

## Supplementary Material

### **Reappraising the species validity of *Cuneopsis szechenyi* comb. nov. (Neumayr, 1899) and revising the taxonomy of *Middendorffinaia mongolica* (Middendorff, 1851)**

*Kaiyu Hou*<sup>A</sup>, *Liping Zhang*<sup>A</sup>, *Lili Liu*<sup>A</sup>, *Xiongjun Liu*<sup>B</sup>, *Junli Jia*<sup>A</sup> and *Ruiwen Wu*<sup>A,\*</sup>

<sup>A</sup>School of Life Science, Shanxi Normal University, Taiyuan, 030031, PR China

<sup>B</sup>Guangdong Provincial Key Laboratory of Conservation and Precision Utilization of Characteristic Agricultural Resources in Mountainous Areas, School of Life Sciences, Jiaying University, Meizhou, 514015, China

\*Correspondence to: Email: [wurw@sxnu.edu.cn](mailto:wurw@sxnu.edu.cn)

**Table S1. Morphological dataset for principal coordinates analysis.**

Species	Species codes	L (mm)	W (mm)	H (mm)	W/H	L/H
<i>Cuneopsis heudei</i>	NW03	109.33	40.19	57.76	0.70	1.89
<i>Cuneopsis heudei</i>	NW04	102.41	36.48	48.01	0.76	2.13
<i>Cuneopsis heudei</i>	NW05	72.14	23.78	37.38	0.64	1.93
<i>Cuneopsis heudei</i>	NW06	100.82	29.25	46.25	0.63	2.18
<i>Cuneopsis heudei</i>	NW07	95.57	29.87	45.46	0.66	2.10
<i>Cuneopsis heudei</i>	NW08	92.07	34.47	48.86	0.71	1.88
<i>Cuneopsis heudei</i>	NW09	94.58	29.72	45.92	0.65	2.06
<i>Cuneopsis szechenyii</i> <b>comb. nov.</b>	DTH01	54.84	18.23	24.18	0.75	2.27
<i>Cuneopsis szechenyii</i> <b>comb. nov.</b>	XH01	84.9	25.93	35.27	0.74	2.41
<i>Cuneopsis szechenyii</i> <b>comb. nov.</b>	XH02	72.83	20.79	31.64	0.66	2.30
<i>Cuneopsis szechenyii</i> <b>comb. nov.</b>	XH03	79.97	23.35	34.25	0.68	2.33

Variables used for morphological analysis are two quantitative characters: W/H and L/H.

