

表一、日本絨螯蟹 (*E. japonica*) 樣本採集地點與樣本編號

Table 1.1 Sample locality of *E. japonica*.

分區 ( Subgeography )	採集地點 ( Sample Locality )	樣本代號 ( Sample ID. )
西部地區 ( West )	烏溪 ( Wu River )	W01*
	大甲溪 ( Da-Jia River )	DJ06 <sup>#</sup>
	大甲溪 ( Da-Jia River )	DJ07 <sup>#</sup>
	大甲溪 ( Da-Jia River )	DJ08 <sup>#</sup>
	後龍溪 ( Hou-Lung River )	HL01
	後龍溪 ( Hou-Lung River )	HL02
	後龍溪 ( Hou-Lung River )	HL03
	頭前溪 ( Tou-Chian River )	TC01
	頭前溪 ( Tou-Chian River )	TC04
	頭前溪 ( Tou-Chian River )	TC05
北部地區 ( North )	頭前溪 ( Tou-Chian River )	TC09
	嘉寶溪 ( Jia-Bau Creek )	JB01
	荖芊坑溪 ( Lau-Chian-Keng Creek )	LCK06
	荖芊坑溪 ( Lau-Chian-Keng Creek )	LCK08
	荖芊坑溪 ( Lau-Chian-Keng Creek )	LCK09
	荖芊坑溪 ( Lau-Chian-Keng Creek )	LCK10
	八連溪 ( Ba-Lian Creek )	BL01
	老梅溪 ( Lau-Mei Creek )	LM01
	老梅溪 ( Lau-Mei Creek )	LM02*
	石門坑溪 ( Shr-Men-Keng Creek )	SMK06
	石門坑溪 ( Shr-Men-Keng Creek )	SMK08
	石門坑溪 ( Shr-Men-Keng Creek )	SMK09
	石門坑溪 ( Shr-Men-Keng Creek )	SMK10
	圓潭溪 ( Yuan-Tan Creek )	YT04
	圓潭溪 ( Yuan-Tan Creek )	YT05
	圓潭溪 ( Yuan-Tan Creek )	YT06
	圓潭溪 ( Yuan-Tan Creek )	YT07
	瑪鍊溪 ( Ma-Su Creek )	MS07
	瑪鍊溪 ( Ma-Su Creek )	MS08
	瑪鍊溪 ( Ma-Su Creek )	MS09
	瑪鍊溪 ( Ma-Su Creek )	MS10
	雙溪 ( Shuang-Shi Creek )	SS03*
	雙溪 ( Shuang-Shi Creek )	SS04*

\*表海洋大學何平合老師提供；<sup>#</sup>為特有生物中心陳榮宗先生提供

表一續、日本絨螯蟹 (*E. japonica*) 樣本採集地點與樣本編號

Table 1.2. Sample locality of *E. japonica*.

分區 ( Subgeography )	採集地點 ( Sample Locality )	樣本代號 ( Sample ID. )
東北地區 ( NorthEast )	大溪川 ( Da-Shi-Chuan Creek )	DSC04
	大溪川 ( Da-Shi-Chuan Creek )	DSC05
	大溪川 ( Da-Shi-Chuan Creek )	DSC07
	大溪川 ( Da-Shi-Chuan Creek )	DSC08
	梗枋溪 ( Keng-Fang Creek )	KF03
	梗枋溪 ( Keng-Fang Creek )	KF04
	梗枋溪 ( Keng-Fang Creek )	KF07
	梗枋溪 ( Keng-Fang Creek )	KF09
	新城溪 ( Shin-Cheng Creek )	SC07
	新城溪 ( Shin-Cheng Creek )	SC08
	新城溪 ( Shin-Cheng Creek )	SC09
	新城溪 ( Shin-Cheng Creek )	SC10
	白米溪 ( Bai-Mi Creek )	BM07
	白米溪 ( Bai-Mi Creek )	BM08
	白米溪 ( Bai-Mi Creek )	BM09
	白米溪 ( Bai-Mi Creek )	BM10
中國大陸 ( China )	珠江 ( Ju-Jiang )	JJ02*
	珠江 ( Ju-Jiang )	JJ04*
琉球 ( Ryuku )	沖繩 ( Okinawa )	Oki01*
	沖繩 ( Okinawa )	Oki02*
	沖繩 ( Okinawa )	Oki03*
	沖繩 ( Okinawa )	Oki04*
	沖繩 ( Okinawa )	Oki05*
	沖繩 ( Okinawa )	Oki06*
	沖繩 ( Okinawa )	Oki07*
	沖繩 ( Okinawa )	Oki08*
	沖繩 ( Okinawa )	Oki09*
	沖繩 ( Okinawa )	Oki10*

