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## Tanki Flip faunal remains

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**THE ARCHAEOLOGY OF ARUBA:  
THE TANKI FLIP SITE**



THE ARCHAEOLOGY OF ARUBA:  
THE TANKI FLIP SITE

edited by

Aad H. Versteeg & Stéphen Rostain

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## VII TANKI FLIP FAUNAL REMAINS

### *Introduction*

This chapter presents the results of the faunal analysis of Tanki Flip. This site is located in a semi-desert environment characterized by an arid vegetation (xerophitic, 425 mm of precipitation per year) at the present time, but was characterized by evergreen and xerophytic forests in pre-Columbian times (Versteeg & Ruiz, 1995:54). Three *rooien* that are dry during most of the year drain water from the area around the site during the rainy season (see Ch. II). The vegetation is denser along the *rooien*. Consequently the majority of small mammals, birds and lizards live there. The shore and the lee- and windward coastal waters, with their rich marine fauna, are three and five km from the site, respectively (Fig. 110).

The analysis of the faunal remains allows to gain insight into subsistence patterns and into part of the prehistoric economy. The selection the Indians made while exploiting the available indigenous fauna can be seen. Indian activities are reflected in the distribution of the faunal remains in the site. Some conclusions on fishing and hunting patterns and locations can be drawn. Contact with the mainland is documented by the presence of (parts of) species from the mainland.

The Tanki Flip sample of faunal remains includes 14,210 bones or bone fragments of which 4922 could be identified (Table 4). They represent 62 taxa (Fig. 197). The preservation of bone in Tanki Flip is generally poor due to the soil and subsoil conditions of the site.<sup>140</sup> Therefore, the bones were fragmented and, in many cases, the identification could not go beyond the family level.

### *Material and Methods*

Two collecting methods were employed. The first one consisted of the features being sectioned and being sifted in the field through a 2.8 mm screen. The bones were sorted from the screen in the field. The second one consisted (for the hearths, some burials and some selected other features, in total 20 features) of sampling, weighing and water screening through 2.0 mm and 1.0<sup>141</sup> mm sifters. The samples were dried, weighed and sorted with the aid of a (20x) microscope in the Archaeological Museum Aruba. The samples from the 1.0 mm screen showed the same results as those from the 2.0 mm screen (note 141). Each identified Indian structure (i.e. house) yielded two different sets of samples: the 2.8 mm from all features inside and around the structure and the 2.0 mm samples from 20 select features within 13 of the 15 Tanki Flip structures.<sup>142</sup>

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<sup>140</sup> Sand covering diorite, and infiltration and circulation of water during and after (the sometimes heavy and intensive) rainfall.

<sup>141</sup> One mm screens were utilized to compare the results with 2 mm sifting procedures. It was abandoned when it turned out that no more results were obtained than by 2 mm sifters.

<sup>142</sup> No samples from features belonging to Str-9 and -11 were sifted through 2.0 mm sifters.

