

SEASONAL DATING OF FISH REMAINS FROM THE HOABINHIAN SITE CAN-CAVE
(KY SON DISTRICT, HOA BINH PROVINCE, VIETNAM)

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ABSTRACT: The paper makes a series of cursory remarks on the archaeozoological analyses carried out on a Vietnamese site assigned to the mesolithic Hoabinian culture. Of particular relevance are the fish remains which altogether barely amount to 5% of the identified material. These bones evidence fishing activities concentrating on a single taxon of cyprinid, *Mylopharyngodon*. Through vertebral growth ring analysis one can see that such fishing was carried out during a restricted portion of the year coincident with the end of the dry monsoon and the start of the wet monsoon season.

KEYWORDS: CARPFISH, *Mylopharyngodon*, FISHING, SEASONALITY, VIETNAM, MESOLITHIC

RESUMEN: El trabajo comenta sucintamente los resultados de la investigación arqueozoológica preliminar llevada a cabo en un yacimiento vietnamita asignado a la cultura mesolítica Hoabinense. De particular interés resultan los escasos restos de peces, apenas un 5% del material faunístico constatado, por cuanto no sólo evidencian una pesca exclusiva de la carpa vietnamita, *Mylopharyngodon*, sino que los patrones de líneas de incremento en los centros vertebrales demuestran que tal actividad se llevó a cabo en un momento posiblemente coincidente con el final del monzón seco y el comienzo del monzón húmedo.

PALABRAS CLAVE: CARPA, *Mylopharyngodon*, PESCA, ESTACIONALIDAD, VIETNAM, MESOLÍTICO

INTRODUCTION

The dominant archaeological culture found throughout Southeast Asia, dated between approximately 12000 and 5000 B.P., is usually referred to as the "Hoabinian" or the "Hoabinhian" Culture. The term "Hoabinhian" was originally coined at the First Congress of Prehistorians of the Far East, meeting in Hanoi in 1932, following the discoveries of archaeological artefacts in the limestone caves of Ton Kin, in the Hoa Binh Province of North Vietnam. Archaeological assemblages which have been assigned to the Hoabinhian Culture have an enormous geographical distribution which spans from Burma (and perhaps even Assam) to Vietnam, and from South China to North Sumatra. There are two types of sites which have been discovered:

1. caves in the limestone karst formations
2. coastal and riverine shell middens, particularly along both sides of Malacca Strait, and in the Red River Delta of North Vietnam and south along the Annam coast.

In spite of the scarcity of published material archaeological excavations in Indochina evidence the outlines of a distinctive Hoabinhian culture. We now know that such culture was based on hunting and food gathering with flaked stone artifacts made primarily from pebbles. As such it was a Mesolithic culture that exhibited "*no evidence of agriculture*".

The faunal evidence from Hoabinhian sites has been summarized by Gorman (1971), Higham (1977) and Pookajorn (1988). A large range of species is present, including pig, cattle, various species of deer, rhinoceros, several species of monkeys and carnivores, rodents, porcupine, ground and flying squirrels, bats, freshwater fish, tortoises and crabs on top of shell-fish and lizards. The

wide range of species suggests a broadly-based hunter-gatherer economy. Archaeozoological research on animal remains from Hoabinhian sites has concentrated on mammal bones. Little research has been done on fish, reptiles and molluscs remains.

In 1985 and 1987 Vietnamese archaeologists from the Institute of Archaeology at Hanoi carried out trial excavations on the Hoabinhian site of Can-cave. The site is located in the limestone mountains near Doc Tap in the Hoa Binh province of North Vietnam. In the vicinity of the cave there is a small river which has a fluctuating water level due to climatic conditions. The excavations yielded a large sample of animal remains, close to 58000 fragments. Both dry- and wet-sieving methods were used for collecting animal remains. The animal remains reported here come from a large pit, pit 1 of the Can-cave site (Figure 1). With the exception of the fish bones all faunal remains have been analyzed by one of us (Le Ván Thue, unpublished data).

