

Supplementary Table S1. List of species from which COI (96 sequences, 62 species) and D2 (53 sequences, 38 species) sequences were used in the molecular phylogenetic study, including GenBank accession numbers and country of locality. First five species highlighted are the outgroup. Accession numbers in bold are sequences obtained from the GenBank database while the ones not in bold sequences are from our own collected samples. * = D2 sequences that were borrowed from other researchers and are previously unpublished.

Species number	GenBank accession numbers		Sample code	Species name	Country of collection
	D2	COI			
1	MH913490	KY983356	Ch01	<i>Cheumatopsyche ceres</i>	Thailand
2	MH913491	KY983357	Ch02	<i>Cheumatopsyche lucida</i>	Thailand
3	MH913492	KY983358	Ch03	<i>Cheumatopsyche criseyde</i>	Thailand
4	MH913493	KY983359	Hyd02	<i>Hydropsyche harpagofalcata</i>	Thailand
5		KX107598		<i>Hydropsyche instabilis</i>	Austria
	HM167440				Austria
6	MH913494	KY983360	Aet01	<i>Aethaloptera sexpunctata</i>	Thailand
7	EU254437	JQ935605		<i>Aethaloptera dispar</i>	South Africa
8		KX104353		<i>Aethaloptera maxima</i>	South Africa

9	MH913495	KY983361	01096	<i>Oestropsyche vitrina</i>	Philippines
	MH913496	KY983362	5		Philippines
	MH913497		Oes06		Philippines
		KY983363	14		Myanmar
		KX104638			Indonesia
		EF513880			China
10	MH913498	KY983364	Pol01	<i>Polymorphanisus astictus</i>	Thailand
		KX104461			China
	EF513890	EF513884			China
		KX106844			China
		KX106708			China
		KX107521			China
		KX294076			Laos
11	EU254451			<i>Polymorphanisus bipunctatus</i>	not indicated in GenBank or in publication
12	MH913499	KY983365	Hfem01	<i>Polymorphanisus muluensis</i>	Thailand
	MH913500		Pol04		Laos

13	MH913501	MH919410	Pol03	<i>Polymorphanisus nigricornis</i>	Laos
14	MH913502	MH919411	Pol02	<i>Polymorphanisus ocularis</i>	Thailand
15	MH913503	KY983366	01098	<i>Polymorphanisus semperi</i>	Philippines
16		FN179088		<i>Polymorphanisus similis</i>	not indicated in GenBank or in publication
17		KX141463		<i>Synoestropsis grisoli</i>	Guyana
18		AF436565		<i>Synoestropsis punctipennis</i>	not indicated in GenBank or in publication
19		KX294351		<i>Synoestropsis species</i>	Peru
20		KX294161		<i>Synoestropsis vitrea</i>	Peru
21	MH913504	KY983368	Amp01	<i>Amphipsyche gratiosa</i>	Thailand
		KY983367	Amp07		Thailand
	MH913505	KY983369	Amp04		Myanmar
22		KY983370	Amp02	<i>Amphipsyche meridiana</i>	Thailand
23	EF513889	EF513881		<i>Amphipsyche proluta</i>	China

24	EU254436			<i>Amphipsyche senegalensis</i>	South Africa
25		KX106273		<i>Baliomorpha banksi</i>	Australia
26	EU254423			<i>Baliomorpha dubia</i>	not indicated in GenBank or in publication
27		JQ935619		<i>Baliomorpha pulchripennis</i>	Australia
		JQ935620			Australia
		JQ935617			Australia
	EU254424				Australia
278		KY983371	Ble01	<i>Blepharopus diaphanus</i>	Brazil
		KX141354			Brazil
	EU254442				Brazil
29		KX105318		<i>Centromacronema auripenne</i>	Costa Rica
30		KX143201		<i>Centromacronema apicale</i>	Costa Rica
31		KX143386		<i>Centromacronema nigripenne*</i>	Venezuela
32		KX144231		<i>Centromacronema</i>	Panama

