

# ANNOTATION OF THE GREEN ALGA *OSTREOCOCCUS TAURI*

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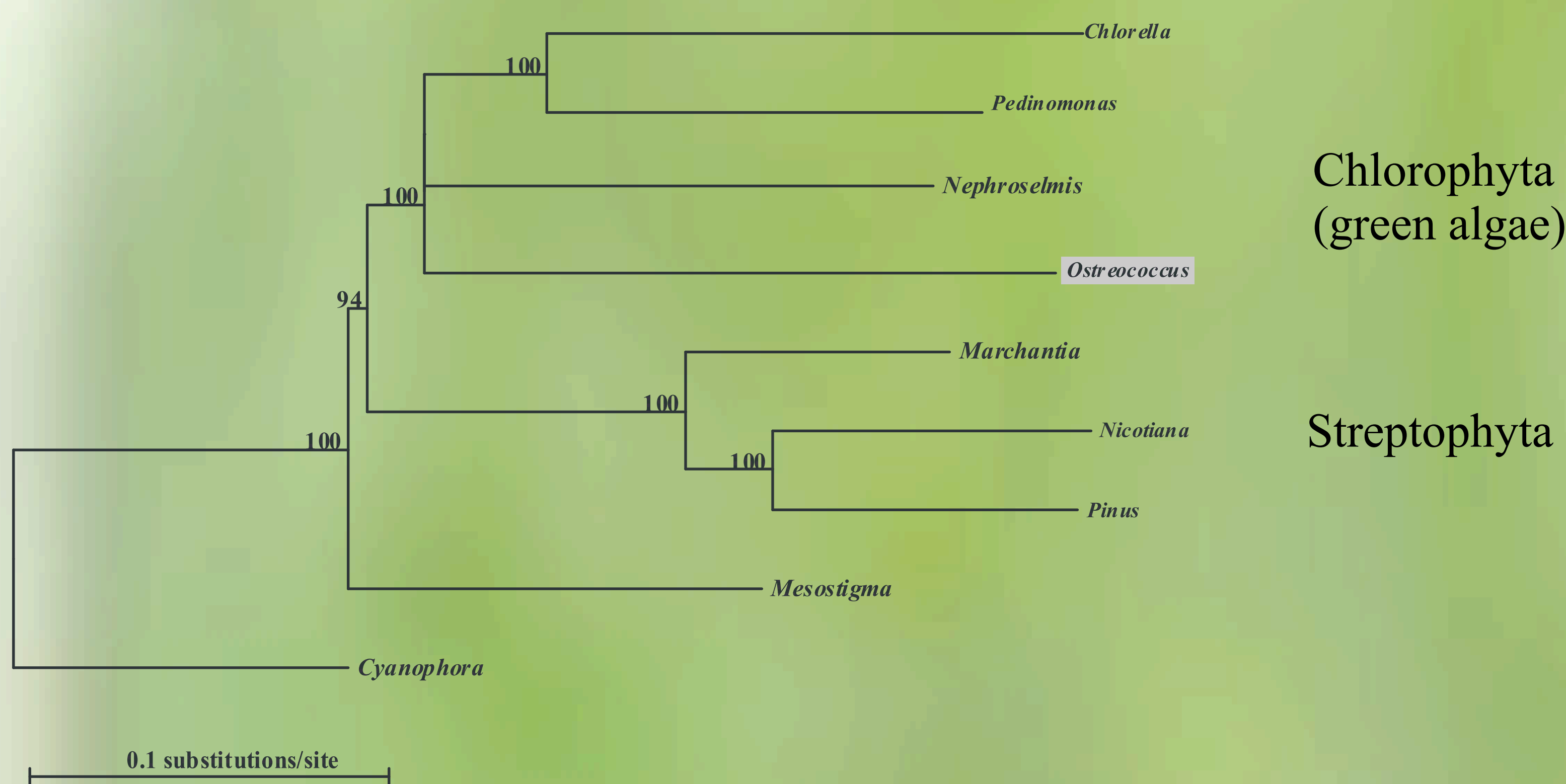
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## What is *Ostreococcus tauri*?

