



APPENDICES

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่

Copyright© by Chiang Mai University

All rights reserved



APPENDIX I

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่

Copyright© by Chiang Mai University

All rights reserved

**Table 1** Survey of *Haplorchis taichui* and other metacercariae in cyprinoid fish from Chom Thong District (November 2001 – October 2002).

Months	Fish species	No. infected/ examined fish	Weight (g) range (mean)	Length(cm) range (mean)	Metacercariae species (No. infected/ examined fish)	No. of metacercariae isolated					Total (intensity)
						fins	scales	gill	head	muscle	
Nov. 2001	<i>H. siamensis</i>	10/10	63.5-92.0 (81.28)	19.0-21.5 (20.15)	<i>Haplorchiodes</i> sp. (7/10)	3-7	1-12	2-4	5	58	
						(1.4, 14)	(3.3, 33)	(0.6, 6)	(0.5, 5)	(5.80)	
						12-33	1	27-462	3	3	
						(12.2, 122)	(0.1, 1)	(153.6, 1536)	34-125	2400	
						(74.1, 741)	(240.00)				
<i>L. siamensis</i>	5/5	57.3-83.5 (69.74)	19.0-20.5 (19.70)	<i>Haplorchiodes</i> sp. (1/5)	34	4	6-17	3-10	38		
					(6.8, 34)	(0.8, 4)	(10.8, 54)	(5.2, 26)	(7.60)		
<i>P. proctozyson</i>	3/5	31.4-51.0 (40.22)	13.5-16.0 (14.90)	<i>Haplorchiodes</i> sp. (2/5)	2-5	2-11			20		
					(1.4, 7)	(2.6, 13)			(4.00)		
					<i>Haplorchis taichui</i> (3/5)	1-5	3	9	(1.80)		
Total	18/20				<i>Haplorchis taichui</i> (1/20)	21	80	6	5	112	
						122	1	1596	770	2489	
						(18/20)					
						<i>Haplorchis taichui</i> (18/20)					
Dec. 2001	<i>B. gontionotus</i>	3/3	148.8-223.0 (175.2)	23.0-25.0 (24.0)	<i>Centrocestus caninus</i> (1/3)	4	4		4		
						(1.33, 4)	(1.33, 4)		(1.33)		
						15-45	45-52		157		
						(20.0, 60)	(32.33, 97)		(52.33)		
<i>Haplorchis taichui</i>	3/3			<i>Haplorchis taichui</i> (3/3)	3-18	64-127	41-43	404			
					(11.0, 33)	(95.67, 287)	(28.0, 84)	(134.67)			

**Table 1** Survey of *Haplorchis taichui* and other metacercariae in cyprinoid fish from Chom Thong District (November 2001 – October 2002) (continued).

Months	Fish species	No. infected/ examined fish	Weight (g) range (mean)	Length(cm) range (mean)	Metacercariae species (No. infected/ examined fish)	No. of metacercariae isolated					Total (intensity)
						fins	scales	gill	head	muscle	
Dec. 2001	<i>H. siamensis</i>	10/10	28.4-82.3 (55.05)	15.0-20.0 (17.9)	<i>Centrocestus caninus</i> (1/10)			1 (0.1, 1)			1 (0.10)
					<i>Haplorchiodes</i> sp. (5/10)	3-5 (0.8, 8)	3-7 (2.5, 25)	2-4 (0.6, 6)	4-6 (1.0, 10)	49 (4.90)	
					<i>Haplorchis taichui</i> (10/10)	3-57 (23.8, 238)	2 (0.2, 2)	56-258 (115.3, 1153)	5-321 (119.3, 1193)	2586 (258.60)	
<i>I. siamensis</i>	4/5	45.0-91.1 (64.42)	17.7-19.0 (18.24)	<i>Haplorchiodes</i> sp. (2/5)						19 (3.80)	
				<i>Haplorchis taichui</i> (4/5)	2-7 (1.8, 9)	5-14 (3.8, 19)	5-36 (11.8, 59)	15 (3.0, 15)	83 (16.60)		
<i>M. marginatus</i>	4/4	16.3-24.8 (21.05)	11.0-12.5 (11.60)	<i>Haplorchiodes</i> sp. (4/4)	13-17 (7.5, 30)	274-875 (593.5, 2374)	27-69 (42.25, 169)	4-21 (12.0, 48)	2621 (655.25)		
				<i>Haplorchis taichui</i> (4/4)	21 (5.25, 21)	3 (0.75, 3)	42-67 (55.5, 222)	3-30 (17.0, 68)	314 (78.50)		
<i>P. proctozystron</i>	3/5	36.0-74.6 (49.02)	14.2-18.5 (15.88)	<i>Haplorchiodes</i> sp. (2/5)	18 (3.6, 18)	21-34 (11.0, 55)		3 (0.6, 3)	76 (15.20)		
				<i>Haplorchis taichui</i> (3/5)	3-5 (1.6, 8)		8-12 (4.0, 20)	10 (2.0, 10)	38 (7.60)		
Total	24/27			<i>Centrocestus caninus</i> (2/27)			5		5		
				<i>Haplorchiodes</i> sp. (15/27)	116	2570	175	61	2922		
				<i>Haplorchis taichui</i> (24/27)	309	5	1741	1370	3425		



**Table 1** Survey of *Haplorenchis taichui* and other metacercariae in cyprinoid fish from Chom Thong District (November 2001 – October 2002) (continued).

Months	Fish species	No. infected/ examined fish	Weight (g) range (mean)	Length(cm) range (mean)	Metacercariae species (No. infected/ examined fish)	No. of metacercariae isolated						Total (intensity)
						fins	scales	gill	head	muscle		
Jan. 2002	<i>B. gonionotus</i>	3/3	149.0-257.0 (189.67)	22.0-26.2 (23.9)	<i>Centrocestus caninus</i>				5 (1.67, 5)			5 (1.67)
					<i>Haplorenchis taichui</i>	25-52 (25.67, 77)	16-21 (18.0, 54)	18-25 (14.33, 43)	4 (1.33, 4)	178 (59.33)		
					<i>Haplorenchis pumilio</i>			1 (0.33, 1)	3 (1.0, 3)	4 (1.33)		
					<i>Haplorenchis taichui</i>	13-15 (9.33, 28)		77-284 (159.67, 479)	148-332 (255.33, 676)	1183 (394.33)		
<i>H. siamensis</i>	10/10	50.4-90.4 (72.43)	18.0-22.0 (20.4)	<i>Centrocestus caninus</i>				1-3 (0.4, 4)			4 (0.40)	
				<i>Haplorenchis taichui</i>	3-8 (1.7, 17)	3-8 (1.5, 15)	2 (0.4, 4)	2 (0.2, 2)	38 (3.80)			
				<i>Haplorenchis pumilio</i>			4 (0.4, 4)	2 (0.2, 2)	6 (0.60)			
				<i>Haplorenchis taichui</i>	7-52 (19.5, 195)	2 (0.2, 2)	15-147 (54.4, 544)	20-198 (67.8, 678)	1422 (142.20)			
				<i>Haplorenchis taichui</i>	17-18 (7.0, 35)	5-14 (7.6, 38)	2 (0.4, 2)	3-7 (2.0, 10)	85 (17.00)			
				<i>Haplorenchis taichui</i>	15-42 (25.6, 128)		24-128 (74.4, 372)	38-165 (107.8, 539)	1039 (207.80)			
<i>M. marginatus</i>	4/4	9.1-17.1 (11.70)	8.5-11.0 (9.43)	<i>Centrocestus caninus</i>				4 (1.0, 4)			4 (1.00)	
				<i>Haplorenchis taichui</i>	6-152 (55.5, 222)	361-823 (510.0, 2040)	11-63 (38.5, 154)	14-27 (22.25, 89)	2512 (628.00)			
				<i>Haplorenchis taichui</i>	32-43 (27.25, 109)		28-214 (80.0, 320)	14-447 (145.75, 583)	1012 (253.00)			

**Table 1** Survey of *Haplorchis taichui* and other metacercariae in cyprinoid fish from Chom Thong District (November 2001 – October 2002) (continued).

Months	Fish species	No. infected/ examined fish	Weight (g) range (mean)	Length(cm) range (mean)	Metacercariae species (No. infected/ examined fish)	No. of metacercariae isolated						Total (intensity)
						fins	scales	gill	head	muscle		
Jan. 2002	<i>P. proctozysson</i>	4/4	58.7-138.5 (109.58)	17.0-21.0 (19.13)	<i>Haplorchiodes</i> sp. (2/4)	10-14 (6.0, 24)	7-37 (11.0, 44)		12-32 (17.0, 68)	5 (1.25, 5)	73 (18.25)	
					<i>Haplorchis taichui</i> (4/4)	3 (0.75, 3)				5-14 (9.5, 38)	109 (27.25)	
					<i>Centrocestus caninus</i> (4/26)				13			13
		26/26			<i>Haplorchiodes</i> sp. (17/26)	375	2191	7	203	110	2886	
					<i>Haplorchis pumilio</i> (3/26)	463	2	3	5	5	10	
					<i>Haplorchis taichui</i> (26/26)				1783	2514	4765	
Feb. 2002	<i>H. siamensis</i>	10/10	41.2-95.0 (68.43)	13.8-21.0 (18.38)	<i>Haplorchiodes</i> sp. (4/10)	2-3 (0.5, 5)	2-7 (0.9, 9)		2-3 (0.5, 5)	1 (0.1, 1)	20 (2.00)	
					<i>Haplorchis taichui</i> (10/10)	2-35 (10.9, 109)	2-3 (0.5, 5)	2 (0.2, 2)	14-310 (81.6, 816)	8-273 (80.1, 801)	1733 (173.30)	
					<i>Haplorchiodes</i> sp. (4/5)	5-32 (9.4, 47)	24-38 (18.0, 90)		3 (0.6, 3)		140 (28.00)	
					<i>Haplorchis taichui</i> (5/5)	3 (0.6, 3)			14-54 (26.6, 133)	12-22 (13.6, 68)	204 (40.80)	
					<i>Haplorchiodes</i> sp. (4/4)	3 (0.75, 3)	37-218 (139.25, 557)		3-22 (14.0, 56)	21-28 (12.25, 49)	665 (166.25)	
		4/4	9.2-32.3 (16.13)	9.0-13.5 (10.53)	<i>Haplorchis taichui</i> (4/4)	5-17 (5.5, 22)	1 (0.25, 1)	3-45 (16.75, 67)	21-86 (36.0, 144)	234 (58.50)		

**Table 1** Survey of *Haplorchis taichui* and other metacercariae in cyprinoid fish from Chom Thong District (November 2001 – October 2002) (continued).

Months	Fish species	No. infected/ examined fish	Weight (g) range (mean)	Length(cm) range (mean)	Metacercariae species (No. infected/ examined fish)	No. of metacercariae isolated					Total (intensity)
						fins	scales	gill	head	muscle	
Feb. 2002	Total	19/19			<i>Haplorchiodes</i> sp. (12/19)	55	656		64	50	825
					<i>Haplorchis taichui</i> (19/19)	134	6	2	1016	1013	2171
Mar. 2002	<i>C. repasson</i>	4/4	21.4-34.1 (28.13)	12.8-16.5 (14.58)	<i>Haplorchiodes</i> sp. (4/4)	12-764 (214.0, 856)	293-1251 (599.5, 2398)		12-34 (19.5, 78)	5 (1.25, 5)	3337 (834.25)
					<i>Haplorchis taichui</i> (2/4)				21-23 (11.0, 44)	3-4 (1.75, 7)	51 (12.75)
	<i>H. siamensis</i>	10/10	77.1-143.8 (101.68)	18.0-21.8 (20.29)	<i>Centrocestus caninus</i> (1/10)			2 (0.2, 2)			2 (0.20)
					<i>Haplorchiodes</i> sp. (3/10)	2-11 (1.3, 13)	4-34 (4.5, 45)		8 (0.8, 8)		66 (6.60)
					<i>Haplorchis taichui</i> (10/10)	2-31 (6.9, 69)			5-124 (35.0, 350)	3-442 (73.5, 735)	1154 (115.40)
<i>L. siamensis</i>	3/3	53.7-74.0 (64.6)	17.0-20.0 (18.67)	<i>Haplorchiodes</i> sp. (2/3)	18 (6.0, 18)	24-32 (18.67, 56)		3 (1.0, 3)		77 (25.67)	
				<i>Haplorchis taichui</i> (3/3)	3 (1.0, 3)			4-15 (10.33, 31)	5-7 (4.0, 12)	46 (15.33)	
<i>M. marginatus</i>	5/5	13.5-27.3 (19.5)	10.0-13.0 (11.2)	<i>Haplorchiodes</i> sp. (5/5)	5-28 (17.2, 86)	437-874 (625.8, 3129)		7-68 (35.0, 175)	10-57 (31.8, 159)	3549 (709.80)	
				<i>Haplorchis taichui</i> (5/5)	2-8 (3.6, 18)	3 (0.6, 3)		38-124 (83.4, 417)	19-156 (84.4, 422)	860 (172.00)	
<i>O. hasselti</i>	3/5	40.9-97.0 (72.8)	15.0-19.1 (17.48)	<i>Haplorchis taichui</i> (3/5)				1-9 (2.4, 12)	1 (0.2, 1)	13 (2.60)	



**Table 1** Survey of *Haplorchis taichui* and other metacercariae in cyprinoid fish from Chom Thong District (November 2001 – October 2002) (continued).

