

ETHNOICHTHYOLOGY OF GAMBOA FISHERMEN OF SEPETIBA BAY, BRAZIL

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ABSTRACT.—We describe aspects of the ethnoichthyology of fishermen from Gamboa, Itacuruçá Island, Sepetiba Bay, State of Rio de Janeiro, Brazil. Ethnobiology includes the study of the folk classification of organisms; thus ethnoichthyology subsumes the folk classification of fish. Fishermen from Gamboa categorize fish by reference to morphological and ecological criteria. We observed an hierarchical system of classification, with fish grouped in ethnofamilies. Following Berlin's framework, the folk taxonomy of Gamboa's fishermen includes fish as a life-form and ethnofamilies as intermediate taxa. The knowledge fishermen have about the ecology and behavior of fish is, for the most part, in concordance with the scientific literature. This important result reinforces the current ethnobiological consensus and may justify the inclusion of local fishermen in management decisions in this priority conservation area, the Atlantic Forest coast of Brazil.

RESUMO.—Este é um estudo sobre a etnoictiologia dos pescadores de Gamboa, Ilha de Itacuruçá, Baía de Sepetiba, Estado do Rio de Janeiro, Brasil. Etnobiologia é o estudo da classificação popular dos organismos e etnoictiologia inclui o conhecimento popular sobre os peixes. Os pescadores de Gamboa identificam os peixes baseando-se em critérios morfológicos e ecológicos. Um sistema de classificação hierárquico, incluindo os peixes agrupados em etnofamílias, foi observado. Segundo a terminologia de Berlin, a taxonomia popular dos pescadores de Gamboa inclui os peixes como "life-form" que inclui etnofamílias como "intermediate taxa." O conhecimento dos pescadores sobre a ecologia e comportamento dos peixes está, em grande parte, em concordância com a literatura científica. Estes resultados são importantes pois reforçam a literatura a literatura corrente em etnobiologia e podem contribuir para a inclusão dos pescadores em decisões de manejo para uma área prioritária para conservação, como é a costa da Mata Atlântica.

RÉSUMÉ.—Cette étude porte sur certains aspects de l'ethnoichthyologie des pêcheurs de Gamboa, Île d'Itacuruçá, Baie de Sepetiba, État de Rio de Janeiro, Brésil. L'ethnobiologie inclut l'étude de la classification populaire des organismes et, par conséquent, l'ethnoichthyologie subsume la classification populaire des poissons. Les pêcheurs de Gamboa classent les poissons à partir de critères morphologiques et écologiques. Un système hiérarchique de classification comprenant des poissons classés en ethnofamilles a été observé. Suivant la terminologie de B. Berlin, la taxinomie populaire des pêcheurs de Gamboa comporte une 'forme de vie' poisson qui comprend elle-même des ethnofamilles comme 'taxons intermédiaires'. La connaissance que les pêcheurs ont de l'écologie

et des mœurs des poissons correspond, en grande partie, à celle des scientifiques occidentaux. Il s'agit là d'un résultat important qui renforce le consensus ethnobiologique actuel et qui peut justifier la participation des pêcheurs locaux aux prises de décisions administratives dans des régions de conservation prioritaire comme la forêt atlantique côtière du Brésil.

INTRODUCTION

Ethnoscience includes the study of the perceptions, knowledge, and classification of the world by different cultures. Most ethnoscience research has dealt with specific domains, such as folk medicine, color categories, and plant classification (Garbarino 1977). Ethnobiology refers to the study of the perceptions that different peoples have of living organisms, in particular, how they classify those organisms. According to Simpson (1962), systematics is the scientific study of the morphology, diversity, and relations among organisms and includes their assemblages or groups and related nomenclature. The analytical part of systematics is called taxonomy (Vanzolini 1992). Berlin (1992) proposed about a dozen general principles for folk biosystematics, which include the proposal that categories of organisms will be of varying degrees of inclusiveness and that these ethnobiological categories may be assigned to one of Berlin's universal folk taxonomic ranks, that is, unique beginner, life-form, intermediate, generic, specific, or varietal.