TAXON	SPECIES	NISP	%NISP
VERTEBRATES			
VERTEBRATES	unident.	367	7,5%
MAMMALS			
MAMMALS	unident.	48	1,0%
SUIDAE	<i>Sus scrofa domestic</i>	1	0,0%
CAPRINI	unident.	17	0,3%
CERVIDAE	<i>Odocoileus sp.</i>	1	0,0%
FELIDAE	<i>Felis pardalis</i>	6	0,1%
SMALL MAMMAL	unident.	1	0,0%
MICROFAUNA	unident.	56	1,1%
RODENT	unident.	59	1,2%
AVES			
PASSER	Sea Bird	148	3,0%
PASSER	Small bird	65	1,3%
COLUMBIDAE	unident.	30	0,6%
REPTILES			
CHELONIIDAE	unident.	361	7,3%
CHELONIIDAE	Small turtle	1	0,0%
TESTUDINIDAE	Freshwater Turtle	4	0,1%
POLYCHRIDAE	unident.	101	2,1%
GEKKONIDAE	<i>Gekko gekko</i>	9	0,2%
TEIIDAE	<i>Ameiva sp.</i>	37	0,8%
IGUANIDAE	<i>Iguana iguana</i>	49	1,0%
BATRACHIANS			
BATRACHIANS	unident.	17	0,3%
FISHES			
OSTEICHTHYES	unident.	1546	31,4%
CARCHARHINIFORME	unident.	7	0,1%
CARCHARHINIDAE	unident.	41	0,8%
SPHYRNIDAE	<i>Sphyrna sp.</i>	9	0,2%
DASYATIDAE	<i>Dasyatis amaricana</i>	10	0,2%
MYLIOBATIDAE	<i>Aetobatis narinari</i>	10	0,2%
ELOPIDAE	<i>Elops saurus</i>	83	1,7%
ELOPIDAE	<i>Megalops atlanticus</i>	2	0,0%
ALBULIDAE	<i>Albula vulpes</i>	224	4,6%
CLUPEIDAE	unident.	15	0,3%
BELONIDAE	unident.	3	0,1%
BELONIDAE	<i>Strongylura sp.</i>	36	0,7%
BELONIDAE	<i>Tylosurus sp.</i>	95	1,9%
HOLOCENTRIDAE	<i>Holocentrus sp.</i>	28	0,6%
PERCEFORMES	unident.	220	4,5%
SERRANIDAE	unident.	45	0,9%
SERRANIDAE	<i>Epinephelus sp.</i>	75	1,5%
SERRANIDAE	<i>Mycteroperca sp.</i>	29	0,6%
MALACANTHIDAE	<i>Malacanthus plumieri</i>	42	0,9%
CARANGIDAE	unident.	216	4,4%
CARANGIDAE	<i>Caranx sp.</i>	58	1,2%
LUTJANIDAE	<i>Lutjanus sp.</i>	53	1,1%
HAEMULIDAE	unident.	168	3,4%
SCIAENIDAE	unident.	15	0,3%
SPARIDAE	unident.	19	0,4%
KYPHOSIDAE	unident.	2	0,0%
EPHYPPIDAE	<i>Chaetodipterus faber</i>	1	0,0%
LABRIDAE	unident.	7	0,1%
SCARIDAE	<i>Scarus sp.</i>	21	0,4%
SCARIDAE	<i>Sparisoma sp.</i>	29	0,6%
MUGILIDAE	<i>Mugil curema</i>	2	0,0%
SPHYRAENIDAE	unident.	80	1,6%
ACANTHURIDAE	<i>Acanthurus sp.</i>	6	0,1%
SCOMBRIDAE	unident.	3	0,1%
SCOMBRIDAE	<i>Euthynnus sp.</i>	19	0,4%
SCOMBRIDAE	<i>Scomberomorus sp.</i>	2	0,0%
BALISTIDAE	unident.	183	3,7%
INVERTEBRATES			
CRAB	unident.	69	1,4%
COENOBITIDAE	unident.	42	0,9%
PORTUNIDAE	unident.	21	0,4%
GECARCINIDAE	unident.	3	0,1%
ECHINOIDEA	unident.	5	0,1%
62 Taxa	Total	4922	99,8%

Fig. 197 Tanki Flip taxa (62) and Number of Identified Specimens per taxon.

Quantitative results were obtained with standard zooarchaeological methods. The Number of Remains (NR), Number of Identified Specimens (NISP) and the Minimum Number of Individuals (MNI) (calculated using the methods of F. Poplin), were calculated for each feature and each sample.

Both methods of counting (Number of Identified Specimens and Minimum Number of Individuals) were used, because the Number of Identified Specimens showed a low representation of Mammals, Birds and Reptiles, and a high representation of Fishes (because fishes have a large quantity of bones). It turned out to be a good method, however, to see the importance of fragmentation and conservation of the bones. The calculations of Minimum Number of Individuals showed the importance of each order without this over-representation of skeleton parts, but it can't show the bias of bone fragmentation.

