

# Fish sauces from Herodian Masada

Hannah Cotton, Omri Lernau and Yuval Goren

with a contribution by Barbara Johnson

The purpose of this paper is to describe, date and interpret the evidence for the presence on Masada of fish sauces, a special Roman delicacy, in the context of the fortress' unique history in the Jewish and Roman world. This evidence falls into three categories: 1) fish remains: about 125 g of sandy material found in a ceramic sherd, a bottom piece of a jar, measuring about 14 x 11 cm (figs. 1-2); 2) jars which contained fish sauces; and 3) inscriptions on jars (*tituli picti*) containing information about their contents.

## 1. The fish bones (figs. 3-23)

The material found in the base of the jar was composed of fine grains of soil mixed with small intact and fragmented bones of fish. A sample weighing 2g was examined and separated under a binocular microscope (x 8). It contained a large number of fish scales, broken fin spines, vertebral processes, ribs, neurocranial fragments and 1494 recognizable skeletal elements of fish (Table 1). The state of preservation of many bones was good, but most were extremely fragile and tended to disintegrate when handled.

TABLE 1: SKELETAL ELEMENTS IDENTIFIED IN SAMPLE OF ALLEC

<i>Element</i>		<i>Number</i>	<i>Figure</i>
Neurocranium	Part	99	
	Basioccipital	21	
	Posttemporal	6	15-17
Branchiocranium			
<i>Oromandibular region</i>	Maxilla	37	3, 4, 5
	Dentary	2	6, 7
	Articular	9	
	Quadrate	8	8, 9
<i>Hyoid region</i>	Hyomandibular	38	10, 11
	Opercular	20	12-14
	Preopercular	9	
	Epihyal	4	
	Hypohyal	9	
	Urohyal	6	
Appendicular skeleton	Cleithrum	34	
Vertebral column	General	279	
	1st vertebra	28	18-21
	Abdominal vertebrae	354	22, 23
	Caudal vertebrae	501	
	Preural vertebrae	21	
Fins	Spines	9	
<b>TOTAL</b>		<b>1494</b>	

The minimum number of individual fish (MNI) in this sample was 28 (derived from 28 first vertebrae). By extrapolation 125 g would contain the remains of at least 1750 individual fish. The largest bones were cleithra and dentaries, measuring about 7 mm. The size of vertebrae was 1.5 mm or less. Most vertebrae had a hollowed centrum and many consisted of transparent 'shells' only, typical of young fish, in which ossification of vertebrae begins as an 'envelope' around the centrum with later accretion of successive layers of bone.<sup>1</sup> The estimated size of the fish was 4-5 cm only.

1 Y. François, "Structure et développement de la vertèbre de *Salmo* et des Téléostéens," *Archive de zoologie expérimentale et générale* 107 (1966) 283-322.