**Table S2. Partitioning strategies from *ModelFinder* and *PartitionFinder* for mitogenome dataset**

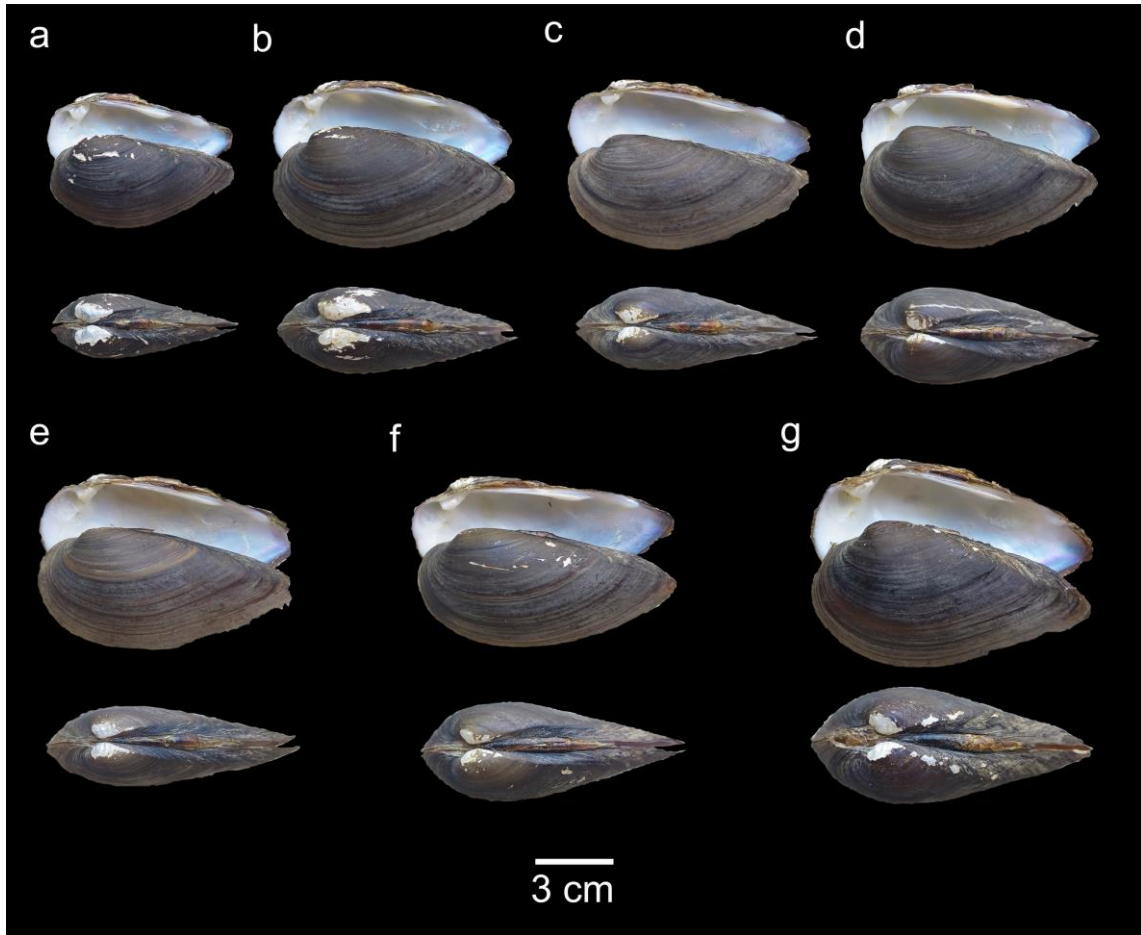
<i>PartitionFinder</i> for mitogenome dataset		
Subset	Best Model	Partition names
1	GTR+I+G	rrnL_mafft_gb
2	GTR+I+G	rrnS_mafft_gb
3	GTR+I+G	nad5_NT_removed_chars_gb_codon1, nad4_NT_removed_chars_gb_codon1, atp6_NT_removed_chars_gb_codon1
4	GTR+I+G	nad4_NT_removed_chars_gb_codon2, nad3_NT_removed_chars_gb_codon2, atp6_NT_removed_chars_gb_codon2
5	GTR+G	atp6_NT_removed_chars_gb_codon3
6	GTR+I+G	cox1_NT_removed_chars_gb_codon1
7	GTR+I+G	cox1_NT_removed_chars_gb_codon2
8	GTR+I+G	cox1_NT_removed_chars_gb_codon3
9	HKY+I+G	cox2_NT_removed_chars_gb_codon1
10	GTR+I+G	cox3_NT_removed_chars_gb_codon2, cox2_NT_removed_chars_gb_codon2
11	GTR+I+G	cox2_NT_removed_chars_gb_codon3
12	GTR+I+G	nad4L_NT_removed_chars_gb_codon2, cox3_NT_removed_chars_gb_codon1
13	GTR+I+G	cox3_NT_removed_chars_gb_codon3
14	SYM+I+G	cytb_NT_removed_chars_gb_codon1
15	GTR+I+G	cytb_NT_removed_chars_gb_codon2
16	GTR+I+G	nad6_NT_removed_chars_gb_codon3, cytb_NT_removed_chars_gb_codon3
17	SYM+I+G	nad1_NT_removed_chars_gb_codon1
18	GTR+I+G	nad1_NT_removed_chars_gb_codon2
19	GTR+G	nad1_NT_removed_chars_gb_codon3
20	GTR+I+G	nad2_NT_removed_chars_gb_codon1
21	GTR+I+G	nad2_NT_removed_chars_gb_codon2, nad6_NT_removed_chars_gb_codon2
22	GTR+I+G	nad2_NT_removed_chars_gb_codon3
23	GTR+I+G	nad4L_NT_removed_chars_gb_codon1, nad3_NT_removed_chars_gb_codon1
24	GTR+I+G	nad4L_NT_removed_chars_gb_codon3, nad3_NT_removed_chars_gb_codon3
25	GTR+G	nad4_NT_removed_chars_gb_codon3
26	GTR+I+G	nad5_NT_removed_chars_gb_codon2
27	GTR+G	nad5_NT_removed_chars_gb_codon3
28	HKY+I+G	nad6_NT_removed_chars_gb_codon1

