

References

- Alberts, B., Bray, D., Lewis, J., Raff, M., Roberts, K. and Watson, J.D. 1983. *Molecular Biology of the cell*. New York : Garland.
- Anderson, I. 1993. The veterinary approach to marine prawns. In Brown (ed.), *Aquaculture for veterinarians: Fish husbandry and medicine*. Amsterdam: Oxford Pergamon Press. pp. 271-290.
- Avise, J. C. 1994. *Molecular markers, natural history and evolution*. New York : Chapman & Hall, Inc.
- Bagley, M.J., Lindquist, D.G. and Geller, J.B. 1999. Microsatellite variation, effective population size, and population genetic structure of vermilion snapper, *Rhomboplites aurorubens*, off the southeastern USA. *Mar. Biol.* 134: 609-620.
- Bahri-Sfar, L., Lemaire, C., Hassine, O. K. and Bonhomme, F. 2000. Fragmentation of sea bass populations in the western and eastern Mediterranean as revealed by microsatellite polymorphism. *Proceedings of the Royal Society of London Series B-Biological Sciences*. 267: 929-935.
- Baily-Brook, J. H. and Moss, S. M. 1992. Penaeid taxonomy, biology and zoogeography. In A.W. Fast and L.J. Lester (eds), *Marine shrimp culture: Principles and practices*, Amsterdam: Elsevier Science Publishers.
- Bassam, B. J., Caetano-Anolles, B. and Gresshoff, P. M. 1991. Fast and sensitive silver staining of DNA in polyacrylamide gels. *Anal. Biochem.* 196: 80-83.

- Beckmann, J. S. and Soller, M. 1990. Toward a unified approach to genetic mapping of eukaryotes base on sequence tagged microsatellite sites. *Biotechnology*. 8: 930-932.
- Bentzen, P., Taggart, C.T., Ruzzante, D.E. and Cook, D. 1996. Microsatellite polymorphism and population structure of the Atlantic cod (*Gadus morhua*) in the northwest Atlantic. *Can. J. Fish. Aquat. Sciences* 53: 2706-2721.
- Benzie, J.A.H., Frusher, S. and Ballment, E. 1992. Geographical variation in allozyme frequencies of populations of *Penaeus monodon* (Crustacea: Decapoda) in Australia. *Aus. Mar. Freshwat. Res.* 43: 715-725.
- Bercovich, D., Regev, Z., Ratz, T., Luder, A., Plotsky, Y. and Gruenbaum, Y. 1999. Quantitative ratio of primer pairs and annealing temperature affecting PCR products in duplex amplification. *BioTechniques*. 27: 762-770.
- Botstein, D., White, R. L., Skolnick, M. and Davis, R. W. 1980. Construction of a genetic linkage map in man using restriction fragment length polymorphisms. *Am. J. Hum. Genet.* 32: 314-331.
- Boyd, Y. 1998. Genetic mapping of the mouse genome. *Methods Enzymol.* 14: 1120-1134.
- Brooker, A. L., Benzie, J. A. H., Blair, D. and Versini, J. J. 2000. Population structure of the giant tiger prawn *Penaeus monodon* in Australian water, determined using microsatellite markers. *Mar. Biol.* 136: 149-157.
- Browdy, C.L. 1996. Development of captive breeding programs for penaeid shrimp. *Asian Shrimp News* 25: 1-4.
- Brown, W. M., George, M., Jun, M. and Wilson, A. C. 1997. Rapid evolution of mitochondrial DNA. *Proc. Natl. Acad. Sci.* 76: 1967-1971.

- Bryan, G. J., Collins, A. J., Stephenson, P., Orry, A., Smith, J. B. and Gale, M. D. 1997. Isolation and characterisation of microsatellites from hexaploid bread wheat. *Theor. Appl. Genet.* 94: 557-563.
- Burland, T. M., Barratt, E. M. and Racey, P. A. 1998. Isolation and characterization of microsatellite loci in the brown long-eared bat, *Plecotus auritus*, and cross-species amplification within the family vespertilionidae. *Molec. Ecol.* 7: 133-140.
- Callen, D.F., Thompson, A.D., Shen, Y., Phillips, H.A., Richards, R.I., Mulley, J.C. and Sutherland, G.R. 1993. Incidence and origin of "null" alleles in the (AC)_n microsatellite markers. *Am. J. Hum. Genet.* 52: 922-927.
- Carvalho, G.R. and Pitcher, T. J. 1995. *Molecular genetics in fisheries*. London: T.J. Press (Padstow) Ltd.
- Cervera, M. T., Gusmao, J., Steenackers, M., Peleman, J., Storme, V., Van de Broeck, A., Van Montagu, M. and Boerjan, W. 1996. Identification of AFLP molecular markers for resistance against *Melampsora larici-populina* in *Populus*. *Theor. Appl. Genet.* 93: 733-737.
- Chase, C. D., Ortega, V. M. and Vallejos, C. E. 1991. DNA restriction fragment length polymorphisms correlate with isozyme diversity in *Phaseolus vulgaris* L. *Theor. Appl. Genet.* 81: 806-811.
- Cho, Y. G., Ishii, T., Temnykh, S., Chen, X., Lipovich, L., McCouch, S. R., Park, W. D., Ayres, N. and Cartinhour, S. 2000. Diversity of microsatellites derived from genome libraries and GenBank sequences in rice (*Oryza sativa* L.). *Theor. Appl. Genet.* 100:713-722.

- Cordeiro, G. M., Maguire, T. L., Edwards, K. J. and Henry, R. 1999. Optimisation of a microsatellite enrichment technique in *Saccharum* spp. *Plant Mol. Biol. Rep.* 17: 225-229.
- Crawford, A. M., Buchanan, F. C. and Swarbrick, P. A. 1991. The use of dinucleotide repeats or microsatellites as genetic markers in domestic animals. *Proc. N.Z. Soc. Anim. Prod.* 51: 79-83.
- Crooijmans, M. A., Bierbooms, A. F., Komen, J., Van der Pool, J. J. and Groenen, A. M. 1997. Microsatellite markers in common carp (*Cyprinus carpio* L.) *Anim. Genet.* 28: 129-134.
- David, N. S. and Michael, E. D. 1994. Occurrence and inheritance of microsatellites in *Pinus radiata*. *Genome.* 37: 977-983.
- Davis, L.G., Dibner, M.D. and Battey, J.F. 1986. Preparation of genomic DNA. In *Basic method in molecular biology*. Elsevier Science. New York. pp. 42-43.
- Dean, M. and Milligan, B. G. 1998. Detection of genetic variation by DNA conformational and denaturing gradient methods. In: Hoelzel, A. R.(ed). *Molecular genetic analysis of populations*. New York: Oxford University Press. pp. 263-268.
- Desvignes, J. F., Laroche, J., Durand, J. D. and Bouvet, Y. 2001. Genetic variability in reared stocks of common carp (*Cyprinus Carpio* L.) based on allozymes and microsatellites. *Aquaculture.* 194: 291-301.
- Dore, I. And Frimodt, C. 1987. *An Illustrated Guide to Shrimp of the World*. New York : Osprey books Press.
- Echt, C. S. and May-marquardt, P. 1997. Survey of microsatellite DNA in pine. *Genome.* 40: 9-17.

