REFFERENCES

Altukhov, Y. P., and Salmenkova, E. A. 1987. Stock transfer relative to natural organization, management, and conservation of fish populations. In: Population Genetics & Fishery Management, Ryman, N. and Utter, F. (eds.). Seattle: Washington Sea Grant Program, University of Washington Press, 333-343.

Anderson, I. 1993. The Veterinary approach to marine prawns. In Brown (ed.), Aquaculture for veterinations : Fish husbandry and medicine, pp.271-290. Oxford : Pergamon Press.

Avise J.C. 1994. Molecular markers, Natural history and Evolution. London: Chapman and Hall.

Avise, J, C., and Vrijenhoek, R.C. 1987. Mode of inheritance and variation of mitochondrial DNA in hybridogenetic fishes of the genus Poeciliopsis. Molecular Biology and Evolution 4: 514-525.

Bailey-Brock J.H., and Moss S.M. 1992. Penaeid taxonomy, biology and zoogeography, In: Marine Shrimp Culture: Principles and Practices, Fast A.W. and Lester L.J. (eds.). Amsterdam: Elsevier Science Publishers : 9-23

Benzie, J.A.H., Ballment, E., and Frusher, S. 1993. Genetic structure of *Penaeus monodon* in Australia: concordant results from mtDNA and allozymes. Aquaculture 111: 89-93.

Benzie, J.A.H., Frusher, S., and Ballment, E. 1992. Geographical variation in allozyme frequencies of populations of *Penaeus monodon* Crustacea: Decapoda) in Australia. Aust J Mar Freshwater Res 43: 715-725.

Billington, N. and Hebert, P.D.N. 1991. Mitochondrial DNA diversity of fishes and its implications for introductions. Can. J. Fish. aquat. Sci. 48(Suppl.1): 80-94.

Birky C.W., Jr, Furest, P., and Maruyama, T. 1989. Organelle gene diversity under migration, mutation and drift: equilibrium expectations, approach to equilibrium, effects of heteroplasmic cells, and comparison to nuclear genes. Genetics 121: 613-627.

Birky, C. W., Maruyama, T., and Fuerst, P. 1983. An approach to population and evolutionary genetic theory for genes in michondrial and chloroplasts and some results. Genetics 103: 513-27.

Boom J.D.G., Boulding E.G., and Beckenbach A.T. 1994. Mitochondrial DNA variation in introduced populations of Pacific oyster, *Crassostrea gigas*, in British Columbia. Can J Fish Aqua Sci 51: 1608-1614.

Bouchon, D., Souty-Grosset, C., and Raimond, R. 1994. Mitochondrial DNA variation and markers of species identity in two penaeid shrimp species: *Penaeus monodon* Fabricius and P. japonicus Bate. Aquaculture 127: 131-144.

Boulding, E.G., Boom, J.D.G., and Beckenbach, A.T. 1993. Genetic variation in one bottlenecked and two wild populations of the Japanese scallop (*Patinopecten yessoensis*): Empirical parameter estimates from coding regions of mitochondrial DNA. Can J Fish Aquat Sci 50: 1147-1157.

Brown, W.M. 1983. Evolution of animal mitochondrial DNA. In: Evolution of Genes and Proteins, Nei, M. and Koehm, R.K. (eds.). Sunderland, Massachusetts: Sinauer Association. Publishers: 62-87.

Carvalho, G.R., and Hauser, L. 1994. Molecular genetics and the stock concept in fisheries. Rev Fish Biol Fisheries 4: 326-350.

Crozier, R H; Crozier, Y C. 1993. The mitochondrial genome of the honeybee *Apis mellifera*: complete sequence and genome organization. Genetics 133(1): 97-117.

Dale, W. L. 1956. Wind and drift currents in the South China Sea. Malayan J Trop Geog 8: 1-31.

Daud, S.K. 1995. Population Genetics of Penaeus monodon Fabricius and Penaeus merguiensis De Man in Malaysia. PhD. thesis. University of Stirling, Scotland.

Department of Business Economics. 1998.

Dore, I., and Fimodt, C. 1987. An Illustrated Guide to Shrimp of the World. 229 pp. New York : Osprey book Press.

Felsenstein, J. 1993. Phylip (Phylogenetic inference Package) version 3.5c. Distributed by the author. Department of Genetics, University of Washington, Seattle.

Garcia, D. K., and Benzie, J. A. H. 1995. RAPD markers of potential use in penaeid prown (*Penaeus monodon*) breeding programs. Aquaculture 130: 137-144.

Garcia, D. K., Faggart, M. A., Rhoades, L., and Alcivar-warren, A. 1994. Genetic diversity of cultured Penaeus vannmei shrimp using three molecular genetic techniques. Molecular Marine Biology and Biotechnology 3 : 270-280.

Graves, J.E., and McDowell, J.R. 1994. Genetic analysis of striped marlin (*Tetrapturus audax*) population structure in the Pacific Ocean. Can J Fish Aquat Sci 51: 1762-1768.

Hall, H G; Smith, D R. 1991. Distinguishing African and European honeybee matrilines using amplified mitochondrial DNA. Proceedings of the National Academy of Science of the United States of America 88: 4548-4552.

Jennings, S. and Beverton, R.J.H.1991. Intraspecific variation in the life history tactics of Atlantic herring (Clupea harengus L.) stock. ICES J. mar. Sci. 48: 117-25.

Johnston, D., Van Trong, N., Tran Tuan, T., and Thanh Xuan, T. 2000. Shrimp seed recruitment in mixed shrimp and mangrove forestry farms in Ca Mau Province, Southern Vietnam. Aquaculture 184(1-2): 89-104.

Kirby, L.T. 1992. DNA Fingerprinting : An introduction New York : Freeman and company.

Klinbunga, S., Penman, D. J., Mc Andrew, B. J., and Tassanakajon, A. 1999. Mitochondrial DNA diversity in Three populations of the Giant Tiger Shrimp *Penaeus monodon*. Marine Biotechnology 1 : 113-121.

Klinbunga, S., Penman, D.J., and Mc Andrew, B.J. 1998. A preliminary study of ribosomal DNA polymorphism in the tiger shrimp, *Penaeus monodon*. Marine Biotechnology. 6: 186-188.

Klinbunga, S., Penman, D.J., and McAndrew, B.J. 1996. An improved protocol for total DNA isolation and visualisation of mtDNA RFLP(s) in tiger prawn, *Penaeus monodon*. Thai J Aquat Sci 3: 36-41.

Klinbunga, S., Penman, D.J., McAndrew, B.J., Tassanakajon, A., and Jarayabhand, P. 1998. Genetic variation, population differentiation and gene flow of the giant tiger shrimp (*Penaeus monodon*) inferred from mtDNA-RFLP data.In: Advances in shrimp biotechnology, Flegel, T.W. (ed.). National Center for Genetic Engineering and Biotechnology, 50-59.

Kocher, T D; Thomas, W K; Meyer, A; Edwards, S V; Paabo, S; Villablanca, F X; Wilson, A C. 1989. Dynamics of mitochondrial DNA evolution in animals: amplification and sequenceing with conserved primers. Proceedings of the National Academy of Science of the United States of America 86: 6196-6200.

