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Grouard Sandrine. Pre-Columbian fishing strategies in Guadeloupe archipelago (FWI). GÚNZMAN A. F., O. POLACO et F. J. AGUILAR. Presencia de la arqueoictiología en México / Presence of the archaeoichthyology in Mexico, Libro de Memorias de la 12a reunión del Grupo de Trabajo en Restos de Peces del Consejo Internacional para la Arqueozoología / Proceedings of the 12th meeting of the Fish Remains Working Group of the International Council for Archaeozoology, 4-12 Sept. 2003, CONACULTA – INAH, pp.53-64, 2003. hal-03527257

HAL Id: hal-03527257

<https://hal.science/hal-03527257>

Submitted on 7 Feb 2022

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PRE-COLUMBIAN FISHING STRATEGIES IN GUADELOUPE ARCHIPELAGO (FWI)

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Resumen: Este artículo presenta los resultados de los análisis de una muestra única, tanto por la talla como por la calidad de los restos de esqueletos de vertebrados y de crustáceos de diversos emplazamientos precolumbianos de Guadalupe. La importancia de la pesca y el de la explotación del mar son reexaminados, lo que muestra su subevaluación a todos los períodos cronológicos. Estos resultados se oponen a ciertas teorías que suponían que los primeros colonos habrían privilegiado una economía de subsistencia terrestre antes que marina. De la misma forma, las teorías que oponían la presión ambiental a la presión cultural sobre las economías de subsistencia son cuestionadas. Los resultados de los análisis arqueozoológicos indican que una dualidad de las formas de economía (generalizada y especializada) ha coexistido entre las comunidades de un mismo período cerámico. Esta complementariedad de las estrategias de subsistencia correspondería a actividades de temporada específicas adaptadas a los diferentes medios geográficos. La movilidad y los intercambios eran elementos clave de estas poblaciones precolumbianas.

Palabras claves: arqueozoología, Guadalupe, Antillas, precolumbino, economía de subsistencia, técnicas de pesca.

Abstract: This paper describes conclusions from the study of a unique sample, both in size and quality, of vertebrate and crustacean remains from several pre-Columbian sites in Guadeloupe (FWI). The role of fishing and marine exploitation during this period is reappraised, showing across the chronology and over location of these sites that fishing and sea exploitation in general has been previously underestimated. Relative proportions of marine resources (mammals, reptiles, fish, crustaceans, and sea urchins) vary between sites and during time. This new set of data contrasts with previous theories including cultural versus environmental pressures, early migrations of cultivators, who turned only later towards sea exploitation and selectivity of the sites themselves. Coexistence of unspecialized and specialized subsistence economies is demonstrated in this archipelago. This economic duality is influenced by seasonal and geographical factors, among which availability of marine resources is important. The maritime economy is supported by a high degree of mobility and exchange between sites.

Key words: zooarchaeology, Guadeloupe, West-Indies, pre-Columbian, subsistence, fishing techniques.

Résumé: Cet article présente les résultats des analyses d'un échantillon unique, tant en taille qu'en qualité, des restes squelettiques de vertébrés et de crustacés de plusieurs sites

précolombiens de Guadeloupe. Le rôle de la pêche et celui de l'exploitation de la mer y sont réexaminés, ce qui montre leur sous-évaluation à toutes périodes chronologiques. Ces résultats s'opposent à certaines théories qui supposaient que les premiers colons auraient privilégié une économie de subsistance terrestre plutôt que marine. De même, les théories qui opposaient la pression environnementale à la pression culturelle sur les économies de subsistance sont remises en question. Les résultats d'analyse archéozoologiques indiquent qu'une dualité des formes d'économies (généralisée et spécialisée) a coexisté entre les communautés d'une même période céramique. Cette complémentarité des stratégies de subsistance correspondrait à des activités saisonnières spécifiques adaptées aux différents milieux géographiques. La mobilité et les échanges étaient des éléments clefs de ces populations.

Mots-clefs: archéozoologie, Guadeloupe, Antilles, précolombien, économies de subsistance, techniques de pêche.