- Echt, C. S., Marquardt, P. M., Hseih, M. and Zahorchak, R. 1996. Characterization of microsatellite markers in eastern white pine. *Genome*. 39: 1102-1108.
- Edwards, A., Civitello, A., Hammond, H. A and Caskey, C. T. 1991. DNA typing and genetic mapping with trimeric and tetrameric tandem repeats. *Am. J. Hum. Genet.* 49: 746-756.
- Fishback, A., Danzmann, R. G., Sakamoto, T. and Ferguson, M. M. 1999. Optimization of semi-automated microsatellite multiplex polymerase chain reaction systems for rainbow trout (*Oncorhynchus mykiss*). *Aquaculture*. 172: 247-254.
- Fisher, D., and Bachmann, K. 1998. Microsatellite enrichment in organisms with large genomes (*Allium cepa* L.). *BioTechniques*. 24:796-802.
- Fries, R. 1993. Mapping the bovine genome: methodological aspects and strategy. *Anim. Genet.* 24: 111-116.
- Fukuoka, S. and Okuno, K. 2001. QTL analysis and mapping of pi21, a recessive gene for field resistance to rice blast in Japanese upland rice. *Theor. Appl. Genet.* 103: 185-190.
- Garcia, D.K., Faggart, M.A., Rhoades, L. and Alcivar-Warren, A. A. 1994. Genetic diversity of cultured *Penaeus vannamei* shrimp using three molecular genetic techniques. *Mol. Mar. Biol. Biotechnol.* 3: 270 - 280.
- Garcia de Leon, F.J., Chikhi, L. and Bonhomme, F. 1997. Microsatellite polymorphism and population subdivision in natural populations of European sea bass *Dicentrarchus labrax* (Linnaeus, 1758). *Molec. Ecol.* 6: 51-62.

- Gibbs, M., Dawson, D. A., McCamley, C., Wardle, A. F., Armour, A. L. and Burke, T. 1997. Chicken microsatellite markers isolated from libraries enriched for simple tandem repeats. *Anim. Genet.* 28: 401-417.
- Giovanni, M. C., Tina, L. M., Keith, J. E. and Robert, J. H. 1999. Optimisation of a microsatellite enrichment technique in *Saccharum* spp. *Plant Mol. Biol. Rep.* 17:225-229.
- Gracia de Leon, F. J., Dallas, J. F., Chatain, B., Canonne, M., Versini, J. J. and Bonhomme, F. 1995. Development and use of microsatellite markers in sea bass, *Dicentrarchus labrax* (Linnaeus, 1758) (Perciformes: Serranidae). *Mol. Mar. Biol. Biotechnol.* 4: 62-68.
- Grey, D.L., Dall, W. and Baker, A. 1983. A guide to the Australian Penaeid prawns. Darwin: Northern Territory Government Printing Office.
- Hallerman, E. M. and Beckmann, J. S. 1988. DNA-level polymorphism as a tool in fisheries science. *Can. J. Fish. Aquat. Sci.* 45: 1075-1087.
- Hedgecock, D., Tracey, M.L. and Nelson, K. 1982. Genetics. In: Abele, L.G. (ed). *Embryology, morphology and genetics*. New York: Academic Press. pp. 283-355.
- Henegariu, O., Heerema, N. A., Dlouhy, S. R., Vance, G. H. and Vogt, P. H. 1997. Multiplex PCR: critical parameters and step-by-step protocol. *BioTechniques.* 23: 504-511.
- Hill, M., Witsenboer, H., Zabeau, M., Vos, P., Kessli, R. and Michelmore, R. 1996. PCR-based fingerprinting using AFLPs as a tool for studying genetic relationships in *Lactuca* spp. *Theor. Appl. Genet.* 93: 1202-1210.

- Holmes, D.S. and Quigley, M. 1981. The rapid boiling method for the preparation of bacterial plasmids. *Anal. Biochem.* 114(1): 193-197.
- Kaga, E.H., Ishii, O.T. and Kamijima, O. 1996. A genetic linkage map of azuki bean constructed with molecular and morphological makers using an interspecific population (*Vigna angularis* x *V. nakashimae*). *Theor. Appl. Genet.* 93:658-663.
- Khasa, P. D., Newton, C. H., Rahman, M. H., Jaquish, B. and Dancik, B. P. 2000. Isolation, characterization, and inheritance of microsatellite loci in alpine larch and western larch. *Genome.* 43: 439-448.
- Kijas, J. M. H., Fowle, J. C. S., Garbett, C. A. and Thomas, M. R. 1994. Enrichment of microsatellites from the citrus genome using biotinylated oligonucleotide sequences bound to streptavidin-coated magnetic particles. *BioTechniques.* 4:656-622.
- King, R.C. and Stansfield, W.D. 1985. *A dictionary of genetics 3rd Ed.* New York: Oxford University Press.
- Kirby, L.T. 1992. *DNA Fingerprinting: An introduction* New York: W.H. Freeman and Company.
- Klinbunga, S., Penman, D.J., McAndrew, B.J. and Tassanakajon, A. 1999. Mitochondrial DNA diversity in three populations of the giant tiger shrimp *Penaeus monodon*. *Mar. Biotechnol.* 1; 113-121.
- Klinbunga, S., Siludjai, D., Wudthijinda, W., Tassanakajon, A., Jarayabhand, P. and Menasveta, P. 2001. Genetic heterogeneity of the giant tiger shrimp (*Penaeus monodon*) in Thailand revealed by RAPD and mitochondrial RFLP analyses. *Mar. Biotechnol.* 3: 428-438.

