

Supplementary Materials

Table S1. Genetic divergences among aligned 18S rRNA sequences expressed as percentage identities (below diagonal) and differences in the number of nucleotides (above diagonal). Represented as GenBank/Sequence ID, Taxon and Country. Sequences from the present study in bold and grey shade. *Lernaea cyprinacea* (MH982195) was used as the outgroup. Abbreviations: AR—Argentina, BI—Burundi; CN—China, CZ—Czech Republic, HU—Hungary, KR—South Korea, NI—Nicaragua, ZA—South Africa (Vaal River), ZM—Zambia (Zambezi River).

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	OR449753 <i>Ergasilus mirabilis</i> ZA		0	33	25	24	3	22	3	4	4	31	3	39	32	16	24	26	26	25	25	27	23	25	25	28	30	33	31	30	136
2	OR449754 <i>Ergasilus mirabilis</i> ZM	100		37	29	28	3	26	3	4	4	35	3	43	36	19	28	29	27	25	27	27	25	30	26	33	35	37	35	34	139
3	MN852694 <i>Acusicola margulisae</i> NI	97.5997.31		39	43	23	36	23	22	22	47	23	45	50	36	43	48	33	37	34	36	35	38	38	38	38	48	45	44	143	
4	DQ107564 <i>Ergasilus anchoratus</i> CN	98.1797.89	97.16		32	13	25	13	14	14	35	13	39	29	27	32	41	34	30	31	32	29	11	11	14	15	35	33	34	139	
5	DQ107572 <i>Ergasilus brianii</i> CN	98.2497.96	96.87	97.67		20	14	20	21	21	20	20	38	41	23	4	39	38	12	13	14	11	34	34	35	37	39	37	36	143	
6	OQ407469 <i>Ergasilus caparti</i> BI	99.7099.70	97.69	99.79	99.79		13	0	1	1	25	0	28	18	15	20	16	16	18	20	20	18	12	12	14	15	15	17	16	98	
7	DQ107573 <i>Ergasilus hypomesi</i> CN	98.3998.11	97.38	98.18	98.98	98.69		13	14	14	20	13	32	35	21	14	37	32	12	13	14	11	26	26	27	29	37	35	34	141	
8	OQ407465 <i>Ergasilus macrodactylus</i> BI	99.7099.70	97.69	99.79	99.79	99.100.00	98.69		1	1	25	0	28	18	15	20	16	16	18	20	20	18	12	12	14	15	15	17	16	98	
9	OQ407466 <i>Ergasilus megacheir</i> BI	99.6099.60	97.79	98.98	99.79	99.90	98.59	99.90		0	26	1	29	19	14	21	15	17	19	21	21	19	13	13	15	16	16	18	17	97	
10	OQ407467 <i>Ergasilus parasarsi</i> BI	99.6099.60	97.79	98.98	99.79	99.90	98.59	99.90	100.00		26	1	29	19	14	21	15	17	19	21	21	19	13	13	15	16	16	18	17	97	
11	DQ107567 <i>Ergasilus parasiluri</i> CN	97.7397.45	96.58	97.45	98.54	97.49	98.54	97.49	97.39	97.39		25	43	44	30	20	42	38	22	22	22	22	37	37	38	40	44	42	41	150	
12	OQ407468 <i>Ergasilus parvus</i> BI	99.7099.70	97.69	99.79	99.100.00	98.69	100.00	99.90	99.90	97.49		28	18	15	20	16	16	18	20	20	18	12	12	14	15	15	17	16	98		
13	DQ107577 <i>Ergasilus peregrinus</i> CN	97.1596.87	96.72	97.16	97.23	97.19	97.67	97.19	97.09	97.09	96.87	97.19		51	36	37	43	44	33	34	35	32	41	41	40	40	40	38	37	148	
14	DQ107565 <i>Ergasilus scalaris</i> CN	97.6697.38	96.36	97.89	97.01	98.19	97.45	98.19	98.09	98.09	96.80	98.19	96.28		34	41	48	43	39	41	41	39	30	30	31	32	45	43	42	145	
15	MW810238 <i>Ergasilus sieboldi</i> CZ	98.8398.62	97.38	98.03	98.32	98.49	98.47	98.49	98.59	98.59	97.82	98.49	97.38	97.52		23	24	30	21	22	23	20	26	25	27	30	35	31	30	136	