Paleoenvironmental studies were developed at the end of the 90's, and the vast majority of researches regarding food consumption in prehistoric West Indian contexts has focused on identifying habitat preferences for the animals identified. Moreover, the traditional subsistence research in the Caribbean focuses on regional or trans-cultural subsistence patterns. The social and cultural contributions to catching largely have been ignored. Thus, Caribbean pre-Columbian are not even well known, but they are classified by the stylistic data of their ceramic (Keegan, 1994). Finally, the problematic of this paper is to know if we can define these pre-Columbian cultures through their techniques of animal exploitation, like it was already demonstrated in the world (Tresset, 1996), or if there is any correlation in between. Most of the time food studies are disconnected from technology that produced it.

The initial interface between humans and their environment occurs when resources are procured. This involves a broad spectrum of activities from the boat construction to the manufacture of traps and nets. The details of food procurement must be specified with regard to the resources that are known (or suspected) to have been exploited. What should be of relevance here are the means and modes of production. In this way, this study try to

understand how the animal gathering occurred under influence of cultural, economical, and biogeographical factors, in an insular environment, and how the evolving cultural processes end up at technological and economical choices, through calculated risks, losses and profit.

To accomplish this goal¹ we began by distinguishing between cultural choices within insular environment exploitations, and by recreating resources patterns from marine environments: gathering techniques, exploitation modes and territorial management. Then, we tried to identify major changes within these choices, regarding chronological periods in a limestone island² (from early Saladoid - 500 BC up to recent Troumassoid - 1500 AD). We then reconstructed models of hunting/fishing techniques and their devices.

MATERIALS AND METHODS: GUADELOUPE AS AN EXAMPLE

Located halfway from South America and the Greater Antilles, Guadeloupe (fig. 1) is the widest island of the West Indies: 1705 km², and it is one of the highest mountain:

¹ This study was partially supported by the Program "L'exploitation des milieux marins par les populations précolombiennes" from the S.R.A.-D.R.A.C.-Guadeloupe, and with the help of a scholarship (Bourse du Patrimoine du Ministère de la Culture).

² The present study focuses on faunal remains from seven archaeological sites of Guadeloupe.

1467 m. The visibility between the islands helps in a mental cartography reconstruction of the islands, even the distant ones. Coastal and terrestrial ecological niches of Guadeloupe are diversified: western volcanic islands, eastern limestone archipelago, and vast mangrove swamp areas. In one hand, marine ecosystems offer a large variety of biotopes and a wide diversity of animal

species. In an other hand, this insular environment is characterized by a poor diversity of the terrestrial fauna, a strong endemism rate, and absence of wide terrestrial mammals (MacArthur & Wilson, 1967; Morgan & Woods, 1986; Pregill *et al.*, 1994; Vigne, 1997). Finally, the evidences of pre-Columbian installations in the islands and its archipelago are numerous.