- Kolliker, R., Jones, E. S., Drayton, M. C. and Dupal, M. P. 2001. Development and characterization of simple sequence repeat (SSR) markers for white clover (*Trifolium repens* L.). *Theor. Appl. Genet.* 102: 416-424.
- Koorey, D. J., Bishop, G. A. and McCaughan, G. W. 1993. Alleles non-amplification: A source of confusion in linkage studies employing microsatellite polymorphisms. *Hum. Mol. Genet.* 2: 289-291.
- Koreth, J., O'Leary, J. J. and O'D. McGee, J. 1996. Microsatellites and PCR genomic analysis. *J. Patho.* 178: 239-248.
- Lester, L.J. 1978. Population genetic of penaeid shrimp from the Gulf of Mexico. *J. Hered.* 70: 175-180.
- Lin. J. J. and Kuo, J. 1995. AFLP: A novel PCR-based techniques for plant and bacterial DNA fingerprinting. *Focus* 17: 66-70.
- Lins, A. M., Sprecher, C. J., Puers, C. and Schumn, J. W. 1996. Multiplex sets for the amplification of polymorphic short tandem repeat loci-silver stain and fluorescence detection. *BioTechniques.* 20: 882-889.
- Lynch, M. and Jarrel, P.E. 1993. A method for calibrating molecular clocks and its application to animal mitochondrial DNA. *Genetics* 135: 1197-1208.
- Ma, Z. Q., Roder, M. and Sorrells, M. E. 1996. Frequencies and sequence characteristics of di-, tri-, and tetra-nucleotide microsatellites in wheat. *Genome* 39: 123-130.
- Margoulas, A. and Zourous, E. 1993. Restriction site heteroplasmy in anchovy (*Engraulis encrasicolus*) incidental biparental inheritance of mitochondrial DNA. *Mol. Biol.* 10: 319-325.

- Markert, C.L. and Moller, F. 1959. Multiple form of enzymes: tissue ontogenics, and species specific patterns. *Proc. Natl. Acad. Sci. USA.* 47: 753-763.
- Marklund, S., Ellegren, H., Eriksson, S., Sandberg, K. and Andersson, L. 1994. Parentage testing and linking analysis in the horse using a set of highly polymorphic microsatellites. *Anim. Genet.* 25: 19-23.
- Misevie, D., Gerie, I. and Tadie, B. 1990. Allozyme markers loci associated with favorable alleles for grain yield in maize. *Theor. Appl. Genet.* 80: 518-522.
- Moor, 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 *Penaeus japonicus*. *Aquaculture.* 173: 19-32.
- Mullis, K. B. 1990. The unusual origin of the polymerase chain reaction. *Sci. Am.* 262: 56-65.
- Nagylaki, T. 1988. Gene conversion, linkage, and the evolution of multigene families. *Genetics* 120: 291-301.
- Naciri, Y., Vigouroux, Y., Dallas, J., Desmarais, E., Delsert, C. and Bonhomme, F. 1995. Identification and inheritance of (GA/TC)_n and (AC/GT)_n repeats in the European flat oyster *Ostrea edulis* (L.). *Mol. Mar. Biol. Biotechnol.* 4: 83-89.
- Nei, M. 1978. Estimation of average heterozygosity and genetic distance from a small number of individuals. *Genetics* 23 : 341-369.
- Olivier, P., Xiuli, C. and Susan, R. McC. 1995. Frequency of microsatellite sequences in rice (*Oryza sativa* L.). *Genome.* 38: 1170-1176.
- O'Reilly, P. and Wright, J.M. 1995. The evolving technology of DNA fingerprinting and its application to fisheries and aquaculture. *J. Fish Biol.* 47 : 29-55.

- Paetkan, D. 1998. Microsatellites Obtained Using Strand Extension: An Enrichment Protocol. *BioTechniques*. 26: 690-697.
- Paetkan, D. and Strobeck, C. 1995. The molecular basis and evolutionary history of a microsatellite null allele in bears. *Molec. Ecol.* 4: 519-520.
- Panaud, O., Chen, X. and McCouch, S. R. 1995. Frequency of microsatellite sequences in rice (*Oryza sativa* L.). *Genome*. 38: 1170-1176.
- Park, L.K. and Moran, P. 1994. Developments in molecular genetic techniques in fisheries. *Rev. Fish. Biol. Fish.*4: 272-299.
- Pestsova, E., Ganal, M. W. and Roder, M.S. 2000. Isolation and mapping of microsatellite markers specific for the D genome of bread wheat. *Genome*. 43: 689-697.
- Piertney, S. B., Goostrey, A., Dallas, J. and Carss, D. N. 1998. Highly polymorphic microsatellite markers in the great cormorant *Phalacrocorax carbo*. *Molec. Ecol.* 7: 133-140.
- Pongsomboon, S., Whan, V., Moor, S. S. and Tassanakajon, A. 2000. Characterization of tri- and tetranucleotide microsatellites in the black tiger prawn, *Penaeus monodon*. *ScienceAsia*. 26: 1-8.
- Prasad, M., Varshney, R. K., Roy, J. K. and Balyan, H. S. 2000. The use of microsatellites for detecting DNA polymorphism, genotype identification and genetic diversity in wheat. *Theor. Appl. Genet.* 100:584-592.
- Qian, L. and Wilkinson, M. 1991. DNA fragment purification: Removal of agarose 10 minutes after electrophoresis. *BioTechniques*. 10: 736-738.
- Queller, D.C., Strassman, J.E. and Hughes, C.R. 1993. Microsatellites and kinship. *Tren. Ecol. Evol.* 8:285-288.

- Rassmann, K., Schlotterer, C. and Tautz, D. 1991. Isolation of simple-sequence loci for use in polymerase chain reaction-based DNA fingerprinting. *Electrophoresis*. 12: 113-118.
- Rithidech, K.N., Dunn, J.J. and Gordon, C.R. 1997. Combining multiplex and touchdown PCR to screen murine microsatellite polymorphisms. *BioTechnique* 23: 36-44.
- Ricardo, P. E., Motohiro, T. and Nobuhiko, T. 1999. Genetic variability and pedigree tracing of a Hatchery-reared stock of red sea bream (*Pagrus major*) used for stock enhancement, based on microsatellite DNA markers. *Aquaculture*. 173:413-423.
- Rice, W.R. 1989. Analyzing tables of statistical tests. *Evolution* 43: 223-225.
- Rick, C. M. and Fobes, J. F. 1974. Association of an allozyme with nematode resistance. *Rep. Tomato Gent. Coop.* 24: 25.
- Rico, C., Ibrahim, K.M., Rico, I. and Hewitt, G.M. 1997. Stock composition in North Atlantic populations of whiting using microsatellite markers. *J. Fish. Biol.* 51: 462-475.
- Rogstad, S. H., Patton, J. C. and Schal, B. A. 1988. M13 repeat probe detects DNA minisatellite-like sequences in gymnosperms and angiosperms. *Proc. Natl. Acad. Sci. USA.* 85: 9176-9178.
- Sambrook, J., Fritsch, E. F. and Maniatis, J. 1989. *Molecular cloning: A laboratory manual*. 2nd ed. New York: Cold Spring Harbor Laboratory Press.
- Schlotterer, C. 1998. Microsatellite. In: Hoelzel, A. R.(ed). *Molecular genetic analysis of populations*. New York : Oxford University Press. pp. 237-261.