Leslie, R.W. and Grant, W.S. 1990. Lack of congruence between genetic and morphological stock structure of the South African anglerfish *Lophius vomerinus*. S. Afr. J. mar. Sci. 9: 39-398.

Maniatis, T., Fritsch, E.F., and Sambrook, J. 1982. Molecular Cloning: A Laboratory Manual. N.Y.: Cold Spring Harbor, Cold Spring Habor Laboratory.

Mattoccia, M., Rosa, G.L., Matthaeis, E.D., Sbordini, M.C., and Sbordini, V. 1987. Patterns of genetic variability and differentiation in Mediterranean populations of *Penaeus kerathurus* (Crustacea, Decapoda). In: Proc. World Symp. On Selection, Hybridization and Genetic Engineering in Aquaculture vol 2, Tiews, K. (ed). Berlin: H. Heenemann GmbH & Co., 131-141

McElroy, D., Moran, P., Bermingham, E., and Kornfield, I. 1991. REAP; The Restriction Enzyme Analysis Package, Version 4.0, University of Maine, Orono, Maine, USA.

Moore, S. S., Whan, V., Davis, G.P., Byrne, K., Hetzel, D. J. S. and Preston, N. 1999. The development and application of genetic markers for the kuruma prawn *Penaaeus japonicus*. Aquaculture 173: 19-32.

Morgan, J.R., and Valencia, M.J. 1983. The natural environmental setting. In: Atlas for marine Science Policy in Southeast Asia Seas, Morgan, J.R. and Valencia, M.J. (eds). University of California.

Moritz, C., Dowling, T.E. and Brown, W.M. 1987. Evolution of animal mitochondrial DNAs: relevance for population biology and systematics. Annu. Rev. Ecol. Syst., 18:269-292.

Motoh, H. 1981. Studies on the Fisheries biology of the giant tiger prawn, *Penaeus monodon* in Philippines. SEAFDEC Tech. Rep. 7 : 128.

Mulley, J.C., and Latter, B.D.H. 1981a. Geographic differentiation of Eastern Australian penaeid prawn populations. Aust J Mar Freshwater Res 32: 889-895.

Mulley, J.C., and Latter, B.D.H. 1981b. Geographic differentiation of tropical Australian penaeid prawn populations. Aust J Mar Freshwater Res 32: 897-906.

Nei, M. 1987. Molecular evolutionary genetics NY: Columbia University Press.

Nei, M., and Li, W.H. 1979. Mathematical model for studying genetic variation in terms of restriction endonuclease. Proc Natl Acad Sci USA 76: 5269-5273.

Nei, M., and Tajima, F. 1981. DNA polymorphism detectable by restriction endonucleases. Genetics 97: 145-163.

O'Connell, M., Skibinski, D.O.F., and Beardmore, J.A. 1995. Mitochondrial DNA and allozyme variation in Atlantic salmon (*Salmo salar*) populations in Wales. Can J Fish Aquat Sci USA 52: 171-178.

Ovenden, J.R. 1990. Mitochondrial DNA and marine stock assessment: a review. Aust J Mar Freshwater Res 41: 835-853.

Palumbi, S.R., Martin, A., Pomano, S., McMillan, W.O., Stice, L., and Grabowski, G. 1991. The Simple Fool's Guide to PCR, version 2. University of Hawaii, Zoology Department, Honolulu, HI.

Parker, P.G., Snow, A.A., Schung, M.D., Booton, G.C., and Fuerst, P.A. 1998. Molecular techniques in ecology : what molecules can tell us about populations : choosing and using a molecular marker. Ecology 79 : 361-382.

Pianka, E. R. 1994. Evolutionary Ecology 5^{th} edition. N.Y.: Harper and Collins College Publishers.

Reeb, C.A., and Avise, J.C. 1990. A genetic discontinuity in a continuously distributed species: mitochondrial DNA in the American oyster, *Crassostrea virginica*. Genetics 124: 397-406.

Roff, D.A., and Bentzen, P. 1989. The statistical analysis of mitochondrial DNA polymorphisms: X 2 and the problems of small samples. Mol Biol Evol 6: 539-545.

Saunders, N.C., Kessler, L.G., and Avise, J.C. 1986. Genetic variation and geographic differentiation in mitochondrial DNA of the horseshoe crab, *Limulus polyphemus*. Genetics 112: 613-627.

Sihanuntavong, D., Sittipraneed, S., and Klinbunga, S. 1999. Mitochondrial DNA diversity and population structure of the honey bee (Apis cerana) in Thailand. J Apicultural Res 38: 211-219.

Smith, D. R., and Brown, W. M. 1998. Polymorphisms in mitochondrial DNA of European and Africanized honeybee (Apis mellifera). Experientia 44 : 257-260.

Sodsuk, S. 1996. Genetic Population Structure of Penaeus monodon Fabricius using Allozyme and Mitochondrial DNA Analysis. PhD. thesis. University of Stirling, Scotland.

Sodsuk, S., Me Andrew, B.J. and Penman, D.J., 1992. Genetic population structure of the giant tiger prawn (*Penaeus monodon* , Fabricus, 1798) in the Gulf of Thailand and the Andaman Sea. In D. Penman, N. Rcongratri and B. McAndrew (eds.), AADCP Workshop proceedings on Genetic in Aquaculture and Fisheries Mangement, pp. 161-164. Institute of Aquaculture, University of Stirling, Scotland.

Supungul, P., Sootanan, P., Klinbunga, S., Kamonrat, W., Jarayabhand, P., and Tassanakajon, A. 2000. Microsattelite polymorphism and the population structure of Black tiger shrimp (*Penaeus monodon*) in Thailand. Marine Biotechnology (in press).

Tassanakajon, A., Pongsomboon, S., Jarayabhand, P., Klinbunga, S., and Boonsaeng, V. 1998 a. Genetic structure in wild population of the black tiger shrimp (*Penaeus monodon*) using randomly amplified polymorphic DNA analysis. Molecular Marine Biology and Biotechnology 6(4) : 308-312.

Tassanakajon, A., Pongsomboon, S., Rimphanitchayakit, V., Jarayabhand, P., and Boonsaeng.V. 1997. Randomly amplified polymorphic DNA (RAPD) markers for determination of genetic variation in wild population of the black tiger prawn (*Penaeus monodon*) in Thailand. Molecular Marine Biology and Biotechnology 6(2): 110-115.

Tassanakajon, A., Tiptawannukul, A., Supungul, P., and Rimphanitchayakit, V. 1998 b. Isolation and characterization of microsatellite markers in the black tiger prawn *Penaeus monodon*. Molecular Marine Biology and Biotechnology 7(1): 55-61.

Thrope, J., Gall, G., Lannan, J. and Nash, C. 1995. Conservation of Fish and Shellfish Resources: Managing Diversity London: Academic Press.

Ward R.D. and Grewe P.M. 1994. Appraisal of molecular genetic techniques in fisheries. Rev Fish Biol Fisheries 4: 300-325

World Prawn Farming. 1998. Statistics of Shrimp culture year 1998 Department of Fisheries, Ministry of Agriculture.

Wuthijinda, W., Klinbinga, S., Tassanakajon A.and Jarayabhand, P. (1999). Anomalous population structure patterns the giant tiger shrimp (*Penaeus monodon*) in the East of Peninsular Thailand: a possible consequence of farming activity and transplantation. National Symposium on Marine Shrimp The 1^{st}: 208.