Different groups or communities may classify organisms using different criteria, but apparently there are some universal aspects in the classification processes. Organisms may be grouped according to habitat, such as among the Meninaku Indians (Costa 1988), or according to their occurrence and feeding behavior (Silva 1988), in addition to their morphology. Classificatory systems may include more than one system, as shown by Marques (1991), which identified hierarchical (with inclusive categories), sequential (with serial orders following some criteria), concentric (including focal species), and cyclic (based on different stages of development) systems of fish classification among fishermen from the state of Alagoas, Brazil. These classificatory patterns were used together as coexisting systems.

In Brazil, pioneering ethnobiological studies were carried out by Posey (1981, 1983, 1986) on the ethnoecology and ethnoentomology of the Kayapó Indians (in the north of Brazil). Studies of Brazilian ethnoichthyology include riverine fishing communities (Begossi and Garavello 1990) and maritime communities (Begossi 1989; Begossi and Figueiredo 1995; Marques 1991, 1994). These studies have shown the deep knowledge fishers have about the taxonomic relations, ecology, and behavior of fish species. Marques (1991), in particular, documents a very detailed Brazilian ethnoichthyological system.

In this study we describe aspects of the folk taxonomy of fishermen from Gamboa, including attributes used in classification of ethnoichthyological families and the feeding behavior and habitat preferences of fish species. Nine ethnofamilies of common occurrence—which were mentioned by most or all fishermen interviewed—are analyzed. At Gamboa "fish" is a life-form which includes ethnofamilies as intermediate taxa, following Berlin (1992).

THE COMMUNITY OF GAMBOA

Gamboa is a community of 26 related nuclear families that live on Itacuruçá Island, Sepetiba Bay, State of Rio de Janeiro. The importance of Gamboa is both ecological and cultural, as it is the last fishing community remaining on this coastal island of 8.3 km² (see Figures 1 and 2).