The faunal remains were identified to the lowest possible taxon. Identified bones were sorted by skeletal elements. Identifications were made using the comparative collection at the Florida Museum of Natural History in Gainesville with the help of Dr. E.S. Wing and her colleagues.

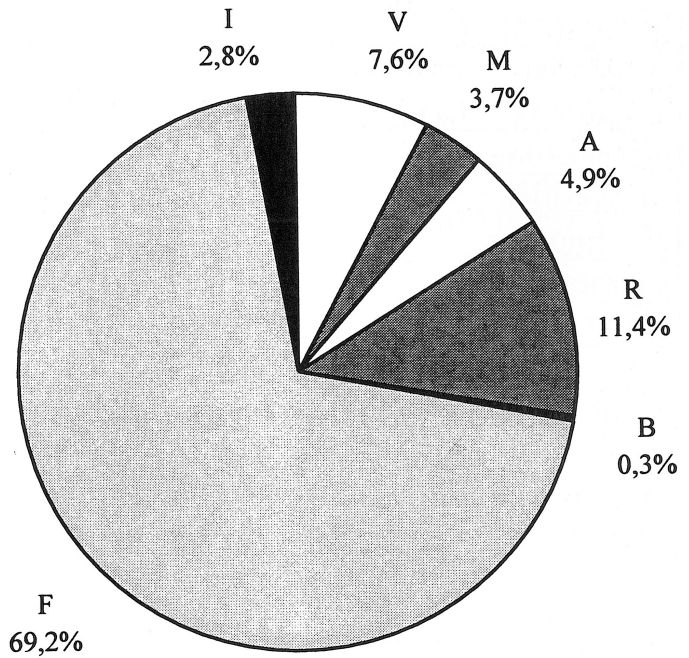
The number of identified vertebrae of fishes (Osteichthyes) was counted in the Number of Identified Specimens, because they were identified to the lowest possible taxon. The spines of Osteichthyes were excluded because their identification was usually not possible.

Fragments of birds (Aves), squirrel fishes (Holocentridae) or crab were counted up to the level of family, but not up to the level of species, for the same reason. The lowest taxon of identification for Aves was Columbidae, small bird, and large bird.

The bone content of the features within the large, oval, and smaller, round, structures of the site (see Ch. III) were compared. The faunal samples from these two groups of structures showed no significant differences. Calculations were made of sections within the identified structures (the quadrants). The results are discussed in Appendix 1 (Fig. 321c), together with those of other find categories.

Fig. 198  
 Percentages of frequencies of each of the  
 7 orders (% NISP). Samples 2.0 + 2.8 mm.

- F = fishes
- I = invertebrates
- V = vertebrates
- M = mammals
- A = aves
- R = reptiles
- B = batrachians



A study was conducted of the habitats of Tanki Flip species and families which were hunted or fished. This study allows an estimation of the use of the environment. It also allows an understanding of the different biotopes, ecosystems and ecological areas, exploited by the Tanki Flip inhabitants. The selection of the habitats made by these people or preferences can be seen. Contact with the mainland or other islands could be detected. Another study was conducted of the different hunting and fishing techniques.

### Results

Bones of 62 taxa were identified among the faunal remains excavated from the Tanki Flip site. Fourteen thousand two hundred and ten bones or bone fragments were collected and 4922 were identified (Fig. 197). The hypothetical absolute Minimum Number of Individuals of the excavated area is about 318. The sea provided the greatest variety of animal species. Fishes form the Vertebrate class that is most abundant in the site, in term of Number of Remains, Number of Identified Specimens, Minimal Number of Individuals and Number of Taxa (Fig. 199). Sea turtles are also well represented. Some terrestrial species from the interior of the island and from the mainland are also present.

The people of the Caribbean area (even of the islands) have access to a relatively high diversity of species. This study has also shown that some relatively rare species were not present in the samples in recognizable form: there is a large number of unidentifiable bones (65 %). The size of the samples is not large enough to off-set this effect. The percentage of unidentifiable remains found by Wing and Brown (1979: 120) for Caribbean sites is 23, ranging from 3 to 51 %. The Tanki Flip 2.8 mm samples (45 %) remain within this range.