- Schlotter, C. and Tautz, D. 1992. Slippage synthesis of sequence DNA. *Nucleic Acids Res.* 20:211-215.
- Sekino M., Takagi, N., Hara, M. and Takahashi, H. 2001. Analysis of microsatellite DNA polymorphisms in Rockfish *Sebastes thompsoni* and application to population genetic studies. *Mar. Biotechnol.* 3: 45-52.
- Selander, R. K. and Whittam, T. S. 1983. Protein polymorphism and the genetic structure of population. In: Nei, M. and Koehn, R.K.(eds.), *Evolution of genes and proteins*. USA: Sinauer associates Inc. pp. 45-57.
- Selvanmani, M. J. P. Degnan, S. M. and Degnan, B.N. 2001. Microsatellite genotyping of individual abalone larvae: Parentage assignment in aquaculture. *Mar. Biotechnol.* 3: 478-485.
- Shepard, A. R. and Rae, J. L. 1997. Magnetic bead capture of cDNA from double – stranded plasmid cDNA libraries. *Nucleic Acids Res.* 25: 3183-3185.
- Smith, D. N. and Devey, M. E. 1994. Occurrence and inheritance of microsatellites in *Pinus radiata*. *Genome.* 37: 977-983.
- Solis, N.B. 1988. Biology and ecology. In Taki, Y. Premavara, J.H., and Lobera, J. (eds.), *Biology and culture of Penaeus monodon*, Aquaculture Department, Southeast Asia Fisheries Development Center.
- Sootanan, P. 1999. *Development of DNA typing in black tiger prawn Penaeus monodon Fabricius by microsatellite technique*. M. Sc. Thesis, Department of Biochemistry, Graduate school, Chulalongkorn University. 116 pp.
- Stalling, R. L., Ford, A. F., Nelson, D., Torney, D. C., Hildebrand, C. E. and Moyzis, R. K. 1991. Evolution and distribution of (GT)_n repetitive sequences in mammalian genomes. *Genomics.* 10: 807-815.

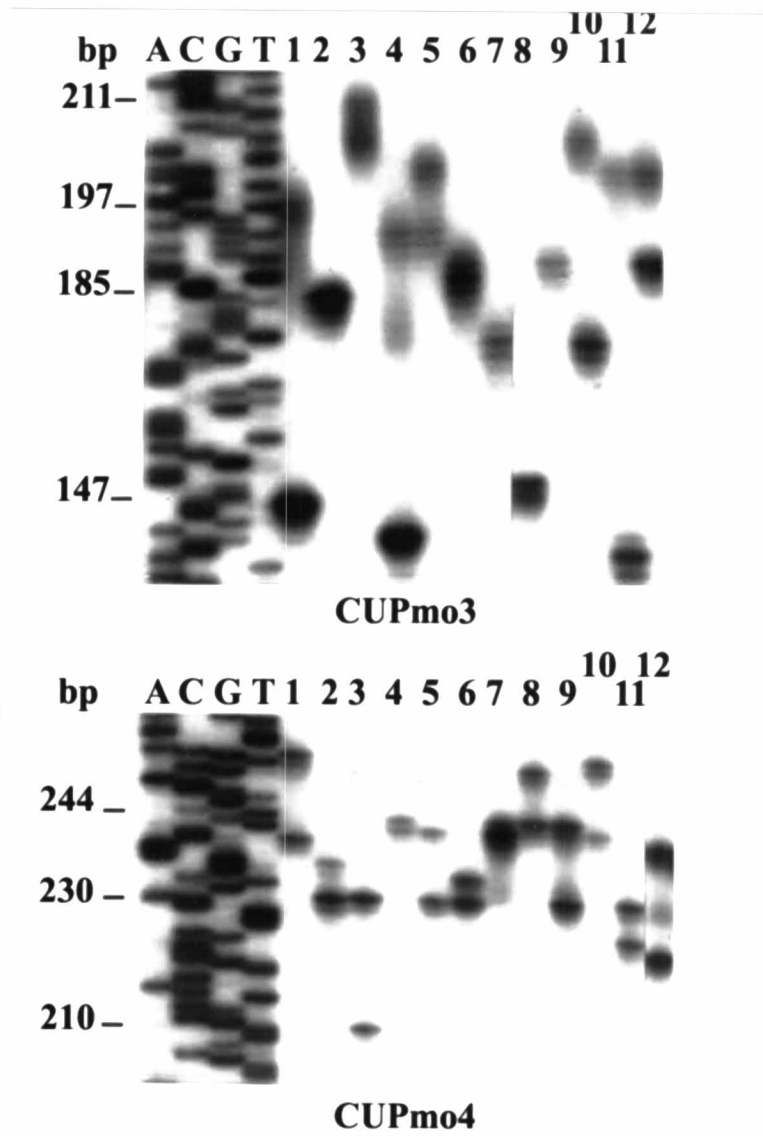
- Stoner, D.S., Quattro, J.M. and Weissman, I. 1997. Highly polymorphic microsatellite loci in the colonial ascidian *Botryllus schlosseri*. *Mol. Mar. Biol. Biotechnol.* 6: 163-171.
- Supungul, P. 1998. *Genetic variation and population structure of the black tiger prawn *P. monodon* in Thailand determined by microsatellite markers*. M. Sc. Thesis, Department of Biochemistry, Graduate school, Chulalongkorn University. 68 pp.
- Supungul, P., Sootanan, P., Klinbunga, S., Kamonrat, W., Jarayabhand, P. and Tassanakajon, A. 2000. Microsatellite polymorphism and the population structure of the black tiger shrimp (*Penaeus monodon*) in Thailand. *Mar. Biotechnol.* 2: 339-347.
- Tassanakajon, A., Pongsomboon, S., Rimphanitchayskit, V., Jarayabhand, P. and Boonsaeng, V. 1997. Random amplified polymorphic DNA (RAPD) markers for determination of genetic variation in wild populations of the black tiger prawn (*Penaeus monodon*) in Thailand. *Mol. Mar. Biol. Biotechnol.* 6:110-115.
- Tassanakajon, A., Tiptawonnukul, A., Supungul, P., Rimphanitchayakit, V., Cook, D., Jarayabhand, P., Klinbunga, S. and Boonsaeng, V. 1998. Isolation and characterization of microsatellite markers in the black tiger prawn *Penaeus monodon*. *Mol. Mar. Biol. Biotechnol.* 7: 55-61.
- Tautz, D. 1989. Hypervariability of simple sequences as a general source for polymorphic DNA markers. *Nucleic Acids Res.* 17:6463-6471.
- Temnykh, S., Park, W. D., Cartinhour, S., Hauck, N., Lipovich, L., Cho, Y. G., Ishii, T. and McCouch, S.R. 2000. Mapping and genome organization of

