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## MORTALITY EVENTS OF BENTHIC ORGANISMS ALONG THE COAST OF ISCHIA IN SUMMER 2017

### *MORTALITÀ DI ORGANISMI BENTONICI LUNGO LE COSTE DI ISCHIA NELL'ESTATE 2017*

**Abstract** - A mortality event of some key-benthic organisms was observed along the coast of Ischia during summer 2017. The scleractinians *Astroides calycularis*, *Cladocora caespitosa*, the gorgonians *Eunicella cavolini* and *E. singularis*, and the coralline algae *Lithophyllum* spp., were the species affected with mortality between 20% (*Lithophyllum* spp., *Astroides* and *Cladocora*) and 60% (*Eunicella* spp.). A heat-wave, with surface temperature up to 28 °C in August and up to 23-24 °C at 25 m depth in September-October, was a possible explanation of such catastrophic events.

**Key-words:** mass mortality, Cnidaria, Coralline White Patch Disease, heath-wave, Tyrrhenian Sea.

**Introduction** - Mass mortality outbreaks of benthic invertebrates, more frequent in the western Mediterranean especially during the last two decades, have been often related to climate change and in particular to summer positive thermal anomalies (heat waves) (Garrabou *et al.*, 2009). Along the coast of Ischia (Tyrrhenian Sea), these events have been documented in 2002, 2003, 2005 and 2009, always concurrent with such thermal anomalies during summers (Gambi *et al.*, 2010). All the recorded mortality events affected the most common local Gorgonacea, *Paramuricea clavata* (Risso, 1826), *Eunicella singularis* (Esper, 1791) and *E. cavolini* (Koch, 1887), while the 2009 heat wave affected also for the first time the scleractinian *Astroides calycularis* (Pallas, 1766) (Gambi *et al.*, 2010). In this paper we report a further severe mortality episode of these key sessile organisms, which occurred in summer 2017 off the coast of Ischia.

**Materials and methods** - Mortality of benthic organisms were observed during several SCUBA and snorkeling surveys conducted from June to October 2017 in various sites off the coast of Ischia. Some of such events were signaled through a web site of Citizen Science activated by the MPA “Regno di Nettuno” (Ischia, Procida and Vivara) in collaboration with the Stazione Zoologica of Napoli ([www.citizensciencerdn.org](http://www.citizensciencerdn.org)). Quantitative estimates for the gorgonians were done between 15 and 22 m depth in 10 50×50 cm quadrats for each *Eunicella* species along the cliff off Sant’Angelo, and in the rocky bank “Formiche of Vivara” (both included in BI no-take zones of the MPA).

**Results and conclusions** - The species affected by different extent of necrosis or total mortality were the scleractinians *Astroides calycularis* and *Cladocora caespitosa* (Linnaeus, 1758), the gorgonians *Eunicella cavolini* and *E. singularis*, and the coralline algae *Lithophyllum* spp. (Fig. 1). Necrosis on the two species of scleractinians were observed from July to September, while necrosis of *Lithophyllum* spp., and *Eunicella* spp. were observed in September/middle October. Along the cliff of S. Angelo, both *E. singularis* and *E. cavolini* showed different degrees of necrosis between 15 and 22 m depth, while deeper than 24 m depth colonies were in healthy conditions. The 9.7% of *E. cavolini* were entirely alive, while 58.2% were totally dead or with 95% tissue

necrosis. *E. singularis* showed 10.2% of alive colonies and 63.2% dead or with more than 95% damaged tissues. In sub-horizontal surfaces of the cliff, large white/dead patches of *Lithophyllum* sp. were also observed at 18-20 m depth, likely due to the *CWPD* (*Coralline White Patch Disease*) (Caronni *et al.*, 2017). At the Formiche of Vivara, only *E. cavolini* was present at 15-20 m depth, showing 4.7% of the colonies still alive, while 60.6% were totally dead or over 95% damaged. Additional necrosis of both species of *Eunicella* were reported at the rocky bank “Bell’ommo ‘e terra”, testifying that mortality was widespread all around Ischia. At shallower depth (0-5 m) of S. Angelo, S. Pancrazio and Punta Vico, *C. caespitosa* and *A. calycularis* showed about 20% of the colonies completely or partially dead, with white corallites/colonies (Fig. 1A). At Punta Vico, *Lithophyllum* cf. *stictaeforme* (Areschoug) Hauck, 1877 showed important necrosis, similar to the effects of the *CWPD* (Fig. 1B), a disease reported only once along the Italian coast by Caronni *et al.* (2017).

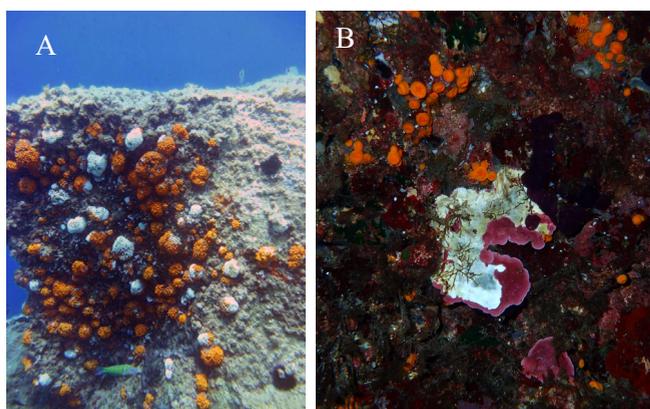


Fig. 1 - A) *Astroides calycularis*, live and dead colonies (S. Angelo - Ischia, -5 m, L. Tiberti); B) *Lithophyllum* cf. *stictaeforme* in necrosis (*CWPD*) (Punta Vico - Ischia, -4 m, N. Teixido).

A) Colonie vive e morte di *Astroides calycularis* (S. Angelo - Ischia, -5 m, L. Tiberti); B) *Lithophyllum* cf. *stictaeforme* in necrosi (*CWPD*) (Punta Vico - Ischia, -4 m, N. Teixido).

A time series of temperature sensors along a depth gradient at Ischia (5-30 m, San Pancrazio cliff) revealed a surface temperature up to 28 °C in August, and peak values of 23-24 °C at 25 m depth in September-October. A similar trend in deep waters was observed also in the previous summer 2016 but without apparent negative effects for benthic organisms. We hypothesize that repetitive thermal stress events (heat-waves) can be the causal explanation of the strong mortality effects observed in these key-sessile organisms, as already occurred at Ischia during the two consecutive heat-waves in 2002 and 2003 (Garrabou *et al.*, 2009).

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