Months	Fish species	No. infected/ examined fish	Weight (g) range (mean)	Length(cm) range (mean)	Metacercariae species (No. infected/ examined fish)	No. of metacercariae isolated					Total (intensity)
						fins	scales	gill	head	muscle	
Mar. 2002	Total	25/27			<i>Centrocestus caninus</i> (1/27)	2					2
					<i>Haplorchiodes</i> sp. (14/27)	973	5628		264	164	7029
					<i>Haplorchis taichui</i> (23/27)	90	3		854	1177	2124
Apr. 2002	<i>B. gonionotus</i>	4/4	165.7-225.0 (205.45)	22.8-25.0 (23.68)	<i>Haplorchiodes</i> sp. (4/4)		12-35 (23.0, 92)			3 (0.75, 3)	95 (23.75)
	<i>B. schwanefeldi</i>	3/3	50.5-64.8 (59.13)	15.5-16.7 (15.9)	<i>Haplorchis taichui</i> (2/4)	4 (1.0, 4)			10-33 (10.75, 43)	34-58 (23.0, 92)	139 (34.75)
	<i>H. siamensis</i>	8/10	14.7-105.2 (56.72)	11.5-21.0 (17.32)	<i>Haplorchiodes</i> sp. (2/3)	12-28 (13.33, 40)	5 (1.67, 5)		2 (0.67, 2)		45 (15.00)
	<i>P. proctozysson</i>	4/5	45.5-101.3 (86.22)	15.4-20.2 (18.58)	<i>Haplorchis taichui</i> (7/10)	5-35 (6.9, 69)	2 (0.2, 2)		23-217 (82.3, 823)	25-303 (110.3, 1103)	2 (0.40)
					<i>Centrocestus caninus</i> (1/5)			2 (0.4, 2)			80 (16.00)
					<i>Haplorchiodes</i> sp. (3/5)		15-42 (16.0, 80)				27 (5.40)
					<i>Haplorchis taichui</i> (2/5)	1 (0.2, 1)			8 (1.6, 8)	6-12 (3.6, 18)	5 (1.67, 5)
	<i>S. orphoides</i>	3/3	20.0-33.86 (27.12)	11.0-13.2 (12.07)	<i>Centrocestus caninus</i> (1/3)						5 (1.67, 5)

**Table 1** Survey of *Haplorchis taichui* and other metacercariae in cyprinoid fish from Chom Thong District (November 2001 – October 2002) (continued).

Months	Fish species	No. infected/ examined fish	Weight (g) range (mean)	Length(cm) range (mean)	Metacercariae species (No. infected/ examined fish)	No. of metacercariae isolated					Total (intensity)
						fins	scales	gill	head	muscle	
Apr. 2002	<i>S. orphoides</i>	3/3	20.0-33.86 (27.12)	11.0-13.2 (12.07)	<i>Haplorchtiodes</i> sp. (3/3)	36-52 (43.67, 131)	127-454 (273.0, 819)	117 (39.0, 117)	8-11 (6.33, 19)	32 (10.67, 32)	1099 (366.33)
					<i>Haplorchis taichui</i> (2/3)					20 (6.67, 20)	39 (13.00)
		Total	22/25			<i>Centrocestus caninus</i> (2/25)			7		
May. 2002	<i>C. apogon</i>	2/2	21.1-24.0 (22.55)	12.0-12.8 (12.4)	<i>Haplorchtiodes</i> sp. (2/2)	13-33 (23.0, 46)	148-341 (244.5, 489)		63-79 (71.0, 142)	7-21 (14.0, 28)	705 (352.50)
					<i>Haplorchis taichui</i> (2/2)	3-16 (9.5, 19)			18-56 (37.0, 74)	13-47 (30.0, 60)	153 (76.50)
					<i>Haplorchtiodes</i> sp. (2/2)	148-199 (173.5, 347)	492-748 (620.0, 1240)		2-84 (43.0, 86)	17 (8.5, 17)	1690 (845.00)
					<i>Haplorchis taichui</i> (2/2)	2 (1.0, 2)			3-5 (4.0, 8)	2-7 (4.5, 9)	19 (9.50)
					<i>Centrocestus caninus</i> (1/7)				7 (1.0, 7)		7 (1.00)
					<i>Haplorchtiodes</i> sp. (3/7)	3-37 (8.29, 58)	5-14 (4.14, 29)		4 (0.57, 4)	7 (1.0, 7)	98 (14.00)
<i>L. siamensis</i>	<i>Haplorchis taichui</i> (7/7)	3/3	31.0-48.0 (41.37)	15.0-17.5 (16.5)	<i>Haplorchis taichui</i> (7/7)	27-142 (71.14, 498)	1-2 (0.43, 3)	4 (0.57, 4)	100-678 (355.7, 2476)	259-1057 (719.0, 5033)	8014 (1144.86)
					<i>Haplorchtiodes</i> sp. (3/3)	21-89 (51.33, 154)	17-61 (33.0, 99)		4 (1.33, 4)		257 (85.67)



Table 1 Survey of *Haplorchis taichui* and other metacercariae in cyprinoid fish from Chom Thong District (November 2001 – October 2002) (continued).

Months	Fish species	No. infected/ examined fish	Weight (g) range (mean)	Length(cm) range (mean)	Metacercariae species (No. infected/ examined fish)	No. of metacercariae isolated					Total (intensity)
						fins	scales	gill	head	muscle	
May. 2002	<i>L. siamensis</i>	3/3	31.0-48.0 (41.37)	15.0-17.5 (16.5)	<i>Haplorchis taichui</i> . (3/3)	4-15 (9.0, 27)	1 (0.33, 1)	31-42 (36.67, 110)	14-33 (25.0, 75)	213 (71.00)	
						27-182 (117.0, 351)	648-2123 (1412.67, 4238)	24 (8.0, 24)	55-203 (129.0, 387)	174-372 (261.0, 783)	5783 (1927.67)
						14-35 (27.67, 83)	4 (1.33, 4)	363-787 (514.67, 1544)	376-1312 (892.0, 2676)	4307 (1435.67)	
<i>M. marginatus</i>	3/3	15.9-55.4 (29.7)	10.7-14.8 (12.17)	<i>Haplorchiodes</i> sp. (3/3)	7-371 (102.5, 615)	4-217 (83.67, 502)	4	2-43 (20.83, 125)	2-62 (15.0, 90)	1121 (186.83)	
					2-75 (14.0, 84)	6(6)	2-43 (20.83, 125)	2-62 (15.0, 90)	299 (49.83)		
					11-52 (31.5, 63)	2(2)	292-330 (311.0, 622)	345-584 (464.5, 929)	1614 (807.00)		
<i>P. proctozysron</i>	6/6	18.1-74.9 (39.75)	11.2-17.5 (14.45)	<i>Haplorchis taichui</i> . (6/6)	7-371 (102.5, 615)	4-217 (83.67, 502)	4	2-43 (20.83, 125)	2-62 (15.0, 90)	1121 (186.83)	
					2-75 (14.0, 84)	6(6)	2-43 (20.83, 125)	2-62 (15.0, 90)	299 (49.83)		
					11-52 (31.5, 63)	2(2)	292-330 (311.0, 622)	345-584 (464.5, 929)	1614 (807.00)		
<i>R. guttatus</i>	2/2	67.8-84.0 (75.9)	20.0-24.5 (22.25)	<i>Haplorchis taichui</i> . (2/2)	7-371 (102.5, 615)	4-217 (83.67, 502)	4	2-43 (20.83, 125)	2-62 (15.0, 90)	1121 (186.83)	
					2-75 (14.0, 84)	6(6)	2-43 (20.83, 125)	2-62 (15.0, 90)	299 (49.83)		
					11-52 (31.5, 63)	2(2)	292-330 (311.0, 622)	345-584 (464.5, 929)	1614 (807.00)		
Total	25/25				7	8	7	627	835	9654	
					1571	6597	24	4959	8872	14619	
					776	8	4				
Jun. 2002	<i>B. gonionotus</i>	5/5	35.6-95.9 (71.88)	14.5-20.0 (18.0)	<i>Centrocestus caninus</i> (2/5)	7-31 (14.4, 72)	24-45 (21.4, 107)	4-7 (2.2, 11)	3-20 (6.0, 30)	4-11 (3.0, 15)	11 (2.20)
						1-3 (1.6, 8)	1-3 (1.6, 8)	2 (0.4, 2)	4-23 (9.4, 47)	3-19 (10.0, 50)	226 (45.20)
						1-3 (1.6, 8)	1-3 (1.6, 8)	2 (0.4, 2)	4-23 (9.4, 47)	3-19 (10.0, 50)	105 (21.00)

Table 1 Survey of *Haplorchis taichui* and other metacercariae in cyprinoid fish from Chom Thong District (November 2001 – October 2002) (continued).

Months	Fish species	No. infected/ examined fish	Weight (g) range (mean)	Length(cm) range (mean)	Metacercariae species (No. infected/ examined fish)	No. of metacercariae isolated					Total (intensity)
						fins	scales	gill	head	muscle	
Jun. 2002	<i>B. schwanefeldi</i>	3/3	121.8-132.6 (125.7)	20.5-21.0 (20.83)	<i>Haplorchiodes</i> sp. (3/3)	8-107 (46.33, 139)	7-15 (7.33, 22)	8-21 (9.67, 29)	18 (6.0, 18)	208 (69.33)	
						45 (15.0, 45)		11-149 (59.0, 177)	15-201 (80.67, 242)	464 (154.67)	
	<i>C. repasson</i>	5/5	17.5-47.2 (33.84)	13.0-17.0 (15.3)	<i>Haplorchiodes</i> sp. (5/5)	7-43 (24.6, 123)	31-427 (206.6, 1033)	15-77 (39.6, 198)	2 (0.8, 4)	1358 (271.60)	
						2-4 (1.8, 9)		2-18 (4.6, 23)	10-11 (4.2, 21)	53 (10.60)	
						12 (2.4, 12)				22 (4.40)	
	<i>H. siamensis</i>	5/5	57.0-140.0 (116.74)	17.0-23.0 (21.3)	<i>Haplorchis taichui</i> (5/5)	9-28 (12.4, 62)	3 (0.6, 3)	1-4 (1.0, 5)	108-632 (505.0, 2525)	3820 (764.00)	
						12-52 (35.67, 107)				3 (1.0, 3)	
						7 (2.33, 7)				3 (1.00)	
	<i>L. siamensis</i>	3/3	30.0-48.5 (38.67)	15.5-18.0 (16.67)	<i>Centrocestus caninus</i> (1/3)	5-64 (34.67, 104)		5-27 (13.33, 40)	15-156 (98.33, 295)	251 (83.67)	
						7 (2.33, 7)		11-81 (54.67, 164)		468 (156.00)	
										5 (1.00)	
	<i>M. marginatus</i>	5/5	14.7-43.5 (28.58)	10.8-15.0 (12.86)	<i>Centrocestus caninus</i> (1/5)	287-1625 (1232.8, 6164)		22-232 (84.0, 420)	7-33 (22.2, 111)	6864 (1372.80)	
						15-57 (29.8, 149)				5 (1.00)	
						13-112 (44.0, 220)	2-4 (1.2, 6)	156-275 (231.6, 1158)	139-752 (424.2, 2121)	3505 (701.00)	

**Table 1** Survey of *Haplorchis taichui* and other metacercariae in cyprinoid fish from Chom Thong District (November 2001 – October 2002) (continued).