APPENDICES

APPENDIX A

Data on sex, total length, carapace length and weight of *P. monodon* collected from 5 geographic different samples.

A.1 *P. monodon* form Satun. (collection date 18 February 1997)

Specimen No.	Sex	Total length(cm)	Carapace length(cm.)	Weight(g.)
SAT 1	F	26.5	7.10	187.13
SAT 2	F	27.3	7.55	205.83
SAT 3	F	29.0	8.30	254.80
SAT 4*	M	29.0	5.80	112.67
SAT 5*	M	21.2	5.20	86.41
SAT 6*	M	20.9	5.25	86.93
SAT 7*	M	21.0	5.15	82.82
SAT 8*	F	24.5	6.80	156.65
SAT 9*	F	27.0	7.15	204.00
SAT 10	F	26.4	7.10	184.09
SAT 11*	M	24.0	6.20	128.25
SAT 12	M	22.5	5.10	107.58
SAT 13	M	22.0	5.50	93.08
SAT 14	M	21.2	5.15	87.66
SAT 15	M	23.5	5.85	116.09
SAT 16	M	23.0	5.70	110.74
SAT 17	M	23.5	5.70	110.94
SAT 18	M	22.5	5.60	107.36
SAT 19	F	26.8	7.20	182.56
SAT 20	F	26.0	7.25	180.97
SAT 21	F	26.4	7.00	185.67
SAT 22	F	29.5	8.00	230.54
SAT 23	F	26.7	7.45	196.06
SAT 24	F	27.5	7.55	205.91
SAT 25	F	28.3	7.85	222.55
SAT 26	F	27.6	7.50	195.61
SAT 27*	M	20.5	5.10	80.18
SAT 28	F	30.0	8.70	290.39
SAT 29	F	28.0	7.70	217.30
SAT 30*	M	22.5	5.65	105.99
SAT 31*	F	23.7	6.20	123.37
SAT 32*	F	26.9	7.65	183.09
SAT 33	M	21.2	5.35	86.50
SAT 34	F	27.0	7.10	200.15

Sample No.	Sex	Total length(cm)	Carapace length(cm.)	Weight(g.)
SAT 35	M	22.6	5.60	103.14
SAT 36	M	21.8	5.45	91.77
SAT 37	M	22.9	5.90	110.10
SAT 38	M	22.5	5.70	105.84
SAT 39*	M	21.5	5.30	91.36
SAT 40*	F	25.6	6.90	158.24
SAT 41	F	27.0	7.25	190.21
SAT 42	F	29.5	8.05	247.51
SAT 43	F	26.9	7.40	193.63
SAT 44*	F	26.3	7.35	194.04
SAT 45	F	26.5	7.25	183.04
SAT 46*	F	29.3	8.10	238.30
SAT 47*	F	26.7	7.40	181.63
SAT 48*	F	25.9	6.70	167.24
SAT 49*	F	27.0	7.40	196.57
SAT 50*	F	28.0	7.90	220.15

A.2 *P. monodon* form Trang (collection date 19 February 1997)

Specimen No.	Sex	Total length(cm)	Carapace length(cm.)	Weight(g.)
TNG 1*	F	29.20	8.20	246.87
TNG 2*	F	28.10	7.70	217.40
TNG 3*	F	29.20	8.10	237.38
TNG 4*	F	27.40	7.10	202.03
TNG 5	F	26.00	6.90	175.06
TNG 6	F	24.50	6.70	148.48
TNG 7*	F	27.60	7.25	191.95
TNG 8	F	27.30	7.40	203.74
TNG 9*	M	21.60	5.50	96.76
TNG 10	F	24.55	6.60	153.98
TNG 11	M	23.00	5.80	110.72
TNG 12	F	26.10	6.80	177.74
TNG 13	M	23.80	5.85	126.85
TNG 14	M	22.75	5.65	112.20
TNG 15	F	26.75	7.15	196.66
TNG 16	F	24.50	6.45	138.32
TNG 17	M	22.75	5.90	113.36
TNG 18	F	25.20	6.70	157.28
TNG 19	F	27.70	7.70	221.74

Specimen No.	Sex	Total length(cm)	Carapace length(cm.)	Weight(g.)
TNG 20	F	26.60	7.30	192.10
TNG 21	F	26.80	7.50	205.82
TNG 22	M	20.60	5.35	87.26
TNG 23	M	22.20	5.50	100.18
TNG 24*	F	26.30	7.00	175.70
TNG 25*	F	26.20	7.20	174.25
TNG 26*	M	21.40	5.20	90.74
TNG 27*	M	23.50	5.85	126.62
TNG 28*	M	22.50	5.45	107.21
TNG 29*	M	21.00	5.25	90.52
TNG 30	M	22.50	5.60	110.67
TNG 31*	M	21.60	5.35	93.92
TNG 32*	F	25.90	7.20	176.78
TNG 33*	M	21.00	5.35	91.65
TNG 34*	M	22.30	5.55	104.47
TNG 35*	M	22.35	5.66	107.60
TNG 36*	M	23.70	6.00	118.07
TNG 37*	M	21.90	5.65	104.03
TNG 38*	M	22.80	5.65	107.02
TNG 39*	M	22.60	5.55	104.14
TNG 40	M	21.10	5.30	86.60
TNG 41	F	26.90	7.10	185.67
TNG 42	F	26.50	7.30	188.92
TNG 43	F	23.60	6.15	135.78
TNG 44*	F	29.60	8.05	260.40
TNG 45	M	23.10	5.80	111.98
TNG 46	F	26.90	7.40	200.18
TNG 47	F	24.50	6.70	141.36
TNG 48	F	26.70	7.00	187.16
TNG 49	M	22.50	5.70	105.82
TNG 50	F	26.40	7.20	168.86
TNG 51	F	27.20	7.10	170.39
TNG 52	M	23.90	6.10	152.06
TNG 53*	F	27.00	7.20	201.56
TNG 54*	M	21.90	5.40	100.15

A.3 *P. monodon* form Phannga (collection date 19 March 1997)

Specimen No.	Sex	Total length(cm)	Carapace length(cm.)	Weight(g.)
PHA 1	M	21.80	4.00	76.97
PHA 2*	F	23.30	4.50	90.80
PHA 3	F	21.00	4.20	71.56
PHA 4	F	21.00	3.80	78.83
PHA 5	F	23.70	5.10	132.20
PHA 6*	M	18.10	3.10	50.04
PHA 7	M	20.50	3.80	65.56
PHA 8*	F	23.50	4.40	105.12
PHA 9*	F	21.50	4.00	78.10
PHA 10	F	28.00	6.10	180.82
PHA 11	F	27.50	5.90	180.16
PHA 12	F	21.50	3.65	74.21
PHA 13	F	21.50	4.00	77.15
PHA 14	M	21.00	3.70	70.92
PHA 15	M	19.60	3.30	56.66
PHA 16*	F	21.20	3.95	80.45
PHA 17	M	20.30	3.60	65.01
PHA 18	M	20.20	3.55	61.07
PHA 19	M	21.10	3.60	71.52
PHA 20	F	23.50	4.50	95.85
PHA 21	F	21.40	3.90	77.64
PHA 22	M	20.90	3.70	73.53
PHA 23	M	19.90	3.60	61.18
PHA 24	F	23.60	4.50	103.11
PHA 25	F	21.60	4.00	82.03
PHA 26	F	24.10	4.60	109.40
PHA 27	F	22.40	4.40	89.48
PHA 28	F	21.10	3.85	71.99
PHA 29	F	23.30	4.60	100.35
PHA 30	M	21.50	3.70	72.81
PHA 31*	M	21.10	3.75	69.61
PHA 32*	F	22.30	4.20	90.10
PHA 33	F	23.20	4.40	94.34
PHA 34	F	24.10	4.50	110.4
PHA 35	F	21.10	3.85	71.84
PHA 36	M	20.60	3.70	64.70
PHA 37	M	19.50	3.45	59.42
PHA 38*	M	20.40	3.60	66.44
PHA 39	M	19.70	3.50	59.16