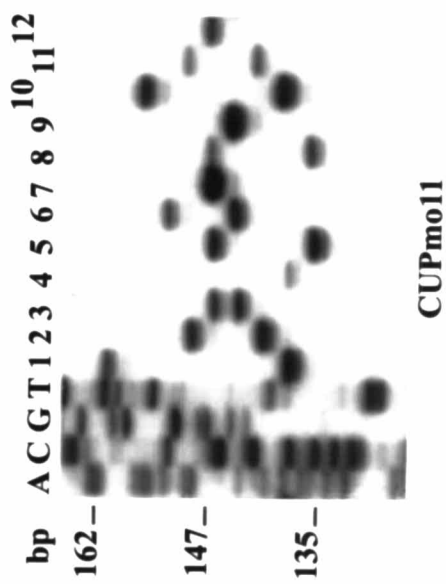
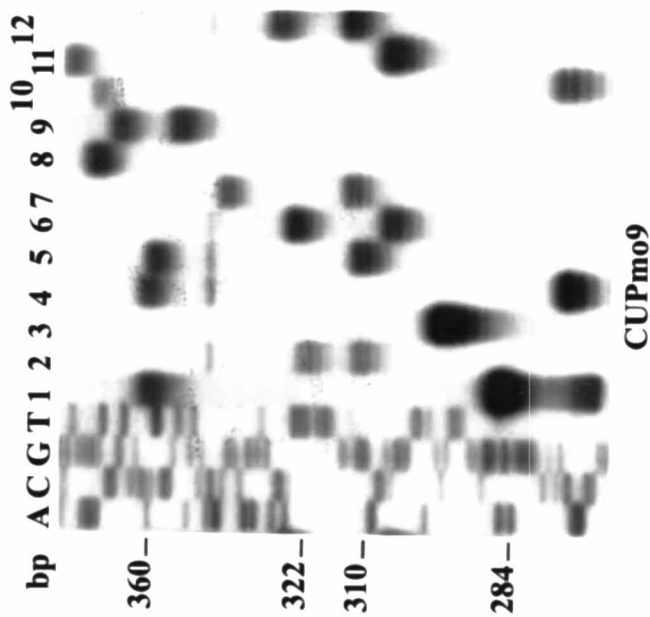
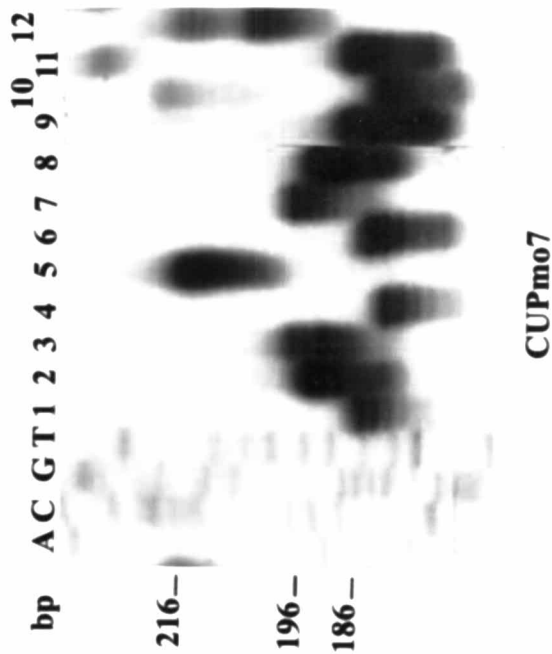
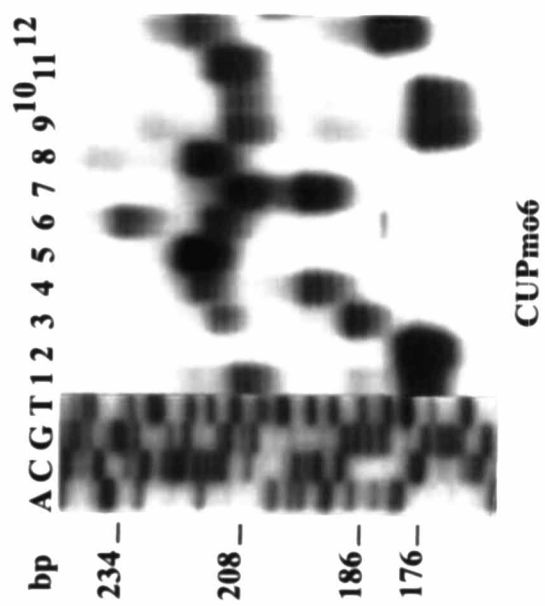
- microsatellite sequences in rice (*Oryza sativa* L.). *Theor. Appl. Genet.* 100: 697-712.
- Tiptawonnukul, A. 1996. *Characterization of microsatellite DNA in giant tiger prawn *Penaeus monodon* genome*. Master's Thesis, Department of Biochemistry, Graduate School, Chulalongkorn University. 123 pp.
- Vos, P., Hogers, R., Bleeker, M., Reijans, M., van de Lee, T., Hornes, M., Frijters, A., Peleman, J., Kuiper, M. and Zabeau, M. 1995. AFLP: A new technique for DNA fingerprinting. *Nucleic Acids Res.* 23: 4407-4414.
- Weber, J.L. 1990. Informativeness of human (dC-dA)_n (dG-dT)_n polymorphisms. *Genomics* 7 : 524-530.
- Weinmayr, G., Vautrin, D. and Solignac, M. 2000. Isolation and characterization of highly polymorphic microsatellites from the Polychaete *Pectinaria koreni*. *Mar. Biotechnol.* 2: 92-99.
- Weising, K., Nybom, H., Wolff, K. and Meyer, W. 1995. *DNA fingerprinting in plants and fungi*. London: CRC Press.
- Welsh, J. and McClelland, M. 1990. Finger printing genomes using PCR with arbitrary primers. *Nucleic. Acids Res.* 18: 7213-7218.
- White, P. S., Tatum, O. L., Tegelstrom, H. and Densmore III, L. D. 1998. Mitochondrial DNA isolation, separation, and detection of fragments. In: Hoelzel, A. R.(ed). *Molecular genetic analysis of populations*. New York: Oxford University Press. pp 65-101.
- Williams, J.G.K., Kubelik, A.R., Livak, K.J., Rafalski, J.A. and Tingey, S.V. 1990. DNA polymorphisms amplified by arbitrary primers are useful as genetic markers. *Nucleic. Acids Res.* 8: 6531-6535.