				<i>oaxacense</i>	
33		KX143795		<i>Centromacronema oculatum</i>	Venezuela
34		KX143734		<i>Centromacronema pygmaeum</i>	Venezuela
35		JQ935643		<i>Leptonema simulans</i>	Costa Rica
36				<i>Leptonema acutum</i> *	Nicaragua
37				<i>Leptonema albovirens</i> *	Venezuela
38				<i>Leptonema heppneri</i> *	Venezuela
39		KX296636		<i>Leptonema</i> sp.	Costa Rica
40		KX143258		<i>Leptonema trispicatum</i>	Brazil
41	MH913506	KY983372	Macro01	<i>Macronema argentilineatum</i>	Brazil
		KX142627			Guyana
	EU254456				Ecuador
42		KX141057		<i>Macronema fraternum</i>	Guyana
43		KX295325		<i>Macronema luteipenne</i>	Costa Rica
44		KX293177		<i>Macronema muelleri</i>	Venezuela
45		KX295023		<i>Macronema percitans</i>	Venezuela

46		KX106834		<i>Macronema variipenne</i>	Mexico
		KX144283			Costa Rica
47	MH913489	MH919414	Mac07	<i>Macrostemum alienum</i>	Nigeria
48		KY983373	Mac01	<i>Macrostemum floridum</i>	Thailand
		KX105255			Thailand
	MH913507		16		Vietnam
	MH913508	MH919413	Mac40		Vietnam
		MH919412	Mac42		Laos
	EU254427				China
49	MH913509	KY983374	Mac02	<i>Macrostemum fastosum</i>	Thailand
	MH913510	KY983375	Mac39		Vietnam
	EF513887				China
		KX106714			China
50	MK011000	KY983376	Mac03	<i>Macrostemum midas</i>	Thailand
	MK010999	KY983377	1		Malaysia
		KX104217			Thailand
51	MH913511	KY983378	Mac04	<i>Macrostemum radiatum</i>	Japan

	MH913512	KY983379	3		South Korea
52	MH913513	KY983380	Mac08	<i>Macrostemum fenestratum</i>	Vietnam
	MH913514	KY983381	Mac37		Vietnam
	MH913515		Mac41		Laos
53	MH913516	KY983382	01070	<i>Macrostemum boettcheri</i>	Philippines
54	MH913517	KY983383	17	<i>Macrostemum</i> sp.	Philippines
55		KX105547		<i>Macrostemum capense</i> *	South Africa
56		KX143228		<i>Macrostemum ulmeri</i>	Guyana
57		KX105969		<i>Macrostemum carolina</i>	United States of America
58		KX105184		<i>Macrostemum dohrni</i>	Thailand
		KX294799			Thailand
		KX103183			Thailand
59		KX104893		<i>Macrostemum centrotum</i> *	China
60		KX295343		<i>Macrostemum hyalinum</i>	Brazil
61		KX294870		<i>Macrostemum erichsoni</i>	Brazil
62		KR145902		<i>Macrostemum zebratum</i>	Canada
63		KX144739		<i>Plectromacronema</i>	Guyana

				<i>comptum</i>	
64		KX107157		<i>Protomacronema africana</i>	Zimbabwe
65		KY983384	2	<i>Pseudoleptonema quinquefasciatum</i>	Laos
	MH913518	KY983385	Pseu01		Thailand
		KY983386	Pseu05		Myanmar
		KX105405			Nepal
66		KX105775		<i>Pseudomacronema vittatum</i>	Venezuela
67		KX107264		<i>Trichomacronema elegans</i>	China
		KX106216			China
	EU254429				China
68	MH913519	KY983387	Tri01	<i>Trichomacronema paniae</i>	Myanmar
	MH913520		15		Myanmar
		KX106083			Thailand
		JQ935670			Thailand

Supplementary Table S2. Primers of 28S Ribosomal RNA D2 and mitochondrial COI with polymerase chain reaction conditions used in this study.

