

Table 1. Species included in this study. Sample localities, number of sample examined, distribution, life cycle and GenBank accession number

Species	Sample locality	Locality code	Number examined	Distribution	Life cycle	Accession Nos.	
						16S rRNA	COI
<i>M. anhuiense</i>	mainland China	ML	1	East Asia	Land-locked	DQ194909	AB235240
<i>M. asperulum</i>	mainland China	ML	6	East Asia	Land-locked	DQ194908	AB235241
	North Taiwan	N-TW	7			DQ194906	AB235242
	South Taiwan	S-TW	5			DQ194907	AB235243
<i>M. australe</i>	Taiwan	TW	6	Indo-West Pacific	Euryhaline	DQ194904	AB235245
	Philippines	PP	1			DQ194905	AB235244
<i>M. edentatum</i>	mainland China	ML	3	Indo-West Pacific	Land-locked	DQ194912	AB235247
<i>M. equidens</i>	Taiwan	TW	4	Indo-West Pacific	Euryhaline	DQ194918	AB235250
	Philippines	PP	3			DQ194916	AB235248
	Singapore	SG	5			DQ194917	AB235249
<i>M. esculentum</i>	Taiwan	TW	6	Indo-West Pacific	Euryhaline	DQ194913	AB235252
	Philippines	PP	1			DQ194914	AB235251
<i>M. formosense</i>	Japan	JP	2	East Asia	Euryhaline	DQ194920	AB235253
	Ryukyus	RK	3			DQ194922	AB235255
	mainland China	ML	2			DQ194921	AB235254
	Taiwan	TW	5			DQ194919	AB235256
<i>M. fukiense</i>	mainland China	ML	2	East Asia	Land-locked	DQ194923	AB235257
<i>M. gracilirostre</i>	Taiwan	TW	5	Indo-West Pacific	Euryhaline	DQ194924	AB235258
<i>M. grandimanus</i>	Ryukyus	RK	2	Indo-West Pacific	Euryhaline	DQ194926	AB235260
	Hawaii	HW	3			DQ194925	AB235259
<i>M. hainanense</i>	mainland China I, I	ML	3, 2	East Asia	Euryhaline	DQ194927	AB235261
<i>M. cf. horstii</i>	Taiwan	TW	9	Indo-West Pacific	Euryhaline	DQ194928	AB235291
<i>M. idae</i>	Taiwan	TL	2	Indo-West Pacific	Euryhaline	DQ194930	AB235262
<i>M. inflatum</i>	mainland China	ML	3	East Asia	Land-locked	DQ194931	AB235263
<i>M. japonicum</i>	Japan	JP	2	East Asia	Euryhaline	DQ194934	AB235264
	Ryukyus	RK	4			DQ194935	AB235265
	Taiwan	TW	8			DQ194933	AB235266
<i>M. jaroense</i>	Taiwan	TW	6	Indo-West Pacific	Euryhaline	DQ194932	AB235267
<i>M. lar</i>	Ryukyus	RK	2	Indo-West Pacific	Euryhaline	DQ194941	AB235269
	Taiwan	TW	8			DQ194939	AB235270
	Philippines	PP	2			DQ194940	AB235268
<i>M. latidactylus</i>	mainland China	ML	1	Indo-West Pacific	Euryhaline	DQ194943	AB235271
<i>M. lanatum</i>	India	IA	3	Indo-West Pacific	Euryhaline	DQ194911	AB235246
	Taiwan	TW	8			DQ194942	AB235275
	Philippines	PP	2			DQ194945	AB235273
	Malaysia	MS	4			DQ194944	AB235272
