

***Ophirina amphinema* n. gen., n. sp., a New Deeply Branching Discobid with Phylogenetic Affinity to Jakobids**

Akinori Yabuki<sup>1†</sup>, Yangtsho Gyaltsen<sup>2</sup>, Aaron A. Heiss<sup>2</sup>, Katsunori Fujikura<sup>1</sup>, Eunsoo Kim<sup>2†</sup>

<sup>1</sup> Department of Marine Biodiversity Research, Japan Agency for Marine-Earth Science and Technology (JAMSTEC)

<sup>2</sup> Division of Invertebrate Zoology and Sackler Institute for Comparative Genomics, American Museum of Natural History

<sup>†</sup>Corresponding authors:

Akinori Yabuki, Department of Marine Biodiversity Research, Japan Agency for Marine-Earth Science and Technology (JAMSTEC)---Telephone number: +81 46867 9498; FAX number: +81 46867-9525; e-mail: [yabukia@jamstec.go.jp](mailto:yabukia@jamstec.go.jp)

Eunsoo Kim, Division of Invertebrate Zoology and Sackler Institute for Comparative Genomics, American Museum of Natural History ---Telephone number: +1 212 769 5510; FAX number: +1 212 769 5277; e-mail: [ekim1@amnh.org](mailto:ekim1@amnh.org)

Running title: ***Ophirina*, the sister taxon to jakobids**

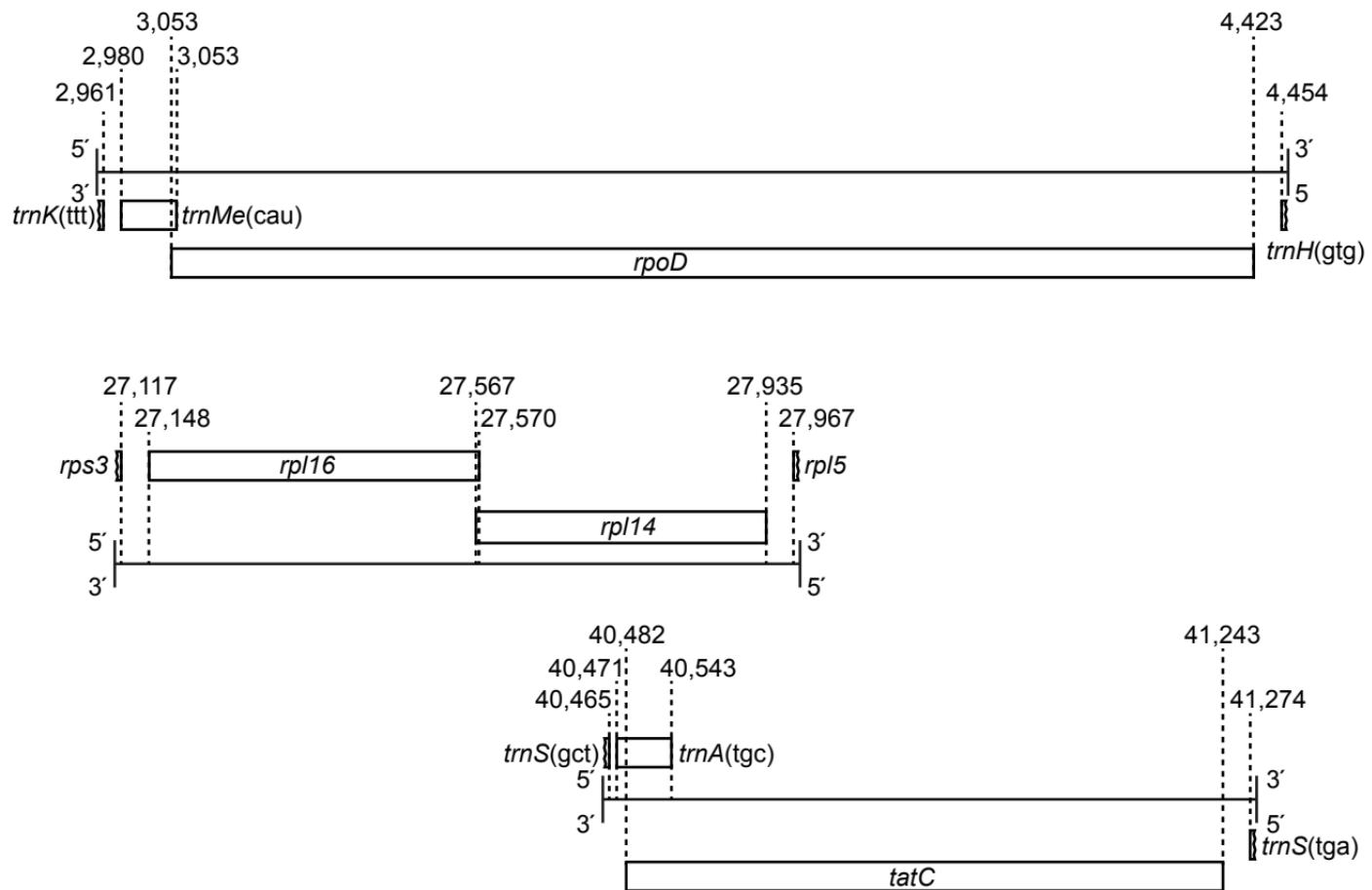


Fig. S1

## Possible Shine-Dalgarno Sequence

**Start Codon**

The figure displays a phylogenetic tree based on sequence data from 26 different genes. The genes are listed along the left y-axis, and sequence positions are indicated by horizontal bars at the top. The tree is rooted at the top center and branches downwards. Colored boxes highlight specific mutations or conserved regions across the genes.

