

First recorded specimen of the giant squid *Architeuthis* sp. in Portugal

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The first occurrence of a giant squid *Architeuthis* sp. specimen in Portuguese waters is noted and another reference set of biological and biometrical data provided which may in future be used in conjunction with others to further elucidate important aspects of the identity, biology and ecology of the species. The fact that the specimen is a male is relevant, since males have been much less frequent in the reports in the scientific literature than have females. Additionally, this is the most southerly report of a male known to have occurred in the Atlantic Ocean.

There is an ever growing number of records of the giant squid *Architeuthis* sp. around the world, and even an apparent increasing reporting rate. They have been recorded dead as prey items (e.g. Roeleveld & Lipinski, 1991), floating or stranded (e.g. Guerra et al., 2004a) and alive as trawl caught specimens (e.g. Lordan et al., 1998). During the last decades, the accumulated number of records prompted researchers to actively pursue clues to allow the understanding of the species identity, habitat, habits and life history.

The specimen presented here, presumably an *Architeuthis dux* (Figure 1), was floating near the beach between Praia da Galé and Melides lagoon (38°11'N 08°48'W), on the west coast of Portugal, on 24 August 2002 when it was sighted by bathers on the shore. It was reported to the Natural Park of Arrábida authorities and subsequently transported to the 'Museu Oceanográfico do Portinho da Arrábida' where it was deep-frozen enclosed in a plastic bag. After thawing naturally overnight, measurements were made the following day. The beak and radula were complete, in perfect condition, and were detached from the buccal mass and separately stored in 70% alcohol.

A data collection protocol for the biometric characters was designed based on Roper & Voss (1983) and for beak measurements based on Roeleveld (2000).

The specimen was found to be a mature male. It presented large portions of the mantle and arms still covered in skin. The fins were complete, although partially detached. One of the tentacles was broken but no sections were missing. Right arm I was complete, right arm III was entirely missing and the remaining six presented variable lengths of the ends missing. No hectocotylus could be observed for lack of the distal ends of both arms IV. All arms were measured to the distal break point and at that point the diameter was obtained to permit reconstruction by comparison with other complete specimens. The diameter at the base was also determined where possible. The eyes were burst and without lenses, preventing measurement of head width, but the globes remained in place. The penis protruded from the mantle along the head, a common observation for the genus (Lordan et al., 1998; Guerra et al., 2004a). Spermatophores were present inside the Needham sac. From the penis, sperm of a light yellow colour poured out easily, possibly as a result of the

destruction of the testis by freezing. Embedded in the skin and between the skin and muscle of left arm IV, the mantle both dorsally and ventrally on the left hand side of the animal, and inside of the left orbital cavity lay very long and twisted ducts with spermatophores, similarly to what has been described in males from north-western Spain (Guerra et al., 2004a).



Figure 1. *Architeuthis* specimen collected at 38°11'N 08°48'W (south-west Portugal) on 24 August 2002.

Table 1. *Morphometric data and indices.*

Character	Measure	Index	Value	Character	Measure	Index	Value
<i>Body:</i>				<i>Body continued</i>			
ML	111	MLI	17.9	FuO	7.9		
BW (kg)	60			FuCL	12.16		
HL	27.5	HLI	24.8	FuCW	3.1		
BEHW	7.5			NCW _a	3.67		
TeL	481 461	TeLI	433.3	NCW _m	3.13		
AL1	150 43●			NCW _r	7.3		
ØAL1	- 16.6 14/16.8			<i>Beak:</i>			
AL2	64● 128●			LRL	1.41		
ØAL2	13/17.8 7/19.8			LJW	1.09		
AL3	- 119●			LWL	3.80		
ØAL3	-/- 5/22.3			LHL	2.10		
AL4	84● 87●			LCL	3.96		
ØAL4	12/21.7 11/22.4			LRC	5.89		
ToL	619.5			LRW	4.75		
FL	47.5	FLI	42.8	URL	1.48		
FW	34	FWI	30.6	UJW	1.25		
MW	41	MWI	36.9	UHL	5.56		
BC	90.5			UCL	8.55		
PL	94	PLI	84.7	URW	3.20		
GiLC (n)	61			UWCL	7.36		
OCMDI	8.1			UWW	1.30		
OCMD _p l	7.4			UWL	2.36		
FuL	17.4	FuLI	15.7				

Characters in cm and indices in %, except where otherwise stated. Symbol ‘|’ separates r.h.-side from l.h.-side, ‘/’ distal from proximal measurements, ‘●’=measurements taken from incomplete appendages; ‘-’=measurement not taken. Characters: ML, dorsal mantle length; BW, body weight; HL, head length; BEHW, width between the eyes; TeL, tentacle length; AL, arm 1 to 4 lengths; ØAL, arm 1 to 4 circumference; ToL, total length; FL, fin length; FW, width of one fin; MW, maximum mantle width; BC, body circumference; PL, penis length; GiLC, count of gill lamellae on one half arch, without common end lamellae; OCMDI, maximum diameter of the left orbital cavity; OCMD_pl, perpendicular to maximum diameter of left ocular cavity; FuL, funnel length; FuO, funnel opening diameter; FuCL, funnel cartilage length; FuCW, funnel cartilage width; NCW_a, NCW_m, NCW_r, maximum nuchal cartilage width at the anterior, neck and posterior sections; LRL, lower rostral length; LJW, lower jaw angle width; LWL, lower wing length; LHL, lower hood length; LCL, lower crest length; LRC, lower rostral tip to corner of lateral wall; LRW, lower rostral tip to inner margin of wing; URL, upper rostral length; UJW, upper jaw angle width; UHL, upper hood length; UCL, upper crest length; URW, upper rostral tip to inner margin of wing; UWCL, upper wing width; UWW, upper wing length; UWL, upper wing length. Indices: MLI, mantle length index=ML/ToL*100; HLI, head length index=HL/ML*100; TeLI, tentacle length index=TeL/ML*100; FLI, fin length index=FL/ML*100; FWI, fin width index=FW/ML*100; MWI, maximum mantle width index=MW/ML*100; PLI, penis length index=PL/ML*100; FuLI, funnel length index=FuL/ML*100.

Morphometric data collected and respective indices are displayed in Table 1.

By comparison to all other records of male *Architeuthis* sp. found in the North Atlantic (Guerra et al., 2004a), this specimen is the second longest and heaviest, comparable to the 2003 Asturian record. It presents a similar MLI to the mean recorded but a moderately lower TeLI. Penis length index is in the range of Irish records and above Asturian records. As for the less condition dependent characters, GiLC is within the range found in two of the Irish records and LRL and URL are both most similar to those found in the same animals, which would all tend to indicate a closer resemblance of this record to two of the Irish records than to the Asturian records.

The Portuguese coast to the south of the Sado estuary presents a narrow shelf of approximately 15 nautical miles. The slope on the other hand, is wide all along the stretch of coast between Setúbal and the Cape S. Vicente, except for the area of the Setúbal canyon (approximately 38°17'N) where the shelf break is ~8 n.m. from the shore. This brings the upper limit of the depth range of the genus (Lordan et al., 1998) close inshore in the area where it was found, but the appearance of a single squid does not imply the existence of favourable conditions for the species, as the specimen may simply be an accidental stray.

The increase in the reports of *Architeuthis* sp. throughout the world (Guerra et al., 2004a), could reflect increased mortality rates due, among possible reasons, to human activities (Guerra

et al., 2004b), but it may also just reflect the awareness of the non-scientific public as exposure given by the mass-media increases. In the North Atlantic the latest records appear to be particularly prevalent around the Iberian Peninsula.

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