices. The ranking and choice of resources, in association with the other factors already discussed, could favor the creation and maintenance of food taboos at Búzios.

Three main factors are potentially related to animal food avoidances at Búzios Island. First, some fish are avoided because they can be toxic (pufferfish, for example) or they could have been toxic in the past (e.g., ciguatoxin; no available data). Second, fish that prey on other fish are avoided by unhealthy persons. Third, some animals are avoided as food because they are preserved for medicinal purposes (e.g., lizard, ray, and turtle). The same factors seem to explain food behaviors of fishermen along the Tocantins River (Begossi and Braga 1992). However, data on fish toxins are much needed in order to understand better the factors which affect food taboos in human populations. Finally, the similarity of taboos on fish such as ray, shark, and *bonito* in communities from Brazil (Búzios Island and Tocantins), India, and Malaysia should be considered the result of possible ecological or nutritional factors.

ACKNOWLEDGEMENTS

I thank the Conselho Nacional de Desenvolvimento Científico e Tecnológico for financial support while undertaking doctoral studies at the University of California, Davis, for financial aid for the fieldwork at Búzios, and for a current research scholarship and grant; the University of California, Davis, for financial support for the Búzios fieldwork; the community of Ilhabela, and especially of Búzios Island, for their kind cooperation and hospitality; the "Delegacia de Ensino de *Caraguatatuba*" for giving permission for this project at Búzios and offering use of their installations; M.D.O. Campos for introducing me to Búzios islanders; P.J. Richerson, B. Orlove, and R. Bettinger (University of California, Davis) for helpful comments on an earlier draft of this manuscript; L.F.L. Duarte, Universidade Estadual de Campinas, for identifying the molluscs and J.L. Figueiredo, Museu de Zoologia, Universidade de São Paulo for reviewing the fish identification. Finally, I thank L. Junqueira for the French translation of the abstract.

LITERATURE CITED

AYRES, JOSE M. and CRISTINA AYRES. 1979. Aspectos da caça no alto rio Aripuanã. Acta Amazonica 9:287–298.

BARTHES, ROLAND. 1961. Pour une psycho-sociologie de l'alimentation contemporaine. Annales 16:977–986.

BASSO, ELLEN. 1972. The Kalapalo dietary system. Pp. 629–637 *in* Atti del XL Congresso Internazionale degli Americanisti. Tilgher, Genova.

_____. 1973. The Kalapalo Indians of Central Brazil. Holt, Rinehart & Winston, New York.

_____. 1978. Comments. Current Anthropology 19:16–17.

BEGOSSI, ALPINA. 1989a. Food Diversity and Choice, and Technology in a Brazilian Fishing Community (Búzios Island, São Paulo State). Ph.D. dissertation, University of California, Davis. University Microfilms, Ann Arbor.

_____. 1989b. Tabus alimentares na Ilha dos Búzios, uma comunidade de pescadores. Pp. 253–262 *in* Anais do III Encontro de Ciências Sociais e o Mar no Brasil. Antonio Carlos Diegues (editor). Programa de Pesquisa e Conservação de Areas Umidas no Brasil. Instituto Oceanográfico da Universidade de São Paulo, Fundação Ford, Instituto International para a Conservação da Natureza, São Paulo.

BEGOSSI, ALPINA and FRANCISCO M. de S. BRAGA. 1992. Food taboos and folk medicine among fishermen from the Tocantins River (Brazil). Amazoniana 12:101–118.

BOYD, ROBERT and PETER J. RICHERSON. 1985. Culture and the Evolutionary Process. The University of Chicago Press, Chicago.

LITERATURE CITED (continued)

CAMPOS, EDUARDO. 1967. Medicina popular do Nordeste. Ediçoẽs O Cruzeiro, Rio de Janeiro.

CANE, SCOTT. 1987. Australian aboriginal subsistence in the Western Desert. Human Ecology 15:391–434.

CARNEIRO, ROBERT L. 1978. Comments. Current Anthropology 19:19–20.