16	DQ107569 <i>Ergasilus tumidus</i> CN	98.2497.96	96.87	97.67	99.71	97.99	98.98	97.99	97.89	97.89	98.54	97.99	30.97	0.19	8.32		39	38	12	13	14	11	34	34	35	37	39	37	36	144	
17	DQ107578 <i>Ergasilus yaluzangbus</i> CN	98.1097.89	96.50	97.01	97.16	98.39	97.31	98.39	98.49	98.49	96.94	98.39	96.87	96.50	98.25	97.16		38	33	33	35	31	37	36	39	42	43	39	39	140	
18	*MT969345 <i>Ergasilus yandemontei</i> AR	98.1198.04	97.59	97.52	97.22	98.42	97.67	98.42	98.32	98.32	97.22	98.42	96.77	96.84	97.82	97.22	97.22		31	31	31	31	33	33	36	39	39	36	35	141	
19	MW810236 <i>Neoergasilus japonicus</i> CZ	98.1698.16	97.28	97.79	99.12	98.19	99.12	98.19	98.09	98.09	98.38	98.19	97.57	97.13	98.45	99.12	97.57	97.72		2	2	0	28	28	29	29	41	37	36	139	
20	MH167969 <i>Neoergasilus japonicus</i> CZ	98.1598.01	97.49	97.71	99.04	97.99	99.04	97.99	97.89	97.89	98.38	97.99	97.49	96.97	98.38	98.99	0.49	97.57	97.71	99.85		0	2	27	27	28	28	40	35	35	136
21	MW810237 <i>Neoergasilus japonicus</i> CZ	98.0198.01	97.35	97.64	98.97	97.99	98.97	97.99	97.89	97.89	98.38	97.99	97.42	96.98	98.31	98.97	97.42	97.72	99.85	100.00		2	28	28	29	29	41	37	36	139	
22	MH167970 <i>Neoergasilus japonicus</i> CZ	98.3098.16	97.42	97.86	99.19	98.19	99.19	98.19	98.09	98.09	98.38	98.19	97.64	97.12	98.52	99.19	97.71	97.11	100.00	99.85	99.85		27	27	28	28	40	35	35	136	
23	DQ107560 <i>Sinergasilus major</i> CN	98.1797.82	97.23	99.20	97.52	98.80	98.11	98.80	98.69	98.69	97.31	98.80	97.01	97.82	98.11	97.52	97.31	97.59	97.94	98.01	97.94	98.01		0	3	7	38	37	36	138	
24	MZ047814 <i>Sinergasilus major</i> HU	98.1798.10	97.22	99.20	97.51	98.80	98.10	98.80	98.69	98.69	97.30	98.80	97.00	97.81	98.17	97.51	97.37	97.59	97.94	98.01	97.94	98.01	100.00		3	7	37	36	35	138	
25	DQ107563 <i>Sinergasilus polycolpus</i> CN	97.9597.60	97.23	98.98	97.45	98.59	98.03	98.59	98.49	98.49	97.23	98.59	97.09	97.74	98.03	97.45	97.16	97.37	97.87	97.94	97.87	97.94	99.78	99.78		6	40	39	38	137	
26	DQ107561 <i>Sinergasilus undulatus</i> CN	97.8197.45	97.23	98.91	97.31	98.49	97.89	98.49	98.39	98.39	97.09	98.49	97.09	97.67	97.82	97.31	96.94	97.14	97.87	97.94	97.87	97.94	99.49	99.49	99.56		43	42	41	141	
27	DQ107576 <i>Paraergasilus brevidigitus</i> CN	97.5997.31	96.50	97.45	97.16	98.49	97.30	98.49	98.39	98.39	96.80	98.49	97.08	96.72	97.45	97.16	96.87	97.14	96.98	97.05	96.98	97.05	97.23	97.30	97.09	96.87		8	7	145	
28	MW810239 <i>Paraergasilus longidigitus</i> CZ	97.7397.45	96.72	97.59	97.30	98.29	97.45	98.29	98.19	98.19	96.94	98.29	97.23	96.87	97.74	97.30	97.16	97.37	97.28	97.42	97.28	97.42	97.31	97.37	97.16	96.94	99.42		3	142	
29	DQ107574 <i>Paraergasilus medius</i> CN	97.8197.52	96.79	97.52	97.38	98.39	97.52	98.39	98.29	98.29	97.01	98.39	97.30	96.94	97.81	97.38	97.16	97.44	97.35	97.42	97.35	97.42	97.38	97.44	97.23	97.01	99.49	99.78		142	
30	MH982195 <i>Lernaea cyprinacea</i> CN	90.1789.98	89.69	98.89	98.69	90.40	89.83	90.40	90.50	90.50	89.19	90.40	89.33	89.55	90.19	89.62	89.91	89.63	89.95	90.15	89.95	90.15	90.05	90.03	90.12	89.83	89.55	89.76	89.76		