Months	Fish species	No. infected/ examined fish	Weight (g) range (mean)	Length (cm) range (mean)	Metacercariae species (No. infected/ examined fish)	No. of metacercariae isolated					Total (intensity)
						fins	scales	gill	head	muscle	
Jun. 2002	Total	26/26			<i>Centrocestus caninus</i> (4/26)			19			19
					<i>Haplorchiodes</i> sp. (22/26)	602	7440	22	717	148	8929
					<i>Haplorchis taichui</i> (25/26)	351	11	5	2794	5254	8415
Jul. 2002	<i>B. gonionotus</i>	5/5	111.4-224.3 (150.1)	20.0-27.0 (22.7)	<i>Centrocestus caninus</i> (2/5)			5-12 (3.4, 17)			17 (3.40)
					<i>Haplorchiodes</i> sp. (5/5)	14-52 (29.2, 146)	57-164 (101.0, 505)	3 (0.6, 3)	3-15 (8.4, 42)		696 (139.20)
					<i>Haplorchis taichui</i> (5/5)	4-14 (7.8, 39)	3 (0.6, 3)	1-2 (0.6, 3)	7-92 (54.8, 274)	67-187 (130.2, 651)	970 (194.00)
	<i>H. siamensis</i>	6/6	67.2-104.8 (82.35)	18.2-20.5 (19.07)	<i>Centrocestus caninus</i> (1/6)			4 (0.67, 4)			4 (0.67)
					<i>Haplorchiodes</i> sp. (3/6)	12-13 (4.17, 25)	5-12 (4.0, 24)		2-4 (1.0, 6)		55 (9.17)
					<i>Haplorchis taichui</i> (6/6)	12-125 (50.0, 300)	2 (0.33, 2)	5 (0.83, 5)	23-568 (204.33, 1226)	75-1550 (513.33, 3080)	4613 (768.83)
	<i>M. marginatus</i>	6/6	9.1-40.1 (19.68)	9.2-14.5 (11.23)	<i>Haplorchiodes</i> sp. (6/6)	48-175 (116.33, 698)	475-2182 (1362.5, 8175)	3-14 (2.83, 17)	82-490 (160.33, 962)	13-385 (91.5, 549)	10401 (1733.50)
					<i>Haplorchis taichui</i> (6/6)	32-383 (104.0, 624)	2-7 (1.5, 9)	1 (0.17, 1)	209-950 (389.33, 2336)	321-1825 (688.33, 4130)	7100 (1183.33)
	<i>P. proctozysson</i>	4/4	44.9-205.0 (125.43)	16.0-24.0 (19.88)	<i>Centrocestus caninus</i> (2/4)			2 (1.0, 4)			4 (1.00)
					<i>Haplorchiodes</i> sp. (4/4)	62-382 (158.25, 633)	132-347 (244.25, 977)		2-15 (8.25, 33)	14-21 (8.75, 35)	1678 (419.50)



**Table 1** Survey of *Haplorchis taichui* and other metacercariae in cyprinoid fish from Chom Thong District (November 2001 – October 2002) (continued).

Months	Fish species	No. infected/ examined fish	Weight (g) range (mean)	Length (cm) range (mean)	Metacercariae species (No. infected/ examined fish)	No. of metacercariae isolated					Total (intensity)
						fins	scales	gill	head	muscle	
Jul. 2002	<i>P. proctozystron</i>	4/4	44.9-205.0 (125.43)	16.0-24.0 (19.88)	<i>Haplorchis taichui</i> (4/4)	2-14 (6.0, 24)	3 (0.75, 3)	1 (0.25, 1)	3-32 (13.5, 54)	8-127 (67.5, 270)	352 (88.00)
	Total	21/21			<i>Centrocestus caninus</i> (5/21) <i>Haplorchiodes</i> sp. (18/21) <i>Haplorchis taichui</i> (21/21)	1502	9681	20	1043	584	12830
						987	17	10	3890	8131	13035
Aug. 2002	<i>A. truncatus</i>	2/2	147.2-177.1 (162.15)	23.0-24.0 (23.5)	<i>Haplorchiodes</i> sp. (2/2) <i>Haplorchis taichui</i> (2/2)	8-12 (10.0, 20) 3 (1.5, 3)	128-237 (182.5, 365)		4-6 (5.0, 10) 15-23 (19.0, 38)	4-6 (5.0, 10) 8-10 (9.0, 18)	395 (197.50) 59 (29.50)
	<i>B. gonionotus</i>	2/2	51.5-117.4 (84.45)	16.2-22.0 (19.1)	<i>Centrocestus caninus</i> (1/2) <i>Haplorchiodes</i> sp. (2/2) <i>Haplorchis taichui</i> (2/2)	12-32 (22.0, 44) 79-126 (102.5, 205)	23-57 (40.0, 80)		8-21 (14.5, 29) 344-353 (348.5, 697)	8-21 (14.5, 29) 324-335 (329.5, 659)	17 (8.5, 17) 153 (76.50) 1563 (781.50)
	<i>B. schwanefeldi</i>	2/2	43.9-140.0 (91.95)	15.0-21.5 (18.25)	<i>Haplorchiodes</i> sp. (1/2) <i>Haplorchis taichui</i> (2/2)	2 (1.0, 2)	13 (6.5, 13)		2 (1.0, 2) 7-18 (12.5, 25)	2 (1.0, 2) 16-21 (18.5, 37)	15 (7.50) 64 (32.00)
	<i>H. siamensis</i>	5/5	101.9-165.7 (127.94)	21.0-24.0 (22.5)	<i>Centrocestus caninus</i> (2/5) <i>Haplorchiodes</i> sp. (5/5)	5-24 (11.6, 58)	18-47 (31.8, 159)	3-11 (2.8, 14)	43-57 (20.0, 100)	43-57 (20.0, 100)	14 (2.80) 317 (63.40)

**Table 1** Survey of *Haplorchis taichui* and other metacercariae in cyprinoid fish from Chom Thong District (November 2001 – October 2002) (continued).

Months	Fish species	No. infected/ examined fish	Weight (g) range (mean)	Length (cm) range (mean)	Metacercariae species (No. infected/ examined fish)	No. of metacercariae isolated					Total (intensity)
						fins	scales	gill	head	muscle	
Aug. 2002	<i>H. siamensis</i>	5/5	101.9-165.7 (127.94)	21.0-24.0 (22.5)	<i>Haplorchis taichui</i> (5/5)	11-122 (46.6, 233)	2-3 (1.0, 5)	3 (0.6, 3)	78-620 (282.0, 1410)	398-1046 (854.2, 4271)	5922 (1184.40)
	<i>L. siamensis</i>	3/3	38.1-65 (51.5)	17.2-19.0 (18.23)	<i>Centrocestus caninus</i> (1/3) <i>Haplorchiodes</i> sp. (3/3) <i>Haplorchis taichui</i> (3/3)	24-38 (30.0, 90) 6-7 (4.33, 13)	18-133 (64.33, 193) 1 (0.33, 1)	3 (1.0, 3)	1-8 (4.33, 13) 3-42 (21.33, 64)	1-5 (2.0, 6) 4-80 (32.67, 98)	3 (1.00) 302 (100.67) 176 (58.67)
	<i>P. proctozyxron</i>	5/5	109.8-185.9 (159.36)	21.0-24.0 (22.9)	<i>Centrocestus caninus</i> (1/5) <i>Haplorchiodes</i> sp. (5/5) <i>Haplorchis taichui</i> (5/5)	5-24 (14.8, 74) 1-3 (1.2, 6)	15-52 (35.0, 175)	5 (1.0, 5)	1-6 (3.4, 17) 5-31 (22.0, 110)	846 (846.0, 846)	5 (1.00) 266 (53.20) 261 (52.20)
	<i>R. guttatus</i>	1/1	190.2 (190.2)	27.0 (27.0)	<i>Haplorchis taichui</i> (1/1)	68 (68.0, 68)			442 (442.0, 442)	846 (846.0, 846)	1356 (1356.00)
	Total	20/20			<i>Centrocestus caninus</i> (5/20) <i>Haplorchiodes</i> sp. (18/20) <i>Haplorchis taichui</i> (20/20)	286	985	39	171	6	39 1448 9401
Sep. 2002	<i>B. schwanerfeldti</i>	3/3	58.4-75.6 (65.13)	15.5-16.3 (15.87)	<i>Haplorchiodes</i> sp. (2/3) <i>Haplorchis taichui</i> (3/3)	14-25 (13.0, 39) 3-22 (12.33, 37)	7 (2.33, 7)		8-16 (8.0, 24) 4-31 (14.0, 42)	2 (0.67, 2) 18-148 (62.33, 187)	72 (24.00) 266 (88.67)





**Table 1** Survey of *Haplorchis taichui* and other metacercariae in cyprinoid fish from Chom Thong District (November 2001 – October 2002) (continued).

Months	Fish species	No. infected/ examined fish	Weight (g) range (mean)	Length (cm) range (mean)	Metacercariae species (No. infected/ examined fish)	No. of metacercariae isolated					Total (intensity)
						fins	scales	gill	head	muscle	
Sep. 2002	<i>P. proctozyson</i>	5/5	99.1-176.7 (135.64)	20.2-25.0 (22.04)	<i>Haplorchis taichui</i> (4/5)	2			1-2	2-4	16
						(0.4, 2)		(1.0, 5)	(1.8, 9)	(3.20)	
						42-137 (89.5, 179)	7			4	
						(2/2)	(2.0, 4)	(3.5, 7)		(2.00)	
						(1/2)	5	5	5	186	
<i>S. orphoides</i>	2/2	50.6-64.0 (57.3)	15.5-17.0 (16.25)	<i>Centrocestus caninus</i> (1/2)	4					4	
					(2.0, 4)				(2.00)		
					42-137 (89.5, 179)	7			186		
					(2/2)	(2.0, 4)	(3.5, 7)		(93.00)		
					(1/2)	5	5	5	37		
Total		25/25			<i>Centrocestus caninus</i> (7/25)	45				45	
						(2.0, 4)				(2.00)	
						42-137 (89.5, 179)	7			186	
						(2/2)	(2.0, 4)	(3.5, 7)		(93.00)	
						(1/2)	5	5	5	37	
Oct. 2002	<i>B. gonionotus</i>	3/3	35.1-180.8 (112.8)	14.0-26.0 (20.33)	<i>Haplorchis taichui</i> (23/25)	1074	3935	4	205	494	5712
						(2.0, 4)					
						42-137 (89.5, 179)	7				2
						(2/2)	(2.0, 4)	(3.5, 7)			4839
						(1/2)	5	5	5		
<i>B. schwanenfeldi</i>	2/2	16.8-78.4 (47.6)	11.2-18.0 (14.6)	<i>Haplorchis taichui</i> (2/2)	958	7		1029	2845	4839	
					(2.0, 4)						
					42-137 (89.5, 179)	7				2	
					(2/2)	(2.0, 4)	(3.5, 7)			4839	
					(1/2)	5	5	5			

**Table 1** Survey of *Haplorchis taichui* and other metacercariae in cyprinoid fish from Chom Thong District (November 2001 – October 2002) (continued).