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表二、從 GenBank 所加入絨螯蟹屬的 COI 序列

Table 2. Additional sources of COI sequences from GenBank.

物種 ( Species )	採集地點 ( Sample Locality )	GenBank 編號 (Accession No. )	本文代號 ( Sample ID. )
<i>E. sinensis</i>	未知採集地 ( Unknown Location )	AY640082	Es01
<i>E. sinensis</i>	未知採集地 ( Unknown Location )	AY640083	Es02
<i>E. sinensis</i>	未知採集地 ( Unknown Location )	AY640084	Es03
<i>E. sinensis</i>	未知採集地 ( Unknown Location )	AY640085	Es04
<i>E. sinensis</i>	未知採集地 ( Unknown Location )	AY640086	Es05
<i>E. sinensis</i>	未知採集地 ( Unknown Location )	AY640087	Es06
<i>E. sinensis</i>	未知採集地 ( Unknown Location )	AF105247	Es07
<i>E. sinensis</i>	未知採集地 ( Unknown Location )	AF105248	Es08
<i>E. sinensis</i>	長江，中國 ( Changjiang, China )	AF516702	Es09
<i>E. hepuensis</i>	未知採集地 ( Unknown Location )	AF317327	Eh01
<i>E. hepuensis</i>	未知採集地 ( Unknown Location )	AF317328	Eh02
<i>E. hepuensis</i>	合浦，廣西，中國 ( Hepu, Guangxi, China )	AF516699	Eh03
<i>P. formosa</i>	台灣 (Taiwan)	AF105249	Pf01
<i>P. formosa</i>	台灣 (Taiwan)	AF105250	Pf02
<i>P. formosa</i>	花蓮，台灣 ( Hwa-Lein Taiwan )	AF516698	Pf03
<i>N. leptognathus</i>	未知採集地 ( Unknown Location )	AF516701	NI01
<i>E. japonica</i>	未知採集地 ( Unknown Location )	AF105245	Ej01
<i>E. japonica</i>	未知採集地 ( Unknown Location )	AF105246	Ej02
<i>E. japonica</i>	未知採集地 ( Unknown Location )	AY640088	Ej03
<i>E. japonica</i>	未知採集地 ( Unknown Location )	AY640089	Ej04
<i>E. japonica</i>	未知採集地 ( Unknown Location )	AY640090	Ej05
<i>E. japonica</i>	未知採集地 ( Unknown Location )	AY640093	Ej06
<i>E. japonica</i>	未知採集地 ( Unknown Location )	AY640094	Ej07
<i>E. japonica</i>	未知採集地 ( Unknown Location )	AY640101	Ej08
<i>E. japonica</i>	未知採集地 ( Unknown Location )	AY640102	Ej09
<i>E. japonica</i>	琉球沖繩 ( Okinawa )	AF317329	Ej10
<i>E. japonica</i>	日本大阪 ( Osaka )	AF317330	Ej11
<i>E. japonica</i>	日本德島縣 ( Tokushima )	AF317331	Ej12
<i>E. japonica</i>	日本下關 ( Shimonoseki )	AF516700	Ej13

表三、從 GenBank 所加入外群的 COI 序列

Table 3. Additional outgroups of COI sequences from GenBank.