---

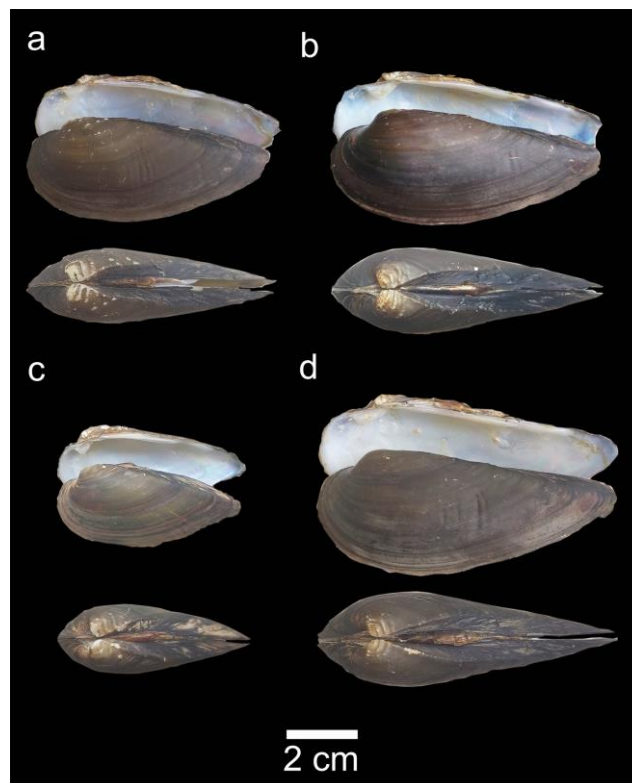
*ModelFinder* for mitogenome dataset

Subset	Best Model	Partition names
1	TIM2+F+I+G4	rrnL_mafft_gb_rrnS_mafft_gb
2	GTR+F+I+G4	atp6_NT_removed_chars_gb_codon1_nad3_NT_removed_chars_gb_codon1_nad4L_NT_removed_chars_gb_codon1_nad4_NT_removed_chars_gb_codon1_nad5_NT_removed_chars_gb_codon1
3	GTR+F+I+G4	atp6_NT_removed_chars_gb_codon2_cox2_NT_removed_chars_gb_codon2_nad3_NT_removed_chars_gb_codon2_nad4L_NT_removed_chars_gb_codon2_nad4_NT_removed_chars_gb_codon2_nad5_NT_removed_chars_gb_codon2
4	TIM3+F+G4	atp6_NT_removed_chars_gb_codon3_nad4_NT_removed_chars_gb_codon3_nad5_NT_removed_chars_gb_codon3
5	TIM+F+I+G4	cox1_NT_removed_chars_gb_codon1_cox2_NT_removed_chars_gb_codon1_cox3_NT_removed_chars_gb_codon1
6	TVM+F+I+G4	cox1_NT_removed_chars_gb_codon2_cox3_NT_removed_chars_gb_codon2
7	GTR+F+I+G4	cox1_NT_removed_chars_gb_codon3_cox2_NT_removed_chars_gb_codon3_cox3_NT_removed_chars_gb_codon3_nad3_NT_removed_chars_gb_codon3_nad4L_NT_removed_chars_gb_codon3
8	TIM2e+I+G4	cytb_NT_removed_chars_gb_codon1_nad1_NT_removed_chars_gb_codon1
9	TVM+F+I+G4	cytb_NT_removed_chars_gb_codon2_nad1_NT_removed_chars_gb_codon2
10	TIM2+F+I+G4	cytb_NT_removed_chars_gb_codon3_nad6_NT_removed_chars_gb_codon3
11	TIM3+F+I+G4	nad1_NT_removed_chars_gb_codon3_nad2_NT_removed_chars_gb_codon3
12	TN+F+I+G4	nad2_NT_removed_chars_gb_codon1_nad6_NT_removed_chars_gb_codon1
13	GTR+F+I+G4	nad2_NT_removed_chars_gb_codon2_nad6_NT_removed_chars_gb_codon2

---



**Fig. S1.** Shell images of *Cuneopsis heudei*.



**Fig. S2.** Shell images of *Cuneopsis szechenyii* comb. nov.