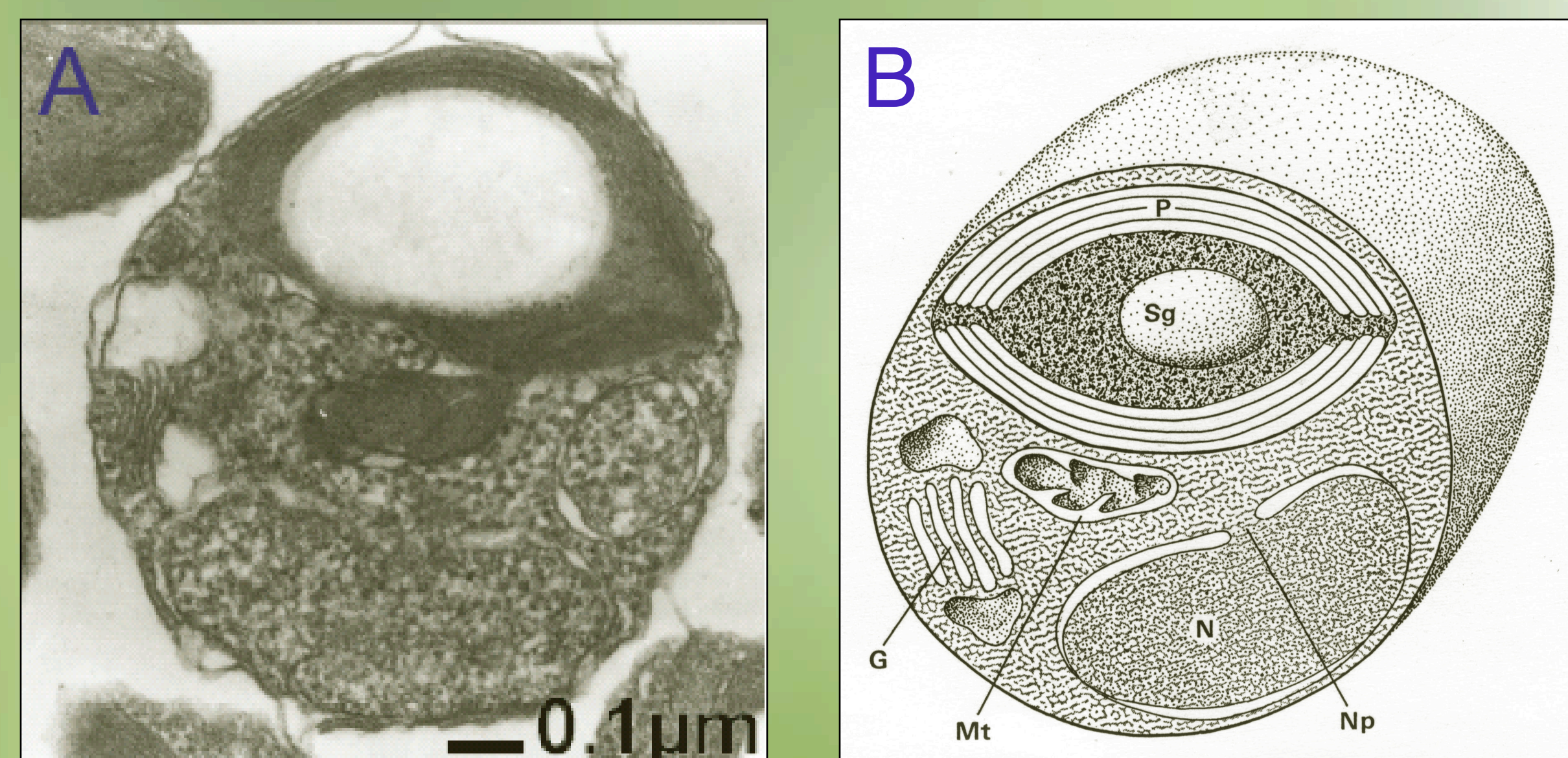
*Ostreococcus tauri* is a unicellular green algae that was discovered in the Mediterranean Thau lagoon (France) in 1994. With a size less than 1µm, comparable with the size of a bacterium, it is the smallest eukaryotic organism described until now (Courties et al., 1994)<sup>\*\*\*</sup>. Its cellular organisation is simple with a relatively large nucleus, a single chloroplast, one mitochondrion, one Golgi body and a very reduced cytoplasmic compartment. A membrane surrounds the cells, but no cell wall can be observed. Morphologically, the absence of flagella is the most typical characteristic of *Ostreococcus tauri*, compared to other green algae. Apart from this simple cellular structure, the genome size of *Ostreococcus tauri* is the smallest of all known eukaryotes. The nuclear genome is about 12.62 Mb, fragmented into 19 chromosomes, ranging in size from 120 to 1500 Kb (Derelle et al., submitted).



