Life in the snow: Algae and other microorganisms

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Abstract

Seasonal or persistent snow is a feature of polar and alpine areas of the Earth. In spring and summer, the snow can have coloured patches caused by concentrations of microorganisms, mostly algae-single celled plants. Snow algae have complex life cycles including motile and resistant resting stages and involving both sexual and asexual reproduction which are tied to the physical and chemical properties of the snow. In addition to the algae that inhabit the snow there are also bacteria, fungi, lichen fragments, protozoa-single celled animals and other small animals which interact as a food web. Organisms which live in snow must be tolerant of low temperature, desiccation, high solar irradiance, large fluctuations in nutrient concentrations and high acidity. Red pigmented snow algae are usually found in areas of high solar exposure. Their pigments have a photoprotective function, reducing the amount of light and UV-B radiation to which they are exposed. Snow algae act as dark bodies absorbing more heat than the surrounding snow leading to an acceleration in the melting of the snow and an increase in the availability of meltwater. Melting snow can cause depressions "sun-cups" in the surface of the snow which can act as traps for windblown debris including insects and other organic and inorganic matter. It is expected that a decrease in the extent and duration of our snow fields as a consequence of global warming will lead to a loss of biodiversity of microorganisms that depend on the snow for their existence or expression of some phase of their life cycle. Considering the relatively small part of the snowfields in which snow algae reach a high concentration, it is unlikely that the loss of snow algae and associated microorganisms as a result of the predicted loss of snow will have discernable ecological consequences. However, microorganisms, especially those from extreme environments, are coming under increased scrutiny as interest accelerates in tapping their biotechnological potential. These organisms, or genes from them, are presently being utilized as a source of antibiotics and other drugs, as additives for human and stock food, and a host of other applications. Organisms inhabiting snow are living in an extreme environment and it is quite probable that they will yield compounds or genes of commercial value. It would be a tragedy if this was recognized in Australia after the snow had vanished.

Notes to readers

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To read all abstracts presented at the Global Threats to the Australian Snow Country Conference, go to:
http://www.aias.org.au/newsletters/newslet1.html#snow

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