Neoscytalidium dimidiatum was isolated from two 12–18 cm abscesses in the lung and the mediastinal lymph nodes of a stranded Risso’s dolphin (Grampus griseus). Histopathologic examination of samples of these organs revealed the presence of hyphae and sclerotic body-like fungal elements. Photobacterium damselae subsp. damselae was recovered from the dolphin’s organs which also were found to contain numerous Monorygma grimaldii cysts. No histopathological signs of morbillivirus infection were seen. To the best of our knowledge, this is the first report of N. dimidiatum infection in a sea mammal.

Keywords Risso’s dolphin, Neoscytalidium dimidiatum, pneumonia

Introduction
The Risso’s dolphin (Grampus griseus) is a large dolphin that may reach 4 meters and is a member of the family Delphinidae. Its distinguishing characteristics are a lack of beak, a vertical cleft that divides its dome in two, no teeth in the upper, and only 2–7 pairs in the lower jaw. It has a wide geographical distribution in tropical and warm temperate waters [1] and is considered as one of the regular cetacean species inhabiting Israeli and Mediterranean waters. Since 1994, six strandings of this species spread along the entire Israeli coastline were recorded, three of which involved live individuals.

Neoscytalidium dimidiatum is a quick-growing dematiaceous hyphomycete from the family Botryosphaeriaceae, prevalent primarily in tropical and subtropical regions. Previous names of the species include Fusicoccum dimidiatum, Hendersonula toruloides, and Scytalidium dimidiatum. Its current binomial was suggested by Crous et al. [2], based on genetic analysis of the family. Colonies are initially white but turn with time to dark grey to black. A non-pigmented variety, S. hyalinum, was deemed, based on molecular analysis, to be a non-pigmented variant of N. dimidiatum and as such was proposed as N. dimidiatum var hyalinum [3]. Microscopically, hyphae are formed from pigmented and hyaline arthroconidia and in some cases a synanamorph, Natrassia mangiferae, may develop which is characterized by the formation of pycnidia in older cultures [4]. N. dimidiatum infects primarily plants but causes dermatophytosis-like skin and nail infections [3] with occasional deeper mycoses in humans [5,6]. N. dimidiatum var hyalinum was reported to be less virulent in a murine model [7] and has thus far been reported as being the cause only of skin and nail infections [3]. To the best of our knowledge with respect to animals, the fungus has been reported only once, as H. toruloides, from a case of bovine abortion [8].

Case report
The fresh carcass of a 294 cm long, 300 kg estimated weight, young female Risso’s dolphin was found on the shore of southern Israel. The estimated time of death was 24–48 h before its discovery. It was transported to the
Pulmonary fungal infection caused by *Neoscytalidium dimidiatum* in a dolphin

Koret School of Veterinary Medicine, where it was kept refrigerated (4°C) and was autopsied 21 h later.

The dolphin looked emaciated, with the thickness of its midline belly blubber being only 25 mm, and had some superficial bruises and a deep wound on the left side of the dorsal fin. Four *Pennella* spp. ectoparasites were seen on the dolphin’s skin surface and its blubber was full of ecchymoses and petechiae. Dozens of *Monorygma grimaldii* cysts were found in the blubber in its ventro-caudal aspect, peritoneum and in the mesovarium along the uterus and the ovaries. However, the most significant lesions were in the respiratory system, i.e., abundant foam in the trachea and two abscesses, in as many lobes, measuring approximately 8–12 cm in diameter. The mediastinal lymph nodes were enlarged and filled with pus. Large parts of the lung were consolidated and a general lymphadenopathy was found.

Bacteriologic, mycologic and histopathologic studies of the intestine, spleen, kidney, lung, mediastinal lymph nodes and brain were conducted as previously described [9]. A hemolytic bacterium, identified with the API 20E kit (bioMerieux, France; profile code 5300244, 99.9% identification) as *Photobacterium damselae* subsp. *damselae* was isolated from all the organs as the dominant member of the bacterial flora. *Salmonella enterica* serotype Kentucky was recovered from the intestine.

After 2 days of incubation at 30°C a quick growing mould was isolated on Sabouraud’s dextrose agar (SDA), which was initially white but turned dark gray with cottony aerial mycelium after an additional 5 days of incubation. Microscopically, chains of mostly dematiaceous arthroconidia were seen (Fig. 1).

The fungus was identified as *N. dimidiatum* by internal transcribed spacer (ITS) ITS1-5.8S-ITS2 sequencing as previously described [9,10]. A BLAST search (www.ncbi.nlm.nih.gov/blast/blast.cgi) of the GENBANK showed a 100% homology with CBS strain 380.36 of *N. dimidiatum*.

Except for the lung and the mediastinal lymph nodes, the histopathological examination revealed no pathological changes in the examined organs, including those associated with morbillivirus infections [11]. A PCR test for the virus could not be performed. However, hyphae and sclerotic body-like fungal elements were seen in these two organs (Fig. 2a, b).

**Discussion**

The large number of parasitic cysts, as well as the isolation of *P. damselae* subsp. *damselae* from various organs of the dolphin, indicate that the animal suffered from some underlying condition. It is noteworthy that *Morbillivirus*-induced immunosuppression has been suggested to act as a predisposing factor to *P. damselae* subsp. *damselae* infections [12]. Although no histopathological signs of infection with this virus could be seen, it cannot be conclusively excluded without more specific tests such as PCR (not performed in this case). The infection of the lung by *N. dimidiatum*

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**Fig. 1** *Neoscytalidium dimidiatum* – microscopic appearance.

**Fig. 2** Histopathology: hyphae and sclerotic body-like fungal elements in (a) the lung – Periodic acid Schiff staining and (b) the mediastinal lymph nodes – hematoxylin and eosin staining.
might also be a sequel of the same state of immunosuppression.

The sclerotic body-like fungal elements seen in the lung abscesses are usually associated with chromoblastomycosis, a cutaneous fungal infection [13,14]. In animals, the presence of such elements has been described in the organs of amphibians [15–18] and a snake [19].

Various mycoses have been described in sea mammals [20,21], with Aspergillus spp. being the most frequent etiologic agents of fungal pneumonia [22]. To the best of our knowledge, this is the first report of an infection with N. dimidiatum in this group of animals.

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References