### Ultrastructure of *Ostreococcus tauri*

A: TEM section of *Ostreococcus tauri*

B: Diagram illustrating the main features of the TEM section of the cell (G, Golgi body; Mt, Mitochondrion; N, nucleus; Np, nuclear pore; P, chloroplast; Sg, starch grain)



### Sequencing status:

- whole genome shotgun sequencing
- 6x coverage
- also chloroplast and mitochondrion

### Annotation:

- manual building of training set
- tailor made EuGene
- 6800 genes

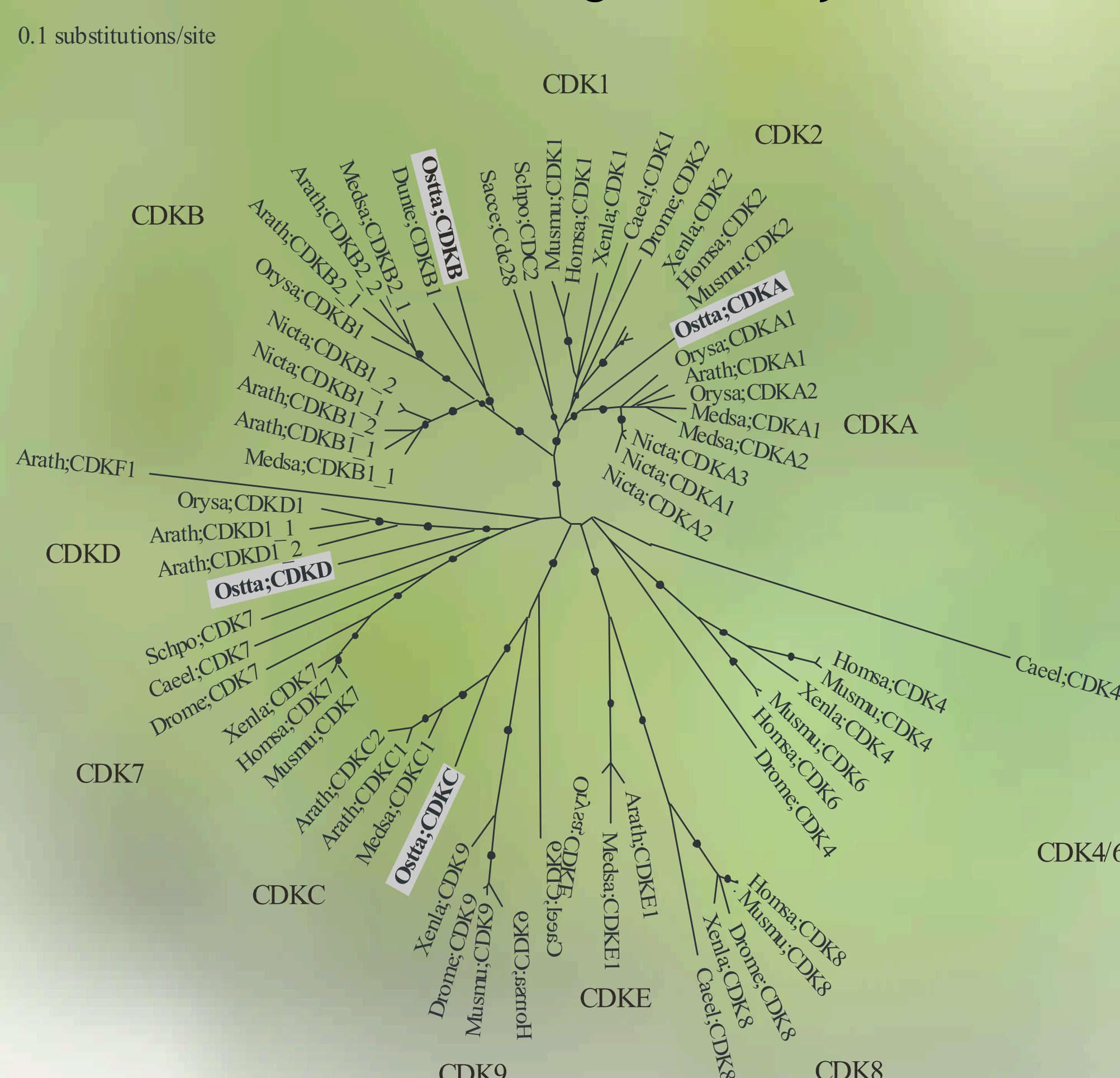
## Genome annotation leading to discoveries:

Every new genome comes with a load of new genes and features. The genome of *Ostreococcus tauri* is no different in that respect, showing a very dense genome, with extremely short intergenic sequences and even overlapping protein encoding genes. Surprisingly this genome has two different types of genes, regarding its splicing signals, exon and intron sizes; while one type of gene has very conserved canonical splicing signals, the other type of genes show no conserved signal further than the minimal GT-AC consensus. The latter type of genes is also restricted to one scaffold and might hypothetically be a remnant chromosome from a symbiont (but this remains to be verified). Although this genome is extremely compact, the presence of a diversity of transposons could be detected.

## Cell Cycle

The cell cycle is a sequential process that is fundamental to the growth and development of all organisms and comparing the cell cycle across species shows that its regulation is evolutionary conserved. *In silico* analyses of the core cell cycle genes in *Ostreococcus tauri* shows the minimal yet complete set of genes described to date (Robbens et al., 2005)\*.

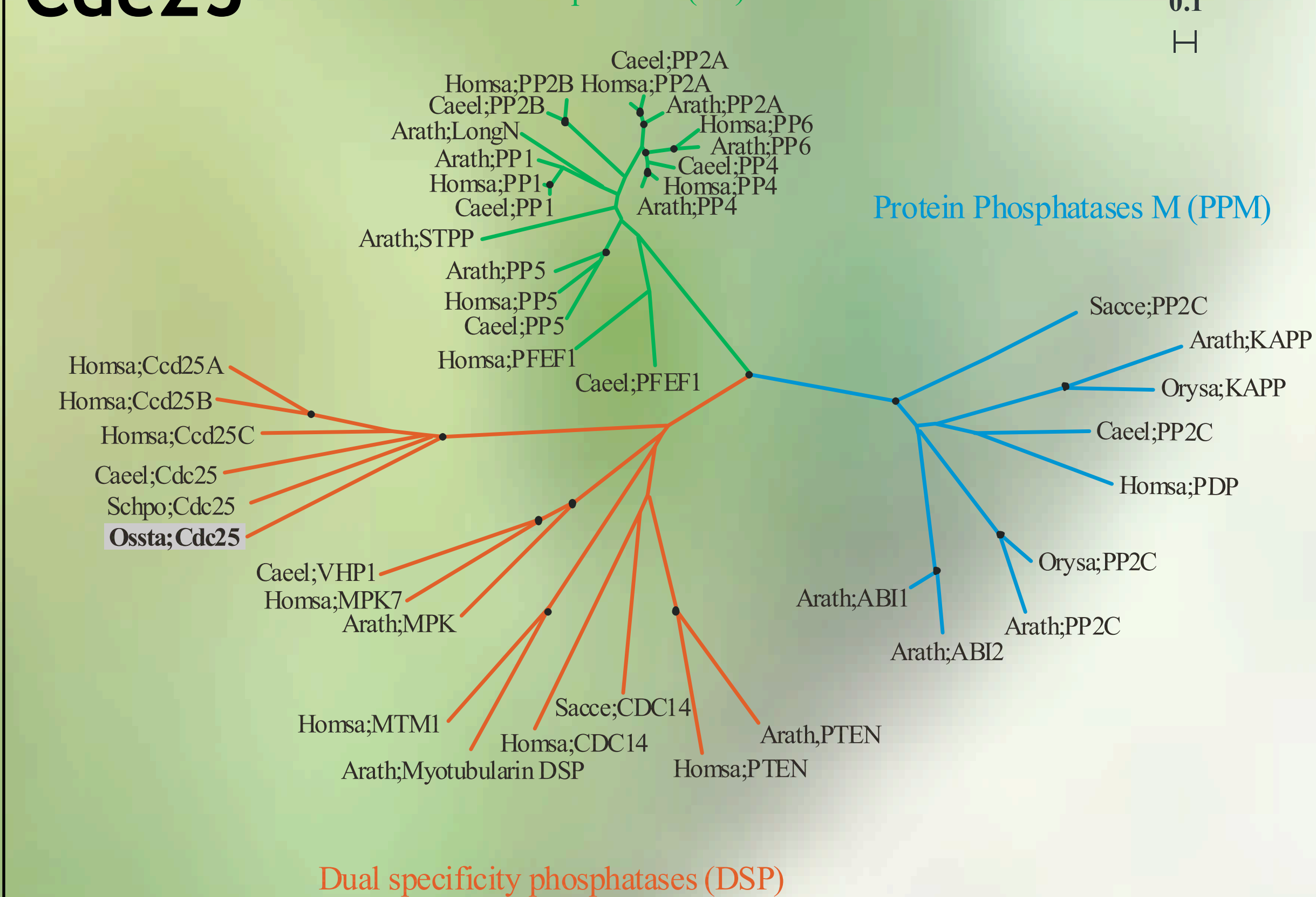
### The CDK gene family



### Minimal set of core cell cycle genes

Cell Cycle genes	<i>Arabidopsis thaliana</i>	<i>Ostreococcus tauri</i>