The 2.0 mm ones, however, with 76.5 % of unidentifiable remains, yielded an extremely high percentage of unidentified bones. The explanation is that the major part of the unidentifiable bones is heavily fragmented. These are more numerous in the 2.0 mm screen samples than in the 2.8 mm ones.

CARANGIDAE	16.8%
ALBULIDAE	13.7%
BALISTIDAE	11.2%
HAEMULIDAE	10.3%
SERRANIDAE	9.1%
BELONIDAE	8.2%
ELOPIDAE	5.2%
SPHYRAENIDAE	4.9%
LUTJANIDAE	3.2%
SCARIDAE	3.1%
MALACANTHIDAE	2.6%
CARCHARHINIDAE	2.5%
HOLOCENTRIDAE	1.7%
SCOMBRIDAE	1.5%
SPARIDAE	1.2%
CLUPEIDAE	0.9%
SCIAENIDAE	0.9%
DASYATIDAE	0.6%
MYLIOBATIDAE	0.6%
SPHYRNIDAE	0.6%
LABRIDAE	0.4%
ACANTHURIDAE	0.4%
KYPHOSIDAE	0.1%
MUGILIDAE	0.1%
EPHYPPIDAE	0.1%

In addition to the finer screen, the finer laboratory procedures of wet sifting and sorting by microscope (20 x magnification) account for the differences. Few complete long bones of large species were found in the Tanki Flip site. In the case of sea turtles, only one bone was recovered more or less complete (Fig. 269). It was located in Str-5, in a feature with a complete pottery vessel (Fig. 225). This feature is interpreted as a pottery/sea turtle cache.

#### *Identification of Taxa*

The class of fish (Osteichthyes) predominates (Fig. 198): 69.2 %. Reptiles make up 11.4 %; undetermined vertebrates 7.6 %; birds 4.9 %; mammals 3.7 %; invertebrates 2.8 %; batrachians 0.3 %. The Number of Identified Specimens (NISP) frequency of each fish family is shown in Fig. 199. The most common families are the jacks (Carangidae) (16.8 %), bonefishes (Albulidae) (13.7 %), leather jackets (Balistidae) (11.2 %), grunts (Haemulidae) (10.3 %), seabass (Serranidae) (9.1 %), needlefish (Belonidae) (8.2 %), and tarpon (Elopidae) (5.2 %).

Fig. 199 *Frequencies of the 25 fish families (% NISP)*.  $N = 1631$  (2.0 + 2.8 mm samples). Note that *Osteichthyes*, *Perciformes*, and *Carcharhiniformes* are not included.

These live in the coastal-to deeper shallow-waters all around the island, particularly in lagoons and near coral reefs (Fisher, 1978). The mammals are not very abundant. Small species of rodents, like rice rat (*Oryzomy* sp.) were found everywhere in the site.<sup>143</sup> They represent 31.2 % of the Mammal remains. Moreover, 29.6 % of the remains are microfauna (unidentified small species) and 25.4 % are unidentified Mammals.

A foot bone (astragalus) of deer (*Odocoileus* sp.) was found in an empty area (= an area in which never houses were built) in the northeast part of the site. This area is located north of *maloca* Str-3. Bones of Cat (*Felis pardalis*)<sup>144</sup> were recovered near Str-11 and between Str-8 and -7A. Remains of sheep or goat (Caprini) and pig (Suidae) were found in the north part of the site, near a colonial period water reservoir (see Ch. II) and other colonial period finds (See Ch. XVI).

Within the class of birds, 60.9 % of the remains are large sea birds, 26.8 % are small birds and 12.4 % are pigeons and doves (Columbidae). Within the class of reptiles, sea turtles (Cheloniiidae), lizards (Lacertilia) and iguanas (Iguanidae) are predominant (63.4 %, 18 % and 8.7 %). Bones of freshwater turtle (Testudinidae) were recovered in the west part of *maloca* Str-3.