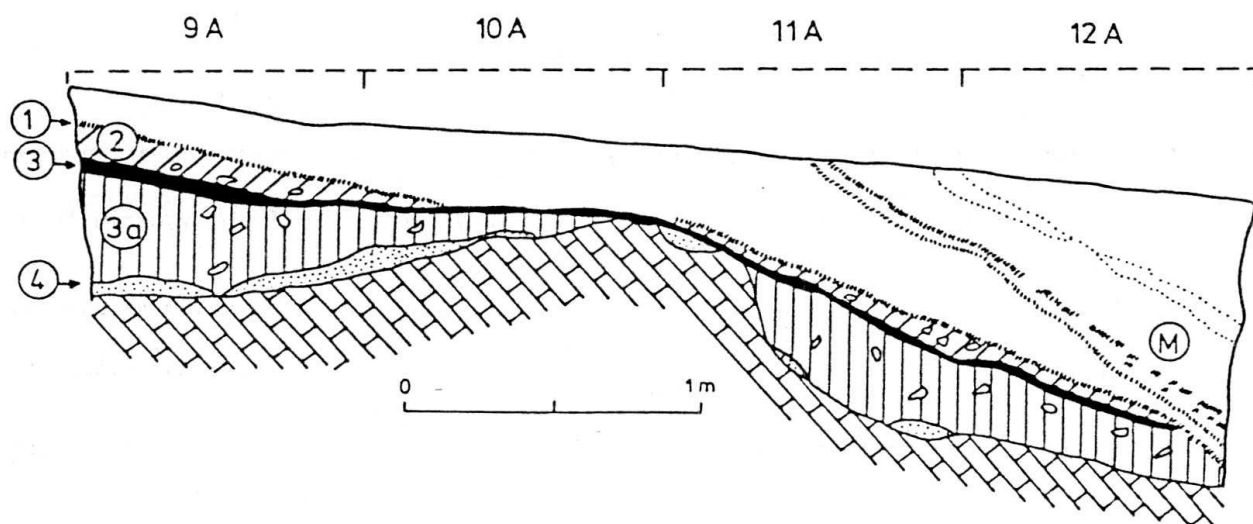


FIGURE 1. Can-cave. Northern section of pit 1.

RESULTS

Table 1 presents a preliminary list of the faunal material from pit 1. The animal remains belong to seven groups: snails, shell-fish, crab, fish, reptiles, birds and mammals. Table 2 shows the composition of the fauna according to these groups. The material is divided into 7 layers plus one sample, which contains mixed material. From this table it becomes clear that the animal remains of pit 1 from Can-cave consist mainly of shells from land and freshwater snails. Bones from small mammals are also frequent. Fish bones on the other hand, represent only 5% of the NISP (Figure 2).

Altogether 1097 fish bones were retrieved in pit 1. The material consists mostly of vertebrae (i.e. 1088 bones or 99.2%). One bone belongs to the cranium (operculare) and 8 bones to other categories of the postcranial skeleton. An explanation for the low number of bones from the cranium could be that the fish were prepared outside the cave and only the edible parts had been brought into the cave. The identification of the bones showed that most if not all bones belong to the genus *Mylopharyngodon* of the family Cyprinidae. The determination has been carried out with the help of recent fish material from the osteological collections of the Museum of Natural History (Berlin) and of the Institute of Zoology (Hanoi)¹.

(1) To control this determination we have sent the material to Prof. 'Chen Yi'yu, a fish specialist working at the Institute of Hydrobiology of the Academy of Sciences in Wuhan (China). He confirmed the determination.