Gene	Sequence Position	Sequence Content
atp8	1-10	atataattttt
nad1	1-10	gttgttttttt
rpl10	1-10	ttaagaaggaa
nad7	1-10	aaatatttttt
cox2	1-10	tgtcatcattt
rpl27	1-10	aagaaatccat
atp9	1-10	tatattttttt
rpoD	1-10	acacacgtttt
nad3	1-10	tagaaatgggg
nad5	1-10	ttaatgtttttt
sdh3	1-10	ariaatttgat
tufA	1-10	taatttatattt
ccmC	1-10	tgaaagttttt
rpl1	1-10	taaaaattttt
rps19	1-10	tagtagttttt
atp4	1-10	aagattttttt
atp1	1-10	gtgagagaccc
nad9	1-10	agtaatttttt
nad10	1-10	acgggagtttt
nad6	1-10	tattttagttt
tatC	1-10	gatgaattttt
rpoA	1-10	cactagttttt
cob	1-10	ttaaaggtttt
cox1	1-10	tttataatttt
rpl31	1-10	taacatttttt
sdh4	1-10	tagagggtttt
cox3	1-10	tatattttttt
nad11	1-10	tatagtttttt
rpl11	1-10	tgttaattttt
rps8	1-10	atiaagttttt
rpoB	1-10	cagtttgggttt
rps1	1-10	acatttttttt
rpl5	1-10	tttttttttttt
ccmA	1-10	tttgttatttt
rps7	1-10	tagaacttttt
atp6	1-10	atttttttttt
atp3	1-10	tgttaattttt
sdh2	1-10	agtttaattttt
rps10	1-10	ataaaattttt
	11-20	aaaaaagtttttt
	21-30	aaaaagttttttt
	31-40	aaaaagttttttt
	41-50	aaaaagttttttt
	51-60	aaaaagttttttt
	61-70	aaaaagttttttt
	71-80	aaaaagttttttt
	81-90	aaaaagttttttt
	91-100	aaaaagttttttt
	101-110	atgttttttttt
	111-120	atggattttttt
	121-130	gtgggttttttt
	131-140	gtgggttttttt
	141-150	gtgggttttttt
	151-160	atggattttttt
	161-170	atggattttttt
	171-180	atggattttttt
	181-190	atggattttttt
	191-200	atggattttttt
	201-210	atggattttttt
	211-220	atggattttttt
	221-230	atggattttttt
	231-240	atggattttttt
	241-250	atggattttttt
	251-260	atggattttttt
	261-270	atggattttttt
	271-280	atggattttttt
	281-290	atggattttttt
	291-300	atggattttttt
	301-310	atggattttttt
	311-320	atggattttttt
	321-330	atggattttttt
	331-340	atggattttttt
	341-350	atggattttttt
	351-360	atggattttttt
	361-370	atggattttttt
	371-380	atggattttttt
	381-390	atggattttttt
	391-400	atggattttttt
	401-410	atggattttttt
	411-420	atggattttttt
	421-430	atggattttttt
	431-440	atggattttttt
	441-450	atggattttttt
	451-460	atggattttttt
	461-470	atggattttttt
	471-480	atggattttttt
	481-490	atggattttttt
	491-500	atggattttttt
	501-510	atggattttttt
	511-520	atggattttttt
	521-530	atggattttttt
	531-540	atggattttttt
	541-550	atggattttttt
	551-560	atggattttttt
	561-570	atggattttttt
	571-580	atggattttttt
	581-590	atggattttttt
	591-600	atggattttttt
	601-610	atggattttttt
	611-620	atggattttttt
	621-630	atggattttttt
	631-640	atggattttttt
	641-650	atggattttttt
	651-660	atggattttttt
	661-670	atggattttttt
	671-680	atggattttttt
	681-690	atggattttttt
	691-700	atggattttttt
	701-710	atggattttttt
	711-720	atggattttttt
	721-730	atggattttttt
	731-740	atggattttttt
	741-750	atggattttttt
	751-760	atggattttttt
	761-770	atggattttttt
	771-780	atggattttttt
	781-790	atggattttttt
	791-800	atggattttttt
	801-810	atggattttttt
	811-820	atggattttttt
	821-830	atggattttttt
	831-840	atggattttttt
	841-850	atggattttttt
	851-860	atggattttttt
	861-870	atggattttttt
	871-880	atggattttttt
	881-890	atggattttttt
	891-900	atggattttttt
	901-910	atggattttttt
	911-920	atggattttttt
	921-930	atggattttttt
	931-940	atggattttttt
	941-950	atggattttttt
	951-960	atggattttttt
	961-970	atggattttttt
	971-980	atggattttttt
	981-990	atggattttttt
	991-1000	atggattttttt

Fig. S2

**Figure S1.** Partial map of the mitochondrial genome in which two genes overlapped.

**Figure S2.** Possible Shine–Dalgarno translation initiation motifs (5'-AAG-3').

**Supplementary video 1.** Two *Ophirina amphinema* cells of suspension type. Note characteristic beating motion of posterior flagellum along feeding groove.

**Supplementary video 2.** Swimming type cell of *Ophirina amphinema*, showing jittery movement.