

## Short Note

### First Confirmed Sighting of the Mediterranean Monk Seal (*Monachus monachus*) in Libya Since 1972

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Following a dramatic decline in the previous century, the Mediterranean monk seal (*Monachus monachus*, Hermann, 1779) has become one of the most critically endangered mammals in the world (International Union for Conservation of Nature [IUCN], 2010). Once abundant throughout the entire Black and Mediterranean Seas and the Atlantic coasts and islands off northwest Africa, it is thought that currently fewer than 600 individuals survive in isolated subpopulations at the Cabo Blanco Peninsula, the archipelago of Madeira, and the northeastern part of the Mediterranean Basin (MOM, 2007; Pires et al., 2008; Martínez-Jauregui et al., 2012). Monk seal populations in the southeastern part of the Mediterranean Basin (i.e., the coastline stretching from Israel to Libya) have been heavily affected by the increase of human activities in coastal areas and by the lack of suitable habitat for resting and pupping. By the mid-20th century, Mediterranean monk seals were already considered to be rare in this part of their distribution (van Wijngaarden, 1962; Johnson et al., 2006). Mediterranean monk seals were last reported in the southeastern Mediterranean Basin along the coast of Cyrenaica in Libya (Norris, 1972). Although no authenticated reports of monk seal sightings from Libya have been published since the 1970s, hopes have been expressed that the inaccessibility of the habitat, the biological richness, and the low human population density along the coast of Cyrenaica might have prevented the extinction of this colony (Hamza et al., 2003). We provide here the first reliable account of the presence of the critically endangered Mediterranean monk seal in Libya in over 40 y.

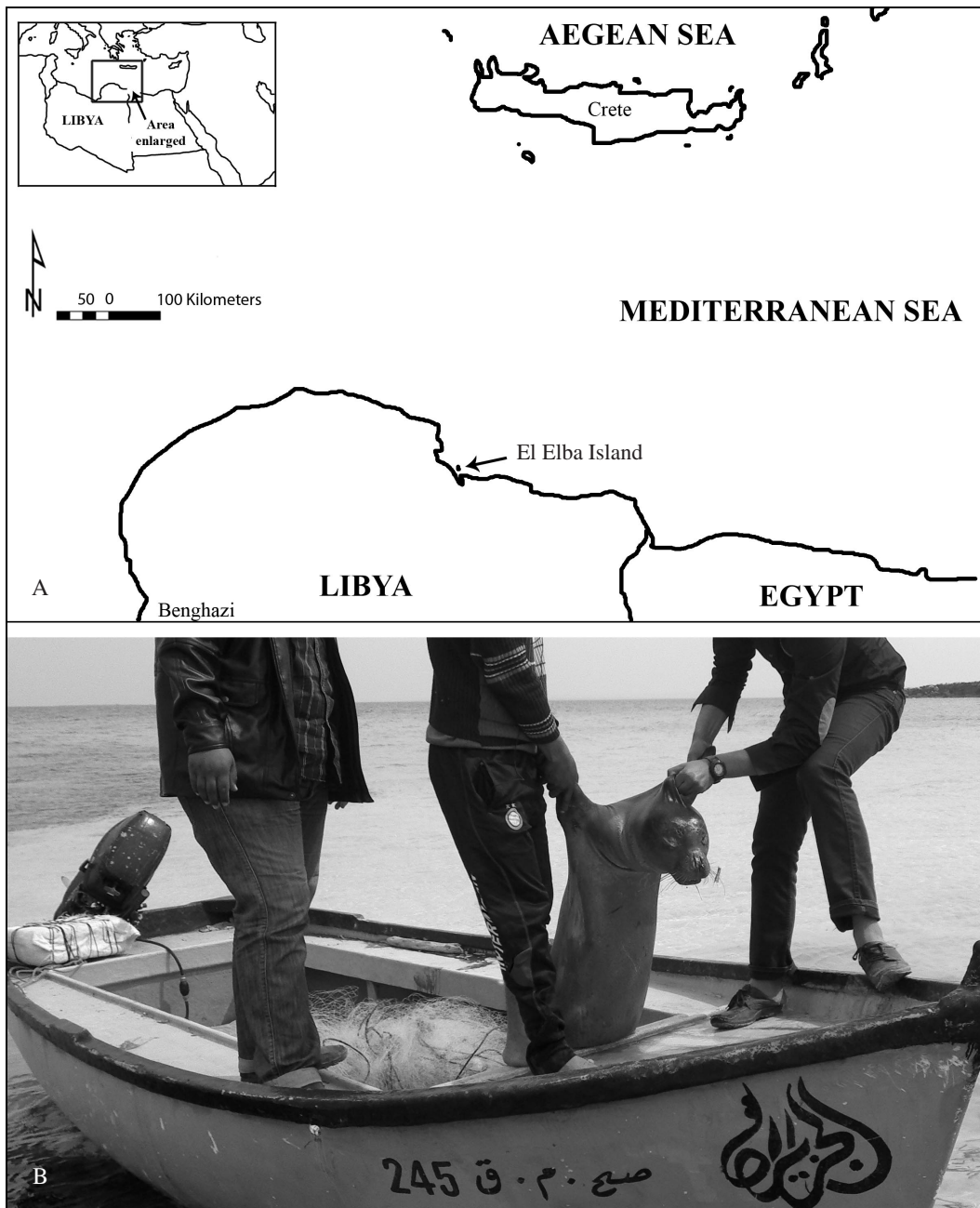
On 25 March 2012, staff of the Marine Biology Research Center (MBRC) in Benghazi, Libya, were alerted to the presence of a dead, "strange" creature entangled in a fishing net near El Elba

