

CEPHALOPOD REMAINS IN THE STOMACH-CONTENT OF BEAKED WHALES, *ZIPHIUS CAVIROSTRIS* (CUVIER, 1823), FROM THE IONIAN SEA

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Abstract

Seventeen beaked whales, *Ziphius cavirostris* (Cuvier, 1823) were found stranded on the southwestern Greek Ionian coasts on 12-15 of May 1996. The stomach contents of 7 beaked whales were made up entirely of cephalopod remains which included detached heads and bodies, crown of arms, isolated buccal masses, loose beaks and eye lenses. Identified beaks attributed to two oceanic teuthoid cephalopods: *Histioteuthis bonnellii* and *Octopoteuthis sicula*. This suggests that, as shown by previous workers, *Ziphius cavirostris* is an exclusive predator of midwater squids and that both squid species, although are seldom caught by fishing gears, are quite abundant in the mesopelagic zone of the Ionian sea. In *Histioteuthis bonnellii* the size range of the beaks is wider than those of the same species found in the stomach content of blue sharks and swordfishes caught in the Adriatic sea

Key-words : Cetacea, food webs, cephalopods, Ionian Sea

Introduction

Cuvier's beaked whale, *Ziphius cavirostris*, is a pelagic species, cosmopolitan in temperate and tropical waters. In the Mediterranean important populations have been recorded along Spanish, French and Italian coasts where isolated individuals or couples are usually encountered and very rarely schools up to 25 individuals (1). Several strandings of beaked whales have been recorded in the last twenty years, on New Zealand (2), northeastern Atlantic and Mediterranean coasts (3, 4, 5, 6, 7), however this is the most numerous stranding of the species that has ever been recorded.

According to Clarke (8) Ziphiidae and Physeteridae are the most important odontocete squid eating cetaceans. There is only one detailed analysis of *Ziphius cavirostris* diet from one specimen stranded at New-Brighton, New Zealand (2). An animal stranded on Northwestern Spanish coasts was examined, but had empty stomach (6). This is the first study on the stomach-content of the species in the Mediterranean.

Materials and methods

From the 17 stranded beaked whales, on the western coasts of Peloponnesos, it was possible to examine only seven of them, 6 males and 1 female, whose sizes were between 5 and 6 m. The samples included detached heads and bodies, crown of arms, isolated buccal masses, loose beaks and eye lenses. The whole stomachs from three beaked whales were kept separately frozen, while the cephalopod beaks and lenses from the rest specimens were put together in a jar, in formalin solution. Beaks were counted and identified according to Clarke (9). The rostral, hood and crest lengths were measured with vernier calipers to an accuracy of 0.01 mm. Lower rostral length (LRL) distributions and the size at which the lower wings become dark are determined for each species. Darkening has been proved to coincide with the onset of maturity (10) and this is useful for comparisons with other collections.

Results

A total of 33 lower and 33 upper beaks (mandibles) were recorded. Only two species were represented by lower beaks. The number of lower and upper beaks of each taxon collected from beaked whales is given in the Table I.

Table I. Cephalopod beaks found in *Ziphius cavirostris* stomach content.

	<i>Ziphius cavirostris</i> specimens				
	1	2	3	Rest	
CEPHALOPODA					
<i>Octopoteuthis sicula</i>	LB	3	6	1	8
(RUPPEL, 1848)	UB	2	1	-	11
<i>Histioteuthis bonnellii</i>	LB	-	2	2	11
(FERUSSAC, 1834)	UB	-	1	-	13
Unidentified	UB	-	1	4	-

LB: lower beaks, UB: upper beaks

Octopoteuthis sicula was the most abundant prey in the stomach of beaked whales accounting for 48.5 % of the total number of beaks. Flesh was present in one stomach, comprising one complete squid (ML: 16 cm, AL: 20 cm) and one crown (AL: 24 cm). Eight pairs of beaks were removed from buccal masses while isolated were found 10 lower and 6 upper beaks. The plot (Figure 1) of upper rostral length against lower rostral length, for 8 pairs of *Octopoteuthis sicula* beaks

seems to follow a straight line, at least in the case of smaller beaks (LRL < 8.5 mm), which comprise the major part of the paired beaks. The estimated regression equation is:

$$URL = -0.873 + 1.176 LRL \quad r^2 = 0.964$$

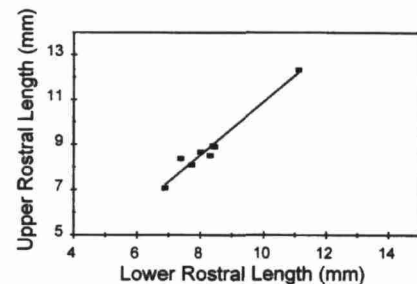


Figure 1. Relationship of upper rostral length against lower rostral length in *Octopoteuthis sicula*.

An histogram of the LRL (Figure 2) has two main peaks at 8 and 12 mm. Five lower beaks with a rostral length of 4.2, 6.9, 7.7, 7.8 and 8.4 mm had transparent wings while four other beaks with LRL of 5.9, 7.4, 8.0 and 8.4 mm presented club-shaped dark areas on the wings with transparent margins. The upper limit of the range is lower than the mode of LRL of beaks found in the stomach of striped dolphins stranded on the western Mediterranean coast (11).

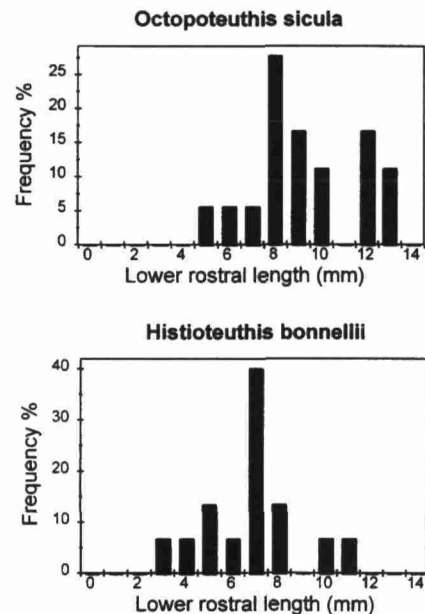


Figure 2. Percentage frequency histograms of the rostral lengths of lower beaks of *Octopoteuthis sicula* and *Histioteuthis bonnellii*