Class Gastropoda: Land and fresh water snails	Class Mammalia
Class Bivalvia	Order Chiroptera
Class Crustacea	Order Primates
	Family Cercopithecidae: <i>Macaca</i> spec.
	Family Pongidae: <i>Hylobates concolor</i>
Class Pisces	Order Rodentia
Family Cyprinidae: <i>Mylopharyngodon (piceus ?)</i>	Family Muridae: <i>Mus</i> spec., <i>Rattus</i> spec.
Class Reptilia	Family Hystricidae: <i>Hystrix</i> spec.
Order Testudines	Order Carnivora
Family Testudinidae: <i>Testudo</i> spec.	Family Viverridae:
Class Aves	<i>Paradoxus hermaphroditus</i>
Order Galliformes	Order Artiodactyla
Family Phasianidae: <i>Gallus</i> spec.	Family Suidae: <i>Sus scrofa</i>
	Family Cervidae:
	<i>Cervus</i> spec., <i>Muntiacus muntjak</i>

TABLE 1. Can-Cave, pit 1. Preliminary fauna list (from spring 1989, according to the determinations from Le Văn Thue).

GROUP	Mixed	1	2	2/3	3	3a	3/4	4
Large mammals Macromammalia	840	10	449	363	35	218	32	108
Small mammals Micromammalia	7392	151	1684	1365	114	440	78	309
Birds Aves	11	-	2	2	-	-	2	1
Reptiles Reptilia	396	3	85	29	4	21	9	10
Fishes Pisces	789	5	182	92	-	16	-	13
Crab Crustacea	396	3	85	29	4	21	9	10
Shell-fish Bivalvia	17	-	-	13	-	11	1	1
Snails Gastropoda	17215	251	5741	9475	1230	7099	-	609
TOTAL	27056	423	8228	11368	1387	7826	131	1061

TABLE 2. Can-Cave, pit 1. Composition of the fauna according to animal groups by layers (number of fragments).