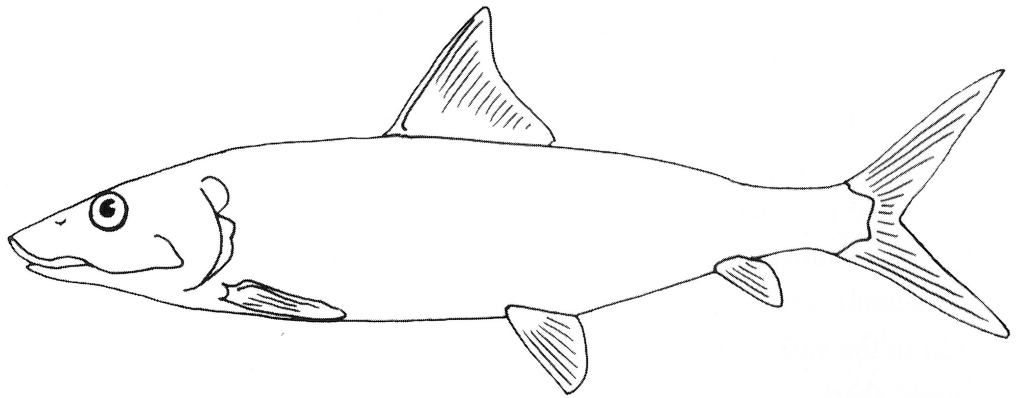
<sup>143</sup> *Calomys hummelincki* has been described for Aruba, Curaçao, and Venezuela.

<sup>144</sup> Note that *Felis* cf. *tigrina* has been described as introduced by Indians on Aruba by Eisenberg (1989). Its common name is little spotted cat.

Fig. 200

*Albula vulpes* =  
Bonefish (Family  
Albulidae). Of this  
species 224 bones  
were identified.

Scale 1:4.



Within the phylum Arthropoda, the unidentified crab (Decapoda) remains are the most important (49.3 %). Crabs of the Coenobitidae family are more frequent (30 %) than those of the Portunidae family (15 %), or the land crab (2.1 %). The sea urchin (class Echinoidea) is poorly represented (3.6 %).

The vertebrates, including all of the unidentified Mammals and Reptiles, have a high Number of Remains (NR) and Number of Identified Specimens (NISP), but no MNI-calculation was done because of the problem of counting the same animal twice.

In Tanki Flip, the number of taxa, Minimum Number of Individuals, Number of Remains, and Number of Identified Specimens for the 2.0 mm samples are higher than for the 2.8 mm samples. This clearly shows the importance of the use of the 2.0 mm screen procedure in not losing essential information.

#### *Habitat Assignment*

This study was recently presented (Grouard, in press). After some modifications the results of this study indicate that the different species found in the site belong to four ecological areas: shallow water, coral reef (i.e. the marine/shore environment), the interior of Aruba, and that of the mainland.<sup>145</sup>

A xerophytic vegetation was present over most of Aruba and all around the Tanki Flip settlement (Versteeg & Ruiz, 1995). The majority of rodents, frogs and toads, and small reptiles (*Gekko*, *Ameiva* sp., *Iguana iguana*) are endemic and live in cactus shrubs and arid vegetation at the present time, but were also living in the former xerophytic forest of the interior of Aruba. They are attracted by water, habitats, and trees near open areas (Conant & Collins, 1991: 84, 95). The Tanki Flip settlement and its surroundings offered all of these conditions (see Chapter II). They may have been hunted by the inhabitants of the settlement or by children training for hunting (A.H. Versteeg, pers. com.).

According to Voous (1983: 142-143) the majority of the pigeons and doves belonging to the family Columbidae of this island '*inhabit acacia and cactus scrub and other arid vegetation .... Particularly during long dry periods (they) approach human habitations and then feed on farm yards and in gardens (...)*'. They are endemic to the island. They could be hunted near the settlement, where the vegetation is very similar to this habitat assignment. The taxon 'small birds'

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<sup>145</sup> The mainland opposite Aruba has different climatic zones and vegetation types.



includes endemic and migrant species. A specific habitat assignment for such a large taxon cannot be given. The taxon 'sea birds' is also large and includes species present all around the island.

