Ancient Italian fossils reveal risk of parasitic infections due to climate change

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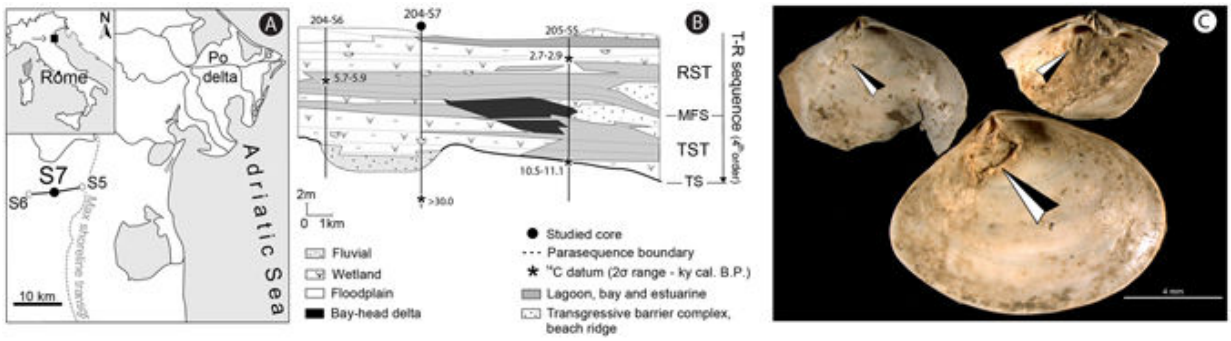

Location map, cross-section, and images of parasitized Abra segmentum valves. A-Location map of investigated Po coastal plain sector, Italy B-Cross section illustrating core samples. C-Photomicrographs of A. segmentum with trematode-induced pits. Credit: *Scientific Reports*

In 2014, a team of researchers led by a paleobiologist from the University of Missouri found that clams from the Holocene Epoch (that began 11,700 years ago) contained clues about how sea level rise due to climate change could foreshadow a rise in parasitic trematodes, or flatworms. The team cautioned that the rise could lead to outbreaks in human infections if left unchecked. Now, an international team from Mizzou and the Universities of Bologna and Florida has found that rising seas could be detrimental to human health on a much shorter time scale. Findings from their study in northern Italy suggest that parasitic infections could increase in the next century, if history repeats itself.

Trematodes are internal parasites that affect mollusks and other invertebrates inhabiting estuarine environments, which are the coastal bodies of brackish water connecting rivers to the open sea. John Huntley, assistant professor of geological sciences in the MU College of Arts and Science, studied the prehistoric clams as a senior visiting fellow for the Institute for Advanced Studies at the University of Bologna, Italy. With core samples taken from the Po River plain in Italy, the team found traces made by trematodes on the shells of the clams disclosing the connections between the ancient clams and climate change.

"The forecasts of increasing global temperatures and sea level rise have led to major concerns about the response of parasites to climate change," Huntley said. "Italy has a robust environmental monitoring program, so there was a wealth of information to examine."

Ancient trematodes had soft bodies; therefore, they didn't leave body fossils. However, infected clams developed oval-shaped pits around the parasite in the attempt to keep it out, and it's the prevalence of those pits and their makeup that provide clues as to what happened during different eras in time.

Using 61 samples collected from a drill core obtained by the Italian government for geological research, the scientists examined trematode traces and matched the information to existing records measuring sea level and salinity rises through the ages.

"We found that pulses in sea-level rise occurred on the scale of hundreds of years, and that correlated to rises in parasitic trematodes in the core samples," Huntley said. "What concerns me is that these rises are going to continue to happen and perhaps at accelerated rates. This poses grave concerns for public health and ecosystem services. These processes could increase parasitism in not only estuarine systems but also in freshwater settings. Such habitats are home to the snail hosts of blood

flukes, which infect and kill a million or more people globally each year. What's scary is it could potentially affect the generations of our kids or grandkids."

Huntley and his team think that the discoveries they continue to make about impending climate change could provide a good road map for conservationists and those making decisions about marine environments worldwide.

The study, "Surges in trematode prevalence liPnked to centennial-scale flooding events in the Adriatic," recently was published in *Scientific Reports*, a journal of *Nature*.

More information: Daniele Scarponi et al. Surges in trematode prevalence linked to centennial-scale flooding events in the Adriatic, *Scientific Reports* (2017). DOI: 10.1038/s41598-017-05979-6

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