CDK A	1	1
CDK B	4	1
CDK C	2	1
CDK D	3	1
CDK E	1	0
CDK F	1	0
Cyclin A	10	1
Cyclin B	9	1
Cyclin D	10	1
Cyclin H	1	1
Wee1	1	1
Cdc25	0	1
Rb	1	1
Dp	2	1
E2F	3	1
DEL	3	1
Cks	2	1

## Cdc25



The Cdc25 protein phosphatase is a key enzyme involved in the regulation of the G2/M transition in metazoa and yeast. However, no Cdc25 ortholog has so far been identified in plants, although functional studies have shown that an activating dephosphorylation of the CDK/cyclin complex regulates the G2/M transition. Here, the first green lineage Cdc25 ortholog is described in the unicellular alga *Ostreococcus tauri*. (Khadaroo et al, 2004)\*\*.

\* Robbens S., Khadaroo B., Camasses A., Derelle E., Ferraz C., Inzé D., Van de Peer Y. and Moreau H.; Mol. Biol. Evol. Mol. Biol. Evol., Advance Access published on November 10, 2004 ; doi: 10.1093/molbev/msi044

\*\* Khadaroo B., Robbens S., Ferraz C., Derelle E., Eychenié S., Cooke R., Peaucellier G., Delseny M., Demaille J., Van de Peer Y., Picard A. and Moreau H.; Cell Cycle. 2004 Apr;3(4):513-518

\*\*\* Courties, C., Perasso, R., Chrétiennot-Dinet, M.J., Gouy, M., Guillou, L. and Troussellier, M. (1998) Phylogenetic analysis and genome size of *Ostreococcus tauri* (Chlorophyta, Prasinophyceae). Journal of phycology, 34, 844-849.