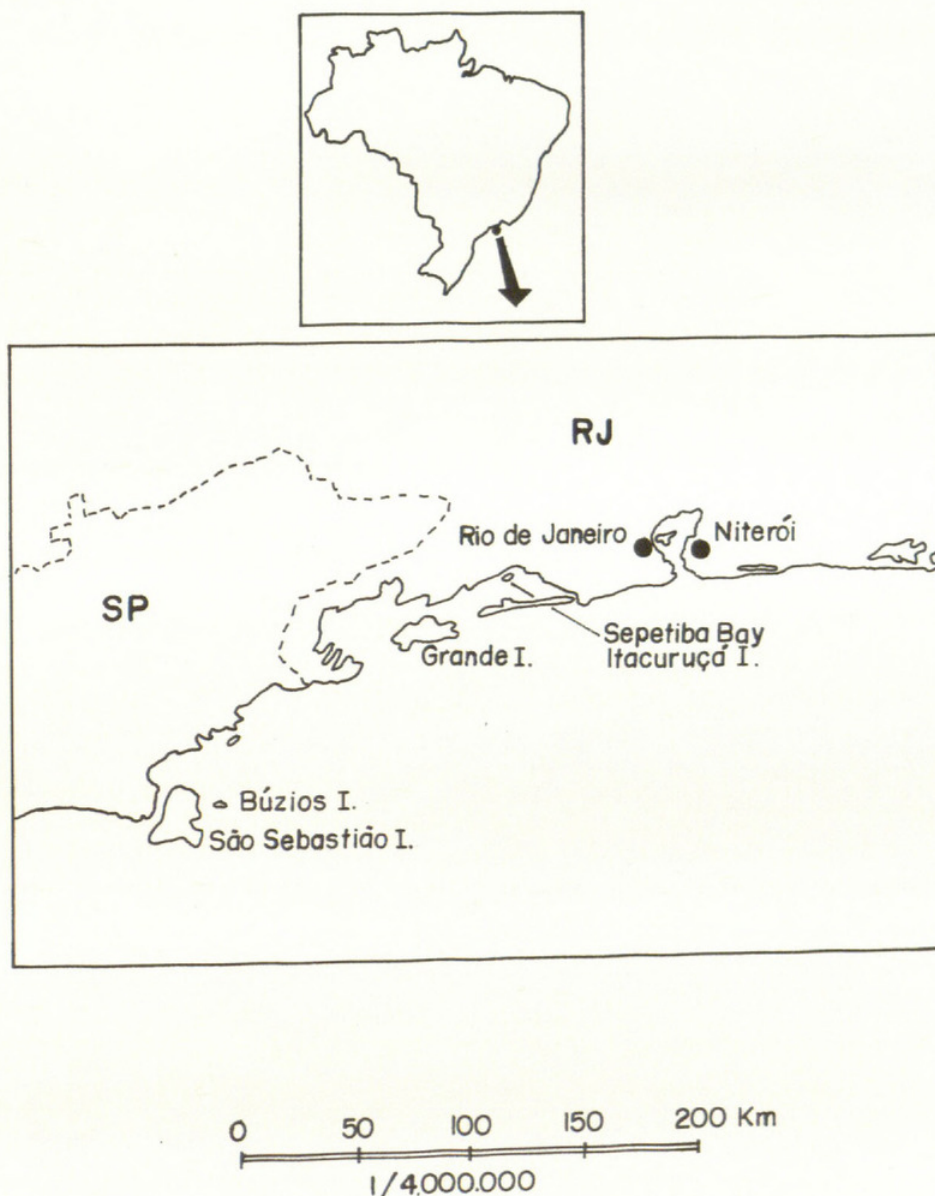


FIGURE 1.—Map of the region within Brazil.

On Itacuruçá Island, as in other major islands of Sepetiba Bay, there are many houses owned by non-residents such as tourists and high income families from the city of Rio de Janeiro. Tourism is vigorously promoted. There are many tourist hotels on the so-called Green Coast ("Costa Verde"), which includes areas of the Atlantic Forest as well as islands in the bay.



FIGURE 2.—Itacuruçá Island.

Itacuruçá Island includes about 50 fishermen's houses, representing 21% of all the houses (Hoefle 1989). Temporary residents own the majority of the island's houses. Gamboa has survived as an artisanal fishing community on Itacuruçá probably because of its location next to a mangrove forest, an area usually avoided by tourists. Most Gamboa residents (33 out of 45) were born here. Illiteracy (including functional illiteracy) is relatively low (26%) compared to other communities and to other Brazilian rural areas (Begossi 1992a). Illiteracy is in general lower in the more developed southeast of Brazil than in other Brazilian regions. Gamboa literacy rates are high compared to those of more isolated communities of the Atlantic Forest coast, such as Búzios Island, where 53% are illiterate (Begossi 1996). Economic activities at Gamboa are essentially fishing, tourism, and some agriculture.

Fishing is performed in paddled or motorized canoes, often using small encircling nets with 30 mm mesh for shrimp and fish (see Figure 3). Marine animals commonly consumed or sold by families are shrimp (*Pennaeus schmitti*), *corvina* (*Micropogonias furnieri*), *pescada* (*Cynoscion* spp., among others) and *paratí* (*Mugil curema*). Marine animals are very important in the diet of families from Gamboa, representing about 67% of the meat consumed.

PROCEDURES

This study is part of a larger study conducted from 1989 to 1991 on fishing and fishermen of Sepetiba Bay, including fishing strategies and fishing techniques, diet, and information on ethnobotany (Begossi 1991, 1992a; Figueiredo *et al.* 1993). In this previous fieldwork, 66 fish species (corresponding to 73 "folk species" or ter-

