

# Phylogenetic analysis of cytochrome oxidase subunit 1 from the *Mesobuthus eupeus* (Scorpions: *Buthidae*) of Khuzestan province

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## Abstract

Ten Scorpion samples *Mesobuthus eupeus* were collected from Baghmalek region in the Khuzestan province of Iran before were identified by Razi Vaccine and Serum Research Institute reference laboratory of Ahvaz. Then, DNA was extracted by phenol/chloroform method in the Laboratory of Molecular Biology in the Faculty of Veterinary Medicine of Shahid Chamran University of Ahvaz. The molecular phylogenetic analysis of *Mesobuthus eupeus* is carried out based on sequence data of 623 nucleotides fragment of cytochrome C oxidase subunit I. The gene fragments were amplified by PCR using the specific forward and reverse primers. PCR products were fractionated by agarose gel electrophoresis prior to purifying using gel extraction kit. The purified DNA was sequenced by an Applied Biosystems DNA sequencer via Gene Fanavaran Company. In order to confirm the sequencing data, each gene fragment was sequenced in both directions. In order to compare the sequence data with the similar sequences from other scorpions, the target sequence data from different scorpions were retrieved from the Genbank using nblast program via NCBI website. Multiple alignments of the deduced amino acid sequence of cytochrome C oxidase subunit I exhibited 92 and 91% identity to the homologous *M. martensii* and *M. gibbosus*, respectively. The highest level of identity was scored with *M. eupeus philipsi* (93%). The results of phylogenetic analysis using cytochrome oxidase subunit 1 indicate that the sequence data of Khuzestan scorpion *Mesobuthus eupeus* is slightly different from *M. eupeus philipsi* gene. As regards of this discrepancy, it concluded that these two *Mesobuthus* species with highly similar morphological features possibly belonging to two different subspecies.

**Key words:** *Mesobuthus eupeus*, Scorpion, Phylogenetic, Cytochrome oxidase, Khuzestan

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## References

- Brown, W.M. (1985). The mitochondrial genome of animals. In: Molecular Evolutionary Genetics, R.J. MacIntyre (ed.). In press, New York, pp: 95-130.
- Dehghani, R.A.; Targari, S.; Vatandoust, H. and Zargan J. (2002) Evaluation of distribution of the scorpion *Mesobuthus eupeus* in Kashan. *Feyz*, 5 (4): 61-67.
- Farzanpay, R. (1987). Scorpion recognition. Publication Center for Academic Publishing, 231. (In Persian)
- Fet, V. (1994). Fauna and zoogeography of scorpions (*Arachnidae*: Scorpions) in Turkmenistan. In: Biogeography and Ecology of Turkmenistan, 525-534.
- Folmer, O.; Black, M.; Hoeh, W.L. and Vrijenhoek, R. (1994). DNA primers for amplification of mitochondrial cytochrome c oxidase subunit I from diverse metazoan invertebrates. *Molecular Marine Biology and Biotechnology*, 3 (5): 294-299.
- Gantenbein, B.; Largiader, C.R. and Scholl, A. (1999). Nuclear and mitochondrial gene variation of *Buthus occitanus* (Amoreux, 1789) across the Strait of Gibraltar. *Revue Suisse de Zoologie* 106: 760.
- Gantenbein, B. and Largiader, C.R. (2002). *Mesobuthus gibbosus* (Scorpiones: Buthidae) on the island of Rhodes: hybridization between Ulysses' stowaways and native scorpions. *Molecular ecology*, 11(5): 925-938.
- Gantenbein, B.; Fet, V. and Gromov, A.V. (2003). The first DNA phylogeny of four species of *Mesobuthus* (*Scorpiones*, *Buthidae*) from Eurasia. *The Journal of Arachnology*, 31 (3): 412-420.
- Habeeb, S.K.M. and Sanjayan, K.P. (2011). Sequencing and phylogenetic analysis of the mitochondrial cytochrome c oxidase subunit I of the *oxycareus laetus* (*hemiptera: lygaeidae*). *International journal of plant, animal and environmental science*, 1(3): 1-8.
- Kadkhodaie, M.; Hanifi, H. and Amoozegary, Z. (2006) Isolation and purification of toxic fractions from the venom of *Mesobuthus eupeus*. *Iranian South Medical Journal*, 9 (1): 9-19.
- Kovarik, F. (1997). Results of the Czech biological expedition to Iran. Part 2. Arachnida: Scorpiones, with descriptions of *Iranobuthus krali* gen. n. et sp. n. and *Hottentotta zagrosensis* sp. n. (Buthidae). *Acta Societatis Zoologicae Bohemicae*, 61:39-52.
- Martin, A.P. and Palumbi, S.R. (1993). Body size, metabolic rate, generation time, and the molecular clock. *Proc National Academy of Sciences*, 90 (9): 4087-4091.
- Mirshamsi, O.; Sari, A.; Elahi, E. and Hosseini, S. (2010). Phylogenetic relationships of *Mesobuthus eupeus* (C.L. (Koch, 1839) inferred from COI sequences (Scorpiones: Buthidae). *The Journal of Natural History*, 44 (47): 2851-2872.
- Mirshamsi, O. (2011). *Mesobuthus eupeus* (Scorpiones: Buthidae) from Iran: A polytypic species complex. *Zootaxa*, 2929: 1-21.
- Navidpour, S.; Kovarik, F.; Soleglad, M.E. and Fet, V. (2008). Scorpions of Iran (Arachnida, Scorpiones). Part I. Khoozestan Province. *Euscorpius*, 65: 3-43.
- Quek, S.P.; Davies, S.J.; Itino, T. and Pierce, N.E. (2004). Codiversification in an ant-plant mutualism: stem texture and the evolution of host use in *Crematogaster* (Formicidae: Myrmicinae) inhabitants of *Macaranga* (Euphorbiaceae). *Evolution* 58(3): 554-570.
- Towler, W.I.; Ponce, S.J.; Gantenbein, B. and Fet, V. (2001). Mitochondrial DNA reveals a divergent phylogeny in tropical *Centruroides* (Scorpiones: Buthidae) from Mexico. *Biogeographica*, 77(4): 157-122.
- Vignoli, V.; Kovarik, F. and Crucitti, P. (2003). Scorpiofauna of Kashan (Esfahan Province, Iran) (Arachnida: Scorpiones). *Euscorpius*, 9: 1-7.
- Xavier, F. (2011). Taq polymerase errors in PCR: Frequency and management. UMR Fruit Biology and Pathology, INRA and University of Bordeaux, Pp: 1-20.