

Cuttlebones of three exotic *Sepia* species (Cephalopoda, Sepiidae) stranded on the Apulian coast (Italy), south-western Adriatic Sea

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Five cuttlebones from three non-Mediterranean cuttlefishes, namely *Sepia pharaonis*, *Sepia bertheloti*, and *Sepia recurvirostra*, were found stranded ashore along the coast of Bari (Italy), south-western Adriatic Sea. These cuttlebone findings cannot be considered evidence of exotic cuttlefish occurrence in the Adriatic Sea. Such *Sepia* shells most probably are the waste of imported frozen seafood dressing operations on the shore.

Key words: Cephalopoda, Sepiidae, cuttlebones, alien species, Mediterranean, Adriatic Sea, Italy.

INTRODUCTION

In the last few decades marine biologists have become aware of the entrance into the Mediterranean Sea of several hundreds of allochthonous or alien species (Galil, 2000) including many molluscs (Zenetos et al., 2004). As for the Cephalopoda, Bello (2003) reports nine alien species in his list of Mediterranean cephalopods, among which a cuttlefish, i.e. the Lessepsian immigrant *Sepia pharaonis*. This cuttlefish was recorded from the Mediterranean based on the occurrence of many cuttlebones stranded along the Israeli coast (Mienis, 2003). The use of beach shells in biogeographic studies is a customary practice – significant correspondences between beached thanatocoenoses and neighbouring malacocoenoses are reported in the literature (e.g. Luque & Templado, 1981) – although it should be employed with due caution. Doubt should be expressed in the case of buoyant shells, such as cuttlebones, which may float over long distances (Adam & Rees, 1966; Voss, 1974).

In the present note an account is given of cuttlebones belonging to three non-indigenous *Sepia* species stranded along the coast of Bari, Apulia (Italy, south-western Adriatic Sea), namely *Sepia bertheloti* d'Orbigny, 1835, *S. pharaonis* Ehrenberg, 1931, and *S. recurvirostra* Steenstrup, 1875 (Sepiidae). The first one is a central-eastern Atlantic cephalopod; the other two live in the Indo-West Pacific (Khromov et al., 1998). All are inshore species.

The occurrence of these exotic *Sepia* shells on Apulian shores cannot be ascribed to natural events, hence cannot be adopted as evidence of alien cephalopod ingression into the Adriatic Sea. In the past some exotic cephalopods have been erroneously ascribed to the Mediterranean teuthofauna because of specimen location misinterpretations (Bello, 1986).

MATERIAL AND METHODS

The *Sepia* shells were found washed ashore at Punta Perotti, a site SE of Bari, Apulia, south-western Adriatic Sea, just outside the town, on a narrow stretch of low rocky shore

covered by rubble. Because of the abundant debris, walking is not easy there. A weak current from the NE usually runs past the coast. The cuttlebones were found during two trips on 26 February 2004 and 8 April 2004 respectively. Northerly winds had blown for a few days before both walks; such winds usually make objects wash ashore.

The shells were identified by reference to Adam & Rees (1966) and Khromov (1998). The shell length (CL) and width (CW) were measured by means of a pair of callipers. The cuttlebones are kept in the author's collection.

RESULTS

Five cuttlebones belonging to *Sepia bertheloti* (1), *S. pharaonis* (2), and *S. recurvirostra* (2) were collected. All had the anterior tip broken; a couple had the spine broken. All were in comparatively good condition, apart from the *S. bertheloti* shell that appeared slightly eroded.

The cuttlebones of *S. pharaonis* were identified thanks to several features including the broad chitinous margins, the wide groove in the middle of the striated zone, and the unique long and dark ventral ledge formed by the inner cone (fig. 1). The *S. bertheloti* shell does not resemble that of any other species because of its general shape, the CW / CL ratio ranging from 23.5 to 33.5%, the length of the striated zone exceeding half the shell length, and some other characters. The *S. recurvirostra* cuttlebones display the exclusive feature of a dark-coloured thick callous substance emarginated in the front connecting the extreme posterior of the inner cone raised as a thin ledge with the outer cone (fig. 2). Additional data are summarized in table 1.