Months	Fish species	No. infected/ examined fish	Weight (g) range (mean)	Length (cm) range (mean)	Metacercariae species (No. infected/ examined fish)	No. of metacercariae isolated						Total (intensity)
						fins	scales	gill	head	muscle		
Oct. 2002	<i>H. siamensis</i>	5/5	41.6-59.6 (48.08)	16.0-20.0 (17.6)	<i>Centrocestus caninus</i>	8					8	(1.60)
					<i>Haplorchiodes</i> sp.	4-22 (12.0, 60)	1-2 (0.6, 3)			100	(20.00)	
					<i>Haplorchis taichui</i>	3-42 (21.0, 105)	15-52 (29.4, 147)	32-68 (47.2, 236)	488	(97.60)		
	<i>M. marginatus</i>	3/3	11.0-14.4 (13.13)	9.3-10.5 (10.03)	<i>Haplorchiodes</i> sp.	792-1752 (1126.3, 3379)	25-37 (31.0, 93)	5-17 (13.33, 37)		3728	(1242.67)	
					<i>Haplorchis taichui</i>	2-23 (8.33, 25)	12-38 (24.0, 72)	7-142 (52.67, 158)	255	(85.00)		
						2-8 (3.4, 17)	6-12 (3.6, 18)	3-28 (7.0, 35)	70	(14.00)		
	<i>P. barroni</i>	5/5	7.7-11.6 (9.48)	10.0-12.0 (10.94)	<i>Haplorchis taichui</i>	3				3	(1.00)	
					<i>Centrocestus caninus</i>	21-125 (69.33, 208)	13-17 (10.0, 30)			310	(103.33)	
					<i>Haplorchiodes</i> sp.	7-38 (24.0, 72)	5-6 (5.33, 16)	1-2 (1.0, 3)	23	(7.67)		
	<i>P. proctozystron</i>	3/3	31.5-58.0 (47.93)	14.0-17.0 (15.83)	<i>Haplorchis taichui</i>	3				3	(1.00)	
					<i>Centrocestus caninus</i>	1						
					<i>Haplorchis taichui</i>	3						
	<i>R. tornieri</i>	2/3	4.2-8.5 (5.77)	8.5-10.5 (9.27)	<i>Haplorchiodes</i> sp.	5				41	(13.67)	
					<i>Haplorchis taichui</i>	3-7 (3.33, 10)	4-15 (6.33, 19)	2-5 (2.33, 7)	2	(0.67)		
						3-7 (3.33, 10)	2 (0.67, 2)	2 (0.67, 2)	7	(1.40)		
	<i>S. orphoides</i>	5/5	13.3-19.0 (16.84)	10.0-10.5 (10.1)	<i>Centrocestus caninus</i>	5				5	(1.0, 5)	
					<i>Haplorchiodes</i> sp.	12-217 (87.0, 435)	14-32 (23.0, 115)	6-103 (21.8, 109)	3	(0.6, 3)		
						34-128 (65.8, 329)						



**Table 1** Survey of *Haplorchis taichui* and other metacercariae in cyprinoid fish from Chom Thong District (November 2001 – October 2002) (continued).

Months	Fish species	No. infected/ examined fish	Weight (g) range (mean)	Length(cm) range (mean)	Metacercariae species (No. infected/ examined fish)	No. of metacercariae isolated						Total (intensity)
						fins	scales	gill	head	muscle		
Oct. 2002	<i>S. orphoides</i>	5/5	13.3-19.0 (16.84)	10.0-10.5 (10.1)	<i>Haplorchis taichui</i> (5/5)	5-56		2	21-152	47-196	1051	
						(23.4, 117)		(0.4, 2)	(75.2, 376)	(111.2, 556)	(210.20)	
Total		28/29			<i>Centrocestus caninus</i> (5/29)	23		2	2		25	
Total					<i>Haplorchitodes</i> sp. (23/29)	1493	6355	5	283	172	8308	
Total					<i>Haplorchis taichui</i> (27/29)	540	2	2	934	1486	2964	



Copyright © by Chiang Mai University  
rights reserved

Table 2 Survey of *Haplorchis taichui* and other metacercariae in cyprinoid fish from Mae Tang District (November 2001 – October 2002) (continued).

Months	Fish species	No. infected/ examined fish	Weight (g) range (mean)	Length (cm) range (mean)	Metacercariae species (No. infected/ examined fish)	No. of metacercariae isolated						Total (intensity)
						fins	scales	gill	head	muscle	Total (mean, total)	
Nov. 2001	<i>B. gonionotus</i>	5/5	66.4-139.0 (107.44)	18.0-22.5 (20.5)	<i>Centrocestus caninus</i> (2/5)			4-7 (2.2, 11)	1 (0.2, 1)		12 (2.40)	
					<i>Haplorchitodes</i> sp. (1/5)	5 (1.0, 5)				5 (1.00)		
					<i>Haplorchis taichui</i> (5/5)	31 (6.2, 31)	3-94 (23.2, 116)	3-295 (66.2, 331)	478 (95.60)			
					<i>Haplorchitodes</i> sp. (1/5)	7 (1.4, 7)	31 (6.2, 31)		38 (7.60)			
					<i>Haplorchis taichui</i> (2/5)	1 (0.2, 1)	2 (0.4, 2)	3-11 (2.8, 14)	17 (3.40)			
<i>H. macrolepidota</i>	2/5	59.8-176.7 (107.6)	17.3-24.0 (20.96)	<i>Haplorchitodes</i> sp. (1/5)							2 (0.40)	
				<i>Haplorchis taichui</i> (2/5)	1 (0.2, 1)	2 (0.4, 2)						
				<i>Centrocestus caninus</i> (1/5)		2 (0.4, 2)			8 (1.60)			
				<i>Haplorchitodes</i> sp. (1/5)	8 (1.6, 8)				624 (124.80)			
				<i>Haplorchis taichui</i> (4/5)	14 (2.8, 14)				9-106 (32.6, 163)			
<i>L. siamensis</i>	4/5	36.0-215.1 (153.84)	14.5-25.0 (21.9)	<i>Centrocestus caninus</i> (1/5)							71 (14.20)	
				<i>Haplorchitodes</i> sp. (3/5)	21 (4.2, 21)	34 (6.8, 34)	4-12 (3.2, 16)	42 (8.40)				
				<i>Haplorchis taichui</i> (4/5)	18 (3.6, 18)	1 (0.2, 1)	2-4 (2.0, 10)	99 (19.80)				
				<i>Haplorchitodes</i> sp. (2/5)	7-74 (16.2, 81)				57 (11.40)			
				<i>Haplorchis taichui</i> (4/5)					2-13 (3.6, 18)			
<i>P. proctozystron</i>	4/5	41.6-66.5 (54.26)	15.5-17.0 (16.3)	<i>Haplorchis taichui</i> (4/5)						9 (1.8, 9)		
				<i>Haplorchitodes</i> sp. (2/5)	18 (3.6, 18)				6 (1.2, 6)			
<i>S. orphoides</i>	1/5	95.0-159.7 (116.32)	18.0-21.5 (19.4)	<i>Haplorchis taichui</i> (1/5)						15 (3.00)		



**Table 2** Survey of *Haplorchis taichui* and other metacercariae in cyprinoid fish from Mae Tang District (November 2001 – October 2002) (continued).

Months	Fish species	No. infected/ examined fish	Weight (g) range (mean)	Length (cm) range (mean)	Metacercariae species (No. infected/ examined fish)	No. of metacercariae isolated					Total (intensity)
						fins	scales	gill	head	muscle	
Nov. 2001	Total	20/30						13	1		14
					<i>Centrocestus caninus</i> (3/30)						
					<i>Haplorchitodes</i> sp. (8/30)	39	135	47			221
					<i>Haplorchis taichui</i> (20/30)	46	3	318		866	1233
Dec. 2001	<i>B. gonionotus</i>	4/5	76.5-123.0 (97.5)	18.0-20.5 (18.94)	<i>Centrocestus caninus</i> (1/5)			2	1		3
					<i>Haplorchitodes</i> sp. (4/5)	15	14-21 (10.4, 52)			5	72
					<i>Haplorchis taichui</i> (2/5)	3		16-32 (9.6, 48)		18	69
											18
					<i>Haplorchitodes</i> sp. (1/5)		18				18
					<i>Haplorchis taichui</i> (3/5)	5	(3.6, 18)	2-14 (3.8, 19)			24
	<i>H. macrolepidota</i>	3/5	32.0-102.5 (65.98)	13.5-20.0 (17.04)							18
											18
											18
											18
<i>H. siamensis</i>		5/5	96.8-133.4 (127.62)	19.5-22.6 (21.22)	<i>Haplorchitodes</i> sp. (1/5)	7	21				28
					<i>Haplorchis pumilio</i> (1/5)		(4.2, 21)				28
					<i>Haplorchis taichui</i> (5/5)	3-32 (10.8, 54)					952
											952
<i>L. siamensis</i>		4/5	103.2-130.7 (123.32)	20.5-23.5 (22.0)	<i>Centrocestus caninus</i> (1/5)			2			2
					<i>Haplorchis taichui</i> (4/5)	15		(0.4, 2)	5-185 (49.0, 245)	2-18 (5.8, 29)	289

Table 2 Survey of *Haplorchis taichui* and other metacercariae in cyprinoid fish from Mae Tang District (November 2001 – October 2002) (continued).

Months	Fish species	No. infected/ examined fish	Weight (g) range (mean)	Length (cm) range (mean)	Metacercariae species (No. infected/ examined fish)	No. of metacercariae isolated range (mean, total)						Total (intensity)
						fins	scales	gill	head	muscle		
Dec. 2001	<i>P. proctozysson</i>	5/5	27.7-85.5 (55.08)	14.5-19.3 (16.06)	<i>Haplorchiodes</i> sp. (5/5)	22	12-34 (14.0, 70)	2-7 (3.6, 18)			110 (22.00)	
						4	(0.8, 4)	3 (0.6, 3)	33 (6.6, 33)	40 (8.00)		
	<i>S. orphoides</i>	2/3	87.7-90.4 (89.2)	17.3-17.5 (17.43)	<i>Haplorchiodes</i> sp. (1/3)	5	21 (7.0, 21)				26 (8.67)	
						<i>Haplorchis taichui</i> (2/3)	182	2-3 (1.67, 5)	11 (3.67, 11)	16 (5.33)		
							49				254	
	Total	23/28				<i>Centrocestus caninus</i> (2/28)	81	4	1		5	
						<i>Haplorchis pumilio</i> (1/28)	1				1	
						<i>Haplorchis taichui</i> (18/28)	735			574	1390	
						<i>Centrocestus caninus</i> (1/5)	4			4 (0.8, 4)	4 (0.80)	
						<i>Haplorchiodes</i> sp. (1/5)	14	27 (5.4, 27)			41 (8.20)	
Jan. 2002	<i>B. gonionotus</i>	4/5	56.6-132.4 (94.66)	16.2-25.0 (19.58)	<i>Haplorchis taichui</i> (4/5)	2-6 (1.6, 8)		5-11 (4.8, 24)	16-33 (20.8, 104)	136 (27.20)		
						12-15 (5.4, 27)	2 (0.4, 2)	2 (0.40)				
	<i>H. macrolepidota</i>	5/5	30.8-52.5 (43.3)	14.0-17.2 (15.56)	<i>Haplorchiodes</i> sp. (3/5)	24-48 (19.4, 97)				124 (24.80)		
						12-15 (5.4, 27)						

**Table 2** Survey of *Haplorchis taichui* and other metacercariae in cyprinoid fish from Mae Tang District (November 2001 – October 2002) (continued).

Months	Fish species	No. infected/ examined fish	Weight (g) range (mean)	Length (cm) range (mean)	Metacercariae species (No. infected/ examined fish)	No. of metacercariae isolated					Total (intensity)
						fins	scales	gill	head	muscle	
Jan. 2002	<i>H. macrolepidota</i>	5/5	30.8-52.5 (43.3)	14.0-17.2 (15.56)	<i>Haplorchis taichui</i> (4/5)	10 (2.0, 10)		53-174 (88.4, 442)	121-263 (137.8, 689)	1141 (228.20)	
	<i>H. stamensis</i>	5/5	102.9-226.1 (160.24)	19.5-24.8 (22.98)	<i>Centrocestus caninus</i> (1/5) <i>Haplorchiodes</i> sp. (2/5) <i>Haplorchis taichui</i> (5/5)		3-4 (1.4, 7) 12-185 (98.8, 494) 3 (0.6, 3)	35-58 (18.6, 93) 3 (0.6, 3)	1 (0.2, 1)	1 (0.20) 100 (20.00) 4516 (903.20)	
	<i>L. stamensis</i>	3/3	107.7-143.0 (128.4)	21.2-23.0 (22.33)	<i>Haplorchiodes</i> sp. (1/3) <i>Haplorchis taichui</i> (3/3)		135 (45.0, 135)	28-61 (43.67, 131)	18-44 (27.67, 83)	135 (45.00) 214 (71.33)	
	<i>P. proctozystron</i>	5/5	42.0-119.3 (62.38)	14.0-21.0 (16.08)	<i>Haplorchiodes</i> sp. (4/5) <i>Haplorchis taichui</i> (5/5)	3-27 (6.0, 30)	7-64 (23.2, 116)	5 (1.0, 5) 2-15 (7.8, 39)	2-5 (2.8, 14)	151 (30.20) 53 (10.60)	
	<i>S. orphoides</i>	2/3	84.3-172.0 (129.43)	16.5-22.0 (19.33)	<i>Haplorchiodes</i> sp. (2/3) <i>Haplorchis taichui</i> (2/3)	13-24 (12.33, 37)	17-45 (20.67, 62)	12-21 (11.0, 33) 7-23 (10.0, 30)	1-15 (5.33, 16)	132 (44.00) 46 (15.33)	
	Total	24/26			<i>Centrocestus caninus</i> (3/26) <i>Haplorchiodes</i> sp. (13/26)	115	530	38		7 683	



**Table 2** Survey of *Haplorchis taichui* and other metacercariae in cyprinoid fish from Mae Tang District (November 2001 – October 2002) (continued).