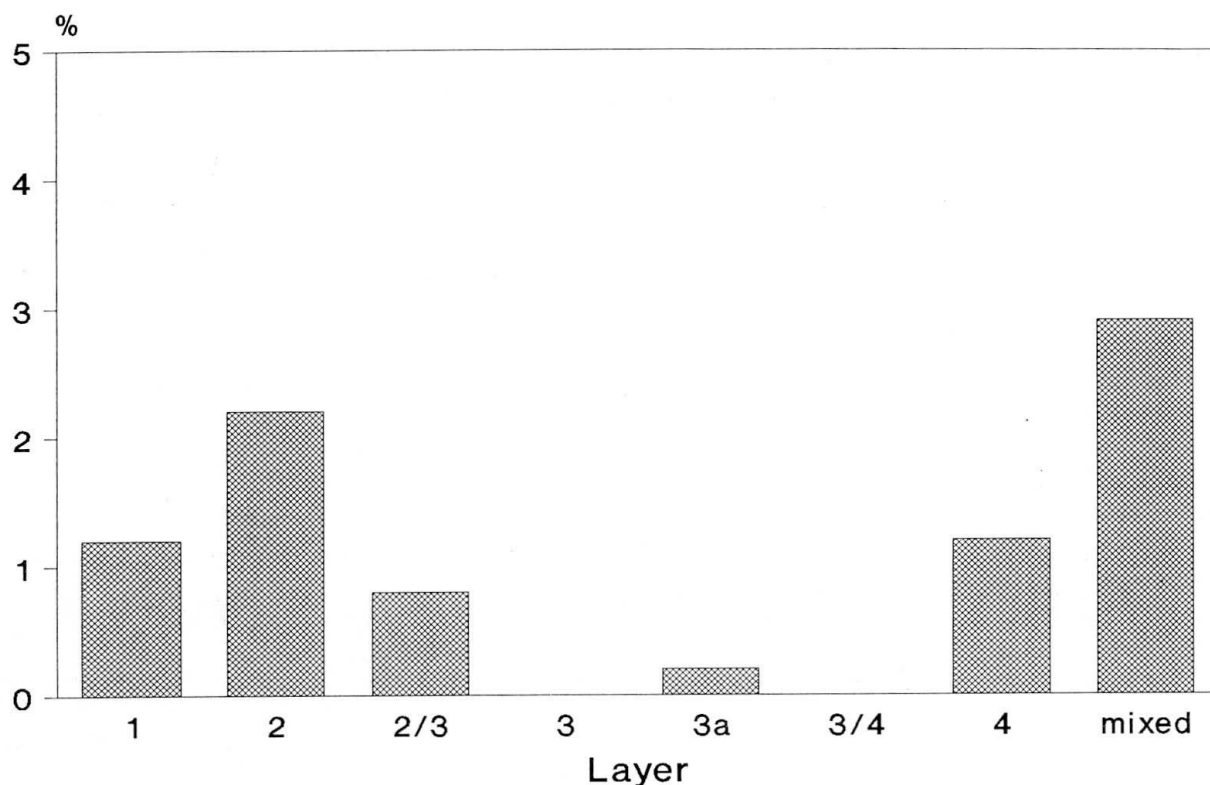


FIGURE 2. Percentage of fish remains within the different layers of pit 1 from Can-cave.

DISCUSSION

The genus *Mylopharyngodon* is a widespread cyprinid taxon in Southeast-Asia. The ichthyofauna of Vietnam, compiled by Mai Dinh Yên, describes only one species of the genus *Mylopharyngodon*. It is *Mylopharyngodon piceus* (Yên, 1969). In the volume "The Freshwater Fishes of China", edited by J.T. Nichols in 1943, this species is called *Mylopharyngodon aethiops* (Nichols, 1943). Possibly, then, all remains found in Can-Cave, pit 1, belong to this species. Today *Mylopharyngodon* is a very common freshwater species in North-Vietnam, living in lakes and rivers of the plains, but also in low- and middle-altitude mountains. Full-grown individuals reach lengths from 50-70 cm and weights ranging between 10-15 kg.

During the examination of the vertebrae it was noticed that all specimens showed a well-developed ring structure, indicating a periodicity in the growth rate, as recorded on many European freshwater species. The investigation of the outermost zone of the *Mylopharyngodon* vertebrae from pit 1 in Can-cave revealed that these could be classified into two groups (Table 3).

LAYER	GROUP 1	GROUP 2	Not Determined	TOTAL
Mixed	4 (4.0)	97 (96.0)	49	150
1	-	3	-	3
2	6 (11.8)	45 (88.2)	33	84
2/3	6 (13.3)	39 (86.7)	8	53
3a	2	8	2	12
4	-	7	1	8

TABLE 3. Can-Cave, pit 1. Classification of *Mylopharyngodon* vertebrae. Group 1: vertebrae with much growth after the narrow-ring. Group 2: vertebrae with the narrow-ring present on the margin.

The first one includes vertebrae with much growth after the narrow-ring (group 1) while a second group exhibits narrow-rings present on the margin (group 2). Most of the vertebrae within all layers (i.e. 86.7% of the recordable ones in layer 2/3, 88.2% in layer 2 and 96% in the mixed material) belong to group 2. This means that most specimens in the sample show the same season of death.

Under temperate climatic conditions wide and narrow rings on fish vertebrae correspond to periods of accelerated and retarded growth respectively, indicating seasons of higher and lower mean temperatures. How can the alternating zones of wide and narrow rings on the *Mylopharyngodon* vertebrae from Can-cave be explained? A climate-diagram from the meteorological station of Hanoi, which is only 30 km from the Can-cave site, gives an impression of the year-round climate in this region (Figure 3). There are two clearly distinct seasons:

- one season from April to October with heavy rain showers and high mean temperatures between 28° C and 32° C. This corresponds to the time of the summer monsoon.

- a second season from November to March with only little rain and lower mean temperatures of about 17° C. This is the time of the winter monsoon, which is also called the dry monsoon.