A.4 *P. monodon* form Chumphon. (collection date 4 June 1997)

Specimen No.	Sex	Total length(cm)	Carapace length(cm.)	Weight(g.)
CHM 1	M	22.2	5.48	106.68
CHM 2	F	25.2	6.84	156.09
CHM 3	M	22.5	5.25	97.99
CHM 4	M	23.2	5.86	106.78
CHM 5	M	24.4	5.80	130.66
CHM 6	M	21.9	5.00	95.21
CHM 7	M	22.2	5.14	104.21
CHM 8	M	21.0	5.11	85.64
CHM 9	F	26.0	6.20	166.47
CHM 10	F	24.6	6.24	137.82
CHM 11	M	22.8	5.60	109.69
CHM 12	M	23.2	5.24	119.00
CHM 13	M	20.3	4.70	74.28
CHM 14	M	21.0	5.13	88.54
CHM 15	M	24.3	5.95	119.96
CHM 16	M	22.9	5.70	110.31
CHM 17	M	22.2	5.30	96.47
CHM 18	F	22.9	5.55	107.47
CHM 19	M	22.7	4.64	106.94
CHM 20	F	25.3	6.76	151.34
CHM 21	F	24.0	5.88	136.38
CHM 22	F	23.0	6.08	123.73
CHM 23	F	27.4	7.40	212.25
CHM 24*	F	25.5	6.52	155.43
CHM 25	M	21.3	5.18	89.86
CHM 26	M	20.9	5.06	84.23
CHM 27	F	24.4	5.46	138.36
CHM 28	F	23.5	6.20	127.16
CHM 29	F	30.2	8.18	276.10
CHM 30	F	23.7	6.20	128.58
CHM 31	F	24.6	6.40	150.51
CHM 32*	F	24.4	6.52	148.92
CHM 33	F	24.0	6.20	137.73
CHM 34*	F	25.6	6.80	164.73
CHM 35	F	24.5	6.50	140.91
CHM 36*	M	21.5	5.36	94.82
CHM 37*	M	21.2	5.36	91.37
CHM 38*	F	23.8	6.06	136.65
CHM 39	M	21.3	5.46	94.07
CHM 40	M	21.1	5.42	88.38

Specimen No.	Sex	Total length(cm)	Carapace length(cm.)	Weight(g.)
CHM 41	M	23.5	5.94	121.07
CHM 42	M	22.6	5.86	110.74
CHM 43	F	24.3	6.21	148.52
CHM 44*	F	23.8	6.30	137.25
CHM 45	F	23.9	6.49	137.25
CHM 46*	M	21.2	5.26	82.90
CHM 47	M	21.0	5.19	93.55
CHM 48*	F	24.7	6.36	147.60
CHM 49*	F	29.7	8.16	260.90
CHM 50 *	F	23.5	6.00	125.95
CHM 51*	F	26.3	7.14	188.11
CHM 52*	F	23.1	5.94	121.92
CHM 53*	M	21.3	4.59	100.50
CHM 54*	F	25.2	6.66	154.58
CHM 55*	M	22.0	5.30	92.51

A.5 *P. monodon* from Trat (collection date 29 November 1997)

Specimen No.	Sex	Total length(cm)	Carapace length(cm.)	Weight(g.)
TRAT1*	M	19.5	7.5	95
TRAT 2*	M	-	-	-
TRAT 3	M	22.0	9.0	95
TRAT 4*	M	20.6	8.0	75
TRAT 5	M	22.3	8.9	110
TRAT 6	M	21.9	8.8	95
TRAT 7	M	20.9	7.5	105
TRAT 8	M	21.5	8.5	95
TRAT 9	M	20.3	7.5	85
TRAT10	M	21.2	8.0	100
TRAT11	M	21.2	8.1	105
TRAT12	M	20.1	8.0	90
TRAT13	F	25	10.0	170
TRAT14	F	25.1	10.5	160
TRAT 15	F	26.3	10.6	180
TRAT 16	F	26.1	10.6	185
TRAT17	F	24	10.0	155
TRAT 18	F	24.6	9.5	155
TRAT 19	F	25.0	10.0	160

Specimen No.	Sex	Total length(cm)	Carapace length(cm.)	Weight(g.)
TRAT 20	F	27.0	11.0	210
TRAT 21	F	24.5	10.0	170
TRAT 22	F	24.5	10.0	180
TRAT 23*	F	24.9	10.0	170
TRAT24*	F	25.8	10.8	180
TRAT25	F	23.6	9.7	145
TRAT 26*	F	24.4	10.0	140
TRAT 27	F	25.1	10.0	180
TRAT28*	F	27.0	11.0	210
TRAT29*	F	25.6	10.5	185
TRAT 30*	F	27.0	11.0	195
TRAT31	F	31.0	13.0	310
TRAT32*	F	24.1	9.5	150
TRAT33	F	25.0	10.7	180
TRAT34*	F	25.0	10.5	145
TRAT35	F	27.0	11.0	200

* not included in RFLP analysis

APPENDIX B

Summary of restriction patterns of 16S rDNA and an intergenic COI-COII of *P. monodon* digested with six restriction endonuclease

Samples	16S rDNA	CO I - CO II				
	Restriction enzyme					
	Mbo I	*Alu* I	*Mbo* I	*Taq* I	*Dde* I	*Hin* fI
Sat001	A	B	B	B	B	A
Sat002	A	B	B	B	B	A
Sat003	A	C	B	B	B	A
Sat010	A	A	A	A	A	C
Sat012	A	B	B	C	B	A
Sat013	A	B	B	B	B	A
Sat014	B	A	A	A	A	C
Sat015	A	C	B	D	E	D
Sat016	B	A	A	A	A	B
Sat017	A	C	B	B	B	F
Sat018	A	C	B	D	B	K
Sat019	A	C	B	B	E	F
Sat020	A	A	A	A	A	C
Sat021	B	A	A	A	A	B
Sat022	B	A	A	A	A	B
Sat023	A	B	B	D	B	A
Sat024	B	A	A	A	A	B
Sat026	A	B	B	B	B	A
Sat028	A	B	B	B	B	A
Sat029	A	B	B	C	B	A
Sat033	A	A	A	A	A	C
Sat034	A	B	B	D	B	A
Sat035	A	C	B	B	C	A
Sat036	B	A	A	A	A	B
Sat037	B	A	A	A	A	B
Sat038	A	B	B	B	B	A
Sat041	A	B	B	B	B	A
Sat042	A	B	B	B	B	A
Sat043	B	A	A	A	A	B
Sat045	B	A	A	A	A	B