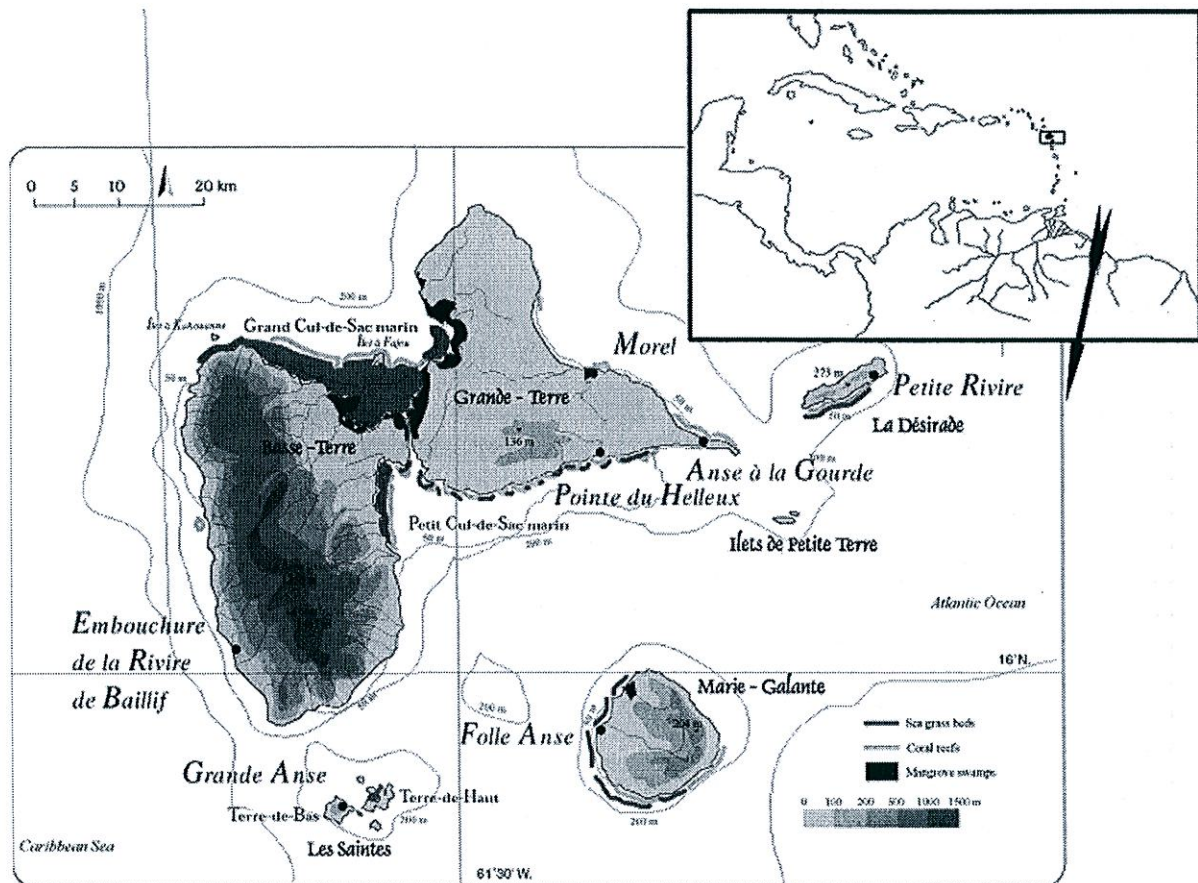


Figure 1. Location of Guadeloupe in the Caribbean. Location of pre-Columbian sites in Guadeloupe.

Seven major archaeological settlements (fig. 1) located near various environments were selected. They follow a complete chrono-cultural sequence:

- ◆ Early and late Saladoïd (~400 BC-600 AD): Morel, Folle Anse, Anse à la Gourde, and Embouchure de la Rivière de Baillif.
- ◆ Post-Saladoïd, with early Troumassoid I and II and late Troumassoid settlements

(~500-1500 AD): Petite Rivière, Grande Anse, and Pointe du Helleux. Stratified sites (Morel and Anse à la Gourde) helps in the question of evolution in a same space.

Samples from 10, 4, and 2.7 mm gauge screen were studied. They come from arbitrary levels of 1 x 1 m excavations. The faunal remains were sorted and identified to their lowest taxonomic levels using

comparative collections at several Institutions in France and in the United States. In order to facilitate the identifications of fish and crustaceans, I drew a hundred of anatomical fish and crustaceans skeleton plates, and I carried out identifications keys (Grouard, 2001a). The faunal spectrum analysis was done (NISP, MNI), with its Richness index (dl), its homogeneity or Diversity index (H'), and its relative abundance

of taxa (Ft) in each assemblage (Cruz-Uribe, 1978; Leonard & Jones, 1989). We can estimate body size (Live Weight, Total Length or Standard Length) of the archaeological fish with an allometric law calculated from actual fish (fig. 2). Results were combined by family (Desse *et al.*, 1989) and by level in order to obtain diagrams. Methods, equations and statistics are accessible in other publications (Grouard, 2001a, b).