Table S2. Genetic divergences among aligned 28S rRNA sequences expressed as percentage identities (below diagonal) and differences in the number of nucleotides (above diagonal). Represented as GenBank/Sequence ID, Taxon and Country. Sequences from the present study in bold and grey shade. *Lernaea cyprinacea* (MH982204) was used as the outgroup. Abbreviations: BI—Burundi; CN—China, CZ—Czech Republic, EG—Egypt, HU—Hungary, NI—Nicaragua, ZA—South Africa (Vaal River), ZM—Zambia (Zambezi River).

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	OR449755 <i>Ergasilus mirabilis</i> ZA		0	71	85	66	32	65	43	41	44	72	45	78	62	57	67	61	81	76	73	74	74	68	70	69	97	79	84	84	218
2	OR449756 <i>Ergasilus mirabilis</i> ZM	100.00		71	85	67	32	66	43	41	44	73	45	78	62	57	68	61	82	76	73	74	74	69	70	70	98	79	85	85	218
3	MN852851 <i>Acusicola margulisae</i> NI	88.87	88.91		71	50	66	43	70	70	73	49	72	51	54	50	53	49	79	64	62	62	63	45	49	49	82	67	71	71	202
4	DQ107528 <i>Ergasilus anchoratus</i> CN	87.29	87.72	88.89		74	77	63	80	80	85	78	84	76	73	69	78	64	100	81	80	80	81	72	72	71	25	9	12	11	228
5	DQ107532 <i>Ergasilus brianii</i> CN	90.15	90.33	92.18	89.31		67	32	66	69	71	18	70	23	43	37	19	43	77	46	45	45	46	47	51	55	87	71	74	75	213
6	OQ407474 <i>Ergasilus caparti</i> BI	95.10	95.10	89.56	88.23	89.77		59	13	14	18	72	17	73	65	59	69	57	73	72	70	70	71	66	66	69	91	73	78	76	210
7	DQ107539 <i>Ergasilus hypomesi</i> CN	90.30	90.48	93.27	90.90	95.38	90.99		63	66	64	32	67	35	40	35	35	41	68	43	41	41	42	47	45	49	75	55	62	62	215
8	OQ407470 <i>Ergasilus macrodactylus</i> BI	93.42	93.42	88.92	87.77	89.92	98.01	90.38		9	15	72	6	73	70	62	68	57	71	74	73	74	67	68	68	72	90	76	79	79	205
9	OQ407471 <i>Ergasilus megacheir</i> BI	93.72	93.72	88.92	87.77	89.47	97.86	89.92	98.62		19	75	13	76	72	64	72	60	73	77	76	76	77	68	69	72	90	76	79	78	206
10	OQ407473 <i>Ergasilus parasarsi</i> BI	93.26	93.26	88.45	87.00	89.16	97.24	90.23	97.70	97.09		71	15	74	72	67	74	65	70	70	69	69	70	74	76	77	95	81	84	82	206
11	DQ107536 <i>Ergasilus parasiluri</i> CN	89.24	89.45	92.32	88.71	97.40	88.99	95.37	88.99	88.53	89.14		72	9	72	40	25	45	74	40	38	38	39	56	58	60	91	75	78	79	206
12	OQ407472 <i>Ergasilus parvus</i> BI	93.11	93.11	88.61	87.16	89.31	97.40	89.77	99.08	98.01	97.70	88.99		75	72	66	72	60	74	76	75	75	76	72	73	77	94	80	83	83	204
13	DQ107538 <i>Ergasilus scalaris</i> CN	88.34	88.73	92.01	89.00	96.67	88.84	94.93	88.84	88.38	88.69	98.70	88.53		72	40	30	46	73	40	36	38	37	55	56	59	91	74	78	79	205
14	MW810242 <i>Ergasilus sieboldi</i> CZ	90.37	90.37	91.25	88.68	93.33	89.83	93.80	89.05	88.73	88.26	92.86	88.42	92.86		10	44	46	66	53	51	51	52	49	49	50	90	71	76	79	215
15	OM812074 <i>Ergasilus sieboldi</i> EG	91.01	91.01	91.76	89.13	94.17	90.62	94.49	90.14	89.83	89.35	93.69	89.51	93.69	98.42		36	44	62	46	44	44	45	44	44	48	83	66	69	71	210
