



**Figure S4:** analysis of number and direction of character changes

(A) Character 36 “spindle rotation in AB” changes only once in our dataset. Moreover, we can deduce from the phylogenetic reconstruction that it was a change from “absence of rotation in AB” (blue) to “presence of rotation in AB” (yellow).

(B) Character 29 “presence of nucleoli” changes 8 times in our dataset. The evolution of this character is more difficult to reconstruct, indeed we cannot determine how many gains or losses of “presence of nucleoli” have occurred as there are several equally parsimonious possibilities.