

Parasites and Holocene sea-level rise: Recurrent upsurges in trematode infestation linked to repeated flooding events in the Adriatic Sea

Daniele Scarponi (1), Michele Azzarone (2), Michał Kowalewski (3), and John Warren Huntley (4)

(1) Bologna University, Dipartimento Scienze Biologiche, Geologiche e Ambientali, Bologna, Italy (daniele.scarponi@unibo.it), (2) Bologna University, Dipartimento Scienze Biologiche, Geologiche e Ambientali, Bologna, Italy, (3) Florida Museum of Natural History, University of Florida, 1659 Museum Rd., Gainesville, FL 32611, USA, (4) Department of Geological Sciences, University of Missouri, 101 Geology Building, Columbia

The accelerating increase in global temperature and concomitant sea level rise may result in an increased prevalence (i.e. infestation frequency) of many pathogens and parasites. Using the Holocene brackish deposits of the Po Plain, we evaluate this issue from a historical perspective by documenting temporal changes in trematode infestation of mollusk hosts during high-frequency (102-103 yrs) sea-level fluctuations that took place over the most recent millennia. During that time interval, the dominant bivalve species, *Abra segmentum*, was frequently infested by trematodes. Median body size was significantly larger in infested individuals ($p = 2.21 \times 10^{-34}$), likely reflecting accumulation of parasites with ontogenetic age. Prevalence estimates were significantly elevated ($p < 0.01$) in samples of *A. segmentum* associated with flooding surfaces and significantly depressed ($p < 0.01$) in intervening samples. In contrast, temporal trends in host body size, host availability, salinity, diversity, turnover, and community structure did not correlate significantly with parasite prevalence. The results reported here reinforce the recently proposed hypothesis that increasing trematode prevalence is linked to flooding events, a pattern now documented in shallow marine and estuarine settings on two continents, in both modern and fossil taxa. Consequently, the ongoing anthropogenic warming and sea-level rise is expected to trigger a significant upsurge in trematode prevalence, resulting in suppressed fecundity of common benthic organisms and negative impacts on marine ecosystems and ecosystem services.