CHAGNON, NAPOLEON and RAYMOND B. HAMES. 1980. La "hipotesis proteica" y la adaptación indígena a la cuenca del Amazonas: Una revisión crítica de los datos y de la teoria. Interciencia 5:346–358.

CORREA, IRACEMA F.L. 1981. A Congada de Ilhabela na festa de São Benedito. Editora Livramento, Escola de Folclore, São Paulo.

DOUGLAS, MARY. 1969. Purity and Danger. Routledge & Kegan Paul, London.

FERRO-LUZZI, GABRIELLA E. 1975. Food avoidances of Indian tribes. Anthropos 70:385–427.

_____. 1980a. Food avoidances of pregnant women in Talminad. Pp. 101–108 *in* Food, Ecology and Culture. John R.K. Robson (editor). Gordon & Breach, New York.

_____. 1980b. Food avoidances during the puerperium and lactation in Talminad. Pp. 109–118 *in* Food, Ecology and Culture. John R.K. Robson (editor). Gordon & Breach, New York.

FIGUEIREDO, JOSE L. 1977. Manual de peixes marinhos do sudeste do Brasil: Caçoẽs, raias e quimeras. Museu de Zoologia, Universidade de São Paulo, São Paulo.

_____ and NAERCIO A. MENEZES. 1978. Manual de peixes marinhos do sudeste do Brasil: Teleostei (1). Museu de Zoologia, Universidade de São Paulo, São Paulo.

_____. 1980. Manual de peixes marinhos do sudeste do Brasil: Teleostei (2). Museu de Zoologia, Universidade de São Paulo, São Paulo.

GOPALAKRISHNAKONE, P. 1988. Structure of the skin glands of the puffer fish [abstract]. Toxicon 26:22.

GOULDING, MICHAEL. 1981. Man and Fisheries on an Amazon frontier. Developments in Hydrobiology, Vol. 4. W. Junk Publishers, The Hague.

HABERMEHL, GERHARD G. 1981. Venomous Animals and Their Toxins. Springer-Verlag, Berlin.

HARRIS, MARVIN. 1977. Cannibals and Kings: The Origin of Cultures. Vintage Books, New York.

_____. 1985. Good to Eat: Riddles of Food and Culture. Simon & Schuster, New York.

_____. 1987a. Comment on Vayda's review of Good to Eat: Riddles of Food and Culture. Human Ecology 15:511–517.

_____. 1987b. Food ways: Historical overview and historical prolegomenon. Pp. 57–92 *in* Food and Evolution. Marvin Harris and Eric B. Ross (editors). Temple University Press, Philadelphia.

HASHIMOTO, YOSHIRO. 1979. Marine Toxins and Other Bioactive Marine Metabolites. Japan Scientific Press, Tokyo.

KILTIE, RICHARD A. 1980. More on Amazon cultural ecology. Current Anthropology 21:541–546.

KODAMA, ARTHUR M. and HOKAMA YOSHITSUGI. 1989. Variations in symptomatology of ciguatera poisoning. Toxicon 27:593–595.

LANDS, WILLIAM E.M. 1986. Fish and Human Health. Academic Press, Orlando.

LENKO, KAROL. 1965. Nosso folclore. Chácaras & Quintais (September):453–456.

LEWIS, NANCY D. 1984. Ciguatera—parameters of a tropical health problem. Human Ecology 12:253–274.

McDONALD, DAVID R. 1977. Food taboos: A primitive environmental protection agency (South America). Anthropos 72: 734–748.

MENEZES, NAERCIO A. and JOSE L. FIGUEIREDO. 1980. Manual de peixes marinhos do sudeste do Brasil: Teleostei (3). Museu de Zoologia, Universidade de São Paulo, São Paulo.

_____. 1985. Manual de peixes marinhos do sudeste do Brasil: Teleostei (4). Museu de Zoologia, Universidade de São Paulo, São Paulo.

MILLER, D.M., D.R. TINDALL, W. DAVIN, and E.J. REGAL. 1987. Assay of ciguateric fish extracts utilizing the guinea pig ileum preparation [abstract]. Toxicon 25:149.

