

Introduction

Excavates are a major lineage of eukaryotic life; however, their placement within the Tree of Life remains uncertain¹. They are united by a shared ‘typical excavate’ morphology of a ventral groove with two associate flagella^{1,2}.

Within Excavata, Jakobida is a deep clade with remarkably poor species diversity³. They are thought to be evolutionarily-important due to their bacteria-like mitochondrion^{3,4}.

A new isolate, SSEX, unexpectedly placed within Jakobida, despite behavioural and morphological differences compared to the other cultured jakobids.

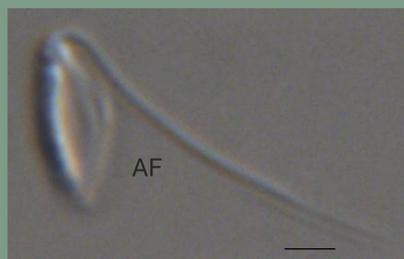


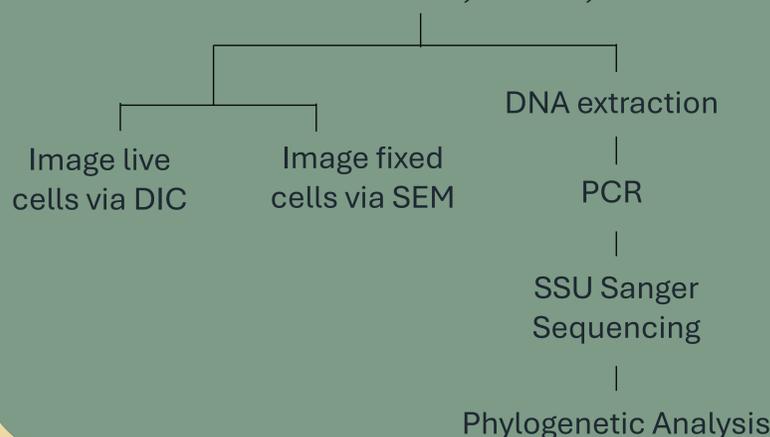
Figure 1 Differential Interference Contrast (DIC) image of a live SSEX cell under 160x magnification. SSEX displays unusual motility by gliding on its anterior flagellum (AF), as well as using it to swim. Scale bar represents 2 µm

AIMS

- I. Determine whether the three cultured isolates are within the *Jakoba libera* morphospecies
- II. Determine how the isolates differ morphologically

Methods

Procure cultures of SSEX, *J. libera*, and Jak2



Results

The three isolates all have 2 flagella, a longer anterior flagellum and a shorter, vaned posterior flagellum. The posterior flagellum generates a current in the ventral feeding groove.

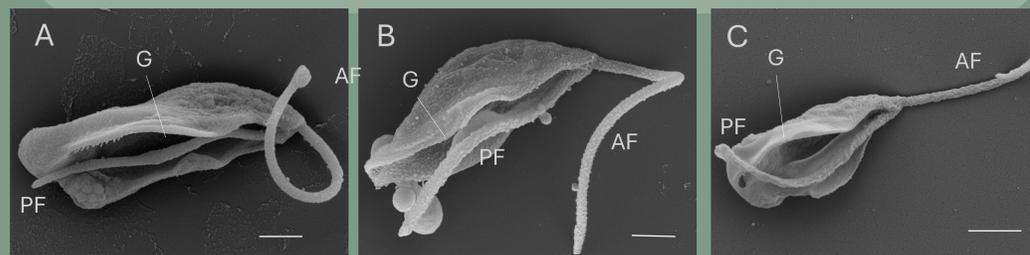


Figure 2 Scanning electron microscopy (SEM) images of A) *J. libera*, B) SSEX, and C) Jak2. Images show ventral feeding groove (G), anterior flagellum (AF), and posterior flagellum (PF). Scale bars represent 1 µm for all images.

The isolates were also found to possess a previously undescribed structure. Cytoplasmic threads found at the posterior end of the cell are believed to be associated with filtering prey for phagocytosis.

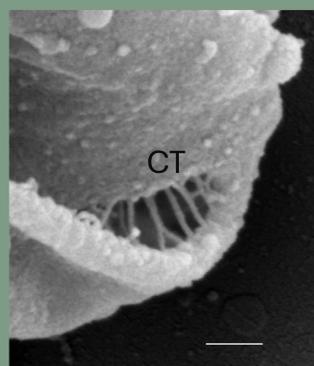


Figure 3 Scanning electron microscopy (SEM) images of the posterior end of an SSEX cell showing cytoplasmic threads (CT). Scale bar represents 200 nm.

Despite sharing the same base morphology, the isolates have significantly different proportions.

	Body length (µm)	Ant. flag. length (µm)	Post. flag. length (µm)
<i>J. Libera</i>	6.91 ± 0.98	15.82 ± 2.58	7.02 ± 1.00
SSEX	6.69 ± 0.65	12.32 ± 1.99	7.07 ± 0.92
<i>Jak2</i>	7.75 ± 0.92	9.68 ± 1.55	6.97 ± 1.50

Table 1: Morphological comparison of isolates' body and flagellar lengths. Bolded values are significant (p-value < 0.05).

The three isolates group phylogenetically as one clade, sister to the only previously published *Jakoba libera* isolate.

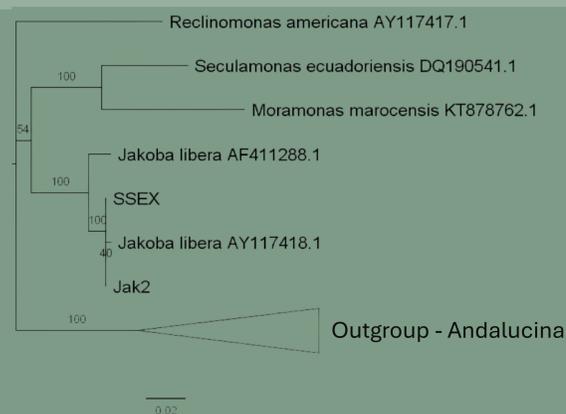


Figure 4 SSU rDNA phylogenetic tree constructed using a maximum likelihood method with 200 bootstrap replicates. 1198 nucleotide sites were chosen via Gblocks and ran using a GTR model in PhyML. Phylogenetic tree shows only Histonina clade, though 16 total Jakobid sequences were included in the analysis

Discussion

The three isolates differ significantly in their flagellar and body proportions. All three isolates branch as closely related, in a clade with the only other described *Jakoba libera* isolate.

This suggests that there is more diversity within the *Jakoba* genus than previously thought.

This morphological and phylogenetic work may contribute to a future formal description of SSEX as a new species within *Jakoba*.

Understanding diversity within this clade may be useful to resolve phylogenetic relationships within Jakobida, as well as allowing for more comparative examinations of typical excavate ecology.

CONCLUSIONS

- I. The isolates appear to be sub-species within the *Jakoba libera* morphospecies
- II. The isolates differ in cell body size, as well as relative flagellar lengths

References

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