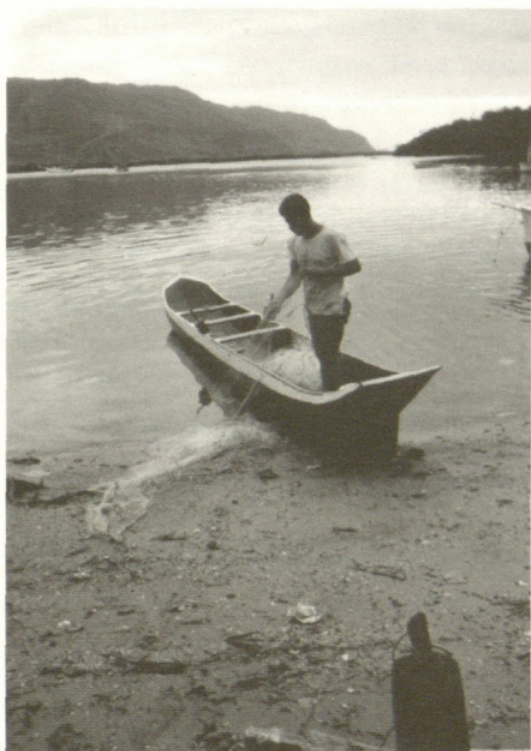


FIGURE 3.—Gamboa fisherman.

minal folk taxa) were collected from fishermen during fishing trips (Begossi and Figueiredo 1995). This fish collection is just a partial representation of the diversity of fish in the region. Fish were identified based on keys by Figueiredo (1977), Figueiredo and Menezes (1978, 1980), and Menezes and Figueiredo (1980, 1985). The ethnoichthyological aspects of this study were recorded primarily from subsequent interviews with local community members, since most fish had been collected and identified earlier in the study (Begossi and Figueiredo 1995).

After interviewing all adult members of the community and collecting data on diet and fishing, we focused interviews on specific ethnoichthyological topics. These were completed during several visits in 1990 and 1991. For these interviews we initially included all 11 full-time fishermen of Gamboa. During the study the sample was reduced to 8 fishermen, because some

of them subsequently shifted their economic activities from fishing.

Interviews were based on questionnaires that included such general questions as: "How did you learn about fish names?" "What are the relations among fish species (if any)?" "How are they assembled in groups?" We included as well questions on fish diet and habitat. Interviews were conducted at fishermen's houses while fishermen were doing daily tasks, such as cleaning, sewing, or manufacturing nylon nets (see Figure 4).



FIGURE 4.—Gamboa fisherman manufacturing a nylon net.

A second type of interview was performed with 58 cards, each one illustrated with a fish drawing from Suzuki (1986). The cards were organized using random numbers. Fishermen were asked to assemble sets of fish they believe were related, or, according to their own way of speaking, fish of the same "family." We encountered some difficulties employing this method. Fishermen sometimes had difficulty recognizing the fish species illustrated. We attribute this to two factors. First of all, fishermen were not accustomed to fish in just two dimensions. Secondly, there were imperfections or errors in the descriptions of species in the drawings on the cards. The cards used included drawings with insufficient detail and faithfulness. Unfortunately, we recognized these problems only at the end of work, with the help of the Brazilian fish taxonomist J. L. Figueiredo, who critically evaluated the cards used.

FISHERMEN'S KNOWLEDGE: ETHNOTAXONOMY AND ETHNOECOLOGY

Fishermen learned about fish from their parents or from other "old," i.e., experienced, fishermen, as is typical of "vertical" cultural transmission (Cavalli-Sforza and Feldman 1981). Morphological features seemed the most important in characterizing fish, but ecological features were also important. Fish are recognized as such because they have scales, gills, do not have hair, and live, breathe, and reproduce in the water.

The life-form "fish" includes a variety of aquatic organisms, including turtles but excluding moray eels. Moray eels were not considered to be fish by most (nine of 11) fishermen because they are snake-shaped and aggressive, biting like a snake. Since the moray eel ethnofamily is considered more similar in shape to land animals, it is separated from the fish life-form. This supports Randall and Hunn (1984), who noted that the fish life-form may or may not include precisely what biologists consider to be "fish"; that the category is often extended to include cetaceans (see Table 1) and other aquatic animal groups.