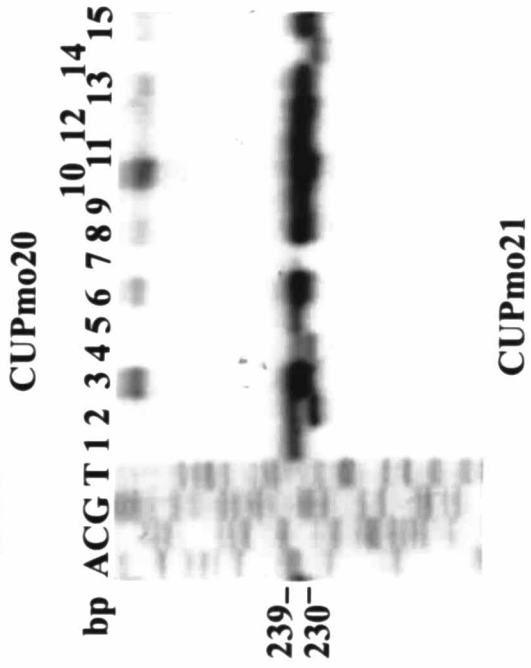
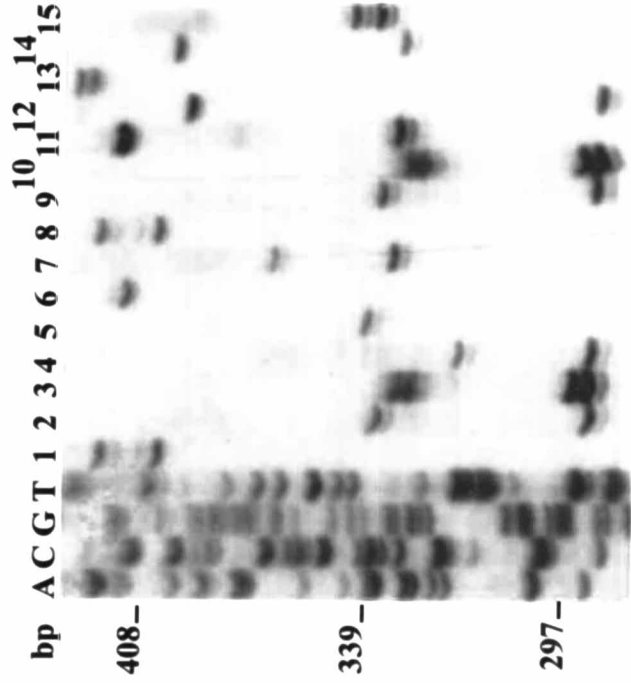
- Wilson, K., Li, Y., Whan, V., Lehnert, S. Byrne, K., Moor, S., Pongsomboon, S., Tassanakajon, A., Rosenberg, G., Ballment, E., Fayzi, Z., Swan, J., Kenway, M. and Benzie, J. 2002. Genetic mapping of the black tiger shrimp *Penaeus monodon* with amplified fragment length polymorphism. *Aquaculture*. 204: 297-309.
- Wolfus, G.M., Garcia, D.K. and Alcivar-Warren, A. 1997. Applications of microsatellite technique for analyzing genetic diversity in shrimp breeding programs. *Aquaculture* 153: 35-47.
- Wright, J. M. and Bentzen, P. 1995. Microsatellites: genetic markers for the future. In: Carvalho, G.R. and Pitcher, T.J.(eds). *Molecular genetics in fisheries*. Great Britain: Chapman&Hall. pp. 117-122.
- Xu, Z., Dhar, A. K., Wurzykowski, J. and Alcivar-Warren, A. 1999. Identification of abundant and informative microsatellites from shrimp (*Penaeus monodon*) genome. *Anim. Genet.* 30: 150-156.
- Yong, H. P. and Russell, J. K. 1994. Enrichment of Microsatellites from the citrus genome using biotinylated oligonucleotide sequences bound to streptavidin-coated magnetic particles. *BioTechniques*. 16:156-162.

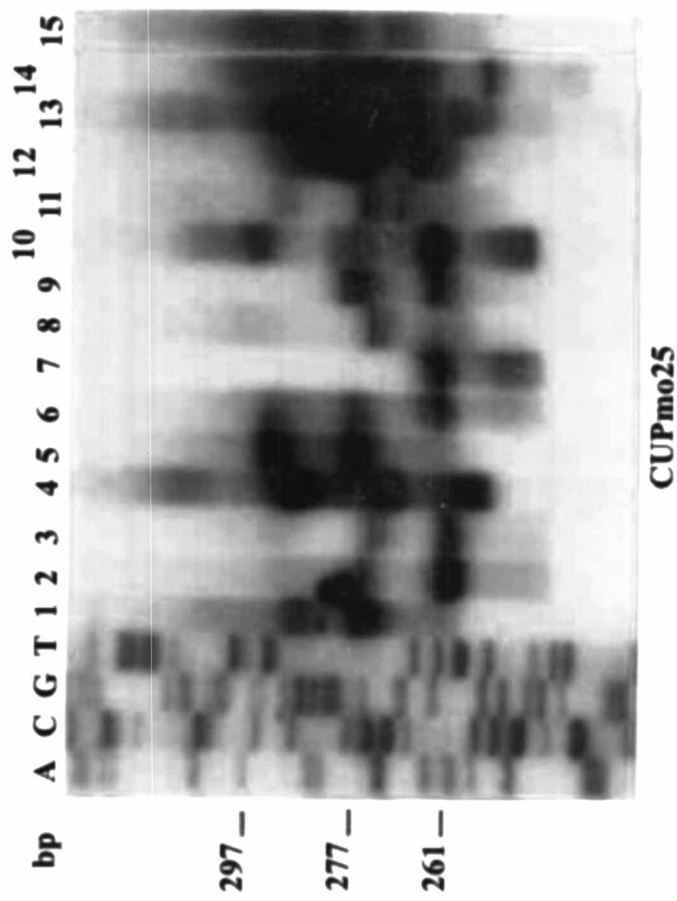
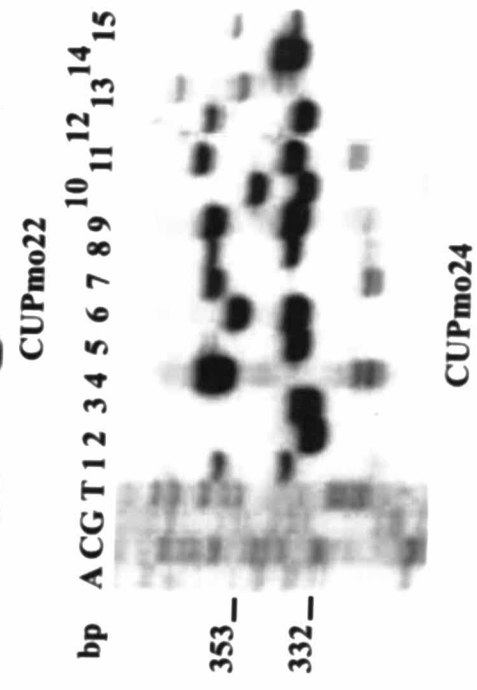
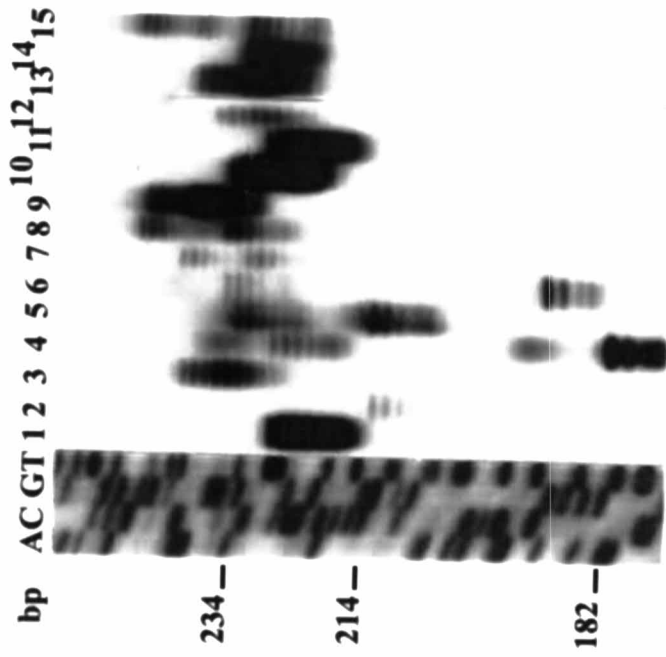
Appendix A

I Genotype patterns obtained from wild broodstock *P. monodon* from Trad province with difference microsatellite loci.