16	DQ107535 <i>Ergasilus tumidus</i> CN	90.00	90.19	91.71	88.73	97.25	89.47	94.94	89.62	89.01	88.70	96.38	89.01	95.66	93.18	94.33		46	74	43	41	41	42	52	52	58	91	75	78	77	213
17	DQ107531 <i>Ergasilus peregrinus</i> CN	90.88	91.18	92.32	90.74	93.78	91.28	94.07	91.28	90.83	90.06	93.48	90.83	93.33	92.86	93.06	93.34		66	59	58	58	59	43	46	42	80	59	66	69	207
18	DQ107540 <i>Ergasilus yaluzangbus</i> CN	87.96	88.22	87.73	85.65	88.95	88.91	90.24	89.21	88.91	89.36	89.37	88.75	89.51	89.81	90.28	89.38	90.52		78	75	77	76	71	74	73	111	94	98	97	212
19	MW810240 <i>Neoergasilus japonicus</i> CZ	88.60	88.60	90.00	87.75	93.04	89.07	93.57	88.76	88.30	89.37	94.02	88.46	94.02	91.82	92.80	93.57	91.14	88.29		2	2	1	55	60	55	92	80	81	79	216
20	MH167967 <i>Neoergasilus japonicus</i> CZ	88.32	88.32	89.92	87.18	92.79	88.80	93.43	88.32	87.84	88.96	93.90	88.00	94.22	91.84	92.85	93.43	90.69	88.08	99.76		0	1	54	58	54	91	79	80	78	212
21	MW810241 <i>Neoergasilus japonicus</i> CZ	88.82	88.82	90.24	87.90	93.19	89.30	93.80	88.84	88.38	89.45	94.24	88.53	94.24	92.06	93.04	93.80	91.21	88.44	99.77	100.00		1	54	58	54	91	79	80	78	215
22	MH167968 <i>Neoergasilus japonicus</i> CZ	88.16	88.16	89.76	87.02	92.63	88.64	93.27	88.16	87.68	88.80	93.74	87.84	94.06	91.68	92.68	93.27	90.53	87.92	99.92	99.84	99.84		55	59	55	92	80	81	79	213
23	DQ107530 <i>Paraergasilus brevidigitus</i> CN	89.84	90.03	92.95	89.58	93.20	89.91	93.20	89.76	89.60	88.69	91.88	88.99	92.03	92.39	93.06	92.47	93.77	89.80	91.67	91.33	91.82	91.17		9	8	84	67	71	71	205
24	MW810243 <i>Paraergasilus longidigitus</i> CZ	89.36	89.36	92.27	89.04	92.24	89.91	93.15	89.60	89.45	88.38	91.16	88.84	91.46	92.33	93.00	92.09	92.99	88.82	90.93	90.69	91.16	90.53	98.62		15	83	66	70	70	205
25	DQ107529 <i>Paraergasilus medius</i> CN	89.69	89.88	92.32	89.73	92.04	89.45	92.91	88.99	88.99	88.23	91.30	88.23	91.45	92.24	92.43	91.61	93.91	89.51	91.67	91.33	91.82	91.17	98.83	97.70		83	64	70	72	207
26	DQ107524 <i>Sinergasilus major</i> CN	85.50	85.84	87.17	96.37	87.43	86.09	89.16	86.24	86.24	85.47	86.83	85.63	86.83	86.05	86.93	86.85	88.42	84.07	86.08	85.42	86.23	85.26	87.84	87.37	87.99		21	19	22	239
27	MZ047815 <i>Sinergasilus major</i> HU	87.92	87.92	89.38	98.62	89.14	88.84	91.59	88.38	88.38	87.61	88.51	87.77	88.67	88.91	89.52	88.53	90.96	85.74	87.75	87.34	87.90	87.18	89.74	89.89	90.20	96.77		8	11	228
28	DQ107525 <i>Sinergasilus polycolpus</i> CN	87.44	87.72	88.89	98.26	89.31	88.07	91.04	87.92	87.92	87.16	88.71	87.31	88.71	88.22	89.13	88.73	90.45	85.94	87.75	87.18	87.90	87.02	89.73	89.35	89.87	97.24	98.77		9	227
29	DQ107526 <i>Sinergasilus undulatus</i> CN	87.44	87.72	88.89	98.40	89.16	88.38	91.04	87.92	88.07	87.46	88.57	87.31	88.57	87.75	88.82	88.87	90.01	86.08	88.05	87.50	88.20	87.34	89.73	89.35	89.58	96.80	98.31	98.69		229
30	MH982204 <i>Lernaea cyprinacea</i> CN	69.12	69.12	70.47	67.71	69.83	70.25	69.59	70.96	70.82	70.82	70.82	71.10	70.96	68.89	69.16	69.83	70.68	70.10	69.48	68.69	69.55	68.54	70.96	70.96	70.68	66.15	67.71	67.85	67.56	