Island (32° 14' 12.0" N, 23° 16' 03.0" E), a sand-bank located approximately 300 km east of Benghazi, along the coast of Cyrenaica (Figure 1). The carcass was transported to the MBRC and kept in a freezer until a necropsy was performed, using specific necropsy protocols for pinnipeds (Winchell, 1990) that have been adapted for the Mediterranean monk seal (Androukaki et al., 2006). Based on the external body measurements (standard length [SL], 149 cm; total length [TL], 165 cm; inner and outer length of fore flippers, 14.5 and 26.5 cm, respectively; and maximum length of hind flippers, 31.0 cm), the development and wear of the dentition, and the examination of the reproductive organs, the seal was identified as a 60-kg female juvenile Mediterranean monk seal, approximately 6 mo old (Samaranch & Gonzalez, 2000; Androukaki et al., 2002).

Externally, the animal did not show any signs of human-caused injury; small traumatic lesions were found around the body, and all nails of the fore flippers were broken off. Skin appearance, organ coloration, and other indicators recorded during the necropsy allowed time of death to be estimated at approximately 2 d prior to the finding of the carcass. Blubber thickness (25 mm at the thorax; 30 mm at the abdominal area) and shape and colour of the internal organs indicated a reasonably good dietary and health state.

For diet analysis, the complete stomach was removed from the abdominal cavity, and the contents were examined. The stomach was partially full, weighed 1.25 kg, and consisted of a mixture of digested prey items, including bones, otoliths, large fish remains, and cephalopod beaks (total weight, ~265 g).

Finally, preliminary genetic analysis of a skin sample collected from the monk seal was consistent with the most common of four mtDNA



**Figure 1.** A. Map of the Mediterranean Sea indicating the location where a Mediterranean monk seal was found entangled in a fishing net in Libya. B. The female juvenile Mediterranean monk seal.

haplotypes found in the eastern Mediterranean monk seal population. This haplotype is common in monk seals throughout the Aegean Sea and the area of Crete, whereas it is very rare in animals from the Ionian Sea (MOM, pers. comm.).

Understanding critically endangered species' distribution patterns and population trends is essential in defining effective monitoring programmes and management and conservation measures. We report here the first reliable account of a Mediterranean monk seal in Libya in the

southeastern Mediterranean Basin, an area from which the species is generally considered to be extirpated (Johnson et al., 2006). Although the necropsy was inconclusive regarding the cause of death, based on the evidence collected (i.e., seal entangled in a net, lack of external and internal injuries, broken nails on fore flippers), drowning through accidental entanglement in a fishing net is suspected (Kuiken et al., 1994). Such interactions have been widely recorded for newborn and subadult marine mammals (Aliaga-Rossel et al., 2010) and are a major threat to the survival of the critically endangered Mediterranean monk seal in Greece (Karamanlidis et al., 2008).

The rediscovery of the critically endangered Mediterranean monk seal along the coast of Libya has two possible explanations. This stranded monk seal could represent an individual from a hitherto unknown monk seal colony along the coast of Cyrenaica in Libya, which once may have been part of a larger southeastern Mediterranean monk seal population. The animal was found within the range of the last confirmed sightings of the species reported by Norris in 1972. Also, a recent field survey in the same area indicated the presence of suitable habitat characteristics and a recognition of the species by local fishermen (Hamza et al., 2003).

Alternatively, the animal could have been a migrant from the last stronghold of the species in the eastern Mediterranean, which is partially supported by mtDNA evidence from the Aegean Sea and the Sea of Crete. This sighting of a Mediterranean monk seal in Libya is but the latest of a spate of extra-limital sightings of the species in the southeastern Mediterranean Basin. Previous sightings have occurred in Israel (Scheinin et al., 2011) and Egypt (Notarbartolo di Sciarra & Fouad, 2012), areas from which the species have been extirpated for decades (Johnson et al., 2006), and sightings also have been attributed to migrant animals from the northeastern Mediterranean monk seal population. Extra-limital sightings also have been recorded recently in Italy and Croatia in the Adriatic Sea (Gomerčić et al., 2011; Mo, 2011). If the Libyan monk seal was a migrant, it would involve the crossing of more than 300 km of open sea (i.e., the closest distance from Libya to the southern coast of the island of Crete) by a juvenile Mediterranean monk seal, thus confirming the assumption of the species being capable of traveling long distances (Adamantopoulou et al., 2011).

Unfortunately, we cannot substantiate either of the two possible explanations, yet both have important implications in the conservation and management of the species. Considering the overall decline of the species over the past 50 y and the fragmentation of the population, the possible

(re)discovery of a monk seal colony along the Libyan coast is of extreme importance and should be accompanied by intensive monitoring efforts that will confirm the presence of the species in the country, identify critical habitat for its survival or for the permanent re-establishment of a population, and promote appropriate management and conservation measures. On the other hand, if the animal is a migrant from Greece and considering the increasing number of extra-limital sightings recently that have been linked to this population, this could indicate a local, partial recovery of the species, which, in turn, would have significant implications for the monitoring and conservation priorities in the country (Notarbartolo di Sciarra et al., 2009), but also internationally.

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