Months	Fish species	No. infected/ examined fish	Weight (g) range (mean)	Length(cm) range (mean)	Metacercariae species (No. infected/ examined fish)	No. of metacercariae isolated					Total (intensity)
						fins	scales	gill	head	muscle	
Jan. 2002	Total	24/26			<i>Haplorchis taichui</i> (23/26)	512	3	2406	3185	6106	
Feb. 2002	<i>B. gonionotus</i>	3/5	59.1-124.8 (87.7)	15.5-24.0 (19.34)	<i>Haplorchiodes sp.</i> (1/5)	37	3			40 (8.00)	
						(7.4, 37)	(0.6, 3)			42 (8.40)	
	<i>H. macrolepidota</i>	2/5	53.7-82.9 (64.4)	16.0-18.5 (17.4)	<i>Haplorchis taichui</i> (3/5)				3-17	42 (8.40)	
									(6.2, 31)		
	<i>H. siamensis</i>	5/5	128.0-175.0 (148.2)	21.5-23.5 (22.4)	<i>Haplorchiodes sp.</i> (1/5)	12	28	2		10 (2.00)	
						(2.4, 12)	(5.6, 28)	(0.4, 2)		3762 (752.40)	
	<i>L. siamensis</i>	3/3	119.8-160.0 (138.33)	22.0-24.5 (23.2)	<i>Haplorchis taichui</i> (5/5)	8	2	3		35 (11.67)	
						(1.6, 8)	(0.4, 2)	(0.6, 3)		1 (0.33)	
	<i>P. proctozystron</i>	5/5	53.8-72.2 (63.16)	15.8-17.5 (16.56)	<i>Haplorchis pumilio</i> (1/3)	11	24	2-5		67 (13.40)	
						(3.67, 11)	(8.0, 24)	(2.33, 7)		267 (53.40)	
					<i>Haplorchis taichui</i> (3/3)	3			48 (16.00)		
					<i>Haplorchis taichui</i> (4/5)	2-7	3-17	5-17		67 (13.40)	
					<i>Haplorchis taichui</i> (4/5)	7	(1.8, 9)	(4.4, 22)		267 (53.40)	
					<i>Haplorchis taichui</i> (4/5)	(1.4, 7)	(7.2, 36)	2-75	14-62	267 (53.40)	
							(22.0, 110)	(30.0, 150)			

Table 2 Survey of *Haplorchis taichui* and other metacercariae in cyprinoid fish from Mae Tang District (November 2001 – October 2002) (continued).

Months	Fish species	No. infected/ examined fish	Weight (g) range (mean)	Length (cm) range (mean)	Metacercariae species (No. infected/ examined fish)	No. of metacercariae isolated						Total (intensity)
						fins	scales	gill	head	muscle		
Feb. 2002	<i>S. orphoides</i>	1/3	80.0-123.6 (98.7)	14.8-19.5 (16.93)	<i>Haplorchis taichui</i> (1/3)				2 (0.67, 2)	4 (1.33, 4)	6 (2.00)	
		19/26			<i>Haplorchiodes</i> sp. (8/26)	40	125		27		192	
					<i>Haplorchis pumilio</i> (1/26)					1	1	
					<i>Haplorchis taichui</i> (18/26)	352	2	3	1252	2533	4142	
Mar. 2002	<i>B. gonionotus</i>	3/5	62.3-125.0 (85.98)	17.0-20.5 (18.64)	<i>Haplorchiodes</i> sp. (1/5)		2 (0.4, 2)				2 (0.40)	
					<i>Haplorchis taichui</i> (2/5)				2-5 (1.4, 7)	3 (0.6, 3)	10 (2.00)	
	<i>H. macrolepidota</i>	2/5	65.0-119.7 (83.42)	16.8-21.5 (18.86)	<i>Haplorchiodes</i> sp. (1/5)	7 (1.4, 7)	22 (4.4, 22)				29 (5.80)	
					<i>Haplorchis taichui</i> (2/5)				9 (1.8, 9)	14-58 (14.4, 72)	81 (16.20)	
					<i>Haplorchiodes</i> sp. (4/5)	1-14 (4.8, 24)	4-27 (7.2, 36)			3 (0.6, 3)	63 (12.60)	
					<i>Haplorchis pumilio</i> (1/5)					2 (0.4, 2)	2 (0.40)	
	<i>H. siamensis</i>	4/5	35.5-266.3 (147.68)	15.8-26.0 (22.02)	<i>Haplorchis taichui</i> (4/5)	21-114 (38.4, 192)			11-699 (195.0, 975)	23-918 (322.0, 1610)	2777 (555.40)	
					<i>Haplorchiodes</i> sp. (3/4)	8-12 (5.0, 20)	18-65 (20.75, 83)		16 (4.0, 16)	8 (2.0, 8)	127 (31.75)	
	<i>L. siamensis</i>	4/4	77.5-150.1 (115.13)	17.5-23.7 (21.18)	<i>Haplorchis taichui</i> (4/4)	3 (0.75, 3)			5-27 (10.0, 40)	4-41 (11.25, 45)	88 (22.00)	



**Table 2** Survey of *Haplorchis taichui* and other metacercariae in cyprinoid fish from Mae Tang District (November 2001 – October 2002) (continued).

Months	Fish species	No. infected/ examined fish	Weight (g) range (mean)	Length (cm) range (mean)	Metacercariae species (No. infected/ examined fish)	No. of metacercariae isolated					Total (intensity)
						fins	scales	gill	head	muscle	
Mar. 2002	<i>P. proctozystron</i>	4/5	24.9-59.5 (37.44)	13.0-16.5 (14.3)	<i>Haplorchitodes</i> sp. (4/5)	3-41 (11.6, 58)	23-52 (21.8, 109)	13	2	182 (36.40)	
					<i>Haplorchis taichui</i> (3/5)			1-4 (1.4, 7)	2 (0.4, 2)	9 (1.80)	
					<i>Haplorchitodes</i> sp. (2/4)	4 (1.0, 4)	18 (4.5, 18)	2 (0.5, 2)		24 (6.00)	
					<i>Haplorchis taichui</i> (4/4)			2-7 (3.0, 12)	3-14 (4.25, 17)	29 (7.25)	
	Total	21/28			<i>Haplorchitodes</i> sp. (15/28)	113	270	31	13	427	
					<i>Haplorchis pumilio</i> (1/28)				2	2	
					<i>Haplorchis taichui</i> (19/28)	195		1050	1749	2994	
Apr. 2002	<i>B. gontionotus</i>	4/5	52.5-176.0 (106.9)	15.8-23.0 (19.42)	<i>Haplorchitodes</i> sp. (1/5)	6 (1.2, 6)		1 (0.2, 1)		7 (1.40)	
					<i>Haplorchis taichui</i> (4/5)	4 (0.8, 4)		3-6 (2.6, 13)	2-15 (4.0, 20)	37 (7.40)	
					<i>Haplorchitodes</i> sp. (1/5)	11 (2.2, 11)	32 (6.4, 32)	4 (0.8, 4)		47 (9.40)	
					<i>Haplorchis taichui</i> (1/5)				3 (0.6, 3)	3 (0.60)	
	<i>H. siamensis</i>	5/5	96.2-165.6 (124.76)	20.0-24.5 (21.6)	<i>Haplorchitodes</i> sp. (1/5)	3 (0.6, 3)	5 (1.0, 5)	2 (0.4, 2)	10 (2.00)		
					<i>Haplorchis taichui</i> (5/5)	17-127 (33.6, 168)	1-2 (0.6, 3)	2-253 (130.0, 650)	5-472 (151.6, 758)	1579 (315.80)	

Table 2 Survey of *Haplorchis taichui* and other metacercariae in cyprinoid fish from Mae Tang District (November 2001 – October 2002) (continued).

Months	Fish species	No. infected/ examined fish	Weight (g) range (mean)	Length (cm) range (mean)	Metacercariae species (No. infected/ examined fish)	No. of metacercariae isolated						Total (intensity)
						fins	scales	gill	head	muscle		
Apr. 2002	<i>L. stamensis</i>	5/5	35.3-152.3 (107.16)	16.5-23.5 (21.2)	<i>Haplorchitodes</i> sp. (1/5)	17					17	(3.40)
						23	(3.4, 17)	1-77	(16.6, 83)	5-46	(14.6, 73)	179
	<i>M. marginatus</i>	3/3	19.2-21.9 (20.37)	11.5-12.3 (11.93)	<i>Haplorchitodes</i> sp. (3/3)	14-243					307	(102.33)
						(90.67, 272)	7-28	(11.67, 35)	2-11	(7.33, 22)	35	(11.67)
<i>P. proctozyron</i>	4/5	25.0-59.8 (48.13)	13.0-16.5 (15.58)	<i>Haplorchitodes</i> sp. (2/5)	17					84	(16.80)	
					(3.4, 17)	15-52	(13.4, 67)	2-12	(4.2, 21)	34	(6.80)	
Total	23/28				37	393	42	780	889	472	1867	
					(9/28)							
					(2/28)							
May. 2002	<i>B. gonionotus</i>	4/5	59.4-77.0 (70.06)	15.5-18.0 (16.34)	<i>Haplorchitodes</i> sp. (3/5)	11	10-127				184	(36.80)
						(2.2, 11)	(34.6, 173)	5-22	(5.4, 27)	2-34	(7.2, 36)	66
	<i>H. macrolepidota</i>	2/5	72.5-131.8 (114.74)	18.5-22.5 (20.5)	<i>Haplorchitodes</i> sp. (2/5)	8	3-12				25	(5.00)
						(1.6, 8)	(3.0, 15)	7	(1.4, 7)	11-15	(5.2, 26)	33
					<i>Haplorchis taichui</i> (2/5)	3						
						(0.6, 3)						

**Table 2** Survey of *Haplorchis taichui* and other metacercariae in cyprinoid fish from Mae Tang District (November 2001 – October 2002) (continued).

Months	Fish species	No. infected/ examined fish	Weight (g) range (mean)	Length (cm) range (mean)	Metacercariae species (No. infected/ examined fish)	No. of metacercariae isolated						Total (intensity)
						fins	scales	gill	head	muscle		
May. 2002	<i>H. stamensis</i>	4/5	19.2-120.0 (86.8)	13.8-21.0 (19.06)	<i>Haplorchiodes</i> sp. (2/5)	7	4-17 (4.2, 21)					28 (5.60)
						18-38 (15.4, 77)	47-180 (73.4, 367)	38-193 (85.0, 425)	869 (173.80)			
	<i>P. proctozyzron</i>	5/5	44.8-134.5 (96.74)	15.5-22.0 (19.2)	<i>Haplorchiodes</i> sp. (4/5)	3-12 (4.0, 20)	7-26 (13.2, 66)					86 (17.20)
						5-8 (2.6, 13)	4-12 (4.0, 20)	7-13 (5.4, 27)	60 (12.00)			
Total	<i>S. orphoides</i>	3/4	83.0-118.0 (100.25)	17.0-19.2 (18.18)	<i>Haplorchiodes</i> sp. (2/4)	7-32 (9.75, 39)	23-78 (25.25, 101)	10 (2.5, 10)				150 (37.50)
						12 (3.0, 12)	7-18 (6.25, 25)	7-18 (8.5, 34)	71 (17.75)			
						85	376	10	2	473		
Jun. 2002	<i>B. gonionotus</i>	2/5	58.0-148.5 (111.24)	15.0-23.0 (19.94)	<i>Centrocestus caninus</i> (1/5)	3						3 (0.60)
						2	1-2 (0.6, 3)	5 (1.0, 5)	10 (2.00)			
	<i>H. macrolepidota</i>	3/5	88.5-197.8 (137.34)	20.0-26.5 (22.9)	<i>Haplorchiodes</i> sp. (3/5)	3-5 (1.6, 8)	5-12 (5.0, 25)					33 (6.60)
						105	446	1-3 (0.8, 4)	4 (0.8, 4)	8 (1.60)		



Table 2 Survey of *Haplorchis taichui* and other metacercariae in cyprinoid fish from Mae Tang District (November 2001 – October 2002) (continued).