Table S3. Sites of amino acid variation in the alignment of partial COI *Ergasilus mirabilis* Oldewage & van As, 1987 sequences from the Vaal River (VR), South Africa and the Zambezi River (ZR), Zambia from this study, using invertebrate mitochondrion translation and stating what amino acids the codons translate.

	Sequence ID	Locality	Position in alignment	Nucleotide substitutions	Codons	Codon positions	3-letter Amino acid	Amino acid
1	OR448769	VR	18	A	GGA	16–18	Gly	Glycine
	OR448770	ZR		G	GGG			
2	OR448769	VR	72	A	AGA	70–72	Ser	Serine
	OR448770	ZR		G	AGG			
3	OR448769	VR	183	A	ATA	181–183	Met	Methionine
	OR448770	ZR		G	ATG			
4	OR448769	VR	339	G	GGG	337–339	Gly	Glycine
	OR448770	ZR		A	GGA			
5	OR448769	VR	354	A	GTA	352–354	Val	Valine
	OR448770	ZR		G	GTG			
6	OR448769	VR	387	G	TCG	385–387	Ser	Serine
	OR448770	ZR		A	TCA			
7	OR448769	VR	468	C	ACC	466–468	Ser	Serine
	OR448770	ZR		T	AGT			
8	OR448769	VR	570	T	CCT	568–570	Pro	proline
	OR448770	ZR		G	CCG			
9	OR448769	VR	600	C	CTC	598–600	Leu	Leucine
	OR448770	ZR		T	CTT			
10	OR448769	VR	670	C	CTA	670–672	Leu	Leucine
	OR448770	ZR		T	TTA			

Table S4. Genetic divergences among aligned COI mtDNA sequences expressed as percentage identities (below diagonal) and differences in the number of nucleotides (above diagonal). Represented as GenBank/BOLD/Sequence ID, Taxon and Country. Sequences from the present study in bold and grey shade. *Lernaea cyprinacea* (MH982220) was used as the outgroup. Abbreviations: AR—Argentina, CA—Canada, CN—China, KR—South Korea, NI—Nicaragua, US—United States of America, ZA—South Africa (Vaal River), ZM—Zambia (Zambezi River).

		1	2	3	4	5	6	7	8	9	10	11	12
1	OR448769 <i>Ergasilus mirabilis</i> ZA		10	132	139	122	122	139	114	133	134	149	150
2	OR448770 <i>Ergasilus mirabilis</i> ZM	98.55		130	139	123	122	138	117	134	135	146	153
3	ECTCR024-14 <i>Ergasilus lizae</i> CA*	79.94	80.24		134	118	114	137	109	125	133	126	144
4	KU557411_ <i>Ergasilus</i> sp. AR	79.32	79.32	79.54		128	124	154	112	126	133	137	142
5	KR049035 <i>Ergasilus</i> sp. KR	79.04	78.87	79.73	78.01		14	115	108	107	102	117	138
6	KR049036 <i>Ergasilus wilsoni</i> KR	79.04	79.04	80.41	78.69	97.59		114	107	105	99	118	138
7	MN854870 <i>Acusicola margulisae</i> NI	79.88	80.03	79.18	77.08	80.24	80.41		103	118	133	138	149
8	KR049037 <i>Neoergasilus japonicus</i> KR	80.41	79.90	81.27	80.76	81.44	81.62	82.30		40	112	115	131
9	MZ964935 <i>Neoergasilus japonicus</i> US	79.79	79.64	81.00	80.76	81.62	81.96	82.07	93.13		124	130	136
10	KR263117 <i>Sinergasilus polycolpus</i> CN	80.64	80.52	79.79	80.21	82.47	82.99	80.75	80.76	81.16		107	139
11	MW080644 <i>Sinergasilus undulatus</i> CN	78.47	78.93	80.85	79.61	79.90	79.73	80.03	80.24	80.24	84.6		144
12	MH982220 <i>Lernaea cyprinacea</i> CN	73.12	72.63	73.38	73.61	72.51	72.51	73.25	73.90	74.86	75.10	74.20	

* Taxon from the Barcode of Life Database (BOLD).