Samples	16S rDNA	CO I - CO II				
	Restriction enzyme					
	Mbo I	*Alu* I	*Mbo* I	*Taq* I	*Dde* I	*Hin* f I
Png001	A	A	A	A	A	C
Png003	C	B	B	B	B	A
Png004	B	A	A	A	A	B
Png005	A	B	B	B	B	A
Png007	A	B	B	B	B	A
Png010	A	B	B	B	B	A
Png011	B	A	A	A	A	B
Png012	A	A	A	A	A	B
Png013	B	A	A	A	A	H
Png014	A	C	B	B	B	A
Png015	B	A	A	A	A	B
Png017	B	A	A	A	A	B
Png018	A	C	B	B	C	A
Png019	A	C	B	B	B	E
Png020	A	A	A	A	A	C
Png021	B	A	A	A	A	B
Png022	B	A	A	A	A	B
Png023	A	B	B	D	E	G
Png024	A	C	B	B	C	A
Png025	B	A	A	A	A	B
Png026	A	B	B	B	B	A
Png027	A	B	B	B	B	A
Png028	B	A	A	A	A	C
Png029	B	A	A	A	A	C
Png030	A	C	B	B	C	A
Png033	B	A	A	A	A	B
Png034	B	A	A	A	A	B
Png035	A	A	A	A	A	C
Png036	B	A	A	A	A	B
Png037	B	A	A	A	A	B
Png039	A	B	B	C	B	A
TRG005	B	A	E	A	A	B
TRG006	A	B	B	B	B	A
TRG008	A	C	B	B	B	A
TRG010	A	C	B	B	B	A

Samples	16S rDNA	CO I - CO II				
	Restriction enzyme					
	Mbo I	*Alu* I	*Mbo* I	*Taq* I	*Dde* I	*Hin* f I
TRG011	A	B	B	B	B	A
TRG012	A	C	B	B	B	A
TRG013	B	A	A	A	A	B
TRG014	A	B	B	D	E	G
TRG015	B	A	A	A	A	B
TRG016	B	A	A	A	A	B
TRG017	A	A	A	A	B	C
TRG018	A	C	B	B	C	I
TRG019	A	C	B	D	H	D
TRG020	B	A	A	A	A	B
TRG021	A	A	A	A	A	C
TRG022	B	A	A	A	A	B
TRG023	B	A	A	A	A	B
TRG030	A	B	B	B	B	A
TRG040	A	B	A	B	B	A
TRG041	A	B	B	B	B	A
TRG042	A	B	B	D	B	A
TRG043	A	B	B	B	B	A
TRG045	B	A	A	A	A	C
TRG046	A	A	A	A	B	C
TRG047	A	A	A	A	B	C
TRG048	A	B	B	B	A	A
TRG049	A	A	A	A	A	C
TRG050	B	A	A	A	A	B
TRG051	A	B	B	B	B	A
TRG052	B	A	A	A	A	B
Chu001	A	C	B	D	B	A
Chu002	A	B	B	C	B	A
Chu003	A	B	B	B	B	A
Chu004	A	C	B	B	C	A
Chu005	A	B	B	B	B	A
Chu006	A	B	B	B	B	A
Chu007	B	A	A	A	A	B
Chu008	A	B	B	B	B	A
Chu009	A	E	A	A	A	C

Samples	16S rDNA	CO I - CO II				
	Restriction enzyme					
	Mbo I	*Alu* I	*Mbo* I	*Taq* I	*Dde* I	*Hin* f I
Chu010	B	A	A	A	A	B
Chu011	B	E	A	A	A	B
Chu012	B	A	A	A	D	B
Chu013	A	D	C	E	C	A
Chu014	B	A	A	A	A	B
Chu015	B	A	A	A	A	B
Chu016	B	A	A	A	A	B
Chu017	B	A	A	A	A	B
Chu018	A	C	B	D	E	J
Chu019	A	C	B	C	B	E
Chu020	A	D	C	E	C	A
Chu021	A	D	B	B	C	A
Chu022	A	B	B	C	C	A
Chu023	B	A	A	A	A	B
Chu025	A	A	A	A	A	B
Chu026	A	D	C	E	B	A
Chu027	A	B	B	C	C	A
Chu028	A	B	B	B	C	A
Chu029	A	B	B	B	C	A
Chu030	B	A	A	A	D	B
Chu031	B	A	A	A	A	B
Chu033	A	C	B	B	C	A
Chu035	A	B	B	B	C	A
Chu039	A	B	B	C	B	A
Chu040	B	A	A	A	A	B
Chu041	A	A	A	A	A	C
Chu042	B	A	A	A	A	B
Chu043	A	B	B	C	B	A
Chu045	B	A	A	A	A	B
Chu047	A	B	B	B	B	A
Tra003	A	B	B	B	B	A
Tra005	A	C	B	B	B	A
Tra006	B	A	A	A	A	B
Tra007	B	A	A	A	E	B
Tra008	A	B	B	C	B	A

Samples	16S rDNA	CO I - CO II				
	Restriction enzyme					
	Mbo I	*Alu* I	*Mbo* I	*Taq* I	*Dde* I	*Hin* f I
Tra009	B	A	A	A	A	B
Tra010	B	A	A	A	D	B
Tra011	B	A	A	A	D	B
Tra012	B	A	A	A	A	B
Tra013	A	E	B	A	G	B
Tra014	A	C	B	B	B	A
Tra015	B	A	A	A	D	B
Tra016	A	B	B	C	B	A
Tra017	A	C	B	B	B	A
Tra018	B	A	A	A	A	B
Tra019	B	A	A	A	D	B
Tra020	A	B	B	C	B	A
Tra021	B	A	D	A	D	B
Tra022	A	C	B	B	B	A
Tra025	B	A	A	A	A	B
Tra027	B	A	A	A	A	B
Tra031	A	B	B	B	C	A
Tra033	B	A	A	A	D	B
Tra035	B	A	A	A	D	B

APPENDIX C

Size of fragments, the presence (1) and absence of a particular fragment resulted from digestion of 16S rDNA and an intergenic COI-COII of *P. monodon* with restriction endonuclease

C.1 16S rDNA / *Mbo* I

Haplotype	Size of fragments (base pairs)				
	390	380	280	170	100
A	1	0	0	1	0
B	0	0	1	1	1
C	0	1	0	1	0

C.2 COI-COII / *Alu* I

Haplotype	Size of fragments (base pairs)											
	725	625	510	455	280	175	165	135	135	105	75	65
A	1	0	0	1	0	0	0	1	1	0	1	0
B	0	0	1	1	0	0	0	1	0	1	1	1
C	0	0	1	1	0	0	1	1	0	1	1	1
D	0	1	0	0	1	1	0	1	0	1	1	1
E	1	0	0	1	0	0	1	1	0	0	1	0

C.3 COI-COII / *Mbo* I

Haplotype	Size of fragments (base pairs)									
	700	565	440	325	300	260	250	185	140	135
A	1	1	0	0	0	0	0	1	1	0
B	0	1	1	0	0	1	0	1	1	0
C	1	0	0	1	1	0	1	0	0	0
D	1	1	0	0	0	0	0	1	0	1
E	1	1	0	1	0	0	0	0	0	0