	Taiwan	TL	1			DQ194946	AB235274
<i>M. latimanus</i>	Ryukyus	RK	1	Indo-West Pacific	Euryhaline	DQ194938	AB235277
	Taiwan	TW	3			DQ194936	AB235278
	Philippines	PP	3			DQ194937	AB235276
<i>M. lepidactyloides</i>	Taiwan	TW	7	Indo-West Pacific	Euryhaline	DQ194929	AB235279
<i>M. maculatum</i>	mainland China	ML	4	Indo-West Pacific	Land-locked	DQ194910	AB235280
<i>M. malayanum</i>	Malaysia	MS	2	Indo-West Pacific	Land-locked	DQ194947	AB235281
<i>M. mammilodactylus</i>	Philippines	PP	1	Indo-West Pacific	Euryhaline	DQ194915	AB235282
<i>M. meridionalis</i>	Mainland China	ML	6	Indo-West Pacific	Euryhaline	DQ194948	AB235283
	Malaysia	MS	1			DQ194949	AB235284
<i>M. naso</i>	Burma	BU	3	Indo-West Pacific	Euryhaline	DQ194950	AB235285
<i>M. neglectum</i>	Malaysia	MS	1	Indo-West Pacific	Euryhaline	DQ194953	AB235286
<i>M. nipponense</i>	mainland China	ML	5	Indo-West Pacific	Land-locked	DQ194952	AB235287
	Taiwan	TW	6			DQ194951	AB235288
<i>M. pinguis</i>	mainland China	ML	2	East Asia	Land-locked	DQ194958	AB235289
<i>M. placidulum</i>	Philippines	PP	4	Indo-West Pacific	Euryhaline	DQ194956	AB235290
<i>M. placidum</i>	Philippines	PP	3	Indo-West Pacific	Euryhaline	DQ194957	AB235292
<i>M. platycheles</i>	Singapore	SG	3	Indo-West Pacific	Land-Locked	DQ194955	AB235294
	Malaysia	MS	2			DQ194954	AB235293
<i>M. rosenbergii</i>	Taiwan	TW	2	Indo-West Pacific	Euryhaline	DQ194959	AB235295
<i>M. shokitai</i>	Ryukyus	RK	5	East Asia	Land-locked	DQ194961	AB235296
<i>M. yui</i>	mainland China	ML	2	South East Asia	Land-locked	DQ194960	AB235297
<i>M. sp. 1</i>	Taiwan	TW	1	East Asia	?	DQ194962	AB235298
<i>M. sp. 2</i>	mainland China	ML	5	East Asia	?	DQ194963	AB235299
<i>M. sp. 3</i>	mainland China	ML	1	East Asia	?	DQ194964	AB235300
<i>M. sp. 4</i>	Cambodia	CD	1	South East Asia	?	DQ194965	AB235301
<i>M. sp. 5</i>	Taiwan	TW	8	East Asia	?	DQ194966	AB235302
<i>M. sp. 6</i>	Philippines	PP	3	Indo-West Pacific	?	DQ194967	AB235303
<i>M. sp. 7</i>	Ryukyus	RK	1	East Asia	?	DQ194968	AB235304
<i>M. sp. 8</i>	Ryukyus	RK	1	East Asia	?	DQ194969	AB235305
Outgroup							
<i>Exopalaemon modestus</i>	mainland China	ML	2	East Asia	Land-locked	DQ194971	AB235307
<i>Exopalaemon orientis</i>	Taiwan	TW	3	East Asia	Euryhaline	DQ194972	AB235306
<i>Palaemonetes sinensis</i>	mainland China	ML	1	East Asia	Land-locked	DQ194970	—
<i>Caridina pseudodenticulata</i>	Taiwan	TW	3	East Asia	Land-locked	DQ194973	AB235308