II Genotypes of *P. monodon* individual from Trad province at CUPmo 1, 2, 3, 4, 6, 7 and 9 loci.

Sample	Genotype						
	CUPmo 1	CUPmo 2	CUPmo 3	CUPmo 4	CUPmo 6	CUPmo 7	CUPmo 9
1	254/323	165/185	183/185	240/242	180/216	212/212	312/358
2	242/254	159/159	179/179	238/246	172/200	184/184	302/366
3	242/275	147/181	177/183	240/240	200/216	216/220	306/324
4	242/251	173/173	147/147	230/242	204/214	-	314/380
5	272/272	147/175	217/219	242/244	170/184	216/216	314/340
6	266/266	153/157	-	230/240	208/218	-	-
7	242/278	163/181	177/179	230/242	186/220	206/206	-
8	263/314	157/185	175/181	234/246	214/214	224/224	374/374
9	272/317	177/189	183/183	238/248	170/210	192/192	352/368
10	266/305	177/177	211/211	224/240	208/216	222/234	274/372
11	311/311	179/213	145/175	240/256	180/180	-	306/378
12	284/284	173/175	181/199	230/236	188/242	196/196	312/328
13	242/317	153/177	179/207	210/230	202/208	212/230	318/326
14	239/299	147/173	175/175	240/242	172/206	210/210	318/348
15	278/281	149/159	181/193	240/242	212/212	184/218	300/316
16	266/272	147/147	147/181	242/244	220/220	-	312/312
17	326/326	165/175	181/181	230/242	192/206	-	330/380
18	251/296	159/165	197/197	230/234	174/214	216/216	356/356
19	233/242	173/213	197/197	242/244	208/208	202/222	304/328
20	266/272	165/165	179/179	244/254	182/218	222/222	304/312
21	242/302	159/165	183/183	230/244	198/218	220/220	284/362
22	257/311	217/217	177/193	242/256	200/210	202/202	370/370
23	275/275	153/173	179/193	222/230	208/218	196/196	296/306
24	254/260	171/185	179/181	228/236	200/200	212/226	304/374

(continued).

Sample	Genotype						
	CUPmo 1	CUPmo 2	CUPmo 3	CUPmo 4	CUPmo 6	CUPmo 7	CUPmo 9
25	257/311	165/165	179/179	220/240	204/206	228/228	296/326
26	233/233	177/183	183/183	238/240	204/234	176/176	308/318
27	245/245	153/165	181/203	206/236	192/216	230/230	312/328
28	233/251	167/183	179/195	206/226	188/188	194/194	304/322
29	257/284	177/195	177/177	240/246	194/200	186/186	304/312
30	254/257	169/177	191/197	236/238	166/166	192/192	326/354
31	317/317	157/181	185/185	230/250	178/206	192/196	306/314
32	248/248	165/185	181/213	222/240	176/202	182/182	312/372
33	257/257	165/173	147/175	222/224	216/232	216/216	306/322
34	263/302	213/217	135/181	240/240	170/198	184/184	326/372
35	260/260	153/153	169/185	242/244	180/210	196/196	-
36	230/233	169/177	173/177	242/242	176/212	192/192	306/308
37	257/302	173/179	177/193	210/210	206/206	172/172	-
38	224/254	165/165	173/187	242/244	178/200	220/220	300/316
39	251/254	153/203	173/175	230/246	218/218	186/186	-
40	242/272	165/173	199/199	224/242	166/198	182/182	-
41	245/266	151/167	187/189	232/242	200/210	186/186	292/298
42	251/263	177/177	179/189	232/240	214/214	202/216	-
43	251/257	165/169	191/197	230/242	202/202	-	316/318
44	236/317	165/201	171/197	232/238	182/218	182/182	324/380
45	248/257	167/207	185/191	240/250	176/212	232/232	306/322
46	239/254	175/209	187/205	230/246	210/216	216/216	-
47	281/281	177/177	177/177	230/240	206/206	-	312/328
48	239/278	161/167	179/223	212/242	206/206	232/232	296/302
49	242/252	153/163	179/179	240/240	184/184	186/216	-
50	269/281	177/185	179/179	210/236	176/176	202/202	-
51	266/269	153/217	175/175	236/240	206/220	-	-

**III Genotypes of *P. monodon* individual from Trad province at
CUPmo 11, 12, 13, 14, 15, 16 and 17 loci.**

	Genotype						
	CUPmo 11	CUPmo 12	CUPmo 13	CUPmo 14	CUPmo 15	CUPmo 16	CUPmo 17
1	138/162	83/89	277/283	275/281	279/345	229/232	405/429
2	147/156	89/89	283/283	275/275	300/345	229/232	297/342
3	141/150	89/99	274/283	275/275	309/351	-	297/336
4	147/150	89/93	271/289	275/279	303/345	229/229	-
5	144/147	91/93	283/310	281/281	300/336	229/229	297/324
6	138/150	83/99	-	-	342/345	229/229	345/345
7	135/147	93/97	283/289	277/281	324/345	229/232	-
8	144/153	91/95	286/292	279/279	-	232/232	420/420
9	147/147	-	283/283	277/277	318/342	229/229	339/360
10	135/147	89/95	283/292	-	300/336	229/229	405/429
11	144/144	83/93	286/298	277/279	336/336	-	297/342
12	138/156	93/97	283/292	275/275	345/345	229/232	297/336
13	150/156	89/95	277/295	277/279	279/315	229/232	339/339
14	147/147	95/95	-	281/281	270/300	226/232	297/390
15	135/147	93/93	289/295	279/279	336/345	223/229	345/345
16	138/144	91/105	283/289	275/275	-	229/229	336/396
17	135/147	-	283/295	279/279	315/324	226/226	-
18	141/147	83/91	286/292	281/281	309/327	-	342/351
19	144/147	93/93	283/295	275/275	279/318	226/229	324/447
20	138/138	89/93	292/298	277/279	-	229/229	321/342
21	141/150	93/97	283/298	275/279	270/342	229/232	378/378
22	147/147	89/89	-	275/275	318/318	229/229	429/429
23	144/156	91/91	286/295	275/279	309/294	229/232	-
24	141/147	83/91	-	275/279	267/336	229/229	330/396

(continued).

