

EFFECTS OF TEMPERATURE ON THE PHOTOSYNTHESIS OF
ANTARCTIC FRESHWATER GREEN ALGAE
(ABSTRACT)

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Unicellular green algae *Chlorella* sp. 82A and *Stichococcus bacillaris* 8212 were isolated from wet soil taken from the shore of Lake Miers, and *C. vulgaris* KG-5 was isolated from King George Island, Antarctica. These algae were cultured axenically in our laboratory at 18–20°C under fluorescent light at about 22 $\mu\text{mol m}^{-2} \text{s}^{-1}$. *Chlorella* sp. 82A can photosynthesize between 0–40°C, with an optimum between 30–35°C. *S. bacillaris* 8212 can photosynthesize between 0–40°C, with an optimum at 30°C. *C. vulgaris* KG-5 can photosynthesize between 0–37.5°C, with an optimum between 25–30°C. On the other hand, *C. pyrenoidosa* IAM C-28 isolated from a temperate zone can photosynthesize between 0–45°C, with an optimum at 35°C. The photosynthetic activity of *C. pyrenoidosa* C-28 at lower than 10°C was less than that of Antarctic algae. When the strains 82A and 8212 were heated to 42.5°C and 45°C respectively for 90 min, they lost their photosynthetic activity at 20°C, while strain C-28 retained its photosynthetic activity after the same treatment. After freezing at –20°C for 90 min, these three Antarctic algae retained their photosynthetic activity, while C-28 strain lost its photosynthetic activity. These results show that these Antarctic algae have psychro- and freeze-tolerant properties in addition to their thermolabile property in their photosynthetic activity. They also suggest that the Antarctic algae are well adaptable to Antarctic environments where the temperature ranges from about –40°C in winter to 20°C in summer.

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