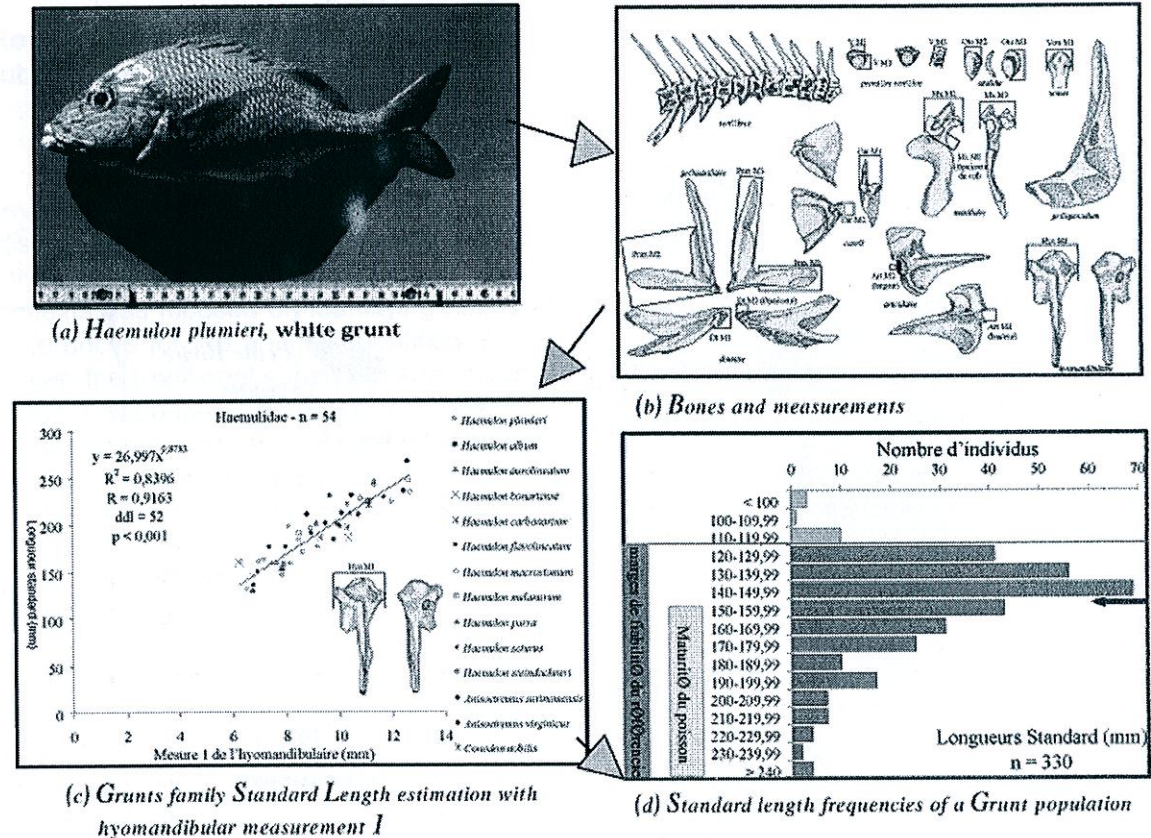


Figure 2. Fish Size Estimation methodology: Example of Grunt family.

RESULTS: PRE-COLUMBIAN ECONOMY OF SUBSISTENCE AND CATCHING TECHNIQUES

Biogeographic variability of the techniques

The study of the seven sites as a whole shows a taxa spectrum very diversified: more than 303,000 remains were counted, almost 95,000 were identified, that represent more than 6,700 individuals (MNI), that is 61 families and 150 taxa (fig.

3a). If the fish are in the lead throughout the assemblages³ (fig. 3b), the faunal spectrum are very different from a site to another, and the proportions vary. As an example, sea urchins are numerous at Anse à la Gourde, crustaceans at Pointe du Helleux, reptiles at Grande Anse, and mammals at Morel and Folle Anse. Within mammals, agoutis, rice rats, and dogs

³ Results are presented in NISP, but proportions are similar in MNI.

make up important part of food remains. However, dogs were also found in sepul-

chral context, associated with human burials, notably at Morel.