	Genotype						
	CUPmo 11	CUPmo 12	CUPmo 13	CUPmo 14	CUPmo 15	CUPmo 16	CUPmo 17
25	135/147	83/89	289/292	277/281	300/327	232/232	405/450
26	144/147	95/95	277/283	277/279	315/336	229/229	405/447
27	138/147	89/93	283/289	281/281	336/336	229/229	324/429
28	141/150	95/95	286/286	277/281	267/267	229/229	429/429
29	138/147	95/95	-	279/279	-	-	282/345
30	147/156	93/95	289/295	275/275	327/327	229/229	297/324
31	135/138	89/89	280/316	275/279	324/324	229/229	336/360
32	-	89/93	280/316	275/275	324/327	229/232	-
33	132/147	-	-	279/281	315/324	226/232	303/396
34	138/147	89/93	286/286	275/279	267/324	229/229	297/342
35	135/147	93/95	277/283	277/277	315/324	226/229	288/429
36	138/141	91/93	277/295	275/279	327/327	229/229	-
37	-	95/97	289/289	-	-	229/229	420/429
38	138/147	-	289/295	277/277	336/336	-	312/429
39	147/147	93/93	280/283	279/279	345/345	229/229	282/300
40	-	91/93	274/283	277/277	294/309	229/232	-
41	147/147	93/95	283/295	281/281	294/294	229/232	-
42	144/147	-	289/289	281/281	-	229/232	300/300
43	147/150	89/97	289/295	-	267/336	-	330/330
44	141/156	93/93	-	279/279	270/270	229/232	336/336
45	141/147	83/93	289/295	279/281	300/300	229/229	390/408
46	147/150	83/89	274/277	279/281	-	229/232	330/336
47	138/147	83/93	274/289	279/281	327/336	229/232	-
48	135/150	93/93	277/289	279/281	294/294	229/229	330/336
49	135/135	93/95	277/283	281/281	315/315	-	429/429
50	-	91/93	-	281/281	294/336	229/232	-
51	138/138	-	289/295	275/277	336/345	229/232	-

IV Genotypes of *P. monodon* individual from Trad province at
CUPmo 19, 20, 21, 22, 23, 24 and 25 loci.

	Genotype						
	CUPmo 19	CUPmo 20	CUPmo 21	CUPmo 22	CUPmo 23	CUPmo 24	CUPmo 25
1	333/345	182/182	233/236	218/220	311/323	338/353	255/279
2	321/324	206/206	230/236	230/236	311/315	332/332	265/279
3	315/315	202/206	233/236	224/234	-	332/335	265/281
4	321/333	200/200	236/236	232/236	311/319	-	279/279
5	-	198/210	236/239	230/232	303/311	353/356	265/265
6	315/339	214/216	236/236	-	311/311	338/338	271/279
7	315/336	204/216	236/236	234/236	311/323	-	267/279
8	315/315	202/216	233/236	188/236	315/315	338/350	265/279
9	321/321	210/214	236/236	232/234	311/319	359/359	265/277
10	321/324	200/202	236/236	218/218	-	338/359	273/273
11	306/321	214/220	236/239	232/240	299/311	338/359	267/277
12	315/324	-	233/236	230/232	307/311	335/347	269/281
13	318/318	-	233/239	232/256	315/323	338/365	-
14	303/315	206/210	236/236	-	311/311	335/362	279/279
15	315/318	198/202	236/236	-	303/307	-	267/279
16	309/318	210/212	230/236	238/240	-	350/368	-
17	321/345	202/214	236/236	218/228	315/315	338/341	265/265
18	321/321	194/200	-	238/254	311/319	338/353	277/277
19	318/324	174/210	236/239	228/230	311/323	-	271/279
20	318/321	206/210	236/236	242/258	311/311	338/338	265/281
21	309/315	176/208	236/239	224/238	-	338/356	267/281
22	315/321	176/216	230/239	-	307/311	338/347	267/279
23	-	-	-	234/236	-	338/347	267/279
24	312/336	200/204	236/236	232/234	315/315	338/338	261/281

(continued).

Sample	Genotype						
	CUPmo 19	CUPmo 20	CUPmo 21	CUPmo 22	CUPmo 23	CUPmo 24	CUPmo 25
25	312/345	196/198	233/236	186/252	315/315	-	265/281
26	303/318	186/186	236/236	230/232	307/311	338/338	265/281
27	312/312	174/174	236/236	212/214	-	338/338	279/279
28	312/336	170/172	236/236	242/248	311/311	338/347	253/273
29	-	192/194	236/239	184/230	307/307	338/365	273/279
30	321/300	168/168	236/236	218/238	303/311	-	271/277
31	306/315	184/184	236/239	192/238	-	353/356	-
32	303/303	164/174	-	234/248	303/311	338/338	267/279
33	306/315	160/160	236/239	-	311/311	347/353	271/279
34	333/336	-	236/236	-	311/315	356/368	265/281
35	306/333	-	233/233	246/256	311/315	338/338	251/281
36	-	174/190	236/236	238/240	311/323	-	267/281
37	336/336	172/174	230/239	232/236	303/307	338/338	265/265
38	315/321	156/174	230/236	238/240	-	335/335	-
39	312/321	192/194	230/239	190/226	311/315	338/338	265/277
40	312/312	174/174	-	-	311/315	-	265/277
41	330/336	166/166	236/236	232/256	311/323	338/350	265/279
42	312/324	-	236/239	232/256	311/311	338/338	265/279
43	312/318	162/162	236/239	222/236	315/315	350/350	265/279
44	303/306	158/158	236/239	188/238	311/311	338/347	-
45	324/351	172/172	236/236	-	311/315	-	265/279
46	321/324	178/178	236/236	188/214	-	338/359	267/281
47	330/336	202/216	236/236	216/240	311/311	-	271/277
48	327/327	214/220	-	-	-	335/356	265/279
49	315/315	206/210	233/239	232/232	311/311	356/362	-
50	-	-	239/239	-	-	-	261/281
51	333/345	196/198	236/236	-	307/311	338/353	267/279

BIOGRAPHY

Miss Siriporn Pongsomboon was born on January 22, 1971 in Chonburi. She graduated with the degree of Bachelor of Science from the Department of Medical Technology at Mahidol University in 1993. In 1997, she graduated with the degree of Master of Science from the Department of Biotechnology, Chulalongkorn University. She has further studied for the Doctor of philosophy (Ph.D.) degree in Biochemistry Department, Chulalongkorn University.