Months	Fish species	No. infected/ examined fish	Weight (g) range (mean)	Length (cm) range (mean)	Metacercariae species (No. infected/ examined fish)	No. of metacercariae isolated						Total (intensity)
						fins	scales	gill	head	muscle		
Jun. 2002	<i>H. siamensis</i>	5/5	54.4-203.5 (135.94)	16.5-25.0 (21.44)	<i>Centrocestus caninus</i>			7 (1.4, 7)				7 (1.40)
					<i>Haplorchitodes</i> sp.	3-5 (1.6, 8)	8 (1.6, 8)			2 (0.4, 2)	18 (3.60)	
					<i>Haplorchis taichui</i>	18-112 (58.4, 292)	2 (0.4, 2)	45-174 (96.4, 482)	270-634 (512.2, 2561)	3337 (667.40)		
	<i>L. siamensis</i>	4/4	35.1-96.0 (57.05)	15.5-21.5 (17.75)	<i>Haplorchitodes</i> sp.	2-5 (3.75, 15)	7-21 (15.0, 60)	3 (0.75, 3)	2 (0.5, 2)			80 (20.00)
					<i>Haplorchis taichui</i>	1 (0.25, 1)			1-2 (1.25, 5)	2-7 (3.0, 12)	18 (4.50)	
					<i>P. proctozyson</i>	2 (0.4, 2)	4-7 (2.2, 11)			13 (2.60)		
	Total	17/24	42.0-64.0 (50.62)	16.0-17.0 (16.34)	<i>Haplorchis taichui</i>	2 (0.4, 2)		3 (0.6, 3)			1 (0.2, 1)	6 (1.20)
					<i>Centrocestus caninus</i>			10			10	
					<i>Haplorchitodes</i> sp.	33	110	3	2	2	150	
					<i>Haplorchis taichui</i>	297		2	497	2583	3379	
Jul. 2002	<i>H. macrolepidota</i>	3/5	49.5-227.5 (113.24)	16.5-27.5 (21.3)	<i>Haplorchitodes</i> sp.		7-16 (4.6, 23)		2 (0.4, 2)		25 (5.00)	
					<i>Haplorchis taichui</i>	1 (0.2, 1)			1 (0.2, 1)	2 (0.4, 2)	4 (0.80)	
					<i>Centrocestus caninus</i>			3 (0.6, 3)		3 (0.60)		



**Table 2** Survey of *Haplorchis taichui* and other metacercariae in cyprinoid fish from Mae Tang District (November 2001 – October 2002) (continued).

Months	Fish species	No. infected/ examined fish	Weight (g) range (mean)	Length (cm) range (mean)	Metacercariae species (No. infected/ examined fish)	No. of metacercariae isolated					Total (intensity)
						fins	scales	gill	head	muscle	
Jul. 2002	<i>H. siamensis</i>	5/5	82.3-104.6 (90.38)	19.0-20.0 (19.4)	<i>Haplorchitoides</i> sp. (2/5)	2	3-7				12
						(0.4, 2)	(2.0, 10)				(2.40)
						2-17	1	15-32	42-159	604	
						(6.6, 33)	(0.2, 1)	(23.0, 115)	(91.0, 455)	(120.80)	
<i>L. siamensis</i>	5/5	21.0-93.6 (56.58)	13.0-21.0 (17.6)	<i>Centrocestus caninus</i> (1/5)	2					2	
					(0.4, 2)					(0.40)	
					3-35	14-54	3-12	2-7	296		
					(18.0, 90)	(32.2, 161)	(5.4, 27)	(3.6, 18)	(59.20)		
<i>M. marginatus</i>	5/5	7.6-24.5 (14.9)	11.5-15.0 (13.04)	<i>Haplorchitoides</i> sp. (5/5)	3	1-2				82	
					(0.6, 3)	(0.6, 3)	5-16	6-21	(16.40)		
					3-113	22-824	8-101	5-13	1755		
					(36.0, 180)	(271.4, 1357)	(33.2, 166)	(8.2, 41)	(351.00)		
<i>P. proctozystron</i>	5/5	34.2-68.7 (47.82)	14.5-18.0 (16.1)	<i>Haplorchis taichui</i> (5/5)	2-11	3				223	
					(4.6, 23)	(0.6, 3)	3-73	1-41	(44.60)		
					3-113	22-824	8-101	5-13	1755		
					(36.0, 180)	(271.4, 1357)	(33.2, 166)	(8.2, 41)	(351.00)		
<i>P. proctozystron</i>	5/5	34.2-68.7 (47.82)	14.5-18.0 (16.1)	<i>Centrocestus caninus</i> (1/5)	4					4	
					(0.8, 4)					(0.80)	
					2-18	8-37	1-12	1-18	192		
					(8.8, 44)	(19.2, 96)	(6.6, 33)	(3.8, 19)	(38.40)		
<i>P. proctozystron</i>	5/5	34.2-68.7 (47.82)	14.5-18.0 (16.1)	<i>Haplorchis taichui</i> (5/5)	1-3					139	
					(0.8, 4)		2-40	2-67	139		
					2-18	8-37	1-12	1-18	192		
					(8.8, 44)	(19.2, 96)	(6.6, 33)	(3.8, 19)	(38.40)		
<i>P. proctozystron</i>	5/5	34.2-68.7 (47.82)	14.5-18.0 (16.1)	<i>Haplorchis taichui</i> (5/5)	2					223	
					(4.6, 23)	(0.6, 3)	3-73	1-41	(44.60)		
					2-11	3	3-73	1-41	223		
					(4.6, 23)	(0.6, 3)	(19.0, 95)	(20.0, 100)	(44.60)		
Total	23/25				11					11	
					(4/25)					(0.80)	
					316	1647	228	78	2280		
					(19/25)				(27.80)		

Table 2 Survey of *Haplorchis taichui* and other metacercariae in cyprinoid fish from Mae Tang District (November 2001 – October 2002) (continued).

Months	Fish species	No. infected/ examined fish	Weight (g) range (mean)	Length (cm) range (mean)	Metacercariae species (No. infected/ examined fish)	No. of metacercariae isolated					Total (intensity)
						fins	scales	gill	head	muscle	
Jul. 2002	Total	23/25			<i>Haplorchis taichui</i> (20/25)	64	7	2	290	689	1052
Aug. 2002	<i>B. gonionotus</i>	5/5	110.4-139.9 (129.8)	20.5-22.0 (21.4)	<i>Centrocestus caninus</i> (2/5) <i>Haplorchitoides</i> sp. (4/5) <i>Haplorchis taichui</i> (3/5)	3-12 (3.0, 15) 7 (1.4, 7)	3-18 (5.2, 26)	4-15 (3.8, 19) 2 (0.4, 2)	2 (0.4, 2) 1-6 (2.0, 10) 1-3 (0.8, 4)	1 (0.2, 1) 1-6 (1.8, 9)	21 (4.20) 54 (10.80) 20 (4.00)
	<i>H. macrolepidota</i>	3/5	75.2-101.5 (88.5)	20.0-21.5 (20.6)	<i>Haplorchitoides</i> sp. (3/5) <i>Haplorchis taichui</i> (2/5)	2-23 (5.6, 28) 1 (0.2, 1)	3-4 (1.4, 7)		2-5 (1.4, 7) 1-3 (0.8, 4)	2 (0.4, 2)	42 (8.40) 7 (1.40)
	<i>H. siamensis</i>	5/5	84.0-199.4 (156.18)	20.0-26.0 (24.06)	<i>Centrocestus caninus</i> (2/5) <i>Haplorchitoides</i> sp. (4/5) <i>Haplorchis taichui</i> (5/5)	2-13 (4.0, 20) 2-48 (18.6, 93)	2-7 (3.4, 17)	3-5 (1.6, 8) 1 (0.2, 1)	3 (0.6, 3) 22-483 (165.4, 827)	187 (37.4, 187) 38-938 (289.6, 1448)	8 (1.60) 227 (45.40) 2369 (473.80)
	<i>L. siamensis</i>	4/4	76.0-105.8 (89.55)	20.0-21.0 (20.6)	<i>Centrocestus caninus</i> (1/4) <i>Haplorchitoides</i> sp. (4/4) <i>Haplorchis taichui</i> (4/4)	2-35 (11.25, 45) 1-35 (9.0, 36)	1-15 (8.25, 33) 1 (0.25, 1)	7 (1.75, 7)	3-34 (11.25, 45) 14-72 (26.75, 107)	5-28 (8.25, 33) 3-59 (20.25, 81)	7 (1.75) 156 (39.00) 225 (56.25)
	<i>M. marginatus</i>	5/5	17.4-31.8 (24.86)	11.0-14.0 (12.44)	<i>Haplorchitoides</i> sp. (5/5)	5-34 (17.0, 85)	114-1215 (465.6, 2328)		17-55 (34.8, 174)	7-27 (15.8, 79)	2666 (533.20)

**Table 2** Survey of *Haplorchis taichui* and other metacercariae in cyprinoid fish from Mae Tang District (November 2001 – October 2002) (continued).

Months	Fish species	No. infected/ examined fish	Weight (g) range (mean)	Length(cm) range (mean)	Metacercariae species (No. infected/ examined fish)	No. of metacercariae isolated						Total (intensity)
						fins	scales	gill	head	muscle		
Aug. 2002	<i>M. marginatus</i>	5/5	17.4-31.8 (24.86)	11.0-14.0 (12.44)	<i>Haplorchis taichui</i> (5/5)	3-452	3	38-651	54-1028	3157		
						(105.6, 528)	(0.6, 3)	(180.0, 900)	(345.2, 1726)	(631.40)		
	<i>P. proctozystron</i>	5/5	42.4-88.3 (63.8)	15.6-18.5 (17.18)	<i>Haplorchiodes</i> sp. (5/5) <i>Haplorchis taichui</i> (4/5)	2-12	7-41	3-14	1	157		
						(3.4, 17)	(22.6, 113)	(4.4, 22)	(0.2, 1)	(31.40)		
						2		1-5	2	18		
						(0.4, 2)		(2.0, 10)	(1.2, 6)	(3.60)		
Total		27/29			<i>Centrocestus caninus</i> (5/29) <i>Haplorchiodes</i> sp. (25/29) <i>Haplorchis taichui</i> (23/29)	34	2	2	301	3302		
						6	261	301	3302			
						1	1852	3272	5796			
Sep. 2002	<i>B. gonionotus</i>	5/5	118.4-145.7 (134.36)	20.5-22.5 (21.8)	<i>Centrocestus caninus</i> (2/5) <i>Haplorchiodes</i> sp. (4/5) <i>Haplorchis taichui</i> (3/5)	5-12	5	1-3	5-11	17		
						(3.4, 17)		(0.8, 4)	(3.2, 16)	(3.40)		
							2-7	1-140	266	34		
							(1.8, 9)	(28.8, 144)	(53.2, 266)	(6.80)		
							90			500		
							(18.0, 90)			(100.00)		
<i>H. macrolepidota</i>	5/5	40.0-139.4 (95.26)	19.8-23.5 (22.06)	<i>Centrocestus caninus</i> (1/5) <i>Haplorchiodes</i> sp. (5/5) <i>Haplorchis taichui</i> (4/5)	3	12-34	7	1-3	3			
					(0.6, 3)	(19.0, 95)	(1.4, 7)	(0.60)				
						6-32	2-3	160	32.00			
						(11.6, 58)	(1.0, 5)	(1.2, 6)	(2.20)			
<i>H. siamensis</i>	5/5	17.2-115.5(75.76)	18.0-20.5 (19.4)	<i>Centrocestus caninus</i> (1/5)	2			2	2			
					(0.4, 2)			(0.40)				



Table 2 Survey of *Haplorchis taichui* and other metacercariae in cyprinoid fish from Mae Tang District (November 2001 – October 2002) (continued).