Table 2. Sources of additional 16S sequences

Species	Sample locality	Locality code	Distribution	Life cycle	Accession Nos.
<i>M. acanthochirus</i>	Mexico	MK	South/Central America	?	AY377837 ^c
<i>M. acanthurus</i>	Mexico	MK	South/Central America	Euryhaline	AY282780 ^b
<i>M. aemulum</i>	Australia	AU	Indo-West Pacific	Euryhaline	AY282769 ^b
<i>M. auratum</i>	Australia	AU	Indo-West Pacific	Euryhaline	AY282775 ^b
<i>M. australiense</i>	Australia	AU	Indo-West Pacific	Land-Locked	AY282764 ^b
<i>M. brasiliense</i>	Brazil	BZ	South/Central America	Land-Locked	AY377839 ^b
<i>M. bullatum</i>	Australia	AU	Indo-West Pacific	Land-Locked	AY282778 ^b
<i>M. carcinus</i>	Puerto Rico	PR	South/Central America	Euryhaline	AY282779 ^b
<i>M. crenulatum</i>	Puerto Rico	PR	South/Central America	Euryhaline	AY377840 ^c
<i>M. equidens</i>	Australia	AU	Indo-West Pacific	Euryhaline	AY282773 ^b
<i>M. gangeticum</i>	India	IA	Indo-West Pacific	Euryhaline	AY730054 ^d
<i>M. hainanense</i>	Hong Kong	HK	Indo-West Pacific	Euryhaline	AY377841 ^c
<i>M. handschini</i>	Australia	AU	Indo-West Pacific	Land-Locked	AY282781 ^b
<i>M. heterochirus</i>	Puerto Rico	PR	South/Central America	Freshwater	AY377842 ^c
<i>M. idea</i>	Australia	AU	Indo-West Pacific	Euryhaline	AY282777 ^b
<i>M. intermedium</i>	Australia	AU	Indo-West Pacific	Marine	AF439515 ^a
<i>M. koombooloomba</i>	Australia	AU	Indo-West Pacific	Land-Locked	AY282767 ^b
<i>M. lamarrei</i>	India	IA	Indo-West Pacific	Land-Locked	AY730051 ^d
<i>M. lar</i>	Australia	AU	Indo-West Pacific	Euryhaline	AY282766 ^b
	Indonesia	IS			AY377843 ^c
<i>M. latimanus</i>	Australia	AU	Indo-West Pacific	Euryhaline	AY282765 ^b
<i>M. latidactylus</i>	Australia	AU	Indo-West Pacific	Euryhaline	AY282770 ^b
<i>M. malcolmsonii</i>	India	IA	Indo-West Pacific	Euryhaline	AY730050 ^d
<i>M. malayanum</i>	Singapore	SG	Indo-West Pacific	Land-Locked	AY377844 ^c
<i>M. mammillodactylus</i>	Indonesia	IS	Indo-West Pacific	Euryhaline	AY377845 ^c
	Australia	AU			AY282776 ^b
<i>M. neglectum</i>	Indonesia	IS	Indo-West Pacific	Euryhaline	AY377846 ^c
<i>M. novaehollandiae</i>	Australia	AU	Indo-West Pacific	Euryhaline	AY282772 ^b
<i>M. olfersii</i>	Brazil	BZ	South/Central America	Euryhaline	AY377848 ^c
	Mexico	MK	South/Central America		AY377849 ^c
<i>M. platycheles</i>	Singapore	SG	Indo-West Pacific	Land-Locked	AY377850 ^c
<i>M. potiuna</i>	Brazil	BZ	South/Central America	Land-Locked	AY377851 ^c
<i>M. rosenbergii</i>	Australia	AU	Indo-West Pacific	Euryhaline	AY282774 ^b
<i>M. sankollii</i>	India	IA	Indo-West Pacific	Land-Locked	AY730052 ^d
<i>M. scabriculum</i>	India	IA	Indo-West Pacific	Euryhaline	AY730055 ^d
<i>M. tolmerum</i>	Australia	AU	Indo-West Pacific	Euryhaline	AY282768 ^b
<i>M. trompii</i>	Singapore	SG	Indo-West Pacific	Land-Locked	AY377852 ^c
<i>M. zariqueyi</i>	Annobon	AN	West Africa	Euryhaline	AY377847 ^c
<i>Palaemon serenus</i>	Australia	AU	Indo-West Pacific	Euryhaline	AF439518 ^a
<i>Palaemonetes atrinubes</i>	Australia	AU	Indo-West Pacific	Euryhaline	AF439520 ^a
<i>Palaemonetes australis</i>	Australia	AU	Indo-West Pacific	Euryhaline	AF439517 ^a

a: Murphy and Austin 2003; b: Murphy and Austin 2004; c: Murphy and Austin 2005; d:

available in GenBank.