LITERATURE CITED (continued)

MORAN, EMILIO F. 1974. The adaptive system of the Amazonian caboclo. Pp. 136–159 *in* Man in the Amazon. C. Wagley (editor). University of Florida Press, Gainesville.

_____. 1977. Estratégias de sobrevivência: O uso de recursos ao longo da rodovia Transamazônica. Acta Amazonica 7:363–379.

MOYLE, PETER B. and JOSEPH J. CECH, JR. 1982. Fishes: An Introduction to Ichthyology. Prentice-Hall, Englewood Cliffs, New Jersey.

MUSSOLINI, GIOCONDA. 1980. Ensaios de antropologia indígena e caiçara. Editora Paz e Terra, Rio de Janeiro.

PEREIRA, NUNES. 1974. Panorama da alimentação indígena. Livraria São José, Rio de Janeiro.

PISO, GUILHERME. 1658. História natural e médica da India Ocidental (reprinted in 1957). Departamento de Imprensa Nacional, Rio de Janeiro.

PYKE, GRAHAM H. 1984. Optimal foraging theory: A critical review. Annual Review of Ecology and Systematics 15:523–575.

QUOD, J.P. and ANNE-MARIE LEGRAND. 1988. Effects of partially purified ciguatoxin from moray-eel, *Gymnothorax javanicus*, on action potential of isolated rat heart [abstract]. Toxicon 26:36.

REA, AMADEO M. 1981. Resource utilization and food taboos of Sonoran desert peoples. Journal of Ethnobiology 1:69–83.

REICHEL-DOLMATOFF, GERARDO. 1976. Cosmology as ecological analysis: A view from the rain forest. Man 11:307–318.

RIBEIRO, BERTA G. 1987. O índio na cultura brasileira. Organização das Nacoes Unidas para a Educação, Ciência, e Cultura, Rio de Janeiro.

RIOS, E.C. 1985. Seashells of Brazil. Fundação Cidade do Rio Grande, Fundação Universidade do Rio Grande, Museu Oceanográfico, Rio Grande.

ROSENBERG, PHILIP (editor). 1987. Common names index: Poisonous animals, plants and bacteria. Toxicon 25:799–890.

ROSS, ERIC B. 1978. Food taboos, diet, and hunting strategy: The adaptation to animals in Amazon cultural ecology. Current Anthropology 19:1–36.

RUSSELL, FINDLAY E. 1965. Marine toxins and venomous and poisonous marine animals. Advances in Marine Biology 3:255–384.

SAHLINS, MARSHALL. 1976. Culture and Practical Reason. The University of Chicago Press, Chicago.

SMITH, NIGEL J.H. 1976. Utilization of game along Brazil's transamazon highway. Acta Amazonica 6:455–466.

_____. 1981. Man, Fishes, and the Amazon. Columbia University Press, New York.

TURTON, DAVID. 1978. Comments. Current Anthropology 19:26–27.

VAYDA, ANDREW P. 1987. Explaining what people eat; A review article. Human Ecology 15:493–510.

VON BRANDT, ANDRES. 1984. Fish Catching Methods of the World. Fishing New Books, Farham, England.

WATABE, S., Y. SATO, M. NAKAYA, N. NOGAWA, K. OOKASHI, T. NOGUCHI, N. MORIKAWA, and K. HASHIMOTO. 1987. Distribution of tritiated tetrodoxin administered intraperitoneally to pufferfish. Toxicon 25:1283–1289.

WILLEMS, EMILIO. 1952. Búzios Island. University of Washington Press, Seattle.

WILSON, CHRISTINE F. 1980. Food taboos at childbirth: the Malay example. Pp. 67–74 *in* Food, ecology and culture. John R.K. Robson (editor). Gordon & Breach, New York.

BOOK REVIEW

Las Plantas y el Hombre: Memorias del Primer Simposio Ecuatoriano de Etnobotánica y Botánica Económica. Montserrat Ríos and Henrick Borgtoff Pederson (editors). Quito, Ecuador: Ediciones ABYA-YALA, 1991. Pp. xxiv, 437. No price given (paperback). ISBN 9978-99-002-X.