C.4 COI-COII / *Taq* I

Haplotype	Size of fragments (base pairs)												
	800	625	575	500	425	290	290	200	175	125	115	75	50
A	1	0	0	1	0	0	0	0	0	0	1	1	0
B	0	1	1	0	0	0	0	0	0	1	1	0	1
C	0	1	0	0	0	1	1	0	0	1	1	0	0
D	0	1	1	0	0	0	0	0	1	0	1	0	0
E	0	0	1	0	1	0	0	1	0	1	1	0	0

C.5 COI-COII / *Hinf* I

Haplotype	Size of fragments (base pairs)							
	1200	250	210	160	100	90	65	60
A	1	0	1	0	0	1	1	0
B	1	1	0	0	0	1	1	0
C	1	1	0	0	0	1	0	0
D	1	0	1	0	0	1	0	1
E	1	0	0	1	1	1	1	0
F	1	0	1	0	0	1	1	1
G	1	1	1	0	0	1	1	0
H	1	0	0	1	0	1	1	0

C.6 COI-COII / *Dde* I

Haplotype	Size of fragments (base pairs)												
	980	900	600	360	325	300	295	225	175	140	125	110	50
A	1	0	0	0	1	0	1	0	0	0	0	0	1
B	0	0	1	1	0	1	1	0	0	0	0	0	1
C	0	0	0	1	1	1	1	0	0	0	0	0	1
D	0	1	0	0	1	0	0	0	1	0	1	0	1
E	1	0	0	0	1	0	1	0	0	0	0	1	1
F	0	1	0	0	1	0	1	0	0	0	0	1	1
G	1	0	0	0	1	0	0	0	1	0	1	0	1
H	0	0	1	0	0	1	1	1	0	1	0	0	1
I	0	1	0	0	1	1	1	0	0	0	0	0	0
J	1	0	0	0	1	0	0	0	1	0	1	1	1
K	0	1	0	0	1	0	0	0	1	0	1	1	1

APPENDIX D

Pairwise genetic distances of 37 composite mtDNA haplotypes generated from digestion of 16S rDNA with *Mbo* I and an intergenic COI-COII digested with *Alu* I, *Mbo* I, *Taq* I, *Hin* fI, and *Dde* I.