In the shallow water category, different ecosystems which are located near the island exist. Included in this category are continental coastal sea, beaches, passes between islands, shallow bays, estuaries, mangroves and lagoons. Twenty-two families of fish were identified in the samples that inhabit these shallow waters. They can be caught near the island, for example jacks (Carangidae), snappers (Lutjanidae) or triggerfishes (Balistidae). Most of these families can be caught in the surface waters, in the surfline or in the intertidal region.

Some sharks often approach close inshore and enter into closed bays and estuaries. Bones of sharks and rays are relatively frequent in Tanki Flip. These animals provide a high quantity of fat. Their skin is also very strong and could be used for utilitarian purposes, or as a grater. A bead made possibly of a shark vertebra was found at Tanki Flip. Some sharks and other fishes (e.g. Snappers) are active at night, which may indicate that the inhabitants were (also) fishing at night.

Sea turtles come back to their birth beach in order to lay their eggs. During that period of the year they are easy to catch near or on the beach. Because of their heavy weight, they were probably butchered on the beach and brought in parts to the settlement.

Invertebrates (crab and sea urchin) can be caught on the beaches or in shallow waters. The hermit crab (Coenobitidae) is terrestrial. Coral reefs, which are present along the south coast of the island, provided an important number of fish, like squirrelfishes (Holocentridae), tile fishes (Malacanthidae), grunts (Haemulidae) or parrotfishes (Scaridae).

Some inshore-fishes are active at night (e.g. Drums [Sciaenidae]), which is another indication for possible fishing at night. Colonial imported species: sheep or goat (Caprini) and pig (Suidae) were identified in features where colonial glass and ceramics were found. These species were introduced by Europeans.

Tropical forest and rivers are absent on the island. Deer (Cervidae), cat (Felidae) and freshwater turtle (Testudinidae) were probably imported from tropical forest areas of mainland. Hooijer remarks that remains of deer (*Odocoileus gymnotus* subsp.) were found in prehistoric archaeological contexts in the Santa Cruz and Sabaneta sites on Aruba. *They do not belong to the extant fauna of Aruba* (Hooijer, 1960:154). So, the present finds of bones of this mainland species in a Dabajuroid context is not the only one. Even the small-scale excavations of the 1960's resulted in the identification of these bones.

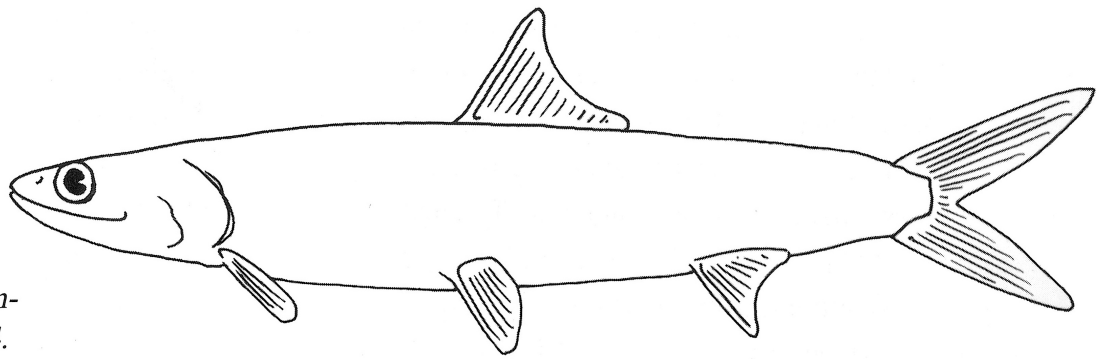
The present data are not conclusive on the organizational aspects of trade, but there are three possibilities:

- The mainland groups brought these animals to Aruba and traded with the Tanki Flip groups.
- Inhabitants of Tanki Flip came to the mainland and traded with local groups. In order to verify these two hypotheses, investigations at mainland Dabajuroid sites have to be done.
- Tanki Flip groups went to the mainland forest to hunt and brought the game back to Aruba.