物種 ( Species )	採集地點 ( Sample Locality )	GenBank 編號 (Accession No. )	本文代號 ( Sample ID. )
<i>G. albolineatus</i>	未知採集地 ( Unknown Location )	AF317338	Ga01
<i>V. litterata</i>	未知採集地 ( Unknown Location )	AF317343	VI01
<i>V. litterata</i>	未知採集地 ( Unknown Location )	AF516704	VI02




表四、日本絨螯蟹 (*E. japonica*) 定序樣本數、族群代號及地理分區表

Table 4. The locality of samples of *E. japonica* and phylogenetic groups of *E. japonica* in Taiwan.

Phylogeny Group	Sample Locality ( Chinese )	Sample Locality ( English )	Sample Locality ( Abbreviated )	Number of Sample	Total No. of samples
Taiwan	West	烏溪	Wu River	W	11
		大甲溪	Da-Jia River	DJ	
		後龍溪	Hou-Lung River	HL	
		頭前溪	Tou-Chian River	TC	
	North	嘉寶溪	Jia-Bau Creek	JB	22
		荖芊坑溪	Lau-Chian-Keng Creek	LCK	
		八連溪	Ba-Lian Creek	BL	
		老梅溪	Lau-Mei Creek	LM	
		石門坑溪	Shr-Men-Keng Creek	SMK	
		圓潭溪	Yuan-Tan Creek	YT	
		瑪鍊溪	Ma-Su Creek	MS	
		雙溪	Shuang-Shi Creek	SS	
	NorthEast	大溪川	Da-Shi-Chuan Creek	DSC	16
		梗枋溪	Keng-Fang Creek	KF	
		新城溪	Shin-Cheng Creek	SC	
		白米溪	Bai-Mi Creek	BM	
China	China	珠江	Ju-Jiang	JJ	2
Japan	Okinawa	琉球沖繩	-	Oki	10
Total				61	61

- : Sampling without detail locality

Table 5. Variable sites of 20 haplotypes of the COI gene in *E. japonica*.



表六、日本絨螯蟹 ( *E. japonica* ) 20 個基因型在各地地理區的分布情形

Table 6. Geographic distribution of 20 haplotypes in *E. japonica*.

Haplotype	Taiwan			Taiwan Total	Japan		Japan Total	China	
	West	North	NorthEast		Okinawa	Japan		Ju-Jiang	
H1					7		7		
H2					1		1		
H3					1		1		
H4					1		1		
H5					1		1		
H6	2		1	3					
H7		1		1					
H8	4	4	4	12					
H9	2	3	4	9					
H10			1	1					
H11								1	
H12			1	1					
H13			1	1					
H14		1		1					
H15	1			1					
H16		1		1					
H17	1	3		4					
H18		1		1					
H19	1	8	2	11				1	
H20			1	1					
H21			1	1					
H22						2	2		
H23						1	1		
Total haplotypes	6	8	9	15	5	2	7	2	

表七、日本绒螯蟹 (*E. japonica*) 各分群之 COI 基因片段多型性

Table 7. Caculation of genetic diversity of COI gene in the populations of *E. japonica*.

	Taiwan			Taiwan	Japan		Japan	China	Total
	West	North	NorthEast	Total	Okinawa	Japan	Total	Ju-Jiang	
Number of samples	11	22	16	49	10	3	14	2	65
Number of polymorphic sites	5	8	8	14	5	1	25	3	44
Number of haplotypes	6	8	9	15	4	2	7	2	23
Haplotype diversity ( $h$ )	0.855	0.827	0.892	0.859	0.533	0.667	0.758	1.000	0.904
The standard deviation of haplotype diversity	0.085	0.058	0.054	0.027	0.180	0.314	0.116	0.500	0.019
Nucleotide diversity ( $\pi$ )	0.00216	0.00258	0.00290	0.00260	0.00180	0.00120	0.01443	0.00541	0.01455
The standard deviation of Nucleotide diversity	0.00040	0.00034	0.00044	0.00023	0.00086	0.00057	0.00428	0.00270	0.00225
$\theta$ ( $\pi$ )	0.00217	0.00259	0.00291	0.00261	0.00181	0.00120	0.01472	0.00544	0.01483
$\theta$ ( $s$ )	0.00309	0.00399	0.00438	0.00574	0.00320	0.00120	0.01458	0.00544	0.01749

表八、Tajima's D 及 Fu and Li's D test 對日本絨螯蟹 (*E. japonica*) COI 基因進行中性檢測之結果

Table 8. Tajima's D and Fu and Li's D test of neutrality for COI gene of *E. japonica*.