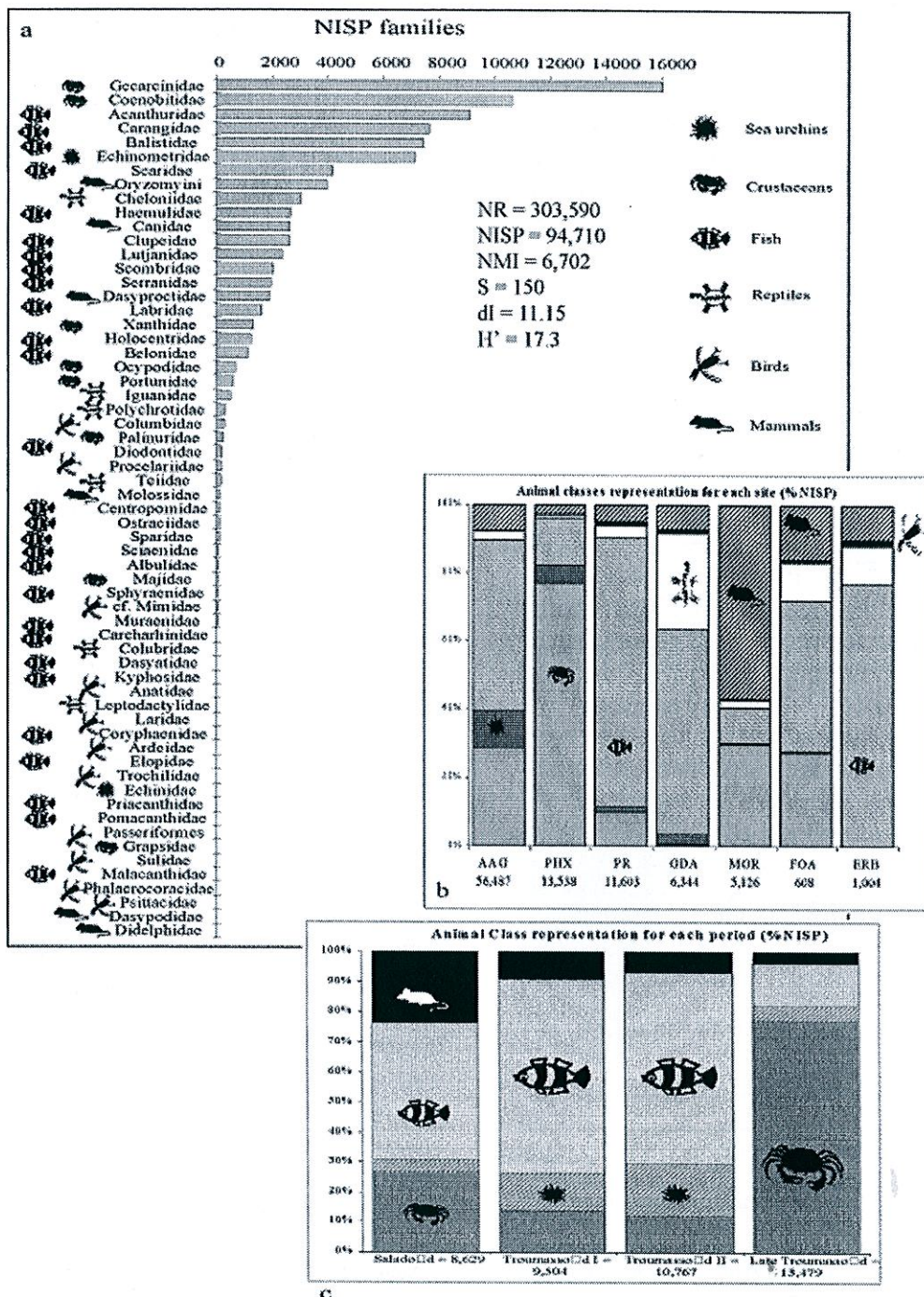


Figure 3. (a) Spectrum taxa listed by families (NISP). (b) Animal class for each site. (c) Animal class for each period.

Zooarchaeological analysis confirm that location had an important impact on the

faunal spectrum gathering. To help the reading, we reduced the numerous ecological

niches to 4 major environments: forests, beaches, coral reefs, and deep water cliffs and channels. Sites located on limestone islands illustrate a faunal spectrum pledged to coral biotopes and to littoral areas (Morel, Anse à la Gourde, Pointe du Helleux, and Folle Anse), whether sites located on volcanic islands have a faunal spectrum pledged to rocky bottoms and deep waters channels (Embouchure de la Rivière de Baillif and Grande Anse). Petite Rivière offers an intermediate situation.

Archaeological fish estimated lengths (fig. 4) demonstrate that coral reefs fishing (Anse à la Gourde, Pointe du Helleux, and Grande Anse de Terre-de-Bas) correspond to small school fish or/and juveniles, whether deep water channels fishing rather affect large mature individuals, or seasonal pelagic fish (Embouchure de la Rivière de Baillif, Folle Anse, and Petite Rivière).