Gamboa fishermen utilize an hierarchical classification, including ethnospecies (Berlin's terminal taxa) within ethnofamilies (Berlin's polytypic folk generic and intermediate taxa) and these in the life-form fish. Ethnofamilies are characterized by a variety of criteria, but the most important are morphological, followed by criteria such as the quality of the flesh (e.g., tasteful, strong, white), monetary value (e.g., cheap or expensive), and ecological relations (e.g., schooling behavior, diet, habitat).

Ethnofamilies.—This category was suggested by Marques (1991) when studying fishermen from the State of Alagoas, Brazil. He found, for example, that the family Mugilidae was considered by fishermen to constitute two distinct ethnofamilies (*família da tainha* and *família do curimã*). Silva (1988) also observed that fishermen from Piratininga, State of Rio de Janeiro, were assembling fish into "families." At Gamboa, ethnofamilies are also typically given a name consisting of *família do/da* followed by X, the name of a generic level taxon within the family. Examples include the *família do cação* (shark family) and *família da arraia* (ray family). Berlin (1992) observed that the terms "relative of" or "companion of" were used by Tzeltal Maya of Mexico for similar species and that these were called "brothers" or "members of the same family" by the Aguaruna and Jívaro of Peru.

Table 1.—Ethnofamilies of fishermen from Gamboa, Sepetiba Bay, Rio de Janeiro, Brazil, and associated information.

Ethno-family	Ethnospecies	Species Collected ¹	Cards Used in Sorting Task	Ethnohabitat (pg. 166)	Ethnodiet (pg. 166)
Arraia (rays)					
	Arraia pinima	<i>Gymnura altavela</i>	<i>Gymnura</i>	open sea ² , coast	fish, crust.*
	A. morcego	<i>Gymnura altavela</i>	<i>Gymnura</i>	open sea, coast	fish, crust.
	A. lixa	<i>Dasyatis guttata</i>	<i>Dasyatis, Raja</i>	mud, sand	fish, crust.
	A. chita	<i>Dasyatis guttata</i>	<i>Dasyatis, Raja</i>	mud, sand	fish, crust.
	A. jereba	<i>Dasyatis guttata</i>	<i>Dasyatis, Raja</i>	mud, sand	fish, crust.
	A. manteiga	<i>Dasyatis guttata</i>	<i>Dasyatis, Raja</i>	mud, sand	fish, crust.
	A. cabocla	<i>Rhinoptera bonasus</i>	card not used	mud, sand	fish, crust.
	A. moitão	<i>Rhinoptera bonasus</i>	card not used	mud, sand	fish, crust.
Cação (sharks)					
	Cação viola	<i>Rhinobatos horkelii</i>	<i>Rhinobatos</i>	open sea	fish
	Cação viola	<i>R. percellens</i>	<i>Rhinobatos</i>	open sea	fish
	C. aniqui	not collected	<i>Galeocerdo</i> , <i>Mustelus</i> , <i>Carcharhinus</i>	open sea	fish
	C. tintureira	not collected	<i>Galeocerdo</i> , <i>Mustelus</i> , <i>Carcharhinus</i>	open sea	fish
	Tintureira verdadeira	not collected	<i>Galeocerdo</i> , <i>Mustelus</i> , <i>Carcharhinus</i>	open sea	fish
	Tubarão	not collected	<i>Galeocerdo</i> , <i>Mustelus</i> , <i>Carcharhinus</i>	open sea	fish
	C. babaqueira	<i>Rhizoprionodon lalandei</i>	card not used	open sea	fish
	C. baniquinha	<i>Rhizoprionodon lalandei</i>	card not used	open sea	fish
	C. leitão	<i>Rhizoprionodon lalandei</i>	card not used	open sea	fish
	Boto ³	not collected	card not used	open sea	fish
	C. campeba	<i>Sphyrna tiburo</i>	<i>Sphyrna</i>	open sea	fish
Cobra do mar/ Moréia (eels/ moray)					
	Cobra verdadeira	not collected	<i>Conger</i>	mud	fish
	Moréia	<i>Gymnothorax ocelatus</i>	<i>Gymnothorax</i> ,	rocky shores	fish
	Caramburú	<i>Gymnothorax ocelatus</i>	<i>Muraena</i> ,	rocky shores	fish
	Camburupí	<i>Gymnothorax ocelatus</i>	<i>Ophichthus</i>	rocky shores	fish
	Muçum	not collected	card not used	rocky shores	fish
	Vira-vira	not collected	card not used	rocky shores	fish
Galo (moonfish)					
	Galo	<i>Selene vomer</i>	<i>Selene</i>	open sea, rocky substrate	fish, crust.
Peixe-porco (filefish)					
	Peixe-porco	<i>Stephanolepis hispidus</i>	<i>Stephanolepis</i> <i>Aluterus</i>	rocky shores, open sea	algae, crust.
Sororoca/ Cavala (mackerels) (Scombridae)					
	Sororoca	<i>Scomberomorus brasiliensis</i>	<i>Scomberomorus</i> ,	open sea	fish
	Cavala	not collected	<i>Scomberomorus</i> , <i>Scomber</i>	open sea	fish