At Tanki Flip, only pieces of the bodies of cat, deer and freshwater turtle were found. The opened area of the excavation is large, but just a few features yielded these taxa. It is probable that this game was butchered on the mainland and that only select parts of the animals (or only the bones) were brought to the site. The meat spoils quickly under the prevailing tropical conditions.

Fig. 201

*Elops saurus* =  
Ladyfish (Fam.  
Elopidae). Of  
this species 83  
bones were iden-  
tified. Scale 1:4.



At least, the presence of deer, cat and freshwater turtle in particular areas of the site can be identified. None of the bones of these 'exotic' species were found centrally within structures, but either near the eastern outer wall or in open areas, outside houses.

Bones of freshwater turtle were recovered in the eastern part of Str-3 close to a special open area located in the northeast part of the site, where a foot bone (astragalus) of deer (*Odocoileus* sp.) was found. This 'empty area' is located north of *maloca* Str-3. It is interpreted as a *plaza* (see Fig. 86). It did not contain any other bone remains. Bones of cat (*Felis pardalis*) were recovered near Str-11 (p. 94-5), and between Str-8 and -7a. Especially this and other finds in the area south of Str-11 suggest that this area must also be interpreted as a *plaza*. (see Ch. XII for a more extensive discussion).

#### *Fishing and hunting techniques:*

Different fishing strategies can be used to catch the fish species present in the Tanki Flip site:

- Nets: this category includes bottom nets, gillnets, seines and trammelnets, beachnets and castnets.
- Lines: this category includes longlines, hook and lines, handlines and casting.
- Traps: this category does not have any sub category.
- Spears: this category includes underwater catching and spears.

Most of the species present in the Tanki Flip site can be caught by nets, lines and traps. Net and line fishing techniques can be used from boats as well as by wading. All species of fish present in the site can be caught near the coast. All categories discussed above under 'line' and 'net' can have been used.

Different hunting strategies were used to catch the mammals, birds and reptiles including hunting, trapping and trade. Most of the reptiles, birds and small mammals can be caught by hunting and trapping. Turtles and large mammals can be hunted, or trapped. An ambushing technique to catch sea turtles on the beach could yield eggs and female adult specimens in a relatively easy way. The colonial species, rodents and most of lizards are classified as intrusive; they are considered 'settlement visitors' that died or were killed in the settlement.

The study of habitat assignment and fishing techniques prove the importance of the coastal sea in the subsistence economy of the Tanki Flip population. This population exploited the environment near the site to a maximum - they did not need the off-shore area, and the limited number of juvenile specimens<sup>146</sup> in the site do not suggest over-exploitation of any ecosystem.

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<sup>146</sup> No measurements or counts on juvenile vs adult individuals were done during the present study. During the taxonomical identification it became evident that the percentage of juvenile specimens is limited.