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 37
ABBBBA
ACBBBA      0.00158844767
AAAAAC      0.04427993744 0.04606349143
ABBCBA      0.00671329219 0.00832386935 0.04427993744
BAAAAC      0.05230498322 0.05407140795 0.00529153807 0.05230498322
ACBDED      0.02136812100 0.01893130393 0.05407140795 0.02561244627
            0.06260394876
BAAAAB      0.05906907623 0.06085148759 0.00904752537 0.05906907623
            0.00341469458 0.07001071145
ACBBBF      0.00645319267 0.00469500597 0.04781464961 0.01353595522
            0.05580829434 0.01665410144 0.06260394876
ACBDBK      0.01734957924 0.01510703429 0.05407140795 0.02136812100
            0.06260394876 0.00621250286 0.07001071145 0.00953092046
ACBBEF      0.01146982940 0.00953092046 0.04953666200 0.01893130393
            0.05751664385 0.01103525552 0.06432747915 0.00452497331
            0.01452073479
ABBDBA      0.00507653159 0.00671329219 0.04246717998 0.00867061393
            0.05050796418 0.01574278446 0.05725563963 0.01194008076
            0.01194008076 0.01734957924
ACBBCA      0.00328032850 0.00158844767 0.05050796418 0.01031858837
            0.05906907623 0.02136812100 0.06644267756 0.00645319267
            0.01734957924 0.01146982940 0.00867061393
CBBBBA      0.00328032850 0.00487831890 0.05050796418 0.01031858837
            0.05230498322 0.02561244627 0.05906907623 0.00990911216
            0.02136812100 0.01510703429 0.00867061393 0.00671329219
AAAAAB      0.05050796418 0.05230498322 0.00356053991 0.05050796418
            0.00904752537 0.06085148759 0.00529153807 0.05407140795
            0.06085148759 0.05580829434 0.04867923629 0.05725563963
            0.05725563963
BAAAAH      0.06085148759 0.06260394876 0.01473517450 0.06085148759
            0.00867061393 0.07175019151 0.00507653159 0.06432747915
            0.07175019151 0.06602304630 0.05906907623 0.06824188624
            0.06085148759 0.01076340275
ACBBBE      0.00315613757 0.00153005945 0.04781464961 0.00990911216
            0.05580829434 0.02048875450 0.06260394876 0.00304100805
            0.01300679191 0.00770746021 0.00832386935 0.00315613757
            0.00645319267 0.05407140795 0.06432747915
ABBDEG      0.01574278446 0.01734957924 0.05230498322 0.01975008986
            0.06085148759 0.00469500597 0.06824188624 0.02296080120
            0.01146982940 0.01665410144 0.01031858837 0.01975008986
            0.01975008986 0.05906907623 0.07001071145 0.01893130393
```

BAEAAB	0.07268698464	0.07453587080	0.01541834426	0.07268698464
	0.00904752537	0.08532507153	0.00529153807	0.07635279935
	0.08532507153	0.07813888691	0.07080496162	0.08162098275
	0.07268698464	0.01124834175	0.01076340275	0.07635279935
	0.08348926384			
AAAABC	0.03850581999	0.04027229316	0.00356053991	0.03850581999
	0.00904752537	0.05407140795	0.01300679191	0.04200896787
	0.04781464961	0.04953666200	0.03670847160	0.04427993744
	0.04427993744	0.00730194055	0.01893130393	0.04200896787
	0.05230498322	0.01983589498		
ACBBCI	0.01031858837	0.00832386935	0.05050796418	0.01810585837
	0.05906907623	0.02136812100	0.06644267756	0.00645319267
	0.01734957924	0.01146982940	0.01643453328	0.00671329219
	0.01411008357	0.05725563963	0.06824188624	0.00990911216
	0.02846514479	0.08162098275	0.04427993744	
ACBDHD	0.01975008986	0.01734957924	0.05230498322	0.02398283346
	0.06085148759	0.00153005945	0.06824188624	0.01510703429
	0.00469500597	0.01300679191	0.01411008357	0.01975008986
	0.02398283346	0.05906907623	0.07001071145	0.01893130393
	0.00645319267	0.08348926384	0.05230498322	0.01975008986
ABABBA	0.00507653159	0.00671329219	0.03670847160	0.01245059779
	0.04427993744	0.02846514479	0.05050796418	0.01194008076
	0.02398283346	0.01734957924	0.01076340275	0.00867061393
	0.00867061393	0.04246717998	0.05230498322	0.00832386935
	0.02232671860	0.06274866761	0.03134449124	0.01643453328
	0.02679676060			
ABBBAA	0.00328032850	0.00487831890	0.03850581999	0.01031858837
	0.04606349143	0.02136812100	0.05230498322	0.00990911216
	0.02136812100	0.01146982940	0.00867061393	0.00671329219
	0.00671329219	0.04427993744	0.05407140795	0.00645319267
	0.01574278446	0.06461199017	0.04427993744	0.01411008357
	0.01975008986	0.00867061393		
ACBDBA	0.00671329219	0.00487831890	0.04427993744	0.01031858837
	0.05230498322	0.01353595522	0.05906907623	0.00990911216
	0.00990911216	0.01510703429	0.00165146908	0.00671329219
	0.01031858837	0.05050796418	0.06085148759	0.00645319267
	0.01194008076	0.07268698464	0.03850581999	0.01411008357
	0.01194008076	0.01245059779	0.01031858837	
AEAAAC	0.04427993744	0.04027229316	0.00356053991	0.04427993744
	0.00904752537	0.04781464961	0.01300679191	0.04200896787
	0.04781464961	0.04371686474	0.04246717998	0.04427993744
	0.05050796418	0.00730194055	0.01893130393	0.04200896787
	0.05230498322	0.01983589498	0.00730194055	0.04427993744
	0.04606349143	0.03670847160	0.03850581999	0.03850581999
BEAAAB	0.05906907623	0.05407140795	0.01300679191	0.05906907623
	0.00699524902	0.06260394876	0.00341469458	0.05580829434
	0.06260394876	0.05751664385	0.05725563963	0.05906907623
	0.05906907623	0.00904752537	0.00867061393	0.05580829434
	0.06824188624	0.00904752537	0.01719004139	0.05906907623
	0.06085148759	0.05050796418	0.05230498322	0.05230498322
	0.00904752537			
BAAADB	0.06644267756	0.06824188624	0.01300679191	0.06644267756
	0.00699524902	0.07813888691	0.00341469458	0.07001071145
	0.07813888691	0.07175019151	0.06461199017	0.06644267756
	0.06644267756	0.00904752537	0.00867061393	0.07001071145
	0.07635279935	0.00904752537	0.01719004139	0.06644267756

	0.07635279935	0.05725563963	0.05906907623	0.06644267756
	0.01719004139	0.00699524902		
ADCECA	0.04027229316	0.04200896787	0.07080496162	0.04606349143
	0.08162098275	0.07001071145	0.09160593078	0.04953666200
	0.06260394876	0.05751664385	0.04427993744	0.04027229316
	0.04606349143	0.07971902400	0.09349474955	0.04371686474
	0.06085148759	0.07971902400	0.06274866761	0.05230498322
	0.06824188624	0.03312704097	0.04606349143	0.04606349143
	0.07080496162	0.09160593078	0.09160593078	
ACBDEJ	0.01893130393	0.01665410144	0.05580829434	0.02296080120
	0.06432747915	0.00452497331	0.07175019151	0.01817790346
	0.00770746021	0.01251750294	0.01353595522	0.01893130393
	0.02296080120	0.06260394876	0.07346131177	0.01452073479
	0.00304100805	0.08712954581	0.05580829434	0.02721641995
	0.00621250286	0.02561244627	0.01893130393	0.01146982940
	0.04953666200	0.06432747915	0.07989335395	0.06432747915
ACBCBE	0.00990911216	0.00800380724	0.04781464961	0.00315613757
	0.05580829434	0.02452893890	0.06260394876	0.00953092046
	0.01665410144	0.01452073479	0.01194008076	0.00990911216
	0.01353595522	0.05407140795	0.06432747915	0.00621250286
	0.02296080120	0.07635279935	0.04200896787	0.01734957924
	0.02296080120	0.01574278446	0.01353595522	0.00990911216
	0.04200896787	0.05580829434	0.07001071145	0.04953666200
	0.01817790346			
ADBBCA	0.01031858837	0.01194008076	0.05725563963	0.01810585837
	0.06644267756	0.03487911091	0.07453587080	0.01734957924
	0.03010671651	0.02296080120	0.01643453328	0.01031858837
	0.01411008357	0.06461199017	0.07635279935	0.01353595522
	0.02846514479	0.09160593078	0.05050796418	0.01810585837
	0.03322516779	0.01643453328	0.01411008357	0.01810585837
	0.05725563963	0.07453587080	0.07453587080	0.02510064160
	0.03172235230	0.02136812100		
ABBCCA	0.00867061393	0.01031858837	0.04867923629	0.00165146908
	0.05725563963	0.02846514479	0.06461199017	0.01574278446
	0.02398283346	0.02136812100	0.01076340275	0.00867061393
	0.01245059779	0.05541004288	0.06644267756	0.01194008076
	0.02232671860	0.07971902400	0.04246717998	0.01643453328
	0.02679676060	0.01473517450	0.01245059779	0.01245059779
	0.04867923629	0.06461199017	0.06461199017	0.04427993744
	0.02561244627	0.00487831890	0.01643453328	
ADCEBA	0.03660175973	0.03829599117	0.06461199017	0.04200896787
	0.07453587080	0.06432747915	0.08348926384	0.04539695216
	0.05751664385	0.05289713752	0.04027229316	0.04200896787
	0.04200896787	0.07268698464	0.08532507153	0.03996275782
	0.05580829434	0.07268698464	0.05725563963	0.05407140795
	0.06260394876	0.02983494545	0.04200896787	0.04200896787
	0.06461199017	0.08348926384	0.09349474955	0.00165146908
	0.05919740716	0.04539695216	0.02679676060	0.04606349143
ABBBCA	0.00165146908	0.00328032850	0.04867923629	0.00867061393
	0.05725563963	0.02398283346	0.06461199017	0.00832386935
	0.01975008986	0.01353595522	0.00699524902	0.00165146908
	0.00507653159	0.05541004288	0.06644267756	0.00487831890
	0.01810585837	0.07971902400	0.04246717998	0.00867061393
	0.02232671860	0.00699524902	0.00507653159	0.00867061393
	0.04867923629	0.06461199017	0.06461199017	0.03850581999
	0.02136812100	0.01194008076	0.00867061393	0.00699524902
	0.04027229316			

BAAAEB	0.06085148759	0.06260394876	0.01473517450	0.06085148759
	0.00867061393	0.05751664385	0.00507653159	0.06432747915
	0.07175019151	0.05289713752	0.05906907623	0.06824188624
	0.06085148759	0.01076340275	0.01031858837	0.06432747915
	0.05580829434	0.01076340275	0.01473517450	0.06824188624
	0.06260394876	0.05230498322	0.06085148759	0.06085148759
	0.01893130393	0.00867061393	0.00867061393	0.09349474955
	0.05919740716	0.06432747915	0.07635279935	0.06644267756
	0.08532507153	0.06644267756		
AEBAGB	0.03660175973	0.03322516779	0.01473517450	0.03660175973
	0.02064319399	0.04539695216	0.01643453328	0.03487911091
	0.03996275782	0.04160296446	0.03487911091	0.03660175973
	0.04200896787	0.01076340275	0.02232671860	0.03487911091
	0.04953666200	0.02337581639	0.01473517450	0.03660175973
	0.04371686474	0.04606349143	0.03660175973	0.03154409172
	0.01076340275	0.01245059779	0.02064319399	0.08348926384
	0.04705216412	0.03487911091	0.04781464961	0.04027229316
	0.07635279935	0.04027229316	0.02232671860	
BADADB	0.07453587080	0.07635279935	0.01719004139	0.07453587080
	0.01076340275	0.08712954581	0.00699524902	0.07813888691
	0.08712954581	0.07989335395	0.07268698464	0.07453587080
	0.07453587080	0.01300679191	0.01245059779	0.07813888691
	0.08532507153	0.00904752537	0.02162126098	0.07453587080
	0.08532507153	0.06461199017	0.06644267756	0.07453587080
	0.02162126098	0.01076340275	0.00341469458	0.09160593078
	0.08890376699	0.07813888691	0.08348926384	0.07268698464
	0.09349474955	0.07268698464	0.01245059779	0.02510064160

APPENDIX E

Relationships of 37 compomsite haplotypes of *P. monodon* mtDNA generated from digestion of 16S rDNA with *Mbo* I and an intergenic COI-COII digested with *Alu* I, *Mbo* I, *Taq* I, *Hin* fI, and *Dde* I.using the unweighted pair-group method using an arithmetic average.UPGMA dendrogram