HANOI (10m) 23,4° 1735
[40-16]

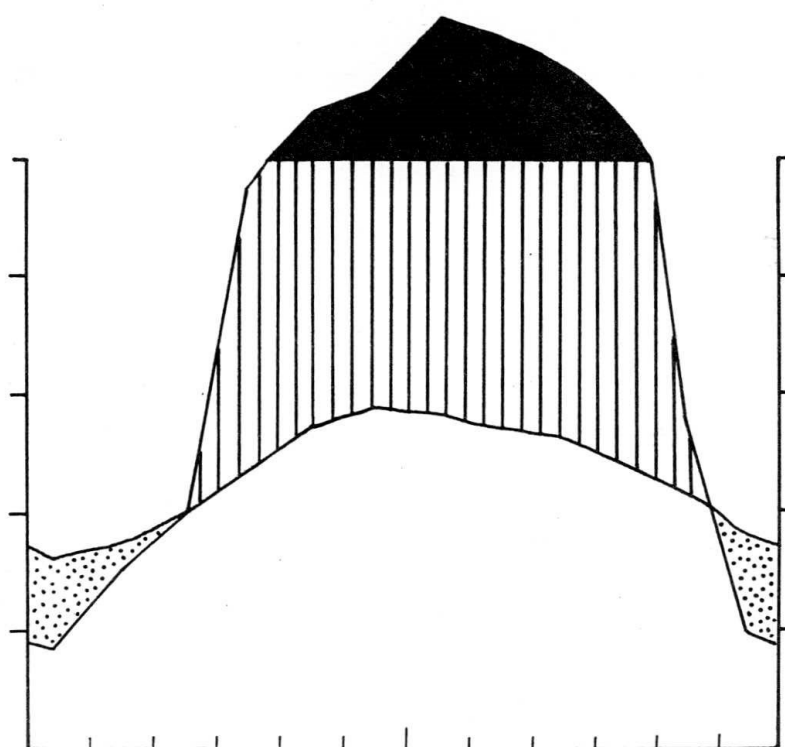


FIGURE 3. Hanoi, climate diagram (from Walter & Lieth, 1964). Lower curve: monthly means of temperature; upper curve: monthly means of precipitation; dotted area: precipitation goes below temperature (arid period, winter monsoon); hatched area: precipitation exceeds temperature (humid period, summer monsoon); black area: precipitations above 100 mm.

On the basis of this diagram one can assume that the wide rings correspond with the time of the summer monsoon. During that season rivers and lakes have much more water and food for fish are abundant. As a result of this growth is rapid. During the time of the winter monsoon lakes and rivers exhibit a dramatic drop in water level. Since certain foodstuffs are not available in the same quantities as during the summer growth is slower. If this explanation is accepted, then vertebrae with

narrow rings present on their margins should come from individuals which have been caught at the end of the winter monsoon season or at the beginning of the summer monsoon season (i.e. in the time between February and May).

According to Casteel (1976) in warmer tropical and subtropical waters other factors besides temperature, such as gonad maturation, may complicate the pattern of ring-formation. Among Californian fish, spawning stress between the months of March and June is the most likely cause for narrow ring formation. There are no data on the spawning-time of *Mylopharyngodon*. The only ones for *Cyprinus carpio*, indicate spawning between May and June.

CONCLUSIONS

From the data presented it can be inferred that at the Hoabinhian Can-cave site fishing was being carried out mostly during the period spanning from February to June. Such conclusion can be further supported by ethnographical evidence from a recent hunter-gatherer group living in remote regions of the limestone mountains in North-Vietnam, the so-called Mo. These people catch fish, *Mylopharyngodon piceus* among other species, mainly during the rainy season. As most vertebrae from Can-Cave have a full-developed narrow-ring present on the margin without any further amount of growth thereafter, one could possibly restrict the time of death of these individuals to the beginning of the rainy season. This result also coincides with the main season of occupation of Can-cave according to other sources of archaeological evidence (unpublished data).

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