	Taiwan			Taiwan	Japan		Japan	China	Total
	West	North	NorthEast	Total	Okinawa	Japan	Total	Ju-Jiang	
Number of samples	11	22	16	49	10	3	14	2	61
Tajima D	-1.138	-1.139	-1.200	-1.645	-1.741	-	-0.086	-	-0.728
	P > 0.1	P > 0.1	P > 0.1	0.1 > P > 0.05	*P < 0.05	-	P > 0.1	-	P > 0.1
Fu and Li's D	-0.764	-1.571	-1.808	-3.269	-2.010	-	0.326	-	-1.076
	P > 0.1	P > 0.1	P > 0.1	*P < 0.05	0.1 > P > 0.05	-	P > 0.1	-	P > 0.1

\*表示具顯著差異

表九、日本絨螯蟹 (*E. japonica*) COI 基因歧異度 (Dxy) 與淨歧異度 (DA)

Table 9. COI gene divergence (Dxy) and net divergence (DA) of *E. japonica*.

D <sub>A</sub>	Dxy	Taiwan			Taiwan	Japan		Japan	China
		West	North	NorthEast	Total	Okinawa	Japan	Total	Ju-Jiang
Taiwan	West		0.00242	0.00251	-	0.03414	0.04373	0.03613	0.00336
	North	0.00005		0.00275	-	0.03346	0.04275	0.03539	0.00336
	NorthEast	0.00002	0.00001		-	0.03390	0.04403	0.03602	0.00338
Japan	Taiwan	-	-	-	-	0.03375	0.04342	0.03578	0.00336
	Okinawa	0.03215	0.03126	0.03155	0.03155		0.03533	-	0.03423
	Main Island	0.04205	0.04086	0.04198	0.04149	0.03342		-	0.04414
China	Japan	0.02783	0.02688	0.02735	0.02723	-	-		0.03629
	Ju-Jiang	0.00043	0.00064	0.00077	0.00064	0.03063	0.04084	0.02637	

表十、日本絨螯蟹 (*E. japonica*) COI 基因遺傳分化值 (Nst、Fst) 與基因交流度 (Nm)

Table 10. COI gene differentiation (Nst、Fst) and gene flow (Nm) of *E. japonica*.

Nm (Nst) Nm (Fst)	Nst Fst	Taiwan			Taiwan Total	Japan		Japan Total	China	
		West	North	NorthEast		Okinawa	Japan		Ju-Jiang	
Taiwan	West		0.01971	0.00868	-	0.94314	0.96262	0.77164	0.12734	
			0.01975	0.00871	-	0.94194	0.96155	0.77032	0.12683	
	North	12.43		0.00508	-	0.93580	0.95695	0.76092	0.18946	
		12.41		0.00501	-	0.93449	0.95576	0.75957	0.18931	
	NorthEast	29.06	49.00		-	0.93208	0.95474	0.76094	0.22934	
		28.96	48.79		-	0.93068	0.95345	0.75941	0.22889	
Japan	Taiwan	-	-	-		0.93609	0.95672	0.76252	0.19021	
		-	-	-		0.93477	0.95551	0.76109	0.18989	
	Okinawa	0.02	0.02	0.02	0.02		0.94704	-	0.89682	
		0.02	0.02	0.02	0.02		0.94590	-	0.89474	
	Main Island	0.01	0.01	0.01	0.01	0.01		-	0.92717	
		0.01	0.01	0.01	0.01	0.01		-	0.92517	
	Japan	0.07	0.08	0.08	0.08	-	-		0.72895	
		0.07	0.08	0.08	0.08	-	-		0.72668	
China	Ju-Jiang	2.21	1.57	1.34	1.56	0.03	0.02	0.09		
		2.21	1.57	1.34	1.57	0.03	0.02	0.09		

表十一、東亞四地理分區日本絨螯蟹 (*E. japonica*) 各區單基因型遺傳結構分析 (AMOVA)

Table 11. Hierarchical analysis of molecular variance (AMOVA) with geographical regions and four lineages comparison among *E. japonica* population in East Asia.