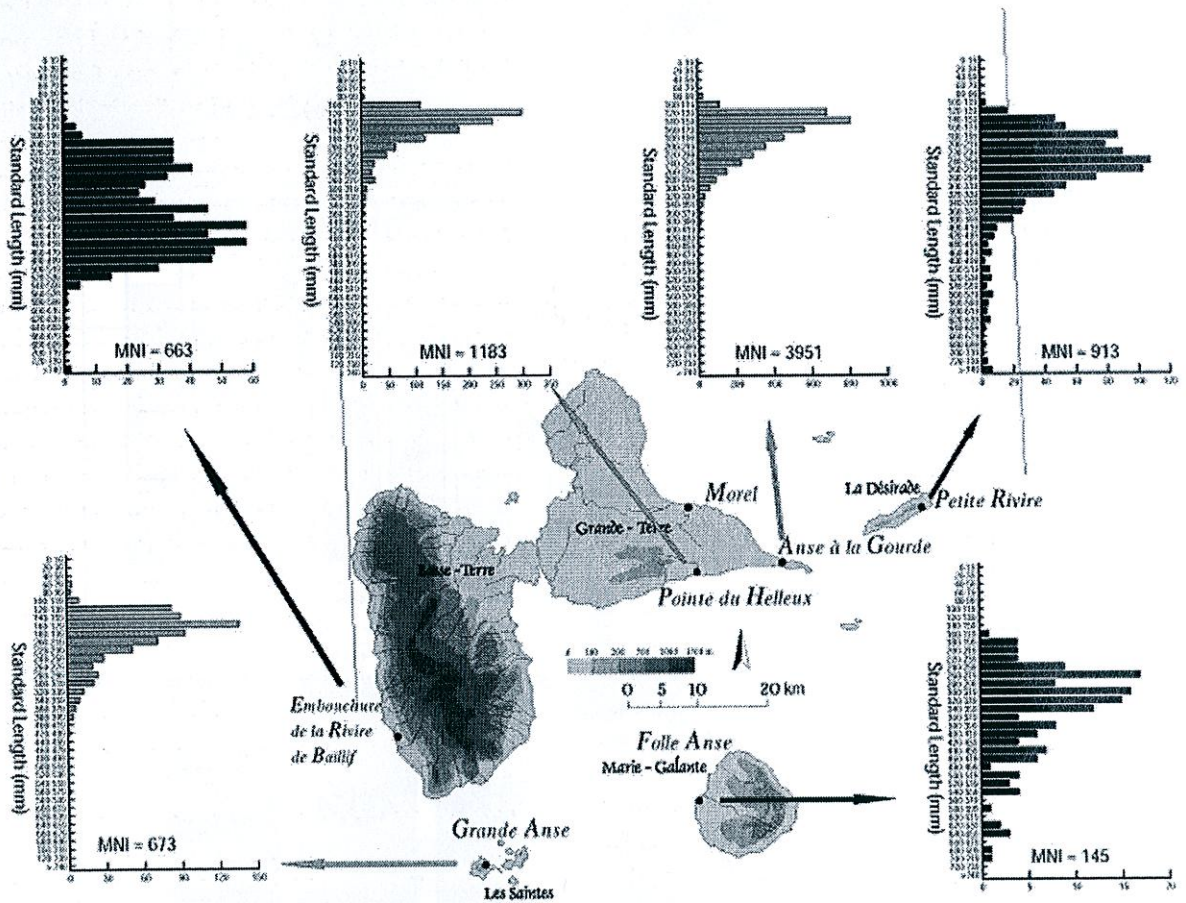


Figure 4 – Archaeological Fish Standard Length estimations for each site (mm).

In the Caribbean, some authors postulate that the environment (settlement location) was the determining factor on the culture (and the diet) (Steward, 1955; Willey & Sabloff, 1980), and others argue that cultural pressure (including the norms, beliefs, and rules that govern individual be-

havior in social and cultural contexts) is the determining factor on diet (Rainey, 1940; Wing, 2001).

Our zooarchaeological analysis demonstrate that each settlement had independent cultural choices. Moreover,

crossed results demonstrate that subsistence economies on volcanic islands were not open, not to say strongly specialized (Embouchure de la Rivière de Baillif with tuna, and Grande Anse with sea turtle), whether subsistence economies on limestone islands were either specialized (Pointe du Helleux with crabs), either open and widespread (Anse à la Gourde, Morel, Petite Rivière, and Folle Anse). Cultural choices should have been more important than environmental determinism.