Table 3. Sampling localities, sample size (n), haplotype number (hn), nucleotide diversity (π) and haplotype diversity (h) of 16S, COI and combined data of *M. asperulum* in Taiwan and two (ML, MG) populations from China.

Locality		16S						COI				16S+COI					
Locality	Code	n	hn	$\pi \pm$ S.E		h \pm S.E		hn	$\pi \pm$ S.E		h \pm S.E		hn	$\pi \pm$ S.E		h \pm S.E	
Tashi R.	TS	7	2	0.001	0.001	0.571	0.119	3	0.001	0.001	0.714	0.127	5	0.001	0.001	0.905	0.103
Shuang R.	SH	6	1	0.000	0.000	0.000	0.000	1	0.000	0.000	0.000	0.000	1	0.000	0.000	0.000	0.000
Peishi R. ^a	PS	10	2	0.001	0.001	0.467	0.132	5	0.004	0.002	0.756	0.130	7	0.002	0.001	0.911	0.077
Tahan R. ^a	TH	7	6	0.010	0.003	0.952	0.096	6	0.024	0.004	0.952	0.096	7	0.018	0.003	1.000	0.076
Touchien R.	TC	9	2	0.001	0.001	0.389	0.164	4	0.002	0.001	0.694	0.147	6	0.001	0.001	0.833	0.127
Chungkang R.	CK	6	1	0.000	0.000	0.000	0.000	3	0.001	0.001	0.600	0.215	3	0.001	0.000	0.600	0.215
Houlung R.	HL	6	1	0.000	0.000	0.000	0.000	2	0.001	0.001	0.600	0.129	2	0.001	0.000	0.600	0.129
Taan R.	TA	13	3	0.003	0.001	0.410	0.154	5	0.006	0.002	0.538	0.161	6	0.004	0.001	0.718	0.128
Tachia R.	TG	10	2	0.001	0.001	0.356	0.159	6	0.004	0.002	0.778	0.137	6	0.003	0.001	0.778	0.137
Degi Res. ^b	DG	10	4	0.005	0.002	0.778	0.091	2	0.001	0.001	0.356	0.159	5	0.003	0.001	0.800	0.100
Tadu R.	TD	13	1	0.000	0.000	0.000	0.000	8	0.029	0.004	0.885	0.070	8	0.016	0.002	0.885	0.070
Choshui R.	CS	12	2	0.001	0.001	0.545	0.062	5	0.003	0.001	0.576	0.163	6	0.002	0.001	0.803	0.096
Tsengwen R.	TW	13	2	0.001	0.001	0.385	0.132	4	0.003	0.001	0.756	0.070	5	0.002	0.001	0.782	0.079
Kaopin R.	KP	10	3	0.003	0.001	0.711	0.086	5	0.007	0.002	0.756	0.130	8	0.005	0.001	0.956	0.059
Linpian R.	LP	12	5	0.002	0.001	0.727	0.113	4	0.010	0.002	0.712	0.105	7	0.006	0.001	0.894	0.063
Fengkang R.	FK	5	2	0.001	0.001	0.400	0.237	1	0.000	0.000	0.000	0.000	2	0.001	0.000	0.400	0.237
Mukau R.	MK	5	1	0.000	0.000	0.000	0.000	2	0.002	0.001	0.400	0.237	2	0.001	0.001	0.400	0.237
Hsiukulus R.	HKL	26	4	0.001	0.000	0.218	0.103	3	0.003	0.001	0.218	0.103	4	0.002	0.001	0.222	0.106
Tapu Pond	TP	6	3	0.002	0.001	0.733	0.155	2	0.017	0.003	0.333	0.215	3	0.010	0.002	0.600	0.215
Peinan R.	PN	9	3	0.003	0.001	0.639	0.126	6	0.017	0.003	0.833	0.127	7	0.011	0.002	0.917	0.005
Mulan R.	ML	6	2	0.001	0.001	0.600	0.129	3	0.020	0.003	0.733	0.155	4	0.022	0.002	0.867	0.129
Ming R.	MG	6	1	0.000	0.000	0.000	0.000	1	0.000	0.000	0.000	0.000	1	0.000	0.000	0.000	0.000

a, Peishi River and Tahan River belong to the Tanshui River system; b, Degi Reservoir is situated at upstream of Tachia River.