Table 1.—Continued

Ethno-family	Ethnospecies	Species Collected	Cards	Ethnohabitat	Ethnodiet
Badejo/ Garoupa / Mira (Serranidae)					
	Badejo	not collected	<i>Mycteroperca</i>	rocky substrate	fish
	Mira	<i>Mycteroperca acutirostris</i>	<i>Mycteroperca</i>	rocky substrate	fish
	Cherne	<i>Epinephelus niveatus</i>	<i>Epinephelus</i>	rocky substrate	fish
	Mero	not collected	<i>Epinephelus</i>	rocky substrate	fish
Xaréu/ Carapau (Carangidae)					
	Xaréu	<i>Caranx hippos</i>	<i>Caranx</i>	open sea, coast shores	fish, crust.
	Olhudo	<i>C. latus</i>	<i>Caranx</i>	open sea, coast shores	fish, crust.
	Xarelele	<i>C. latus</i>	<i>Caranx</i>	open sea, coast shores	fish, crust.
	Carapau	<i>C. latus</i>	<i>Caranx</i>	open sea, coast shores	fish, crust.
	Palombeta	<i>Chloroscombrus chrysurus</i>	<i>Chloroscombrus</i> <i>Tachinotus</i>	coast shores	crustacea
Linguado (flounders)					
	Linguado	<i>Citharichthys spilopterus</i>	<i>Paralichthys</i>	mud, sand	fish, crust., detritus

*crust.=crustacea.

¹ Begossi and Figueiredo (1995).
² Called “mar grosso” or “mar aberto.”
³ Boto is a dolphin (Cetacea).

Nine ethnofamilies were readily recognized by all or most Gamboa fishermen (see Table 1). Other ethnofamilies were mentioned by a few fishermen, such as the families of snook, bluefish, and species of *Cynoscion* (Sciaenidae), also economically important groups. Due to the small sample size and limited period of the investigation, we decided to analyze only the ethnofamilies mentioned by most or all fishermen. These were, besides the sharks and rays mentioned, *sororoca/cavala* (mackerels), *galo* (moonfish), *mira/garoupa/badejo* (groupers), *peixe-porco* (filefish), *linguado* (flounders), *xaréu/carapau* (jacks), and *cobra/moréia* (eel/moray). These ethnofamilies are important for fishermen either because they are caught, eaten, and sold (mackerels, groupers, flounders, filefish, and jacks), or because they may be dangerous (rays, sharks, and morays). These results show the importance of utilitarian purposes in terms of the folk classification, as noted by Hunn (1982). Begossi and Garavello (1990) also observed that fishermen from the Tocantins River region of Brazil have a detailed taxonomy based on how fish are used.