Primer name	Gene	Nucleotide sequence	References	Conditions
D2up4 (forward)	D2	GAGTTCAAGAGTACGTGAAACCG		95 °C for two minutes,
D2dnB (reverse)		CCTTGGTCCGTGTTTCAAGAC		40x (94 °C for 30 seconds, 60 °C for 45 seconds, 72 °C for one minute), 72 °C for 10 minutes, 4 °C hold
LCO1490 (forward)	COI	GGTCAACAAATCATAAAGATATTGG	Folmer <i>et al.</i> 1994	94 °C for five minutes,
HCO2198 (reverse)		TAAACTTCAGGGTGACCAAAAAATCA	Folmer <i>et al.</i> 1994	40x (95 °C for 30 seconds, 50 °C for one minute, 72 °C for 1.30 minutes), 72 °C for five minutes, 4 °C hold
1709Fs (forward)	COI	TAATTGGAGGATTTGGAAATTG	Zhou <i>et al.</i> 2007	94 °C for three minutes,
2191R (reverse)		CCYGGTAAAATTAAAATATAAACTTC	Kjer <i>et al.</i> 2001	40x (94 °C for 30 seconds, 53 °C for 45 seconds, 72 °C for one minute), 72 °C for 10 minutes, 4 °C hold
1709Fg (forward)	COI	TAATTGGAGTTGGWAAATG	Zhou <i>et al.</i> 2007	Same as COI: 1709Fs/2191R
2209R (reverse)		GAGAAATTATTCCAAATCCRGGTAA	Zhou <i>et al.</i> 2007	
1751F (forward)	COI	GGATCACCTGATATAGCATTCCC	Zhou <i>et al.</i> 2007	Same as COI: 1709Fs/2191R
2191R (reverse)		CCYGGTAAAATTAAAATATAAACTTC	Kjer <i>et al.</i> 2001	
LepF1 (forward)	COI	ATTCAACCAATCATAAAGATATTGG	Hebert <i>et al.</i> 2004	94 °C for 23 minutes,

LepR1 (reverse)	TAAACTTCTGGATGTCCAAAAAATCA	Hebert <i>et al.</i> 2004	35x (95 °C for one minute, 48 °C for one minute, 72 °C for one minute), 72 °C for five minutes, 4 °C hold
-----------------	----------------------------	---------------------------	--

Supplementary Table S3. Species list and coding of morphological characters^{1,2} for morphological character tracing. First five species highlighted are the outgroup.

Species name	1	2	3	4	5	6	7	8	9	10	11	12
<i>Cheumatopsyche ceres</i>	0	0	0	0	0	0	0	0	0	0	0	1
<i>Cheumatopsyche lucida</i>	0	0	0	0	0	0	0	0	0	0	0	1
<i>Cheumatopsyche criseyde</i>	0	0	0	0	0	0	0	0	0	0	0	1
<i>Hydropsyche harpagofalcata</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Hydropsyche instabilis</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>Aethaloptera dispar</i>	0	2	1	0	1	1	1	0	1	4	0	1
<i>Aethaloptera sexpunctata</i>	0	2	1	0	1	1	1	0	1	4	0	1
<i>Amphipsyche gratiosa</i>	0	2	1	0	0	1	1	0	2	3	1	2
<i>Amphipsyche proluta</i>	0	2	1	0	0	1	1	0	2	3	0	2
<i>Amphipsyche senegalensis</i>	0	2	1	0	0	1	1	0	2	3	0	2
<i>Baliomorpha dubia</i>	0	3	1	1	0	1	1	0	0	2	1	1
<i>Baliomorpha pulchripennis</i>	0	3	1	1	0	1	1	0	0	2	1	1
<i>Blepharopus diaphanus</i>	0	1	1	0	0	1	1	0	0	1	0	0
<i>Centromacronema nigripenne</i>	0	3	1	1	0	1	0	0	0	2	1	2