Chrono-cultural variability in a limestone island

Until the 80's, cultural migrations Rouse's scheme (1986) suggests that Saladoïd peoples from the Orinoco River drainage quickly colonized the Antilles by 400 BC because of both climatic and demographic pressures. These migrants would have conserved a continental subsistence economy, giving priority to forestry animals and roots, and have rejected marine resources (Carbone, 1980; Keegan & Diamond, 1987). The Post-Saladoïd would have migrated near the coast, near littoral and marine resources. Progressively, these populations moved away from the coast (Allaire, 1984; Watters & Rouse, 1989).

However, zooarchaeological study of our sample, admittedly a little bit small⁴, allowed some hypothesis on subsistence economies: Saladoïd groups used to exploit with equilibrium the animal resources in all (fig. 3c), the early Troumassoïd I and II made a quick specialization on fish and sea urchins, and late Troumassoïd increased their cat-

ching pressure on crabs. If we pursue this line of reasoning in a territorial management conception, chrono-cultural variations are important: Saladoïd groups used to exploit with equilibrium the environment resources in all, early Troumassoïd I and II made a specialization on coral reefs, and late Troumassoïd made a specialization on the beaches.

The overexploitation of coastal animals (crabs, marine turtles, sea birds, etc.) does not seem to be linked to special cultural or climatic effects, but instead seems to be linked to the first installation of a new site. In other words, during the initial settlement of an island the economy was diversified with every ecosystem and a large number of animal species exploited. However, following a long sequence of occupation a more specialized economy developed progressively, and the economy was concentrated on coastal, lagoon, and coral reefs habitats. Throughout this stage the economy became more and more specialized, and fewer and fewer animal species were collected (although they were collected in large numbers). In sum, the shift from mammals to crabs began during the terminal Saladoïd because many of the excavated villages had been occupied for a long time. Furthermore, several Post-Saladoïd sites also illustrate an overexploitation of crabs following the establishment of a new coastal installation (Grouard, 2001c).

Hunting/fishing devices and catching techniques

By considering the archaeological fish sizes in conjunction with studies of traditional technology (historical and ethnographic data), archaeologists can reconstruct several fishing techniques adapted to the different geographical contexts (Grouard, 2001b). However, to date most reports give only vague allusions to the use of various capture techniques and other aspects of labor. The use of fishing devices involves the procurement of the raw materials nee-

⁴ Zooarchaeological collections from volcanic islands are so rare, that the chrono-cultural analysis had to be done only on limestone islands. De facto, the number of zooarchaeological collections for this analysis is limited (Saladoïd period is formed by Morel and Anse à la Gourde). Both early Troumassoïd periods are made up with Anse à la Gourde. Finally, late Troumassoïd period is represented by Pointe du Helleux.

ded to manufacture the device, their placement near on a selected bottom (using canoes), and the removal of captured species. These activities open a variety of questions concerning specialization, cooperative fishing, ownership of the means of production (devices and canoes), and the final distribution of the catch.

Even if the objectivity of ancient event observation is unsure, the travelers from XVI^e and XVII^e centuries (Colomb, 1492-1506; Anghera, 1511; Breton, 1647; de Rochefort, 1658-63) gave us patchy writings about animals, Natural History, daily activity, catching techniques, food processing, pharmacopoeias, taboos, choices, and diet of the Caribbean Amerindians. These documents should provide information on cultural identity and social practices. Moreover, a lot of drawings describe animal catching, fishing, hunting, food processing, smoke-drying, or illustrates anatomical zoological scientific representations. As an example, various maps of the Caribbean show exotic animal illustrations in the margin (Anthiaume, 1916; Devèze, 1977). Chroniclers documents (Anonyme, 1776) recount sea turtle and manatee fishing using a canoe, spear and harpoons, but today, sea turtles are "collected" on the beaches when they lay their eggs, and manatees disappeared. Terrestrial crabs were trapped on the beach, with traps or using torch at night. Mammals, attracted by gardens, and littoral birds, nesting on the floor, were also trapped, with traps, snare, pits, bow, blowpipe, or even by hands.