Months	Fish species	No. infected/ examined fish	Weight (g) range (mean)	Length (cm) range (mean)	Metacercariae species (No. infected/ examined fish)	No. of metacercariae isolated						Total (intensity)
						fins	scales	gill	head	muscle		
Sep. 2002	<i>H. siamensis</i>	5/5	17.2-115.5 (75.76)	18.0-20.5 (19.4)	<i>Haplorchiodes</i> sp. (4/5)	1-2 (0.6, 3)	2-13 (3.6, 18)				21 (4.20)	
						3-18 (7.4, 37)	25-300 (86.4, 432)	23-352 (133.8, 669)	1140 (228.00)			
						3-15 (8.4, 42)	3-4 (1.4, 7)					
						4-7 (2.2, 11)	1-43 (8.8, 44)	2-74 (16.0, 80)	135 (27.00)			
						5-1213 (251.2, 1256)	3-84 (25.2, 126)	2-38 (8.0, 40)	2251 (450.20)			
	<i>L. siamensis</i>	5/5	42.8-118.90 (86.2)	16.0-24.0 (20.7)	<i>Haplorchiodes</i> sp. (5/5)	3-15 (8.4, 42)	12-62 (24.0, 120)				169 (33.80)	
						4-7 (2.2, 11)	3-4 (1.4, 7)	2-74 (16.0, 80)	135 (27.00)			
						5-1213 (251.2, 1256)	3-84 (25.2, 126)	2-38 (8.0, 40)	2251 (450.20)			
						3-531 (131.6, 658)	3-387 (83.4, 417)	2-702 (142.8, 714)	1793 (358.60)			
						3-531 (131.6, 658)	3-387 (83.4, 417)	2-702 (142.8, 714)	1793 (358.60)			
<i>M. marginatus</i>	5/5	17.0-37.8 (28.38)	11.0-14.0 (12.84)	<i>Haplorchiodes</i> sp. (5/5)	5-1213 (251.2, 1256)	21-374 (165.8, 829)				2251 (450.20)		
					3-531 (131.6, 658)	3-387 (83.4, 417)	2-702 (142.8, 714)	1793 (358.60)				
					3-531 (131.6, 658)	3-387 (83.4, 417)	2-702 (142.8, 714)	1793 (358.60)				
					3-531 (131.6, 658)	3-387 (83.4, 417)	2-702 (142.8, 714)	1793 (358.60)				
					3-531 (131.6, 658)	3-387 (83.4, 417)	2-702 (142.8, 714)	1793 (358.60)				
<i>P. proctozyzron</i>	5/5	40.2-112.3 (73.16)	15.0-20.5 (17.6)	<i>Centrocestus caninus</i> (1/5)	6 (1.2, 6)					6 (1.20)		
					3 (0.6, 3)	2 (0.4, 2)	62 (12.40)					
					2 (0.4, 2)	3-17 (6.8, 34)	48 (9.60)					
					2 (0.4, 2)	28	28					
					2 (0.4, 2)	28	28					
Total	30/30				1371	1124	146	56	2697			
					798	4	2	1747				
					2	2	2	3627				
					2	2	2	3627				
					2	2	2	3627				
Oct. 2002	<i>B. gonionotus</i>	5/5	55.4-84.2 (70.04)	16.0-18.5 (17.3)	<i>Centrocestus caninus</i> (1/5)	2 (0.4, 2)				2 (0.40)		
						2 (0.4, 2)				2 (0.40)		

**Table 2** Survey of *Haplorchis taichui* and other metacercariae in cyprinoid fish from Mae Tang District (November 2001 – October 2002) (continued).

Months	Fish species	No. infected/ examined fish	Weight (g) range (mean)	Length(cm) range (mean)	Metacercariae species (No. infected/ examined fish)	No. of metacercariae isolated						Total (intensity)
						fins	scales	gill	head	muscle		
Oct. 2002	<i>B. gonionotus</i>	5/5	55.4-84.2 (70.04)	16.0-18.5 (17.3)	<i>Haplorchiodes</i> sp. (3/5)	5	3-12	8				35 (7.00)
						(1.0, 5)	(4.4, 22)	(1.6, 8)				
					<i>Haplorchis taichui</i> (5/5)	3-120 (74.6, 123)		2-24 (8.2, 41)	1-97 (28.2, 141)		305 (61.00)	
	<i>H. macrolepidota</i>	5/5	107.8-166.0 (128.32)	21.0-25.0 (22.66)	<i>Haplorchiodes</i> sp. (5/5)	2-17 (8.4, 42)	8-54 (19.8, 99)	1-5 (1.8, 9)			150 (30.00)	
					<i>Haplorchis taichui</i> (3/5)	2 (0.4, 2)		1-12 (5.0, 25)	2-9 (3.8, 19)		46 (9.20)	
	<i>H. siamensis</i>	5/5	58.6-88.4 (71.2)	18.0-21.0 (19.0)	<i>Haplorchiodes</i> sp. (4/5)	5-12 (4.6, 23)	3 (0.6, 3)			3 (0.6, 3)	29 (5.80)	
					<i>Haplorchis taichui</i> (5/5)	7-21 (5.6, 28)		25-132 (81.6, 408)	104-382 (253.4, 1267)		1703 (340.60)	
	<i>L. siamensis</i>	5/5	86.6-133.5 (104.06)	20.0-23.0 (21.3)	<i>Haplorchiodes</i> sp. (4/5)	5-12 (3.4, 17)	2-12 (4.2, 21)	3 (0.6, 3)			41 (8.20)	
					<i>Haplorchis taichui</i> (5/5)	1 (0.2, 1)	4 (0.8, 4)	4-11 (5.6, 28)	4-26 (14.0, 70)		103 (20.60)	
	<i>P. proctozystron</i>	5/5	43.9-92.4 (62.04)	15.0-19.0 (16.58)	<i>Haplorchiodes</i> sp. (4/5)	8-17 (5.0, 25)	36-105 (39.8, 199)	2-32 (10.0, 50)	3-8 (2.2, 11)		285 (57.00)	
					<i>Haplorchis taichui</i> (5/5)	2-7 (3.4, 17)	1-3 (0.8, 4)	3-22 (11.4, 57)	4-38 (24.0, 120)		198 (39.60)	
	<i>S. orphoides</i>	4/4	58.8-115.0 (90.1)	15.2-19.0 (17.5)	<i>Haplorchiodes</i> sp. (4/4)	5-45 (24.75, 99)	12-128 (52.0, 208)	5-72 (25.25, 101)	4-5 (2.25, 9)		417 (104.25)	
					<i>Haplorchis taichui</i> (4/4)	3-25 (10.5, 42)		6-10 (5.75, 23)	7-12 (6.75, 27)		92 (23.00)	

**Table 2** Survey of *Haplorchis taichui* and other metacercariae in cyprinoid fish from Mae Tang District (November 2001 – October 2002) (continued).

Months	Fish species	No. infected/ examined fish	Weight (g) range (mean)	Length(cm) range (mean)	Metacercariae species (No. infected/ examined fish)	No. of metacercariae isolated						Total (intensity)
						fins	scales	gill	head	muscle		
Oct. 2002	Total	29/29				2					2	
					<i>Centrocestus caninus</i> (1/29)				171	23	957	
					<i>Haplorchiodes</i> sp. (24/29)	211	552					
					<i>Haplorchis taichui</i> (27/29)	213	8		582	1644	2447	



ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่  
 Copyright © by Chiang Mai University  
 rights reserved



**Table 3.** Recovery of *Haplorchis taichui* from chicks, experimentally infected with 200 metacercariae in each chick during 1 to 54 days post-infection.

Day after Infection	Number of worms recovery from			Total	Worm recovery rate (%)
	duodenum	jejunum	ileum		
1	1	24	20	45	22.5
2	0	17	17	34	17.0
3	0	17	21	38	19.0
4	0	12	37	49	24.5
5	0	7	33	40	20.0
6	0	4	26	30	15.0
7	0	1	31	32	16.0
8	0	2	46	48	24.0
9	0	0	39	39	19.5
10	0	3	30	33	16.5
11	0	22	37*	59	29.5
12	0	2	29	31	15.5
13	0	5	32	37	16.5
14	0	2	39	41	20.5
15	0	3	39	42	21.0
16	0	7	28	35	17.5
17	0	9	40	49	24.5
18	0	0	19	19	9.5
19	0	2	52	54	27.0
20	0	0	10	10	5.0
21	0	0	37	37	18.5
22	0	0	16	16	8.0
23	0	0	24	24	12.0
24	0	0	10	10	5.0
25	0	0	14	14	7.0
26	0	0	23	23	11.5
27	0	0	7	7	3.5
28	0	0	1	1	0.5
29	0	0	13	13	6.5
30	0	0	2	2	1.0
31	0	0	5	5	2.5
32	0	0	3	3	1.5
33	0	0	9	9	4.5
34	0	0	3	3	1.5
35	0	0	8	8	4.0
36	0	0	2	2	1.0
37	0	0	0	0	0
38	0	0	2	2	1.0
39	0	0	7	7	3.5
40	0	0	8	8	4.0

**Table 3.** Recovery of *Haplorchis taichui* from chicks, experimentally infected with 200 metacercariae in each chick during 1 to 54 days post-infection (continued).

Day after Infection	Number of worms recovery from			Total	Worm recovery rate (%)
	duodenum	jejunum	ileum		
41	0	0	2	2	1.0
42	0	0	0	0	0
43	0	0	0	0	0
44	0	0	0	0	0
45	0	0	0	0	0
46	0	0	2	2	1.0
47	0	0	5	5	2.5
48	0	0	2	2	1.0
49	0	0	0	0	0
50	0	0	0	0	0
51	0	0	0	0	0
52	0	0	0	0	0
53	0	0	0	0	0
54	0	0	0	0	0
Total	1	139	772	912	15.2

\* Including one of metacercaria

**Table 4.** Recovery of *Haploschis taichui* from mice, experimentally infected with 200 metacercariae in each mouse during 1 to 15 days post-infection.

Day after Infection	Number of worms recovery from			Total	Worm recovery rate (%)
	duodenum	jejunum	ileum		
1	0	21	7	28	14
2	0	35	15	50	25
3	0	32	4	36	18
4	0	1	22	23	11.5
5	0	0	32	32	16
6	0	7	38	45	22.5
7	0	0	15	15	7.5
8	0	0	24	24	12
9	0	0	8	8	4
10	0	0	0	0	0
11	0	0	0	0	0
12	0	0	1	1	1
13	0	0	0	0	0
14	0	0	0	0	0
15	0	0	0	0	0
Total	0	101	166	267	8.9





APPENDIX II

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่

Copyright© by Chiang Mai University

All rights reserved

**REAGENTS****1. 1% Acid pepsin solution**

Pepsin powder (Sigma)	1	g
Hydrochloric acid	1	ml
0.85% normal saline	99	ml

**2. Tyrode's solution**

Sodium chloride	6.5	g
Sodium hydrogen phosphate	0.01	g
Potassium chloride	0.14	g
Calcium chloride	0.12	g
Glucose	2.0	g
Distilled water	750	ml

**3. Phosphate buffer solution****Stock solution**

(1) 0.2 M Sodium phosphate monobasic

$\text{NaH}_2\text{PO}_4 \cdot \text{H}_2\text{O}$	27.6	g
or $\text{NaH}_2\text{PO}_4 \cdot 2\text{H}_2\text{O}$	31.21	g
Distilled water	1,000	ml

(2) 0.2 M Sodium phosphate dibasic

Na <sub>2</sub> HPO <sub>4</sub> ·2H <sub>2</sub> O	35.61	g
or Na <sub>2</sub> HPO <sub>4</sub> ·7H <sub>2</sub> O	53.65	g
or Na <sub>2</sub> HPO <sub>4</sub> ·12H <sub>2</sub> O	71.64	g
Distilled water	1,000	ml

**Working solution**

X ml (1)	Y ml (2)	pH
68.5	31.5	6.5
62.5	37.5	6.6
56.5	43.5	6.7
51.0	49.0	6.8
45.0	55.0	6.9
39.0	61.0	7.0
33.0	67.0	7.1
28.0	72.0	7.2
23.0	77.0	7.3
19.0	81.0	7.4
16.0	84.0	7.5

**4. 2.5% Glutaraldehyde**

50% glutaraldehyde	5.0	ml
0.1 M phosphate buffer pH 7.3	95	ml

Copyright © by Chiang Mai University

All rights reserved



**5. 1% Osmium tetroxide****Stock solution**

4% Osmium tetroxide

Osmium tetroxide crystals	1.0	g
Distilled water	25	ml

**Working solution**

1% Osmium tetroxide

4% Osmium tetroxide	1	part
0.1M phosphate buffer	2	part
Distilled water	1	part

**6. 5% Formalin**

40% Formaldehyde	5	ml
Distilled water	95	ml

**STAINS****1. 0.05% Neutral red**

Neutral red powder	0.5	g
Distilled water	1,000	ml

**2. Borax carmine** (Grenacher's alcoholic)

Borax carmine	8	g
70% ethanol	200	ml

Boil for ½ hour, cool and make up to 200 ml.