<i>Leptonema acutum</i>	0	1	0	0	0	1	1	0	0	4	0	0
<i>Leptonema albovirens</i>	0	1	0	0	0	1	1	0	0	4	0	0
<i>Leptonema heppneri</i>	0	1	0	0	0	1	1	0	0	4	0	0
<i>Oestropsyche vitrina</i>	0	4	1	1	1	1	1	0	2	4	0	1
<i>Polymorphanisus astictus</i>	0	4	1	1	1	1	1	0	0	4	0	1
<i>Polymorphanisus bipunctatus</i>	0	4	1	1	1	1	1	0	0	4	0	1
<i>Polymorphanisus muluensis</i>	0	4	1	1	1	1	1	0	0	4	0	1
<i>Polymorphanisus nigricornis</i>	0	4	1	1	1	1	1	0	0	4	0	1
<i>Polymorphanisus ocularis</i>	1	4	1	1	1	1	1	0	0	5	1	1
<i>Polymorphanisus semperi</i>	0	4	1	1	1	1	1	0	0	4	0	1
<i>Macronema argentilineatum</i>	0	3	1	1	0	1	1	0	1	1	1	0
<i>Macrostemum alienum</i>	0	1	1	0	0	1	0	0	0	2	0	1
<i>Macrostemum boettcheri</i>	0	1	1	0	0	1	0	0	0	1	0	1
<i>Macrostemum capense</i>	0	1	?	0	0	1	0	0	0	1	0	?
<i>Macrostemum centrotum</i>	0	1	?	0	0	1	0	0	0	2	0	1
<i>Macrostemum fastosum</i>	0	1	0	0	0	1	0	0	0	3	0	1
<i>Macrostemum fenestratum</i>	0	1	1	0	0	1	0	0	0	1	0	2

<i>Macrostemum floridum</i>	0	1	1	0	0	1	0	0	0	1	0	2
<i>Macrostemum midas</i>	0	1	0	0	0	1	0	0	0	3	0	1
<i>Macrostemum radiatum</i>	0	1	1	0	0	1	0	0	0	1	0	1
<i>Macrostemum species</i>	0	1	1	0	0	1	0	0	0	3	0	1
<i>Pseudoleptonema quinquefasciatum</i>	0	1	0	0	0	1	0	0	0	1	0	2
<i>Trichomacronema elegans</i>	0	1	0	0	0	1	0	1	0	2	0	1
<i>Trichomacronema paniae</i>	0	1	0	0	0	1	0	1	0	2	0	1

¹Morphological adult characters and character coding used in this study for morphological phylogeny analysis.

Character 1—eye size (0 = with normal size and widely separated, 1 = large and almost meeting ventrally).

Character 2—head setal warts count (0 = 7, 1 = 5, 2 = 4, 3 = 3, 4 = 2).

Character 3—size of anterior warts on head (0 = small, usually smaller than posterior warts when present, 1 = large, usually larger than posterior warts when present).

Character 4—size of posterior warts on head (0 = large, 1 = small, 2 = absent).

Character 5—palps (0 = present, 1 = absent).

Character 6—forewing A1 (0 = A1 unmodified, 1 = part of a file-and-groove structure).

Character 7—forewing crossveins *c-sc* (0 = absent, 1 = present).

Character 8—forewing discoidal cell (0 = present and very evident, 1 = present but minute, 2 = absent).

Character 9—forewing base of Rs (0 = entire, 1 = obsolete).

Character 10—forewing coloration (0 = brown, 1 = black to dark brown with complicated wing markings, 2 = black to dark brown without white markings or with simple white streak coloration, 3 = yellow to light brown with dark brown bands in some species, 4 = pale to green especially for fresh materials, forewing without markings, 5 = pale to green with dark brown spots on forewings).

Character 11—inferior appendages of male genitalia (0 = two segmented, 1 = unsegmented).

Character 12—phallus apex shape (0 = ending in complex apparatus, 1 = rounded or globular, 2 = rounded or globular with pointed apparatus or protrusions).

²Missing data are coded as “?”.