Morphological criteria are very important in order to characterize both ethnospecies and ethnofamilies. Presence or absence of scales (*peixe de couro* or *de pele*, meaning “scales absent”), of spines, and the fish shapes are important attributes. For example, the ethnofamily of groupers have spines and scales; absence of scales is noticed for filefish, eel or moray, and rays; while flounders have an unusual shape. Criteria based on taste are exemplified by the strong-tasting flesh

of rays and the white flesh of *cavala* (mackerel), groupers, and *galo* (moonfish). In another study nearby on Búzios Island (Begossi 1992b), strong-tasting flesh was linked to fish prohibitions or food taboos, for example, of rays. At Gamboa, rays were mentioned by 78% of 40 adults interviewed as a tabooed food.

Market value, such as the high price of flounders, groupers, and mackerel-like fishes (compared to inexpensive fish, such as rays) were also noted in differentiating fish. Other criteria used are those based on ecological features, such as the observations that mackerels school and have low rates of reproduction; that eels live in the mud; that groupers do not school and live among rocks (*peixes de pedra*); that sharks live in the open sea (*mar grosso*); that moonfish live near the surface while mackerels prefer waters of medium depth. Fish with medicinal (filefish) or ornamental (pufferfish) value were also mentioned. Multiple criteria occur in the folk taxonomy of Gamboa fishermen, as in other Brazilian fishing communities (Marques 1991). Other ethnofamilies were distinguished by reference to fishing practices, as for example: shrimp lures are used for groupers; nets as well as lures are used for sharks; the high speed of moonfish make them difficult to capture; while mackerels show jumping behavior. Besides form and edibility, capture methods were also observed to affect the folk taxonomy of fish among southern Philippine Sinama (Randall and Hunn 1984).

The ethnofamily of morays includes several Western scientific families, such as the Muraenidae, Congridae, and Ophichthidae (see Table 1), all of which are of the order Anguilliformes. Similar results were found by Marques (1991) among fishermen from the State of Alagoas: in that case the ethnofamily was called *mororó* and included the Muraenidae, Ophichthidae, and Gobiidae. Their snake-like shapes seem the primary factor for grouping these species in both communities.

The ethnofamily *xaréu/carapau* includes ethnospecies that are subdivided into named size classes. *Xaréu* are big, *xerelete* medium-sized, and *olhudo* small. However, they are considered to be a single ethnospecies, with different names labeling forms differing only based on size, perhaps interpreted as phases of life-cycle development. In terms of the Western scientific taxonomy, we may be dealing with different species (*Caranx hippos* and *C. latus*). Another example of name differentiation based on size or on developmental stage is for the Mugilidae. *Virote* and *tainha* are also forms of the same ethnospecies: the first is the young and the second the adult of *Mugil platanus*. Marques (1991) also observed, among another group of Brazilian fishermen, systems of classification based on life-cycle development.

Moonfish, a member of the Carangidae, were considered by fishermen from Gamboa to represent a different ethnofamily from the other Carangidae (see Table 1). This monotypical ethnofamily may be attributed to the unusual morphology typical of moonfish.

Some fish were well known to fishermen, but were not classified in any ethnofamily. These were *Hipocampus punctulatus* (*cavalo do mar*, sea horse), *Euthynnus alleteratus* (bonito) and *Oligoplites saliens* (*guaivira*, another jack). These may be cases of "unaffiliated generics" (Berlin 1992). Some ethnofamilies closely correspond to Western scientific families. According to Berlin (1992), intermediate taxa often group folk generics in ways that make good biological sense or correspond to Western scientific families.

Begossi and Figueiredo (1995) reported that at Sepetiba Bay about 20% of the ethnospecies were labeled with binomials. If these correspond to Berlin's folk generics (1992), a low degree of polytypy (11%) was observed, compared to cases cited by Berlin (1992). However, we believe that this original total was an underestimate. We later recognized at least 11 polytypic genera, compared to just six cited by Begossi and Figueiredo (1995): *arraia*, *bagre*, *baiacú*, *budião*, *cação*, *cara*, *corcoroca*, *garoupa*, *pescada*, *paratí*, and *sardinha*.