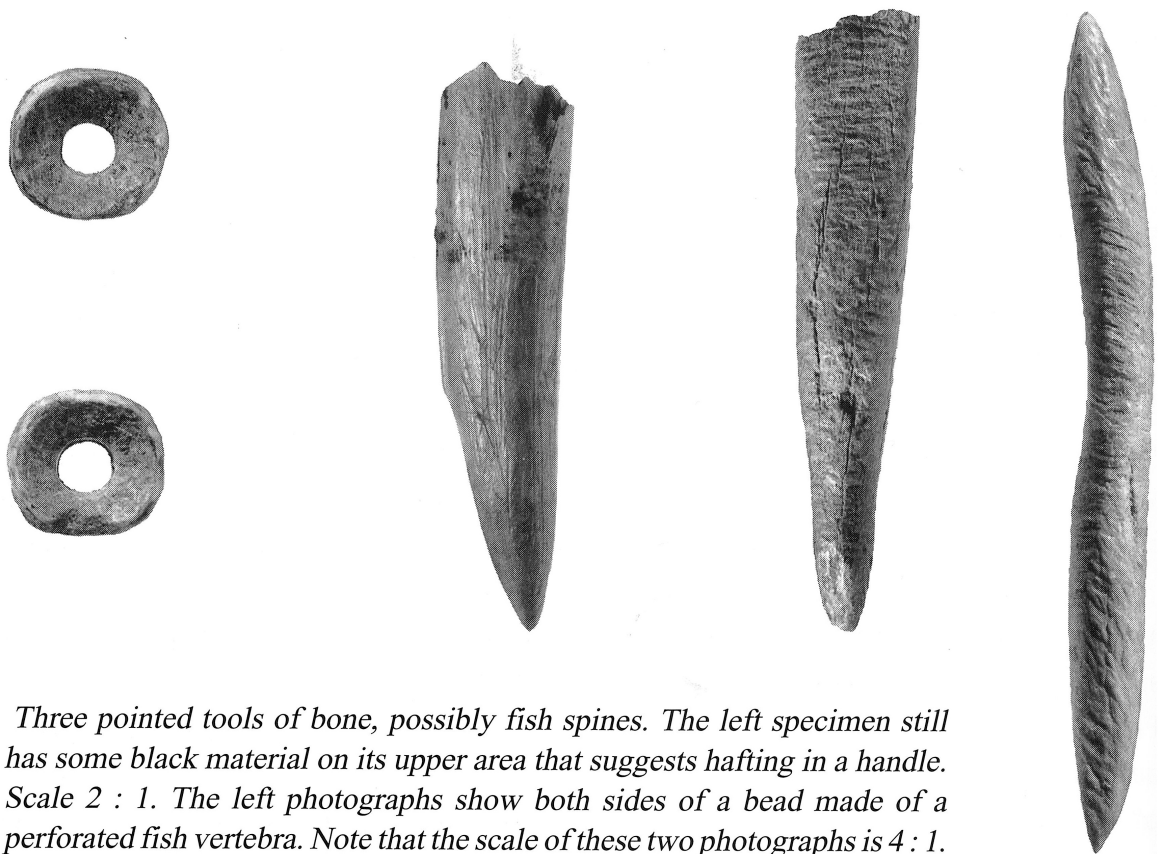


Fig. 202 *Three pointed tools of bone, possibly fish spines. The left specimen still has some black material on its upper area that suggests hafting in a handle. Scale 2 : 1. The left photographs show both sides of a bead made of a perforated fish vertebra. Note that the scale of these two photographs is 4 : 1.*

#### *Modified bone*

Four bones were modified by man: three polished points made of bone, perhaps the spines of fish, and one bead was found made of a perforated fish vertebra (Fig. 202).

#### *Conclusions*

In Tanki Flip 14,210 bones were found in 545 features of an excavated area of 48 x 50 m. About 35% of this total, or 4922 bones, could be identified to 7 orders and 62 taxa could be identified lower than order. Nearly 70% of these identified bones belong to fishes showing the importance of marine food resources. Shallow water and coral reef areas provided the most frequently occurring species. These animals were undoubtedly food items and more precisely protein-suppliers. A determination to species was only possible for a limited number of bones. The bone samples of Tanki Flip could not supply a complete insight into the protein procurement of the prehistoric inhabitants. The other important protein supply is provided by shellfish.

Sea turtles are also well represented. In two features, however, they were found together with complete pottery. This is suggestive of some sort of cache (see Ch. III). The conclusion is that sea turtle bone may have significance in a symbolic context. But more specifically, the non-endemic freshwater turtle remains probably should be interpreted within that framework. A few other remains from 'exotic' mainland species (cat and deer) were also found, stressing the importance of these non-endemic species. It is extremely improbable that these mammals were endemic in Aruba at the time Tanki Flip was occupied. Their find-spots suggest in the first place a symbolic function.

Sandrine Grouard  
Paris

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