There is a rich ethnographic literature on the social perception of the sea (Ringel & Wylie, 1979; Bonniol, 1979) and the environment (Renard, 1979), the insularity as a dimension of the social fact (Hurbon, 1979; Benoist, 1987), the ritual and sacred knowledge associated with canoe making (Wilbert, 1977), the elite control of production, the social dynamics (Malinowski, 1935), and other aspects of cultural practice. Various heritages exist from the pre-

Columbian fishermen, like environment knowledge and fishing techniques transmission. By the specificity of the techniques, fishermen were on the fringe of the society since the beginning of the colonization, and they maintained a specific technological culture (Cove, 1973; Borry & François, 1983; Phalente, 1986; Bellail, 1993). Today, in Guadeloupe, the fishing strategies in use are adapted to season, location, techniques and know-how, but also to the sea bottoms, period of the year, species and size of fishes. Finally, they are linked to an equilibrium between profitability, economic profits and human risks (Archambault, 1972; Collomb *et al.*, 2000; Hurault *et al.*, 1998).

Archaeological fish size estimations revealed five groups, that suggests five catching techniques:

1. Calibrated small size school fish, caught with cast nets and lines, from shallow sand bottoms, sea-grass beds, or mangrove swamps.
2. Small coral reef fish, caught from small boat with hoop nets, pots or traps, especially from May to December (rain and hurricane season).
3. Mature fish, intermediate in size, solitary or in school, like bottom fish (i.e. large grouper or snapper), caught with tramails all year round, except from December to February (strong currents). The reed curtain may also have been used⁵.
4. Permanent pelagic fishes (like anchovies, needlefish, houndfish, little tunny, mackerel scad, or barracuda), caught with surface hooks and lines, seines, or casting nets the whole year.
5. Seasonal pelagic species (like mackerel and tuna), caught with dragnet, from January to

⁵ The reed curtains close the estuary with a reed curtains when rises the tide. When the tide ebbs, fishes and crabs that try to join the sea remain prisoners.

June in swift currents or inshore waters, with canoe.

A few juveniles were caught, but the vast majority of individuals were intermediate in size (fig. 4), with some large adults. This effect suggests that the capture technique constrained the size of the fishes captured. Most of the size class distributions have a shape different from the theoretical model ("Poisson" distribution), that is a more "Normal" distribution.

CONCLUSIONS

Hunting/fishing technologies are correlated to a particular subsistence economy: a very broad spectrum of species was caught since the first pre-Columbian settlements. Natural environment lead to a diversification of the techniques, but human choices took place within their use and the "chaîne opératoire". Since Saladoïd period (400 ap. J.C.) Guadeloupe pre-Columbians (Baillif) developed a deep water fishing (tuna) with a high technological level, shipping skill and a good knowledge of the sea. It could be a season fishing, because of the caught fish ethology (large pelagic Scombridae). Thus, contrary to Rouse's theory, these populations were Seamen colons able to set up and survive in new islands.

Coexistence of generalized and specialized economies since the first settlements could reflect the management of a wide marine territory, made up of islands and archipelagos, with a strong rationalization of the marine areas, naval techniques, exchanges and social relationship. The visibility between the islands, that helps in a mental cartography reconstruction of the islands, underline this hypothesis. Moreover, exchanges between several populations from the Continent, the Great Antilles and the West Indies are now attested (Anonyme, 1776; Prato-Perelli, 1983; Boomert,

1987; Moreau, 1991; Knippenberg, 1995; Grouard, 1997). Today as in the past, the marine traffic is a determinant factor of the Caribbean Amerindian culture. Thus, pre-Columbian did appropriated the far territories with various settlements corresponding to specific activities, like fishing season or procurement of the raw materials (Grouard, 2001b). The results demonstrate how a more comprehensive approach to cultural subsistence and the hunting/fishing techniques can improve our understanding native West Indian societies, as a model of itinerant populations in coastal environment.

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Libro de memorias de la 12^a reunión del Grupo de Trabajo en Restos de Peces del
Consejo Internacional para la Arqueozoología

Proceedings of the 12th meeting of the Fish Remains Working Group of the
International Council for Archaeozoology

Guadalajara, Jalisco, México
4-12 septiembre / September 2003

Ana Fabiola Guzmán
Óscar J. Polaco
Felisa J. Aguilar
(editores / editors)

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