**3. Delifield Alum Haematoxylin**

Aluminium alum	3	g
Haematoxylin	0.6	g
Glycerine	15	ml
Methanol	15	ml
95% alcohol	4	ml
Distilled water	70	ml

Dissolve Haematoxylin in 95% alcohol (1)

Dissolve Aluminium alum in distilled water (2)

Solutions (1) + (2) add Glycerine and methanol. Stand in a sunny place to ripen for several weeks.

**4. Eosin Alcoholic**

Eosin powder	1	g
80% ethanol	100	ml

**5. Fast green**

Fast green, C.F.C	0.5	g
95% ethanol	100	ml

**6. 1% tuloidine blue**

Tuloidine blue powder	1	g
Distilled water	100	ml

**7. 0.5% Uranyl acetate**

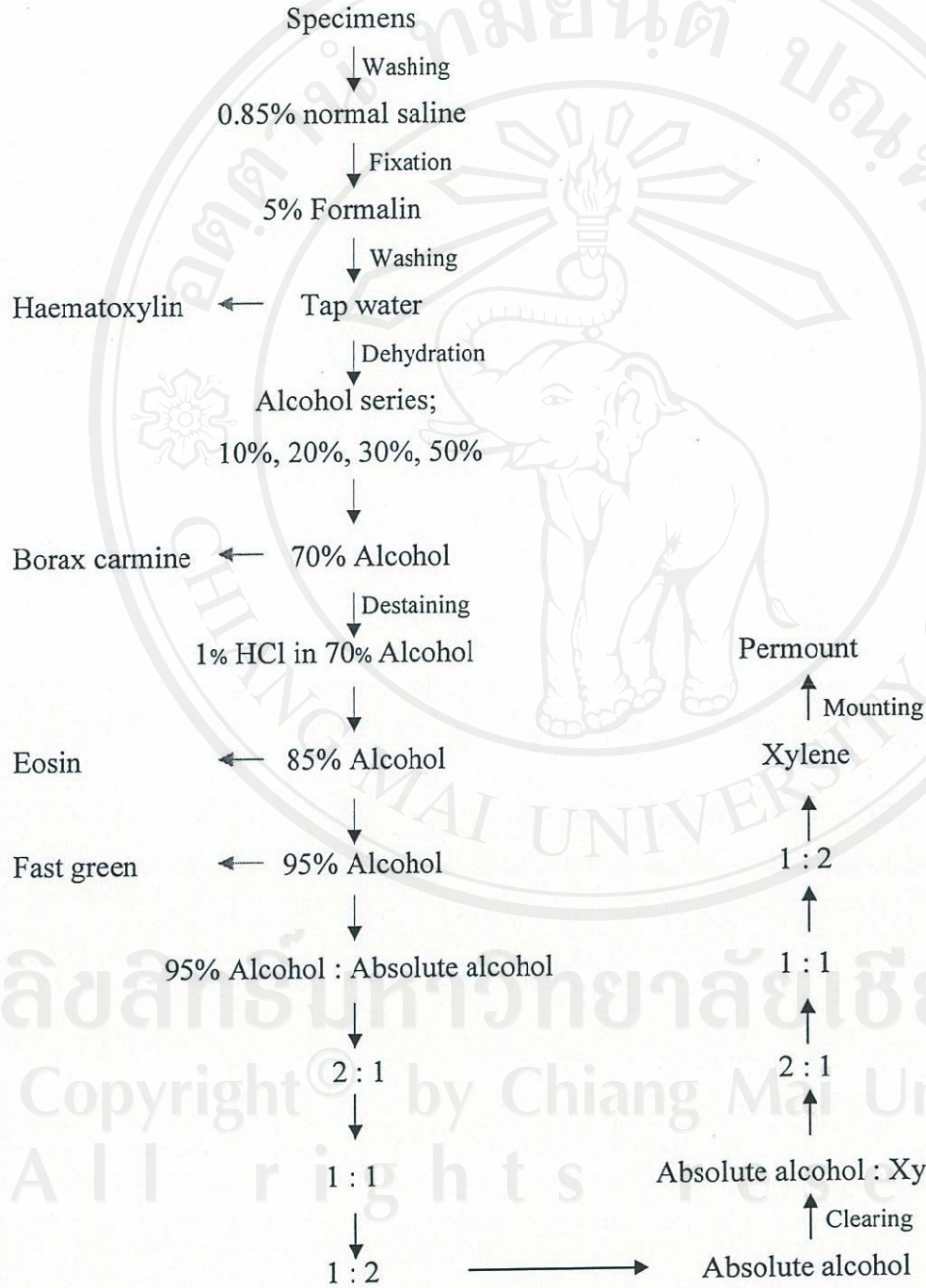
Uranyl acetate	0.5	g
30% ethanol	100	ml

**8. Lead citrate**

(1) Sodium citrate	0.76	g
Distilled water	15	ml
(2) Lead nitrate	1.33	g
Distilled water	15	ml
Solutions (1) + (2)		
Na OH	8	g
Make up to 50 ml with distilled water		

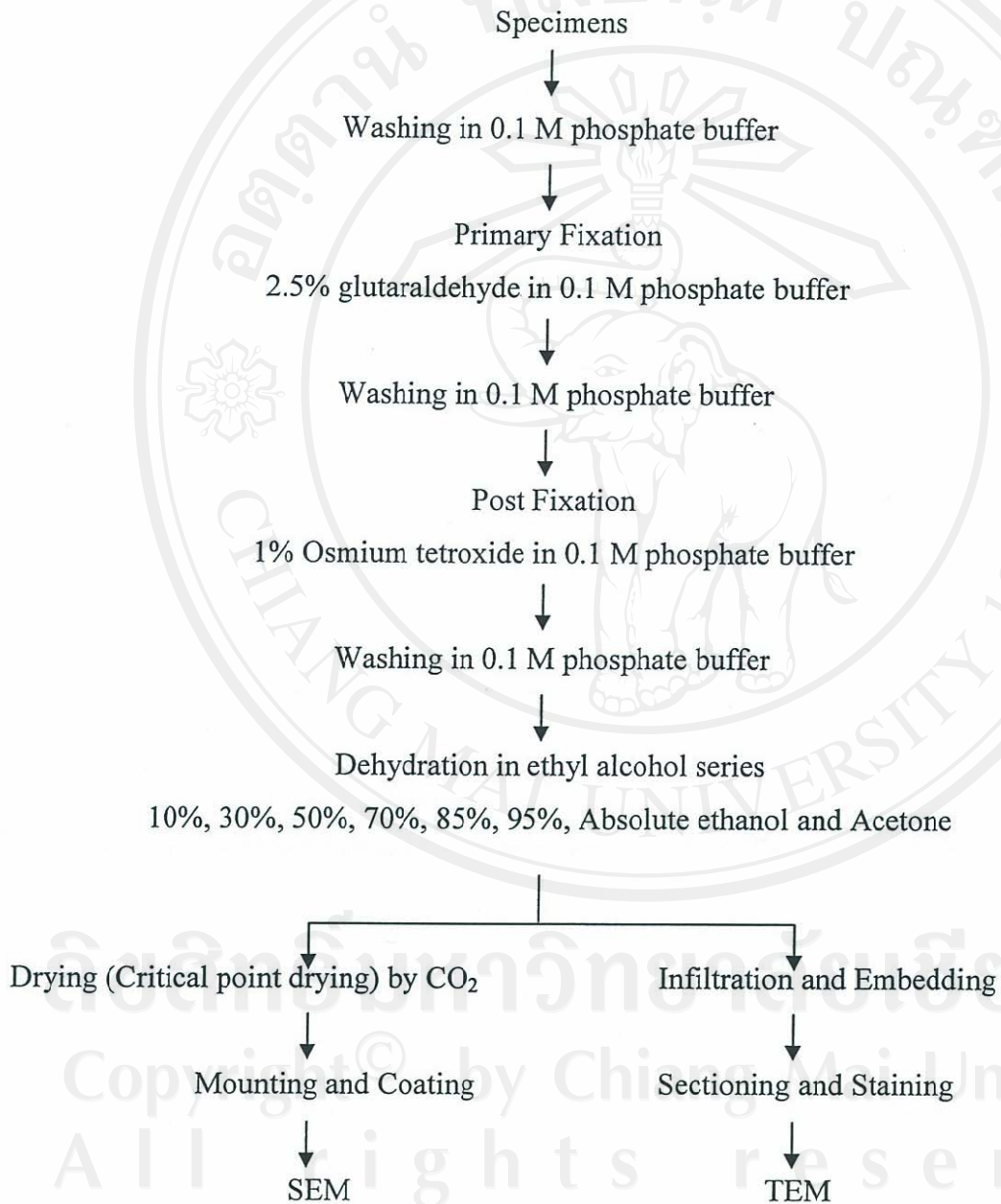


The processes of specimen preparation for permanent slide



ลิขสิทธิ์ในมหาวิทยาลัยเชียงใหม่  
 Copyright © by Chiang Mai University  
 All rights reserved

### The processes of specimen preparation for SEM and TEM observations



## CURRICULUM VITAE

- Name :** Miss Kanda Kumchoo
- Place of Birth :** Trang, Thailand
- Date of Birth :** July 8, 1973
- Address :** 37 M. 2 T. Khaopoon A. Hui-yod, Trang Province 92130  
Email: kan\_kumchoo@yahoo.com
- Education :** 1998 Bachelor of Science (Aquaculture), Fishery Technology;  
Faculty of Agricultural production MaeJo University,  
Chiang Mai, Thailand
- 2000 Master of Science (Biology); Faculty of Science,  
Chiang Mai University, Chiang Mai, Thailand
- Scholarships :** 1997-1999 Biodiversity Research and Training program (BRT)  
No. BRT 541021 from Thailand Research Fund (TRF)
- 2001-2005 Royal Golden Jubilee (RGJ) Ph.D Program  
No. PHD/0081/2544 and The Basic Research Grant  
(BGJ) No. K4700010 from Thailand Research Fund  
(TRF)
- Experience :** 2000-2001 Lecturer, Faculty of Science and Technology,  
Rajabhat Institute Nakhon Sri Tammarat, Nakhon  
Sri Tammarat, Thailand



**Published articles :**

Chalobol Wongsawad, **Kanda Kumchoo** and Aditheppornchai Pachanawan. 1998.

A new tapeworm from Maesa Stream fish of Chiang Mai, Thailand. *Rivista di Parasitologia*. XV (LIX): 305-308.

**Kanda Kumchoo**, Chalobol Wongsawad and Aditheppornchai Pachanawan. 1998.

Ultrastructural of rediae and cercariae of *Transversotrema patialensis* (Soparkar) (Transversotrematidae) from the snail host *Melanoides tuberculata* Muller. *Journal of Medical and Applied Malacology*. 10: 41-46.

**Kanda Kumchoo**, Chalobol Wongsawad, Prapaisiri Sirikanchana and Pralongyuth

Sripalwit. 1999. Light microscopy and scanning electron microscopy of *Camallanus anabantis*, Pearse, 1933 (Nematoda : Camallanidae) from *Anabas testudineus* Bloch, 1972. *Songkhlanakarin Journal of Science and Technology*, 23 (2), 185-191.

**Kanda Kumchoo**, Chalobol Wongsawad, Jong-Yil Chai and Pramote Vanittanakom

and Amnat Rojanapaibul. 2003. Recovery and growth of *Haplorchis taichui* (Trematoda : Heterophyidae) in chicks. *Southeast Asian Journal of Tropical Medicine and Public Health*, 5(4), 547-555.

**Kanda Kumchoo**, Chalobol Wongsawad, Jong-Yil Chai, Pramote Vanittanakom and

Amnat Rojanapaibul. 2005. High prevalence of *Haplorchis taichui* metacercariae in Chiang Mai Province. *Southeast Asian J. Trop. Med. Public Health*, 5(4), 547-555.

**Kanda Kumchoo**, Chalobol Wongsawad, Jong-Yil Chai, Pramote Vanittanakom and

Amnat Rojanapaibul. Effect of niclosamide on the tegumental surface of *Haplorchis taichui* by scanning electron microscopy. (in press).