Source of variation	Degrees of freedom	Sum of squares	Variance components	Percentage of variation
Among groups	2	170.114	6.09811 Va	76.01
Among populations within groups	3	45.677	1.20394 Vb	15.01
Within populations	59	42.547	0.72114 Vc	8.99
Total	64	258.338	8.02319	

表十二、台灣島內日本絨螯蟹 (*E. japonica*) 各地理分區兩兩之間的遷移狀況

Table 12. The migration between each two geographical regions of *E. japonica* in Taiwan.

Populations		Item					
Population A ( $P_A$ )	Population B ( $P_B$ )	$SS_A$	$SS_B$	$Q_A$	$Q_B$	$M_{A \rightarrow B}$	$M_{B \rightarrow A}$
West	North	11	22	11.719	9.968	6.235	5.505
North	NorthEast	22	16	14.959	20.529	4.795	5.725

附註：  $SS_A$  表示 A 族群的樣本數量；  $Q_A$  表示 A 族群的有效族群量；  $M_{A \rightarrow B}$  表示 A 族群遷移到 B 族群的頻率。

表十三、絨螯蟹屬 (*Eriocheir*) COI 基因分子鐘的建構

Table 13. The molecular clock of genus *Eriocheir*.

Results from IM mya	<i>E. japonica</i> ( Taiwan & China )	<i>E. japonica</i> ( Okinawa )	<i>E. japonica</i> ( Japan )	<i>Platyeriocheir. formosa</i>	<i>E. sinensis</i>	<i>E. leptognathus</i>
<i>E. japonica</i> ( Taiwan & China )		7.0850	8.2950	7.7850	8.8350	6.2150
<i>E. japonica</i> ( Okinawa )	6.38		8.4950	8.4350	7.9550	2.0650
<i>E. japonica</i> ( Japan )	7.47	7.65		2.6850	7.4050	7.8950
<i>Platyeriocheir. formosa</i>	7.01	7.60	2.42		7.8550	0.2050
<i>E. sinensis</i>	7.96	7.17	6.67	7.08		6.6350
<i>E. leptognathus</i>	5.74	1.92	7.30	0.19	6.13	

附註： mya 表示 Million years ago

Table 14. The genetic divergence of the species of *Eriocheir*.

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表十五、日本絨螯蟹 (*E. japonica*) 各基因型所包含的各族群樣本

Table 15. The populations of specimens of each haplotype of Japanese mitten crab (*E. japonica*).

Haplotype	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
H01	Oki01	Oki03	Oki04	Oki05	Oki06	Oki07	Oki09	Ej06							
H02	Oki08														
H03	Oki10	Ej07													
H04	Oki02														
H05	Ej10	Ej10													
H06	W01	HL02	DSC05												
H07	SS04														
H08	DJ06	TC01	TC04	TC09	LCK03	LCK07	YT07	MS07	KF04	SC07	SC10	BM10	Ej03	Eh03	
H09	DJ07	HL01	LCK06	BL01	SMK0	DSC04	KF07	BM07	BM08	Eh02					
H10	DSC07														
H11	JJ04														
H12	SC09														
H13	SC08	Eh01													
H14	LCK04														
H15	HL03														
H16	MS09	Ej05													
H17	TC05	SMK0	YT06	SS03											
H18	MS08														
H19	DJ08	JB01	LM01	LM02	SMK0	SMK1	YT04	YT05	MS10	DSC08	KF09	JJ02	Ej01	Ej02	Ej04
H20	BM09														
H21	KF03														
H22	Ej08	Ej09	Ej12	Ej13											
H23	Ej11														