Table 4. Hierarchical analysis of molecular variance (AMOVA) with geographical regions and four lineages comparison among *M. asperulum* populations in Taiwan.

Comparison	Source of variation	Percent of variations	Variance components
Geographic Region	Among regions	58.07	$\Phi_{CT} = 0.5807^{***}$
	Among population/within regions	29.25	$\Phi_{SC} = 0.6977^{***}$
	Within population	12.68	$\Phi_{ST} = 0.8732^{***}$

*** $p < 0.001$



Table 5. Pairwise F_{ST} values and exact test of population differentiation among sites, below diagonal are F_{ST} values. Exact test probabilities of nondifferentiation above the diagonal (* $P < 0.05$; ** $P < 0.01$; ns: not significant). Locality codes are given in Table 1.

	TS	SH	PS	TH	TC	CK	HL	TA	TG	DG	TD	CS	TW	KP	LP	FK	MK	HKL	DP	PN	ML
TS	—	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
SH	0.940	—	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
PS	0.466	0.852	—	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
TH	0.539	0.584	0.524	—	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
TC	0.914	0.934	0.870	0.618	—	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
CK	0.975	0.992	0.948	0.566	0.960	—	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
HL	0.964	0.989	0.923	0.472	0.927	0.959	—	**	**	**	**	**	**	**	**	**	**	**	**	**	**
TA	0.889	0.891	0.880	0.681	0.870	0.824	0.805	—	**	**	**	**	**	**	**	**	**	**	**	**	**
TG	0.952	0.959	0.939	0.773	0.942	0.948	0.940	0.654	—	**	**	**	**	**	**	**	**	**	**	**	**
DG	0.947	0.956	0.935	0.771	0.939	0.945	0.937	0.695	0.455	—	*	**	**	**	**	**	**	**	**	**	**
TD	0.758	0.751	0.762	0.543	0.729	0.628	0.620	0.310	0.265	0.380	—	**	**	**	**	**	**	**	**	**	**
CS	0.960	0.967	0.946	0.731	0.953	0.883	0.934	0.778	0.920	0.924	0.562	—	**	**	**	**	**	**	**	**	**
TW	0.964	0.970	0.951	0.823	0.957	0.964	0.962	0.880	0.937	0.934	0.760	0.950	—	**	**	**	**	**	**	**	**
KP	0.928	0.932	0.919	0.761	0.921	0.918	0.910	0.835	0.892	0.886	0.704	0.914	0.549	—	ns	**	**	**	**	**	**
LP	0.901	0.904	0.894	0.735	0.893	0.885	0.874	0.804	0.862	0.855	0.680	0.888	0.390	0.100	—	**	**	**	**	**	**
FK	0.980	0.994	0.960	0.756	0.972	0.985	0.985	0.863	0.940	0.936	0.695	0.958	0.774	0.579	0.471	—	*	**	**	**	**
MK	0.972	0.986	0.951	0.739	0.963	0.977	0.974	0.696	0.467	0.468	0.309	0.941	0.953	0.895	0.859	0.972	—	**	**	**	**
HKL	0.957	0.960	0.949	0.862	0.949	0.955	0.948	0.776	0.606	0.674	0.529	0.935	0.946	0.921	0.901	0.950	0.601	—	**	**	**
TP	0.884	0.889	0.878	0.565	0.875	0.763	0.799	0.605	0.782	0.793	0.383	0.605	0.883	0.816	0.784	0.849	0.763	0.849	—	**	**
PN	0.839	0.840	0.838	0.637	0.825	0.812	0.783	0.514	0.410	0.423	0.247	0.801	0.813	0.733	0.700	0.760	0.359	0.558	0.581	—	**
ML	0.753	0.751	0.744	0.469	0.665	0.820	0.743	0.787	0.852	0.848	0.635	0.866	0.892	0.844	0.819	0.863	0.837	0.907	0.723	0.715	—