Fatty Acid Oxidizing Activity in a Red Marine Alga, *Porphyra* sp.

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A crude enzyme solution prepared from fronds of *Porphyra* sp. showed remarkable oxygen uptake activity when linoleic acid was added as a substrate. Fatty acid oxidizing activity was mainly present in the soluble fraction of the crude homogenate. The activity was purified 769-fold from mature fronds by ammonium sulfate fractionation, ion-exchange and hydrophobic chromatography. SDS-PAGE analysis of the purified proteins indicated that its subunit size was about 13 kDa. Gel filtration chromatography equipped with a photodiode array detector revealed that the activity was associated with a protein having a molecular weight of 12,500–13,000. It eluted with a chromophore having the maximum absorbance at 417 nm, thus, the protein was suggested to be a heme protein. The spectrophotometric property of the protein was highly similar to that of cytochrome *c* suggesting that it has heme *c* as a prosthetic group. The protein showed highest oxygenation activity against linoleic acid, and α-linolenic acid and arachidonic acid followed, but oleic acid could not be oxidized. From linoleic acid the protein formed 9- and 13-hydroperoxides to the same extent, and both were shown to be racemic. These results showed that the oxidizing activity is accountable to a cytochrome, but not to a typical lipoxygenase.