Table 1. Size of cuttlebones washed ashore along the Bari coast. CL, cuttlebone length; CW, cuttlebone width.

Species	#	Collection date	CL (cm)	CW (cm)	Notes
<i>Sepia pharaonis</i>	1	26.2.2004	11.0+	4.5	spine broken off
	2	26.2.2004	12.2+	4.7	
<i>Sepia bertheloti</i>	1	8.4.2004	8.4+	2.6	CW = 29% CL
<i>Sepia recurvirostra</i>	1	8.4.2004	7.3+	2.3	spine broken off
	2	8.4.2004	8.9(+)	2.9	

DISCUSSION

In my opinion the cuttlebone findings reported upon in the present note cannot be considered evidence of exotic cuttlefish occurrence in the Adriatic Sea.

Cuttlefish are benthic cephalopods that reproduce by benthic hatchlings (Boletzky, 1974). Therefore expansion of any population is slow. Both the distribution of *Sepia bertheloti* [central-eastern Atlantic Ocean, from the Canary islands to 14° S (Khromov et al., 1998)] and of *S. recurvirostra* [Indo-West Pacific, from the Andaman Sea to the Yellow Sea (Khromov et al., 1998)] are not contiguous to either entrance of the Mediterranean basin, viz. the Straits of Gibraltar and the Suez Canal. Hence it is extremely improbable, not to say impossible, to expect natural entrance into the Mediterranean.

As for *Sepia pharaonis* - an Indo-Pacific cephalopod recorded from the Red Sea to the East China Sea and northern Australia (Khromov et al., 1998; Lu, 1998), which might be



Fig. 1. Cuttlebone of *Sepia pharaonis*. CL = 12.2+ cm. Left, ventral face; right, dorsal face. An asterisk marks the ventral ledge formed by the inner cone. Note the broken anterior tip (uppermost part in the photograph) and the tar blotch on the left side of the ventral smooth zone.



Fig. 2. Cuttlebone of *Sepia recurvirostra*. CL = 8.9+ cm. Left, ventral face; right, dorsal face. An asterisk marks the thick callous substance connecting the extreme posterior of the inner cone with the outer cone. Note the broken anterior tip (uppermost part in the photograph).

indeed a species complex (Norman, 2000) - it made its way from the Red Sea into the Suez Canal, where it has become a fishery target species, less than fifty years ago (cf. Barash & Danin, 1972, and Gabr et al., 1998). In recent years, *S. pharaonis* appears to have entered the Mediterranean, reaching the Israeli coast, as recorded by Mienis (2003) who found abundant cuttlebones of this species, many of them with some flesh remains, washed ashore in April 2003. Nevertheless, it is highly improbable that the newly settled Mediterranean population (if any) of this benthic cephalopod has dispersed to the Adriatic Sea in the short time elapsed since it crossed the Suez Canal.

None of the three cuttlefish dealt with herein is imported alive for aquacultural purposes. Moreover no capture of any exotic cuttlefish in the intensely fished western Adriatic coastal waters has ever been reported by local fishermen.

In addition to the fact that cuttlebones may float for a very long time and over long distances (Adam & Rees, 1966), the occurrence of shells from three alien *Sepia* species on the south-western Adriatic coast is easily explained by the habit of some local seafood retailers of dressing imported frozen products, especially cephalopods, on the shore. The broken anterior tip of all exotic cuttlebones depends on the dressing mode - the bone is pushed from the rear and is thus forced out through the anterior mantle border - and is further proof that they are the waste products of dressing operations. Indeed, in Bari and in the Apulian region large quantities of dressed cephalopods are sold.

Stranded cuttlebones of *S. pharaonis* were also recorded along the north-eastern Atlantic coast (Lacourt, 1974, 1975).

Stranded cuttlebones of any *Sepia* species cannot simply be used as evidence for the presence of living animals in nearby areas (Voss, 1974). Cuttlebones may naturally float over long distances and may be waste products.

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