Ethnohabitat and Ethnodiet.—Fishermen showed a detailed knowledge of fish habitat and diet (see Table 1). Comparing their folk knowledge with the scientific data (Figueiredo 1977; Figueiredo and Menezes 1978, 1980; Menezes and Figueiredo 1980; Moyle and Cech 1982), we observe that local accounts of habitat preferences and feeding behavior of rays, sharks, filefish, mackerels, groupers, and flounders correspond very closely to what is reported in this literature. Filefish were considered by fishermen to live in the open sea or in shallow waters close to rocky shores. Ichthyologists also report that filefish may be found in diverse habitats, from shallow waters to locations far from shore. Local fishermen report that algae (*limo*), mollusks, and crustacea constitute the diet of filefish, which corresponds well with current ichthyological opinion. Other information shows less certain correspondence with the scientific literature. For example, while local reports of the feeding habits of the Carangidae correspond to this literature, reports of habitat preferences do not: Gamboa fishermen consider Carangidae to be open-sea fish, whereas they are reported in the ichthyological literature to inhabit shallow estuarine or coastal waters (with the exception of *Caranx lugubris*, which is found in the open sea, according to Menezes and Figueiredo 1980).

CONCLUSIONS

Some ethnofamilies are considered to be important by Gamboa fishermen because of their economic value, such as the highly priced flounders and mackerels, others because they have medicinal uses, such as filefish (used for bronchitis), and still others because of their common occurrence, such as Carangidae and Serranidae. These observations reinforce a practical view, in a sense that people tend to perceive more detail for the most useful organisms (which might mean those that are consumed, sold, or perceived as dangerous).

In terms of the folk categories mentioned by Berlin (1973, 1992), the folk taxonomy of Gamboa's fishermen includes fish as a life-form that includes ethnofamilies ("intermediate taxa" and/or polytypic folk genera) given the same name as one (or more) ethnospecies included in each family. The grouping of fish in families may be a more general folk classificatory strategy than previously considered, as shown by other studies on Brazilian fishermen (e.g., Marques 1991).

The importance of comparing folk knowledge with Western scientific knowledge is obvious. It is another way of improving that knowledge, as some folk classifications have provided the basis for new scientific discoveries. Marques (1991) noted some examples, such as a catfish (*Arius herzbergii*) called *bagre marruá* from the Lagoa Manguaba, Alagoas, that included mayflies (*Campsurus* sp., Ephemeroptera, "maripôsas") in its diet.

A large part of the Brazilian coast includes remnants of the Atlantic Forest which are included in the Man in the Biosphere Program (MAB/UNESCO). The importance of fishermen's biological knowledge should not be underestimated, because it may be valuable for resource management in the region. It has been shown that in adopting certain innovations, local fishermen are aware of both ecological and economic costs and benefits of new technologies, and that this awareness is closely tied to their biological knowledge (Begossi and Richerson 1991). Brazilian fishermen also employ traditional technologies based on their knowledge of organisms, such as the *caíçara* technique (brush parks) by which fish are attracted selectively using branches and leaves of different tree species, a form of native aquaculture (Marques 1991).

Questions that our preliminary results have not yet resolved include the basis for recognition of relations among fish species, defined by local fishermen as fish that are similar to each other but differing in features such as size or taste. The place of the moray eel ethnofamily is also an aspect that needs to be better understood. Morays and other snake-shaped animals were grouped in an ethnofamily separate from the fish life-form.

ACKNOWLEDGEMENTS

We thank the Departamento de Ecologia, UFRJ, where part of this study was developed, and the Brazilian Agencies: FAPERJ for financial aid to the field work (1990), FAPESP for a 1992 grant, and CNPq (Conselho Nacional de Desenvolvimento Científico e Tecnológico) for grants and scholarships (1989-95). We are grateful for careful review and thoughtful suggestions by J. L. Figueiredo (who also reviewed the fish identifications) and J. G. Marques, and to E. Hunn as a referee. Finally, we thank L. Junqueira for the French translation of the abstract.

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