Silica algae reveal how ecosystems react to climate changes

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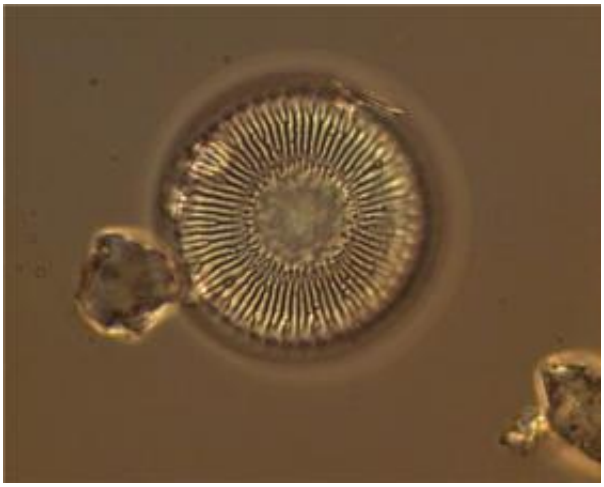

Cyclotella, a fossil silica algae.

A newly published dissertation by Linda Ampel from the Department of Physical Geography and Quaternary Geology at Stockholm University in Sweden examined how rapid climate changes during the most recent ice age affected ecosystems in an area in continental Europe.

Rapid and extensive climate changes have taken place on several occasions in the past. For example, the latest ice age (lasting from about 115,000 to 11,500 years ago) is characterized by several rapid and dramatic climate swings. These swings recurred in cycles of roughly 1,500 years and were originally discovered through studies of ice cores from Greenland in the early 1990s. These cycles started with an

extremely rapid rise in temperatures, over just a few years or decades, of as much as 8-16C over Greenland.

Linda Ampel studied how these rapid cycles in the climate affected ecosystems in an area in continental Europe. The study was based on analyses of sediment cores from an overgrown lake named Les Echets in eastern France and focuses on a time interval between 40,000 and 16,000 ago.

The findings are based on analyses of fossil silica algae, diatoms. Various species of diatoms prefer different water conditions relating to physical and chemical parameters such as temperature, salinity, access to nutrients, light, water depth, or available types of places to grow. These parameters, in turn, are affected by climate. Different species of diatoms can therefore indicate how the water environment changed as a consequence of the climate in the past.

Diatom analyses of the environmental archive from Les Echets, together with further analyses of chemical and biological parameters such as content of organic material and pollen grains from trees and other plants preserved in the lake, show that the ecosystems in the lake and its surroundings underwent marked changes during the latest ice age as a consequence of these 1,500-year cycles. The adaptation of the ecosystems prompted by the recurring warm periods took place as quickly as within 50 to 200 years.

“These findings show that ecosystems have changed rapidly in reaction to climate changes in the past, which indicates that quick adaptations could also take place in the future as a consequence of global warming, for instance,” says Linda Ampel.

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