

# Deep-sea algae may be 'living fossils'

November 19 2010, by Lin Edwards

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(PhysOrg.com) -- Researchers in the US and Belgium say two types of deep-sea seaweed may be representatives of ancient forms of algae previously unrecognized.

The two seaweed species grow at depths of around 210 meters below the surface, which is extremely deep for photosynthetic organisms and may mean they could be "living fossils" of the earliest known green plants.

The seaweeds, from the genera *Verdigellas* and *Palmophyllum*, are also found in shallower water but generally under overhanging ledges where there is less light. Samples of *Verdigellas umbricola* were taken from the western Atlantic Ocean, while the *Palmophyllum* samples were taken from waters around New Zealand.

Leader of the research team, Professor Frederick Zechman of California State University, said the seaweeds, which had already been identified, seem to have special chlorophyll pigments that enable them to use low intensity blue light and live in deeper waters than most [photosynthetic algae](#). Zechman said the algae were also unusual in that they are multicellular but there appears to be no meaningful interaction between individual cells, which form part of a gelatinous matrix that takes on shapes such as stalks.

In the paper, published in the *Journal of Phycology*, Zechman and the team from across the US and Belgium described their [genetic analyses](#) of the DNA in the nuclei and chloroplasts within the algae cells. The genetics revealed the species have much older origins than previously

suspected.

The scientists expected the algae to be members of the Chlorophyta, the group (known scientifically as a *clade*) to which all other [green algae](#) except those with the most complex structures belong. The other clade includes the [land plants](#) and the most complex green algae (charophytes or stoneworts). The *Verdigellas* and *Palmophyllum* algae belonged to neither clade, but instead appeared to be members of an extremely ancient group of green plants.

Zechman said the algae should be assigned to their own Order, the Palmophyllales, because they are so different from other algae. He added that a comparison of the gene sequences of the algae to the same genes in other plants revealed that the [algae](#) are among the earliest, if not the earliest, diverging green plants, originating before about a billion years ago when the two groups of plants diverged.

Zechman said the findings could change “vastly” the scientific view of the ancestor to all the green plants in the world today, which is at present assumed to be a single-celled aquatic plant able to move around with the help of a flagellum (tail). The key to the amazing longevity of the *Verdigellas* and *Palmophyllum* may be the depth at which they live, since in deep water there is less variation in temperature, less stress from wave action, and fewer grazing herbivores.

**More information:** An Unrecognized Ancient Lineage of Green Plants Persists in Deep Marine Waters, *Journal of Phycology*, [DOI:10.1111/j.1529-8817.2010.00900.x](https://doi.org/10.1111/j.1529-8817.2010.00900.x)

Frederick W Zechman: [fresca.calstate.edu/faculty/2038](http://fresca.calstate.edu/faculty/2038)

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