```
  37 Populations

Neighbor-Joining/UPGMA method version 3.572c


 UPGMA method

 Negative branch lengths allowed


        +AEBAGB
        !
        !        +AAAAAC
     +-31     +-12
     !  !  +-17  +AAAAAB
     !  !  !  !
     !  +-20  +AAAABC
     !     !
     !     +AEAAAC
     !
     !           +BAAAEB
     !           !
  +-32        +-22     +BAAAAB
  !  !        !  !  +-10
  !  !        !  +-15  +BAAAAC
  !  !     +-25     !
  !  !     !  !     +BEAAAB
  !  !     !  !
  !  !  +-26  +BAAAAH
  !  !  !  !
  !  !  !  !  +BADADB
  !  +-28  +-11
  !     !     +BAAADB
  !     !
  !     +BAEAAB
  !
  !                 +ABBCBA
  !              +--6
  !           +-13  +ABBCCA
  !           !  !
  !           !  +ACBCBE
  !           !
  !           !           +ABBBAA
```

```
  !              !           !
  !              !        +-16     +ABBBBA
  !              !        !  !  +--4
  !           +-29        !  !  !  +ABBBCA
  !           !  !        !  +--8
-36           !  !        !     !  +ACBBCA
  !           !  !     +-19     +--7
  !           !  !     !  !        !  +ACBBBA
  !           !  !     !  !        +--1
  !           !  !  +-23  !           +ACBBBE
  !           !  !  !  !  !
  !           !  !  !  !  +CBBBBA
  !        +-30  +-24  !
  !        !  !     !  +ABABBA
  !        !  !     !
  !        !  !     !  +ABBDBA
  !        !  !     +--3
  !        !  !        +ACBDBA
  !     +-33  !
  !     !  !  !     +ACBBBF
  !     !  !  !  +-14
  !     !  !  +-27  +ACBBEF
  !     !  !     !
  !     !  !     +ACBBCI
  !  +-34  !
  !  !  !  +ADBBCA
  !  !  !
  !  !  !     +ABBDEG
  !  !  !  +--9
  !  !  !  !  +ACBDEJ
  !  !  +-21
  +-35     !     +ACBDHD
     !     !  +--2
     !  +-18  +ACBDED
     !        !
     !        +ACBDBK
     !
     !  +ADCECA
     +--5
        +ADCEBA
```

Between	And	Length
36	32	0.02273
32	31	0.00116
31	AEBAGB	0.00637
31	20	0.00335
20	17	0.00031
17	12	0.00094
12	AAAAAC	0.00178
12	AAAAAB	0.00178
17	AAAABC	0.00272
20	AEAAAC	0.00303
32	28	0.00304
28	26	0.00009

26	25	0.00032
25	22	0.00036
22	BAAAEB	0.00374
22	15	0.00113
15	10	0.00090
10	BAAAAB	0.00171
10	BAAAAC	0.00171
15	BEAAAB	0.00260
25	BAAAAH	0.00409
26	11	0.00270
11	BADADB	0.00171
11	BAAADB	0.00171
28	BAEAAB	0.00450
36	35	0.00668
35	34	0.01360
34	33	0.00223
33	30	0.00164
30	29	0.00085
29	13	0.00326
13	6	0.00118
6	ABBCBA	0.00083
6	ABBCCA	0.00083
13	ACBCBE	0.00201
29	24	0.00119
24	23	0.00028
23	19	0.00103
19	16	0.00012
16	ABBBAA	0.00264
16	8	0.00115
8	4	0.00066
4	ABBBBA	0.00083
4	ABBBCA	0.00083
8	7	0.00030
7	ACBBCA	0.00119
7	1	0.00042
1	ACBBBA	0.00077
1	ACBBBE	0.00077
19	CBBBBA	0.00276
23	ABABBA	0.00379
24	3	0.00325
3	ABBDBA	0.00083
3	ACBDBA	0.00083
30	27	0.00164
27	14	0.00222
14	ACBBBF	0.00226
14	ACBBEF	0.00226
27	ACBBCI	0.00448
33	ADBBCA	0.00776
34	21	0.00657
21	9	0.00190
9	ABBDEG	0.00152
9	ACBDEJ	0.00152
21	18	0.00070
18	2	0.00196
2	ACBDHD	0.00077
2	ACBDED	0.00077
18	ACBDBK	0.00273

35	5	0.02277
5	ADCECA	0.00083
5	ADCEBA	0.00083

Treefile:

```
(((AEBAGB:0.00637,(((AAAAAC:0.00178,AAAAAB:0.00178):0.00094,
AAAABC:0.00272):0.00031,AEAAAC:0.00303):0.00335):0.00116,
((((BAAAEB:0.00374,((BAAAAB:0.00171,BAAAAC:0.00171):0.00090,
BEAAAB:0.00260):0.00113):0.00036,BAAAAH:0.00409):0.00032,
(BADADB:0.00171,BAAADB:0.00171):0.00270):0.00009,BAEAAB:0.00450):0.0
0304):0.02273,
(((((((ABBCBA:0.00083,ABBCCA:0.00083):0.00118,ACBCBE:0.00201):0.0032
6,
((((ABBBAA:0.00264,((ABBBBA:0.00083,ABBBCA:0.00083):0.00066,
(ACBBCA:0.00119,(ACBBBA:0.00077,ACBBBE:0.00077):0.00042):0.00030):0.
00115):0.00012,
CBBBBA:0.00276):0.00103,ABABBA:0.00379):0.00028,(ABBDBA:0.00083,
ACBDBA:0.00083):0.00325):0.00119):0.00085,((ACBBBF:0.00226,
ACBBEF:0.00226):0.00222,ACBBCI:0.00448):0.00164):0.00164,
ADBBCA:0.00776):0.00223,((ABBDEG:0.00152,ACBDEJ:0.00152):0.00190,
((ACBDHD:0.00077,ACBDED:0.00077):0.00196,ACBDBK:0.00273):0.00070):0.
00657):0.01360,
(ADCECA:0.00083,ADCEBA:0.00083):0.02277):0.00668);
```

BIOGRAPHY

Miss Duangkamon Siludjai was born on May 14^{th} 1974 in Nakhonnayok. She graduated with the degree of Bachelor of Science from the Department of Botany, Concentration of Genetics, Faculty of Science, Chulalongkorn University in 1996. She has studied for the degree of Master of Science at the program of Biotechnology, Chulalongkorn University since 1997.