Ancestors of land plants revealed

April 18 2011

It was previously thought that land plants evolved from stonewort-like algae. However, new research published in BioMed Central's open access journal *BMC Evolutionary Biology* shows that the closest relatives to land plants are actually conjugating green algae such as Spirogyra.

Ancestors of green plants began to colonise the land about 500 million years ago and it is generally accepted that they evolved from streptophyte algae (a group of green, fresh water algae). But this group of algae is very diverse and currently ranges from simple, one cell, flagellates to more complex, branching, algae such as stoneworts (Chara).

It was thought that Charales were the closest relatives to land plants because they share (amongst other characteristics) a similar method of fertilisation, oogamy, with a large egg and small swimming sperm. For flowering plants this sperm is contained within pollen grains. In contrast, another type of streptophytes, the Zygnematales, use conjugation, a method of reproduction where the gametes are of equal size, isogamy, and one or both crawl, amoeba-like, into a fertilization tube where they meet and fuse.

Some phylogenetic analysis had been done previously, on a smaller number of genes, which seemed to support the Charales theory. However, a multinational team, involving researchers in Germany and Canada, analysed genetic divergence in 129 genes from 40 different green plant taxa. This data showed that, despite the differences in reproductive strategy, the closest living relatives to land plants are in fact

the Zygnematales.

Dr Becker explained, "It seems that Zygnematales have lost oogamy and their ability to produce sperm and egg cells, and instead, possibly due to selection pressure in the absence of free water, use conjugation for reproduction. Investigation of such a large number of genes has shown that, despite their apparent simplicity, Zygnematales have genetic traces of other complex traits also associated with green land plants. Consequently Zygnematales true place as the closest living relative to land plants has been revealed."

More information: Origin of land plants: Do conjugating green algae hold the key? Sabina Wodniok, Henner Brinkmann, Gernot Glöckner, Andrew J Heidel, Hervé Philippe, Michael Melkonian and Burkhard Becker, *BMC Evolutionary Biology* (in press)

Provided by BioMed Central

Citation: Ancestors of land plants revealed (2011, April 18) retrieved 20 April 2024 from https://phys.org/news/2011-04-ancestors-revealed.html

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